ROCKLAND COUNTY
SOLID WASTE MANAGEMENT AUTHORITY
d/b/a
Rockland Green
172 Main Street
Nanuet, NY 10954

REQUEST FOR PROPOSALS

RFP 2026-02

Installation of Pre-Purchased Backup Power Generators

Hillburn Transfer Station

Hillburn Scale House

Bowline Transfer Station

February 24, 2026

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RECEIPT CONFIRMATION

[This form must be completed by each member of the Proposer team]

PLEASE COMPLETE AND RETURN THIS CONFIRMATION FORM WITHIN FIVE (5) BUSINESS DAYS OF RECEIVING THE RFP PACKAGE TO:

Ms. Dee Louis, Engineer II
Rockland Green
172 Main Street
Nanuet, NY 10954
Phone: (845) 753-2200 (Ext. 613)
Fax: (845) 753-2281
Email: dlouis@rocklandgreen.com
Failure to return this form may result in no further communication or addenda regarding this RFP.

Company Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Contact: _____

Phone Number: _____ Fax Number: _____

Email: _____

I have received a copy of the above noted Proposal.

_____ We will be submitting a Proposal (for RFP #2026-02)

_____ We will NOT be submitting a Proposal (please indicate reason)

I authorize Rockland Green to send further correspondence that Rockland Green deems to be of an urgent nature by the following method:

Courier Collect: _____ Mail: _____

Signature: _____

Title: _____

NOTICE TO PROPOSERS

RFP 2026-02

Installation of Pre-Purchased Backup Power Generators

NOTICE IS HEREBY GIVEN THAT Rockland Green is seeking proposals for the installation of two (2) pre-purchased 60 kW stationary electrical generators and automatic transfer switches and one (1) pre-purchased 70 kW trailer mounted electrical generator and manual transfer switch, including modified electrical services, at the Hillburn Municipal Solid Waste Transfer Station located at 50 Baler Boulevard, Hillburn, NY 10931; the Bowline Municipal Solid Waste Transfer Station located at 200 Beach Road, West Haverstraw, NY 10993; and, the Hillburn Transfer Station Scale House located at 250 Torne Valley Road, Hillburn, NY 10931. The Request for Proposal ("RFP") document # RFP 2026-02 may be obtained from the offices of Rockland Green located at 166 S. Route 303, West Nyack, NY 10994 between the hours of 9:00 AM and 4:00 PM, Monday through Friday, except holidays, on or after February 24, 2026.

A pre-proposal meeting and site visit is scheduled for March 10, 2026, at 10:00 AM beginning at the Hillburn Transfer Station. Attendance is mandatory. Contact Dee Louis, Engineer II, at (845) 753-2200 ext. 613 for details.

Sealed proposals will be received by Rockland Green until March 31, 2026 at 2:00 p.m. local time, in the offices of Rockland Green, located at 166 South Route 303 West Nyack, NY 10994. Any proposals not delivered in person should be mailed to: Dee Louis, Engineer II, Rockland Green, 166 South Route 303 West Nyack, NY 10994. All proposals shall be submitted in sealed envelopes and shall be plainly marked on the outside with the statement "RFP 2026-02" with the Proposer's name and the title of the RFP. The attention of the Proposers is directed to the applicable federal, state, and local law requirements and to the "Affidavit of Non-Collusion" in the proposal forms. Rockland Green encourages the fullest possible utilization of minority and women's business enterprises (M/WBE's).

By order of Rockland Green

172 Main Street

Nanuet, New York 10954

By: Gerard M. Damiani, Jr., Executive Director

I. PURPOSE OF RFP

Rockland Green is issuing this Request for Proposals ("RFP") to companies who are interested in providing the services described herein.

II. BACKGROUND

Rockland Green is a public benefit corporation organized and existing under the laws of the State of New York. Rockland Green's purpose, as reflected in its mission statement, is to "develop the education, programs, and technology to lead the waste prevention, recovery, responsible disposal movement, and animal management services in Rockland County." Rockland Green owns multiple waste management and recycling facilities that handle various types of waste streams. Municipal Solid Waste is managed using three separate transfer stations consisting of the Hillburn Transfer Station, the Bowline Transfer Station, and the West Nyack (Clarkstown) Transfer Station. All facilities are located within the County of Rockland but in three separate towns.

The transfer stations are used by commercial haulers and residents as convenient local disposal points for municipal solid waste (MSW), construction & demolition debris (C&D), and some recyclable products. The delivered waste products are loaded into larger transport vehicles and sent to an out-of-county private landfill or local recycling processing facilities. Given the daily waste disposal needs in the county, it is essential that these facilities remain operational with minimal disruption to public service. To further secure uninterrupted operations, Rockland Green has initiated a program to install backup power generation at key facilities.

III. SCOPE OF SERVICES SUMMARY

Rockland Green's objective is to enter into a contract with the selected Proposer to provide the following services:

1. Furnish and install new concrete slabs on grade for each of the new 60kW stationary generators (Hillburn and Bowline).
2. Install two new Owner-purchased 60 kW generators and Owner-purchased Automatic Transfer Switches (ATS) as shown on the contract drawings and in accordance with the

technical specifications. A copy of the description of the generator and ATS purchased from Cummins is included as Attachment F.

3. Install one Owner-purchased 70 kW trailer mounted generator and Owner-purchased Manual Transfer Switch (MTS). A copy of the description of the generator and MTS purchased from Cummins is included as Attachment F.
4. Furnish and install all conduits, conductors, electrical connections, panelboards, safety switches, for a complete installation in accordance with the drawings and specifications.
5. Proposers are advised that construction activities will be performed while Transfer Station operations continue. Proposer shall be responsible for maintaining continuous power to the facilities using portable generators as described on the drawings (supplied by the Proposer).
6. Provide uninterrupted power (24/7) at each site while completing power tie-in and when power to the facilities must be temporarily interrupted.
7. For the Bowline Transfer Station, the Proposer may initiate and complete the new service point of entry, the new service, installation of the new generator, and related electrical work prior to switchover from the existing panels. During switchover, temporary backup power shall be provided to the facility. However, Proposers shall be advised that all demobilization and remobilization costs shall be included in the Proposers Price Proposal for each lump sum price.
8. Complete all site restoration as required around concrete pad excavations, along excavated trenches, in paved areas, and within existing buildings.

All work shall be completed in accordance with the plans and specifications included with this RFP 2026-02.

Proposers must identify on Business Proposal Form 3, any and all of the exceptions taken to the scope of services, or any other aspect of the requirements stated in this RFP. Failure to identify such exceptions in the proposal may result in Rockland Green's rejection of the proposal.

IV. PROCUREMENT SCHEDULE

Issuance of RFP(1)	February 24, 2026
Pre-Proposal Site Visit(2)	March 10, 2026
Deadline for Clarification Questions from Proposers	March 17, 2026
Rockland Green Response to Clarification Questions	March 24, 2026
Deadline for Submittals	March 31, 2026
Award of Contract	April 21, 2026

(1) Within five (5) business days following the receipt of the RFP package, the Receipt Confirmation Form found at the front of this RFP must be completed and returned to Rockland Green as indicated thereon.

(2) Pre-Proposal site visit will be held at 10:00 am. at the Hillburn Transfer Station located at 50 Baler Blvd, Hillburn, NY 10931.

(3) Proposals are due no later than 2:00 p.m. on the Proposal due date. One (1) original and three (3) hard copies of each Proposal shall be submitted in a single envelope, bearing on the outside the name of the Proposer and the name of the procurement.

V. CONSTRUCTION SCHEDULE

Time is of the essence for completion of construction activities. It is Rockland Green's intent to maintain a full level of service (ongoing operations) at the Transfer Stations and Scale House during the active construction period and access to these facilities will be shared. Coordination will be necessary for some work activities which may include vehicle routing and truck scale access. Coordination with Rockland Green is expected to ensure that transfer station operations will not be disrupted.

Rockland Green anticipates that the generators and transfer switches will be delivered to the site on or about June 8, 2026. Rockland Green will advise Proposers of any changes to the delivery schedule as it is provided by Cummins. Proposers shall complete all work activities that can be done in advance of the delivery of the generators and anticipate a return visit to the site to complete installation of the generators and related electrical system connections. All

work shall be included with the Proposer's price, and no additional compensation will be allowed for remobilization to the site to install the generator.

Construction activities shall not begin until Proposer has completed or received the following:

1. A fully executed Contract, including all required forms, bonds, and proof of insurance.
2. A written Notice to Proceed from Rockland Green that will formally establish contract dates based on the specified contract duration periods noted below, with initiation from the date of Notice to Proceed to establish the date for Substantial Completion.
3. Submittal of a Construction Progress Schedule as described in the specifications, including expected delivery time for electrical accessories with greater than a two week delivery time.
4. Submittal of a written Schedule of Values(s) for all lump sum price item.
5. Submittal of a written schedule (tabular list) for all shop drawing submittals, including prioritization of key submittals where rapid review(s) are requested.
6. Written receipt of all shop drawing approvals from the Authority's Engineer.
7. Delivery of all equipment and other temporary facilities associated with mobilization of work crews.

Once Rockland Green is satisfied that the above conditions have been met, Rockland Green will issue a written **Notice to Commence Work** that will initiate construction activities. The Contract dates will be established as follows:

Notice of Award	April 22, 2026
Contract Date (Contract Execution)	Within 14 Calendar Days of Notice of Award
Notice to Proceed	Within 5 Calendar Days of Contract Date
Date of Substantial Completion	90 Calendar Days from Notice to Proceed Date
Date of Final Completion	30 Calendar Days from Date of Substantial Completion

If Proposer believes there will be a delay in delivery of some materials or equipment, they shall immediately inform Rockland Green in writing documenting reasons for the delay. Shipping delays will not automatically be a justification for a modification to the contract times.

VI. QUESTIONS

All questions concerning this RFP must be submitted in writing by the deadline in the schedule above, to Dee Louis at dlouis@rocklandgreen.com. Rockland Green will respond to all questions submitted prior to the deadline set forth above.

VII. PROPOSAL SUBMISSION REQUIREMENTS

This section contains instructions regarding the required content and organization of the Proposals. All Proposers must provide all required information in the order set forth below. Rockland Green reserves the right to add or delete specific items from the final award or to negotiate modifications to specific items prior to such award.

Proposals must be received by the deadline in the schedule above. Proposals received after the deadline will be late and ineligible for consideration. Each proposal shall be prepared simply and economically avoiding the use of elaborate promotional materials beyond those sufficient to provide a complete, accurate, and reliable presentation. Rockland Green is not interested in receiving marketing brochures, generic narratives, or laundry lists of unrelated experience in the response.

One (1) original and three (3) copies of the proposal shall be submitted. One copy must be clearly marked “original” and must contain all original executed copies. Late proposals will be considered non-responsive and may be returned to the Proposer unopened. NO PROPOSAL will be accepted unless filed on or before the date and at the place designated herein. When sent by mail, the sealed Proposal, marked as above, shall be enclosed in an additional envelope similarly marked and addressed to the person stipulated in the Notice to Proposers. Proposals received prior to the time of opening will be securely kept unopened. Proposals received thereafter will be returned unopened.

All hard copy submittals must be delivered by-hand, regular mail or by a nationally recognized express mail carrier to Rockland Green at the address listed below. The package or box must be clearly marked on the outside with the proposer’s name and the statement “Response to RFP-2026-02 Enclosed”. The response shall be typed or printed on 8-1/2 inch by 11-inch paper, with a minimum font size of 12.

Proposals shall be submitted with the Proposal Forms set forth in this RFP. All blank spaces for Proposal prices shall be properly filled in, in ink, or typed, in both words and figures. In case of any price shown in words and its equivalent shown in figures do not agree, the written words shall be binding on the Proposer. All Proposal Forms included in this RFP must be completed and submitted with all blank spaces for Proposal prices filled in with the Proposal amount in order to be considered a responsible Proposer.

All submittals become the property of Rockland Green and will not be returned.

VIII. STATEMENT OF RIGHTS AND GENERAL PROCUREMENT CONDITIONS

This RFP constitutes only an invitation to provide a proposal to Rockland Green. This section describes Rockland Green's responsibilities, rights, and options as they relate to various business, legal, and financial aspects of the procurement. Rockland Green reserves, holds and may at its sole discretion, exercise the following rights and options with respect to this RFP. By responding to this RFP, proposers acknowledge and consent to the following conditions relative to the RFP process.

1. This RFP does not obligate Rockland Green to contract for any services whatsoever.
2. All costs incurred by a proposer in connection with responding to this RFP, the evaluation and selection process, and any negotiations entered into with Rockland Green will be borne by the proposer, and with the express understanding that no claim can be made for reimbursement from Rockland Green for any associated costs.
3. Rockland Green has the right to cancel this RFP without issuing another RFP.
4. Rockland Green reserves the right to select and enter into negotiations with the proposer(s) who best satisfies the interests of Rockland Green and is most responsive to the RFP, and not necessarily on the basis of price or any other single factor.
5. Any and all responses not received by the deadline for receipt of proposals may be rejected and returned unopened in Rockland Green's sole discretion.

6. Rockland Green may select and enter into negotiations with one or more, or none of the proposers whose response best satisfies the interests of Rockland Green and to discontinue and resume such negotiations at any time prior to execution of an agreement.
7. Rockland Green reserves the right to determine in Rockland Green's sole discretion which, if any, proposers are responsive and deemed qualified, and at any time to determine that any or all proposers will not be selected for further consideration.
8. Rockland Green reserves the right to eliminate any proposer who submits an incomplete and inadequate response or is not responsive to the requirements of this RFP.
9. Rockland Green may reject non responsive submissions without evaluation, but also has the right, in its sole discretion, to waive any technicalities, immaterial irregularities or minor noncompliance.
10. Rockland Green reserves the right to reject, for any reason, any and all proposals and components thereof and to eliminate any and all proposers responding to the RFP from further consideration for this procurement.
11. Rockland Green reserves the right to issue additional requests and/or amendments to this RFP and to cancel this RFP at any time.
12. Rockland Green reserves the right to conduct investigations of the proposers and their responses to this RFP and to request additional evidence to support the information included in any such response.
13. Rockland Green reserves the right to conduct interviews with representatives from proposers.
14. Rockland Green reserves the right to conduct clarification discussions, at any time, with one or more proposers, request additional information, and to receive questions from proposers and provide answers as it deems appropriate.
15. Rockland Green reserves the right to modify deadlines.
16. Rockland Green reserves the right to enter into agreements for only portions of the services contemplated by the responses submitted or not to enter into any agreement[s].

17. Neither Rockland Green, its staff, its representative, nor any of its consultants will be liable for any claims or damages resulting from the solicitation, collection, review, or evaluations of responses to this RFP.
18. Rockland Green reserves the right to enter into concurrent or sequential negotiations with two (2) or more proposers.
19. No contract awarded by Rockland Green shall be binding and valid until fully executed by the parties.
20. Rockland Green reserves the right to designate, at any time, one (1) or more proposers with whom it may select to have a full evaluation of their proposal.
21. If a site visit is required, Rockland Green reserves the right to waive the site visit on a case-by case basis.
22. The proposals will constitute formal offers to Rockland Green that are binding on the proposer for 180 calendar days from the submittal date of the proposal.

Minority and Women's Business Enterprises

Rockland Green encourages the fullest possible utilization of Minority and Women Owned Business Enterprises.

Authority to Do Business in New York

Any entity formed under the laws of the State of New York must provide a certificate of good standing from the New York Secretary of State, and any entity not formed under the laws of the State of New York must provide a certificate of authority from the New York State Secretary of

State to do business in New York in accordance with Article 13 of the New York Business Corporation Law.

No Discrimination

The proposers shall not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, sexual orientation, age, disability, military status,

predisposing genetic characteristics, or marital status and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination.

Confidentiality

The New York State Freedom of Information Law, Public Officers Law, Article 6, Sections 84-90 provides for public access to government records. However, proposals may contain trade secrets and other technical, financial, or administrative data whose public disclosure could cause substantial injury to the proposer's competitive position. Proposers must clearly indicate whether there are portions of their proposals that contain trade secrets and other technical, financial, or administrative data whose public disclosure could cause substantial injury to the proposer's competitive positions. Accordingly, to protect the proposer from release of this sensitive information under the State Freedom of Information Law, the proposer should specifically identify and mark the pages of its submittal(s) that contain such information and insert the following notice in the front of its submittal:

Notice

The data on pages [_____] of this proposal identified by an asterisk (*) contain technical or financial information, which are trade secrets and/or whose disclosure would cause substantial injury to the proposer's competitive position. The proposer requests that such data be used only for the evaluation of the proposal but understands that the disclosure will be limited to the extent that Rockland Green considers proper under the law. If

an Agreement is entered into with this proposer, Rockland Green shall have the right to use or disclose the data, as provided in the Agreement, unless otherwise obligated by law.

Rockland Green does not assume any responsibility for disclosure or use of marked data for any purpose. In the event properly marked data are requested, pursuant to the State Freedom of Information Law, the proposer will be advised of the request and may expeditiously submit to

Rockland Green a detailed statement indicating the reasons it has for believing that the information is exempt from disclosure under the law. This statement will be used by Rockland Green in making its determination as to whether disclosure is proper under the law.

Correction, Modification, or Withdrawal of Proposal

A proposer may correct, modify, or withdraw a proposal by written notice received by Rockland Green prior to the time and date set for the receipt of proposals. For any proposals received by Rockland Green, Rockland Green may elect to waive minor informalities or may elect to allow the proposer to correct them.

Record of Proposals

All proposals are the property of Rockland Green and will not be returned. Rockland Green will use its best efforts to prevent the unauthorized disclosure of proprietary information, provided same is properly identified in accordance with this RFP. In no event will Rockland Green assume liability for any loss, damage, or injury, which may result from any disclosure or use of marked data within proposals.

Security Bond

A security bond or certified check in the amount of 5% of the proposed price made payable to Rockland Green must accompany the proposal. The bond shall provide that prior to the expiration or termination of the bond, the proposer shall (1) if so, requested by Rockland Green, negotiate an agreement with Rockland Green, and (2) if Rockland Green selects the proposer's proposal as the most advantageous proposal, enter into a contract. If the proposer fails to comply with the above, the surety will pay to Rockland Green, as liquidated damages, the full amount of the security bond or, as applicable; the certified check shall become the property of Rockland Green and be deposited in Rockland Green's accounts.

Any security bond must be valid for at least 180 days from the proposal submission date. If the contract has not been executed prior to the expiration of the security bond, Rockland Green may

require the renewal of the security bond for an additional 180 days. No proposal will be considered unless it is accompanied by the required certified check or security bond. The form of the Security Bond and Surety Letter of Intent, which must be submitted, is described in Business Proposal Form 5.

The certified check or security bond submitted by a proposer will be returned within ten (10) business days after the earliest to occur of (1) the rejection of the proposal of such proposer by Rockland Green and (2) the execution of the contract by and between Rockland Green and the selected proposer.

Labor and Materials Payment Bond

A Labor and Materials Payment Bond shall be provided to Rockland Green for 100% of the value of the work and in accordance with "Business Proposal Form 5" in Appendix A.

Independent and Separate Prices

Where separate prices are required by this RFP for specific services, such prices are understood to be independent and separable. Accordingly, elimination or modification by Rockland Green of any portion of the proposed scope of services should not affect the price proposed for any other portion of the scope of services. Rockland Green will reserve the right after contract award to modify the scope of services within the limits of applicable law.

Sales Tax

The New York State Tax Law exempts from sales and use taxes, imposed under Article 28 and pursuant to Article 29 thereof, the sale or use of tangible property incorporated in structures, buildings, or real property owned by an exempt organization. Rockland Green is an exempt organization, and therefore, proposers should not include sales and use tax in their proposals.

Insurance

Proposer shall possess or be able to obtain all insurance such as, Professional Liability Insurance, Commercial General Liability/Auto, and Workmen's Compensation Insurance, and other types of coverage, as indicated in the Insurance Requirements found in Appendix B to this RFP

Labor, Wages, and Equal Employment Opportunity.

Proposer will be expected to be familiar with and to comply with all Federal, State, and local labor laws, rules, regulations, ordinances, and executive orders, including without limitation, requirements for minimum wages, prevailing wages and benefits, workmen's compensation, and equal employment opportunity.

Affirmative Action.

Proposer must also agree to comply with the affirmative action requirements of County Resolution 471 of 1975 if the proposer (1) employs a minimum of fifteen (15) employees and (2) does a minimum of fifty thousand dollars ($50,000) per annum business with Rockland County. See Business Proposal Form 8.

IX. DETAILED SCOPE OF SERVICES

Complete all work in accordance with the plans and specifications included with this RFP 2026-02 .

X. QUALIFICATIONS AND EXPERIENCE

Proposers must provide the following information for the Proposer**:**

- A summary of your company's experience in providing the services requested herein.
- A list projects of a similar nature and scope completed by the proposer in the past 5 years (minimum of 3 projects).
- Contact information for listed references, including project size, completion date, and any other relevant details for completed projects.

- The name of the Project Superintendent and Project Foreman assigned to be on site and their related experience. Experience of other key personnel may be requested by Rockland Green as part of the evaluation process.
- Upon request by Rockland Green, provide additional information related to qualifications to clarify or supplement the qualifications information requested in Appendix A of this RFP.
- Financial Information
- Evidence of Authorization to conduct business in the State.
- Evidence that demonstrates the ability to obtain the required insurance set forth herein.

XI. COMPENSATION

The selected Proposer shall invoice Rockland Green on or before the tenth (10^{th}) calendar day of each month after commencement of services, but no more frequently than once monthly. The selected Proposer may submit a payment request for the period ending the last calendar day of the previous month. Payment Request shall be in such format and include whatever supporting information as may be reasonably required by the Engineer. In its Payment Request, the selected Proposer may request payment for ninety percent (90%) of that portion of the Contract Price allocable to the Contract Services that have been properly provided, including labor, materials and equipment properly incorporated in the Work, and materials or equipment necessary for the Work and properly stored at the

Project Site (or elsewhere if offsite storage is approved in writing by the Engineer), less the total amount of previous payments received from Rockland Green

Proposers must complete the price proposal form attached as Price Proposal Form 1.

XII. CONTENTS OF PROPOSALS

Proposers are required to submit with their proposals <u>all</u> the information, documentation, and Forms requested in this RFP. The proposal must be organized as follows; details on each of the items below are provided after this section:

(i) Cover Letter and Security Bond

(ii) Acknowledgement of responsiveness to this request for proposal (in cover letter), including the following.

a. The Proposer has reviewed and fully understands the scope of work, sequencing of work, and timing for the project.

b. The proposer has provided the requested information relative to qualifications and experience.

(iii) Qualifications and Experience

(iv) General Requirements

(v) Proposal Forms

(vi) Evidence of Proposer's ability to obtain the required insurance, if selected.

(vii) All comments, if any, to the draft Agreement, included with this RFP, if any

(viii) Evidence of Proposer's ability to obtain the required Labor and Material Bond, if selected.

(ix) A certificate of good standing or authority from the New York State Secretary of State to do business in New York in accordance with Article 13 of the New York Business Corporation Law.

The Proposal Cover Letter is the proposer's official letter transmitting the complete proposal to Rockland Green. The format required for the Proposal Cover Letter is provided in Table 10-1 below. The letter is to be written in text form and is not to exceed three (3) pages, typed, and double-spaced. Since the Proposal Cover Letter introduces the proposer to Rockland Green, it should clearly and concisely summarize the proposal. This letter is to be typed on the proposer's letterhead and is to be signed by the Proposer's Chief Executive Officer ("CEO") and attested by another officer of the proposer. If the proposer is a joint venture, the CEO of the lead or sponsoring proposer is to sign the letter.

Table 10-1

FORMAT OF PROPOSAL COVER LETTER

A. Addressee	Dee Louis, Engineer II Rockland Green 172 Main Street Nanuet, New York 10954
B. Content of Letter	First Paragraph:
	• Name of Proposer (or Proposers, if joint venture) submitting the Proposal. • If a joint venture, the name of the lead or sponsoring Proposer. • Confirm that the signatory is authorized to make the Proposal. Second Paragraph:
	• Response to the requirement for a Security Bond, which must be enclosed. Third Paragraph:
	• A brief description of the Proposer(s). • Summarize qualifications of the Proposer(s). • Commitment of the Proposer(s) to deliver the services required in the Request for Proposals and described in the attached Proposal and at the prices quoted in the Proposal. Fourth Paragraph:
	• Commitment of the Proposer to enter into an Agreement with Rockland Green at the prices stated in the Proposal. Fifth Paragraph:
	• Acknowledgement of responsiveness to the Request For Proposals Very truly yours, President/CEO Attachment: Security Bond or certified check Certificates of Insurance Surety Statement for Labor & Material Bond Certificate New York Secretary of State

(i) Scope of Services

Proposers must address all aspects of the scope of services described in this RFP. The proposer must acknowledge an understanding of and a commitment to meeting all the responsibilities and obligations stated in this RFP.

(ii) Qualifications and Experience

a. Qualifications.

The proposer must demonstrate qualifications consistent with the minimum qualifications described in Section X of this RFP.

b. Experience.

The proposer must demonstrate experience consistent with the requirements described in Section X of this RFP.

(iii) Proposal Forms

All proposals must include at least one (1) complete set of Business, Price, and Technical Proposal Forms, as applicable, completed by the proposer.

XIII. PROPOSAL EVALUATION

This section describes Rockland Green's proposal evaluation process and criteria. Rockland Green will evaluate the net total and net present value costs of each proposal and the proposer's ability and willingness to meet all of the proposer's responsibilities. Each section of a proposal will be evaluated in terms of the commitments made, the completeness and the reliability of the approach taken, and conformance with the requirements and the instructions provided in this RFP. A proposer's failure to adequately respond to all of the technical and pricing requirements in this RFP, to accurately complete the Proposal Forms, to disclose violations of applicable laws, codes or regulations, or to provide other business-related information required in the RFP, shall be grounds to deem a proposal as non-responsive.

Selection will not be solely based on the lowest cost, although cost will be a factor in the evaluation process.

After evaluating the proposals, Rockland Green may short-list proposers for interviews and enter into contract negotiations with one (1) or more proposers who meet(s) Rockland

Green's evaluation criteria and whose proposals are regarded as most advantageous to Rockland Green.

a. Evaluation Team

The proposal evaluation and selection process described in this Section will be conducted by an evaluation team led by Rockland Green. The team may consist of personnel from Rockland Green and its technical, legal, and financial consultants. The team will review and evaluate proposals and select one (1) or more proposers with whom Rockland Green will conduct negotiations.

b. Cost Evaluation

The Price Proposal will be evaluated on the basis of the fees proposed by the proposer in all Proposal Forms. Proposers are strongly advised to submit pricing wholly consistent with the RFP, then to clearly delineate any caveats or exceptions to baseline pricing.

c. Requests for Clarification

Once proposals have been reviewed, Rockland Green may request that the proposer submit additional information or clarify certain aspects of the proposal.

d. Proposal Interviews

After proposals have been evaluated according to the process described above, the evaluation team may choose to meet with and interview the proposers who submitted the most advantageous proposal(s). Following the interviews, Rockland Green may select the proposer(s) with whom to conduct contract negotiations.

APPENDIX A

PROPOSAL FORMS

BUSINESS PROPOSAL FORM 1

SIGNATURE PAGE

To Rockland Green: The Proposer, in compliance with your Request for Proposals for [___ _____], having examined the Request for Proposals and being familiar with all conditions surrounding the project , hereby proposes to furnish all labor, equipment, materials and supplies necessary to meet the obligations of the proposal in accordance with the solicitation, within the time and prices set forth therein.

Proposer understands that Rockland Green reserves the right to reject any or all proposals and to accept any item or items in any one proposal and to waive any informalities in the RFP process.

Respectfully Submitted:

_____
Printed Name / Signature

_____
Date

_____
Title

_____
Business Address

(Seal, if corporation)

BUSINESS PROPOSAL FORM 2

ADDENDA ACKNOWLEDGEMENT FORM

The undersigned hereby acknowledges receipt of the following Addenda (if any) to the Request for Proposals for **Installation of Three (3) Pre-Purchased Back-Up Power Generators, RFP-2026-02:**

Addendum No.	Date
_____	_____
_____	_____
_____	_____
_____	_____

Person, firm, or corporation submitting this Proposal:

_____
Contractor

_____
Signature

_____
Title

_____
Date

BUSINESS PROPOSAL FORM 3

EXCEPTIONS TAKEN TO THIS REQUEST FOR PROPOSALS

____ No exceptions taken.

____ Exceptions taken (please provide cross references, as shown below):

Request for Proposal Page _____, Section _____

Exception taken: _____

_____

_____

_____
Printed Name / Signature

_____
Title

_____
Date

BUSINESS PROPOSAL FORM 4

FORM OF SECURITY BOND

KNOW ALL MEN BY THESE PRESENT, that we [NAME OF PROPOSER], as Principal (hereinafter the "Proposer") and [NAME OF SURETY], a [Corporation],[Partnership] duly organized under the laws of the State of _____, as Surety, are held and firmly bound unto Rockland Green as Obligee, in the sum of [_____] ($[
]) lawful money of the United States of America to be paid to Rockland Green, its successors or assigns, for which payment, well and truly to be made, we bind ourselves, our successors and assigns, jointly and severally, firmly by these present, and

WHEREAS, the above-named Proposer has submitted or is about to submit to Rockland Green a proposal to provide [_____] as described in the Request for Proposals (RFP [ ]), dated [_____](the "RFP"), issued by Rockland Green and covered by the Proposal submitted by the Proposer in response thereto, which Proposal is made a part hereof.

NOW THEREFORE, the Surety hereby understands that if the above-referenced Proposer is selected by Rockland Green as the most advantageous Proposer, then the Proposer will enter into an Agreement based on its proposal within the time specified in the RFP or any extension thereof agreed to in writing by Rockland Green. Surety hereby agrees that if the Proposer shall fail to do so, Surety will pay to Rockland Green, as liquidated damages, the full amount of this Bond within thirty (30) calendar days after receipt by the Proposer and Surety of written notice of such failure from Rockland Green, which notice shall be given with reasonable promptness, identifying this Bond, and including a statement of the amount due. Upon execution of the Agreement, this Bond shall thereafter become null and void, otherwise to remain in full force and effect unless terminated as hereinafter provided.

It is agreed that this Bond shall become effective on the date the Proposal is submitted and will continue in full force and effect for three hundred sixty-five (365) days from such date of submittal (unless extended for up to an additional three hundred sixty-five (365)) or until terminated, as hereinafter provided.

If the Proposal is not accepted within the time specified in the RFP, or any extension thereof agreed to in writing by Rockland Green, then after written notice by Rockland Green of such non-acceptance, this Bond may be terminated by the Surety or Proposer upon written notice to each other and to Rockland Green by registered mail at least ten (10) days prior to the termination date specified in such notice. Upon the giving of such notice, Surety shall be discharged from all liability under this Bond for any act or omission of the Proposer occurring after the date of the notice of non-acceptance.

Any suit or action under this bond shall be commenced only in a court of competent jurisdiction located in the State of New York.

IN WITNESS WHEREOF, Surety and Proposer, intending to be legally bound hereby, do each cause this Security bond to be duly executed on its behalf by its authorized officers, agent or representative.

Signed and sealed this _____day of _____, _____.

SURETY	PROPOSER
[NAME OF SURETY]	[NAME OF CONTRACTOR]
Name:_____	Name:_____
Signature:_____	Signature:_____
Title:_____	Title:_____

BUSINESS PROPOSAL FORM 5

FORM OF

LABOR AND MATERIALS PAYMENT BOND

Bond No. _____

KNOW ALL MEN BY THESE PRESENT, that we [ ] with a place of business at as principal (the "Principal"), and [ ], a [ ] qualified to do business in the State of New York, with a place of business at [ ] as Surety (the "Surety"), are held and firmly bound unto Rockland Green as Obligee (the "Obligee"), in the sum of [Dollars ($)] lawful money of the United States of America, to be paid to the Obligee, for which payment, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, the Principal has assumed and made a contract with the Obligee, bearing the date of [ ], and entitled the [ ] (the "Contract").

NOW, THE CONDITIONS of this obligation are such that if the Principal and all Subcontractors under said Contract shall promptly pay for all labor performed or furnished and for all materials used or employed in said Contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said Contract that may hereafter be made, notice to the Surety of such modifications, alterations, extensions of time, changes or additions being hereby waived, then this obligation shall become null and void; otherwise, it shall remain in full force and virtue.

The Surety's obligation to the Obligee under this Bond shall arise after the Obligee provides notice to the Principal and Surety of claims, demands, liens or suits against the Obligee or the Obligee's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Contract.

The Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Obligee against any duly tendered claim, demand, lien or suit against the Obligee or the Obligee's property.

IN WITNESS WHEREFORE, the Principal and Surety have hereto set their hands and seals this _____ day of _____, 2021.

PRINCIPAL	SURETY
_____	_____
_____	_____
[Name and Seal]	[Name and Seal]
_____	_____
[Title]	[Title]
_____	_____
[Address]	[Address]
_____	_____
[Phone]	[Phone]
Attest:_____	Attest:_____

The rate of the Bond is _____% of the first $_____ and _____% for the next $_____. The total premium for this Bond is $_____.

BUSINESS PROPOSAL FORM 6

CONTRACTOR QUALIFICATIONS

This form must be completed by each member of Proposer team.

(Section C must be signed before a Notary Public)

A. General Information

1. ***Firm: _____

2. Address: _____

3. Telephone: _____

4. Contact Person: _____

5. Type of Organization (e.g., a corporation; joint venture; partnership; and individual):

_____

6. Name of Parent Company, if any: _____

7. Name of Affiliate Companies, if any: _____

8. ***Identity of Joint Venture Partners, if any: _____

9. Financial References: _____

10. New York Surety: _____

11. Signature of person duly authorized to submit on behalf of the Proposer

_____
Signature

_____
Title

***** Referred to in Proposal Forms individually and collectively as "Proposer." Information requested must be provided with respect to each party to the Proposal.

BUSINESS PROPOSAL FORM 6 (Continued)

CONTRACTOR QUALIFICATIONS

B. Business Information

1. Brief history of Proposer(s) involved in the Proposal (attach additional sheets as necessary):

   _____

   _____

2. Name and address of all partners, key shareholders, principals and/or owners:

   _____

   _____

3. Has Proposer ever failed to complete any contract awarded to it? _____

4. If so, where and why: _____

   _____

5. Has any officer or partner of Proposer ever been an officer or partner of some other organization that failed to complete a contract? _____

   _____

6. If yes to #5, state name of individual, other organization, reason, and bonding company: _____

   _____

7. In what other lines of business is Proposer directly or indirectly involved? _____

   _____

8. With what individual or entities have you been associated as partner or otherwise during the past five (5) years?

   _____

BUSINESS PROPOSAL FORM 6 (Continued)

CONTRACTOR QUALIFICATIONS

9. Describe the principal and any secondary nature of your current business: _____

_____

_____

10. State the length of time you have been in that business under your present name and identify all other names under which you have done business: _____

_____

11. Has any individual, partner, shareholder, principal, owner or affiliate of your firm been the subject of administrative or judicial action for an alleged violation of environmental or public health laws or regulations? If so state the details and disposition. _____

_____

_____

12. Are you, your partners, joint venturers, parent corporation or subsidiaries a party to any legal actions that may affect your ability to perform the obligations described in your Proposal? If so, identify these actions: _____

_____

13. Have you, any partner, key shareholder, principal, owner or affiliate of your firm been the subject of any criminal conviction(s) indictment(s) or investigation(s)? If so, state the details:

_____

_____

14. Are you, your partners, joint venturers, parent company or subsidiaries a party to or subject to any threatened or pending litigation, either civil or criminal? If so state the details: _____

_____

BUSINESS PROPOSAL FORM 6 (Continued)

CONTRACTOR QUALIFICATIONS

15. List any and all civil penalties, judgments, consent decrees or other sanctions within the last five (5) years, as a result of a violation of any law, rule, regulation or ordinance in connection with its business activities, by the Proposer, any affiliate of the Proposer, or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

16. List any and all current investigations, indictments or pending litigation by any Federal, State or local jurisdiction of the Proposer, any affiliate of the Proposer or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

17. List any and all actions occurring within the last five (5) years which have resulted in revocation or suspension of any permit or authority to do business in any Federal, State or local jurisdiction, by the Proposer, any affiliate of the Proposer, or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

18. List any and all actions occurring in the past five (5) years that have resulted in the barring from public bidding by the Proposer, any affiliate of the Proposer, or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

19. List any bankruptcy proceedings in the past five (5) years by the Proposer, any affiliate of the Proposer, or any shareholder, officer or director of the Proposer or any affiliate thereof. _____

_____

20. List the names, addresses, and telephone numbers, and contact name of municipalities or other organizations, which have utilized your services:

_____

_____

21. List the names, addresses and telephone numbers, and contact name of municipalities for whom you have provided services of the same nature as those contemplated in this RFP:

_____

_____

22. Please attach a description of the services you provide(d) for each reference municipality, including the term of your agreement with each such municipality:

_____

23. For the past three (3) years, have any of the reference projects in this RFP been the subject of administrative or judicial action for an alleged violation of environmental or public health laws or regulations? If so, state the details and disposition: _____

_____

C. <u>Financial Information</u> (To be signed before a Notary Public)

Attach financial statements, prepared on an accrual basis, in a form which clearly indicates the Proposer's assets, liabilities and net worth over the most recent three (3) year period or as many years as your firm has been in business if less than three (3) years.

Dates of financial statements: _____

Name(s) of firms(s) preparing statements: _____

Dated this ___ day of _____, 20___

_____
(Print or Type Name of Proposer)

(Seal, if corporation)

By:_____

Title:_____

_____ being duly sworn, deposes and says that the financial statement(s) referenced above are a true and accurate statement of Proposer's financial condition as of the date hereof; and all of the foregoing qualification information is true, complete and accurate.

Sworn to before me this ____ day of _____, _____

_____
Notary Public

BUSINESS PROPOSAL FORM 7

STATEMENT OF NON-COLLUSION

In accordance with applicable law, all proposals and contracts awarded or accepted by a municipality must contain a Statement of Non-collusion. By submission of this Proposal, the Proposer certifies that:

Each Proposer and each person signing on behalf of any Proposer certifies, and in the case of a joint Proposal, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(a) The prices in this Proposal have been independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition as to any matter relating to such prices with any other proposer or with any competitor.

(b) Unless otherwise required by law, the prices which have been quoted in this Proposal have not been knowingly disclosed by the Proposer and will not knowingly be disclosed by the Proposer prior to opening, directly or indirectly, to any other proposer or to any competitor.

(c) No attempt has been or will be made by the Proposer to induce any other person, partnership or corporation to submit or not to submit a proposal for the purpose of restricting competition.

(d) The person signing this Proposal certifies that he has fully informed himself regarding the accuracy of the statements contained in this certification under the penalties of perjury, affirms the truth thereof such penalties being applicable to the Proposer, as well as to the person signing on its behalf.

(e) If a corporation, the attached hereto is a certified copy of the resolution authorizing the execution of this certificate by the signature of this Proposal on behalf of the corporate Proposer.

BUSINESS PROPOSAL FORM 7 (Continued)
STATEMENT OF NON-COLLUSION

Resolved that _____ (**Name of Individual**) be authorized to sign and submit the Proposal of _____for the _____ _____ and to certify as to non-collusion required by applicable law as the act and deed of such corporation and for any inaccuracies or misstatements in such certificates this corporate Proposer shall be liable under the penalties of perjury.

_____
Signature and Title

Sworn to before me this _____day of _____, _____

_____
Notary Public

BUSINESS PROPOSAL FORM 8
DISCLOSURE STATEMENT

(Proposer must sign this form before a Notary Public)

STATE OF NEW YORK)
) ss
COUNTY OF _____)

I, _____, _____
(NAME) (TITLE - Officer of Corporation, Partner or Principal)

being duly sworn depose and swear under the penalties of perjury:

1. That, in connection with the above Proposal or Agreement for the _____ _____ , no other person will have any direct or indirect interest in this Proposal except:

_____
(In case of corporations, all officers of the corporation and stockholders owning more than 5% of the corporation stock must be listed. Use attached sheet if necessary.)

2. That _____ related to any officer
(I am not) (none of the officers or stockholders are)

or employee of Rockland Green except_____

_____

3. There is not any state or local officer or employee or a member of Rockland Green interested in such application.

_____
Signature and Title

Sworn to before me this _____ day of _____, _

_____
Notary Public

BUSINESS PROPOSAL FORM 9

AFFIRMATIVE ACTION PLAN

(Proposer Must Sign This Form Before a Notary Public)

STATE OF NEW YORK)
) ss:
COUNTY OF ROCKLAND)

_____ being duly sworn, deposes and says that he/she is the _____ of _____. That *I do (do not) employ fifteen (15) employees and *I do (do not do) a minimum of $50,000 per annum business with the Rockland County Solid Waste Management Authority d/b/a Rockland Green.

Based on the above information, attached hereto is an Affirmative Action Plan or, because of the above, no Affirmative Action Plan is necessary.

Sworn to before me this ___ day of _____, ____.

_____
Notary Public

* strike out non-applicable information.

BUSINESS PROPOSAL FORM 10
FOIL ACKNOWLEDGEMENT FORM

The Proposer hereby acknowledges and recognizes that the New York State Freedom of Information Law, Public Officers Law, Article 6, Sections 84-90 provides for public access to government records. However, Proposals may contain trade secrets and other technical, financial, or administrative data whose public disclosure could cause substantial injury to the Proposer's competitive position.

Please indicate whether your Proposal contains trade secrets and other technical, financial or administrative data whose public disclosure could cause substantial injury to your competitive position by marking the applicable below.

_____ The Proposal DOES contain trade secrets and other technical, financial or administrative data whose public disclosure could cause substantial injury to our competitive position, and we have clearly marked pages in our Proposal containing such information in accordance with Section 1.6 of the RFP.

_____ The Proposal DOES NOT contain trade secrets and other technical, financial or administrative data whose public disclosure could cause substantial injury to your competitive position.

Person, firm or corporation making this Proposal:

_____
Proposer

_____
Signature

_____
Title

_____
Date

BUSINESS PROPOSAL FORM 11
PROPOSER QUESTIONS

(All questions pertaining to this solicitation must be submitted in writing.)

Please use this form and fax it (845.753.2281) or email it (dlouis@rocklandgreen.com) **to the attention of Dee Louis**. Rockland Green will respond to all questions submitted prior to the cut-off date indicated in the RFP.

Date:_____

Proposer Name:_____

Proposer Company:_____

Phone:_____ Fax:_____

Question(s):_____

BUSINESS PROPOSAL FORM 12

DISCLOSURE OF CONTRACTOR RESPONSIBILITY STATEMENT

(This form must be completed by each member of the Proposer team)

1. List any criminal investigations, indictments, or convictions of any person, subsidiary or affiliate of the Proposer arising out of obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of such contract or subcontract.

2. List any indictments, convictions or ongoing investigations of any person, subsidiary, or affiliate of this Proposer for offenses such as embezzlement, theft, fraudulent schemes, etc. or any other offense indicating a lack of business integrity or business honesty which affect the responsibility of the Proposer.

3. List any convictions or civil judgments under state or federal antitrust statutes.

4. List any violations of contract provisions such as knowingly (without good cause) to perform, or unsatisfactory performance, in accordance with the specification of a contract.

5. List any prior suspensions or debarments by any government agency.

6. List any contracts not completed on time.

7. List any documented violations of federal or state labor laws, regulations or standards, or occupational safety and health rules.

I, _____, as _____,
(Name of Individual) (Title and Authority)
of _____, declare under oath that the
(Proposer Name)

above statements, including any supplemental responses attached hereto, are true.

_____
Signature

Subscribed and sworn to before me on this ___ day of _____, _____ ,

by_____, representing him/herself to be _____ of the Proposer.

_____
Notary Public

PRICE PROPOSAL FORM

RFP-2026-02: Installation of Pre-Purchased Backup Power Generators

Proposer shall perform the Work in accordance with the Contract Documents for the prices shown in the Price Proposal Summary shown below.

Proposer acknowledges that Proposer's price(s) constitute Proposer's sole compensation for performing all Work required by the Contract Documents, and if a particular part of the Work is not listed specifically in the Price Quote Summary set forth below in Schedule A of this section, Proposer shall include that part of the Work in the Cost Item Description which it most logically belongs.

Schedule A: Lump Sum Cost Items:

Lump sum items include all Work in the Contract Documents, except items specifically identified as Unit Price Work (if applicable).

Measurement and payment of Lump Sum Cost Items is defined in Section 012210, Lump Sum Items, of the Technical Specifications and Rockland Green's Contract Terms and Conditions.

Lump Sum Cost Items Table:

Item No.	Estimated Quantity	Units	Description	Total Item Price (Figures in Dollars and Cents)
A-1	1	LS	Install New 60 kW generator and ATS at the Hillburn TS, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete, all in accordance with manufacturer's recommendations and this RFP 2026-02	
A-2	1	LS	Install New 60 kW generator and ATS at the Bowline TS and Furnish and Install New Electric Service and All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete, all in accordance with manufacturer's recommendations and this RFP 2026-02	

A-3	**1**	**LS**	**Install New Trailer Mounted 70 kW generator and MTS at the Hillburn Scale House, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete, all in accordance with manufacturer's recommendations and this RFP 2026-02**	

Schedule B: Total Proposal Price:

Determination of the Total Proposal Price will be determined as follows.

a. In case of discrepancy between the correct sum of individual bid items and the (incorrectly) calculated sum, the correct sum of individual cost items will govern.

Proposer shall complete the shaded Total Proposed Price section in Schedule B. The shaded areas are used to delineate the total proposed price, which is the summation of all total prices shown in Schedule A.

Schedule	Total Proposed Price – Summation of All Total Price Items Identified in Schedule A (Figures in Dollars and Cents)
TOTAL PROPOSAL PRICE: (Sum of Schedule A)	

Total Proposed Price (In Words):

_____

_____

Submitted By:

_____

(Company Name)

_____ _____

(Signature of Authorized Representative) (Date)

APPENDIX B
INSURANCE REQUIREMENTS

Prior to the start of the Agreement and throughout the term thereof, the Contractor will obtain and pay for will, independent of any insurance the Contractor may possess for other projects, file and maintain with the insurance coverage listed below.

(a) Worker's compensation insurance and disability benefits liability insurance required by New York State law covering all of the employees of the Contractor at the Facility.

(b) Employer's liability insurance required by New York State law covering all the employees of the Contractor at Rockland Green's Facility.

(c) Commercial general liability and property damage insurance with broad form blanket contractual liability and products completed operations coverage, with combined single limit for bodily injury, and for property damage with limits of not less than one million dollars ($1,000,000) per occurrence and two million ($2,000,000) in the aggregate on a per project basis.

(d) Commercial Comprehensive automobile liability insurance endorsed for any automobile with limits of one million dollars ($1,000,000) combined single limit.

(e) Excess liability insurance above the required comprehensive general, automobile and employer's liability insurance in the amount of five million dollars ($5,000,000).

(f) All risk physical damage insurance (including terrorism) covering loss, damage, or destruction to the Facility in an amount equal to the full replacement value of the Facility, but not less than two million dollars ($2,000,000) with no co-insurance provision and subject to the following maximum deductibles:

Earthquake and Flood – Twenty-five thousand dollars ($25,000)

All Other Perils – Ten thousand dollars ($10,000)

(g) Pollution liability insurance with limits not less than five million dollars ($5,000,000).

1. The General Aggregate must apply on a per project basis waiver of subrogation in favor of Rockland County Solid Waste Management Authority known as Rockland Green #0-day notice of cancellation applies per policy provisions and 10-day for non-payment of premium to Rockland County Solid Waste Management Authority known as Rockland Green in the event of cancelation or change of coverage. Copies of declaration pages including forms to confirm the policy has no Labor Law Exclusions.

2. Additional Insureds. The Contractor will name Rockland Green, the County, and their officers, agents, employees, Rockland Green Engineer, and consultants as additional named insureds on a primary, non-contributory basis (the "Additional Insureds") on all insurance policies required herein, other than paragraphs 1. (a.) and 1. (b.).

   The Contractor to the Agreement will waive the subrogation rights of its various insurance carriers in favor of the other Authority.

3. Insurance Certificates and Policies. Insurance and any renewals thereof will be evidenced by certificates of insurance (the "Certificates") and copies of all insurance policies issued or countersigned by a duly authorized representative of the issuer and delivered to Rockland Green for its approval thirty (30) days prior to the start of services or, in the case of a renewal, as reasonably provided by the insurer. The Certificates will require thirty (30) days written notice to Rockland Green, of cancellation, intent not to renew, or reduction in its coverage by the insurance company.

4. Non-Recourse Provision. All insurance policies will provide that the insurers will have no recourse against the Additional Insureds for payment of any premium or assessment and will contain a severability of interest provision in regard to mutual coverage liability policies. The coverages provided by mutual coverage liability insurance policies required pursuant to the Agreement will be the primary source of any restitution or other recovery for any injuries to, or death of persons, or loss or damage to property incurred as a result of an action or inaction of the Contractor or its subcontractors, of their respective suppliers, employees, agents, representatives, or invitees, that fall within these coverages and also within the coverages of any liability insurance or self-insurance program maintained by Rockland Green.

5. Deductibles. All deductibles will be agreed upon by the Contractor and Rockland Green if different from those shown in paragraph 1 above and payment of the deductibles will be by the Contractor. There will be no deductibles for any of the liability insurance provided in paragraph 1 hereof.

6. Subcontractors. The Contractor will be responsible for ensuring that all subcontractors which are engaged by the Contractor to perform any part of the services secure and maintain all insurance coverages under paragraphs 1. (a.), (b.), (c), (d.), and (e.) above and

other financial sureties required by applicable law in connection with their presence and the performance of their duties.

7. Specific Provisions for Comprehensive General Liability Insurance. Comprehensive General Liability insurance, as required under paragraph 1. (c.), will include premises-operations, blanket contractual, products and completed operations, personal injury, host liquor liability, explosion, collapse, underground hazards, and broad form property damage, including completed operations and independent contractor's coverages.

8. Specific Provisions for Worker's Compensation Coverage. Worker's Compensation insurance must be in accordance with the requirements of New York law, as amended from time to time. The required worker's compensation insurance will include other State's coverage, voluntary compensation coverage, and federal longshoreman and harbor worker's coverage.

9. Specific Provisions for All Risk Physical Damage Insurance. Coverage for all risk physical damage required under paragraph 1. (f.) will be on an all risk basis and will protect against loss of, damage to, and destruction of the Facility. Such insurance will also cover loss, damage, or destruction caused by flood, earthquake, and volcanic eruption, provided that earthquake and volcanic eruption insurance may have sublimits equal to the lesser of five million dollars ($5,000,000) or the full replacement value of the Facility. All policies obtained may be subject to normal exclusions relating to nuclear risks, war risks, terrorism, and such other perils as are generally imposed by insurers on similar properties.

10. Changes in Insurance Coverage. The insurance listed herein are the minimum coverages permitted, except that Rockland Green may decrease or omit the coverages specified in paragraph 1. (e.) at any time in its sole discretion, and may decrease the coverage specified in paragraph 1. (c.) hereof to the extent it is not available on commercially reasonable terms. If Rockland Green decreases such coverage, any cost savings will be credited to the benefit of Rockland Green.

11. Qualifications of Insurers. The Contractor is required to obtain the insurance set forth in this RFP with insurance companies that carry a Best's "A" or better. In addition, insurance must be obtained and maintained with insurers authorized to do business in the State of New York.

12. Cost of Insurance. If Rockland Green chooses to arrange for the insurance outlined herein, Rockland Green may elect to obtain such insurance, provided that:

    (a) Written notice is received by the Contractor at least ninety (90) days prior to the contract year during which Rockland Green will assume this responsibility or ninety (90) days prior to the expiration date of the insurance placed by the Contractor.

(b) Rockland Green may at any time during the term of the Agreement, upon ninety (90) days written notice prior to any Contract Year, require the Contractor to assume the responsibility to obtain the Required Insurance.

(c) Rockland Green pays any cancellation penalty (or short-rate) arising out of canceling the insurance coverage provided by the Contractor provided coverage required in this RFP, prior to its expiration date.

(d) The Contractor reduces its Base Fee in proportion to the costs of the insurance the Contractor has been providing to.

APPENDIX C
PREVAILING WAGES

PRC# 2026004719

APPENDIX D

TECHNICAL SPECIFICATIONS

Contract Documents
For
Rockland Green
RFP 2026-02: Installation of Pre-Purchased Backup Power Generators

PREPARED BY:

Environmental Design & Research, Landscape Architecture,
Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202

It is a violation of the New York State Education Law for any person unless he is acting under the direction of a licensed professional engineer, to alter an item on this specification in any way. If an item is altered, the altering engineer shall affix to the item his seal and the notation “altered by” followed by his signature and the date of such alteration, and a specific description of the alteration.

2026

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SECTION 011100

SUMMARY OF WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Project - Work covered by Contract Documents

B. Limits of work area

C. Construction permits and easements

D. Work sequence

E. Quality assurance

F. Preconstruction conference

G. Progress meetings

H. Coordination with ongoing operations

1.02. WORK INCLUDED

A. The Proposer shall furnish and install materials, equipment, and labor for the following items, all in accordance with the drawings, specifications, and requirements of RFP-2026-02.

B. Furnish all equipment, materials, and labor to install new reinforced concrete slabs (generator pads) at the Hillburn Transfer Station and the Bowline Transfer Station to the dimensions shown on the drawings and in accordance with the specifications, including excavation and disposal of surplus materials, erosion and sediment control measures, protection and curing of concrete, and site restoration, complete. Coordination with Rockland Green is expected.

C. Furnish all equipment, materials, and labor to install two new Owner-purchased 60 kW generators and Owner-purchased Automatic Transfer Switches (ATS) as shown on the contract drawings and in accordance with the technical specifications.

D. Furnish all equipment, materials, and labor to install one new Owner-purchased 70 kW generator and Owner-purchased Manual Transfer Switch (MTS) as shown on the contract drawings and in accordance with the technical specifications.

E. Furnish and install all conduits, conductors, electrical connections, panelboards, safety switches, for a complete installation in accordance with the drawings and specifications.

F. Furnish a 50 kW portable generator for maintaining continuous uninterrupted power at each site while completing power tie-in.

G. Coordinate with Rockland Green to establish daily work zones, vehicular patterns, temporary traffic barriers, removal of materials, delivery of materials, temporary stockpile locations, and other coordination efforts to minimize disruption to ongoing transfer operations.

H. Rockland Green encourages the use of recyclable products to the greatest extent possible. In support of this goal, Recyclable Concrete Aggregate (RCA) will be made available to the Proposer at Rockland Green's Concrete and Asphalt Recycling Facility located at the Clarkstown Transfer Station (on site hauling from the Concrete and Asphalt Recycling Facility is the responsibility of the Proposer). In addition, Rockland Green will furnish a recyclable crushed glass product for use as pipe bedding (delivered to the Clarkstown Transfer Station from their Material Recovery Facility in Hillburn, NY). The RCA and crushed glass products are approved for the following uses:

1. RCA

    a. Granular fill below the reinforced concrete landing gear pads and wheel stop pads

    b. Pipe bedding.

2. Crushed glass

    a. Pipe bedding.

Cost of the RCA and crushed glass products for this project will be waived by Rockland Green.

1.03. LIMITS OF WORK AREA

A. Confine construction operations within the Contract Limits shown on the Drawings. Storage of equipment and materials, or erection and use of sheds outside of the Contract Limits, if such areas are the property of Rockland Green, shall be used only with Rockland Green's approval. Such storage or temporary structures, even within the Contract Limits, shall be confined to Rockland Green's property and shall not be placed on properties designated as easements or rights-of-way. All roadways and access to the transfer station shall remain open and clear from obstruction while operations are active.

B. It is Rockland Green's intent to maintain ongoing operations at the transfer station during the active construction period and access to this area will be shared.

C. Proposer shall always maintain clear and free vehicular access unless specifically approved by Rockland Green with 48-hour notification.

1.04. CONSTRUCTION PERMITS AND EASEMENTS

A. The Proposer shall obtain and pay for necessary construction permits from those authorities or agencies having jurisdiction over land areas, utilities or structures which are located within the Contract Limits, and which will be occupied, encountered, used, or temporarily interrupted by Proposer's operations.

B. When construction permits are accompanied by regulations or requirements issued by a particular authority or agency, it shall be Proposer's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this project.

1.05. WORK SEQUENCE

A. Time is of the essence for completion of construction activities.

B. Construction activities shall not begin until Proposer has completed or received the following:

1. A fully executed Purchase Order, including all required forms and proof of insurance.

2. Submittal of a written Schedule to indicate sequencing of work.

3. Written receipt of all shop drawing approvals from the Authority's Engineer.

4. Delivery of all equipment and other temporary facilities associated with mobilization of work crews.

5. Authorization to proceed with work from Rockland Green.

1.06. QUALITY ASSURANCE

A. The entire Contract work shall be completed in strict accordance with all applicable federal, state and local regulations and ordinances and the best standards of practice.

1.07. PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a conference after the Effective Contract Date.

B. Attendance Required - Rockland Green, Engineer, Proposer, and each major subcontractor (if applicable).

C. Agenda

1. Distribution of extra sets of Contract Documents.

2. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.

3. Designation of personnel representing the parties in Contract and the Engineer.

4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.

5. Scheduling.

6. Scheduling activities of concrete testing laboratory (third-party testing by Rockland Green).

7. Requirements of regulatory agencies.

8. Use of premises by Rockland Green and Proposer.

9. Temporary facilities to be provided by Rockland Green and by Proposer.

10. Procedures for testing.

11. Procedures for maintaining record documents.

12. Periodic cleanup of site.

13. Notification of utilities' Owners, as applicable.

1.08. COORDINATION WITH ONGOING OPERATIONS

A. Rockland Green's facility must remain in continuous operation during the work under this Contract.

B. The Proposer is advised of the following work that may present interferences or require coordination and interfacing. This list is provided for information only and may not be complete.

1. Routine Transfer Station Operations.

C. The costs associated with the interferences, coordination, and interfacing with the current operations as well as with Rockland Green shall be included in the Contract Price.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. EXECUTION

A. All procedures shall be in accordance with the manufacturer's recommendations for the specified product, federal and state regulations, and Best Management Practices.

B. Proposer shall provide a container for storage and transport of all waste debris removed from excavations. The waste debris shall be weighed at Rockland Green's exterior weigh scale on site (Clarkstown TS) prior to disposal. The cost for disposal of the waste debris will be covered by Rockland Green. The Proposer will be responsible for all costs associated with providing a container (or truck), hauling, operations to load and unload the container and any other costs associated with this work. The Authority's weigh scale is open between the hours of 7 am – 4 pm Monday through Friday, and 7 am through 12 pm on Saturdays.

1. Saw cut existing paved areas as required to avoid feather edging of repair material and to provide a neat, finished appearance.

END OF SECTION

SECTION 011190

CONTRACT CONSIDERATIONS

PART 1 GENERAL

The contract considerations described under all Division 1 specifications are intended to serve as "Supplementary Conditions" to Rockland Green's Standard Terms and Conditions described in the Contract as executed between Rockland Green and Proposer. In all cases, Rockland Green's Standard Terms and Conditions shall have precedence over all other terms and conditions described in these Division 1 specifications.

1.01. DESCRIPTION OF WORK

A. Schedule of values

B. Applications for Payment

C. Change procedures

D. Alternates

1.02. DEFINITIONS

A. Mobilization - Mobilization includes, but is not limited to, performance of preparatory construction operations, including the movement of personnel and equipment to the project site; the cost of insurance and other securities (if required); application, fee payment, and acquisition of all required permits (i.e., erosion and sediment control plans, temporary and permanent building and trade permits, utility connections, etc.); and the establishment of Proposer's temporary facilities required at the site in order to begin work.

1.03. SCHEDULE OF VALUES

Proposer shall provide a Schedule of Values for Lump Sum Items only if requested by Rockland Green or if the duration of the Work exceeds one month.

A. Submit one electronic copy in Microsoft Excel of the Schedule of Valves prior to beginning construction activities.

B. Line items shall be subdivided into the Price Proposal Summary Items shown on the Price Proposal Form.

C. The sum of all line items in the Schedule of Values shall equal the Total Proposal Price included on the Price Proposal Form plus authorized Additive Alternatives (if any) as listed in the Agreement.

D. Each line item shall include a directly proportional amount of the Proposer's overhead and profit.

E. Schedule of Values shall serve as a breakdown of Work used to establish progress payments. Progress payments for lump sum items will be made based on the percentages of completion of the work items included in the Schedule of Values for each lump sum item. Progress payments for Unit Price Work will be based on actual quantities of work performed. Progress payments for Contingent Unit Price work will only be made if work is authorized by Rockland Green and Engineer.

F. For Lump Sum Proposal Items, the following format shall be followed when developing the Schedule of Values.

1. If Mobilization is not identified in the Price Proposal Form as a separate Proposed Price Item, Proposer shall include in the Schedule of Values a line item for Mobilization as part of a Lump Sum Proposal Price Item.

a. Lump sum line item shall include all work described in the definition of mobilization included herein.

b. Costs for bonds and insurance shall be included in the lump sum mobilization line item.

c. Mobilization cost shall not be greater than five percent of the Total Proposal Price.

2. Include separate line items for demobilization and contract closeout.

3. Format - Show cost breakdown for each lump sum item. Include, as a minimum, mobilization and demobilization and cost for materials.

G. Revise Schedule of Values to include executed Change Orders with each Application for Payment.

1.04. APPLICATIONS FOR PAYMENT

A. **Refer to Rockland Green's Terms and Conditions.**

1.05. CHANGE PROCEDURES

A. **Refer to Rockland Green's Terms and Conditions.**

1.06. ALTERNATES

Not used.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 012210

LUMP SUM ITEMS (BID ITEM DESCRIPTIONS)

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Price basis.

B. Elements of Bid Item Description page.

C. Lump sum item list.

D. Bid Item Descriptions.

1.02. PRICE BASIS

A. Lump sum prices bid by Contractor are deemed to be full compensation for all required labor, products, tools, equipment, plant, transportation, testing, inspection, services, incidentals, administrative, procedures, applicable taxes, permit fees, overhead, profit, and other miscellaneous expenses.

1.03. ELEMENTS OF BID ITEM DESCRIPTION PAGE

A. Identification of lump sum item, as set forth in the Bid Form.

B. Statement of work involved in the item.

C. Listing of components of work which make up the item including reference to the section(s) covering each component.

D. Cross-references to associated work not included in the item.

1.04. LUMP SUM ITEMS - CONTRACT 1

Bid Item No.	Bid Item Description
A-1	Install New 60 kW generator and ATS at the Hillburn TS, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete.
A-2	Install New 60 kW generator and ATS at the Bowline TS and Furnish and Install New Electric Service and All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete.
A-3	Install New Trailer Mounted 70 kW generator and MTS at the Hillburn Scale House, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete.

1.05. BID ITEM DESCRIPTIONS

A. Bid Item Description pages identified above are attached at the end of this section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

(continued)

BID ITEM DESCRIPTION A-1

INSTALL NEW 60 KW GENERATOR AND ATS AT THE HILLBURN TRANSFER STATION

A. DESCRIPTION

Under this item, Proposer shall provide all labor, materials, and equipment (rented and owned) necessary to Install a New 60 kW generator and ATS, and furnish and install all other electrical service Modifications, including Mobilization/Demobilization, concrete pad, return mobilization for generator installation, removal of existing electrical components and disposal, and site restoration, complete in accordance with the plans and specifications included with this RFP 2026-02. Work shall include, but is not limited to the following:

- Mobilization/demobilization, return mobilization for generator installation, shop drawing submittals, bonds, insurance, contract considerations, site preparation, site health and safety precautions, including personal protective equipment (PPE), and any other items needed in support of completing the work.
- Furnish and install a reinforced concrete pad (complete) for the new generator as shown on the drawings, including clearing, excavation, soil disposal, granular subbase materials, formwork, reinforcing, protection and curing, and site repairs around the pad.
- Install new 60kW electrical generator and Automatic Transfer Switch (ATS) in accordance with manufacturers' recommendations and as shown on the drawings and further described in the Technical Specifications and the Cummins purchase summary (Appendix F of RFP 2026-02).
- Furnish and install all electrical components and systems as shown on the Contract Drawings and further described in the Technical Specifications
- Provide proper excavation and installation procedures for all electrical components in accordance with the National Electric Code (NEC) and manufacturer's recommendations.
- Coordinate with Cummins to complete startup and generator testing in accordance with manufacturer recommendations and as described in the Technical Specifications
- Coordinate work activities with the existing transfer station operations and Rockland Green.
- Final site cleanup and restoration, including turf and grass repairs, topsoil and seeding, mulch, and pavement replacement, as applicable.
- Specified warranties, as applicable

B. WORK INCLUDED UNDER THIS ITEM

Rockland Green RFP 2023-02, complete
Contract Drawings and Specifications
Remobilization for generator installation

C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM

Concrete testing (by Rockland Green)
All work associated with other lump sum items.

D. METHOD OF PAYMENT — Payment for this item will be made on a lump sum basis.

E. MEASUREMENT AND LIMITS — Measurement shall be based on the percentage completion of all activities including labor, equipment, and materials necessary to complete specified construction work, or as approved by Rockland Green. Payment for stored materials shall include backup for proof of purchase and must have been delivered to the site.

BID ITEM DESCRIPTION A-2

INSTALL NEW 60 KW GENERATOR AND ATS AT THE BOWLINE TRANSFER STATION

A. DESCRIPTION

Under this item, Proposer shall provide all labor, materials, and equipment (rented and owned) necessary to Install a New 60 kW generator and ATS and furnish and install new electric service and feed systems and all other electrical service Modifications, including Mobilization/Demobilization, concrete pad, return mobilization for generator installation, removal of existing electrical components and disposal, and site restoration, complete in accordance with the plans and specifications included with this RFP 2026-02. Work shall include, but is not limited to the following:

- Mobilization/demobilization, return mobilization for generator installation, shop drawing submittals, bonds, insurance, contract considerations, site preparation, site health and safety precautions, including personal protective equipment (PPE), and any other items needed in support of completing the work.
- Furnish and install a reinforced concrete pad (complete) for the new generator as shown on the drawings, including clearing, excavation, soil disposal, granular subbase materials, formwork, reinforcing, protection and curing, and site repairs around the pad.
- Furnish and install new electric service into the transfer station building in accordance with the drawings, complete.
- Install new 60kW electrical generator and Automatic Transfer Switch (ATS) in accordance with manufacturers' recommendations and as shown on the drawings and further described in the Technical Specifications and the Cummins purchase summary (Appendix F of RFP 2026-02).
- Furnish and install all electrical components and systems as shown on the Contract Drawings and further described in the Technical Specifications
- Provide proper excavation and installation procedures for all electrical components in accordance with the National Electric Code (NEC), Orange & Rockland Electric requirements, and manufacturer's recommendations.
- Coordinate with Cummins to complete startup and generator testing in accordance with manufacturer recommendations and as described in the Technical Specifications
- Coordinate work activities with the existing transfer station operations and Rockland Green.
- Final site cleanup and restoration, including turf and grass repairs, topsoil and seeding, mulch, and pavement replacement, as applicable.
- Specified warranties, as applicable

B. WORK INCLUDED UNDER THIS ITEM

Rockland Green RFP 2026-02, complete
Contract Drawings and Specifications
Remobilization for generator installation

C.	ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM	Concrete testing (by Rockland Green) All work associated with other lump sum items.
D.	METHOD OF PAYMENT	Payment for this item will be made on a lump sum basis.
E.	MEASUREMENT AND LIMITS	Measurement shall be based on the percentage completion of all activities including labor, equipment, and materials necessary to complete specified construction work, or as approved by Rockland Green. Payment for stored materials shall include backup for proof of purchase and must have been delivered to the site.

BID ITEM DESCRIPTION A-3

INSTALL NEW TRAILER MOUNTED 70 KW GENERATOR AND MTS AT THE HILLBURN SCALEHOUSE

A.	DESCRIPTION	Under this item, Proposer shall provide all labor, materials, and equipment (rented and owned) necessary to Install a New 70 kW trailer mounted 70 kW generator and MTS and furnish and install new feed systems and all other electrical service Modifications, including Mobilization/Demobilization, and site restoration, complete in accordance with the plans and specifications included with this RFP 2026-02.
B.	WORK INCLUDED UNDER THIS ITEM	General Requirements (Sections 011100 through 014000) Contract Drawings and Specifications
C.	ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM	All work associated with other lump sum items.
D.	METHOD OF PAYMENT	Payment for this item will be made on a lump sum basis.
E.	MEASUREMENT AND LIMITS	Measurement shall be based on the percent completion of all activities including labor, equipment, and materials necessary to complete specified construction work, or as approved by Rockland Green. Payment for stored materials shall include backup for proof of purchase and must have been delivered to the site.

END OF SECTION

SECTION 013300

SUBMITTALS

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Submittal procedures

B. Construction progress schedule

C. Proposed products list

D. Shop drawings

E. Substitutions

F. Manufacturers' instructions

1.02. SUBMITTAL PROCEDURES

A. Transmit each required submittal using Rockland Green and Engineer accepted form.

B. Number the submittals as follows:

1. First: Specification Section number.

2. Submittal number within the Specification Section.

3. Review cycle number.

4. Title of submittal.

5. For example:

a. 330500-01-01 – Ductile Iron Pipe (first review cycle).

b. 330500-01-02 – Ductile Iron Pipe (second review cycle).

C. Identify project, Proposer, subcontractor, or supplier; pertinent Drawing sheet and detail number(s), and specification section number, as appropriate.

D. Apply Proposer's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the work and Contract Documents. Stamp shall show the following information:

1. Shop Submittal Number: _____

2. Deviations: None_____; As Listed_____

3. Reference Specification Number: _____

4. Reference Drawing Number: _____

5. Space Requirement: As Designed _____ Different, As Listed _____

6. Representation is made to Rockland Green and Engineer that the Proposer has determined and verified all field measurements and quantities, field construction criteria, materials, catalog numbers and similar data, that he has reviewed and coordinated the information in each shop drawing with the requirements of thework and the Contract Documents, and hereby approves this submittal.

   Proposer_____
   Signature_____
   Date_____

E. All submittals shall be submitted through electronic submission system. All submittals shall be in PDF format. Email size is limited to 10 MB at any one time. For larger files, utilize a cloud drive service. It is Proposer's responsibility to confirm receipt. Proposer is not to assume e-mail has transmitted successfully.

F. Schedule submittals to expedite the Project and deliver to Engineer via email (jheath@edrdpc.com and cstevenson@edrdpc.com). Coordinate submission of related items. Proposer shall anticipate that submittals will be reviewed within 7 calendar days. Proposer shall take into account the submittal review time in their schedule and plan accordingly. **No work shall proceed under this RFP 2026-02 until all shop drawings have been approved and equipment and have been delivered to the site.**

G. Identify deviations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed work.

H. Identify space requirements which differ from those designed or shown on the Contract Documents.

I. Revise and resubmit in accordance with review comments/corrections provided. Proposer to distribute appropriate number of revised copies to Rockland Green with appropriate new samples if required. Proposer shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals. Identify all changes made since previous submittal in a cover letter or memorandum. **Rockland Green reserves the right to recover cost for engineering review time from the Proposer if there are more than one resubmittal for any given shop drawing.**

J. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

K. Submittals not requested will not be recognized or processed and will be returned as "Not Reviewed".

L. Items shall not be fabricated or delivered without fully approved Shop Drawings.

M. Ensure no associated work begins until associated Shop Drawings are fully approved.

N. Fabrication prior to receiving an "Approved" or "Approved as Corrected – No Resubmittal Required" is at Proposer's risk.

1.03. REVIEW OF SUBMITTALS

A. Review of submittals will be in accordance with the General Conditions.

B. Review Times - No less than 10 business days shall be allowed for Engineer's review of submittals and resubmittals unless otherwise specified in the Contract Documents.

C. Review Codes

1. Approved

2. Approved as Corrected – No Resubmittal Required

3. Approved as Corrected – Resubmit Required

4. Approved as Corrected - Provide Requested Information Only

5. Revise and Resubmit

6. Not Approved

7. Not Reviewed

8. For Informational Purposes Only

D. Payment will not be made for any items requiring submittals until no further submittals are required for the item.

1.04. SCHEDULE OF SUBMITTALS

A. Submit preliminary Schedule of Submittals in accordance with General Conditions. Provide within 30 days following the Notice to Proceed.
B. Revise and resubmit until acceptable to Engineer.

1.05. CONSTRUCTION PROGRESS SCHEDULE

A. Submit preliminary progress schedule in duplicate within 10 days after effective date of Rockland Green and Proposer Agreement for Engineer review.

B. Submit finalized progress schedule at least 10 days before submission of the first Application for Payment.

C. Submit revised schedules at each progress meeting, identifying changes since previous version.

D. Prepare horizontal bar chart with separate entry for each major section of work. Include work sequence requirements, if any. Identify first workday of each week.

E. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of work at each progress meeting.

1.06. PROPOSED PRODUCTS LIST

A. Within 30 days after date indicated in the Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product, and appropriate Specification Section number.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.07. SHOP DRAWINGS

A. Electronic copies of shop drawings are allowed but **must contain a complete submittal**. Multiple email submissions for the same submittal will be returned as “not reviewed”.

B. Provide information in accordance with General Conditions as supplemented herein and as required by individual Specification Sections.

C. Shop Drawing submittals shall include all descriptive data, performance characteristics, material specifications, drawings, diagrams and shall be complete and accurate to indicate item-by-item compliance with the Contract Documents.

D. Shop Drawings shall be drawn at scales matching those on the Drawings depicting the same items.

E. All catalog cuts, manufacturer’s specifications, drawings, and verbal descriptions shall be clearly marked to allow identification of the specific products used.

F. If the submittal deviates from the requirements of the Specifications in any way, it shall be clearly marked in the submittal with the justifying reason stated for evaluation by Engineer and Owner.

G. After review and approval by Engineer, distribute and preserve copies for record documents purposes.

1.08. SUBSTITUTIONS

A. Rockland Green and Engineer will consider requests for substitute or "or equal" items after the Effective Date of Rockland Green - Proposer Agreement.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Proposer. Furnish evidence that product is unavailable.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request constitutes a representation that the Proposer:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Rockland Green.

4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Rockland Green the costs incurred by Rockland Green for review and any subsequent redesign services by Engineer, including Engineer's revisions to the Contract Documents, and Engineer's assistance in connection with review by authorities when re-approval is required, if Engineer determines that the item of material or equipment proposed by Proposer is a substitute item.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Submittal Procedures

1. Submit to Engineer three copies of request for substitution for consideration, limiting each request to one proposed substitution.

2. Each request shall basically conform to the procedures outlined in Article 1.03 of this section.

3. Include shop drawings, product data, and certified test results attesting to the proposed product equivalence.

4. The Engineer will notify Proposer, in writing, of decision to accept or reject request.

1.09. MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections or on the drawings, submit manufacturers' printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, in quantities specified for product data. Installation instructions shall be available in the field prior to, and during, installation of any product.

B. When specified submit manufacturer's operation and maintenance instructions for equipment supplied for this project. Manuals shall be delivered after shop drawing approval and prior to equipment being started up.

C. Identify conflicts between manufacturers' instructions and Contract Documents.

D. All manufacturer required measurements, records and verifications shall be performed and documented. Contractor shall confirm no exceptions are being taken to manufacturer instructions.

1.10. MANUFACTURER’S CERTIFICATES

A. When specified in individual Specification Sections, submit manufacturer's certificate to Engineer for review, in quantities specified for product data.

B. Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 014000

QUALITY CONTROL

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Quality assurance and control of installation.

B. References and standards.

C. Tolerances.

D. Tests and inspections.

E. Manufacturers' field services.

1.02. QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply fully with manufacturers' instructions.

C. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the work except when code requirements or equipment manufacturer requires more stringent standards.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion and disfigurement.

G. Employ skilled and experienced installer to perform cutting and patching.

H. Submit written request in advance of cutting or altering elements which may affect:

1. Structural integrity of element.

2. Integrity of weather-exposed or moisture-resistant elements.

3. Efficiency, maintenance, or safety of element.

4. Visual qualities of sight-exposed elements.

5. Work of Rockland Green or separate contractor.

I. Execute cutting, fitting, and patching, including excavation and fill, to complete work and to:

1. Fit the several parts together, to integrate with other work.

2. Uncover work to install or correct ill-timed work.

3. Remove and replace defective and non-conforming work.

J. Execute work by methods which will avoid damage to other work and provide proper surfaces to receive patching and finishing.

K. Cut rigid materials using masonry saw or core drill.

L. Restore work with new products in accordance with requirements of Contract Documents.

M. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

N. Identify any hazardous substance or condition exposed during the work to Rockland Green and Engineer in writing for decision or remedy. Refer to the Contract Drawings and specifications for work associated with potentially contaminated soil.

1.03. REFERENCES AND STANDARDS

A. For products and workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified and/or are required by applicable codes.

B. Obtain copies of standards where required by individual specification sections.

C. If specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.04. TOLERANCES

A. Monitor fabrication and installation tolerance control to produce acceptable work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. If manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.05. TESTS AND INSPECTIONS

A. Rockland Green (Owner) shall employ and pay for the services of an independent testing laboratory to obtain concrete samples, granular materials samples, and perform soil compaction tests.

B. Independent testing laboratory will:

1. Perform inspections, soil compaction and concrete tests, and other services specified in the individual specification sections and as required by Engineer and Rockland Green.

2. Prepare and submit reports to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Engineer will forward copy of report(s) to Contractor.

C. Contractor shall:

1. Cooperate with independent firm; furnish samples of materials; equipment, tools, storage, and assistance as requested.

2. Notify Engineer and Rockland Green 24 hours prior to expected time for operations requiring services.

3. Provide weekly look-ahead schedules for testing needs.

D. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm which performed the initial tests and inspections as instructed by the Engineer.

E. Costs for retesting and re-inspection will be deducted from Contractor’s progress payments.

1.06. MANUFACTURERS’ FIELD SERVICES

A. When specified in individual specification sections, material or product suppliers or manufacturers shall provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment, equipment demonstration, and training as applicable, and to initiate instructions when necessary.

B. Staff person to report observations, site conditions, or instructions given to applicators or installers, which are supplemental or contrary to manufacturers' written instructions

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 GENERAL

The contract considerations described under all Division 1 specifications are intended to serve as "Supplementary Conditions" to Rockland Green's Standard Terms and Conditions described in the Contract as executed between Rockland Green and Proposer. In all cases, Rockland Green's Standard Terms and Conditions shall have precedence over all other terms and conditions described in these Division 1 specifications.

1.01. SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.

2. Final Completion procedures.

3. List of incomplete items.

4. Submittal of Project warranties.

5. Final cleaning.

1.02. ACTION SUBMITTALS

A. Proposer's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.03. CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. All warranties, as applicable.

1.04. SUBSTANTIAL COMPLETION PROCEDURES

A. Proposer's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Proposer's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Rockland Green unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit testing, adjusting, and balancing records.

5. Submit changeover information related to Rockland Green's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Rockland Green of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Rockland Green. Advise Rockland Green's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Rockland Green's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

6. Advise Rockland Green of changeover in utility services.

7. Participate with Rockland Green in conducting inspection and walkthrough with local emergency responders, if applicable.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements.

10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Rockland Green and their authorized representative(s) will either proceed with inspection or notify Proposer of unfulfilled requirements. Rockland Green’s Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Proposer of items, either on Proposer's list or additional items identified by Rockland Green’s representatives, that must be completed or corrected before certificate will be issued.

1.05. FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Rockland Green procedures outlined in the Agreement.

2. Certified List of Incomplete Items: Submit certified copy of the Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Rockland Green's Engineer. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with Rockland Green's insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of five days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Rockland Green will either proceed with inspection or notify Proposer of unfulfilled requirements. Rockland Green's Engineer will prepare a final Certificate for Payment after inspection or will notify Proposer of construction that must be completed or corrected before certificate will be issued.

1.06. LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Proposer that are outside the limits of construction.

1. Include the following information at the top of each page:

a. RFP Number and Project Name.
b. Date.
c. Name of Engineer (EDR).
d. Name of Proposer.
e. Page number.

2. Submit list of incomplete items in the following format:

a. MS Excel Electronic File: Rockland Green and Engineer will return annotated file.

1.07. SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Rockland Green for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Rockland Green's rights under warranty.

B. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by email to Rockland Green

PART 2 PRODUCTS

2.01. MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01. FINAL CLEANING

A. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

    a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
    b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    c. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    d. Remove labels that are not permanent.
    e. Wipe surfaces of electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    f. Replace disposable air filters and clean permanent air filters.

3.02. CORRECTION OF THE WORK

A. Complete repair and restoration operations required under this Request for Proposal before requesting inspection for determination of Substantial Completion.

END OF SECTION

SECTION 029800

SITE REHABILITATION

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Site restoration resulting from excavation and backfilling work outside of pavement limits.

B. Removal and disposal of all excess materials, equipment, trash, and debris used for, or resulting from, the work included in this section.

1.02. REFERENCES

A. The American Association of Nurserymen Standards - ANSI Standard 2-60.1, “Nursery Stock”.

B. Soil Conservation District of the Department of Agriculture.

1.03. QUALITY ASSURANCE

A. Areas and Features to be Restored

1. All areas, including natural features occurring thereon, which are damaged or disturbed by the Proposer’s operations, shall be restored, repaired, or replaced to the same or superior condition which existed prior to construction or as modified herein or as shown on the Drawings.

2. Artificial features shall be restored equal to a new condition or as modified herein or as shown on the Drawings.

1.04. SUBMITTALS

A. Submit under provisions of Section 013300, Submittals.

1.05. QUALIFICATIONS

A. All planting material to be furnished from a nursery which meets the requirements of the American Association of Nurserymen.

1.06. PACKING AND SHIPPING

A. All seed furnished for this project shall be delivered in standard size unopened bags of the vendor, showing weight, mixture, vendor’s name, and guaranteed analysis.

1.07. STORAGE

A. Seed shall be properly stored in dry conditions at the site of the work.

1. Any seed damaged or spoiled during storage shall be replaced by the Proposer.

1.08. ENVIRONMENTAL CONDITIONS

A. Topsoil shall not be delivered or placed in a frozen or muddy condition.

B. Seeding is to be done on dry or moderately dry soil.

1. Seeding is to be done when the wind velocity does not exceed 5 miles per hour.

1.09. SCHEDULE

A. The Proposer is advised to do all seeding during the periods of May 1st to June 15th, or August 15th to October 1st .

1. Seeding may be conducted under unseasonable conditions without additional compensation, and at the option and full responsibility of the Proposer.

1.10. GUARANTEE

A. Any new, reestablished, replaced, or disturbed plant material that fails to respond properly within the one-year guarantee period shall be replaced as specified above at the Proposer's expense.

PART 2 PRODUCTS

2.01. MATERIAL

A. Topsoil

1. Topsoil shall be natural, fertile, friable agricultural soil capable of sustaining healthy vegetative growth.

2. Topsoil shall meet the following gradation requirements free of stones, roots, sticks and other foreign substances:

Grain Diameter	Sieve Size	Percent Passing by Weight
6.3 mm	6.3 mm	100
4.75 mm	No. 4	60-85
0.075 mm	No. 200	20-45
0.002 mm	--	7-27

a. Topsoil shall contain less than 52 percent sand.

3. The pH of topsoil shall be between 5.0 and 7.0.

4. Topsoil shall contain no less than 6.0 percent organic matter.

5. Topsoil may be from previously excavated, stockpiled, and protected materials, provided the materials meet the requirements for topsoil.

B. Fertilizer

1. General Fertilizer

a. Fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer.

b. All fertilizer shall contain a minimum of 10 percent nitrogen, 6 percent available phosphorous and 4 percent potash.

c. Other commercially available fertilizers, such as 20-10-10 and 12-6-6, may be utilized provided that spreading rates are adjusted to provide the aforementioned minimum requirements for nitrogen.

2. Plant Fertilizer - As recommended by local Soil Conservation District of the Department of Agriculture for the type(s) of soil(s) and plant(s).

C. Seed

1. All seed shall be fresh, re-cleaned and of the latest crop year.

2. Each component shall meet or exceed the minimum State and Federal requirements for purity and germination for that component.

3. The weed content of each component shall not exceed 0.1 percent.

4. The following seed mixture is suggested for lawns or cultivated (landscape) areas:

Percent by Weight	Variety	Purity	Germination
50	Kentucky Blue Grass	85%	80%
20	Red or Chewing Fescue	97%	80%
30	Red Top	92%	90%

a. Variations may be recommended by qualified personnel but shall not be used without approval by the Engineer.

D. Mulch for Tree or Shrub Plantings - Mulch shall consist of dry, clean, hardwood chips.

E. Mulch for Seeded Areas - Mulch shall be oat, wheat or rye straw, or hay, free from noxious weeds and other materials which may interfere with the establishment of a healthy stand of grass.

F. Plantings - Trees, shrubs, vines, ground cover and other vegetation to be replaced or installed new as specified which meet the requirements of the American Association of Nurserymen.

1. Classifications of plants, dimensions, planting procedures, etc., shall conform to ANSI Standard Z 60.1, “Nursery Stock”.

G. Peat Moss - As recommended by the supplier of nursery stock.

H. Metal Edging

1. Edging shall be 3/16-inch thick by 4-inches high steel in 16- and 20-foot lengths.

a. Secure edging with 16-inch long tapered steel stakes at 30 inches on center.

b. All steel materials shall be painted with one coat of epoxy primer and two coats of epoxy finish.

I. Weed Barrier - Weed barriers shall consist of two plies of 6-mil thick black polyethylene film.

J. Stones

1. All stones used for landscape surfacing shall be between 2 and 4 inches in maximum dimension and average to about 3 inches.

a. Stones shall be well-rounded.

2. All stones used for mowing strips shall be a washed crushed stone, size 1/2-inch to 1-inch size.

K. Tree Wrapping - Wrapping for trees shall be 8 ounce first quality burlap.

PART 3 EXECUTION

3.01. EXAMINATION

A. Determine that surface area is ready for fine grading and/or to receive topsoil and seeding or plantings.

1. Remove trash, debris, large stones, and other foreign materials from surface areas to be restored or rehabilitated.

2. Topsoil shall be free of frozen fragments, debris, large stones, and other foreign materials.

3.02. PREPARATION

A. Fine Grading - Areas requiring topsoil shall be fine graded to within 4 inches of finished grade to provide a minimum compacted thickness of 4 inches of topsoil at all locations.

1. All such areas, whether in cut or fill, shall be raked to a depth of 1 inch, be parallel to finished grade as shown or required and shall be free of all stones, larger than 1 inch, roots, rubbish, and other deleterious material.

3.03. INSTALLATION

A. Areas to be Developed

1. When the project site is to be modified and developed to meet new conditions, the Proposer shall perform all required grading, topsoiling, fertilizing, seeding, planting, mulching and maintenance of areas, all in accordance with the Drawings and as specified herein.

2. Unless shown otherwise on the Drawings, the entire unpaved area within the grading limits and within the overall areas excavated and backfilled shall be so developed.

3. New landscaping work and artificial features, if any, are shown on the Drawings and specified elsewhere.

B. The Proposer shall reestablish all existing cultivated or landscape items, trees, shrubs, vines, and ground covers as practicable.

1. Proposer shall provide additional or modify existing vegetation, as shown on the Drawings.

2. Existing trees, plants, shrubs, saplings, ground cover, vines, etc., which are disturbed or damaged by the Proposer's operations shall be replaced with new plant materials.

3.04. TOPSOILING

A. Topsoil shall be furnished and spread in the required areas to a depth of approximately 4 inches.

1. Stockpiled topsoil may be used if approved by the Engineer.

2. In the event this topsoil is not satisfactory, or is inadequate to cover the required areas, the Proposer shall furnish the required amount of satisfactory topsoil from approved sources off the site.

B. The soil shall be uniformly compacted with a light hand roller to a final depth of not less than 2 inches.

1. When finished, the surface shall conform to the finished grades shown or required and shall have a smooth pulverized surface at the time of seeding.

2. Any irregularities shall be corrected before the fertilizer and seed are placed.

3. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Proposer's expense.

3.05. FERTILIZING

A. The fertilizer shall be uniformly spread by a mechanical spreader at the rate of 25 lbs. per 1,000 square feet.

1. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.

2. Other commercial fertilizers, such as 20-10-10 or 12 6-6 may be used at rates adjusted to provide the same quantity of nitrogen per 1,000 square feet.

3.06. SEEDING

A. Seed shall be applied at a rate of not less than 5 lbs. per 1,000 square feet, using a mechanical spreader.

1. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.

B. The process of spraying grass seeds, water, fertilizer, and mulch known as hydro-seeding or hydro-mulching may be utilized if water hazards are minimized.

1. Presoaking, the spraying of the materials and watering after spraying shall be in strict accordance with the manufacturer's instructions.

2. All materials, protection, maintenance, etc., shall be in conformance with this specification.

3. The mulch may be a wood fiber material compatible with the spray equipment.

3.07. PLANTING

A. All new plant materials which are to replace existing plant materials shall be of the same genus and species as the original and shall be placed in the same location as the item being replaced.

1. The size of the new plant materials shall, if practical, match that of the item being replaced, consistent with normally available sizes from nursery stock.

2. Depending on the size and type of material, and when ordered by the Engineer, guy wires, stakes, anchors, and wrappings shall be furnished and installed in a proper manner to brace and protect the plant.

3. The Proposer shall, as soon as practicable, water and maintain all reestablished, replaced, or disturbed plant materials until final acceptance of the contract.

B. Plant shall be set plumb and true.

1. Shape area around saucer to form drainage grades as shown on the Drawings.

C. Install wooden posts, guy wires and hose section for protection as shown on the Drawings.

1. Provide three guy wires per planted item.

D. For all trees of 2-inch caliber or larger, wrap with tree wrap.

1. Begin at base of tree and work upward to the first branches.

2. Tie the burlap wrap with cord (no synthetic cord nor wire) at 2-foot intervals and at the bottom and top.

E. Place weed barriers on prepared subgrade at depth shown on the Drawings.

1. Turn up weed barrier at all edges and corners.

F. Place washed stone over weed barriers to the specified depths.

1. Rake stone to produce a smooth, uniform surface.

G. Install metal edging such that the top edge projects 1/4 inch above surrounding soil and stone.

3.08. MULCHING AND PROTECTION

A. The Proposer shall protect and maintain seeded areas to assure a full even stand of grass.

1. Immediately after seeding and rolling, the Proposer shall apply oat, wheat or rye straw, or hay, free from noxious weeds, as a mulch, to a loose depth of about 1 inch.

2. The Proposer shall perform all watering and reseeding as necessary for a minimum of 30 days and until final acceptance of the Contract, to ensure the establishment of a uniform stand of specified grasses.

3.09. MAINTENANCE

A. Any portion of seeded areas failing to produce a full uniform stand of grass from any cause, shall be reseeded at full rate and re-fertilized at one-half rate and protected and maintained until such a full stand has been obtained.

B. Plantings to be maintained for one year following final acceptance of the contract.

3.10. SPECIAL CONDITIONS

A. Damaged Trees - Vegetation which has been damaged by site preparation activities and deemed non-functional by the Rockland Green or engineer, shall be replaced by the Proposer with vegetation of the same caliper, genus, and species at no additional compensation to the Proposer.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Concrete formwork.

B. Concrete pads.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Miscellaneous concrete elements, including equipment pads and equipment pits.

F. Concrete curing.

1.02. REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2016.

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

F. ACI 305R - Guide to Hot Weather Concreting; 2010.

G. ACI 306R - Guide to Cold Weather Concreting; 2016.

H. ACI 308R - Guide to External Curing of Concrete; 2016.

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).

J. ACI 347R - Guide to Formwork for Concrete; 2014, with Errata (2017).

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.

L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.

M. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

N. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.

O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2020.

P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2020.

Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2020.

R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.

S. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.

T. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

U. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2017a.

V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.

W. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.

X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2018.

Y. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

Z. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.03. SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

B. Mix Design: Submit proposed concrete mix design.

C. Test Reports: Submit a report for each test or series of tests specified.

1.04. QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

1. Maintain one copy of each document on site.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01. FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Proposer's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

2. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02. REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).

1. Type: Deformed billet-steel bars.

2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.

1. Form: Flat Sheets.

2. WWR Style: As indicated on drawings.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Provide galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03. CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type III – High Early Strength Cement.

1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

1. Acquire aggregates for entire project from same source.

2. Coarse aggregates shall be strong, clean crushed limestone complying with ASTM C33/C33M, size no. 67 provided from one source.

3. Sand: Clean sharp, natural sand, graded in accordance with ASTM C33.

C. Fly Ash: ASTM C618, Class C or F.

D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04. ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

1. Manufacturers:

a. Euclid Chemical Company; PLASTOL 6420: www.euclidchemical.com/#sle.

E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

1. Manufacturers:

a. Euclid Chemical Company; ACCELGUARD 80: www.euclidchemical.com/#sle.

F. Accelerating Admixture: ASTM C494/C494M Type C.

1. Manufacturers:

a. W. R. Meadows, Inc; Hydraset: www.wrmeadows.com/#sle.

G. Retarding Admixture: ASTM C494/C494M Type B.

H. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05. ACCESSORY MATERIALS

A. Under slab Vapor Retarder: Sheet material complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.

1. Installation: Comply with ASTM E1643.

2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.06. BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber.

2. Manufacturers:

a. W. R. Meadows, Inc; Fiber Expansion Joint Filler with Snap-Cap: www.wrmeadows.com/#sle.
b. or approved equal.

B. Epoxy Bonding Adhesive with integrated Anti-Corrosion Primer: ASTMC 881, three-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2. Manufacturers:

a. Sika, Corp; Sika Armatec-110 EpoCem
b. or approved equal.

2.07. CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

B. Moisture-Retaining Sheet: ASTM C171.

1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.

2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

C. Water: Potable, not detrimental to concrete.

2.08. CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days as follows:

a. All general uses not otherwise specified: 4,500 psi at 28 days

2. Water-Cement Ratio:

a. General Use: 0.45 max

3. Total Air Content: as determined in accordance with ASTM C173/C173M.

a. General Use: 6.0% (+/- 1.5%)

4. Maximum Slump: 5 inches (+/-1") inches.

5. Maximum Aggregate Size: 3/4 inch.

2.09. MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

C. All concrete shall be mixed until there is uniform distribution of materials and shall be discharged completely before mixer is recharged.

D. If concrete is not placed within 90 minutes after batched or if the concrete has become partially set, the concrete will be rejected and shall be disposed of off-site.

PART 3 EXECUTION

3.01. EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02. PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent according to bonding agent manufacturer's instructions.

E. In locations where new concrete is doweled into hardened concrete, drill holes in existing concrete, and utilize chemical adhesive system.

3.03. INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04. PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

H. Deposit and consolidate concrete for slabs in a continuous operation until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

I. Cold Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

K. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Proposer's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.05. SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

3.06. FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:

1. Exposed Concrete Floors: 1/8 inch in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07. CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

E. Concrete Slabs: Finish to requirements of ACI 302.1R, and trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.08. CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than seven days, or approved by Engineer.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:

1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days, or approved by Engineer, by water ponding, water-saturated sand, water-fog spray, or saturated burlap.

a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
b. Spraying: Spray water over floor slab areas and maintain wet.
c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

2. Final Curing: Begin after initial curing but before surface is dry.

a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09. FIELD QUALITY CONTROL

A. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

B. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

C. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure (6) 6" diameter cylinders or (9) 4" diameter cylinders. Break, 1 set (2 cylinders if 6" or 3 cylinders if 4") of cylinders at 7 days, 1 set at 28 days and remaining set for reserve. Obtain test samples for every 50 cubic yards or less of each class of concrete placed.

D. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

E. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

F. Perform one air content test for each set of test cylinders taken following procedures of ASTM C231 or ASTM C173.

3.10. DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Engineer and Rockland Green within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Proposer when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

E. Patching: Repair defective areas and fill form-tie holes and similar defects in accordance with Chapter 9 of ACI 301. Where, in the opinion of the Engineer, surface defects such as honeycomb occur, repair the defective areas as directed by the Engineer.

3.11. PROTECTION

A. Do not permit traffic over unprotected concrete surfaces until fully cured and cylinders indicate design strength has been achieved.

END OF SECTION

SECTION 260500

ELECTRICAL WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

A. General work description and requirements for electrical work included in this contract.

B. Raceways, fittings, and boxes.

C. Conductors and accessories.

D. Wiring devices.

E. Grounding.

F. Panelboards.

G. Disconnect and safety switches.

H. Nameplates and labels.

I. Spare devices.

1.02. GENERAL REQUIREMENTS

A. All work shall be subject to applicable sections of these specifications, not necessarily the aforementioned related sections.

B. Examination of Premises

1. Before submitting a proposal, the Proposer shall examine all drawings and specifications relating to work of all trades to determine scope and relation to other work.

2. Ascertain access to site, available storage, and delivery facilities.

3. Before commencing work, verify all governing dimensions and examine all adjacent work at site and/or buildings.

4. Some equipment or material items may be special order items having long order times and shall be ordered well in advance of installation. Unavailability due to long lead times or special orders is not an excuse for not providing the specified items.

1.03. SCOPE OF WORK

A. The principal items of electrical work include, but are not necessarily limited to, the following:

1. Provide all electrical power, lighting, control, instrumentation, ductbanks, communications systems, including exposed and concealed raceway systems, conductors, cables, fittings, special control, wiring devices, distribution equipment, generators, overcurrent protection, terminations, connections, and interconnections, and all related appurtenances to provide a complete and operating electrical system.

2. Provide all system and equipment grounding in conformance with the requirements of these specifications and the National Electrical Code (NEC).

3. Provide electrical labels, signs, and nameplates per this section.

4. Install all electrical equipment, conduit, wire, conductors, cable, connections, etc., required for complete and operating systems.

5. Coordinate work with the work of others for timely completion of the work of this contract.

6. Repair, fill and/or patch surfaces of all building components including walls, floors, ceilings, and roofs damaged or left open or bare as a result of the electrical work.

7. Have a Rockland Green-approved third-party inspecting agency inspect electrical installation. Submit a final certificate approving all work to the Engineer prior to final acceptance of the electrical work.

8. See Section 01 77 00 for additional requirements for record drawings, operation and maintenance manual, final testing and inspection, and guarantees and warranties.

9. Provide all materials, equipment, and labor required for complete and operating electrical power and instrumentation systems.

10. Perform all trenching, backfilling, compaction, restoration of surfaces, dewatering (as required), duct bank fabrication, and pole installation required for grounding system, electric services and distribution, and instrumentation.

1.04. CODES AND STANDARDS

A. Reference to various codes and standards are a minimum installation requirements standard. In case(s) of discrepancy between the Contract Documents and the NEC, the stricter requirement shall apply.

B. All work, equipment, and materials furnished shall conform with the existing rules, requirements, and specifications of the Insurance Rating Organization having jurisdiction; the NEC; National Electric Manufacturer’s Association (NEMA); Underwriters Laboratories (U.L.); and the respective utilities.

C. All material and equipment shall bear the inspection labels of Underwriters Laboratories, unless otherwise allowed by the Engineer in writing and if the material and equipment is of the class inspected by said laboratories. All labeling shall be for the intended usage.

D. The Proposer shall be held responsible for adherence to all rules, requirements, and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the bid price. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for non-conformity. Acceptance by Rockland Green or Engineer does not relieve the Proposer from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

1.05. SUBMITTALS

A. Submit shop drawings under provisions of Section 01 33 00, Submittals.

B. The Engineer's approval shall be obtained for all equipment and material for which shop drawings are required before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.

C. Provide submittals for all conduit, wire, cable, boxes other than device boxes, enclosures, fittings, hangers, supports, outlets, disconnect switches, lighting fixtures, ballasts, starters, overloads, overcurrent devices, panelboards, control and starter panels, VFDs, seal-offs, and all other electrical equipment as listed in other sections.

D. Provide submittals for all Division 26 electrical and instrumentation work.

E. Conduit Layout Submittal: Provide submittals for all interior and exterior conduit layout. Submittals shall be 11x17 or 24x36, scaled drawings indicating conduit routing, elevations, quantity and type of conduits, quantity and type of wires, and conduit source and destination. All pull and junction boxes shall also be noted on the drawings. Conduits shall be tagged/labeled on the drawings and likewise labeled during installation.

1.06. RECORD DRAWINGS

A. In addition to the requirements of Section 017700, Contract Closeout, regarding record drawings, prepare and submit marked-up field record drawings, which shall include all addenda items and changes made during construction, to the Engineer prior to final acceptance. Additionally, submit record drawings consisting of the following three types of drawings:

1. Elementary or Schematic Diagrams - All control schematics and elementary diagrams. Those constructed as shown on Contract Drawings need only be verified on the marked-up field set. For those that changed, submit preliminary revised schematic and elementary diagrams for the Engineer's review. Once reviewed and approved, these diagrams shall be drafted on 24-inch by 36-inch sheets and added as "__A" sheets.

2. Block Diagrams - Prepare and submit fully labeled block diagrams, showing all point-to-point connections giving conduit size and fill (each conductor number, size, and color listed) showing all junctions boxes, pullboxes, panels, etc., together with terminal numbers at all conductor terminations. Each wire shall be assigned a unique identification tag, reflecting the label installed in the field. Initially, hand sketches on 8-1/2-inch by 11-inch sheets can be submitted for review. Once reviewed and approved, these designs shall be drafted on 24-inch by 36-inch sheets with suitable title block data. Block diagrams are to be updated to reflect all final connections (connections labeled) or other changes. When there is more than one sheet of block diagrams, an index shall be included to indicate on which sheet the respective pieces of equipment can be found. See sample attached to end of this Section.

3. Proposer's As-built Drawings - Provide one 24-inch by 36-inch copies of electrical as-built drawings of the Contract Drawings with all field notes and comments to illustrate actual construction conditions. As-built drawings shall include all addenda items issued during bidding and all other changes to the documents that occurred during construction. Drawing to be titled "Proposer's As-built Drawing, Prepared By: (name of Contactor), Date Issued:".

   Electronic copies of the as-bid set of Contract Drawings will be provided to the Proposer for use in record drawing preparation. Proposer shall modify the as-bid set of drawings for record drawings. All drawings shall be prepared using AutoCAD drafting; no paste-on information will be allowed.

B. Submit a final record drawing copy on 24-inch by 36-inch vellum for the Engineer's review.

C. "A" drawings shall be prepared (24-inch by 36-inch) showing all concealed conduit including ductbanks that cannot be shown clearly on the marked-up field set. All underground conduit routings and ductbanks shall be dimensioned from aboveground structures. All manholes, handholes, pullboxes, and bends without structures shall have at least two ties.

D. Once final approval of the drawings with corrections is provided to the Proposer, all final drawings shall be provided on a compact disc and produced using the computer-aided drafting system, AutoCAD 2014, as a minimum. Later revisions shall be saved as this version.

1.07. EQUIPMENT PROTECTION

A. Equipment and material shall be delivered to the site in new, unused condition in original packaging. Proposer shall be responsible to store equipment and protect against damage, theft, dirt, moisture and temperature extremes.

B. All switchboards, motor control centers, programmable logic controllers, variable frequency drive, generators and instrumentation to be transported under this contract shall be shipped to and from the site in enclosed, weathertight, sealed containers in a manner designed to protect the units against damaging stress caused by sudden acceleration or deceleration. An indicating meter, such as "Drop-N-Tell," designed to indicate any sudden impacts that exceed the unit's rating shall be shipped with and fixed to each assembly or its packing crate. Upon arrival of each shipment at the project site, the meter shall be examined in the presence of representatives of the Engineer, the Proposer, and the equipment manufacturer. If the acceleration indicates the package exceeded the limits of the meter, the assembly or subassembly shall be dismantled and completely inspected. All damage shall be corrected before the equipment is incorporated into the work. The Proposer shall bear all cost arising out of dismantling, inspection, repair, and reassembly, including engineering costs. The meters shall be sized for three times the weight of the packaged item.

C. During the installation of equipment, controls, controllers, circuit protective devices, etc., these items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operation.

D. Damaged equipment, as determined by Rockland Green and/or the Engineer, shall either be repaired to new condition or replaced with new equipment.

E. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

1.08. EQUIPMENT INSTALLATION AND REQUIREMENTS

A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.

Equipment shall be installed as close as practical to locations shown on the Drawings. Where Proposer supplied equipment sizes differ from that anticipated on the Drawings, the Proposer shall prepare and submit to the Engineer new “to scale” layouts showing new equipment locations for approval.

B. Equipment Provided Under Other Divisions

1. Reasonable effort has been made to show the actual locations and sizes of the equipment to be provided under other sections of the specifications and installed by other trades for the project. These locations shall be considered approximate, but suitable for preparation of the Proposer’s price proposal. These locations are not necessarily final locations. Proposer shall verify equipment size and location with the installing trades before rough in and obtain the applicable shop drawing information to enable the electrical trade(s) to furnish and install electrical service to the equipment, at no cost to Rockland Green.

2. The Proposer and/or the electrical installer(s) shall coordinate the exact locations of all equipment, receptacles, box-outs, sleeves and similar items required for the completion of electrical work with the structural, architectural, mechanical or other work.

3. The wiring configuration of equipment provided by other divisions will vary, depending on the manufacturer used. Specific wire connections to equipment provided by other divisions are not shown in these documents. The electrical installer(s) shall coordinate the wire connections with the division supplying the equipment.

4. No additional compensation will be made for relocations, reconnections or additional work required as a result of the failure of the Proposer and/or the electrical installer(s) to fully coordinate the work of all trades.

C. Inaccessible Equipment

1. Where the Engineer determines that the Proposer or his subcontractors has installed equipment that is not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as required by the Engineer at the Proposer’s expense.

2. “Conveniently accessible” is defined as reachable without the use of ladders, without climbing over or crawling under obstacles such as equipment, structures, piping and ductwork. Equipment shall be installed at the heights as specified in other sections of these specifications, except any readout devices shall be installed so that the centerline of the readout is 5 feet 0 inches above finish floor.

D. Equipment and Material - Equipment and material shall be designed to assure satisfactory operation and operating life for environmental conditions where being installed. These specifications, the NEC, and other code requirements shall apply to the installation in areas requiring special protection; i.e., hazardous, wet or corrosive area/location, and weatherproof construction.

E. Classified Areas

1. General - Enclosures for classified areas shall be as specified in Section 16161, Control Panels and Enclosures.

2. Hazardous Areas

a. In the areas designated as hazardous and where explosionproof work is shown or specified, all work shall meet the requirements of the NEC for the classification of that location.

b. Equipment enclosures shall be approved for use in the atmosphere of the area in which they are installed, i.e., Class I, Division 1, Group D; Class I, Division 2, Group D atmospheres.

3. Wet and Outdoor Locations - Where installed outdoors or in areas designated as wet locations, all work shall meet the requirements of these specifications and of the NEC for wet locations.

4. Corrosive Areas - All equipment shall be corrosion resistant in areas so designated unless specified otherwise.

F. Rigging and Moving Equipment - Proposer and his subcontractors shall exercise extreme care and caution in moving and installing equipment. Skilled riggers shall be employed to move any equipment over 300 lbs. or of sufficient bulk. Proper falsework, skids, blocking, runways, supports of new or existing work, or other devices shall be employed when moving or placing equipment.

G. Diagrammatic Drawings

1. Circuit diagrams shown are diagrammatic and functional only and are not intended to show exact circuit or wiring layouts, number of fittings or other installation details. The Proposer shall furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.

2. Circuits beyond their pushbutton and control device and conduits containing lighting circuits beyond panelboards are not always shown or scheduled.

3. The number of conductors shown is not necessarily the correct number required. Proposer shall install as many conductors as are required for the complete and satisfactory operation of all systems.

H. Conductor Sizing - Conductor sizes are shown for equipment branch circuits extending less than 100 feet from power source. Refer to schedule in this section for sizing conductors on circuits more than 100 feet long. Conduit sizes shall change accordingly.
Proposer shall include this cost in the price proposal.

PART 2 MATERIALS

2.01 RACEWAYS, FITTINGS AND BOXES

A. Raceways

1. Type A - Rigid Galvanized Steel Conduit (RGS)

a. Application - Unless otherwise indicated on the Contract Drawings or under this Specification Section, all wiring shall be run in Type A conduit.

b. Description - Hot dipped galvanized rigid steel conduit, shall conform to ASA C80-1.

c. Manufacturers

1) Youngstown.
2) Pittsburgh Standard (RobRoy Industries).
3) Triangle.
4) Or approved equal.

2. Type D - Rigid Non-metallic Conduit Schedule 40 (PVC)

a. This conduit shall be used in ductbanks. This type conduit shall not be used for stub-ups from ductbanks. Stub-ups shall be Type E.

b. Description - Rigid, non-metallic conduit, shall be rigid PVC, Schedule 40 and shall conform to Federal Specifications W-C-1094 and Underwriters Laboratories, Inc. Standard UL-651.

c. Manufacturers

1) Allied.
2) Cantex.
3) Or approved equal.

3. Type E – PVC-Coated Rigid Steel Conduit with an Interior Urethane Coating

a. Application - This conduit shall be used in the following areas: hazardous, wet, outdoor and corrosive areas.

b. Description – PVC-coated, rigid steel conduit. Shall conform to Federal Specification WWC-581d and be coated with a heat polymerizing adhesive prior to plastic coating. PVC coating shall be applied by plastisol method. The interior coating shall be a factory-applied two-part 2 mil thick chemically cured hot dipped urethane coating. The conduit shall conform to NEMA Standard No. RNI-1986.

c. Manufacturers

1) RobRoy Industries.
2) OCAL.
3) Or approved equal.

4. Type G - Liquid-tight Flexible Conduit

    a. Application - For use in wet areas as final connection to heating and ventilating equipment, motors, and other vibrating equipment.

    b. Description - Liquid-tight, flexible conduit shall be flexible galvanized steel case with extruded PVC jacket.

    c. Manufacturers

        1) Anonconda.
        2) Triangle.
        3) Keystone.
        4) O.Z. Gedney.
        5) Or approved equal.

5. Type H - Explosionproof, Flexible Conduit

    a. Application - For use in hazardous areas as final connection to lighting, heating and ventilating equipment, motors, and other vibrating equipment.

    b. Description - Explosionproof, flexible conduit shall be flexible core with bronze braid covering and steel end fittings.

    c. Manufacturers

        1) Crouse-Hinds.
        2) Appleton.
        3) Killark.
        4) Or approved equal.

B. Conduit Fittings

1. All Fittings – Cast-type material and coatings shall match conduit system it is to be used with.

2. Covers shall be of the same material as the fittings to which they are attached. Provide gaskets for exterior use and for interior wet areas.

C. Expansion Deflection Fittings

1. Material shall match conduit system it is to be used with, designed for 4-inch movement.

2. Coupling shall compensate for the following movements:

    a. Axial expansion or contraction.

    b. Angular misalignment.

    c. Parallel misalignment.

2. Application – expansion deflection fittings shall be provided at all underground to above ground conduit transitions and building expansion joints.

D. Access Fitting and Pulling Fitting - Of the same construction as conduit fittings. Provide cover gasket for interior wet locations and exterior areas. For corrosive areas, use PVC or fiberglass boxes.

E. Boxes

1. Outlet and Device - Of the same construction as conduit fittings. Provide cover gasket in wet locations.

2. Junction and Pullboxes - Of the same construction as conduit fittings. Up to 100 cubic inches. Larger interior non-classified area boxes shall be galvanized with hinged covers. Exterior and interior wet, non-corrosive areas shall be stainless steel. Provide cover gasket in wet or corrosive locations. Provide terminal strips for joining conductors in boxes over 100 cubic inches.

F. Elbows - Factory made by same manufacturer as couplings or conduit. Material to match conduit system it is to be used with.

G. Miscellaneous

1. Nipples, Locknuts, and Bushings - Factory made; material to match conduit system it is to be used with.

H. Conduit and Core Hole Sealing - Mechanical link type with elastomeric links joined by stainless steel bolts which also serve to expand the seal. Manufacturer – GPT Industries, Model “Linkseal.” Shall be fire rated when used in fire walls.

2.02 CONDUCTORS AND ACCESSORIES

A. Conductors: Application - Material - Manufacturers

1. Multi-Conductor Power and Control Cable

a. Application - For use in place of building wire and cable when powering three-phase equipment or for consolidating the number of power and control cables between two locations.

b. Description - Multi-conductor, Type TC cable.

1) Conductor - Stranded copper.
2) Insulation Voltage Rating - 600 volts.
3) Insulation Material - PVC with phase indicators for individual conductors and nylon or PVC for overall jacket.

c. Manufacturers

1) Anixter - Model 3G.
2) Cablec - Model AP14321.
3) Belden – Tray cable.
4) Or approved equal.

2. Building Wire and Cable

    a. Application - For general use for all conductor applications unless specifically called out otherwise. Not for use as instrumentation cable or in manufactured control panels, service entrance cable, and submersible cable.

    b. Description - Single conductor insulated wire type as indicated below.

        1) Conductor - Stranded copper only.
        2) Insulation Voltage Rating - 600 volts.
        3) Insulation Type - Type THWN for feeders and branch circuits.
        4) Insulation Material - PVC or thermoplastic with nylon overall jacket.

    c. Manufacturers

        1) Southwire – Type THWN
        2) General Cable – Type THWN
        3) Or approved equal.

3. Twisted Instrumentation Cable (Interior)

    a. Application - For signal or instrumentation wiring and use where called for on Contract Drawings.

    b. Description - Single or multi, twisted pair and twisted triad cable with overall shield.

        1) Conductor - Stranded copper, Size 16 AWG.
        2) Insulation Voltage Rating - 600 volts.
        3) Insulation Material - Color coded PVC for individual conductors and nylon or overall jacket.
        4) Shielding – 100 percent overall aluminum or aluminum/polyester foil.
        5) Drain - Tinned copper wire.

    c. Manufacturers

        1) Alpha - Model 2471 (2421).
        2) Belden - Model 8719 (8760).
        3) Or approved equal.

4. Twisted Instrumentation Cable (Exterior and Ductbanks)

    a. Description - Single and multi-twisted pair cable with overall shield.

    b. Conductor - Stranded copper, size 16 AWG.

    c. Insulation Voltage Rating - 600 volts.

    d. Insulation - PVC.

    e. Shielding, Single Pair - Aluminum/polyester tape.

    f. Drain - Tinned copper drain wire.

    g. Overall Jacket - Nylon.

h. Manufacturers

1) Okonite Company - Type P-OS, Model 264.
2) Belden Model 9342.
3) General Cable BICC, No. 125986.
4) Or approved equal.

5. Telecommunication Cable (for Interior Use)

a. Application - For use where called for on Contract Drawings.

b. Description - Multi-conductor cable, insulated and twisted into pairs.

1) Conductor - Solid copper, minimum Size 24.
2) Insulation Material - Color-coded PVC for individual conductors and PVC for overall jacket.
3) Rip Cord - If available.
4) Outer Jacket - PVC.

c. Manufacturers

1) Anixter - Inside wiring, Model CAT 6 Type CMR.
2) Belden – CAT 6, Model 1232A1.
3) General Cable – CAT 6 UTP Type CMR.
4) Or approved equal.

6. Telecommunication Cable for Underground Ductbank Installations

a. Description - Multi-conductor cable. Insulated conductor is twisted into pairs for installation in ductbanks.

b. Conductor - Minimum size No. 24 solid, annealed, bare copper.

c. Insulation – Color-coded, polyethylene or polypropylene.

d. Units - Pairs stranded into units.

e. Cover - Wire bundle covered with non-hyroscopic tape.

f. Sheath - Aluminum shield.

g. Jacket - Polyethylene; marked at foot intervals. Outside plant rated.

h. Manufacturers

1) Anixter – Type RUS/REA PE-89.
2) General Cable – Type RUS (REA) P-89AL.
3) Or approved equal.

7. Submersible Motor Conductors

a. Description - Submersible, non-hazardous, extra heavy usage.

b. Conductor - Stranded copper.

c. Insulation Voltage Rating - 600 volts.

d. Insulation - EPD and CP or EP (ethylene propylene) with phase indicators.

e. Manufacturers

1) Anixter - Model 4 PC.
2) Okonite.
3) Cable supplied with and as part of the manufacturer's standard product offering.
4) Or approved equal.

8. Bonding and Grounding Conductors

a. Application - For use as needed to meet the requirements of this specification as shown on the Drawings and the NEC for bonding and grounding.

b. Description - Multi-conductor cable, insulated conductor is twisted into pairs.

1) Conductor - Bare copper wire.
2) Stranding - Solid ASTM B-1 for Sizes No. 8 and smaller. Stranded ASTM B-8 for Sizes No. 6 and larger.
3) Grounding system conductor from inside equipment to grounding rods or plates and under ductbanks shall be tin-plated. Note: This is a special item; order well in advance of installation.

c. Manufacturers

1) Anixter - Model 1A or 1B.
2) Cablec - Molded "bare and coated copper conductors" listed under Section 7, "Special Purpose Cables."
3) Or approved equal.

9. Control Panel Wire

a. Application - For use in all manufactured or custom built control panels.

b. Description - 90 degrees C machine tool wire.

1) Conductor - Minimum Size AWG #16, 19 strand.
2) Insulation - PVC, 2/64-inch for 600 V service.

c. Manufacturers

1) Carol - Catalog Series 7600.
2) Anixter - Catalog Series 6W.
3) Or approved equal.

10. Multi-Conductor -1000V Flexible Motor Supply Cable (VFD Cable)

a. Application – For use as motor wiring for VFD driven equipment.

b. Description – 90 degrees C AC motor drive, VFD motor cable.

1) Four-conductor, three-stranded tinned copper circuit conductors plus one ground wire with PVC insulation, XLP insulation.
2) Overall foil shield (100 percent coverage) plus tinned copper braid shield (85 percent coverage), tinned copper drain wire.
3) Overall sun and oil-resistant PVC jacket.

c. Manufacturers - Belden Model No. 29502.

B. Wire Terminations and Connectors

1. General

a. Connector material shall be compatible with the wire that it is to be used with.

b. Connectors made of aluminum shall not be used with copper conductors.

c. Connectors listed below are for use with copper wire. Connectors to be used with aluminum wire shall be of the same general type and construction as those listed below, but shall be suitable for use with aluminum conductors.

2. Terminal Block Manufacture

a. Control Wiring

1) Buchanan - Model 0241.
2) Connectron - Model NSS3.
3) Or approved equal.

b. Equipment Power Wiring

1) Buchanan - Model 416.
2) Connectron - Model NC3.
3) Or approved equal.

3. Two-Way Splices

a. Description - Tubular compression type for conductors 1/0 and larger. Rated 600 VAC and uninsulated.

b. Manufacturer

1) Burndy - Model YS-L “Hylink.”
2) Thomas & Betts - Model 545.
3) 3M Model 10000.
4) Or approved equal.

4. Crimp Connectors

a. Description - For branch circuit connections, other than lighting and receptacle circuits.

b. Manufacturers

1) Ideal - Series 30; Model 410, 411, 412 with Model 415 and 417 insulator.
2) Thomas & Betts - Model PT66M.
3) Or approved equal.

5. Bus or Lug Terminals, Manufacturer - 600 VAC, Crimp Type

a. Burndy - “HYLUG” Catalog, Series YA.

b. Ideal - Catalog Series CCL and CC.

c. Or approved equal.

6. Terminal Strip Connectors

a. Description - For control and instrumentation connections to terminal strips. Locking fork, vinyl, self-insulated, crimp-type connectors or tubular clamp type.

b. Manufacturers

1) Burndy - “VINYLUG” Types TP-LF and BA-EL.
2) Thomas & Betts - Catalog Series 18RA, 14RB, and 10RC.
3) Ideal - Series 83-7.
4) Or approved equal.

7. Wire Nuts

a. For Unclassified Areas - Hexagonal-shaped for use with a nut driver, compact swept-wings, ribbed cap, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).

1) Ideal - Models 341 and 342.
2) 3M - Models 212, 312, and 512.
3) Buchanan - Models B-1, B-2, and B-4.
4) Or approved equal.

b. For Wet, Corrosive, and Hazardous Areas - Compact swept-wings, ribbed cap, filled with non-hardening sealant, UL listed for 600V with temperature rating of 105 degrees C (221 degrees F).

1) Ideal - Model DB Plus.
2) Buchanan - Model BTS2 and BTS4.
3) Or approved equal.

8. Bolted Wire Connectors - Mechanical connectors for all combination of copper and aluminum conductors. Connectors shall be of a compact high-strength design, tin-plated copper alloy, two-piece connector, and shall utilize two hex head bolts.

a. Burndy - Model KVSU.
b. Ideal.
c. Ilsco Corp.
d. Or approved equal.

2.03 WIRING DEVICES

A. Wall Switches

1. Types, Manufacturers, and Catalog Numbers

Contact	P&S	Leviton	G.E.	Hubbell
1-pole	20AC-1	1221-2	GE5951-1G	1221
2-pole	20AC-2	1222-2	GE5952-1G	1222
3-way	20AC-3	1223-2	GE5953-1G	1223
4-way	20AC-4	1224-2	GE5954-1G	1224
3-position	1225	--	GE5957-1	1387
Pilot, 1-pole	20AC-1-RPL	1221-PL	SP121-8G	1221PL
Locator, 1-pole	PS20AC-1-CSL	1221-LHC	SL122-2G	1221IL

Hazardous Area, Class I, Divisions 1 and 2, 1-pole factory sealed snap switch or manual motor starting switch - Crouse Hinds, Model EDS Series; or Appleton, Model EDS Series with selector switch covers.

B. Receptacles (Note: All receptacles shall be “side wired” style. “Push-in” styles are not acceptable.)

1. Single Convenience Receptacle

a. Pass & Seymour, Inc. - Model 5361.
b. Hubbell - Model 5361.
c. General Electric - Model 4102.
d. Leviton - Model 5361.

2. Duplex Convenience Receptacle (Interior Use Only) - 20 amp, 125 volt.

a. Pass & Seymour, Inc. - Model 5362.
b. Hubbell - Model 5362.
c. General Electric Co. - Model GE5342.
d. Leviton - Model 5362.

3. GFCI Receptacle

a. Pass & Seymour, Inc. - Model 2091-S.
b. Hubbell - Model GF-5362.
c. General Electric - Model GFR-5342.
d. Leviton - Model 6899.

4. Dust and Moisture-Resistant Receptacle, Gray Face, Exterior Use

a. Pass & Seymour, Inc. - Model CR6307.

5. Explosionproof Receptacle, Class I, Division 1, 20 Amp, 125 Volt

a. Single gang, feed-thru units.

1) Crouse Hinds - Model ENRC21201.
2) Appleton Electric Company - Model EFSC175-2023.

b. Single gang, dead-end units.

1) Crouse Hinds - Model ENR21201.
2) Appleton Electric Company - Model EFS175-2023 Company.

C. Verify wall openings are neatly cut and will be completely covered by wall plates.

D. Wall Plates - Install receptacle and switchplates in accordance with the following schedule:

1. Interior, Unclassified

a. Finished Areas - Standard ivory non-metallic.

b. Unfinished

1) Concealed Wiring - Standard non-metallic brown plates.
2) Surface-Mounted Raceway - Standard brown non-metallic receptacle plates. Standard brown non-metallic switchplates.

2. Interior, Wet Areas

a. Non-metallic weatherproof receptacle plate.

b. Stainless steel switchplate.

2.04 GROUNDING

A. Existing ground system shall remain intact. Any portions that are disturbed during construction shall be restored or replaced.

B. Size of grounding and bonding conductors shall be as shown but not smaller than required by the NEC, Articles 250-66 and 250-122.

C. See specification 26 05 26 Grounding for additional requirements.

2.05 PANELBOARDS

A. General

1. Interiors

a. All interiors shall be completely factory assembled.

b. Neutral bars to be full size and insulated. Neutral bussing to have suitable lugs for each feeder. In subfeed panels, neutral shall be isolated from ground.

c. Provide a ground bus in each panel.

2. Boxes - Panelboards

a. Provide at least minimum gutter space in accordance with NEC.

b. Provide a minimum of four interior mounting studs.

d. Provide door within a door front cover.

e. Enclosures shall be as scheduled on the drawings, NEMA 12 minimum.

3. Trim

a. Provide barriers as required for completely dead-front construction.

b. Provide minimum projection, chrome-plated latch with key lock on panelboards. Key all locks alike.

c. Provide heavy plastic cover over permanent directory.

4. Bus Bars - All main bus bars shall be tin-plated copper sized in accordance with UL Standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above air ambient of 40 degrees C maximum.

B. Lighting Panelboards (LP)

1. Definition - Lighting panelboards shall operate at 208Y/120 volt, 3 phase power. The panel may contain circuit breakers to power lighting and receptacles. The panel may contain breakers to power equipment other than lighting and receptacles.

2. Panelboard breakers shall be molded case, thermal magnetic trip, bolt-on connection, quick-make, quick-break, toggle handle circuit breakers. Two- and three-pole units shall be internal common trip type. Contacts shall be silver alloy.

3. Main circuit breakers shall be rated 22,000 A.I.C. or as indicated on the Drawings.

4. Panelboards for use at 240 volts AC maximum shall incorporate branch circuit breakers as shown or scheduled rated at 22k A.I.C. symmetrical at 240 volts.

5. Provide three handle padlock attachments for each, 1-pole, 2-pole, and 3-pole breakers.

6. Design Basis – Square D NQOD series.

C. Equipment Panelboard (PP)

1. Definition – Equipment panelboards are to operate on 480Y/277 volt, 3 phase power. Equipment panelboards shall not have a main circuit breaker larger than 225 amps. Equipment panelboards shall not have branch circuit breakers larger than 70 amps. The panel may contain circuit breakers to power lighting.

2. Panelboard Breakers - Molded case, thermal magnetic trip, bolt-on connection, quick-make, quick-break, toggle handle circuit breakers. Two- and three-pole units to be internal common trip type with silver alloy contacts.

3. Main Circuit Breakers - Rated at 22,000 A.I.C. or as indicated on the Drawings.

4. Panelboards for use at 480 or 600 volts AC maximum to incorporate branch circuit breakers as shown or scheduled rated at 25,000 A.I.C. symmetrical at 480 volts.

5. Design Basis - Square D Model NF series.

2.06 DISCONNECT AND SAFETY SWITCHES

A. Definitions

1. Disconnect Switches - Non-fusible switches.

2. Safety Switches - Fusible switches.

B. Characteristics

1. Heavy-duty type construction.

2. Number of poles shall be equal to the number of current carrying conductors.

3. Lockable in “off” or “open” and in the “on” or “closed” position.

4. Quick-make, quick-break switch mechanism.

5. Dual cover interlock to prevent opening of the switch door when handle is in the “on” position, and to prevent closing of switch mechanism with the door open. Provide a defeat mechanism.

6. Visible blade construction.

7. Single throw unless noted otherwise.

8. All main service safety switches shall come with an AR-type fuse rejection kit and shall be listed “Service Entrance Rated”.

9. Manual transfer switch shall be triple pole, double throw, center position off, lockable.

C. Ratings

1. 600 volts for 480V systems and 240 volts for 208V systems. Ampere or horsepower rating as shown or required.

2. RMS symmetrical interrupting rating shall be 100,000 amperes for main service, 10,000 amperes otherwise.

3. Lugs shall be rated and U.L. listed for 60 degrees C and 75 degrees C wires.

D. Enclosures

1. U.L. listed.

2. NEMA 4X stainless steel for exterior and wet locations; NEMA 4X non-metallic for corrosive areas; NEMA 7 for hazardous locations; all others NEMA 12.

3. Provide with enclosure-mounted handle operator, operating through approximately 180-degree arc.

E. Fuses - Dual element RK1 current limiting type, time delay. Bussman Low-Peak LPN-RK or equal.

F. Manufacturers - Heavy-duty Square D Class 3110; ABB Type TH; Eaton Type H-600; or equal.

2.07 NAMEPLATES AND LABELS

A. Nameplates

1. Material - Rigid laminated plastic.

2. Lettering Height - 5/16-inch high.

3. Lettering Color - White.

4. Background Color - Black.

B. Labels

1. Self-debossing, aluminum foil type.

2. Typewritten or preprinted black legends on white background.

3. Permanent Pressure-Sensitive Adhesive - Provide high temperature adhesive for labels on heat producing devices.

4. Use preprinted sleeve type for conductors. Label at each termination or splice.

5. Manufacturers - Seton or equal.

C. Equipment and Control Identification

1. In addition to the requirements of the NEC, install an identification label which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), motor control centers, VFDs, safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchgear and motor control assemblies, control devices and other significant equipment.

2. Provide nameplates for all electrical equipment and controls.

3. Attach nameplates with stainless steel or other non-corrosive metallic rivets or screws.

4. Provide a nameplate at each remote switch or control device when the controlled function is not readily identifiable.

5. All wiring except major power conductors shall have each end of the conductor labeled. Label wires at each junction box.

D. Conduit Tags

1. 1.5” diameter stainless steel tags with etched or embossed lettering. Provide stainless steel wire ties.

2. Manufacturers – Brady or equal.

PART 3 EXECUTION

3.01 CONDUIT INSTALLATION

A. Conduit System Fabrication

1. All interior conduit shall be installed exposed. No conduit shall be in or under slabs except for building incoming/outgoing systems.

2. No conduits within walls where the walls are below grade, i.e., in basements or galleries.

3. No conduit shall be run on the exterior face of any structure unless specifically shown exposed or approved by the Engineer prior to installation.

4. Conduit Defects - All conduit runs, cuts in coatings, to be free of indentations, elliptical sections, blisters, and other defects. Repair or replace damaged conduit sections as instructed by the Engineer.

5. Conduit Cutting - Cut all conduit ends square and remove all burrs. Cut conduit ends exactly to avoid excessive penetration into boxes.

6. Expansion Joints - Provide approved conduit expansion joints wherever conduit crosses a structural expansion joint; is attached between two separate structures; the conduit run is 50 feet or more in a single length for Types B, C, D, and D-1 conduit or 100 feet or more for Types A and E; or wherever shown or specified. Support conduit on each side of the expansion joint.

7. Preparation for Conductor Installation - Prior to pulling cables in any conduit system, thoroughly clean the inside of each length of conduit by swabbing or the use of compressed air to remove all foreign matter. Then temporarily plug the ends of each conduit to prevent the entrance of dirt or foreign matter.

8. Couplings

   a. Tightly butt ends of conduit into the couplings.

   b. In exposed work only, where standard couplings cannot be used, only union-type couplings are permitted or as otherwise acceptable to the Rockland Green.

9. Cutting of Structures - Keep the cutting of walls or floors for conduit to a minimum. Where such cutting is absolutely necessary, take care so as not to weaken the walls or floor involved. Do not cut beams or other structural supports under any condition.

10. Connection to Devices - Conduit attachment to all electrical equipment, such as sheet steel junction boxes, pullboxes, switches, etc., to be made with approved fittings with non-metallic bushings.

11. Conduit Bends and Elbows

    a. Rigid Metallic Conduit Systems (Type E)

        1) Heating metal conduit to facilitate bending is strictly prohibited.

        2) Field bending metal conduit is permitted as follows:

            a) Type E - Up to and including 3/4-inch size.

        3) For all rigid metal conduit larger than that above, use manufactured elbows or use hydraulic one-shot bender to fabricate bends.

        4) Use manufactured elbows for all bends in Type E conduit systems.

        5) Make all bends with radius no less than NEC requirement.

        6) Apply PVC spray for all exposed threads, cuts, etc.

    b. Rigid Non-Metallic Systems (Type D)

        1) Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit with appropriate cleaner, then dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

        2) Field bending of Type D conduit is permitted only if a “hot box” is used.

        3) Make all bends with radius no less than NEC requirement.

        4) Kinked or crimped conduit bends are not acceptable. Remove and replace all such bends.

12. Routing of Conduits - Keep the number of bends, offsets, and crossovers to a minimum; however, not more than three 90-degree elbows or equivalent bends up to 270 degrees is to be installed in any run between pulling or access fittings.

13. Structural - Make holes around conduit or cables watertight or gastight via silicone or acrylic latex masonry sealant upon completion of conduit or cable system.

B. Conduit Size - Minimum conduit sizes shall be as follows unless specifically shown otherwise:

    1. 3/4-inch for exposed locations (includes those areas above drop ceiling of lay-in tiles)

    2. 1-inch for any concealed conduit in walls or within or beneath slabs.

    3. 2-inch for any conduit in ductbanks (unless specifically shown otherwise).

C. Changes in Conduit Sizes - Made at pull or junction boxes except where specifically shown via a pull fitting.

D. Conduit and Sleeve Sealing

1. Seal inside of conduit (after installing and testing conductors) where passing through exterior walls or walls containing vapor seals or required to be gastight. Sealing may be accomplished by locating junction or approved sealing fitting at wall and filling with an approved waterproof electrical putty or sealing compound. Seal around all interior conduit passing through floor and wall boxouts.

2. Where driptight and watertight NEMA 4X and 12 installations are required, use only watertight hubs for top or side entry. Locknuts with gaskets are not acceptable. Conduits entering the top of electrical equipment are to either be sealed or located in such a manner as to prevent water from entering the equipment through the conduit system. Install conduit for ease of sealing.

3. Provide boxouts where conduit passes through poured-in-place concrete floors or walls. Core drill all other concrete walls, new or existing. Make cores 1-inch minimum, larger than O.D. of conduit.

E. Interior Walls

1. Non-Fire Rated Walls

a. Between Unclassified Areas

1) No Drop Ceiling or Below Drop Ceiling - Use core drilled holes.

2) Above Drop Ceiling

a) Air Handling Space - Core drill holes and seal around conduit.

b) Not Air Handling Space - Box out wall for conduits.

b. Between Classified or Classified/Unclassified Areas

1) Use core drilled hole. In masonry wall, seal with non-shrink grout to within 3/4-inch of wall face. Seal gastight and watertight with silicone acrylic latex masonry sealant. Fill hollow masonry voids with grout.

In concrete wall, seal around conduit with modular neoprene links and stainless steel compression bolts.

F. Access Fittings

1. May be used as required to facilitate installation of conductors or where shown.

2. Provide access fittings or conductors, as manufacturer recommends so as not to damage conductor or insulation during conductor pulling operations.

G. Pull and Junction Boxes - All pull and junction boxes shall be installed where shown or specified. Additional boxes may be installed as required to facilitate installation of conduit system.

3.02 CONDUCTOR INSTALLATION

A. Installation

1. Install products in accordance with manufacturers' instructions.

2. Do not pull thermoplastic wire at temperatures below 35 degrees F.

3. Protect exposed cable from damage.

4. Provide Kellem support grips when electrical cables hang in a vertical, sloping, or horizontal position.

5. Neatly train and lace wiring inside boxes, equipment, and panelboards.

6. Install electrical circuit loadings as designed on Contract Drawings unless approved otherwise by Engineer.

7. Where instrumentation cables are installed in panels, etc., the Proposer shall arrange wiring to provide maximum clearance between instrumentation cables and other conductors. Instrumentation cables shall not be installed in the same bundle with conductors of other circuits.

8. Intrinsically safe conductors shall be in separate conduits both inside and outside enclosure and shall be terminated on terminal strips with barriers. Barriers are to physically isolate intrinsically safe conductors from non-intrinsically safe conductors.

9. Installation in Concrete Manholes and Handholes - Neatly bundle conductors and train them around the outside (long way around) of the enclosure. Support conductors from hooks or cable supports inside of enclosure.

10. Wiring Diagrams

    a. Any wiring diagrams shown on plans for hookup of equipment furnished by others are approximate and are for bidding purposes only.

    b. Obtain wiring diagrams, certified correct for the job, from respective supplier for all equipment and systems furnished by them.

    c. Install all work in accordance with certified wiring diagrams.

11. Electrical Trade to provide all power, control, and signal wiring and conduits between system components (including installation of any conductors supplied by other trades), including final connections to labeled terminal strips integral in equipment, as shown on Drawings, and in accordance with approved manufacturer's wiring diagrams. Exception is for certain HVAC conduit and wiring where specifically shown or specified to be by HVAC Trade.

B. Color Coding

1. Provide color coding for all service, feeder, branch, control, fire alarm, and signaling circuit conductors.

2. Grounded Conductor Color Coding in New Installations

   a. Ground – Green.

   b. Neutrals – White for 120V systems; gray for 277V systems.*

      *Exception: Where neutrals of more than one system are installed in the same raceway or box, each neutral shall be white or gray with a different colored (not green) stripe.

3. In addition to existing facilities, ungrounded conductors in different voltage systems shall match the existing system and/or be as follows:

   a. 120/208-volt, 3 phase: 120/240*
      Phase A - Black
      Phase B - Red
      Phase C - Blue

      *For high (“wild” or red) leg delta system, the high leg shall be orange.

   b. 277/480-volt, 3 phase:
      Phase A - Brown
      Phase B - Orange
      Phase C - Yellow

   c. 120/208 or 120/240-volt, single phase: Red and Black

   d. DC Power:
      Positive Lead - Red
      Negative Lead - Black

   e. DC Control: All blue

   f. 120-volt Control Wiring: Single conductor AC control wire shall be red, except a wire entering a motor control center compartment or control panel which is an interlock shall be color coded yellow.

   g. 24-volt Control Wiring: Orange

   h. Neutral (Grounded Conductor): White or Gray

   i. Grounding Conductor: Green

C. Conductor Sizing

1. Conductor sizes that are shown for equipment branch circuits are the minimum sizes allowed. Refer to schedule in paragraph 3.02.C.2.c. below for sizing conductors on circuits longer than the minimum length shown for the various voltages. Adjust conduit sizes accordingly.

2. Wiring shown without size to be sized by one of the following methods, whichever is larger. No additional payment will be made for oversized conduit or conductor.

   a. Power and Lighting Circuits - Minimum size No. 12 AWG. Quantity as required for proper operation. Use 3/4-inch conduit types as required for the area where conduit is installed.

b. Control Circuits - Minimum size No. 14 AWG. Quantity as required for proper operation, use 3/4-inch conduit, type as required for the area where conduit is installed.

c. Increase minimum size conductors for 20 ampere single phase circuits where distance between power source and item served exceeds noted length in accordance with the following table. No more than 2 percent voltage drop of all branch circuits at equipment's rated full load current is permitted.

120 volts	100' to 150'	#10	151' to 225'	#8	226' up	#6
208/240 volts	100' to 175'	#10	175' to 250'	#8	251' up	#6
265/277 volts	125' to 200'	#10	201' to 300'	#8	301' up	#6
460/480 volts	225' to 350'	#10	351' to 525'	#8	526' up	#6

d. Minimum size of branch circuits over 20 amps per requirements of NEC Tables 310.16 thru 310.31.

3. Neutral Wire - To be equal to ungrounded wires unless otherwise shown.

4. Ground Wire - Minimum size as required by the NEC Table 250-122.

D. Spare Conductors - Wherever groups of control and instrumentation conductors are required, provide the following minimum numbers of spare conductors. As required, Proposer shall increase conduit sizes shown to accommodate spare conductors. Terminate at terminal strips on both ends and mark as spare and indicate the location of opposite end.

Conductors	Spares
Up to 10	4
11 to 18	6
19 and over	8

3.03 CONDUCTOR STRANDING

A. All conductors shall be stranded except for interior lighting and receptacle circuits #10 and smaller.

3.04 CONNECTORS AND TERMINATIONS

A. Use manufacturer's standard lugs for connection of conductors to equipment panel or devices.

B. Use UL approved wire nuts for lighting and receptacle circuits and for other circuits, compression connectors for connection of conductors to other conductors.

C. Terminal Board Terminations - All interconnecting instrumentation wiring to terminal boards and strips to be made with insulated crimp type connectors (locking fork type). Stranded wire is not to be directly connected to terminals without the use of connectors unless the terminations are specifically made to accept bare stranded wire, i.e., tubular clamp type termination. No loose strands shall be permitted outside of the connector, whichever is utilized.

D. Motor Connections

1. Motors Less Than 1 HP - Use wire nut appropriate for the environment where the motor is located.

2. Motors From 1 to 20 HP - Use branch circuit crimp-type connectors.

3. Motors Above 20 HP - Use bolted wire connectors. Insulate the connector with insulating putty to at least 7/64 inch and tape the insulated connection with two layers half lapped of neoprene splicing tape.

E. Splicing - Make splices in accessible locations and in junction boxes. No splices will be permitted in pulling fittings or MCC wiring spaces.

3.05 GROUNDING

A. Maintain electrical integrity of conduit system throughout. Provide bonding jumpers at fittings as required; jumpers to be no longer than required. Provide separate ground wire for all conduit systems and where grounding integrity is doubtful.

B. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and that neutral only be connected to ground at the main service grounding point. Run equipment ground independently back to main service ground. Use separate insulated (green) grounding conductors for all grounding conductors. Where ground passes through panels and disconnects, braze ground lugs to panel or disconnect housings. Isolate neutral bus or lug from ground. Ground all conduits at each panel.

C. Shielding to be continuous and grounded at one point only unless otherwise required by equipment manufacturer’s recommendations.

3.06 EQUIPMENT AND DEVICE MOUNTING HEIGHTS

A. Mounting heights are as follows, unless otherwise noted:

1. Receptacles - 48 inches.

2. Switches - 45 inches to the center.

3. Thermostats - 54 inches.

4. Enclosed Starters or Circuit Breakers

a. Wall Mounted - 66 inches to top.

b. Interior Mounting Stand/Exterior Not on Tank – 36 inches to center of operating handle for equipment less than 60 inches high.

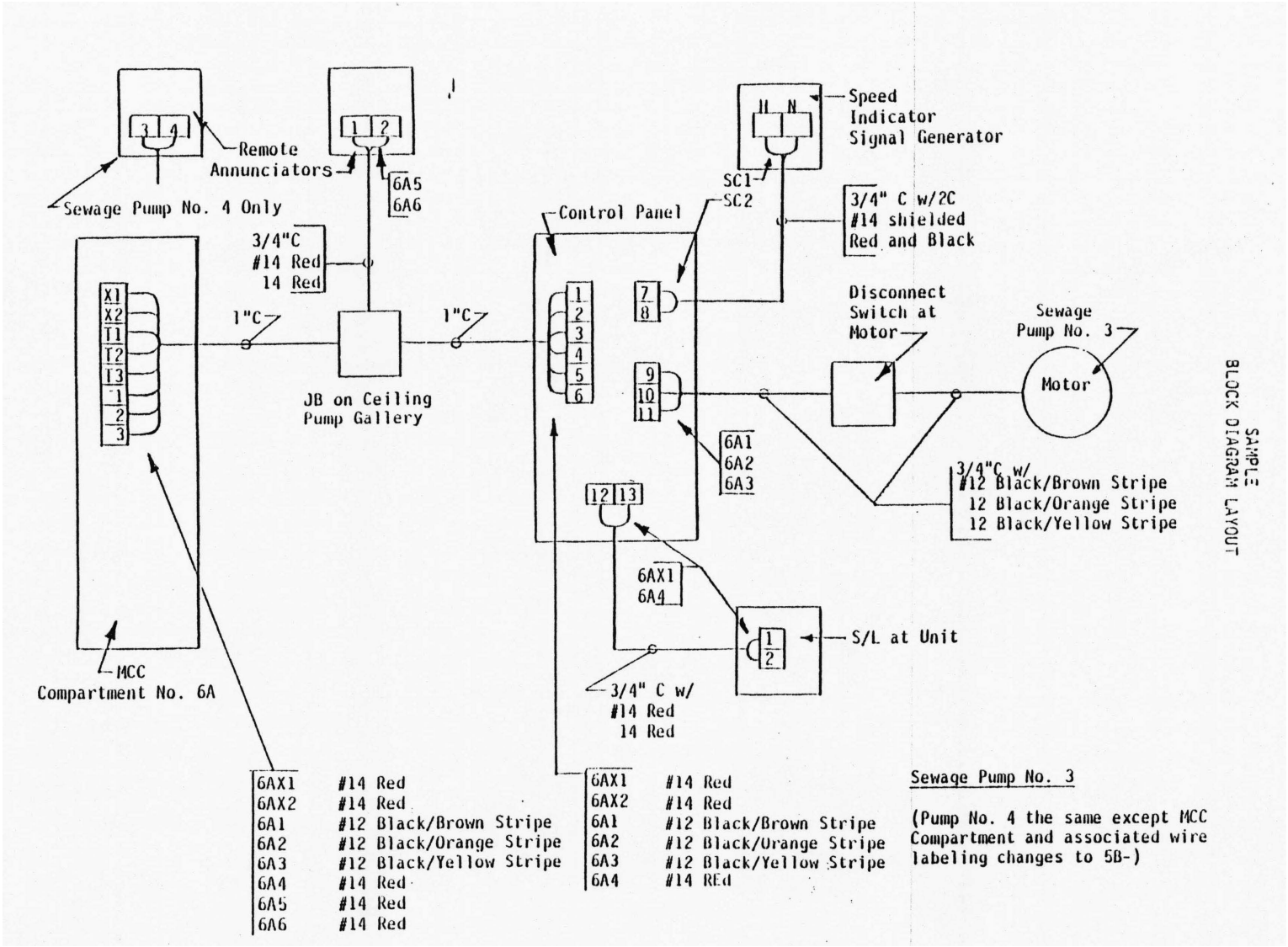
c. Exterior Mounting on Tanks – 36 inches to center.

5. Control or Starter Panels - See Section 26 27 16, Control Panels and Enclosures.

6. Panelboards - 66 inches to top.

7. Disconnect Switches - See Section 26 27 16, Control Panels and Enclosures.

(continued)



END OF SECTION

SECTION 260529

ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.02. REFERENCES

A. NECA - National Electrical Contractors Association.

B. ANSI/NFPA 70 - National Electrical Code.

1.03. SUBMITTALS

A. Manufacturer’s Instructions - Indicate application conditions and limitations of use stipulated by Product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.04. REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01. PRODUCT REQUIREMENTS

A. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.

B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products and designing system supports.

2.02. STEEL CHANNEL

A. Non-PVC Coated

1. Ductile Iron

a. Description - Hot dipped galvanized steel channel designed for use with steel fittings, spring backed washers and nuts.

b. Manufacturers

1) Kindorf.
2) Uni-Strut.
3) B-Line.
4) Globe.

2. Stainless Steel

a. Description - For the purpose of this Section, all stainless steel shall be Type 304.

b. All fasteners, fittings, clamps, saddles and accessories shall be stainless steel.

c. Manufacturer

1) Uni-Strut.
2) B-Line.

B. Polyvinyl Chloride (PVC) Coated Materials

1. Hanger or support shall be hot dipped galvanized including the threads.

2. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.

3. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.

4. The PVC coating shall be applied by the liquid fluidized bed method.

5. The coating material shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers or gross, non-uniform characteristics.

6. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mils) and a maximum thickness of 0.045-inch (45 mils).

7. Finished Color - Manufacturer’s standard.

8. Manufacturers

a. B-Line Systems, Inc.

b. Perma-Cote Industries.

c. Occidental Coating Company (OCAL).

d. Robroy Industries (Plasti-Bond Red).

e. Kor Kap.

2.03. TWO-PIECE MALLEABLE IRON CLAMPS

A. Cast malleable iron or stainless steel strap clamp sized to match conduit with mating malleable iron clamp backs (spacers). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Cadmium-plated anchor and washer. Manufacturer - O-Z/Gedney, Thomas & Betts, Appleton, Raco, or equal.

B. PVC coated cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp back (spacer). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Stainless steel anchor and washer. Manufacturer - Robroy, Thomas & Betts, Ocal, Perma-Cote Industries, Kor Kap, or equal.

PART 3 EXECUTION

3.01. INSTALLATION

A. General

1. Install products in accordance with manufacturer’s instructions.

2. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Anchor conduits to or support from structural members only.

3. Fasteners used to wall mount any material or equipment weighing 75 lbs or more to concrete or masonry shall be adhesive grouted Type 316 stainless steel anchors. All floor-mounted equipment and other wall-mounted materials or equipment weighing less than 75 lbs may be supported via drilled anchors.

4. Do not use spring steel clips and clamps.

5. Do not use powder-actuated anchors.

6. Do not drill or cut structural members.

7. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel. Obtain the Engineer’s written approval of any drilling or cutting on the structure.

8. Through spaces where surface mounting is not available, install multiple conduits on electrical channel rack, either hung or wall mounted. Provide space on each rack for 25 percent additional conduits.

9. All hung systems with conduits 3-inch or larger shall also have lateral seismic supports at each hanger.

10. Support conduit passing through above-grade floors so that sealing sleeves or mechanical link seals do not carry the weight of the conduit.

11. Secure conduit installed in poured-in-place concrete to reinforcing bars with tie wires. Install suitable brackets secured to forms in the absence of reinforcing bars.

12. Install individual surface-mounted conduit with two-piece cast malleable iron clamp assembly.

13. Install surface-mounted cabinets and panelboards with minimum of four or six anchors, depending upon the number of normal anchor points. See table at the end of this section.

14. In wet and damp locations use PVC-coated steel channel supports to stand cabinets, panelboards and mounting panels 1/2-inch (12 mm) off wall.

15. Finish of all supports shall be compatible with the conduit system applicable for the area classification where installed.

16. After thorough investigation of architectural, structural and shop drawings related to work to determine how equipment, fixtures, conduit, panelboards, etc. are to be supported, mounted or suspended, provide:

    a. Extra steel bolts, inserts, pipe stands, brackets, or any other items required for proper support.

    b. Supporting accessories where required, whether or not shown on Drawings.

17. Refer to details on the Contract Drawings for free standing and railing mounted construction and for any other details of special conditions. For other situations, the Proposer shall, prior to installation, submit mounting details to the Engineer for approval.

18. Coat field cuts of PVC-coated support members with matching PVC material to thickness of system coating. File smooth all cuts prior to coating.

B. In areas where spray insulation is to be applied, install steel channel standoffs for electrical conduit, boxes and enclosures prior to installation of insulation.

   Provide conduit extensions to all boxes and enclosures. Install connecting conduit, boxes and/or enclosures over the installed insulation.

C. Support Applications

   1. Unclassified Areas - Galvanized steel channel system or malleable iron clamps.

   2. Interior Corrosive Areas - Fiberglass reinforced plastic channel system.

   3. Interior Polymer Areas - PVC-coated galvanized steel channel system.

   4. Interior Wet Areas - Stainless steel channel system.

   5. Hazardous Areas - PVC-coated galvanized steel channel system.

   6. Exterior Areas - Stainless steel channel system.

D. Anchor and Fastener Application Schedule - See schedule at end of this section.

E. Support Spacing

   1. Metallic Conduit - Not more than 8 feet on center. Types A, A-1, B, E, E-1 within 3 feet of each outlet box, junction box, cabinet or fitting. Type C, within 18 inches of box or fitting. Support boxes, fittings, or cabinets independent of conduit system.

2. Non-Metallic Conduit

    a. Sizes up through 1-1/4-inches diameter - not more than 3 feet on center.

    b. Sizes 1-1/2-inches diameter and larger - Not more than 4 feet on center.

    c. Within 18 inches of each outlet box, junction box, cabinet or fitting.

3. Maximum Deflection

    a. Metallic Conduit - 1/100th of span between supports.

    b. PVC Conduit - 1/360th of span between supports.

(continued)

ANCHOR AND FASTENER APPLICATION SCHEDULE

Item Category	Mounting Surfaces					
	Wood, Plywood	Wallboard, Gypsum, FRP, Composition	Hollow Masonry	Solid Masonry	Cast Concrete	Sheet Metal
Individual conduit	F	G	D	A	A	E
Steel/FRP channel	F, I	D	D	A	A	E
Structures (i.e., conduit rack, cable tray)	F, I	D	D	A	A	--
Devices and Equipment Less than 75 lbs.	I	Note 1	D	A	A	Note 2
Devices and Equipment 75 lbs. or More (Note 4)	I	Note 2	H	B, H	B, C, H	Note 2
Mounting panels (Note 3)	I	Note 1	D	B, H	B, C, H	Note 2

Key to Anchor Types:
A = Drilled (lead insert in masonry, expansion bolt in concrete)
B = Adhesive grouted anchor
C = Cast in place insert
D = Toggle bolt, hollow wall fastener
E = Sheet metal screw
F = Wood screw
G = Sheet rock screw
H = Through bolt
I= Lag screw

In wet, exterior, corrosive, or hazardous areas, all fasteners and anchors shall be Type 316 stainless steel. In all unclassified areas, cadmium-plated fasteners shall be used, except grouted anchors shall be Type 316 stainless steel.

Notes:
1) Support via plywood mounting panel lagged to studs or via electrical channel lagged to studs.
2) Do not mount to these surfaces.
3) Panels mounted to masonry or concrete surfaces shall have 1/2-inch air space between surface and panel via stainless steel spacers.
4) Provide two additional support connections; minimum of four or six, depending on number of normal connection points. This requirement may necessitate fabricating the additional connections. Maintain NEMA rating of enclosure.

END OF SECTION

SECTION 260800

TESTING AND INSPECTION

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Electrical power distribution and control circuit testing.

1.02. SUBMITTALS

A. Made in accordance with Sections 260500, Electrical Work, and as specified herein.

B. Submit test records and reports for all testing.

1.03. CERTIFICATION OF TESTING

A. Perform all tests in the presence of a duly authorized representative of Rockland Green unless waived in writing by the Engineer. When the presence of such representative is so waived, certified results of the tests made and the results thereof shall be furnished by the Proposer.

B. Perform all tests in the presence of the Engineer. Give the Engineer written notice of all tests at least two weeks in advance.

1.04. TEST EQUIPMENT

A. Furnish all instruments and a qualified engineer to properly perform all tests required.

1.05. FACTORY-TRAINED SUPERVISION

A. Provide necessary factory trained supervision to check over equipment for proper functioning before putting the equipment into operation as may be required by these specifications. This shall include establishing a simulated fault on checking out the coordination of the protective devices.

B. Make necessary adjustments and testing in cooperation with the respective manufacturers and other Proposers when necessary. Perform all tests in accordance with the latest standards of the ANSI, IPCEA, IEEE and NEMA.

1.06. COSTS

A. Costs of all tests shall be borne by the Proposer and shall be included in the contract price.

1.07. DAMAGES

A. If damage is indicated or observed during testing or from the review of tabulated data, replace defective or damaged materials and retest at no cost to Rockland Green.

PART 2 MATERIALS

2.01. TESTING EQUIPMENT

A. Furnish all test equipment required to correctly perform the system tests.

2.02. SPECIAL EQUIPMENT REQUIREMENTS

A. 500-volt dc Megger - For maximum 300-volt systems.

B. 1,000-volt dc Megger - For maximum 600-volt systems.

PART 3 EXECUTION

3.01. GENERAL

A. After completion of the work, thoroughly test the entire electrical system, including electrical work required for instrumentation, control and power, and adjust electrical system as required.

B. Test all electrical circuits to insure circuit continuity, insulation resistance, proper splicing, and freedom from improper grounds.

C. System performance test runs are required. Coordinate test runs of electrical systems with test runs of equipment served thereby (i.e., mechanical, heating, air conditioning, process systems and plumbing).

3.02. GENERAL TESTING METHODS

A. Panels - Test each panel with mains disconnected from the feeder, branches connected, branch circuit breakers closed, all fixtures in place and permanently connected, lamps removed or omitted from the sockets, and all wall switches closed.

B. Feeders - Test with the feeders disconnected from the panels.

C. Individual Power Circuits - Test each individual power circuit at the panel or motor control center with the power equipment connected for proper operation.

D. Transformers (Low Voltage) - Megohmmeter test all transformers in accordance with the manufacturer’s recommendations.

E. Lighting and receptacle circuits do not need to be megger tested.

3.03. EQUIPMENT TESTING (600 volts and below)

A. Megohmmeter Tests

1. Conduct megohmmeter tests of the insulation resistance of rotating machines and power distribution feeders down to panelboard feeders. The results will be accepted when the megger shows the insulation resistance to be not less than 50 megohms at 20 degrees C using either a 500-volt or 1,000-volt megger. Wait 1 minute between each test for all conductors in the same enclosure and each conductor and ground.

2. Perform megohmmeter testing (Insulation Resistance Test) of all motor power and control wiring after the cables are in place and just prior to final terminations. Record all data as per Exhibit A. Lighting and receptacle panelboard branch circuits are not megohmmeter tested.

B. Voltage and Amperage Testing

1. Check all single and three phase motor amperage while the unit is running at as close to operating load as possible. Record voltage on each line and the amp draw for each leg. Provide results in a typed report format and submit as part of the Proposer's closeout package.

2. Check the load current in each phase of each distribution, lighting and receptacle panelboard feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for each panelboard.

3.04. GROUNDING SYSTEM

A. Test the grounding system to verify a resistance to ground of 5 ohms or less. If the resistance is greater than 5 ohms, modifications shall be made to the system by adding additional ground rods or plates to bring the resistance test value to 5 ohms or less. Submit a record/report to the Engineer. Include the following:

1. Time, date, temperature, frost information depth (if applicable), and weather conditions.

2. Moisture content of earth at time of measurement (wet, dry, etc.).

3. Ground test equipment, model numbers, and last date of calibration.

4. Detailed description of method used.

5. Plot of "distance from ground grid versus resistance." Resistances shall range from 0-50 ohms with enough points to produce a smooth curve.

6. Maintenance information and recommendations (if applicable).

B. Test all grounding conductors and grounding systems for continuity. Where continuity does not exist, conditions will be corrected by an approved method and the system retested.

3.05. SYSTEM LOAD BALANCING

A. Check the load current in each phase of each distribution panel feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for distribution panels.

3.06. SYSTEM CHECKS

A. Preliminary

1. Connect all motors to protective devices and controls to give proper motor acceleration and correct motor rotation. Interconnect the control wiring to all the control devices associated with a machine, a group of machines, or other device to produce the correct operation, timing, and/or sequencing of the equipment.

2. Adjust overload elements in motor starters and check for coordination with the actual installed motor characteristics. Replace any overload element that is inadequate.

3. Check all motor nameplates for verification of proper voltage, horsepower, speed, phase, and power factor.

B. Operational

1. Then give the equipment an operational test to determine that all components including motors, controls, protective and switching devices, and auxiliary associated equipment are in operable condition and can function as described and shown on relevant specifications, operating instructions, and drawings.

2. Take motor current reading at full load or as close to full load as the driven machine will develop. If the ammeter reading is over the rated full load current or the proper current for the load at which the machine was operated, determine the reason for the discrepancy and take the necessary corrective action.

3. Remove the cause of any motor operating above full load rating instead of increasing the overload relay trip rating.

3.07. CLOSEOUT PROCEDURES

A. General - Sequence closeout procedures so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated. Closeout shall be in accordance with Section 017700, Closeout Procedures, and as required herein.

B. Final Operational Check - Make a check of each item in each system to determine that it is set for proper operation. With the Engineer present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During the following test runs, make final corrections or adjustments of systems to refine and improve performances where possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices to permit observation of actual system performances and shall demonstrate that controls and items requiring service or maintenance are accessible.

C. Cleaning and Lubrication - After final performance test run of each electrical system, clean system both externally and internally, comply with manufacturer’s instructions for lubrication of both power and hand operated equipment, and remove excess lubrication, touch up minor damage to factory-painted finishes and other painting specified as electrical work, and refinish work where damage is extensive.

D. Operating Instructions - General operating instructions are required. In addition to specific training of Rockland Green’s operating personnel specified in the individual sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified elsewhere in these specifications, provide general operating instructions for each operational system and equipment item of electrical work, and coordinate instructions with instructions for mechanical work, and other equipment where associated with electrical systems or equipment.

E. System Description and Operation

1. Perform in the presence of Rockland Green, Rockland Green’s operating personnel and the Engineer.

2. Describe each basic electrical system and explain identification system, displayed diagrams, signals, alarms and audio visual provisions.

3. Describe interfaces with mechanical equipment, including interlocks, sequencing, startup, shutdown, emergency, safety, system failure, security, and similar provisions.

4. In the presence of Rockland Green's personnel, display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, spare parts inventory, storage and extra materials, meter readings, and similar service items.

3.08. CONTINUED SYSTEM OPERATIONS SUPPORT

A. Coordinate Rockland Green's takeover of electrical systems with takeover of mechanical systems, including the provision of skilled electrical operating and maintenance personnel until the time Rockland Green's personnel take over operation of entire mechanical and electrical plant. Respond promptly with continued consultation and services (beyond takeover date) on electrical systems, matching required continued services on associated mechanical systems and equipment until the end of the warranty period.

3.09. DOCUMENTATION PROCEDURE

A. Signed commitments are required. The transfer of electrical systems to Rockland Green for operation will not proceed until guarantees, warranties, performance certifications, maintenance agreements and similar commitments to be signed by Proposer and other entities have been executed and transmitted to and accepted by the Engineer for placement in Rockland Green's records.

3.10. THERMOGRAPH INSPECTIONS

A. Perform thermograph inspections on all service terminations, subfeed terminations, major power splices, and motor terminations for motors 5 HP or larger. Testing on major power distribution equipment will be performed with the plant running at a minimum of 70 percent capacity or the highest load that can be operated. Testing on individual pieces of equipment will be performed while the unit is operational at rated load and has operated for at least 30 minutes for continuously operated equipment or near the end of a cycle for equipment that operates on/off. Loads shall be minimum of 40 percent of full load. Readings at overcurrent devices and starters will be for line and load; motors will be connections in motor terminal boxes; and for transformers, primary and secondary terminations. Provide a report of test results to Rockland Green including indication of any actions taken to resolve abnormal readings. See Exhibit B at the end of this section. All thermographic tests shall be reported on this form.

(continued)

EXHIBIT A

TESTING AND INSPECTION

ELECTRICAL INSULATION TEST RECORD
INSULATION RESISTANCE TEST

Equip. I.D. Ckt/Mark No.	Test Voltage	Phase to GND. MEG OHMS				Phase to Phase MEG OHMS						Date Tested
		A	B	C	N	A-B	A-N	B-C	B-N	C-A	C-N	

TEST EQUIPMENT CONTROL NO. _____ _____ _____

REMARKS: _____

_____

PERFORMED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____
Test Engineer

EXHIBIT B

TESTING AND INSPECTION
THERMOGRAPHIC TERMINATION TEST

Equipment	Ambient[1]	Line/Primary			Load/Secondary			Load Condition (% of Full)	Comments[2,3]
		1	2	3	1	2	3		

Thermograph Model

Date of Test: _____ Conducted By: _____

Outdoor Temperature: _____ Room Temperature: _____

Owner/Engineer Witness

(1) Ambient is the breaker case temperature, transformer winding temperature, or motor housing temperature. For bus or cabling, it shall be the temperature of the bus or cable a minimum of 24 inches from the splice or termination.

(2)

Temperature Difference	Condition	Action
1°C to 3°C	Possible Deficiency	Investigate (i.e., clean terminations/retorque)
4°C to 15°C	Deficiency	Determine problem and repair; retest
16°C and above	Major Deficiency	Immediate shutdown; determine problem and repair and retest

(3) Indicate any discrepancies the cause of any temperature differences and indicate action to be taken.

Test Parameters:

- Imaging equipment shall be capable of detecting a minimum temperature difference of 1 degree at 30 degrees C.
- Equipment shall detect and convert emitted radiation to a visual signal.
- Tests to be run during periods of maximum possible loading, but at least 40 percent of rated load.

END OF SECTION

SECTION 262713

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.01. SUMMARY

A. Section includes arrangement with utility company for permanent electric service; payment of utility company charges for service; service provisions; and utility metering equipment for the West Haverstraw Transfer Station.

B. The existing primary metered electric service and pad-mount utility transformer are to remain at the Hillburn Transfer Station. Coordinate utility outage as required.

C. The existing secondary utility metering and overhead service are to remain at the Hillburn Scale House. Coordinate utility outage as required.

1.02. SYSTEM DESCRIPTION

A. Utility Company – Orange and Rockland. Contact: Mr. Cian McArdle (845) 577-3765.

B. System Characteristics - 120/208 volts, 3 phase, 4 wire, 60 Hertz.

C. 400A, 120/208 volts, three phase, four wire, 60 Hertz underground secondary from pole mounted utility transformer.

1.03. SUBMITTALS

A. Submit utility company-prepared drawings. Coordinate Division of Responsibility and Service Layout.

B. Submit Engineer-approved shop drawings to utility company for their approval as required.

1.04. QUALITY ASSURANCE

A. Perform work in accordance with utility company written requirements.

B. Maintain one copy of each document on site.

1.05. FIELD MEASUREMENTS

A. Verify field measurements are as indicated on utility company drawings.

1.06. COORDINATION

A. Coordinate with utility company, relocation of overhead or underground lines interfering with construction. Where power lines are to be temporarily relocated, bill utility costs, directly to Owner.

B. Contact utility company regarding charges related to service installation. Utility fees to be paid directly by Rockland Green.

1.07. REGULATORY REQUIREMENTS

A. Confirm to requirements NFPA 70.

B. Products - Listed and classified by Underwriters Laboratories, Inc., testing from acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.08. PRE-INSTALLATION MEETING

A. Convene at least one week prior to commencing work of this section. Review service entrance requirements and details with utility company representative.

PART 2 PRODUCTS

2.01. UTILITY METERS

A. Furnished by utility company.

2.02. METERING CABINET

A. Manufacturers - Must be a utility-approved manufacturer.

B. Size - As required by utility.

C. Description - Sheet metal cabinet with hinged door conforming to utility company requirements, with provisions for locking and sealing with fused main service disconnect.

2.03. SERVICE ENTRANCE CONDUCTORS

A. Conductors shall be copper type USE-2/RHW-2 insulation as required by the utility company.

2.04. SERVICE ENTRANCE CONDUITS

A. Underground service entrance conduits shall be schedule 40, HDPE or PVC conduits as required by the utility company.

PART 3 EXECUTION

3.01. EXAMINATION

A. Verify service equipment is ready to be connected and energized.

3.02. EXISTING WORK

A. Remove exposed abandoned service entrance raceway and conductors, including abandoned components above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Disconnect abandoned service equipment and remove.

C. Maintain access to existing service equipment, boxes, metering equipment, and other installations remaining active and requiring access. Modify installation or provide access panel.

D. Extend existing service installations using materials and methods compatible with existing electrical installations, or as specified.

E. Clean and repair existing service equipment to remain or to be reinstalled.

3.03. INSTALLATION

A. Install metering cabinet at height in accordance with utility company requirements. Install drip loop in service conductors.

END OF SECTION

SECTION 263214

PACKAGED ENGINE GENERATOR SYSTEMS - DIESEL OUTDOOR

PART 1 GENERAL

1.01. WORK INCLUDES

A. Installation of a pre-purchased two (2) 60 kW, diesel, outdoor generator with sound attenuating enclosure for the West Haverstraw Transfer Station (208V) and Hillburn Transfer Station (480V). The generator has been pre-purchased by Rockland Green; approved shop drawings are included with the Contract Documents. The Proposer shall accept delivery, rig into place and complete installation as shown on the Drawings and specified. This specification is provided for the Proposer's information and coordination.

B. Proposer to anchor generator enclosure to concrete pad, provide ½" stainless steel anchor bolts and hardware.

C. Proposer to receive delivery and provide all rigging as required for installation of new generator.

D. Proposer shall provide all fuel for testing and fill tank complete prior to turning over to Rockland Green. Proposer shall assist manufacturer for specified field testing.

1.02. CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards:

1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.

2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.

3. NFPA37

4. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.

5. NFPA99 – Essential Electrical Systems for Health Care Facilities.

6. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:

1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.

2. UL142 – Sub-base Tanks.

3. UL1236 – Battery Chargers.

4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.

2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.

3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.

4. FCC Part 15, Subpart B.

5. IEC8528 part 4. Control Systems for Generator Sets.

6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.

7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.

8. UL1236 –Battery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.03. SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.

B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, microprocessor control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, trailer and radiator.

C. Prototype Test Reports: Submittals will not be received without submission of prototype test report as specified herein.

D. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

E. Manufacturer’s Certificate: Certify that Products meet or exceed specified requirements.

F. Alternator data indicating sub transient reactance and temperature rise rating to meet requirements specified herein.

1.04. OPERATION AND MAINTENANCE

A. Manuals: Furnish three (3) Operation and Maintenance manuals in hardcopy, bound and 1 electronic PDF copy.

B. Operation & Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.05. QUALITY ASSURANCE

A. To provide proven reliability of the Generator set, three series of tests shall be performed, no exceptions taken:

1. Prototype model tests

2. Fully assembled factory production model tests

3. Field acceptance tests

B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and Factory Production tested as described herein shall not be acceptable.

C. Generator set Prototype Tests: These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer’s standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.

D. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.

E. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.

F. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.

G. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer's standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.

H. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two (2) minutes.

I. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.

J. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (131 °F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.

K. Maximum Motor Starting KVA Test: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.

L. Transient Response, Steady State Speed Control and Voltage Regulation Test: Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.

M. Witness-Generator Set Factory Production Tests: On the equipment to be shipped, an five-(5) hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing. The Proposer and/or equipment supplier at their expense shall coordinate and provide all transportation and lodging for Rockland Green and Owner's engineering representative to witness the above stated factory test. Tests performed at facilities other than the manufacturer's factory shall not be acceptable.

N. Factory Test: The unit shall completely assembled and all preliminary adjustments made before the test is initiated. 60 KW genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator, heat exchanger attachments shall not be acceptable.

O. Testing Procedure:

1. Test diesel-alternator unit at 0.8 PF in the following sequence:

2. 0.5 hour at ¼ load.

3. 0.5 hours at ½ load.

4. 0.5 hours at ¾ load.

5. 2.5 hours at full load.

P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:

1. Barometric Pressure.
2. Intake Air Pressure.
3. RPM.
4. Output voltage per phase.
5. Output amperes per phase.
6. Power Factor.
7. KW.
8. Winding temperature.
9. Transient response testing sequence:
10. 0-25%, 25%-0.
11. 0-50%, 50%-0.
12. 0-75%, 75%-0.
13. 0-100%, 100%-0.

Q. Above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.

R. Field Acceptance Tests: Generator supplier shall provide and conduct a four (4) hour load bank test at unity power factor for the generator set. Proposer must provide portable load bank for testing generator set at 100% load. Load bank test shall test each generator at full nameplate KW ratings. Generator manufacturer’s representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.

S. Initial startup and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Proposer responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.

T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.

1.06. QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with an authorized distributor offering 24 hour parts and service availability within 50 miles of the project. Proposed engine/generator combination shall have been in production a minimum of five (5) years.

B. Supplier: Authorized distributor of specified manufacturer with minimum five (5) years documented experience with specified products and factory-trained service technicians.

1.07. REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.

B. Furnish Products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.08. PRE-INSTALLATION CONFERENCE

A. Convene one (1) week prior to commencing work of this Section.

1.09. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept unit on site mounted on trailer. Inspect for damage. Provide written verification that Genset tested and Genset received are one and the same.

C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic during construction.

1.10. EXTRA MATERIALS

A. Provide two (2) of each fuel, oil and air filter element, engine belts and hoses.

1.11. WARRANTY

A. A no deductible comprehensive warranty shall be provided for all products against defects in materials and workmanship for a five-year or 1500 hour period from the start-up date. Warranty shall cover all costs of covered repairs, including travel expenses.

1.12. SERVICE AGREEMENT

A. Manufacturer shall provide Owner with a two (2) year service agreement that includes changing all fluids and filters once a year and a minor inspection six (6) months after each change.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Approved manufacturer:

1. Cummins Power Generation, model C60D6C rated for STANDBY POWER with UC2G Frame Alternator as distributed by Cummins Power Systems LLC, 890 Zerega Avenue, Bronx, NY 10473. Contact Edward Cheung: 718-892-2400, ed.cheung@cummins.com.

B. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.02. DIESEL ENGINE-GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 120/208 Volts AC or 277/480 Volts AC, 3-phase, 4-wire, 60 hertz.

2. The generator set shall be rated at 60 kW, 75 kVA at 0.8 PF, standby rating, based on site conditions of: Altitude 1,000 ft., ambient temperatures up to 131 degrees F with seismic designed enclosure.

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.

2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.

3. The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.

4. Motor starting capability shall be a minimum of 306 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set.

5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.

6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

7. The generator shall have a minimum surge KW rating of 72 KW.

8. Sustained short-circuit current: for a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 8 seconds without damage to generator system components. For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.

2. Power connections to auxiliary devices shall be made at the devices,[with required protection located at a wall-mounted common distribution panel] If walk-in enclosure.

3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.03. ENGINE AND ENGINE EQUIPMENT

A. The engine shall be diesel, EPA TIER 3 Certified, 4 cycle, 4 cylinder, radiator and fan cooled. Minimum displacement shall be 272 cubic inches. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable.

B. A digital electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.

C. Skid-mounted radiator and cooling system rated for full load operation in 131 degrees F (55 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H_2O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment.

Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental Electric starter(s) capable of three complete cranking cycles without overheating.

2.04. ENGINE ACCESSORY EQUIPMENT

A. The engine for the generator shall include the following accessories:

1. Positive displacement, contact.

2. Mechanical, full pressure, lubrication oil pump.

3. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

4. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.

5. Replaceable dry element air cleaner with restriction indicator.

6. Flexible supply and return fuel lines.

7. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

B. Coolant heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.

3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.

4. The coolant heater(s) shall be 120V and sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

C. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

D. Starting and Control Batteries shall be calcium/lead antimony type, 24 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.

E. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed inside the sound enclosure.

F. A UL listed/CSA certified 12 amp voltage regulated battery charger shall be provided for each engine-generator set. The charger may be located in an automatic transfer switch, or may be wall mounted, at the discretion of the installer. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:

Loss of AC power - red light
Low battery voltage - red light
High battery voltage - red light
Power ON - green light (no relay contact)

G. Charger shall include an Analog DC voltmeter and ammeter, 12 hour equalize charge timer, and AC and DC fuses.

2.05. AC ALTERNATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 80 degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

D. The subtransient reactance of the alternator shall not exceed 7.6 percent for 480VAC, based on the 80°C rise rating.

E. Alternator shall be rated for a minimum of 66 KW at 80°C, 480 VAC standby.

2.06. ENGINE GENERATOR SET CONTROL

A. Generator set Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. Control Switches

1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.

2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.

3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

D. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, .5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.

3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.

4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

E. Generator Set Alarm and Status Display.

1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).

b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.

c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.

d. The control shall include an amber common warning indication lamp.

2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:

Low oil pressure (warning)
Low oil pressure (shutdown)
Oil pressure sender failure (warning)
Low coolant temperature (warning)
High coolant temperature (warning)
High coolant temperature (shutdown)
High oil temperature (warning)
Engine temperature sender failure (warning)
Low coolant level (warning)
Fail to crank (shutdown)
Fail to start/overcrank (shutdown)
Overspeed (shutdown)
Low DC voltage (warning)
High DC voltage (warning)
Weak battery (warning)
Low fuel day tank (warning)
High AC voltage (shutdown)
Low AC voltage (shutdown)
Under frequency (shutdown)
Over current (warning)
Over current (shutdown)
Short circuit (shutdown)
Ground fault (warning) (optional--when required by code or specified)
Over load (warning)
Emergency stop (shutdown)
(4) configurable conditions

3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

F. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control

Engine oil pressure (psi or kPA)
Engine coolant temperature (degrees F or C)
Engine oil temperature (degrees F or C)
Engine speed (rpm)
Number of hours of operation (hours)
Number of start attempts
Battery voltage (DC volts)

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

2.07. ENGINE CONTROL FUNCTIONS

A. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.

B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled. Total duration of operating time in the idle mode shall be controlled by the system, to prevent degradation of the engine capabilities due to excess operating time at idle.

C. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

D. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

E. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

2.08. ALTERNATOR CONTROL FUNCTIONS

A. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from mis-operation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field.

The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

B. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

C. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

D. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

E. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

F. When required by National Electrical Code or indicated on project drawings, the control System shall include a ground fault monitoring relay. The relay shall be adjustable from 3.8-1200 amps, and include adjustable time delay of 0-10.0 seconds. The relay shall be for indication only, and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set, and provide relay that will function correctly in system as installed.

2.09. OTHER CONTROL FUNCTIONS

A. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

2.10. GENERATOR MAIN LINE CIRCUIT BREAKER

A. The generator set shall be provided with a mounted main line circuit breaker, rated 200 amps (208V) or 100 amps (480V). The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

B. In addition to the above main line breaker, the generator set shall be provided with a utility grade protective relay, designed to provide thermal overload protection for the alternator, and performance certified for that purpose by a 3rd party testing organization. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided. Relay shall be installed to allow shutdown of the generator excitation system on an alternator overload condition, with the engine operating for a cool-down period before shutdown. The relay shall not include an instantaneous trip function.

2.11. OUTDOOR WEATHER-PROTECTIVE SOUND ATTENUATED ENCLOSURE

A. Construction:

1. Steel - UL2200 listed Sound Attenuated, Weatherproof Genset Enclosure

a. Package shall comply with the requirements of the NEC for all wiring materials and components.

b. Sound attenuation rating of 70.5 dBA @ 7m.

c. The enclosure shall be designed in which allows generator set to operate at full rated load in an ambient temperature of up to 50° C.

B. The enclosure will consist of a cambered roof, two sidewalls, two end walls, and a usable 250 Gallon fuel tank base, incorporating pre-painted aluminum construction and application-specific non-hydroscopic acoustic insulation, air handling equipment designed to provide the specified level of sound attenuation.

C. Construction:

1. Louvers: Equipped with bird screen to permit air circulation when engine is not running while excluding birds and rodents.

2. Hinged Doors: With padlocking provisions. Restraint/Hold back hardware to prevent door to keep door open at 180 degrees during maintenance. Rain lips over all doors.

3. Exhaust System:

a. Muffler Location: Within enclosure.

4. Hardware: All hardware and hinges shall be stainless steel.

5. Wind Rating: Wind rating shall be 150 mph

6. Mounting Base: Suitable for mounting on sub-base fuel tank or housekeeping pad.

7. A weather protective enclosure shall be provided which allows the generator set to operate at full rated load with a static pressure drop equal to or less than 0.5 inches of water.

8. Inlet ducts shall include rain hoods.

D. Exhaust silencer shall be installed inside enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with rain cap.

E. Engine Cooling Airflow through Enclosure: Housing shall provide ample airflow for engine generator operation at rated load in an ambient temperature of 50 deg C.

1. Louvers: Fixed-engine, cooling-air inlet and discharge.

2. Motorized Louvers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating. Dampers shall be of a “fail open” design to allow airflow in the event of failure.

F. Site Provisions: Lifting of complete assembly of engine generator, enclosure, and sub-base fuel tank shall be designed to be lifted into place as a single unit, using spreader bars.

G. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure with internal drain valves.

H. External radiator fill provision must be provided.

I. Doors shall be recessed, lockable with retainers to hold doors open for easy access.

J. Inlet of enclosure shall be provided with rodent barriers.

2.12. SUBBASE FUEL TANK

A. Provide a sub-base nominal 250 gallon fuel tank for the generator set. The sub-base fuel tank shall be UL142 listed and labeled. Installation shall be in compliance to NFPA 37. The fuel tank shall be a double-walled, steel construction and include the following features:

1. Emergency tank and basin vents.

2. Mechanical level gauge.

3. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.

4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.

5. High and low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.

6. Basin drain.

7. Integral lifting provisions.

8. Electrical stub up(s).

9. Lockable fuel fill.

10. Sub-base tank shall include a welded steel containment basin, sized at a minimum of 110% of the tank capacity to prevent escape of fuel into the environment in the event of tank rupture.

PART 3 EXECUTION

3.01. ACCEPTANCE

A. Equipment shall be initially started and operated by representatives of the manufacturer.

B. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.

C. Proposer shall provide all fuel for start-up and testing. Proposer shall fill tank complete prior to turning over to Owner.

3.02. TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than two (2) four (4) hours sessions in duration and the class size shall be limited to five (5) persons. Training date shall be coordinated with the facility owner.

3.03. DEMONSTRATION

A. Provide systems demonstration. Electric Proposer shall provide fuel for testing and shall fill tank complete after all testing is done and before turning over to Owner.

B. Describe loads connected to standby system and restrictions for future load additions.

C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 263613

ENCLOSED TRANSFER SWITCHES

PART 1 GENERAL

1.01. SUMMARY

A. Installation of a pre-purchased automatic transfer switches and manual transfer switch. The automatic and manual transfer switches have been pre-purchased by Rockland Green, approved shop drawings are included with the Contract Documents. The Proposer shall accept delivery, rig into place and complete installation as shown on the Drawings and specified. The Proposer shall assist the manufacturer with specified field testing. This specification is provided for the Proposer's information and coordination.

B. The West Haverstraw Transfer Station ATS shall be 400A, 120/208V, 3-pole, solid neutral, open transition, NEMA 12/3R enclosure.

C. The Hillburn Transfer Station ATS shall be service entrance rated, 800A, 277/480V, 3-pole, solid neutral, open transition, NEMA 3R secure outer door enclosure

D. The Hillburn Scale house service entrance rated, manual transfer switch with portable generator cam-locks and shall be 200A, 120/240V, 2 pole, solid neutral, NEMA 3RX secure enclosure.

1.02. REFERENCES

A. NFPA 70 - National Electrical Code.

B. NEMA ICS 1 - General Standards for Industrial Control and Systems.

C. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.

D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

E. UL 891 - According to this UL Standard, the equipment shall be labeled: "Suitable for use only as service equipment."

F. UL 1008 - Standard for Transfer Switch Equipment

1.03. QUALIFICATIONS

A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 20 years' documented experience and with service facilities within 50 miles of the project.

B. Supplier - Authorized distributor of specified manufacturer with minimum 10 years' documented experience.

1.04. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure and finish.

1.05. FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.06. MAINTENANCE SERVICE

A. Furnish service and maintenance of transfer switch for one year from date of Substantial Completion.

1.07. MAINTENANCE MATERIALS

A. Provide two of each special tool required for maintenance.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Cummins OTEC series (design basis, West Haverstraw).

B. ASCO 7000 series (design basis, Hillburn Transfer Station).

C. ESL Power Systems (design basis, Hillburn Scale House)

2.02. AUTOMATIC TRANSFER SWITCH

A. Description - NEMA ICS 10, automatic transfer switch (ATS).

B. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted.

C. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.

D. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

E. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.

F. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.

G. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

H. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.03. SERVICE CONDITIONS

A. Service Conditions - NEMA ICS.

B. Temperature - 105 degrees F.

C. Altitude - 100 feet.

2.04. RATINGS

A. Voltage - 120/208 volts or 277/280V, 3 phase, 4 wire, 60 Hertz.

B. Switched Poles - Three

C. Load Inrush Rating - Combination load.

D. Continuous Rating – 400 amperes or 800 amperes.

E. Interrupting Capacity - 400 percent of continuous rating.

F. Withstand Current Rating - The ATS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans.

2.05. PRODUCT OPTIONS AND FEATURES

A. Indicating Light Emitting Diode Lights - Mount in cover of enclosure, one to indicate when the ATS is connected to normal source (green), one to indicate when the ATS is connected to emergency source (red), one to indicate when the normal source is available (green), and one to indicate when the emergency source is available (red).

B. Emergency Switch - Mount in cover of enclosure to initiate manual transfer to emergency source.

C. Normal Switch - Mount in cover of enclosure to initiate manual transfer to normal source.

D. Transfer Switch Auxiliary Contacts - Contacts rated 10 amps, 480VAC shall be provided consisting of one contact, closed when the ATS is connected to normal source and one contact closed, when the ATS is connected to emergency source.

E. Normal Source Monitor - The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100 percent and dropout adjustable from 75 to 98 percent of pickup setting.

F. Alternate Source Monitor - Single-phase voltage sensing of the emergency source shall be provided, with a pickup voltage adjustable from 85 to 100 percent and frequency sensing with pickup adjustable from 90 to 100 percent.

G. In-phase monitor.

H. Solid neutral.

2.06. ENCLOSURE

A. Enclosure - ICS 6, NEMA 3R, secured outer door.

2.07. SERVICE ENTRANCE RATED MANUAL TRANSFER SWITCH AND PORTABLE GENERATOR CAM-LOCK BOX

A. Service entrance rated manual transfer switch and portable generator cam-lock box shall be as manufactured by ESL Power Systems, StormSwitch series 3020.

B. Enclosure – NEMA Type 3RX, stainless steel, powder-coated ANSI Grey.

C. Circuit Breakers – sizes as shown on the drawings, 3-pole, thermal magnetic type disconnect.

D. Color-coded series 16 cam style male inlets, 400A rated, arranged for 120/240V, 1Ø, 3-wire service.

E. UL 1008 listed.

PART 3 EXECUTION

3.01. EXAMINATION

A. Verify that surface is suitable for transfer switch installation.

3.02. INSTALLATION

A. Install transfer switches in accordance with manufacturer's instructions.

B. Provide engraved plastic nameplates under the provisions of Section 26 05 00, Electrical Work.

3.03. MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems.

3.04. DEMONSTRATION

A. Demonstrate operation of transfer switch in normal and emergency modes.

3.05. TESTS AND CERTIFICATION

A. The manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The manufacturer shall be certified to the ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

3.06. SERVICE REPRESENTATION

A. The ATS/MTS manufacturer shall maintain a local service center within a 50-mile radius of the job location. The service center's personnel must be factory trained and must be on call 24 hours per day, 365 days per year.

The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION

SECTION 264000

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Circuit breakers below 600 volts.

B. Fuses below 600 volts.

C. Spare fuse cabinet.

1.02. REFERENCES

NECA (National Electrical Proposers Association) “Standard of Installation”	
NEMA AB 1	Molded Case Circuit Breakers
NFPA 70	National Electrical Code
NEMA FU 1	Low Voltage Cartridge Fuses

1.03. SUBMITTALS

A. Submit under provisions of Section 26 05 00, Electrical Work

B. Product Data - Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

C. Manufacturer’s Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

D. Samples as requested by the Engineer.

1.04. REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Circuit Breakers - Conform to requirements of NEMA AB-1 and UL 489.

C. Furnish products listed and classified by UL or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.05. EXTRA MATERIALS

A. Provide three of each size and type current limiter.

B. Proposer to provide separate NEMA 12 enclosure and shall provide spare fuses for each type used, as follows:

1. Power distribution fuses above 200 amps - One set.

2. All others - Two sets.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Circuit Breakers

1. Square D

2. Cutler Hammer

3. General Electric

4. Or approved equal.

B. Main Fuses, Unless Otherwise Noted

1. Bussman - Model CPN-RK

2. Gould-Shawmut - Model A2K

C. Motor and Device Fuses, Unless Otherwise Noted

1. Bussman - Model RU5

2. Gould-Shawmut - Model TRI-ONIC

2.02. GENERAL REQUIREMENTS

A. Circuit breakers shall be of the molded case type.

B. Shall consist of the number of poles, ampere rating, and interrupting rating as shown or specified.

C. Molded case circuit breakers shall have overcenter toggle-type mechanism, providing quick-make, quick-break action. Mechanism shall be mechanically trip-free from the handle so the contacts cannot be held closed against short circuit currents.

D. Multiple pole breakers shall be common trip type.

E. On and Off positions shall be clearly marked and color coded.

F. All breakers in panels for switching duty shall be “SWD” or “T” rated, for switching duty.

G. Breakers 250 ampere frame and larger shall have interchangeable trip.

H. All main service breakers shall have 100 percent ampere rating and shall be service entrance rated.

I. Breakers over 100-ampere frame size shall have front adjustable magnetic trip elements to provide instantaneous tripping over a range of 400 to 1000 percent of the continuous ampere trip rating.

J. All breakers shall be of the bolt-on type.

K. Dimensions and Performance - NEMA FU 1, Class as specified or indicated.

L. Voltage - Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

2.03. CONTACTS

A. Contacts shall be non-welding under rated operating conditions.

B. Silver-to-silver type.

C. Provide with suitable arc interrupting devices.

2.04. TERMINATIONS

A. Circuit breakers shall have lugs that accommodate wire sizes shown on the Contract Drawings, including additional lugs where shown or required.

B. Lugs shall be UL listed for copper conductors only.

C. Breakers shall be UL listed for mechanical-type lugs.

2.05. GROUND FAULT PROTECTION

A. 250-ampere frame circuit breakers or less.

1. Integral with circuit breaker.
2. Push to test.
3. Reset feature.
4. Trip indication.
5. 0.8-second maximum pickup time.

2.06. RATINGS

A. All circuit breakers shall meet or exceed the following unless otherwise noted on the Contract Drawings or in the specifications.

Frame Size Maximum Constant Current - AMPS	Nema* Interrupting Cap. Symmetrical-Amps	Poles	Maximum Voltage Rating
100	10,000 @ 120 volts	1	120
100	10,000 @ 240 volts	2,3	240
100	18,000 @ 480/277 volts	1	480
100	18,000	2,3	600
250 Branch	25,000	2,3	600
250 Main	35,000	2,3	600
400 Branch	30,000	2,3	600
400 Main	35,000	2,3	600
1000 Branch	30,000	2,3	600
1000 Main	65,000	2,3	600
1200	100,000	2,3	600
2000	100,000	2,3	600

*Interrupt ratings are at 480 volts unless noted otherwise.

2.07. BREAKER TRIP CHARACTERISTICS

All breakers shall be Type A thermal magnetic type unless noted otherwise on the Contract Drawings or specified.

A. Thermal Magnetic Type (Type A)

1. Long time, nonadjustable, thermal overload, trip.
2. Instantaneous, electromagnetic trip.
3. Ambient compensating.
4. “Push-to-trip” test button.

B. Integral Magnetic and Solid State Trip Type (Type B)

1. Provide solid-state logic programmer.
2. Long delay, range adjustable trip.
3. Magnetic pick up, range and time adjustable, trip.
4. Integral power supply.
5. 100 percent equipment rated.
6. Integral ground fault protection where noted on the Contract Drawings or specified.
7. Ground fault system neutral current transformer for each breaker equipped for ground fault.
8. “Push-to-trip” pushbutton.
9. Adjustable rating plug type.

C. Integral Solid State Trip Type (Type C)

1. Solid state logic programmer.
2. Long delay, range and time adjustable, trip.
3. Short delay, range and time adjustable, trip where noted.
4. Instantaneous, range adjustable, trip unless noted otherwise for specific breakers.
5. Ground fault, range and time adjustable, trip where noted.
6. Neutral sensor for each breaker equipped with ground fault on three phase, four wire, enclosed breakers, panels and switchboards.
7. 100 percent equipment rated.
8. Integral power supply.

9. “Push to Trip” button.

10. Sensor ratings 200-1200 ampere.

11. Provide trip targets for overload, short circuit and ground fault for breakers as noted on Contract Documents:

D. Motor Circuit Protectors (Type MCP)

1. Each pole shall provide instantaneous short circuit protection.

2. MCP shall have provisions for adjusting the instantaneous magnetic trip element.

3. All poles shall be constructed to open, close, and trip simultaneously.

4. The MCP mechanism shall be the transient inrush suppressor type appropriate for the protection of energy efficient motors.

2.08. CURRENT LIMITERS

A. Current Limiter - Designed for application with molded case circuit breaker.

B. Coordinate limiter size with trip rating of circuit breaker to prevent nuisance tripping and to achieve interrupting current rating specified for circuit breaker.

C. Provide interlocks to trip circuit breaker and to prevent closing circuit breaker when limiter compartment cover is removed or when one or more limiter is not in place or has operated.

2.09. FUSES

A. Main Service Switches - Class RK (time delay).

B. Motor Load Feeder Switches - Class RK (time delay).

C. Other Feeder Switches - Class RK (time delay).

D. Power Branch Circuits - Class RK (time delay).

E. Motor Branch Circuits - Class RK (time delay).

F. Lighting Branch Circuits - Glass G.

PART 3 EXECUTION

3.01. GENERAL

A. Circuit breaker trip ratings and fuse sizings shown on the Contract Drawings are maximum for the specific application.

B. Breakers shall be removable from the front of the panel or board without disturbing adjacent units.

C. All breakers and fuses shall be suitably mounted in an enclosure suitable for the area and supported in accordance with Section 26 05 29, Electrical Supports, Anchors and Fasteners. Enclosures shall be NEMA 12 minimum, NEMA 3R for outdoor areas, NEMA 4 for wet areas, and NEMA 7 for hazardous areas.

D. Individual-mounted circuit breakers and fused switches shall be provided with NEMA enclosures and installed at locations shown on Drawings and as required by National Electrical Code (NEC) at approximately 60 inches from floor to top of enclosure.

E. Fuses shall be of the rejection type unless otherwise shown or specified.

F. Install spare fuse enclosure where indicated by Owner.

3.02. HANDLE OPERATORS

A. All enclosures for individually-mounted circuit breakers or fuses shall have enclosure-mounted handle operators, operating through approximately 180-degree arc. Flush mounted circular rotating handle operators are unacceptable.

3.03. DISCONNECTING MEANS - LOCKING

A. For separately-mounted exterior circuit breakers, safety and disconnect switches, provide locking-type handles to be locked in both the On (closed) or Off (open) positions.

3.04. IDENTIFICATION

A. Circuit breakers shall be provided with uniformly designed nameplates to clearly indicate the type, rating, listing/recognition/certification marks, and other information as defined in UL 489 in accordance with Section 26 05 00, Electrical Work.

3.05. TERMINALS

A. All terminals shall comply with UL 486A and B and CSA 1165 Standards. Torque markings shall be provided and followed per UL 489.

B. Terminals shall be amply sized, including adapters or special lugs to connect the conductor(s) as shown, specified or required.

3.06. RATINGS - FUSES

A. Main distribution fuses shall be sized as shown on the Contract Drawings.

B. Motor and device fuses shall be sized as per the manufacturer’s requirements in accordance with the NEC.

3.07. FIELD QUALITY CONTROL

A. Inspect each circuit breaker visually, per NETA ATS-1995.

B. Perform several mechanical On-Off operations on each circuit breaker.

C. Verify circuit continuity on each pole in closed position.

D. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB-1 requirements.

E. Include description of testing and results in test report.

3.08. ADJUSTING

A. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.

B. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION

SECTION 310519

GEOTEXTILES FOR EARTHWORK

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Cushion geotextile

2. Reinforcement geotextile

1.02. REFERENCES

A. Quality Control Testing Standards

1. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

2. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

3. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

4. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

5. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

6. ASTM D6241 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

7. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

8. ASTM D-5261 - Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.

1.03. PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.04. SUBMITTALS

A. Product Data:

1. Submit product data sheet for each geotextile proposed for use on this project.

1.05. DELIVERY, STORAGE, AND HANDLING

A. Geotextiles labeling, shipment, and storage shall follow ASTM D4873. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

B. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.

C. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Cushion Geotextile

1. Shall be needle-punched, nonwoven geotextile specifically designed for cushion applications.

2. Shall be composed of polyester and/or polypropylene polymers.

3. Documentation shall be provided by the manufacturer indicating that each roll was inspected at the point of manufacturing for the presence of broken needles using an in-line metal detector.

4. Shall meet the criteria listed in Table 310519-1.

B. Reinforcement Geotextile

1. Shall be a woven geotextile specifically designed for reinforcement applications.

2. Shall be composed of polyester and/or polypropylene polymers.

C. Shall meet the criteria listed in Table 310519-1.

TABLE 310519-1
MINIMUM ACCEPTANCE CRITERIA GEOTEXTILE

Test Description	Test Method	Criteria
Separation		
Mass per unit area	ASTM D5261	≥8 oz/SY
Apparent opening size	ASTM D4751	≤No. 70 sieve
Puncture resistance	ASTM D6241	≥110 lb.*
Tensile strength	ASTM D4632	≥160 lb.*
Trapezoid tearing strength	ASTM D4533	≥80 lb*
Permittivity	ASTM D4491	≥1.1 cm/sec

Test Description	Test Method	Criteria
Reinforcement		
Mass per unit area	ASTM D5261	≥8 oz/SY
Puncture resistance	ASTM D4833	≥150 lb.
Tensile strength	ASTM D4595	≥160 lb.*
Trapezoid tearing strength	ASTM D4533	≥120 lb.*
Apparent opening size	ASTM D4751	≤40 sieve
Cushion		
Mass per unit area	ASTM D5261	24 oz/SY
Puncture Resistance	ASTM D4833	225 lb.

*Minimum acceptance criteria shall apply to both the machine direction (MD) and the cross machine direction (XMD).

2.02. PRODUCTS

A. Separation Geotextile - The following is a list of materials that meet the specifications in this section:

1. Carthage Mills FX-80 HS.

2. Propex Geotex 861.

3. Skaps GE 180.

4. Or equal.

B. Reinforcement Geotextile - The following is a list of materials that meet the specifications in this section:

1. TenCate Mirafi FW 403.

2. Propex Geotex 4x4.

3. Carthage Mills FX-400MF.

4. Or equal.

C. Cushion Geotextile - The following is a list of materials that meet the specifications in this section:

1. TenCate Mirafi S2400
2. Or equal.

PART 3 EXECUTION

3.01. INSPECTION

A. The Contractor shall inspect all geotextile upon delivery and verify that the proper materials and quantities have been supplied.

B. The Contractor shall inspect the subgrade for protrusions or other unacceptable conditions prior to installation of geotextiles.

C. The Contractor shall continuously inspect needle-punched geotextiles during deployment for broken needles remaining from needle-punching operations.

3.02. PREPARATION

A. Subgrade shall be prepared as indicated in the specifications.

3.03. PROTECTION

A. Protect all geotextile materials from damage due to exposure to sunlight, dirt, dust and other hazards.

B. Maintain the protective wrapping on geotextile rolls at all times.

C. The geotextiles shall be covered after installation within a 10-day period.

D. During spreading operations of backfill, a minimum depth of 12 inches of aggregate shall be maintained over the geotextiles when possible. Construction equipment shall not operate directly on the geotextile.

3.04. INSTALLATION

A. Geotextile rolls shall be positioned as required and unrolled.

B. When placed on prepared subgrades, geotextile shall be overlapped a minimum of 1.0 feet on all edges.

C. When geotextile is placed in trenches, the material shall be overlapped a minimum of 1 foot over the top of the trench. Longitudinal seams between adjacent rolls of material shall be overlapped a minimum of 2 feet.

D. Geotextile rolls shall be cut and laid flat such that buckling of the roll does not occur.

E. If geotextiles are damaged during any phase of construction or installation, a new piece of the same type shall be cut and placed over the damaged area with a 2-foot minimum overlap and sewn.

F. Aggregate shall be spread in the direction of overlap wherever possible.

3.05. MAINTENANCE

A. Maintain geotextile rolls until backfilling operations have completed one lift.

END OF SECTION

SECTION 312305

SUBGRADE PREPARATION

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Subgrade preparation, below either pavement system or gravel access roads.

2. Furnishing natural soils.

3. Furnishing select borrow material.

4. Temporary drainage.

5. Compaction.

6. Proof rolling.

7. Removal and replacement of unacceptable materials.

8. Grading.

9. Install geotextile fabric.

1.02. REFERENCES

A. ASTM D698 - Moisture/Density Relations of Soil/Aggregate Mixtures Using 5.5-Lb. Rammer and 12-Inch Drop

B. ASTM D1557 - Moisture/Density Relations of Soils and Soil/Aggregate Mixtures Using 10-Lb. Rammer and 18-Inch Drop

C. NYSDOT - Manual of Uniform Traffic Control Devices

1.03. DEFINITIONS

A. “Subgrade” shall be defined as the foundation layer of natural soils or select material that supports the pavement or gravel access road layers.

1.04. PERFORMANCE AND TESTING REQUIREMENTS

A. Compaction of subgrade shall meet the requirements for compaction as stated in Section 312330 - Compaction.

1. Compaction curves shall be developed for each type of subgrade material when “in-place density” tests are required by the Engineer.

2. The cost of failed compaction tests will be reimbursed by the Proposer to Rockland Green.

1.05. SUBMITTALS

A. Submit under Provisions of Section 013300 – Submittal Procedures.

B. Granular Materials - Refer to Section 312325 - Backfilling.

1.06. REGULATORY REQUIREMENTS

A. Conform to regulatory agencies having jurisdiction over the work.

B. Occupational Safety and Health Administration Act (OSHA) of 1970 and its amendments and regulations or to the New York State Industrial Code Rule 23 entitled, “Protection in Construction, Demolition and Excavation Operations” as issued by New York State Department of Labor, Board of Standards and Appeals.

1.07. ENVIRONMENTAL REQUIREMENTS

A. Provide erosion and sediment controls in accordance with NY State Guidance and the Erosion and Sediment Control Drawing to prevent debris, stones, and silt from entering drainage systems.

1.08. FIELD MEASUREMENTS

A. Prior to start of construction, verify by field measurements that existing conditions are as shown on Drawings, notify Engineer of specific differences.

B. Prior to start of construction, where required, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the Underground Utility Protection Organization applicable to the project location and protect utilities in accordance with requirements of RFP 2026-02.

1.09. COORDINATION

A. Coordinate field work under provisions of Section 011100 – Summary of Work and the terms and conditions of RFP-2026.02.

B. Coordinate work with local utility companies (private and municipal), as applicable.

PART 2 PRODUCTS

2.01. MATERIALS

A. Natural on-site soil, if suitable, shall be utilized if approved by the Engineer.

B. Granular materials, if required, shall be as specified in Section 312325 – Backfill or shown on the drawings. The type, size and quantity of granular material shall be that required to prepare a compacted subgrade approved by the Engineer.

PART 3 EXECUTION

3.01. EXAMINATION

A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.

B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris.

C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.

D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

E. All underground utility installations, including pipes, shall be completed, backfilled and compacted prior to completion of subgrade.

F. Verify that traffic controls and erosion and sediment controls are in place.

3.02. PREPARATION

A. Temporary erosion and sediment controls shall be installed prior to start of construction.

B. Temporary surface diversion and ditches shall be constructed as necessary to remove water from the subgrade area.

1. Proposer to prevent the entrance of debris, stones, and silt from entering existing drainage systems, including the use of filter socks, screens, and other desilting methods as shown on the Erosion and Sedimentation Control Plan details.

C. Backfilled areas shall be retested at the discretion of the Engineer.

3.03. INSTALLATION

A. Construct the subgrade by cutting or filling with material as required.

1. The final subgrade surface below the roadway surface shall be fine graded, rolled and compacted to form a smooth, even surface.

B. The subgrade in fill section shall be placed in maximum 12-inch layers before compaction and compacted before the next layer is spread.

C. The subgrade surface shall drain to the road edges, be free from holes, bumps, wheel ruts and of standing water, snow, frozen material and organic materials prior to the placement of the next course.

1. Soft or otherwise unacceptable subgrade materials shall be removed and replaced with select on-site material acceptable to the Engineer.

2. Where no suitable on-site material is available, granular materials shall be installed and compacted at no cost to the Rockland Green.

3.04. FIELD QUALITY CONTROL

A. For compaction requirements, refer to Section 312330, Table 1.

B. Tolerances - The final subgrade surface shall not vary more than +1/2 inch from the design grade elevation at any location, parallel to the final road surface as defined by the total roadway thickness.

C. Proof Rolled - Prior to the placement of the next pavement course, the subgrade surface shall be proof rolled to locate areas of inadequate compaction or defections or soft or rutting areas requiring undercutting, with 8- to 10-ton pneumatic tire compactors.

1. Areas of inadequate compaction to be re-compacted.

2. If additional rolling does not correct an area of unstable condition, then this area and soft or rutted areas shall be removed and replaced with select material and compacted.

3. Where no suitable on-site material is available, granular materials shall be installed and compacted; areas inaccessible to rollers to be compacted by mechanical methods.

3.05. DUST CONTROL

A. Dust control shall be accomplished by using water, brooming, and cleaning methods.

1. Dust control shall be carried out daily.

END OF SECTION

SECTION 312310

EXCAVATION

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Excavation for site structures.
2. Excavating trenches for utilities.
3. Pipe foundations and bedding.

1.02. FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. EXECUTION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Notify utility companies.

D. Protect above- and below-grade utilities which are to remain.

E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

F. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

G. Excavations shall be in completed in accordance with all details of applicable codes, rules, and regulations including all local, state, and federal regulations including the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulations Part 1926, Subpart P - Excavations and Trenching Standards.

3.02. CLASSIFICATION OF EXCAVATED MATERIALS

A. Classifications of excavated materials are as follows:

1. Unclassified Excavation - “Unclassified excavation” shall include all material excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include “rock excavation” as well as “common excavation” as defined herein.

2. Common Excavation - “Common excavation” shall include all excavation except “rock excavation.” All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered “common excavation.” All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as “common excavation.”

3. Rock Excavation - “Rock excavation” shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment.

3.03. EXCAVATING

A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.

B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving, and site structures.

C. Machine-slope banks to angle of repose or less, until shored.

D. Excavation cut not to interfere with normal 45-degree bearing splay of foundation. Undercutting of excavation faces will not be permitted.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Hand trim excavation to required undisturbed subgrade. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock under 1 cubic yard, measured by volume. Refill voids with Mix “C” concrete or compacted gravel/crushed stone.

H. Notify Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in area until notified to resume operations.

I. Should the Proposer, through negligence or otherwise carry his excavation below the designated subgrade, granular material used for backfilling shall be spread and compacted in conformance with the requirements of Sections 312325 - Backfilling and 312330 - Compaction. The cost of this refilling operation, including any tests associated therewith, shall be borne by Proposer.

J. Stockpile excavated material to be re-used in area designated by Rockland Green on site and remove excess material not being reused from site.

3.04. DISPOSAL OF MATERIAL

A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site unless Rockland Green designates an on-site location.

B. Reuse of excavated material as on-site fill shall conform with Section 312325 - Backfilling.

3.05. FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 014000 - Quality Requirements.

B. Provide for visual inspection of bearing surfaces.

3.06. PROTECTION

A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform, plane areas, shaped to receive the foundation components of the building, structure or new underground pipe.

END OF SECTION

SECTION 312315

TRENCHING

PART 1 GENERAL

1.01. SUMMARY

A. Section includes:

1. Excavating trenches for utilities
2. Backfilling and compaction
3. Materials

1.02. REFERENCES

A. Standard Material Specifications for gravel, sand, crushed stone and gravel-cement mixtures published by the New York State Department of Transportation (DOT).

B. Occupational Safety and Health Administration (OSHA).

1.03. SUBMITTALS

A. Submittals for granular material shall be in accordance with Section 312325 – Backfilling.

1.04. FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

2.01. ON-SITE MATERIALS

A. On-site material shall be in accordance with Section 312325 - Backfilling.

2.02. OFF-SITE MATERIALS

A. Off-site material shall be in accordance with Section 312325 - Backfilling.

PART 3 EXECUTION

3.01. EXAMINATION

A. Verify fill materials to be used are approved.

B. Verify that all subsurface excavations for the project have been compacted, approved, and are ready for backfilling (including installation of geotextiles where required).

3.02. PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Prior to start of construction, notify utility and have staked or marked all underground utilities. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities' location and elevation. Provide the Engineer with the results of the exploratory excavations for his review. Allow the Engineer sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.

C. Abandoned pipes and laterals shall be plugged per Contract Documents.

D. Conduct the operations such that no interruptions to the existing utility system shall occur.

E. Protect plant life, lawns, rock outcropping, and other features remaining as a portion of final landscaping.

F. Protect control points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Preserve the control points as provided throughout the life of the project, and accurately replace any such point, which is damaged or moved, at Proposer's expense.

G. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with specified pipe foundation and compact to density equal to or greater than requirements for subsequent backfill material.

H. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by backfilling operations.

I. Maintain a stable, dry backfill area.

J. Remove all water, snow, ice and debris from surfaces to accept fill materials and from the backfill material. No calcium chloride or other chemicals shall be used to prevent freezing.

K. Areas to receive compacted fill shall be graded to prevent ponding and to provide surface runoff.

L. Only approved backfill material shall be used.

M. Only approved geotextile fabrics shall be used.

N. Backfill operations shall be started at the lowest elevation in the area to be backfilled, and continue, in horizontal layers, upward to the limits specified.

O. Any crushed gravel stockpiles which have undergone excessive particle segregation shall be remixed.

3.03. TRENCH EXCAVATION

A. Trench widths shall be held to minimize restoration. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in trenches, the bottom of the shield shall be positioned so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward.

B. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and compacted. Installation of sheeting and bracing and use of mobile shields shall be in accordance with details of applicable safety codes, rules and regulations including applicable local, state, federal, and OSHA.

C. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.

D. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special backfill installed in conformance with the Contract Documents. In any event, operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.

E. Bedrock, boulders and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.

F. In general, trenches shall not be opened for more than 50 feet in advance of installed pipe. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations. Trenches left open overnight shall be protected as specified within this section and to the satisfaction of Rockland Green. Trenches shall not be left open overnight unless prior approval is granted from Rockland Green.

3.04. EXCAVATION CLASSIFICATION

A. All material excavation shall be classified in accordance with Section 312310 - Excavation.

3.05. UNAUTHORIZED EXCAVATION

A. The Proposer shall not be entitled to additional compensation for unauthorized excavations carried beyond or below the lines and subgrades prescribed in the Contract Documents. The Proposer shall refill such unauthorized excavations at his own expense, and in conformance with the following provisions:

B. Should the Proposer, through negligence or for reasons of his own, carry excavations below the designated subgrade, backfill in accordance with Section 312325 - Backfilling, in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted. The cost of tests associated with this refilling operation shall be borne by the Proposer.

C. If the maximum widths of pipe trenches are exceeded, the installed pipes shall be fully cradled using the specified bedding material at the Proposer’s expense.

D. Excavation below subgrade which is ordered by the Engineer because the normal subgrade has been disturbed by the Proposer’s operations shall be considered as unauthorized excavation.

3.06. MAINTENANCE OF EXCAVATIONS

A. All excavations shall be properly and legally maintained while they are open and exposed. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition. All signs, markers, barricades shall conform to the requirements of the Manual of Uniform Traffic Control Devices. All barricades, signs and markers shall be reflectorized.

B. To maintain traffic and safety, temporary plating over trenches consisting of steel plates shall be used to temporarily bridge trench excavations. Plates shall be of size and positioned to provide adequate bearing at plate edges, shall be securely anchored, and shall be fitted in place in a manner to minimize noise when crossed by traffic. Plates shall be of sufficient thickness to safely carry heavy traffic without detrimental deflection; however, unless otherwise specified, the minimum thickness of plates shall be 1-inch.

C. Plate edges exposed to traffic shall be feathered with asphalt mix as part of trench excavation work. Work includes surveillance and adjustment of plating over trenches which shall be provided by the Proposer during non-working hours, weekends, and holidays.

3.07. FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000 - Quality Requirements.

B. Tests and analysis of fill material will be performed in accordance with Section 312325 - Backfilling.

C. Compaction testing will be performed in accordance with Section 312330 - Compaction.

3.08. PROTECTION OF FINISHED WORK

A. Protect finished work.

B. Re-grade and re-compact disturbed fill areas subjected to vehicular traffic.

END OF SECTION

SECTION 312325

BACKFILL

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Granular materials for backfilling.

2. Classification of materials.

3. Backfilling trenches for utilities.

4. Consolidation and compaction.

1.02. REFERENCES

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates

B. ASTM D1556 - Density of Soil in Place by Sand-Cone Method

C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort

D. ASTM D2922 - Density of Soil in Place by Nuclear Methods

E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.03. SUBMITTALS

A. Granular Materials

1. Granular materials required for filling, backfilling, subbase, and other purposes shall be as shown on the Drawings. Prior to bidding, prospective Proposers shall familiarize themselves with the available quantities of approved on-site and off-site materials.

2. For each on-site and off-site material proposed, notify the Engineer of the source of the material and furnish to the Engineer for approval a certified gradation analysis (ASTM C136) and a Modified Compaction Test (ASTM D1557) at least 15 days prior to date of anticipated use of such material that has been tested within the last 6 months.

3. The Engineer reserves the right to inspect proposed source of off-site granular material and to order such tests of the materials as he deems necessary to ascertain its quality and graduation of particle size. The Proposer shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Engineer. If similar tests of the material from a particular source were performed previously (within 6 months), submit results of these tests to the Engineer for consideration.

4. No granular materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer, and only material from approved sources shall be used.

PART 2 PRODUCTS

2.01. GENERAL

A. Approvals- All materials to be utilized on the project shall be subject to testing, examination, and the approval of the Engineer. The Engineer and Rockland Green shall determine whether a material is suitable or unsuitable for the use intended. It is the intent of these Specifications that use shall be made of existing material excavated during the construction work, provided it meets the requirements for backfill included in this section, or unless otherwise specified or indicated on the Contract Drawings. Rockland Green makes no guarantee that the existing material will meet the requirements of the specifications for use as backfill. Only when sufficient on-site suitable material does not exist, shall the Proposer import suitable material from off-site. Costs of importing off-site material for normal backfilling purposes shall be the responsibility of the Proposer.

B. Suitable Material- In general, mineral (inorganic) soil, blasted or broken rock (if it meets backfill specifications) and similar materials of natural or manmade origin, including mixtures thereof, are considered as suitable materials, as determined by the Engineer to be suitable for filling, backfilling, as a base for placement of pipe, structures, or fill, or other uses.

C. Unsuitable Material- Any material containing chunks of cinders, earth or clay, vegetable or organic matter, such as muck, peat, organic silt, roots, stumps, topsoil or sod, shale or other soft, poor durability particles that is not satisfactory for the use intended, as determined by the Engineer, is designated as an unsuitable material.

2.02. ON-SITE MATERIALS

A. Type A, Excavated Material - Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material on-site is approved for reuse and is suitable, it shall be used for filling or backfilling purposes. If the Proposer so elects, the Proposer may, at their own expense, substitute other types of material in place of Type A material, provided such substitution is approved in advance by the Engineer. All replaced or surplus material shall be disposed of per Specification Section 312310.

B. Type A material shall not have any larger aggregate larger than 4-inches in any dimension and shall meet the specified compaction requirement per Specification 312330. The material shall be screened to meet these requirements and any remaining material which does not shall be removed and disposed of off-site at the Proposer's expense. In no case the top 12-inches nearest the final subgrade below the topsoil layer or pavement in local roads shall contain any aggregate larger than 2-inches.

2.03. OFF-SITE MATERIALS

A. Within the following specifications where grain size distribution requires a maximum of 10 percent or less material capable of passing the #200 mesh sieve, the percentage of material finer (than the #200 sieve) by weight shall be determined by wet screening in accordance with ASTM D1140. It is the intent of the specifications to allow the use of granular materials from local suppliers. Material specifications shall conform to the requirements of the New York State Department of Transportation, (NYSDOT) and shall conform to the latest NYSDOT Standard Specification.

B. No crushed stone or run-of-crusher material shall be used for this project until approval is obtained from the Engineer, and only material from approved sources shall be used. A certified sieve analysis from the supplier shall be submitted for the Engineer's approval prior to the use of any materials specified in this specification section.

C. Required Materials

1. Trench backfill (Green Areas Only) Above Pipe Backfill Material– Type A.

2. Pavement subbase - NYSDOT subbase course 733-0402, Type 2.

3. Trench special bedding - NYSDOT 733-0201, Type 3A stone.

4. Pipe Bedding - NYSDOT subbase course 733-0402, Type 2.

5. Backfill adjacent to, and under, structures - NYSDOT subbase course 733-0402, Type 2.

6. Impervious Fill: Naturally occurring or manufactured mixture of clayey gravel and sand capable of compacting to a dense state.

a. Maximum Particle Size: 1 inch

Sieve Size	Percent Passing by Weight
¾ inch	50-100
No. 4	40-90
No. 40	30-85
No. 200	25-75

b. Plasticity index of portion finer than #200 sieve greater than 15 and less than 20.

PART 3 EXECUTION

3.01. PIPE FOUNDATIONS

A. All pipes, fittings, or specials which are to be installed in the open trench excavation shall be properly bedded in, and uniformly supported on pipe foundations of the various types as specified and shown on the Drawings. Flat-bottom trenches of required width shall be excavated to the necessary depth shown on the Drawings and maintained in accordance with this section prior to installing the foundation. Trenches shall be dewatered and all work performed in a dry trench and free of rocks.

B. Bedding material shall be spread in maximum of 8-inch layers to the midpoint (spring line) of the pipe and each layer shall be compacted until the required total depth of the bedding has been built up. The Proposer shall perform his bedding operations with care to maintain line and grade. Compaction shall achieve a modified proctor value of 95%.

C. The pipe foundation above the midpoint of the pipe shall be spread and then compacted after foundation is 24-inches above the top of the pipe.

D. Type I - Normal Soil Conditions - Unless shown otherwise in the Drawings, all pipe shall be supported on Type I foundation. The trench shall be excavated 4 inches deeper than the bottom of the pipe. Acceptable bedding as described in the Contract Specifications shall be furnished, placed and compacted in the trench for its full width such that, after the pipe has been uniformly bedded in this material, the required minimum depth of material remains between pipe and undisturbed trench bottom. Suitable depressions shall be provided in the trench bottom to permit adequate bedding of bells, couplings, or similar projections. The bedding shall extend upward to be 24-inches over the top of the pipe. Minimum width of pipe foundation shall be outside diameter of pipe plus 2 feet 0 inches. The pipe centerline shall be longitudinally centered within the pipe bedding per the detail.

E. Type II - Moderately Unstable Soil Conditions - When specifically called for on the Drawings, or when ordered by the Engineer as existing conditions dictate, and as approved by the Engineer, the pipe shall be supported on Type II foundation. The foundation shall be installed where a suitable supporting soil or rock stratum occurs within 2 feet, more or less of the bottom of the pipe. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Install a reinforcing geotextile in accordance with Section 02420 - Backfilling, followed by trench special bedding which is then furnished and placed in the trench for its full width. The material shall be spread in 12-inch layers and each layer shall be compacted to achieve a modified proctor value of 95%. Trench special bedding shall extend from the supporting stratum up to the bottom of the Type I pipe foundation.

F. Type III – Unstable Soil Conditions – As conditions dictate, and as determined by the Engineer, the pipe bedding shall be supported on a Type III foundation. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Backfilling with a loosely compacted NYSDOT 703-0201 Type 3A stone bedding material shall be provided. This shall be followed by the bedding material as shown in the Type II and Type I pipe foundations.

3.02. GENERAL BACKFILLING REQUIREMENTS

A. Follow requirements of 312330 - Compaction.

B. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, and concrete has acquired a suitable degree of strength. Backfilling shall be carried on expeditiously thereafter. Backfill shall be started at the lowest section of the area to be backfilled. Natural drainage shall not be obstructed at any time.

C. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed. No backfill shall be placed against foundation walls on structural members unless they are properly shored and braced or of sufficient strengths to withstand lateral soil pressures.

D. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing. Material incorporated in the backfilling operation which is not in satisfactory condition shall be subject to rejection and removal at the Proposer’s expense.

E. If the Proposer fails to stockpile and protect on-site excavated material acceptable for backfill, then the Proposer shall provide an equal quantity of acceptable off-site material at no expense to Rockland Green.

F. Remove surplus backfill material from site.

G. Backfill areas to contours, grades, and elevations shown on the drawings, using unfrozen materials.

H. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

I. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed.

J. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary.

K. Hydraulic compaction by ponding or jetting is not permitted.

L. Employ a placement and compaction method consistent with Section 312330 - Compaction, that does not disturb or damage adjacent walls, drainage systems, damp proofing, waterproofing, protective coverings, utilities in trenches, underground conduits, or tanks.

M. Maintain optimum moisture content of backfill materials to attain required compaction density.

N. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradually. Blend slopes into level areas.

O. Remove surplus backfill materials from site.

3.03. PERIODIC CLEAN-UP AND BASIC RESTORATION

A. Perform clean-up work on a regular basis and as frequently as required. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished if partially completed facilities must remain incomplete for some time due to unforeseen circumstances.

B. Upon failure of the Proposer to perform periodic clean-up and basic restoration of the site, Rockland Green may, upon five days prior written notice to the Proposer, without prejudice to any other rights to remedies of the Rockland Green, cause such work for which the Proposer is responsible to be accomplished to the extent deemed necessary by the Contract Documents, and all costs resulting therefrom shall be charged to the Proposer and deducted from the amounts of money that may be due him.

3.04. EXAMINATION

A. Verify fill materials to be used are acceptable.

B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.

3.05. PREPARATION

A. Generally, compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of in situ compaction. Compact soil to a density equal to or greater than the requirements for subsequent backfill material.

3.06. TOLERANCES

A. Top Surface of Backfilling Under Pavement Subgrade - ±1 inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas- ±1/2 inch from required elevations.

C. Top Surface of General Backfilling - ±1 inch from required elevations.

3.07. FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000 - Quality Requirements.

B. Tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 31 2330 - Compaction.

C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 01400 - Quality Requirements.

D. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Rockland Green.

3.08. PROTECTION OF FINISHED WORK

A. Protect finished work.

B. Regrade and re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 312230

COMPACTION

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Compaction requirements and test methods.

2. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.02. REFERENCES

A. ASTM D698 - Laboratory Compaction of Soil Using Standard Effort

B. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method

C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort

D. ASTM D2922 - Density of Soil in Place by Nuclear Methods

E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.03. SUBMITTAL

A. Submit compaction plan including the specific equipment and detailed methods proposed to be used for compaction in accordance with Section 013300- Submittals.

B. Rockland Green will use an independent testing firm for compaction tests.

1.04. QUALITY ASSURANCE

A. The Proposer shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure, and piping to be placed thereon, or therein, without damage to the new or existing facilities.

B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.

C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.

D. This compaction shall be limited to that required to compact loose surface material and shall be terminated if it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.

E. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

PART 2 PRODUCTS

2.01. MATERIALS

A. Materials to be compacted shall be as specified in Section 312325 - Backfilling.

PART 3 EXECUTION

3.01. EXAMINATION

A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.

B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris.

C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.

D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

3.02. PREPARATION

A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.

B. Proof-roll all subgrade surfaces to accept fill material.

C. Each layer of fill shall be compacted to the specified density the same day it is placed.

1. The moisture content of backfill or fill material shall be adjusted, if necessary, to achieve the required degree of compaction.

D. Compact each lift in accordance with Table 1.

E. Match compaction equipment and methods to the material and location being compacted to obtain specified compaction, with consideration of the following guidelines:

1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.

2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.

3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 lbs. per linear inch (PLI).

4. Vibratory compaction is preferred for dry, granular materials.

5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.

6. Hydraulic compaction by ponding or jetting will not be permitted.

7. Backhoe-mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self-propelled vibratory compactors or static roller.

TABLE 1
COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (Inches)	ASTM	Minimum Compaction
I. STRUCTURES*			
a. Fill beneath foundation elements and under slabs-on-grade - hand-guided compaction	6	D1557	95%
b. Fill beneath foundation elements and under slabs-on-grade - self-propelled or tractor-drawn compaction	8	D1557	95%
c. Fill around structures and above footings	12	D1557	95%
II. TRENCHES**			
a. Fill under pipelines and pipe bedding	8	D1557	95%
b. Pipe sidefills and top 4 feet of pipe backfill under pavements	12	D1557	95%
c. Backfill below 4 feet under pavement	12	D1557	90%
d. Backfill under lawns, gardens and cultivated fields	12	D1557	90%
III. EMBANKMENTS AND FILLS			
a. Fill under streets, parking lots, and other paved areas	12	D1557	95%
b. Embankments not supporting pavement or structures	12	D1557	90%
c. Rough site grading	12	D698	85%
IV. TRENCH PLUGS	6	D1557	93% or 95%

*Where structural loads are carried by piles, caissons or other deep foundations, minimum compaction may be reduced to 92 percent.
**The first foot above non-plastic pipelines shall have a compacted thickness of 12 inches.
*** Compact impervious soil to at least 95% of standard Proctor maximum density. If more than 50% passes the 200 sieve, compact to at least 93% of the modified Proctor density if less than 50% passes the #200 sieve.

3.03. FIELD QUALITY CONTROL

A. Material Testing

1. Testing will be done by a qualified, independent testing laboratory in accordance with this section and Section 014000 - Quality Requirements.

2. The Proposer shall aid the third-party testing company in obtaining representative material samples to be used in testing.

3. For each material which does not meet specifications, the Proposer shall reimburse Rockland Green for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.

4. The Proposer shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. Rockland Green reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts at any time and at any location to confirm that specified compaction is being met.

2. Testing shall be conducted for every 200 cubic yards of fill or backfill, or every 100 linear feet of trench backfill is placed, whichever is less. Tests are required for each lift of fill or backfill placed.

3. The Proposer shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer.

4. For each test which does not meet specifications, the Proposer shall retest at his cost. If the retest does not meet specifications, the Proposer shall replace and recompact material to the specifications at no additional cost to Rockland Green.

5. The Proposer shall anticipate these tests and incorporate the time and effort into procedures.

6. Nuclear moisture density testing by “probe” methods will be acceptable for compacted layers not exceeding 12 inches in thickness.

   a. Nuclear “backscatter” methods will be acceptable only for testing asphalt paving layers not less than 3 inches in thickness.

   b. Only certified personnel will conduct nuclear testing.

   c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to material testing materials.

D. Alternate Methods of Compaction - The Proposer may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer’s satisfaction.

E. Select Material - On-Site

1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.

2. No on-site material shall be used without prior review and approval of Rockland Green.

F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.04. PROTECTION

A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.

B. As backfill progresses, the surface shall be graded to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.

C. The Proposer shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

SECTION 312500

EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01. SUMMARY

A. Section includes:

1. Temporary compost filter sock
2. Temporary drainage inlet protection
3. Temporary dust control
4. Submittals as required
5. Cleanup and repair

1.02. DEFINITIONS

A. Temporary erosion and sediment control practices shall be understood to mean temporary structures and practices designed to minimize the changes in the quality and quantity of water discharged from a location during construction activities.

1.03. PRE-INSTALLATION MEETINGS

A. Preconstruction Conference: Conduct conference at Project site.

1.04. SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all items listed.
2. Compliance with project Stormwater Pollution Prevention Plan and New York Standards and Specifications for Erosion and Sediment Control (most current edition). Proof shall be submitted in writing by Contractor.

1.05. QUALITY ASSURANCE

A. All construction materials specified with NYSDOT Item numbers shall appear on the current NYSDOT approved List.

B. Comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess and waste materials.

C. Obtain and pay for all required inspections, permits, and fees. Provide timely notices required by governing authorities.

D. Codes and standards: This work shall conform to all rules, regulations, specifications, and requirements that pertain to soil and water conservation practices of all agencies of government having jurisdiction.

E. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction, and in accordance with the current Occupational Safety and Health Administration (OSHA) Standards of Excavation.

F. Erosion and sediment control practices as may be required must meet the requirements of the New York State Standards and Specifications for Erosion and Sediment Control and the New York State Stormwater Management Design Manual, and the Contract Documents.

G. The Proposer shall be required to maintain public and private roadways adjacent to the project site in a clean condition.

1.06. DELIVERY, STORAGE AND HANDLING

A. Store materials properly to prevent damage, deterioration, and contamination.

B. Aggregates shall be stockpiled in well-drained locations.

C. Packaged materials shall be delivered in their original unopened containers that identify the material name and type and stored in a weatherproof enclosure.

D. Aggregates, earth fill, and topsoil that are muddy or frozen shall not be handled, delivered to the site, stockpiled, or spread.

1.07. FIELD CONDITIONS

A. Utility Locator Service: Notify Dig Safely New York at 1-800-962-7962 for area where Project is located before site clearing.

B. Prior to performing any topsoil stripping or other earthwork activities on the site, the Proposer shall mark out with surveyor's flagging the limits of all areas to be disturbed and install all required temporary erosion and sediment control measures.

1. The Proposer shall adhere to all erosion and sediment control policies of the agencies of government having jurisdiction.

C. Discrepancies: Prior to the start of any construction work, immediately report to Rockland Green's Representative any discrepancies found on the site between actual conditions and those indicated on the Contract Drawings and confirm in writing. Where applicable, provide field information specific to the discrepancy to expedite resolution.

PART 2 PRODUCTS

2.01. MATERIALS

A. Temporary Compost Filter Sock

1. Fabric

a. Multi-filament polypropylene
b. Photodegradable

c. 12” Diameter
d. Mesh opening = 3/8”
e. Tensile strength = 44 psi
f. Ultraviolet stability% original strength (ASTM G-155)= 100% at 1,000 Hr.
g. Minimum functional longevity= 1 year

2. Compost filter media

a. Organic matter content = 25%-100% Dry weight
b. Organic portion= Fibrous and elongated
c. PH=6.0-8.0
d. Moisture content= 30%-60%
e. Particle size= 100% passing a 1” screen and 10-15% passing a 3/8” screen.
f. Soluble salt concentration= 5.0 ds/m (mmhos/cm) Maximum

3. Compost infill.

a. The compost infill shall be well decomposed (matured at least 3 months), weed-free, organic matter. it shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed above. Note all biosolids compost produced in New York State (or approved for importation) must meet NYSDEC's 6 NYCRR Part 360 (Solids Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content. When using compost filter socks adjacent to surface water, the compost should have a low nutrient level.

B. Temporary drainage inlet protection:

1. Paved areas

a. Snake Bag manufactured by Sacramento Bag Manufacturing Company of Sacramento, California, or equal.

b. Fiber roll – field constructed rolled tube of erosion control blanket, or BioD-Watl™ coir wattle as manufactured by RoLanka International, Inc. 55 Andrew Drive, Stockbridge, GA 30281, (800) 760-3215, or equal.

c. Ultra DrainGuard™ oil and sediment model – Part No. 9217, as manufactured by P.E.P. Products, Branchburg, NJ, 1 (800) 407-3726, or equal.

2. Non-paved areas

a. Silt fence as indicated in “Temporary Silt Fence” above.

b. Stake material shall be standard 2 x 4 pressure treated wood or equivalent metal with a minimum length of 3 feet.

C. Dust control

1. Non-driving areas

a. Vegetative cover see Section 329200 - Turf and Grasses.

b. Mulch

1) Wood mulch, see Section 329300 - Plants.
2) Gravel mulch, Clean 2” crushed stone, meeting NYSDOT 703-0201, #2 stone.

2. Driving areas

a. Water

b. Polymer additives if approved by Rockland Green

1) Earthbind™, Stabilizer, manufactured by Enviroad http://www.enviroad.com/index.shtml or equal.

c. Barriers

1) Woven geotextiles - see Temporary stabilized construction area in this section.
2) Stone - see Temporary stabilized construction area in this section.

d. Wind breaks - see temporary silt fence in this section.

PART 3 EXECUTION

3.01. EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

A. The Proposer shall contact Rockland Green’s Representative immediately if clarification or interpretation of the Contract Documents, or any other aspect of the project, is required.

B. Before commencing with other site operations including demolition, site clearing and earthwork –related activities, the Proposer shall erect site perimeter erosion control measures as required.

3.03. GENERAL INSTALLATION

A. In the event of conflict between these specification requirements and regulations by governmental agencies having jurisdiction, the more restrictive laws, rules, or regulations apply.

B. The Proposer’s schedules and methods shall be consistent with the project erosion and sediment control plan as shown in the Contract Documents or as reviewed by Rockland Green’s Representative.

C. To control erosion and sedimentation on the project site and to protect adjoining sites and watercourses, the Proposer shall take all necessary precautions including, but not limited to, the following:

1. The Proposer shall erect the site perimeter erosion control measures before commencing the demolition operation, site clearing or earthwork.

2. The Proposer shall limit the area of clearing and grubbing, excavation, borrow and embankment operations commensurate with their capability and progress in keeping the finish grading, mulching, seeding and other temporary and/or permanent control measures installed and maintained to the satisfaction of the Rockland Green's Representative.

3. In areas where soil disturbance has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within 7 days from the date the soil disturbance ceased.

4. Control dust by standard water spray methods. Road dust shall be controlled using water or other allowed materials.

5. Keep paved roads adjacent to the project site clean. Sweep frequently and do not allow soil and debris to accumulate.

6. All mulch placed atop permanent seeding on slopes steeper than 3:1 (run:rise) shall be anchored with a biodegradable rolled erosion control product installed according to manufacturer's directions.

3.04. INSTALLATION

A. Install all temporary sediment control practices per the current edition of the New York State Department of Environmental Conservation, New York State Standards and Specifications for Erosion and Sediment Control.

3.05. FIELD QUALITY CONTROL

A. Refer to Section 014000 – Quality Control.

3.06. MAINTENANCE SERVICE

A. Maintenance Service: Beginning at start of construction, maintenance service shall include full maintenance by skilled employees of erosion and sediment controls Installer. Include weekly preventive maintenance, repair or replacement of worn or defective components, as required for proper operation.

B. Always maintain all temporary erosion control measures in proper working order during the construction period. They shall remain in place until the permanent surface treatments have been sufficiently established to prevent soil erosion and Rockland Green's Representative has authorized removal.

1. Check all erosion and sediment control practices for stability and operation following every ½-inch rainfall but in all cases at least once every week. Immediately make repairs as needed.

2. The Proposer shall be responsible for maintenance and inspection of erosion and sediment control and stormwater quality facilities for the duration of the project, including winter or other shutdowns.

3. Remove sediment from behind silt fences when the capacity has been reduced by 50%. Repair silt fences as necessary to maintain an effective barrier.

4. Clean out sediment traps when the capacity has been reduced by 50%.

5. Inspect check dams for stability and operation following every ½ inch rainfall, but in all cases at least once every week, remove accumulated sediment when capacity has been reduced by 50%.

   a. If erosion has occurred between structures, install a temporary layer of a rolled erosion control product, stone or other suitable material to stabilize that portion of the channel until permanent surface treatments are established and the stormwater collection system is in place.

6. Remove sediment from inlet protection devices when the storage capacity is reduced to 50% of the inlet protection device capacity.

3.07. CLEANUP AND RESTORATION

A. Promptly remove soil and debris created by work described in this Section.

B. At the completion of the site work described in this Section, the site shall be left in a neat and orderly condition. Remove all resultant miscellaneous materials and debris from the site.

C. Turf areas, pavements and all other site amenities that were damaged during the work described in this Section shall be restored to their original condition prior to this construction at the Proposer's expense, and to Rockland Green's satisfaction.

D. When temporary erosion and sediment control practices are no longer needed as determined by Rockland Green's Representative and the agency of government having jurisdiction, the Proposer shall remove and return the area to a condition similar to that which existed before construction. Areas where temporary erosion and sediment control practices were located shall be graded with no obstruction to natural surface water flows or the proper functioning and access to the works of improvement installed. The Proposer shall exercise extreme care during the removal stages to minimize the loss of soil sediment and debris that was trapped during construction.

END OF SECTION

SECTION 321216

ASPHALT PAVING

PART 1 GENERAL

1.01. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

A. Section Includes:

1. Asphalt paving; top course, binder, and base course.

2. Driveways and parking areas.

3. Compaction.

4. Tolerances.

5. Field quality control.

B. REFERENCES

1. New York State Department of Transportation (NYSDOT) Standard Specifications, dated May 1, 2018.

2. NYSDOT - Manual of Uniform Traffic Control Devices.

1.03. PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.

b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.04. PERFORMANCE REQUIREMENTS

A. Where pavement replacement is being accomplished, match the sectional profiles of the existing pavement unless otherwise stated herein or shown on the Drawings.

B. All thicknesses of pavement courses described herein or shown on the Drawings are after completion of compaction.

1.05. SUBMITTALS

A. Submit under provisions of Section 013300 – Submittals, including asphalt materials, equipment and paving methods.

B. Submit certification of plant job mix formulas that have been approved by the NYSDOT.

1.06. QUALITY ASSURANCE

A. Perform work in accordance with the most current NYSDOT Standard Specifications as they apply to the following:

1. Materials and batch plant requirements.

2. Construction procedures except as modified herein.

3. Weather and seasonal limitations except as modified herein.

B. Paving work shall be performed by a qualified paving contractor or subcontractor with minimum 10 years of documented experience acceptable to Rockland Green and Engineer. Supporting documentation for the paving contractor or subcontractor stating years in service with three references shall be submitted to the Engineer for review and approval prior to start of work.

1.07. ENVIRONMENTAL LIMITATIONS

A. Weather and Seasonal Limitations - Asphalt concrete and bituminous surface treatments shall not be placed on wet surfaces or when it is raining or when conditions prevent the proper handling, compacting or finishing of the asphalt concrete or when the surface temperature is less than specified in the following table:

Nominal Compacted Lift Thickness	Surface Temperature Minimum (Note 1)	Seasonal Limits
3" or Greater	40°F	None
Greater than 1" but less than 3"	45°F	Notes 2 and 3
0.1" or less	50°F	Notes 2 and 3
Bituminous Surface Treatments (Note 3)	70°F or greater	Note 4

Notes:

1. All temperatures shall be measured on the surfaces (lay glass thermometer on surface and read after temperature has stabilized) where the paving is to be placed and the controlling temperature shall be the average of three temperature readings taken at locations +25 feet apart.

2. Top course shall be placed only during the period of May 1 to October 15 in all counties except Dutchess, Orange, Rockland, Putnam, Westchester, Nassau, Suffolk, and the City of New York in which top course shall be placed only during the period of April 1 to November 15. In addition, when top course is placed between September 15 and November 15, not less than two rollers shall be furnished and operated by the Contractor.

3. Surface treatments shall be placed during the period of May 1 up to and including the first Saturday after Labor Day.

4. The ambient temperature shall be not less than 50 degrees F in the shade and not more than 95 degrees F.

5. Bituminous paving mixtures for curbs, driveways, sidewalks, gutters and other incidental construction shall be placed on surfaces having a temperature of 45 degrees F or greater. Installation of these items is not subject to seasonal limitations.

6. When work is halted because of weather conditions, limited tonnage enroute to the project may be placed, if permitted, and the mixture is within the temperature requirements.

1.08. COORDINATION

A. Coordinate field work including maintenance of traffic, access to private driveways, and emergency vehicle access.

1.09. SCHEDULING

A. Schedule the paving operations such that all paving necessary to provide safe and adequate maintenance and protection of traffic or for protection of previously laid courses is completed within the weather and seasonal limitations.

1. Such scheduling shall include expediting construction operations to permit paving before the seasonal limitations or by limiting the length of work to that which can be completed before the seasonal shutdown.

2. The cost of scheduling and sequencing of work to conform with the seasonal limitations shall be reflected in the bid prices for the related contract items.

1.10. MAINTENANCE

A. The Proposer shall maintain driving surfaces, free of ruts and potholes, for maintenance of traffic until temporary paving or permanent paving is installed.

1. All temporary paving and pavement replacement shall be maintained in a safe, drivable condition until the pavement wearing course is installed.

2. All subgrade, subbase and base courses shall also be maintained in their specific finish condition prior to placement of the next course.

B. If the Proposer fails to complete the necessary paving operations prior to weather and seasonal limitations, all temporary materials and work which become necessary as a result of such failure, such as the lowering or shimming of castings and protrusions, drainage of the roadway, providing acceptable rideability, and other work needed for the adequate maintenance and protection of traffic until paving operations can be completed the following paving season, shall be at the Proposer’s expense.

C. For a period of one year after issuance of the Certificate of Substantial Completion, the Proposer shall promptly patch, maintain, repair, and/or replace any pavement that settles or becomes damaged due to settlement or defective materials or workmanship.

1. Areas to be repaired shall be cut out in a square or rectangular shape to the depth matching the top course.

2. The vertical face of asphalt to be painted with asphalt emulsion prior to placing the asphalt concrete.

3. If more than top course depth of 1-1/2-inch settlement has occurred, the pavement shall be removed to the subbase and subbase and/or binder and base course restored to proper grade before restoration of the wearing course.

4. The finished grade, in any case, shall be as shown on the Contract Drawings.

PART 2 PRODUCTS

2.01. ASPHALT

A. All asphalt pavement courses shall be hot mix asphalt pavement conforming to material requirements of the following:

1. Top Course – NYSDOT 9.5 F1, Top Course HMA 80 series compaction.

2. Binder Course – NYSDOT 19 F9, Binder Course HMA 80 series compaction.

3. Pavement Subbase - NYSDOT Type 1 F9, Asphalt-Treated Permeable Base Course.

4. Tack Coat - New York State Item No. 407.0103, tack coat, emulsified asphalt.

PART 3 EXECUTION

3.01. EXAMINATION

A. Permanent restoration of pavements shall not begin until 30 days after trench or structure backfill has been completed in accordance with the applicable specifications or until testing of the installed utility has been completed in accordance with the specifications (whichever is the longest period after completion of trench or structural backfill).

1. Completion of backfill shall include compaction tests to ascertain compliance with degree of compaction required as described in Section 312330 - Compaction.

a. Verify base conditions

b. Verify that compacted subgrade is dry and ready to support paving.

c. Verify gradients and elevations of base are correct.

B. If painted traffic markings on the pavement are to be interrupted by the new pavement replacement, they are to be restored using an approved traffic paint.

C. Driveway and Parking Areas

1. Driveways and parking areas that are disturbed or damaged by the Proposer’s operations shall be restored equal to a new condition.

2. Driveway or parking area aprons which do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1 inch per foot with top course material of the new pavement, so that the apron conforms to the elevation of the road pavement at each location.

3. New driveways or parking areas shall be constructed as described herein and as shown on the Drawings.

3.02. PREPARATION

A. Where project consists of reconstructing existing streets, lower valve boxes and existing manholes to subgrade level by removing frame and cover and brick masonry.

1. Cover valve boxes and manholes with steel plates and locate with measured ties.

2. After constructing the subbases and pavement courses, and prior to placing the final top course, recover valve boxes and manholes and raise to finished grade.

B. All existing and new manholes, frames and covers, valve boxes, curb boxes, etc., shall be raised or lowered to be 1/2 inch below the new pavement grade.

1. No manhole covers or valve box covers shall be covered with paving material or be exposed in a depression in the pavement greater than 1/2 inch.

C. Catch basin frames and grates shall be raised or lowered to be 1 inch below the new pavement finished grade.

D. Pavement Cuts

1. Pavement cuts for final pavement replacement shall be made as described herein.

2. Pavement cuts shall be made parallel to the centerline of the trench, shall be located a minimum of 12 inches outside the backfilled trench on undisturbed subgrade in a straight line between those stations where changes in direction of the installed piping were made.

3. Loose, torn, cut, marked up or damaged pavement outside the cutback areas shall be removed and replaced at the Proposer’s expense and match the proposed permanent paving.

4. Pavement cuts in driveways shall be cut back 12 inches and made in a straight alignment perpendicular or parallel to the driveway and for its full width.

5. Pavement cuts in parking areas shall be cut back 12 inches and made in a straight alignment parallel to the centerline of trench.

E. Preparation of Existing Surfaces

1. Prior to placing of asphalt concrete, the existing pavement surfaces shall be cleaned including brooming, mechanical sweeping, and flushing with water such that no dust or foreign material remains on the existing surface and in accordance with NYSDOT Specification Section 633 “Conditioning Existing Pavement Prior to Hot Mix Asphalt (HMA) Overlay”.

2. After cleaning of surface, all unsealed or inadequately sealed cracks and joints shall be cleaned with compressed air and then sealed as required under NYSDOT Specification “633-3.02 Cleaning, Sealing and Filling Joints and Cracks.”

3. Prior to placing of asphalt concrete, vertical faces of existing pavement, structures, curbs and gutters shall receive a tack coat as described in NYSDOT Specification “407 Tack Coat.” Curbs and gutter faces to be sprayed only to the extent to be covered by the asphalt concrete.

F. All new pavement where meeting existing pavement shall be butted up against a vertical face in the existing pavement.

1. This vertical face to be cut to the depth of the new pavement.

2. Where the new pavement is an overlay, the beginning and end of the top course shall be similarly butted against a vertical face.

3. The existing pavement shall be removed for a minimum length of 2 feet, as measured parallel to the direction of paving, or greater if required to eliminate any noticeable bump or to provide adequate drainage away from structures, and to the width of new pavement.

G. Removal of Existing Pavement

1. Where shown on the Contract Drawings, the Proposer shall remove a portion of an existing pavement to the limits and profile specified.

2. Excavated asphalt shall be loaded, hauled, and weighed at Rockland Green's MSW truck scale and delivered to the on-site Concrete and Asphalt Crushing (recycling) Facility.

3.03. PREPARATION - TACK COAT

A. Apply tack coat in accordance with manufacturer's instructions

1. Tack coat temperature to be not less than 120 degrees F.

2. The tack coat shall be applied no more than four hours prior to paving the asphalt concrete course.

a. No traffic will be allowed on the freshly applied tack coat.

B. Apply tack coat to contact surfaces of curbs, gutters, and existing vertical surfaces.

3.04. PREPARATION - RESET MANHOLE FRAMES

A. Prior to placing wearing (top) course, make final adjustments of manhole frames, catch basin frames, valve boxes and any other utility structures located in the pavement in relation to finished grade.

1. Manhole frames, valve boxes, etc. to set 1/2 inch below finished grade and parallel to finished crown.

2. Catch basin frames to set 1 inch below finished grade and parallel to finished crown.

a. Bevel slope of wearing course (for 6-inch width) around catch basin frame.

3.05. INSTALLATION

A. Install work in accordance with NYSDOT standards.

B. Place asphalt within four hours of applying tack coat.

C. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact with vibratory pans and hand tamps in area inaccessible to rolling equipment.

D. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.06. PLACING AND COMPACTING

A. Placing mix in an appropriate ambient temperature and on a surface sufficiently warm to minimize the risk of excessive cooling before completion of rolling is of paramount importance. Holding the aggregate particles in place is solely the function of the film of asphalt. The asphalt cannot perform this function properly if the mix is too cool when rolled.

1. A thin course compresses very little under the roller and, as it cools quickly, it must be rolled as soon as possible.

2. The Proposer shall supply sufficient number of rollers to perform the required compaction while asphalt concrete is still hot and in a workable condition and coordinate speed of paver with rollers such that the degree of compaction required is obtained.

3. A high degree of densification is not the goal with this type of mix -- the aim is firm seating and contact of the aggregate particles.

4. One or two coverages (see Table 1) with a steel-wheeled roller weighing 8 to 10 tons is sufficient. Additional rolling may be excessive, causing a break in the bond of asphalt between aggregate particles, particularly after the mix has cooled.

5. When overtaken by sudden storms, the Engineer may permit work to continue up to the amount which may be in transit from the plant at the time, provided the mixture is within temperature limits specified.

B. Paving - All asphalt concrete shall be installed using self-powered units in accordance with the NYSDOT Specification “402-3.02 HMA Pavers and 402-3.06 Spreading and Finishing".

1. A self-powered paving unit shall be provided except where hand methods are permitted by the Engineer in small areas or areas inaccessible to a paving unit. For such areas, the mixture shall be dumped, spread, screened and compacted to give the required section and compaction thickness.

C. Compaction - Asphalt concrete shall be compacted in accordance with NYSDOT Specification “402-3.07 Compaction and 402-3.09 Joints” using either option as follows:

1. Option A - Tandem roller (static or vibratory) 8 to 10 ton size.

2. Option B - Vibratory compaction.

D. The required number of passes for either vibratory or static rollers, listed in Table 1, are minimum and may be increased by the Engineer. One pass shall be defined as one movement of the roller over any point of the pavement in either direction. Static roller passes shall continue until all ruts, ridges, roller marks or other irregularities are removed from the surface. The Engineer may alter the compaction procedures for small areas where the specified procedures are not practical.

TABLE 1

REQUIRED NUMBER OF PASSES (MINIMUM)

Pavement Courses	Vibratory Roller		Steel-Wheel Tandem Finish Roller
	Vibrating Passes*	Static Passes**	Static Passes
Base (open graded each lift)	4	2	5
Base (dense graded)	4	2	5
Binder (dense graded)	4	Not required	5
Top (dense graded all types)	2	Not required	2

*The required number of vibrating passes shall be reduced by one-half for dual vibrating drum rollers when the drums are tandem and are both in the vibrating mode.

**The required number of static passes may be completed by the vibratory roller operating in the static mode.

E. Unless otherwise directed by the Engineer, vibratory rollers having pneumatic drive wheels shall compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two passes with the drum operating static. Unless otherwise directed by the Engineer, dual vibrating drum rollers shall compact the joint by overlapping the joints in two passes with both drums operating static.

F. To prevent adhesion of the mixture to the drum(s), the drum(s) shall be kept properly moistened with water, or water mixed with small quantities of detergent. If required to prevent pneumatic tire pickup, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar material. In all instances, the surface of the pavement shall be protected from drippings of fuel oil or any other solvents used in paving, compaction or cleaning operations.

G. If the Engineer determines that unsatisfactory compaction is being obtained or damage to highway components and/or adjacent property is occurring using vibratory compaction equipment, the Proposer shall immediately cease using this equipment and proceed with the work in accordance with the conventional static compaction procedures at no additional cost.

H. The Proposer should note that if he elects to use vibratory compaction equipment, he assumes full responsibility for the cost of repairing all damage that may occur to highway components and adjacent property or underground utilities.

3.07. DRIVEWAYS AND PARKING REAS

A. Paving materials, type of paving, depth of various courses, etc., shall be as shown on the Drawings.

1. The driveways and parking areas shall be cut back 12 inches from outside disturbed or damaged areas as described above.

2. The work shall include proper compaction of any necessary subbase, base course and paving courses, in accordance with Section 312330 - Compaction.

3.08. TOLERANCES

A. Surface Tolerance - The pavement surface shall be constructed to a 1/4-inch tolerance. If, in the opinion of the Engineer, the pavement surface is not being constructed or has not been constructed to this tolerance based upon visual observation or upon riding quality, he may test the surface with a 16-foot straight edge (furnished by the Proposer) or string line placed parallel to the centerline of the pavement and with a 10-foot straight edge or string line placed transversely to the centerline of the pavement on any portion of the pavement.

1. Variations exceeding 1/4-inch shall be satisfactorily corrected or the pavement relayed at no additional cost as ordered by the Engineer.

B. Thickness Tolerance - The thickness indicated for each of the various courses of bituminous pavement is the nominal thickness. The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical, and within the tolerances specified below.

1. Material which is part of a trueing or leveling course or shim course will not be considered in pavement thickness determinations.

2. A tolerance not to exceed 1/4-inch from the nominal thickness required for the course specified under one pay item will be acceptable where the required nominal thickness is 4 inches or less. A tolerance not to exceed 1/2-inch from the nominal thickness required for the course or courses specified under one pay item will be acceptable where the required nominal thickness is over 4 inches. In addition, the sum total thickness of all bituminous mixture courses shall not vary from the total of the nominal thickness indicated on the plans by more than 1/4 inch where the total nominal thickness is 4 inches or less; or more than 1/2-inch where the total nominal thickness is over 4 inches but not more than 8 inches; and by not more than 5/8-inch where the total nominal thickness is more than 8 inches.

3.09. FIELD QUALITY CONTROL

A. The required degree of compaction for wearing or top courses and shim course is a finished product having not more than 7 percent air voids.

B. Rockland Green reserves the right to order testing of materials at any time during the work. The Proposer shall provide testing at no additional cost to Rockland Green.

3.10. PROTECTION

A. Any pavement constructed or reconstructed, which is subsequently damaged due to activity of work under this contract, shall be removed and replaced by the Proposer at no additional cost to Rockland Green.

B. Protect pavement from vehicular traffic until compaction is completed.

END OF SECTION

APPENDIX E

DRAWINGS

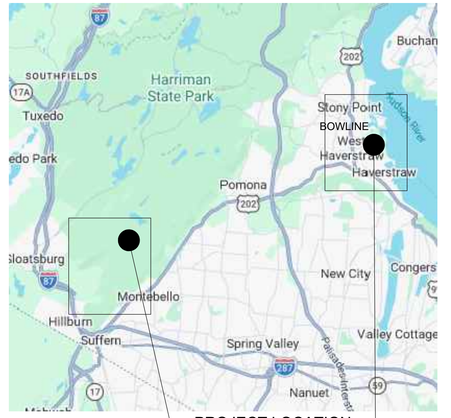
RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK

ROCKLAND COUNTY, NEW YORK

FEBRUARY 2026

EDR JOB #: 20098

PROJECT LOCATION MAP: REGION



SCALE: NO SCALE

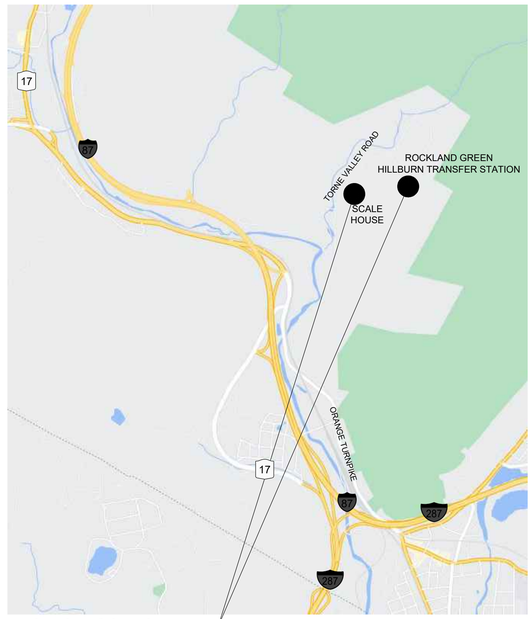
ROCKLAND GREEN
172 MAIN STREET
NANUET, NEW YORK 10954

EDR
a better environment

Environmental Design & Research,

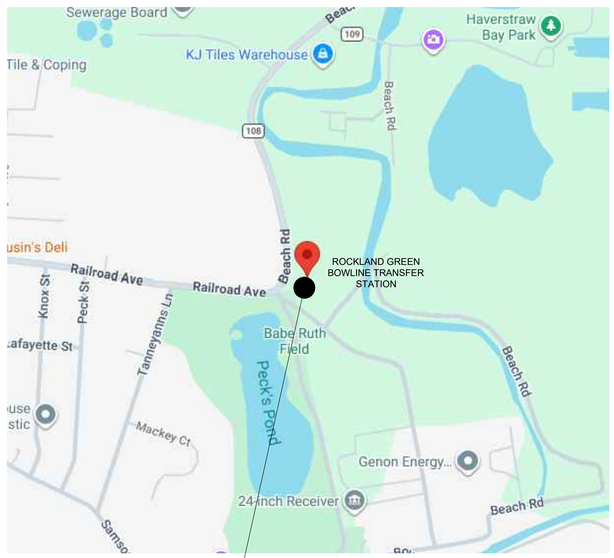
Landscape Architecture, Engineering
& Environmental Services, D.P.C.
12 Water Street, Suite 202
White Plains, New York 10601
P. 315.471.0688

PROJECT LOCTATION MAP: LOCAL



SCALE: NO SCALE

PROJECT LOCTATION MAP: LOCAL



SCALE: NO SCALE

STATE OF NEW YORK
MICHAEL E. TAMBURINI
073737
LICENSED PROFESSIONAL ENGINEER

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NOTE: LIST OF ABBREVIATIONS ARE STANDARDS OF THIS OFFICE AND NOT ALL ARE USED.

ABBREVIATIONS:

A or AMP - AMPERE, AMPS
AC - ALTERNATING CURRENT
AF - AMPERE FRAME SIZE
AFF - ABOVE FINISHED FLOOR
AFG - ABOVE FINISHED GRADE
AIC - AMPS INTERRUPTING CURRENT
ALT - ALTERNATOR
AM - AMMETER
ANN - ANNUNCIATOR
AS - AMMETER SWITCH
ASV - AIR SOLENOID VALVE
AT - AMPERE TRIP RATING
ATS - AUTOMATIC TRANSFER SWITCH
AUX - AUXILIARY
AWG - AMERICAN WIRE GAUGE
BB - CK BOOST
BKR - BREAKER
BTS - BEARING TEMPERATURE SENSOR
C or COND - CONDUIT
C&W - CONDUIT & WIRE
CA - CABLE
CB - CIRCUIT BREAKER
CDRS - CONDUCTORS
CIRC - CIRCUIT
CLF - CURRENT LIMITING FUSE
COMP - COMPARTMENT
COR - CORROSION RESISTANT
CP - CONTROL PANEL
CPT - CONTROL POWER TRANSFORMER
CR - CONTROL RELAY
CT - CURRENT TRANSFORMER
DC - DIRECT CURRENT
DM - DAMPER MOTOR
DPSH - DIFFERENTIAL PRESSURE
DS - DISCONNECT SWITCH
EA - EACH
EC - ELECTRICAL CONTRACTOR
EMH - ELECTRICAL MANHOLE
EMT - ELECTRICAL METALLIC TUBING
EMTP - EMBEDDED MOTOR THERMAL PROTECTOR
ES - EMERGENCY SWITCH
ESTOP - EMERGENCY STOP
ETM - ELAPSED TIME METER
FA - FIRE ALARM
FIT - FLOW TRANSMITTER
FLEX - FLEXIBLE
FLOA - FLOAT SWITCH
FM - FORCE MAIN
FOSA - FAST-OFF-SLOW-AUTOMATIC
FOS - FAST-OFF-SLOW
FS - FLOW SWITCH
FSW - FUSED SWITCH
FVNR - FULL VOLTAGE NON REVERSING
FVR - FULL VOLTAGE REVERSING
FVTS - FULL VOLTAGE TWO SPEED
GC - GENERAL CONTRACTOR
GEN - GENERATOR
GENSET - EMERGENCY POWER GENERATOR
GFCI - GROUND FAULT CIRCUIT INTERRUPTER
GFI - GROUND FAULT INTERRUPTER
GRD - GROUND
HOA - HAND-OFF-AUTO SELECTOR SWITCH
HP - HORSE POWER
HV - HEATING AND VENTILATION
HFS - HIGH FLOAT SWITCH
IB/OB - INBOARD/OUTBOARD
IL - INDICATING LIGHT
I/0 - INPUT/OUTPUT
ISR - INTRINSICALLY SAFE RELAY
JB - JUNCTION BOX
JIC - JOINT INDUSTRIAL COUNCIL
KCMIL - THOUSAND CIRCULAR MILS
KSU - KEY SERVICE UNIT
KVA - KILOVOLT AMPERES
KW - KILOWATT
LA - LIGHTNING ARRESTOR
LC - LIGHTING CIRCUIT
LO - LOCKOUT
LS - LIMIT SWITCH
mA - MILLIAMPS
MAG - MAGNETIC
MAX - MAXIMUM

ABBREVIATIONS:

MCC - MOTOR CONTROL CENTER
MCP - MOTOR CIRCUIT PROTECTOR
MCS/ - MOLDED CASE SWITCH
T - THERMAL ONLY
M - MAGNETIC ONLY
AUTO - AUTOMATIC ONLY
MDP - MAIN DISTRIBUTION PANEL
MFR - MANUFACTURER
MIN - MINIMUM
MLO - MAIL LUGS ONLY
MMS - MANUAL MOTOR STARTER
MSS - MOTOR STARTING SWITCH
MTR - MOTOR TIMING RELAY
MWTS - MOTOR WINDING TEMPERATURE SENSOR
MWTP - MOTOR WINDING THERMAL PROTECTION
Mx - MOTOR CONTACTOR AUXILIARY CONTACT
NC - NORMALLY CLOSED
NEC - NATIONAL ELECTRIC CODE
NIMO - NIAGARA MOHAWK POWER
NO - NORMALLY OPEN
NP - NAMEPLATE
NYSEG - NEW YORK STATE ELECTRIC & GAS
OH/E - OVERHEAD ELECTRIC
OH/L - OVERHEAD TELEPHONE
OL - OVERLOAD RELAY
ø - PHASE
P - POLE
PB - PUSHBUTTON
PBx - PULL BOX
PF - PULLING FITTING
PLC - PROGRAMMABLE LOGIC CONTROLLER
PNL - PANEL
POT - POTENTIOMETER
PR - PAIR
PS - PRESSURE SWITCH
PT - POTENTIAL TRANSFORMER
R&R - REMOVE & REPLACE
RECP - RECEPTACLE
RGS - RIGID GALVANIZED STEEL CONDUIT
ROS - REMOTE OPERATING STATION
RV-AT - REDUCED VOLTAGE AUTO TRANSFORMER
RTU - REMOTE TERMINAL UNIT
SA - SURGE ARRESTOR
SCR - SILICON CONTROLLED RECTIFIER
SEC - SECOND
SEL or SEL SW - SELECTOR SWITCH
SHLD - SHIELDED
S/L - STOP/LOCKOUT SWITCH
SN - SOLID NEUTRAL
SS - STAINLESS STEEL
SSRVS - SOLID STATE REDUCED VOLTAGE STARTER
SSW - SAFETY SWITCH
S/S - STOP/START PUSH BUTTON
STR - STRANDED
SV - SOLENOID VALVE
SW - SWITCH
SWD - SWITCHING DUTY
SWSV - SEALWATER SOLENOID VALVE
TC - TERMINAL CABINET OR TIMED CLOSED
TDR - TIME DELAY RELAY
TERM - TERMINAL
TR - TIMER
TR.SW. - TRANSFER SWITCH
TR24 - 24-HOUR TIMER
TPR - TERTIARY PHOSPHOROUS REMOVAL
TS - TORQUE SWITCH
TSP - TWISTED SHIELDED PAIR
TST - TWISTED SHIELDED TRIAD
TYP - TYPICAL
UG/E - UNDERGROUND ELECTRIC
UG/T - UNDERGROUND TELEPHONE
UNK. - UNKNOWN
UPS - UNINTERRUPTIBLE POWER SUPPLY
VA - VOLT-AMPERES
VFD - VARIABLE FREQUENCY DRIVE
VM - VOLTMETER
VS - VOLTMETER SWITCH
VSC - VARIABLE SPEED CONTROL
VSH - VIBRATION SENSOR
W/ - WITH
WP - WEATHER PROOF, WATER PROOF
XP - EXPLOSION PROOF
2S1W - 2 SPEED, 1 WINDING
2S2W - 2 SPEED, 2 WINDING
XFMR - TRANSFORMER

GENERAL NOTES:

1. ALL WORK SHALL COMPLY WITH AND BE INSTALLED IN ACCORDANCE WITH THE LATEST VERSION OF THE BUILDING CODE OF THE STATE OF NEW YORK AND ALL CODES LOCAL OR OTHERWISE HAVING JURISDICTION OVER THE WORK.
2. THE WORDS PROVIDE OR INSTALL, SINGLY OR IN COMBINATION SHALL MEAN FURNISH AND INSTALL.
3. THE CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING AS REQUIRED FOR THE INSTALLATION OF HIS WORK.
4. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF HIS WORK AND NEWLY INSTALLED OR EXISTING WORK, INCLUDING PROTECTION OF BUILDING OCCUPANTS, PUBLIC, AND PERSONNEL. PROVIDE APPROPRIATE BARRIERS, AND SAFETY GUARD RAILS AS REQUIRED.
5. NO SYSTEM SHALL BE SHUT DOWN WITHOUT PERMISSION OF THE OWNER/OWNER. ADEQUATE NOTICE SHALL BE GIVEN TO THE OWNER/OWNER. WHEN SYSTEM SHUTDOWN INVOLVES A TEMPORARY DISRUPTION TO SERVICES.
6. ANY DISRUPTION IN SERVICES SHALL BE KEPT TO A MINIMUM AND SHALL NOT BE IMPLEMENTED WITHOUT RECEIVING PRIOR WRITTEN APPROVAL OF THE OWNER/OWNER.
7. ALL WORK SHALL BE COORDINATED WITH THE OWNER AND ALL TRADES RELATED TO THE INSTALLATION OF THIS PROJECT.
8. THE CONTRACTOR SHALL TURN OVER TO THE OWNER AT THE COMPLETION OF ALL WORK, THREE (3) COPIES IN BOUND FORM OF OPERATING, MAINTENANCE, AND INSTRUCTION MANUALS WHICH SHALL INCLUDE ALL EQUIPMENT BROCHURES, PIPING AND WIRING DIAGRAMS, DRAWINGS, TEMPERATURE CONTROLS, AND STARTUP AND SHUTDOWN PROCEDURES OF ALL NEWLY INSTALLED EQUIPMENT.
9. THE CONTRACTOR SHALL FILE PLANS WITH GOVERNING AUTHORITIES HAVING JURISDICTION AND SHALL SECURE ALL PERMITS AND PAY ALL FEES REQUIRED FOR THE INSTALLATION OF HIS WORK. ALL WORK TO BE INSPECTED BY 3RD PARTY INSPECTOR.
10. THE CONTRACTOR SHALL GUARANTEE ALL MATERIAL AND WORK INSTALLED TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR, AFTER ACCEPTANCE OF THE INSTALLATION BY THE ENGINEER AND OWNER. THE CONTRACTOR SHALL SUBMIT IN WRITING TO THE OWNER STATING SAME.
11. THE CONTRACTOR SHALL INDEMNIFY THE OWNER, HIS REPRESENTATIVES AND THE ENGINEER FROM ANY CLAIMS OR SUITS RESULTING IN NEGLIGENCE ON THE PART OF THE CONTRACTOR AND FOR FAILING TO EXECUTE HIS WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
12. THE CONTRACTOR SHALL PROVIDE ALL RIGGING, HOISTING AND SCAFFOLDING AS REQUIRED FOR THE INSTALLATION OF HIS WORK.
13. ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS AND WORKMAN EXPERIENCED IN THE TRADE HAVING JURISDICTION. ALL WORK SHALL BE SUPERVISED AT ALL TIMES AND WORKMANSHIP SHALL BE FIRST CLASS IN ALL RESPECTS.
14. ANY DEVIATION OR CHANGE IN DESIGN SHALL NOT BE MADE WITHOUT WRITTEN APPROVAL OF THE ENGINEER OR THE OWNER/OWNER. ANY WORK INSTALLED WITHOUT PRIOR APPROVAL OF THE ENGINEER OR OWNER/OWNER OR FOUND TO BE DEFECTIVE OR OF POOR QUALITY SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.
15. ALL CONSTRUCTION WORK SHALL BE CONFINED TO THE AREA INDICATED ON PLANS.
16. ALL WORK SHALL BE PERFORMED DURING NORMAL WORKING HOURS: 8 A.M. TO 5 P.M. MONDAY THROUGH FRIDAY EXCEPT LEGAL HOLIDAYS OR FOR EMERGENCY REPAIRS, UNLESS DIRECTED OTHERWISE BY THE OWNER/OWNER. HOWEVER, THE CONTRACTOR MAY WORK EXTRA HOURS AS NEEDED TO COMPLETE THE CONTRACT SCOPE OF WORK AND MEET THE COMPLETION DATE AT NO ADDITIONAL COST TO OWNER, AS LONG AS THE OWNER/OWNER HAS BEEN PROPERLY NOTIFIED AND HAS APPROVED SAME.
17. PATCHING & REPAIR OF CONCRETE, SIDEWALK OR GROUND, ETC. SHALL MATCH EXISTING SURROUNDING AREA IN ALL RESPECTS. WORK AREA SHALL BE LEFT CLEAN AT THE END OF EACH DAY. ALL DISCARDED AND DEMOLISHED MATERIAL AND RUBBISH SHALL BE REMOVED FROM PREMISES DAILY IN A LEGAL AND APPROVED MANNER.
18. THE CONTRACTOR SHALL MAINTAIN ON THE JOB SITE A SET OF SHOP DRAWINGS IN WHICH ANY DEVIATIONS FROM THE ORIGINAL DESIGN SHALL BE NOTED. UPON COMPLETION OF THE INSTALLATION OF NEW WORK THE CONTRACTOR SHALL TURN OVER TO THE OWNER/OWNER AND ENGINEER (1) SET OF AS-BUILT REPRODUCIBLE DRAWINGS AND (1) SET OF PRINTS INCLUDING ALL APPROVED FIELD CHANGES AND DESIGN DEVIATIONS PRIOR TO RECEIPT OF FINAL PAYMENT BY OWNER.
19. ALL WORK SHOWN ON ALL DRAWINGS IS TO BE PROVIDED UNLESS OTHERWISE NOTED.
20. ALL DOWNSTREAM DEVICES AND EQUIPMENT WHICH BECOME DISCONNECTED DURING THIS CONSTRUCTIONS SHALL BE RECONNECTED AT NO COST TO THE OWNER. PROVIDE ALL CONDUIT AND WIRE AS REQUIRED
21. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK, AS WELL AS BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF THE WORK.
22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING REASONABLE PRECAUTIONS AND SHALL PROVIDE REASONABLE PROTECTION TO PREVENT INJURY OR DAMAGE TO PERSONS, THE WORK AND OTHER PROPERTY.

LEGEND

SYMBOL	DESCRIPTION
———	EXISTING EQUIPMENT, DEVICE, CONDUIT, ETC.
▨	EXISTING EQUIPMENT, DEVICE, CONDUIT, ETC. TO BE REMOVED
———	EQUIPMENT, DEVICE, CONDUIT, ETC. TO BE FURNISHED AND PROVIDED
—⌒—	CIRCUIT BREAKER
(M)	METER
⏚	CURRENT TRANSFORMER
▭	PANELBOARD
MH	MAN HOLE
ATS	AUTOMATIC TRANSFER SWITCH
◢ 30/-	DISCONNECT SWITCH - FRAME/FUSE
WP, GFI	WEATHER-PROOF, GROUND FAULT-INTERRUPT
PB	PULLBOX
(G)	GENERATOR
▯	TRANSFORMER
⌐¬	MOUNTING RACK
⏚	SERVICE GROUND BOND AND GROUND ROD

NOTE: ALL WORK IS TO BE PROVIDED UNLESS OTHERWISE NOTED

ORIGINAL DRAWING SIZE: ARCH D (24" X 36")
g:\data\jobs\20098 rockland green\CadFiles\dwg drawings\electrical\bill\bum - haverstraw\20098 - E-1 Legend & Abbreviations.dwg

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The following is paraphrased from the New York Education Law, Article 145, Section 7209, and Chapter II, Section 79-1.4, and applies to this drawing: "It is a violation of this law for any person unless he is acting under the direction of a licensed professional engineer, licensed landscape architect or licensed land surveyor to alter an item in any way. If an item bearing the seal of an engineer, landscape architect or land surveyor is altered, the altering engineer, landscape architect or land surveyor shall affix to the item his seal and the notation "altered by" followed by his signature and the date of such alteration and a specific description of the alteration".

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PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

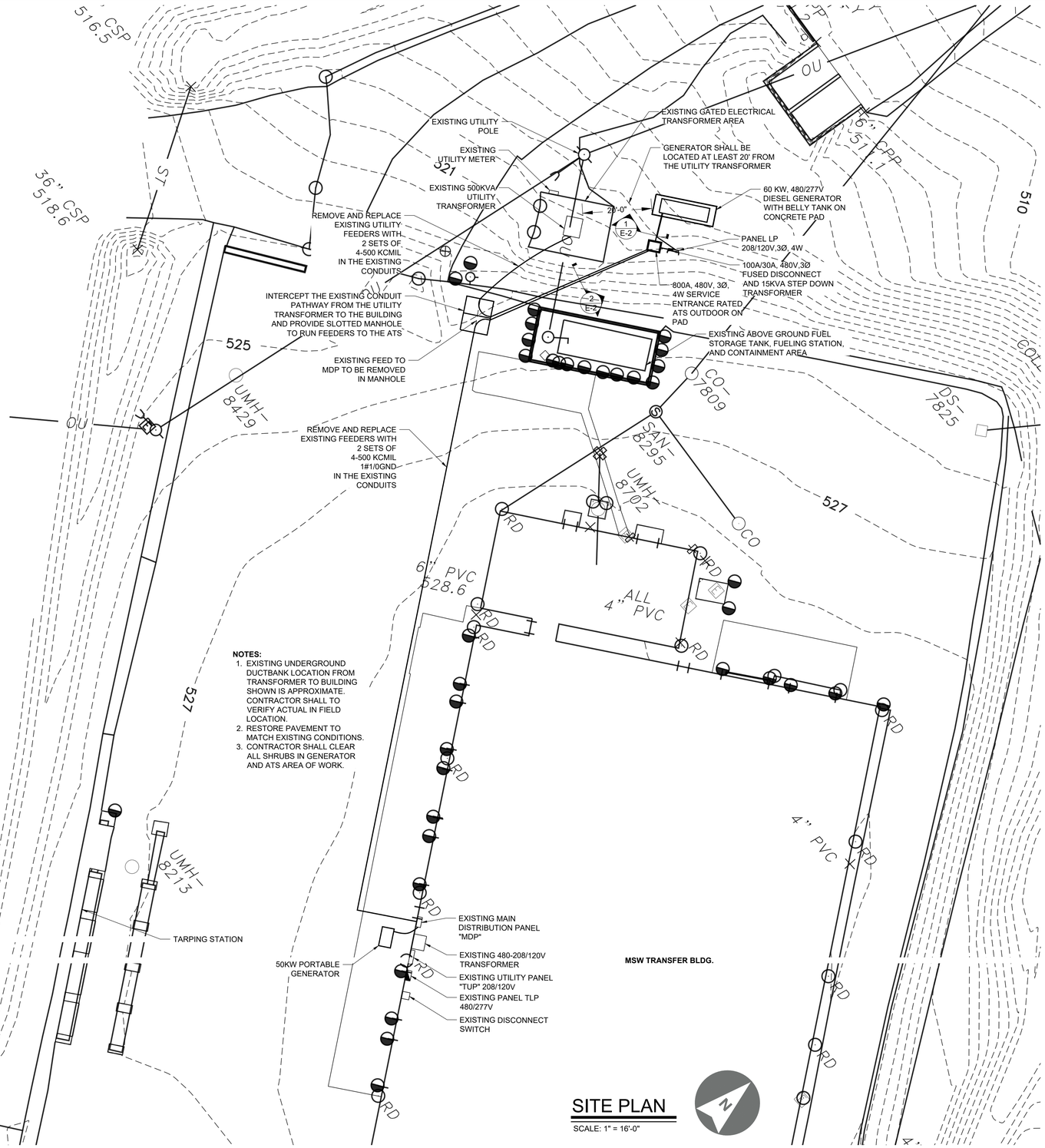
DRAWING TITLE: **ABBREVIATIONS, GENERAL NOTES, AND LEGEND**

CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1	02/26	FOR BIDDING	JGD	GRL	JH
2					
3					
4					
5					
6					

EDR JOB#: **20098**
DATE: **02/2026**
SCALE: **AS SHOWN**
DRAWN BY: **AGG**
CHECKED BY: **JD**
DRAWING NUMBER: **E-1**

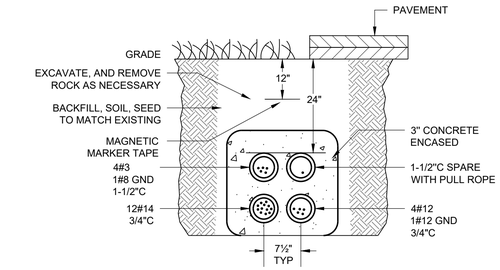


NOTES:

1. EXISTING UNDERGROUND DUCTBANK LOCATION FROM TRANSFORMER TO BUILDING SHOWN IS APPROXIMATE. CONTRACTOR SHALL TO VERIFY ACTUAL IN FIELD LOCATION.
2. RESTORE PAVEMENT TO MATCH EXISTING CONDITIONS.
3. CONTRACTOR SHALL CLEAR ALL SHRUBS IN GENERATOR AND ATS AREA OF WORK.

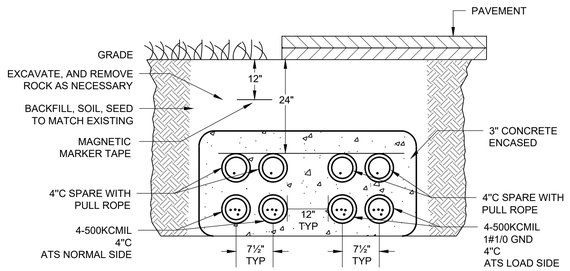
SITE PLAN

SCALE: 1" = 16'-0"



TRENCH DETAIL 1 / E-2

NO SCALE



TRENCH DETAIL 2 / E-2

NO SCALE

CONTRACTOR TO HIRE SERVICES OF OUTSIDE AGENCY FOR MARKING OUT ALL UNDERGROUND UTILITIES. MARK OUT UNDER AND 6'-0" BOTH SIDES OF EXCAVATION AREA AND ENTIRE LENGTH. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGED UTILITIES AND COST FOR THE REPAIRS.

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ORIGINAL DRAWING SIZE: ARCH D (24" X 36")

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PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **PART SITE PLAN - HILLBURN TRANSFER STATION**

CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
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DATE: **02/2026**
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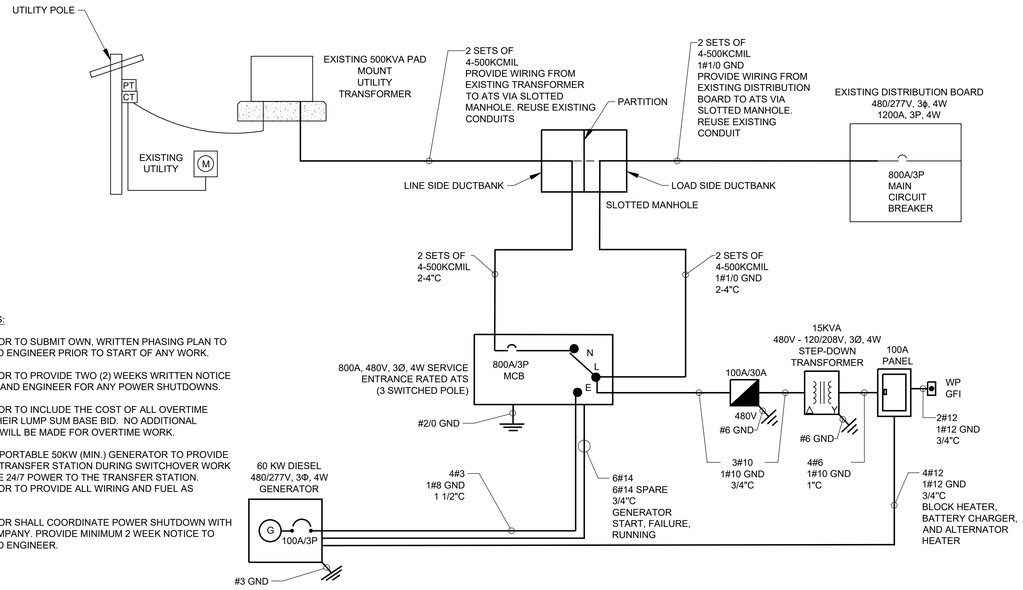
DRAWING NUMBER: **E-2**



PHASING NOTES:

1. CONTRACTOR TO SUBMIT OWN, WRITTEN PHASING PLAN TO OWNER AND ENGINEER PRIOR TO START OF ANY WORK.
2. CONTRACTOR TO PROVIDE TWO (2) WEEKS WRITTEN NOTICE TO OWNER AND ENGINEER FOR ANY POWER SHUTDOWNS.
3. CONTRACTOR TO INCLUDE THE COST OF ALL OVERTIME WORK IN THEIR LUMP SUM BASE BID. NO ADDITIONAL PAYMENTS WILL BE MADE FOR OVERTIME WORK.
4. PROVIDE A PORTABLE 50KW (MIN.) GENERATOR TO PROVIDE POWER TO TRANSFER STATION DURING SWITCHOVER WORK TO PROVIDE 24/7 POWER TO THE TRANSFER STATION. CONTRACTOR TO PROVIDE ALL WIRING AND FUEL AS REQUIRED.
5. CONTRACTOR SHALL COORDINATE POWER SHUTDOWN WITH UTILITY COMPANY. PROVIDE MINIMUM 2 WEEK NOTICE TO OWNER AND ENGINEER.

POWER SINGLE LINE DIAGRAM

SCALE: NTS

PANEL BOARD LP

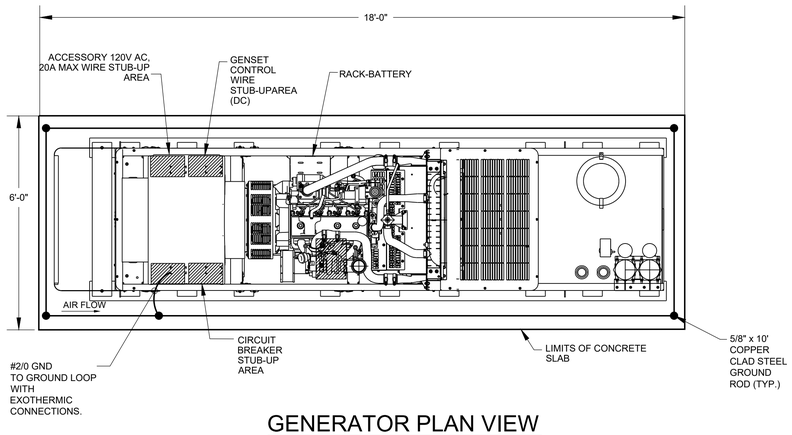
MAIN BUS RATINGS: 100 A, 120/208 VOLTS, 3 PHASE, 4 WIRE
MINIMUM SHORTCIRCUIT INTERRUPTION RATING: 10,00 KAIC
MAIN BREAKER TRIP: 60 A
ESTIMATED CONNECTED LOAD: 1.9 KW
* INDICATES GFCI CIRCUIT BREAKER

FED FROM: 15 KVA TRANSFORMER
INCOMING FEED: 4#6 1#10 GND
ENCLOSURE: NEMA 3R

DESCRIPTION	LOAD KW	CB TRIP/POLE	CIR. NO	A B C	CIR. NO	CB TRIP/POLE	LOAD KW	DESCRIPTION
BLOCK HEATER	1.5	20A/1P	1		2	20A/1P	.2	BATTERY CHARGER & ALTERNATOR HEATER
SERVICE RECEPTACLE	.2	20A/1P	3		4	20A/1P	-	SPARE
SPARE	-	20A/1P	5		6	20A/1P	-	SPARE
SPARE	-	20A/1P	7		8	20A/1P	-	SPARE
SPARE	-	20A/1P	9		10			SPACE
SPACE			11		12			SPACE
SPACE			13		14			SPACE
SPACE			15		16			SPACE
SPACE			17		18			SPACE

GENERATOR AND ATS PAD DETAIL

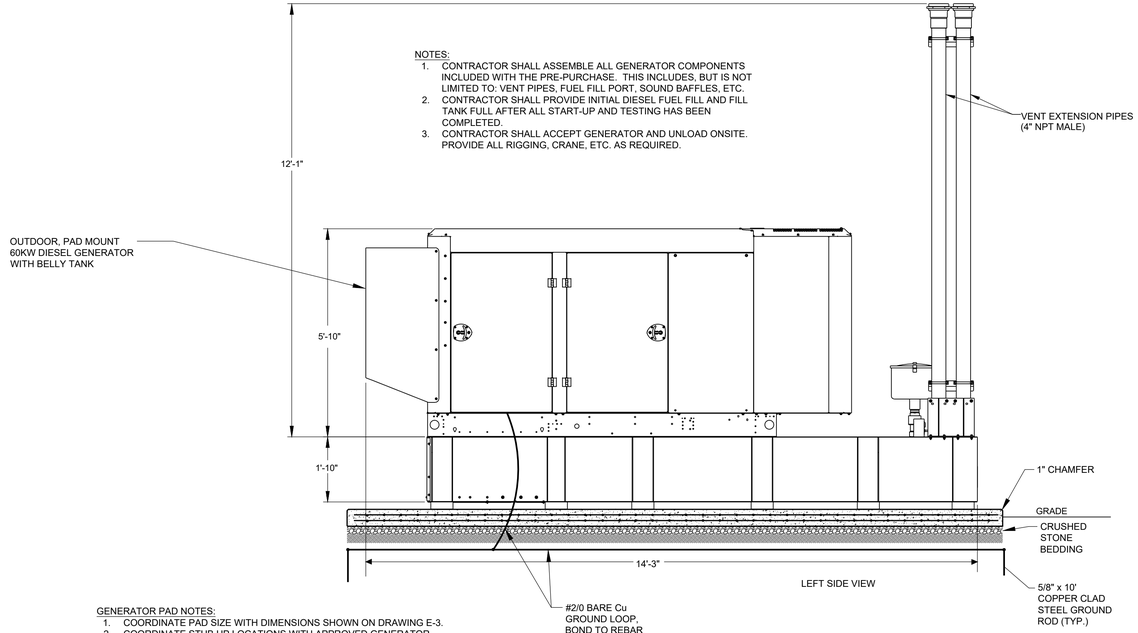
SCALE: NTS



GENERATOR PLAN VIEW

SCALE: NTS

NOTES:
1. CONTRACTOR SHALL ASSEMBLE ALL GENERATOR COMPONENTS INCLUDED WITH THE PRE-PURCHASE. THIS INCLUDES, BUT IS NOT LIMITED TO: VENT PIPES, FUEL FILL PORT, SOUND BAFFLES, ETC.
2. CONTRACTOR SHALL PROVIDE INITIAL DIESEL FUEL FILL AND FILL TANK FULL AFTER ALL START-UP AND TESTING HAS BEEN COMPLETED.
3. CONTRACTOR SHALL ACCEPT GENERATOR AND UNLOAD ONSITE. PROVIDE ALL RIGGING, CRANE, ETC. AS REQUIRED.



GENERATOR PAD NOTES:
1. COORDINATE PAD SIZE WITH DIMENSIONS SHOWN ON DRAWING E-3.
2. COORDINATE STUB UP LOCATIONS WITH APPROVED GENERATOR MANUFACTURERS SHOP DRAWINGS.
3. CONTRACTOR SHALL FURNISH AND INSTALL TEN (10) ANCHOR FOR THE OWNER PROVIDED GENERATOR. ANCHORS SHALL BE A STAINLESS STEEL 1/2" DIAMETER HILTI KWIK BOLT 3 WITH 3-1/2" MINIMUM EMBED DEPTH. ANCHORS SHALL MAINTAIN A MINIMUM OF 10-INCHES EDGE DISTANCE FROM ALL CONCRETE EDGES.

GENERATOR ELEVATION VIEW

SCALE: NTS

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PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**
PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**
CLIENT: **ROCKLAND GREEN**
DRAWING TITLE: **SINGLE LINE DIAGRAM PANEL SCHEDULE, AND DETAILS - HILLBURN TRANSFER STATION**
CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
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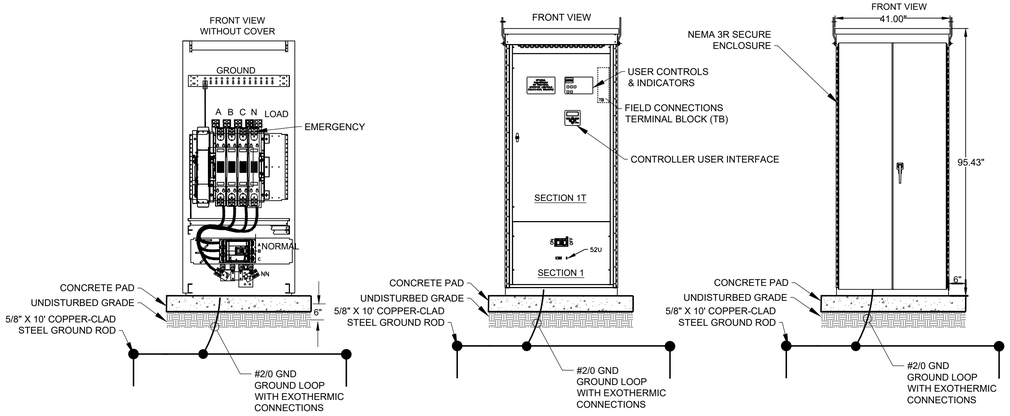
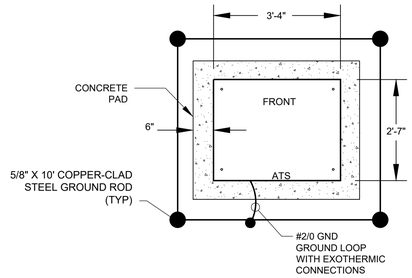
EDR JOB#: **20098**
DATE: **02/2026**
SCALE: **AS SHOWN**
DRAWN BY: **AGG**
CHECKED BY: **JD**
DRAWING NUMBER: **E-3**

Date Printed: 2/19/2026 1:41:07 PM
\\20098 Rockland Green\Cad\Working Drawings\ELECTRICAL\Hillburn - Haverstraw\20098 E-3 SINGLE LINE DIAGRAM & DETAILS - HILLBURN TS.dwg
ORIGINAL DRAWING SIZE: ARCH D (24" X 36")



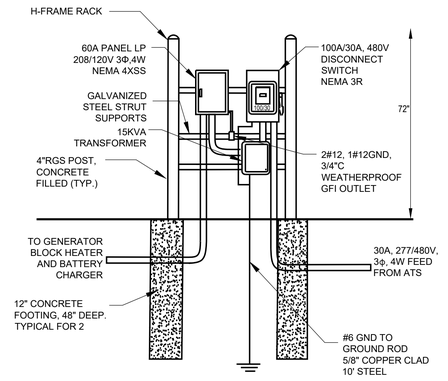
ATS ELEVATION DETAIL

SCALE: NTS



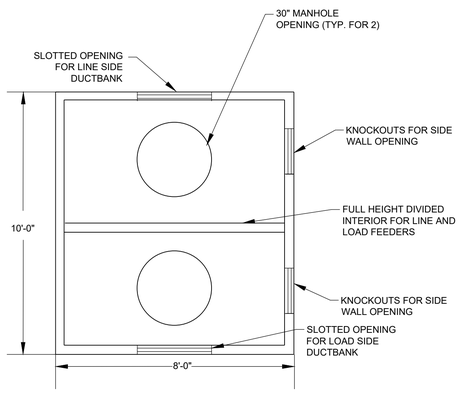
ATS PLAN VIEW

SCALE: NTS



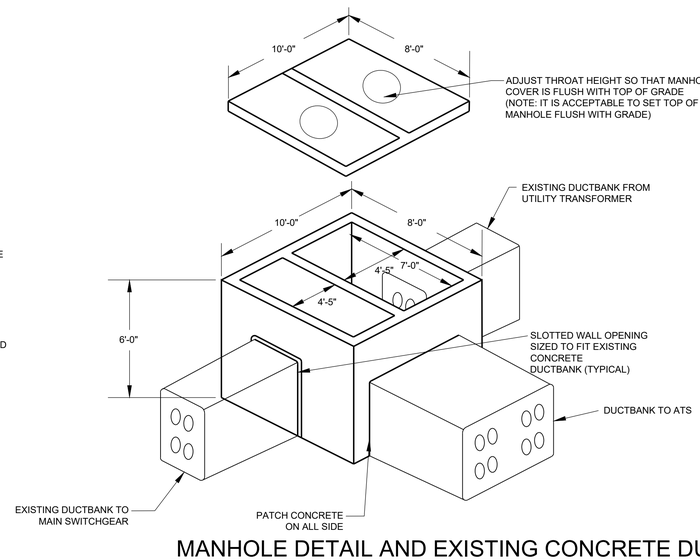
EQUIPMENT RACK ELEVATION DETAIL

SCALE: NTS



SLOTTED MANHOLE PLAN VIEW

SCALE: N.T.S.



MANHOLE DETAIL AND EXISTING CONCRETE DUCTBANK

SCALE: N.T.S.

NOTES:

1. CONTRACTOR SHALL CUT EXISTING CONCRETE DUCTBANK AND CHISEL BACK CONCRETE FROM CONDUITS, INSTALL COUPLINGS, BUSHINGS AND REROUTE CONDUITS TO ATS. GROUT EXISTING DUCTBANK TO MANHOLE WITH NONSHRINK GROUT.
2. PROVIDE PRE-CAST SLOTTED MANHOLE WITH H-20 WHEEL LOADING. PROVIDE NYS PROFESSIONAL ENGINEER'S DESIGN CALCULATIONS WITH SUBMITTAL.
3. PROVIDE OPEN BOTTOM FOR DRAINAGE. SET MANHOLE ON 8" CRUSHED STONE BED.
4. PROVIDE CAST IRON MANHOLE COVERS NOTED "ELECTRIC".

Date Printed: 2/11/2026 2:02:19 PM
p:\jobs\yr2009\ 20098 .rockland green\CadDwrks\og drawings\electric\ATSdtl.dwn - hwentzaw,2/9/26, F-4 SCHEDULE & DETAILS - HILLBURN TS.dwg
ORIGINAL DRAWING SIZE: ARCH D (24" X 36")
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CLIENT / SUBCONSULTANT:

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12 Water Street, Suite 202
White Plains, New York 10601
P. 315.471.0688

PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **DETAILS - HILLBURN TRANSFER STATION**

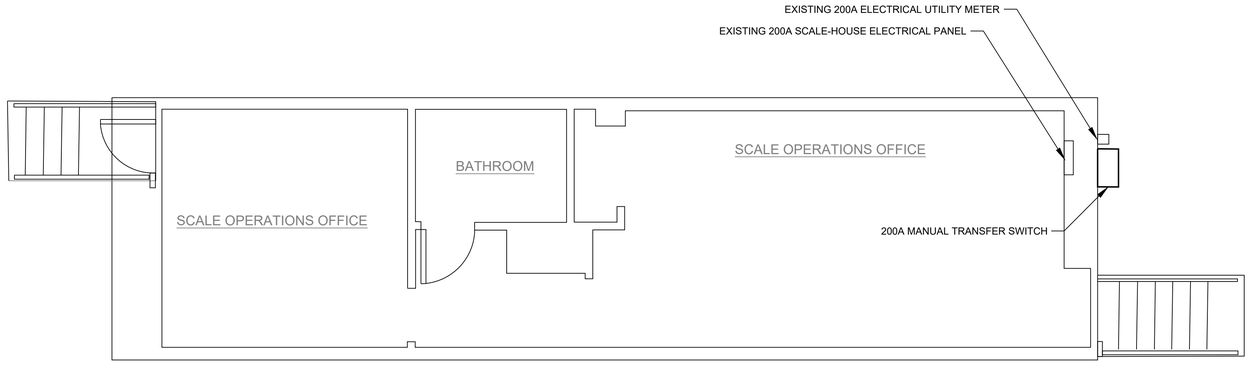
CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
2					
3					
4					
5					
6					

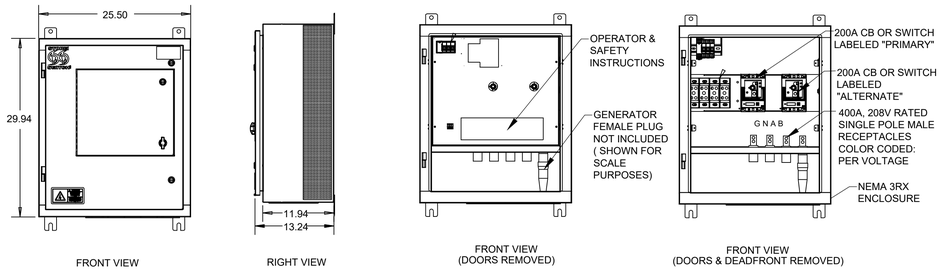
EDR JOB#: **20098**
DATE: **02/2026**
SCALE: **AS SHOWN**
DRAWN BY: **AGG**
CHECKED BY: **JD**
DRAWING NUMBER: **E-4**

Date Printed: 2/19/2026 1:43:13 PM



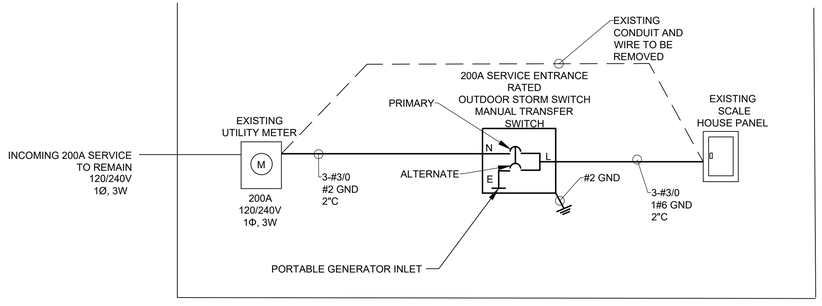
SCALE HOUSE ELECTRICAL PLAN

SCALE: 1/4" = 1'



MANUAL TRANSFER SWITCH DETAIL

NO SCALE



POWER SINGLE LINE DIAGRAM

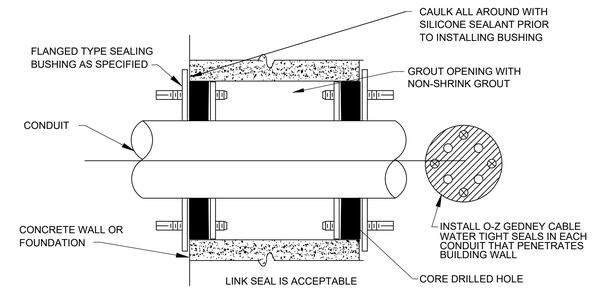
NO SCALE

GENERATOR CABLE DETAIL

NO SCALE

NOTES:

1. PROVIDE ONE (1) SET (5 CABLES) 400A/600VAC, TYPE W, 16 SERIES CAM-TYPE FEEDER EXTENSION CABLES.
2. CABLES SHALL BE 50FT LENGTH, SINGLE POLE MALE (PLUG) TO SINGLE POLE FEMALE (CONNECTOR).
3. PROVIDE ONE (1) SET (5 CABLES) FEEDER TAILS WITH MALE (PLUG). TAILS SHALL BE 5FT LENGTH.
4. PROVIDE ONE (1) CABLE AND ONE (1) FEEDER TAIL PER PHASE, NEUTRAL AND GROUND. COLOR CODED FOR VOLTAGE (BLACK, RED, BLUE, WHITE AND GREEN).
5. GENERATOR CABLES SHALL BE AS MANUFACTURED BY LEX PRODUCTS OR EQUAL.

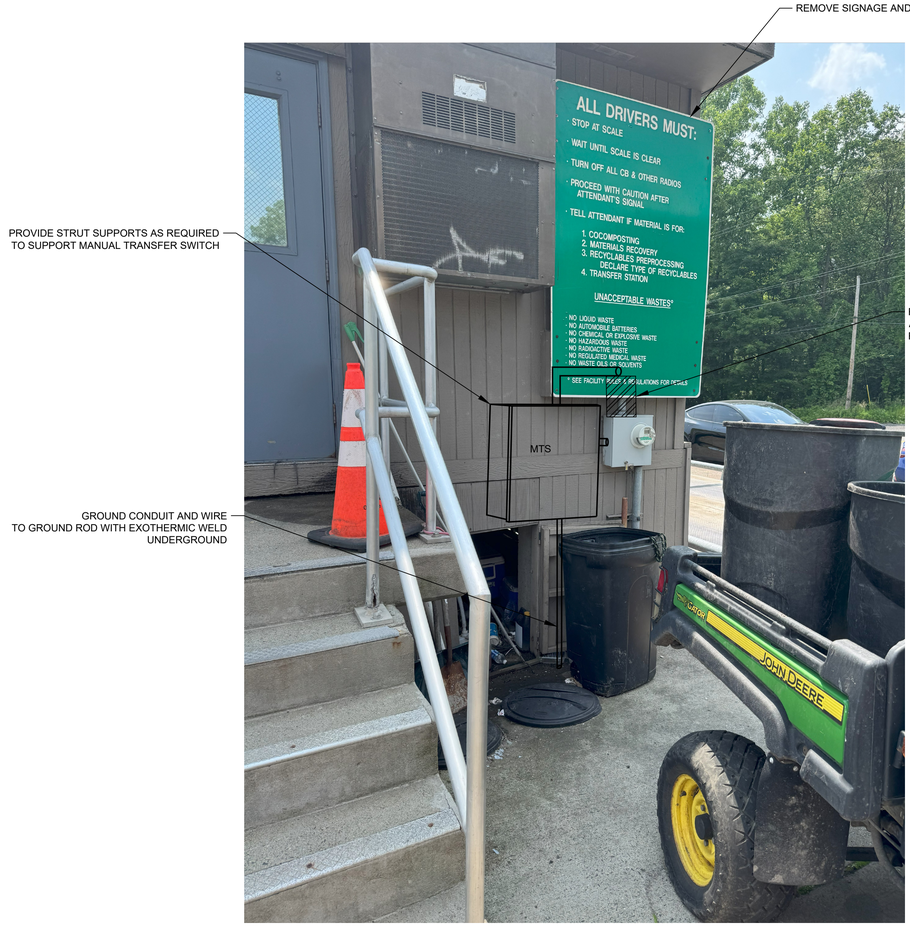


TYPICAL SLEEVE DETAIL FOR EXISTING WALL PENETRATION

NO SCALE

PHASING NOTES:

1. CONTRACTOR TO SUBMIT OWN, WRITTEN PHASING PLAN TO OWNER AND ENGINEER PRIOR TO START OF ANY WORK.
2. CONTRACTOR TO PROVIDE TWO (2) WEEKS WRITTEN NOTICE TO OWNER AND ENGINEER FOR ANY POWER SHUTDOWNS.
3. CONTRACTOR TO INCLUDE THE COST OF ALL OVERTIME WORK IN THEIR LUMP SUM BASE BID. NO ADDITIONAL PAYMENTS WILL BE MADE FOR OVERTIME WORK.
4. PROVIDE A PORTABLE 15KW (MIN.) GENERATOR TO PROVIDE POWER TO SCALE HOUSE DURING SWITCHOVER WORK. CONTRACTOR TO PROVIDE ALL WIRING AND FUEL AS REQUIRED.
5. CONTRACTOR SHALL COORDINATE POWER SHUTDOWN WITH UTILITY COMPANY. PROVIDE MINIMUM 2 WEEK NOTICE TO OWNER AND ENGINEER.



ORIGINAL DRAWING SIZE: ARCH D (24" X 36")
J:\20098 Rockland Green\CAD\Working Drawings\ELECTRICAL\Hillburn - Haverstraw\20098-E-5 SITE PLAN - HILLBURN SCALE HOUSE.dwg

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PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **FLOOR PLAN, SINGLE LINE & DETAILS - HILLBURN SCALE HOUSE**

CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
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EDR JOB#: **20098**
DATE: **02/2026**
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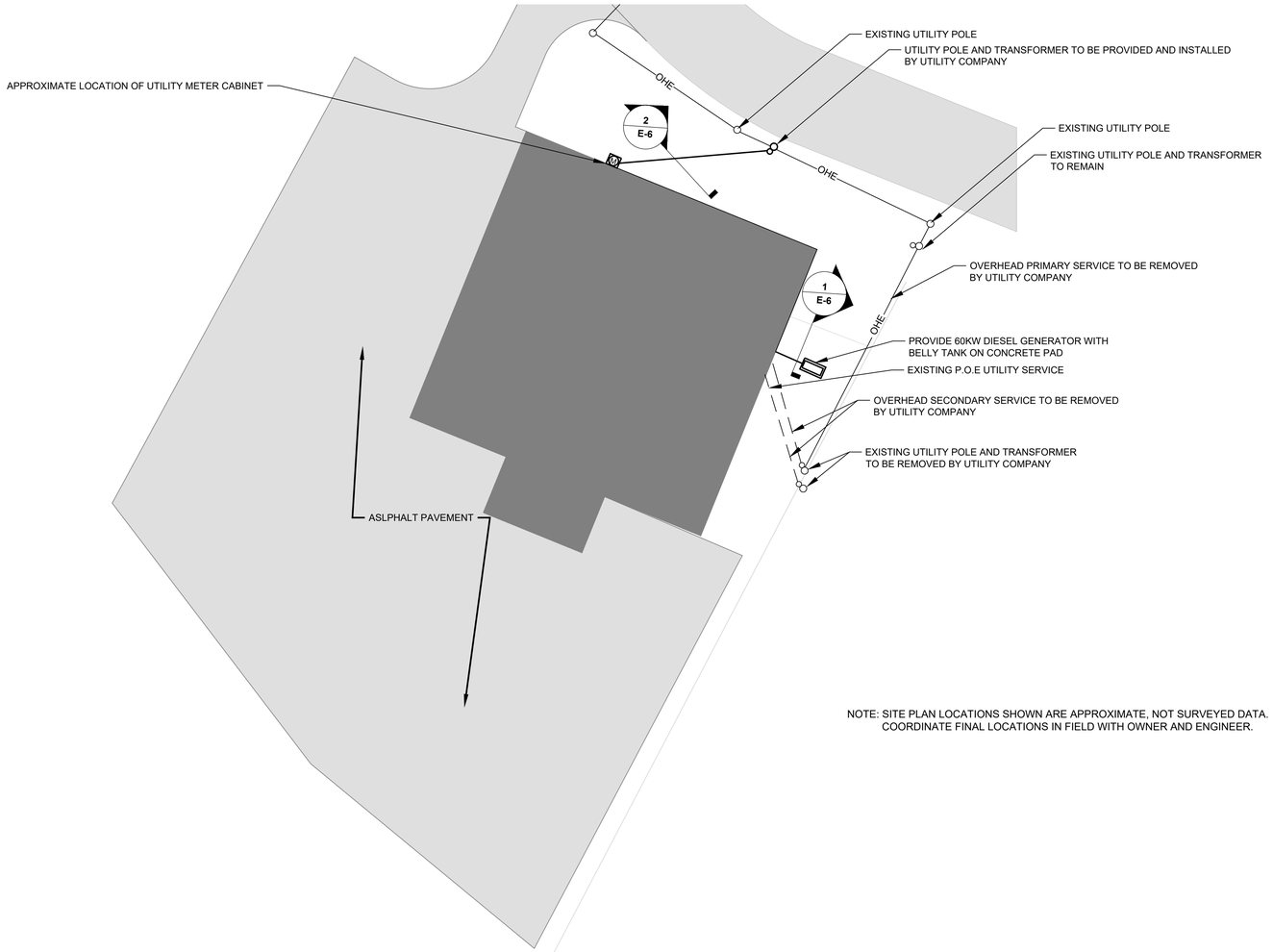
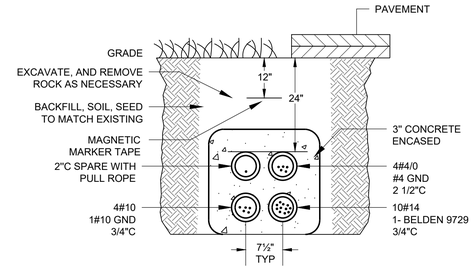
CHECKED BY: **JD**
DRAWING NUMBER: **E-5**



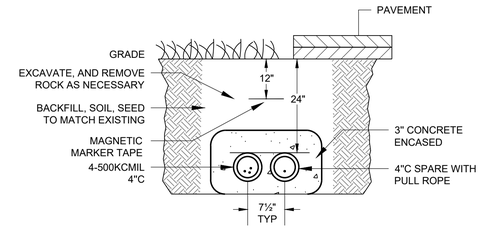
SITE PLAN

SCALE: 1" = 30'-0"



TRENCH DETAIL 1/E-6

NO SCALE



TRENCH DETAIL 2/E-6

NO SCALE

NOTE: SITE PLAN LOCATIONS SHOWN ARE APPROXIMATE, NOT SURVEYED DATA.
COORDINATE FINAL LOCATIONS IN FIELD WITH OWNER AND ENGINEER.

CONTRACTOR TO HIRE SERVICES OF OUTSIDE AGENCY FOR MARKING OUT ALL UNDERGROUND UTILITIES. MARK OUT UNDER AND 6'-0" BOTH SIDES OF EXCAVATION AREA AND ENTIRE LENGTH. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGED UTILITIES AND COST FOR THE REPAIRS.

Date Printed: 2/13/2026 2:02:19 PM

ORIGINAL DRAWING SIZE: ARCH D (24" x 36")

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White Plains, New York 10601
P. 315.471.0688

PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **SITE PLAN - BOWLINE TRANSFER STATION**

CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

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1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
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EDR JOB#: **20098**

DATE: **02/2026**

SCALE: **AS SHOWN**

DRAWN BY: **AGG**

CHECKED BY: **JD**

DRAWING NUMBER: **E-6**

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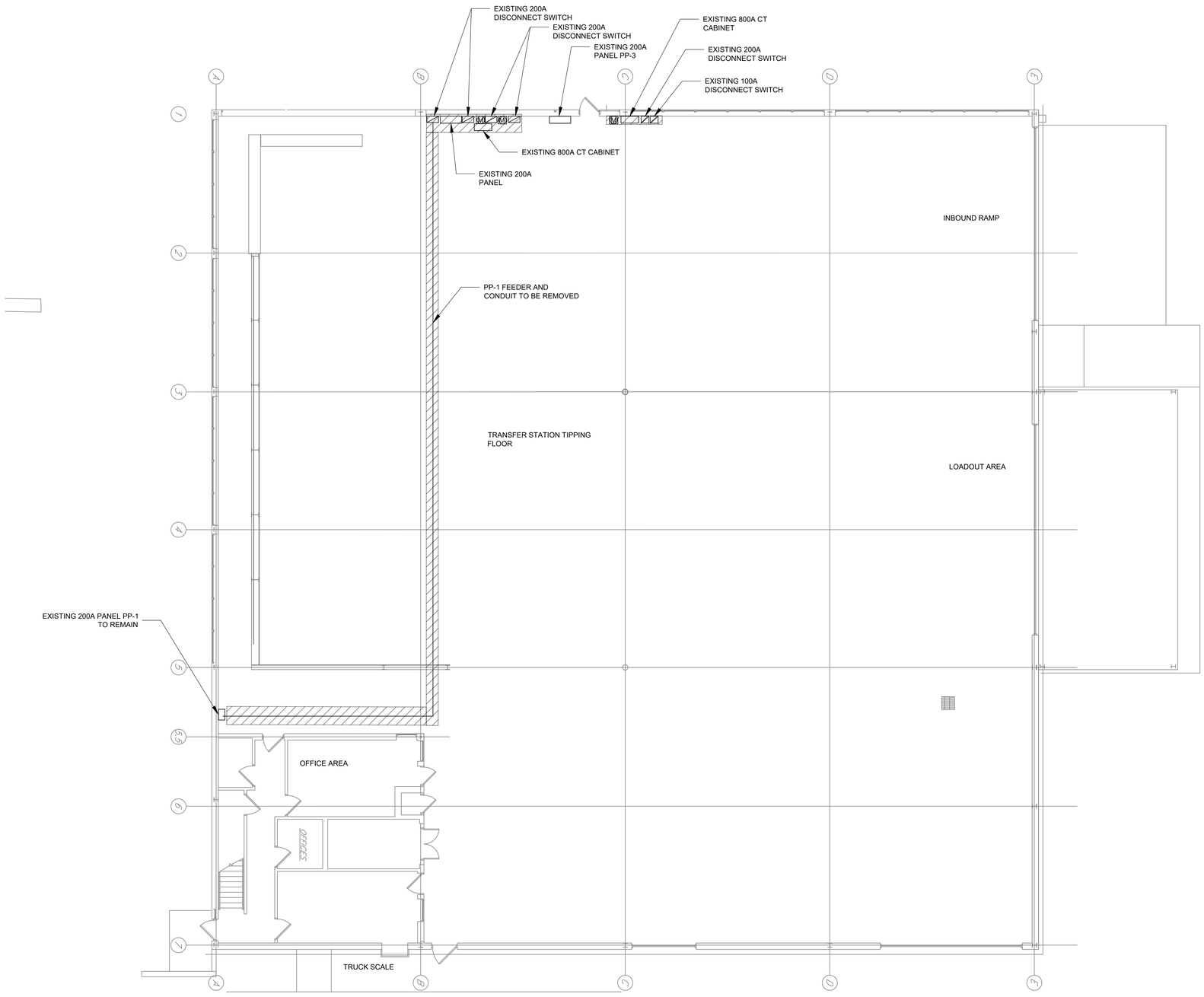

NOTE: TURN OVER EXISTING CT'S AND METERS TO UTILITY COMPANY

ELECTRICAL DEMOLITION PLAN

SCALE: 1/8"=1'-0"

ORIGINAL DRAWING SIZE: ARCH D (24" X 36")
p:\jobs\yr2009\rockland green\5.drawing\drawings\electrical\hillburn - haverstraw\20098 E-7 DEMOLITION FLOOR PLAN - HAVERSTRAW.dwg

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White Plains, New York 10601
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PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **ELECTRICAL DEMOLITION PLAN - BOWLINE TRANSFER STATION**

CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
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6					

EDR JOB#: **20098**
DATE: **02/2026**
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DRAWN BY: **AGG**
CHECKED BY: **JD**
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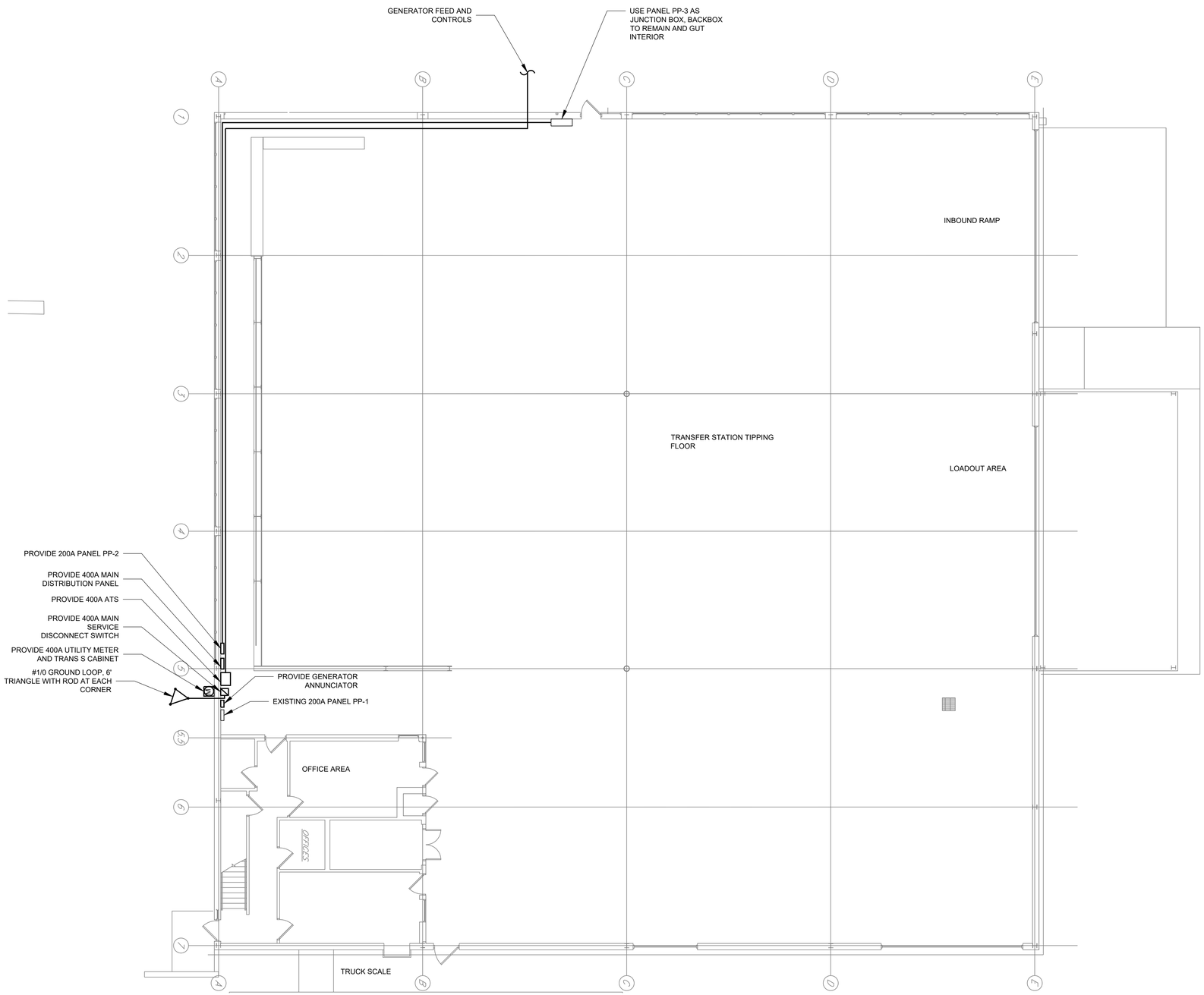

ELECTRICAL FLOOR PLAN

SCALE: 1/8"=1'-0"

ORIGINAL DRAWING SIZE: ARCH D (24" X 36")

g:\jobs\yr2098\ rockland green\5.0\drawing drawings\shell\hillburn - haverstraw\20098 E 8 FLOOR PLAN - HAVERSTRAW.dwg

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PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **ELECTRICAL FLOOR PLAN - BOWLINE TRANSFER STATION**

CONTRACT NO. **1**

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1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
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EDR JOB#: **20098**

DATE: **02/2026**

SCALE: **AS SHOWN**

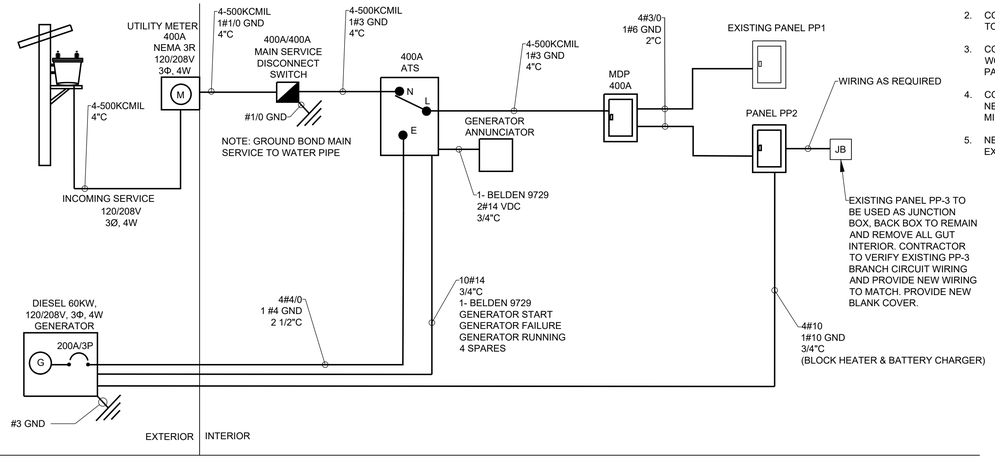
DRAWN BY: **AGG**

CHECKED BY: **JD**

DRAWING NUMBER: **E-8**

Date Plotted: 2/19/2026 1:46:09 PM

NOTE: ATS SHALL BE "BREAK-BEFORE-MAKE" TYPE.

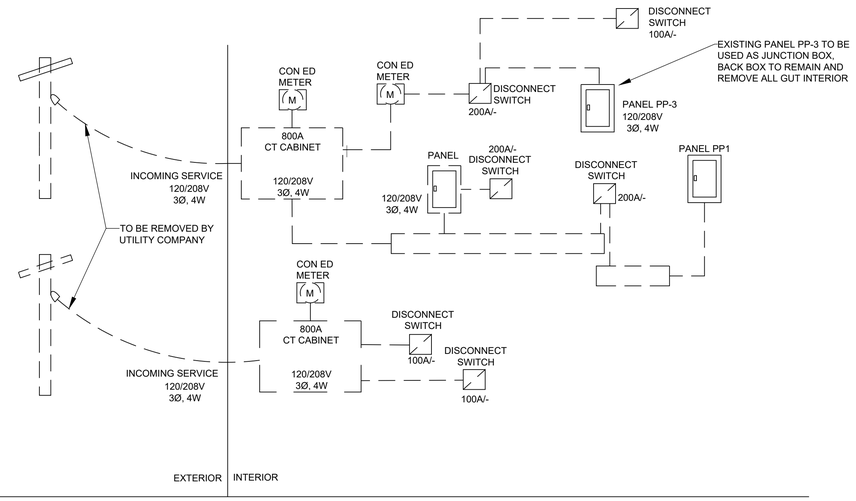


PHASING NOTES:

1. CONTRACTOR TO SUBMIT OWN, WRITTEN PHASING PLAN TO OWNER AND ENGINEER PRIOR TO START OF ANY WORK.
2. CONTRACTOR TO PROVIDE TWO (2) WEEKS WRITTEN NOTICE TO OWNER AND ENGINEER FOR ANY POWER SHUTDOWNS.
3. CONTRACTOR TO INCLUDE THE COST OF ALL OVERTIME WORK IN THEIR LUMP SUM BASE BID. NO ADDITIONAL PAYMENTS WILL BE MADE FOR OVERTIME WORK.
4. CONTRACTOR SHALL COORDINATE POWER SHUTDOWN AND NEW UTILITY SERVICE WITH UTILITY COMPANY. PROVIDE MINIMUM 2 WEEK NOTICE TO OWNER AND ENGINEER.
5. NEW SERVICE SHALL BE INSTALLED BEFORE DEMOLITION OF EXISTING SERVICES.

POWER SINGLE LINE DIAGRAM

NO SCALE



DEMOLITION POWER SINGLE LINE DIAGRAM

NO SCALE

EXISTING PANEL BOARD PP-1

MAIN BUS RATINGS: 250 A, 120/208 VOLTS, 3 PHASE, 4 WIRE
MINIMUM SHORTCIRCUIT INTERRUPTION RATING:
MAIN BREAKER TRIP: 200A
ESTIMATED CONNECTED LOAD:
* INDICATES GFCI CIRCUIT BREAKER

FED FROM: MDP
INCOMING FEED: 4 #3/0, 1 #6 GND
ENCLOSURE: NEMA 4X SS

DESCRIPTION	LOAD KW	CB TRIP/POLE	CIR. NO	A B C	CIR. NO	CB TRIP/POLE	LOAD KW	DESCRIPTION
EXISTING LOAD	-	40A/3P	1		2	15A/1P	-	EXISTING LOAD
			3		4	20A/2P	-	EXISTING LOAD
			5		6			
EXISTING LOAD	-	15A/3P	7		8			
			9		10	40A/3P	-	EXISTING LOAD
			11		12			
EXISTING LOAD	-	30A/2P	13		14	20A/1P	-	EXISTING LOAD
			15		16	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	17		18	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	19		20	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	21		22			
EXISTING LOAD	-	20A/1P	23		24	15A/3P	-	EXISTING LOAD
EXISTING LOAD	-	15A/1P	25		26			
EXISTING LOAD	-	20A/1P	27		28	30A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	29		30	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	31		32	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	33		34	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/2P	35		36	20A/1P	-	EXISTING LOAD
			37		38	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	39		40	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	15/1P	41		42	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	30A/2P	43		44	30A/2P	-	EXISTING LOAD
			45		46			
EXISTING LOAD	-	20A/2P	47		48	15A/1P	-	EXISTING LOAD
			49		50	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	51		52	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	53		54	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/2P	55		56	20A/1P	-	EXISTING LOAD
			57		58	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/2P	59		60	30A/2P	-	EXISTING LOAD
			61		62			
SPACE			63		64			SPACE
SPACE			65		66			SPACE

PANEL BOARD PP-2

MAIN BUS RATINGS: 200 A, 120/208 VOLTS, 3 PHASE, 4 WIRE
MINIMUM SHORTCIRCUIT INTERRUPTION RATING: 22,000 AIC
MAIN BREAKER TRIP: 200 A
ESTIMATED CONNECTED LOAD: -
* INDICATES GFCI CIRCUIT BREAKER

FED FROM: MDP
INCOMING FEED: 4 #3/0, 1 #6 GND
ENCLOSURE: NEMA 4X SS

DESCRIPTION	LOAD KW	CB TRIP/POLE	CIR. NO	A B C	CIR. NO	CB TRIP/POLE	LOAD KW	DESCRIPTION
EXISTING LOAD	-	20A/1P	1		2	20A/1P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	3		4	20A/1P	-	EXISTING LOAD
SPACE			5		6	30A/2P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	7		8			
EXISTING LOAD	-	20A/1P	9		10	50A/3P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	11		12			
EXISTING LOAD	-	20A/1P	13		14			
EXISTING LOAD	-	15A/1P	15		16	60A/3P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	17		18			
EXISTING LOAD	-	20A/1P	19		20			
EXISTING LOAD	-	20A/1P	21		22	30A/2P	-	EXISTING LOAD
EXISTING LOAD	-	20A/1P	23		24			
GENERATOR CONTROLS	.2	20A/1P	25		26	20A/1P	-	EXISTING LOAD
BLOCK HEATER & CHARGER	.6	20A/1P	27		28			SPACE
SPACE			29		30			SPACE
SPACE			31		32			SPACE
SPACE			33		34			SPACE
SPACE			35		36			SPACE
SPACE			37		38			SPACE
SPACE			39		40			SPACE
SPACE			40		41			SPACE

- PROVIDE 2#10, 1 #10 GND IN 3/4" C FOR 15A/1P AND 20A/1P CIRCUITS.
- PROVIDE 2#8, 1 #10 GND IN 3/4"C FOR 30A/2P CIRCUITS.
- PROVIDE 3#6, 1#10 GND IN 1 1/4" C FOR 50A/3P CIRCUITS.
- PROVIDE 3#4, 1#8 GND IN 1 1/2" C FOR 60A/3P CIRCUITS.

PANEL BOARD MDP

MAIN BUS RATINGS: 400 A, 120/208 VOLTS, 3 PHASE, 4 WIRE
MINIMUM SHORTCIRCUIT INTERRUPTION RATING:
MAIN BREAKER TRIP: 400A
ESTIMATED CONNECTED LOAD: -
* INDICATES GFCI CIRCUIT BREAKER

FED FROM: MAIN SERVICE DISCONNECT
INCOMING FEED: 4 -500 KCMIL, 1#3 GND
ENCLOSURE: NEMA 4X SS

DESCRIPTION	LOAD KW	CB TRIP/POLE	CIR. NO	A B C	CIR. NO	CB TRIP/POLE	LOAD KW	DESCRIPTION
EXISTING PANEL PP1	-	200A/3P	1		2			
			3		4	200A/3P	-	PANEL PP-3
			5		6			
SPARE	-	100A/3P	7		8			
			9		10	200A/3P	-	SPARE
			11		12			
SPACE			13		14			SPACE
SPACE			15		16			SPACE
SPACE			17		18			SPACE
SPACE			19		20			SPACE
SPACE			21		22			SPACE
SPACE			23		24			SPACE
SPACE			25		26			SPACE
SPACE			27		28			SPACE
SPACE			29		30			SPACE

ORIGINAL DRAWING SIZE: ARCH D (24" X 36")
J:\2009\Rockland Green\Cad\Working Drawings\ELECTRICAL\Vol1\Bwm - Haverstraw2009\E-9 SINGLE LINE DIAGRAM & DETAILS - HAVERSTRAW.dwg

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The following is paraphrased from the New York Education Law, Article 145, Section 7209, and Chapter II, Section 79-1.4, and applies to this drawing: "It is a violation of this law for any person unless he is acting under the direction of a licensed professional engineer, licensed landscape architect or licensed land surveyor to alter an item in any way. If an item bearing the seal of an engineer, landscape architect or land surveyor is altered, the altering engineer, landscape architect or land surveyor shall affix to the item his seal and the notation "altered by" followed by his signature and the date of such alteration and a specific description of the alteration".

STATE OF NEW YORK
MICHAEL E. TAMBURINI
073737
LICENSED PROFESSIONAL ENGINEER

CLIENT / SUBCONSULTANT:

EDR
a better environment
Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
12 Water Street, Suite 202
White Plains, New York 10601
P. 315.471.0688

PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **SINGLE LINE DIAGRAM AND SCHEDULES - BOWLINE TRANSFER STATION**

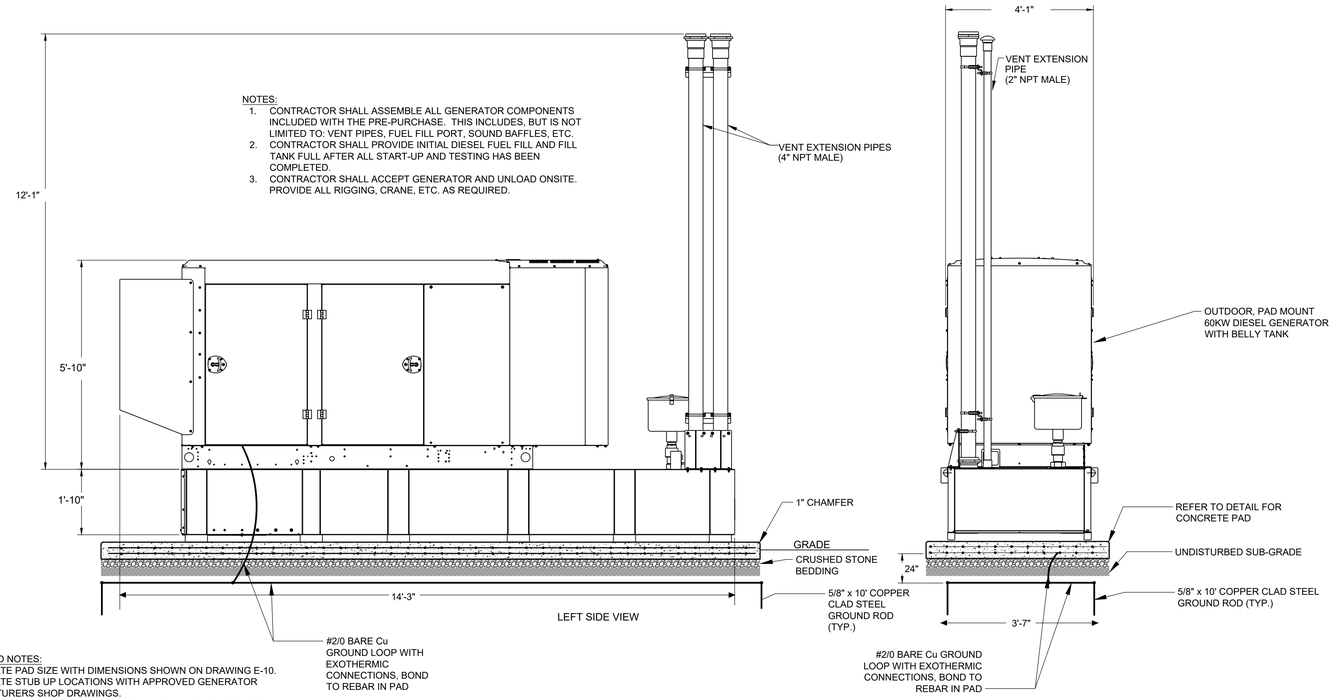
CONTRACT NO. **1**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1	**02/26**	**FOR BIDDING**	**JGD**	**GRL**	**JH**
2					
3					
4					
5					
6					

EDR JOB#: **20098**
DATE: **02/2026**
SCALE: **AS SHOWN**
DRAWN BY: **AGG**
CHECKED BY: **JD**
DRAWING NUMBER: **E-9**

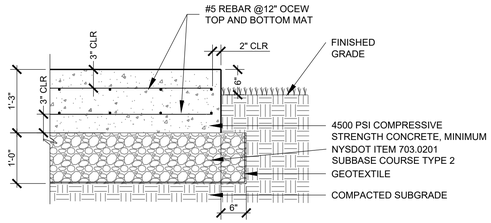
Date Printed: 2/10/2026 2:22:23 PM



GENERATOR PAD NOTES:
1. COORDINATE PAD SIZE WITH DIMENSIONS SHOWN ON DRAWING E-10.
2. COORDINATE STUB UP LOCATIONS WITH APPROVED GENERATOR MANUFACTURERS SHOP DRAWINGS.
3. CONTRACTOR SHALL FURNISH AND INSTALL TEN (10) ANCHOR FOR THE OWNER PROVIDED GENERATOR. ANCHORS SHALL BE A STAINLESS STEEL 1/2" DIAMETER HILTI KWIK BOLT 3 WITH 3-1/2" MINIMUM EMBED DEPTH. ANCHORS SHALL MAINTAIN A MINIMUM OF 10-INCHES EDGE DISTANCE FROM ALL CONCRETE EDGES.

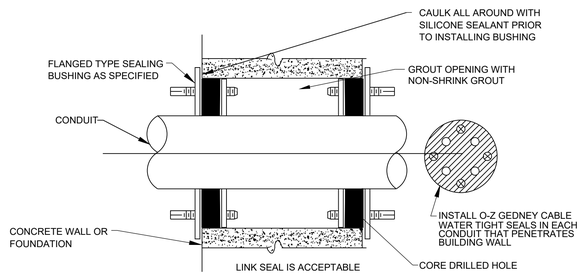
GENERATOR ELEVATION VIEW

SCALE: NTS



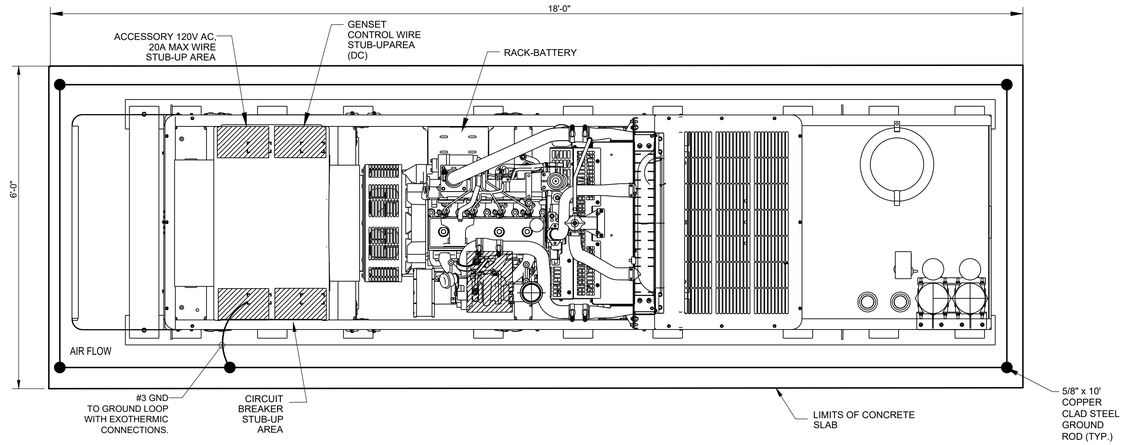
GENERATOR PAD DETAIL

SCALE: NTS



TYPICAL SLEEVE DETAIL FOR EXISTING WALL PENETRATION

NO SCALE



GENERATOR PLAN VIEW

SCALE: NTS

ORIGINAL DRAWING SIZE: ARCH D (36" x 24")
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PROJECT TITLE: **RFP-2026-02: INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS & ASSOCIATED WORK**

PROJECT LOCATION: **HILLBURN, NEW YORK AND WEST HAVERSTRAW, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **DETAILS - BOWLINE TRANSFER STATION**

CONTRACT NO. **1**

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EDR JOB#: **20098**
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DRAWN BY: **AGG**
CHECKED BY: **JD**
DRAWING NUMBER: **E-10**

APPENDIX F

CUMMINS GENERATORS AND ATS/MTS DESCRIPTIONS (PRE-PURCHASED BY ROCKLAND GREEN)

Sales and Service

Rockland Green - Hillburn Transfer Station

1.A - SUBMITTAL FOR APPROVAL

Transmittal

Name: Rockland Green

Address: 172 Main Street

City: Nanuet

State: NY **Zip Code:** 10954

Phone:

Date: Dec 11, 2025

Attention: Dee Louis **Email:** dlouis@rocklandgreen.com

SENDING THE FOLLOWING PAGE(S) ATTACHED: 114

PROJECT SUBMITTAL: ◉ PROJECT SCHEDULE: ○ SAMPLES: ○

DOCUMENT ORIGINALS: ○

CORRESPONDENCE: ○ ADDITIONAL INFO.: ○ OTHER: ○

SENDING VIA: FAX: ○ HAND DELIVERY: ○ MAIL: ○

OVERNIGHT: ○ E-MAIL: ◉

COPIES	DATED	DESCRIPTION
1	Dec 11, 2025	GENERATOR & ATS SUBMITTALS – ONE ELECTRONIC FILE

TRANSMITTED BY: Mark Woodward **DIRECT: (339)216-8909**

COMMENTS: **Please do not hesitate to query.**

Sales and Service

Rockland Green - Hillburn Transfer Station

1.A - SUBMITTAL FOR APPROVAL

Submittal Approvals

Date: Dec 11, 2025

Approval Actions:

Please send approval actions C/O:

Mark Woodward - Project Manager

Email: mark.n.woodward@cummins.com / Direct Line: 339-216-8909

Cummins Sales and Service - East Region

EDR, D.P.C.

EDR a better environment

- [x] **APPROVED**
- [ ] **APPROVED AS CORRECTED**
- [ ] **REVISE AND RESUBMIT**
- [ ] **NOT ACCEPTED**
- [ ] **FOR INFORMATION ONLY**

Checking is only for conformance with the design intent of the project and compliance with the information given in the contract documents. Contractor is responsible for dimensions, correct information indicated, coordination of the work with all trades and all other requirements of the contract documents. This shop drawing is the product and the property of the contractor and is not a part of the contract documents.

BY jdulak **DATE** 12/12/2025

Cummins Sales and Service

SUBMITTAL
POWER GENERATION EQUIPMENT

PROJECT NAME: Hillburn Transfer Station

PROJECT: Cummins Project# TBD

MODEL(s): C60D6C w/ OTECSED 800A ATS

CUSTOMER: Rockland Green

REFERENCE PO #: TBD

SUPPLIER: Cummins Sales and Service

DATE: 12/11/25

SALES REPRESENTATIVE: Ed Cheung
718-502-1217
ed.cheung@cummins.com

PROJECT MANAGER: Mark Woodward
339-216-8909
mark.n.woodward@cummins.com

Serving Cummins Customers
in the
East Region

NOTICE

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED, PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS

For questions or comments regarding this submittal, please contact your Cummins Sales Representative listed on the Cover Page.

To inquire about factory ship dates, arranging delivery and to schedule start-up of your Cummins Power Generation equipment, please contact the Project Manager listed on the Cover Page of this submittal.

**** Start-Ups must be Scheduled 4 Weeks in Advance ****

- PLEASE NOTE WARRANTY STARTS ON THE DATE OF STARTUP OR 18 MONTHS AFTER SHIPMENT
- PLEASE NOTE IF THE EQUPMENT IS NOT GOING TO BE STARTED UP FOR 6 MONTHS OR LONGER IT MAY NEED TO HAVE LONGTERM STORAGE PROCEEDURES COMPLETED AND / OR PREVENATIVE MANTENANCE. THESE WOULD BE AT AN ADDITIONAL COST.

Sales and Service

December 11, 2025

Rockland Green
172 Main Street
Nanuet, NY 10954

RE: Rockland Green – Hillburn Transfer Station - 1.0 Submittal Review

Dear Dee,

We have reviewed the submittal comments, please see formal responses

1. The 800A service entrance rated ATS shall be 3-pole, solid neutral as per specification 26 36 13-2.04.B. & 2.05.H.

   RESPONSE: The ATS will be provided as a 3-Pole, solid neutral, submittal has been updated.

2. Verify NEMA 3R enclosure for ATS. The enclosure shown on page 104 with secure outer door is required per specification 26 36 13-2.06.A.

   RESPONSE: Page 103 shows the cable entrance for all ATS available cabinets. Page 104 shows the NEMA 12 & 3R cabinet and internal components. The ATS provided is NEMA 3R, submittal has been updated.

Regards,

Mark N. Woodward

Project Manager

CC: Ed Cheung

Cummins Sales and Service
890 Zerega Avenue
Bronx, NY 10473-1122
Tel (718) 892-2400
Fax (718) 892-0055
cumminssalesandservice.com

Sales and Service

Rockland Green - Hillburn Transfer Station

1.A - SUBMITTAL FOR APPROVAL

Submittal

Bill of Materials:

Date: **Dec 11, 2025**

Project Description:	Cummins Sales and Service is pleased to present the following submittal for the above referenced project Facility Electrical Power Generation Equipment consisting of the following:
Generator Model:	C60 D6C
Fuel Type / Fuel System:	Diesel
kW Rating:	60kW
Phase:	(3) Three Phase;
Voltage:	277/480;
Power Factor:	0.8 PF;
Power Ratings:	(ESP) Emergency Standby Power
Charging System:	12 volt, Negative Ground Electrical Starting System.
Certifications and Listings:	The generator set is listed: - UL 2200, Stationary Engine Generator Assemblies.
Engine Data:	Model: Cummins Inc. QSB5-G13 Type: 4 Cycle, In-line, 4 Cylinder Diesel Displacement: 272 cu. In. (4.5 liters) Bore: 4.21 in. (107.0 mm), Stroke: 4.88 in. (124 mm) Compression Ratio: 17.3:1 Aspiration: Turbocharged and charge air-cooled Emission Control Device: Turbocharged and charge air-cooled
Cooling System:	Standard Set Mounted Radiator Cooling System with the following features / options: - Shutdown on Low Coolant Level option.
Radiator Ambient Temperature:	50 Degree C, High Ambient Radiator Provided

Sales and Service

Alternator:	Cummins revolving field, 4 pole, brushless design. Dynamically balanced rotor permanently aligned to engine by flexible disc coupling. Class H insulation throughout. Alternator specifics include: - 12 Lead - Upper Broad Range - 105 Degree (C) Rise - ads-207 UC3D Alternator - Low Voltage - (1) 120 volt, 100W Alternator Heater Provided.
Excitation:	Cummins PMG (Permanent Magnet Generator) excitation provided.
Bearing:	Heavy duty, prelubricated cartridge bearing.
Voltage Regulator:	Cummins PMG provides torque matched operation for improved motor starting and reduces engine stalling in overload situation.
Governor:	Electronic Isochronous frequency regulation - Random frequency variation +/- 0.5% - Voltage Regulation, no load to full load +/- 1.0%
Engine Control Panel:	Power Command Control PC 2.3: Cummins' microprocessor based control system with: AmpSentry™ Protective Relay - UL Listed true alternator over current protection. See specification sheet for more detail.
Instrumentation, Controls, and Relays:	See specification sheet for details.
Charging System:	12 volt, negative ground electrical starting system:
Sub Base Fuel Tank:	UL 142 compliant, double wall, sub-base fuel tank with the following features / options: - 250 Gallon Tank Size - 39 Hour Run Time at Full Load - Rupture Basin Switch - Low Fuel Level Switch - High Fuel Level Switch - Fuel Gauge - OFPV - 5 Gal. Spill Fill - Vent Extensions

Sales and Service

Generator Enclosure:	Cummins generator enclosure with the following features / options: - Weather Protective Enclosure - Aluminum Construction - Sound Attenuated Level 2 - 70.5 Sound Pressure Levels @ 7 meters dB(A) - Maintenance Doors Mounted Both Sides & Rear - Lockable doors using key or padlock - Color: Green, - Fixed Louver Openings - Internally Mounted Critical Exhaust - Wind Rating 180 m.p.h.
Structural Sub Base:	Provided for mounting of engine and generator - with Coolant Drain and Oil Drain Extensions.
Exhaust System:	Provided: - Critical Type exhaust
Battery:	12 volt lead acid type, with welded battery rack, cables.
Battery Charger:	Float type, 6 amp, 12 volt D.C. output
Circuit Breakers and Accessories:	- Breaker # A - Molded case type, mounted in enclosure and wired to generator, (1) 70-250A, LSI Adjustable Trip, 3 pole, UL 600V, 100% rated, unit mounted: Right Side of Alternator. - Breaker # B - Molded case type, mounted in enclosure and wired to generator, (1) 100A, Thermal Trip, 3 pole, UL 600V, 80% rated, unit mounted: Right Side of Alternator.
Coolant Heater:	1500 Watt, 120 Volt, Single Phase Thermostatically Controlled Coolant Heater Temperature Rated for below 40 Degrees F Ambient
GenSet Options, Accessories and Miscellaneous Items:	Annunciator: - Cummins 20 light, Annunciator provided. See specification sheet for details. Vibration Isolators: - Integral Isolation provided. Other Options / and Accessories: - Larger Battery Rack - Control Meters

Sales and Service

- Control E-Stop
- Aux. Contacts in Control
- Fuel Water Separator
- Oil Pressure Gauge

Lube, Oil, and Antifreeze:	Provided.
Operations and Maintenance Manual:	One Provided. Additional copies per project specifications (If Applicable)
GenSet Warranty:	Standby 5 year / 2,500 hours, Parts, Labor, Travel
Automatic Transfer Switching:	(1) Cummins Model OTECSED, 800 amp, Automatic Transfer Switch with all standard accessories including the following: - 3 pole - Application – Utility to Genset - UL 1008/CSA Certification - 60 Hz, - (3) Phase, - 480 Volt - NEMA Type 3R Enclosure - Auxiliary Relay-Switch In Emergency & Normal Position-12 VDC - Integral Control Power Supply - Load Monitoring - Cabinet Heater - Standard Time Delays
Transfer Switch Warranty:	5 Year Comprehensive Extended Warranty

Start Up and Testing:	Provided by Cummins Trained Technicians:
	- Factory Testing:
	  - Safety Shutdowns
	- On-Site Testing:
	  - Startup
	  - 2hr Load Bank

Planned Maintenance:	A 2 Year Maintenance contract is included with 1 Inspection and 1 Full service per year.

Specification Sheet

Diesel Generator Set

QSB5 Series Engine
50-125 kW Standby
EPA Tier 3 Emissions

Description

Cummins® generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby applications.

Features

Heavy duty engine - Rugged 4-cycle industrial diesel delivers reliable power and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 1.1 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance. The PowerCommand 2.3 control is also optional and is UL 508 Listed and provides AmpSentry™ protection.

Cooling system - Standard cooling package provides reliable running at up to 50 ℃ (122 ℉) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminium material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7 -10. The design has hinged doors to provide easy access for service and maintenance.

Fuel tanks - Dual wall sub-base fuel tanks are offered as optional features, providing economical and flexible solutions to meet extensive code requirements on diesel fuel tanks.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby 60 Hz		Prime 60 Hz		
Model	**kW**	**kVA**	**kW**	**kVA**	**Data sheets**
~~C50D6C~~	~~50~~	~~63~~	45	56	NAD-6333-EN
C60D6C	60	75	54	68	NAD-6334-EN
~~C80D6C~~	~~80~~	~~100~~	72	90	NAD-6335-EN
C100D6C	100	125	90	113	NAD-6336-EN
C125D6C	125	156	112.5	141	NAD-6216-EN

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Generator Set Specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.50%
Radio frequency emissions compliance	FCC code title 47 part 15 class A and B

Engine Specifications

Design	Turbocharged and charge air cooled
Bore	107 mm (4.21 in.)
Stroke	124 mm (4.88 in.)
Displacement	4.5 L (272 in^3)
Cylinder block	Cast iron, in-line 4 cylinder
Battery capacity	850 amps per battery at ambient temperature of 0 ℃ (32 ℉)
Battery charging alternator	100 amps
Starting voltage	2 x 12 volt in parallel, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	High ambient radiator
Rated speed	1800 rpm

Alternator Specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 ºC (248 ℉) Standby
Exciter type	Torque match (shunt) with PMG as option
Alternator cooling	Direct drive centrifugal blower
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3%

Available Voltages

1-phase	3-phase				
• 120/240	• 120/208	• 120/240	• 277/480	• 347/600	• 127/220

Generator Set Options

Fuel system

- Basic fuel tanks
- Regional fuel tanks

Engine

- Engine air cleaner – normal or heavy duty
- Shut down – low oil pressure
- Extension – oil drain
- Engine oil heater

Alternator

- 120 ℃ temperature rise alternator
- 105 ℃ temperature rise alternator
- PMG excitation
- Alternator heater, 120 V
- Reconnectable full 1 phase output alternator

Control

- AC output analog meters
- Stop switch – emergency
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)

Electrical

- One, two or three circuit breaker configurations
- 80% rated circuit breakers
- 80% or 100% rated LSI circuit
- breakers
- Battery charger

Enclosure

- Sound Level 1 or Level 2 enclosure, sandstone or green color
- Weather protective enclosure with muffler installed, green color
- Winter protective enclosure, green color

Cooling system

- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Coolant heater options:
  - <4 ℃ (40 ℉) – cold weather
  - <-18 ℃ (0 ℉) – extreme cold

Exhaust system

- Exhaust connector NPT
- Exhaust muffler mounted

Generator set application

- Base barrier – elevated genset
- Radiator outlet duct adapter

Warranty

- Base warranty – 2 year/1000 hours, Standby
- Base warranty – 1 year/unlimited hours, Prime
- 3 year Standby warranty options
- 5 year Standby warranty options

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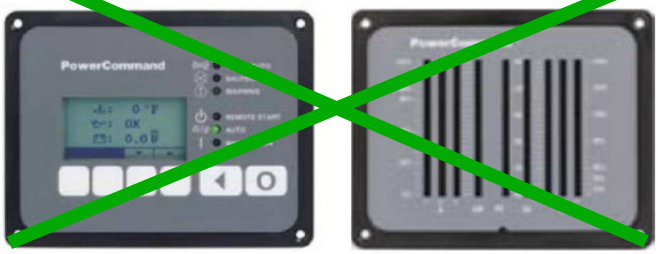
Generator Set Accessories

- Coolant heater
- Battery heater kit
- Engine oil heater
- Remote control displays
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- Audible alarm
- Remote monitoring device – PowerCommand 500/550
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Base barrier – elevated generator set
- Mufflers – industrial, residential or critical
- Alternator PMG excitation
- Alternator heater

Control System PowerCommand 1.1



PowerCommand control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 °C to +70 °C
- Bargraph display (optional)

AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (over crank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown

Alternator data

- Line-to-Line and Line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total kVA

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase Line-to-Line sensing
- Configurable torque matching

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop
- Automatic Transfer Switch (ATS) control
- Generator set exercise, field adjustable

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Options

- Auxiliary output relays (2)
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)
- AC output analog meters (bargraph)
  - Color-coded graphical display of:
    - 3-phase AC voltage
    - 3-phase current
    - Frequency
    - kVa
- Remote operator panel
- PowerCommand 2.3 control with AmpSentry protection

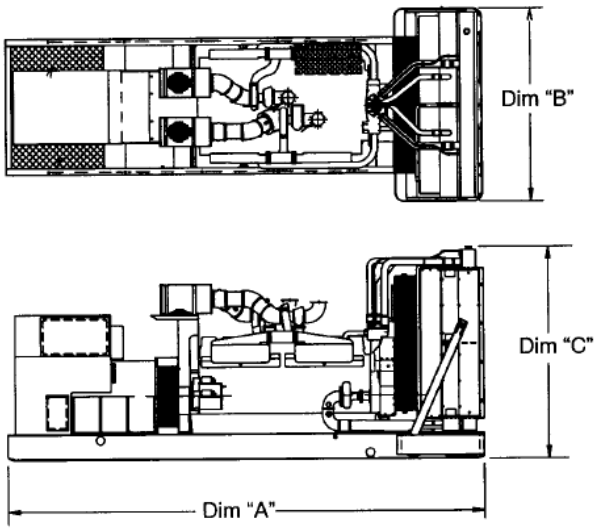
Ratings Definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

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Codes and Standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	**U.S. EPA**	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.
	All low voltage models are CSA certified to product class 4215-01.	**International Building Code**	The generator set is certified to International Building Code (IBC) 2012.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

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NAS-6211-EN - 06DEC2019.DOCX (12/19) A055Y560

Generator set data sheet

Model:	C60D6C
Frequency:	60 Hz
Fuel type:	Diesel
KW rating:	60 standby 54 prime
Emissions level:	EPA Tier 3, Stationary emergency

Exhaust emission data sheet:	EDS-2027
Exhaust emission compliance sheet:	EPA-3034
Sound performance data sheet:	MSP-1301
Cooling performance data sheet:	MCP-1401
Prototype test summary data sheet:	PTS-450

Fuel consumption

	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	60 (75)				54 (68)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	2.20	3.30	4.60	6.10	2.1	3.00	4.20	5.50
L/hr	8.33	12.49	17.41	23.09	7.95	11.36	15.90	20.82

Engine

	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	QSB5-G13	
Configuration	Cast iron, in-line, 4 cylinder	
Aspiration	Turbocharged and charge air cooled	
Gross engine power output, kWm (bhp)	129 (173)	113 (152)
BMEP at set rated load, kPa (psi)	1205 (174.7)	1083 (157.1)
Bore, mm (in)	107 (4.21)	
Stroke, mm (in)	124 (4.88)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	7.44 (1464)	
Compression ratio	17.3:1	
Lube oil capacity, L (qt)	12.2 (12.9)	
Overspeed limit, rpm	2250	

Fuel flow

Maximum fuel flow, L/hr (US gph)	133 (35.0)
Maximum fuel inlet restriction with clean filter, mm Hg (in Hg)	127 (5.0)

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Air

	Standby rating	Prime rating
Combustion air, m3/min (scfm)	9.63 (340)	9.34 (330)
Maximum air cleaner restriction with clean filter, kPa (in H2O)	1.25 (5)	

Exhaust

Exhaust flow at set rated load, m^3/min (cfm)	20 (696)	18.52 (654)
Exhaust temperature, °C (°F)	370 (697)	341 (645)
Maximum back pressure, kPa (in H_2O)	10 (40.18)	10(40.18)
Available exhaust back pressure with CPG sound level 2 enclosure muffler, kPa (in H_2O)	3.5 (14.1)	4.5 (18.1)
Available exhaust back pressure with CPG weather enclosure muffler, kPa (in H_2O)	4.5 (18.1)	5 (20.1)

Standard set-mounted radiator cooling

Ambient design, ° C (° F)	50 (122)	
Fan load, kW_m (HP)	5.22 (7)	
Coolant capacity (with radiator), L (US Gal)	16 (4.2)	
Cooling system air flow, m^3/min (scfm)	218.04 (7700)	
Total heat rejection, MJ/min (Btu/min)	8.96 (8491)	8.38 (7943)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)	

Weight[2]

Unit wet weight, kg (lb)	1000 (2211)

Notes:
[1] For non-standard remote installations contact your local Cummins Power Generation representative.
[2] Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Engine power available to 3581 m (11750 ft) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 2.2% per 300 m (1000 ft) and 16.1% per 10° C (18° F)
Prime	Engine power available to 4343 m (14250 ft) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 2.3% per 300 m (1000 ft) and 18.8% per 10° C (18° F)

Ratings definitions

Emergency standby power (ESP):	Limited-time running power (LTP):	Prime power (PRP):	Base load (continuous) power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

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Alternator data

Standard Alternators	Single phase[2]		Three phase[1]				
Maximum temperature rise above 40 °C ambient	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C
Feature code	BB88-2[3]	BB90-2	B946-2	B986-2	B943-2	B952-2	BB86-2
Alternator data sheet number	ADS-205	ADS-204	ADS-204	ADS-204	ADS-204	ADS-202	ADS-204
Voltage ranges	120/240	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	69.3	71.0	73.3	73.3	73.9	72.6	73.5
Motor starting kVA (at 90% sustained voltage) Shunt			231	231	231	188	231
Motor starting kVA (at 90% sustained voltage) PMG			272	272	272	221	272
Full load current amps at standby rating	250	250	208	181	90	72	197

Alternator data

Standard Alternators	Single phase[2]		Three phase[1]				
Maximum temperature rise above 40 °C ambient	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C
Feature code	BB87-2[3]	BB91-2	BB93-2	BB94-2	BB95-2	BB92-2	BB85-2
Alternator data sheet number	ADS-207	ADS-205	ADS-204	ADS-204	ADS-204	ADS-204	ADS-204
Voltage ranges	120/240	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	70.2	71.7	73.3	73.3	73.9	73.9	73.5
Motor starting kVA (at 90% sustained voltage) Shunt			231	231	231	231	231
Motor starting kVA (at 90% sustained voltage) PMG			272	272	272	272	272
Full load current amps at standby rating	250	250	208	181	90	72	197

Notes:
[1] Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor
[2] Full single phase output up to full set rated 3-phase kW at 1.0 power factor
[3] Reconnectable option

Formulas for calculating full load currents:

Three phase output

$$\frac{kW \times 1000}{Voltage \times 1.73 \times 0.8}$$

Single phase output

$$\frac{kW \times SinglePhaseFactor \times 1000}{Voltage}$$

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Power Generation

Cummins Certified Shop Testing Procedures

GENSET MODEL: C60D6C
GENSET VOLTAGE: 480 VAC
GENSET RATING: 60 KW

INTRODUCTION

This test procedure details the testing to be performed as part of Cummins Power Generation's Standard Test Procedure. For this standard test, all data is to be recorded on the Cummins Power Generation INDUSTRIAL PRODUCTS TEST RECORD - CERTIFICATE OF TEST.

TEST PROCEDURE

1. Record the following information on the Certificate of Test:

A. Genset Model
B. Genset Serial Number
C. Customer (Distributor sold to)
D. Order Number
E. Service Rating
F. Fuel Type
G. Governor Type
H. Cooling System
I. Ambient Temp
J. Barometric Pressure
K. Genset rated voltage, frequency and number of phases

2. PowerCommand Control Set-up Test

A. During control set-up, perform the following tests:

(1) Verify flashing red LED when control switch is in "non-automatic" position.
(2) Press "Emergency Stop" switch and check that control panel display reads Emergency Stop.

B. Prior to running the genset, verify that the control indications are functioning properly by spot checking items such as:

(1) Oil pressure (approximately 0 psi)
(2) Coolant temperature (check only for a reading. Depending upon when the unit was previously operated, it could be anywhere between ambient and 215 deg F).
(3) Battery voltage (approximately 24 vdc)
(4) RPM (approximately 0 rpm)
(5) Volts, line to line (approximately 0 volts)
(6) Amps (approximately 0 amps)

C. Check "Remote Start" box if remote start switch operates properly (i.e. displays no flashing light and no error message).

3. Generator Set Start-Up and Standard Production Testing

A. If engine is not already close to operating temperature, warm up engine and conduct testing with coolant temperature at normal operating temperature. Warm-up procedure will be:

(1) Low idle speed (no load): approx. 1 minute
(2) Rated speed (no load): approx. 1 minute
(3) Rated speed (50% load): approx. 5 minutes

B. No Load Testing: Verify that the no-load output voltages are close to nominal, and then adjust voltage at the genset control if necessary to meet the voltage requirement. Utilize Test Cell AC metering as the standard for adjustment.

C. Check the following at no load (1800 RPM or 1500RPM), and record the following items on Certificate of Test form.

(1) Battery Voltage (must be greater than 24vdc)
(2) Voltage Regulator Adjustment at PowerCommand Control (+/- 5% adjustment)
(3) All line-to-line and line-to-neutral voltages
(4) Frequency
(5) Coolant Temperature
(6) Oil Pressure
(7) Phase Sequence (A-B-C)

D. Full Load Testing: After loading the genset to 100% of rated load and power factor as determined with Test Cell metering, check the AC metering at the control and calibrate as necessary. When this is done, check the “Meter Accuracy” box on Certificate of Test form.

E. Check the following at full rated load level and rated RPM, and record the following on Certificate of Test form:

(1) Battery Voltage (greater than 24vdc)
(2) All line-to-line and line-to-neutral voltages
(3) All line currents
(4) KW Load
(5) Frequency
(6) Power Factor (reflects rated 0.8 pf)
(7) Oil Pressure
(8) Coolant Temperature

F. Check maximum power of the genset at 1.0 PF. Record maximum power (KW), frequency and one L-L voltage. Note that ISO correction factor is 1.0.

G. Verify steady-state stability

(1) At both no load and full load, run a brief chart recording of one L-L voltage and frequency. Verify steady-state frequency regulation remains isochronous (+/- 0.25%) at no load and full load.
(2) Verify voltage regulation remains within +/- 0.5% of rated voltage at no load and full load.
(3) Check "Governor" and "Voltage Regulation" boxes if these PowerCommand functions maintained required steady-state control. Do not retain strip chart recordings after verifying that they meet the required steady state stability requirements.

H. Verify full-load pick-up capability

(1) Utilizing the chart recorder to measure frequency and one L-L voltage, apply full rated load at rated power factor in one step.
(2) Verify that the generator set will pick up full load in one step, and that the voltage and frequency dips and recovery times meet the stated requirements for this generator set model.
(3) After completion of this test, do not retain strip chart recordings.

Power Generation

Factory Generator Set Production Tests Provided

L020 – Extended Run Tests

1. Run genset at stated load conditions for the length of time specified. All load percentages are to be percentage of rated load. All kW loads to be at 0.8 power factor.
2. Every 15 minutes during the test, record the following:

A. Time of Day
B. Oil Pressure
C. Coolant Temperature
D. kW
E. Power Factor
F. Frequency
G. All L-L and L-N voltages
H. All line currents

3. Duration of test is as follows:
L020 – 1 hr. at 75% of Stated Rating & 1 hr. at 100% of Stated Rating (2 hours total)

L023 – Safety Shutdowns

1. The following safety shutdowns will be simulated using service tools:

A. Pre-low oil pressure warning
B. Oil pressure shutdown
C. Pre-high engine temperature warning
D. High engine temperature shutdown
E. Overspeed

L024 – Exhaust Temperature

1. Exhaust temperature (both banks if dual manifolds) will be recorded every 15 minutes during the running at rated load.
2. If pyrometers are not ordered, hook-up to pyrometers in the test cell exhaust system near the exhaust elbows will be accomplished.

2025 EPA Tier 3 Exhaust Emission Compliance Statement C60D6C Stationary Emergency

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 3 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	SCEXL0275AAK-037
Effective Date:	1/27/2025
Date Issued:	1/27/2025
EPA Engine Family (Cummins Emissions Family):	SCEXL0275AAK

Engine Information:

Model:	QSB5-G13	Bore:	4.21 in. (106.9 mm)
Engine Nameplate HP:	173	Stroke:	4.88 in. (123.9 mm)
Type:	4 cycle, in-line, 4 cylinder	Displacement:	272 cu. in. (4.45 liters)
Diesel Aspiration:	Turbocharged	Compression Ratio:	17.3:1
Emission Control Device:		Exhaust Stack Diameter:	4 in. (102 mm)

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NO_x + NMHC	CO	PM	NO_x + NMHC	CO	PM
EPA Emissions Limit	3.0	2.6	0.15	4.0	3.5	0.20

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50, Reference: ASTM D975 No. 2-D, 300-500 ppm Sulphur

Reference conditions: Air Inlet Temperature: 25 °C (77 °F), Fuel Inlet Temperature: 40 °C (104 °F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Prototype Test Support (PTS)
60 Hz test summary

Generator set models

C50D6C C80D6C
C60D6C C100D6C

Representative prototype

Model: C100D6C
Alternator: UC27 D
Engine: QSB5-G5

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity. Prototype testing is conducted only on generator sets not sold as new equipment.

Maximum surge power: 117.5 kW

The generator set was evaluated to determine the stated maximum surge power.

Maximum motor starting: 146.3 kVA

The generator set was tested to simulate motor starting by applying the specified kVA load at low lagging power factor (0.4 or lower). With this load applied, the generator set recovered to a minimum of 90% rated voltage.

Alternator temperature rise:

The highest rated temperature rise (120 °C) test results are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with the rated voltages. Only the highest temperatures are reported.

Location	Maximum rise (ºC)
Alternator stator	N/A
Alternator rotor	N/A
Exciter stator	N/A
Exciter rotor	N/A

Torsional analysis and testing:

The generator set was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted.

Cooling system: 50 °C ambient
0.5 in. H_2O restriction

The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load in elevated ambient temperature under static restriction conditions.

Durability:

The C100D6C generator set was subjected to a minimum 500 hour endurance test operating at variable load up to the Standby rating based upon MIL-STD-705 to verify structural soundness and durability of the design.

Electrical and mechanical strength:

The generator set was tested to several single phase and three phase faults to verify that the generator can safely withstand the forces associated with short circuit conditions. The generator set was capable of producing full rated output at the conclusion of the testing.

Steady state performance:

The generator set was tested to verify if the steady state operating performance was within the specified maximum limits.

Voltage regulation:	± 1%
Random voltage variation:	± 1%
Frequency regulation:	± Isochronous
Random frequency variation:	± 0.5%

Transient performance:

The generator set was tested to verify single step loading capability as required by NFPA 110 and verify acceptable voltage and frequency response on load addition or rejection. The following results were recorded at 1.0 power factor:

Full load acceptance:

Voltage dip:	28%
Recovery time:	1.3 seconds
Frequency dip:	9.1%
Recovery time:	2.6 seconds

Full load rejection:

Voltage rise:	20.2%
Recovery time:	0.6 seconds
Frequency rise:	7.0%
Recovery time:	1.7 seconds

Harmonic analysis:

(per MIL-STD-705B, method 601.4)

	Line to Line		Line to Neutral	
Harmonic	No load	Full load	No load	Full load
3	0.04	0.15	0.15	0.15
5	0.2	0.2	0.2	0.2
7	0.6	0.6	0.6	0.6
9	0.02	0.04	0.04	0.04
11	0.52	0.52	0.52	0.52
13	0.26	0.26	0.26	0.26
15	0.0	0.0	0.0	0.0

Alternator Data Sheet
Frame Size: UC3D
(CGT Frame Name: UCI274D)

Characteristics

	No of Bearings:	**1-bearing**		**2-bearing**	
Weights:	Stator assembly:	8521 lb	3865 kg	8521 lb	3865 kg
	Rotor assembly:	4392 lb	1992 kg	4246 lb	1926 kg
	Complete assembly:	12912 lb	5857 kg	12767 lb	5791 kg
Maximum speed:		2250 rpm			
Excitation current:	Full load:	Wdg 12: 3.6; Wdg 13: 3.6; Wdg 19: 3.14			
	No load:	Wdg 12: 0.86; Wdg 13: 0.86; Wdg 19: 0.86			
Insulation system:	Class H throughout				

3 Ø Ratings (0.8 power factor)			**60 Hz** (winding no)								
			190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
163° C rise ratings	@ 27° C	kW	114	114	114	127	100	114	120	120	127
		kVA	142.5	142.5	142.5	158.8	125	142.5	150	150	158.8
150° C rise ratings	@ 40° C	kW	110	110	110	124	98.4	110	116	116	125
		kVA	137.5	137.5	137.5	155	123	137.5	145	145	156.3
125° C rise ratings	@ 40° C	kW	105	105	105	117	96	105	110	110	117
		kVA	131.3	131.3	131.3	146.3	120	131.3	137.5	137.5	146.3
105° C rise ratings	@ 40° C	kW	96	96	96	105	88	96	100	100	105
		kVA	120	120	120	131.3	110	120	125	125	131.3
80° C rise ratings	@ 40° C	kW	80	80	80	88	72	80	87	87	88
		kVA	100	100	100	110	90	100	108.8	108.8	110

3 Ø Reactances (Based on full load at 125° C rise rating)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	208/416 (311)	220/440 (311)	230/460 (311)	240/480 (311)
Synchronous	3.08	2.79	2.58	2.02	2.38	2.52	2.36	2.16	2.11
Transient	0.25	0.23	0.21	0.17	0.17	0.21	0.20	0.18	0.17
Subtransient	0.17	0.16	0.14	0.11	0.16	0.15	0.14	0.13	0.12
Negative sequence	0.21	0.19	0.18	0.13	0.11	0.17	0.16	0.15	0.14
Zero sequence	0.12	0.11	0.10	0.08	0.08	0.10	0.09	0.09	0.08

3 Ø Motor starting Maximum kVA (90% sustained voltage)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
(Shunt)	360	360	360	360	360	360	360	360	[illegible]
(PMG)	423	423	423	423	423	423	423	423	423

Time constants (sec)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
Transient	0.03	0.03	0.03	0.03	0.031	0.031	0.031	0.031	0.031
Subtransient	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Open circuit	0.82	0.82	0.82	0.82	0.85	0.85	0.85	0.85	0.85
DC	0.007	0.007	0.007	0.007	0.0073	0.0073	0.0073	0.0073	0.0073

Windings (@22° C)		190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
Stator resistance	(L-L Ohms)	0.546	0.546	0.546	0.103	0.088	0.088	0.088	0.088	0.088
Rotor resistance	(Ohms)	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
Number of leads		12	12	12	12	12	12	12	12	12

Specification Sheet

PowerCommand® 2.3 Control System

Control System Description

The PowerCommand control system is a microprocessor-based generator set monitoring, metering and control system designed to meet the demands of today's engine driven generator sets. The integration of all control functions into a single control system provides enhanced reliability and performance, compared to conventional generator set control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied.

Features

- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support.
- AmpSentry™ protective relay - true alternator overcurrent protection.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Digital voltage regulation. Three phase full wave FET type regulator compatible with either shunt or PMG systems.
- Generator set monitoring and protection.
- 12 and 24 VDC battery operation.
- Modbus® interface for interconnecting to customer equipment.
- Warranty and service. Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE, UKCA and CSA standards.

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PowerCommand Digital Genset Control PCC 2300

Description

The PowerCommand generator set control is suitable for use on a wide range of generator sets in non-paralleling applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC Line-to-Line.

Power for this control system is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 30 VDC.

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation - Three phase full wave FET type regulator compatible with either shunt or PMG systems. Sensing is three phase.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine
- due to thermal Control Module (ECM).
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
- Reduces the risk of Arc Flash overload or electrical faults by inverse time protection
- Common harnessing - with higher feature Cummins controls. Allows for easy field upgrades.
- Generator set monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system to sense and warn against a weak battery condition.
- Configurable for single or three phase AC metering.
- Engine starting - Includes relay drivers for starter, Fuel Shut Off (FSO), glow plug/spark ignition power and switch B+ applications.
- Generator set protection – Protects engine and alternator.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Advanced serviceability - using InPower™, a PC-based software service tool.
- Environmental protection - The control system is designed for reliable operation in harsh environments. The main control board is a fully encapsulated module that is protected from the elements.
- Modbus interface for interconnecting to customer equipment.
- Configurable inputs and outputs - Four discrete inputs and four dry contact relay outputs.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

Base Control Functions

HMI Capability

Operator adjustments - The HMI includes provisions for many set up and adjustment functions.

Generator set hardware data - Access to the control and software part number, generator set rating in kVA and generator set model number is provided from the HMI or InPower.

Data logs - Includes engine run time, controller on time, number of start attempts, total kWh, and load profile (control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history - Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase Line-to-Line and Line-to-Neutral)
- Current (single or three phase)
- kW, kVar, power factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1- Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Service adjustments - The HMI includes provisions for adjustment and calibration of generator set control functions. Adjustments are protected by a password. Functions include:

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Service adjustments (continued)

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable output set up
- Meter calibration
- Display language and units of measurement

Engine Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data swapping between genset and engine controller for control, metering and diagnostics.

12 VDC/24 VDC battery operations - PowerCommand will operate either on 12 VDC or 24 VDC batteries.

Temperature dependent governing dynamics (with electronic governing) - modifies the engine governing control parameters as a function of engine temperature. This allows the engine to be more responsive when warm and more stable when operating at lower temperature levels.

Isochronous governing - (where applicable) Capable of controlling engine speed within +/-0.25% for any steady state load from no load to full load. Frequency drift will not exceed +/-0.5% for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

Droop electronic speed governing - Control can be adjusted to droop from 0 to 10% from no load to full load.

Remote start mode - It accepts a ground signal from remote devices to automatically start the generator set and immediately accelerate to rated speed and voltage. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

Remote and local emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either emergency stop switch will wakeup the control.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating. The control can also be configured to go into a low current state while in auto for prime applications or applications without a battery charger.

Engine starting - The control system supports automatic engine starting. Primary and backup start disconnects are achieved by one of two methods: magnetic pickup or main alternator output frequency. The control also supports configurable glow plug control when applicable.

Cycle cranking - Is configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shut down after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Alternator Control

The control includes an integrated three phase Line-to-Line sensing voltage regulation system that is compatible with shunt or PMG excitation systems. The voltage regulation system is a three phase full wave rectified and has an FET output for good motor starting capability.

Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/- 1.5% for a 40 ºC (104 ºF) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level. The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided.

Protective functions include:

Battle Short Mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation are not bypassed. Please refer to the control application guide or manual for list of these faults.

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Derate

The derate function reduces output power of the genset in response to a fault condition. If a derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or modbus.

Configurable Alarm and Status Inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, shutdown or status indication and for labeling the input.

Emergency Stop

Annunciated whenever either emergency stop signal is received from external switch.

Full Authority Electronic Engine Protection

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

General Engine Protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the generator set is signaled to start and indicate a warning if the battery indicates impending failure.

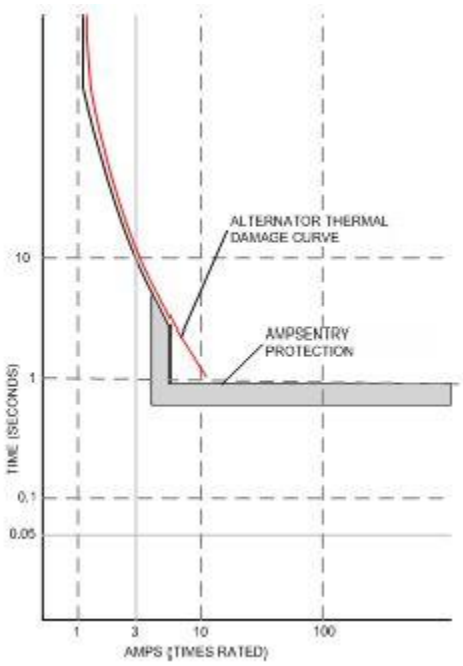
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the generator set or in the load. It also provides single and three phase fault current regulation so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3-Phase short) or fixed timer (2 sec for 1-Phase short, 5 sec for 2-Phase short). See document R1053 for a full-size time over current curve.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off during synchronizing.

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5- 20 second time delay. Default: 6 Hz, 10 seconds.

Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81 o) - Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz,
20 seconds, disabled.

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Overcurrent warning/shutdown - Thresholds and time delays are configurable. Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Loss of sensing voltage shutdown - Shutdown of generator set will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown generator set when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point.

Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Field Control Interface

Input signals to the PowerCommand control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Battleshort
- Rupture basin
- Start type signal
- Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Output signals from the PowerCommand control include:

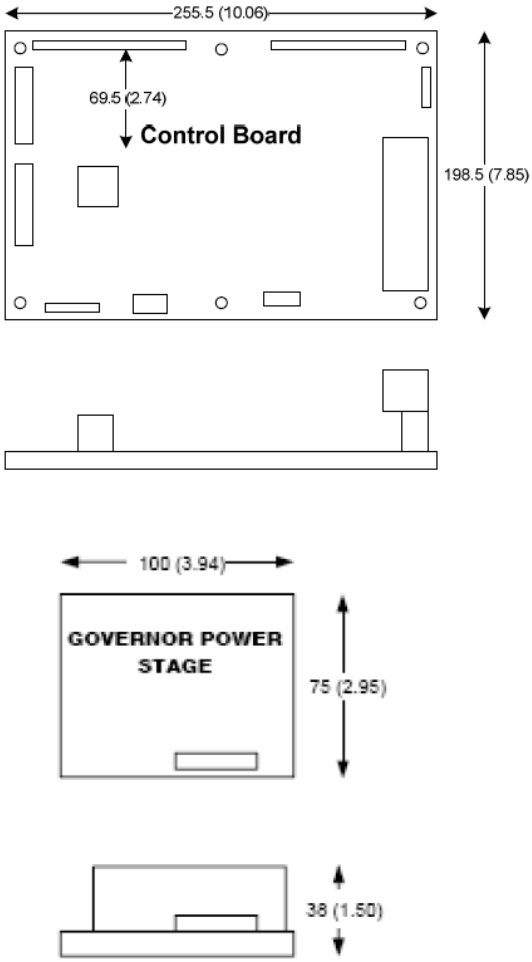
- Load dump signal: Operates when the generator set is in an overload condition.
- Delayed off signal: Time delay based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 – 120 seconds. Default: 0 seconds.
- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30 VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (generator set running) signal: Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

Communications Connections Include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins products.

Mechanical Drawings



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PowerCommand Human Machine Interface HMI320

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

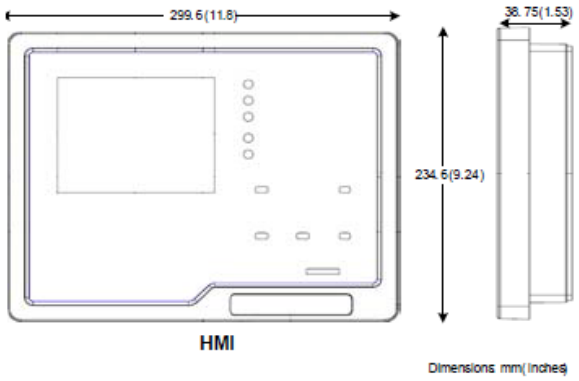
Features

- LED indicating lamps:
  - Genset running
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.
- LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian and Chinese Characters.

Communications connections include:

- PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.
- This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand generator sets and transfer switches, to facilitate service and monitoring of these products.

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC to +70º C (-40 ºF to 158 ºF) and for storage from -55 ºC to +80 ºC (-67 ºF to 176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC to +70 ºC (-4 ºF to 158 ºF) and for storage from -30 ºC to +80 ºC (-22 ºF to 176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

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Certifications

PowerCommand meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4: 1993 compliance, controls and switchgear.
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking: The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN50081-1,2 residential/light industrial emissions or industrial emissions.
- EN50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

Warranty

All components and subsystems are covered by an express limited one year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

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Data Sheet

Circuit Breakers

Description

This Data sheet provides circuit breaker manufacturer part numbers and specifications. The Circuit breaker box description is the rating of that breaker box installation on a Cummins Generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable Models

Engine	Models					
Kubota	C10D6	C15D6	C20D6			
QSJ2.4	C20N6	C25N6	C30N6	C30N6H	C36N6	C36N6H
	C40N6	C40N6H	C50N6H	C60N6H		
B3.3	C25D6	C30D6	C35D6	C40D6	C50D6	C60D6
QSJ5.9G	C45N6	C50N6	C60N6	C70N6	C80N6	C100N6
QSJ8.9G	C125N6	C150N6	C175N6B	C200N6B		
QSB5	DSFAC	DSFAD	DSFAE	C50D6C	C60D6C	C80D6C
	C100D6C	C125D6C				
QSB7	DSGAA	DSGAB	DSGAC	DSGAD	DSGAE	
		C125D6D	C150D6D	C175D6D	C200D6D	
QSL9	DSHAD	DQDAA	DQDAB	DQDAC		
QSM11	DQHAB					
QSX15	DFEJ	DFEK				

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.

2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an “N”, use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Please refer to the catalog numbering systems page, which is given in the chart, to understand the nomenclature of the catalog number.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16-17
H, J, and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8-9
Q	0734CT0201 http://www.schneider-electric.us/en/download/document/0734CT0201/	4

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above. http://products.schneider-electric.us/technical-library/

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3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

*If the catalog number starts with “N”, skip the N and begin your search with the second letter.

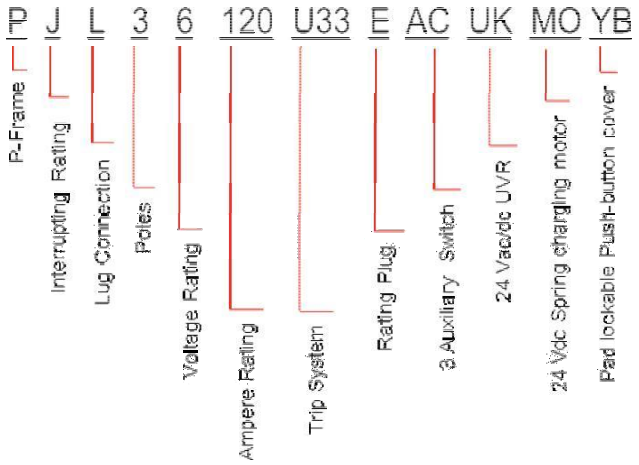
*If the first 3 letters are “PJP,” the search will not work. You will need to start with just “PJ” and use the description pages to obtain the information you are looking for on the “PJP.”

Example

After finding your circuit breaker catalog number to be "PJL36120U33EACUKMOYB," navigate to the P-frame catalog by using the link provided.

Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PJL36120.”



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Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KV85-2	CB,Loc B,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KV86-2	CB,Loc B,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KV87-2	CB,Loc B,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KV88-2	CB,Loc B,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A
KV89-2	CB,Loc B,90A,3P,600VAC,80%,UL	A043K997	Schneider Electric	HDL36090	Thermal Magnetic	N/A
KV90-2	CB,Loc B,100A,3P,600VAC,80%,UL	A043L024	Schneider Electric	HDL36100	Thermal Magnetic	N/A
KV91-2	CB,Loc B,125A,3P,600VAC,80%,UL	A043K994	Schneider Electric	HDL36125	Thermal Magnetic	N/A
KV92-2	CB,Loc B,150A,3P,600VAC,80%,UL	A043K991	Schneider Electric	HDL36150	Thermal Magnetic	N/A
KV93-2	CB,Loc B,175A,3P,600VAC,80%,UL	A043L619	Schneider Electric	JDL36175	Thermal Magnetic	N/A
KV94-2	CB,Loc B,200A,3P,600VAC,80%,UL	A043L520	Schneider Electric	JDL36200	Thermal Magnetic	N/A
KV95-2	CB,Loc B,225A,3P,600VAC,80%,UL	A043L517	Schneider Electric	JDL36225	Thermal Magnetic	N/A
KV96-2	CB,Loc B,250A,3P,600VAC,80%,UL	A043L510	Schneider Electric	JDL36250	Thermal Magnetic	N/A
KX09-2	Circuit Breaker-250A,Right CB on Right side,3-Pole,UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX14-2	CirBrkr-250A,Left,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX15-2	CirBrkr-250A,Right,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX22-2	Circuit Breaker-250A,Left CB on Right side,3-Pole,UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX26-2	CB,Loc A,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A

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PowerPact H-, J-, and L-Frame Circuit Breakers

Catalog
0611CT1001 R02/16

2015
Class 0611

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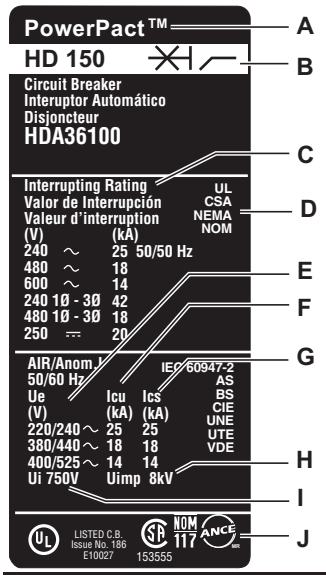
SQUARE D™
by Schneider Electric

General Characteristics

Faceplate Label



Characteristics indicated on the faceplate label:

A. Circuit breaker type
B. Circuit breaker disconnector symbol
C. Performance levels
D. Standards
E. Ue: Operating voltage per IEC
F. Icu: Ultimate breaking capacity per IEC
G. Ics: Service breaking capacity per IEC
H. Uimp: Rated impulse withstand voltage per IEC
I. Ui: Insulation voltage per IEC
J. Certification marks

NOTE: When the circuit breaker is equipped with an extended rotary handle, the door must be opened to view the faceplate.

Codes and Standards

H-, J-, and L-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards.

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

Table 8: Codes and Standards (Domestic)

PowerPact H-, J-, and L-Frame Circuit Breakers	H-, J-, and L-Frame Switches	PowerPact H-, J-, and L-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 508
IEC 60947-2	IEC 60947-3	IEC 60947-2
CSA C22.2 No. 5[2]	CSA C22.2 No. 5[4]	CSA C22.2 No. 14
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Marking
CCC	CE Marking	
CE Marking		

1 PowerPact H- and J-frame circuit breakers are in UL File E10027. PowerPact L-frame circuit breakers are in UL File E63335.

2 PowerPact H- and J-frame circuit breakers are in CSA File LR40970. PowerPact L-frame circuit breakers are in CSA File 69561.

3 PowerPact H- and J-frame switches are in UL File E87159.

4 PowerPact H- and J-frame switches are in CSA File LR32390.

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Table 11: Circuit Breakers

Circuit Breaker		150 A H-Frame					250 A J-Frame					400 A L-Frame					600 A L-Frame					1200 A L-Frame	
Circuit Breaker Type		HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR	LG	LL
Number of poles[1]		2, 3				3	2, 3				3	3, 4					3, 4					4	
Amperage Range (A)		15-150					70-250					70-400					200-600					700-1200	
UL 489 Circuit Breaker Ratings																							
Breaking Capacity (AIR) UL/CSA/NOM (kA rms)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	—	—
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	—	—
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	—	—
	250 Vdc[2]	20	20	20	20	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	20	—	50	—	—	20	—	—	50	—	20	—	—	50	—	20	—	20	—	20	50
IEC 947-2 Circuit Breaker Ratings																							
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	—	—
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75[4]	—	—
	690 Vac	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—
	250 Vdc[2]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%					—	—
Insulation Voltage	V_i	750 Vac					750 Vac					750 Vac					750 Vac					—	—
Impulse Withstand Voltage	V_{imp}	8 kVac					8 kVac					8 kVac					8 kVac					—	—
Operational Voltage	V_e	690 Vac					690 Vac					690 Vac					690 Vac					—	—
Sensor Rating	I_n	150 A					250 A					400 A					600 A					—	—
Utilization Category	—	A					A					A					A					—	—
Operations (Open-Close Cycles)																							
Without Current		4000					5000					5000					5000					—	
With Current		4000					1000					1000					1000					—	
Protection and Measurements																							
Short-circuit protection	Magnetic only	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Overload/short-circuit protection	Thermal-magnetic	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	X	X
	Electronic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with neutral protection (Off-0.5-1-OSN)[5]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with ground fault protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with zone selective interlocking (ZSI)[6]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Display / I, V, f, P, E, THD measurements / interrupted-current measurement		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Options	Front display module (FDM121)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Operating assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Counters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Histories and alarms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Metering Com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Device status/control com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Dimensions / Weight / Connections																							
Dimensions (Three-Pole Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)					13.38 (340)	
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)					5.51 (140)	
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)					4.33 (110)	
Weight - lb. (Kg)		4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)					13.7 (6.2)	
Connections / Terminations	Unit Mount	X					X					X					X					X	
	I-Line	X					X					X					X					—	
	Rear Connection	X					X					X					X					X[7]	
	Plug-In	X					X					X					X					—	
	Drawout	X					X					X					X					—	
	Optional Lugs	X					X					X					X					—	

1 H and J-frame breakers with Micrologic trip units available only with three poles. The HJ, HL and the J-Frame two pole circuit breakers are three pole modules.

2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.

3 500 Vdc specific catalog numbers, ungrounded UPS systems only.

4 I_{cs} for 600 A L-frame circuit breaker at 525 V is 19 kA.

5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

6 ZSI using restraint wires.

7 Rear connection is not available for 700–1200 A four pole L-frame circuit breakers.

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PowerPact H-, J-, and L-frame Circuit Breaker Trip Units

Table 12: Micrologic Trip Unit Features

Features	Micrologic Trip Unit (X = Standard Feature, O = Available Option					
	Standard		Ammeter		Energy	
	3.2/3.3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	X					
LSI[1]		X	X		X	
LSIG/Ground Fault Trip[2]				X		X
Ground-Fault Alarm Trip				X		X
Current Settings Directly in Amperes	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X
LED for Long-Time Pickup	X	X	X	X	X	X
LED for Long-Time Alarm	X	X	X	X	X	X
LED Green “Ready” Indicator	X	X	X	X	X	X
Up to 12 Alarms Used Together			X	X	X	X
Digital Ammeter			X	X	X	X
Zone-Selective Interlocking[3]			X	X	X	X
Communications	O	O	O	O	O	O
LCD Display			X	X	X	X
Front Display Module FDM121			O	O	O	O
Advanced User Interface			X	X	X	X
Neutral Protection			X	X	X	X
Contact Wear Indication[4]			X	X	X	X
Incremental Fine Tuning of Settings			X	X	X	X
Load Profile[4, 5]			X	X	X	X
Power Measurement					X	X
Power Quality Measurements					X	X

1 The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.

2 Requires neutral current transformer on three-phase four-wire loads.

3 ZSI for H/J-frame devices is only OUT. ZSI for L-frame devices is IN and OUT.

4 Indication available using the communication system only.

5 % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% I_n.

Thermal-Magnetic or Electronic Trip Unit?

Thermal-magnetic trip units (available on H- and J-frame circuit breakers only) protect against overcurrents and short-circuits using tried and true techniques. For applications requiring installation optimization and energy efficiency, electronic trip units offering more advanced protection functions combined with measurements.

Trip units using digital electronics are faster as well as more accurate. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate events and plan any necessary servicing.

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Table 20: H-Frame 150 A and J-Frame 250 A Electronic Trip UL Rated Circuit Breakers (600 Vac, 50/60 Hz) With Factory Sealed Trip Unit Suitable for Reverse Connection

Electronic Trip Unit			Sensor Rating	Interrupting Rating				
Type	Function	Trip Unit		D	G	J[1]	L[2]	R[2]
Standard (80%) Rated Circuit Breakers, Three-Pole								
Standard	LI	3.2[2]	60 A[3]	HDL36060U31X	HGL36060U31X	HJL36060U31X	HLL36060U31X	HRL36060U31X
			100 A[3]	HDL36100U31X	HGL36100U31X	HJL36100U31X	HLL36100U31X	HRL36100U31X
			150 A[3]	HDL36150U31X	HGL36150U31X	HJL36150U31X	HLL36150U31X	HRL36150U31X
			250 A[4]	JDL36250U31X	JGL36250U31X	JJL36250U31X	JLL36250U31X	JRL36250U31X
Standard	LSI	3.2S[2]	60 A[3]	HDL36060U33X	HGL36060U33X	HJL36060U33X	HLL36060U33X	HRL36060U33X
			100 A[3]	HDL36100U33X	HGL36100U33X	HJL36100U33X	HLL36100U33X	HRL36100U33X
			150 A[3]	HDL36150U33X	HGL36150U33X	HJL36150U33X	HLL36150U33X	HRL36150U33X
			250 A[4]	JDL36250U33X	JGL36250U33X	JJL36250U33X	JLL36250U33X	JRL36250U33X
Ammeter	LSI	5.2A	60 A[3]	HDL36060U43X	HGL36060U43X	HJL36060U43X	HLL36060U43X	HRL36060U43X
			100 A[3]	HDL36100U43X	HGL36100U43X	HJL36100U43X	HLL36100U43X	HRL36100U43X
			150 A[3]	HDL36150U43X	HGL36150U43X	HJL36150U43X	HLL36150U43X	HRL36150U43X
			250 A[4]	JDL36250U43X	JGL36250U43X	JJL36250U43X	JLL36250U43X	JRL36250U43X
Energy	LSI	5.2E	60 A[3]	HDL36060U53X	HGL36060U53X	HJL36060U53X	HLL36060U53X	HRL36060U53X
			100 A[3]	HDL36100U53X	HGL36100U53X	HJL36100U53X	HLL36100U53X	HRL36100U53X
			150 A[3]	HDL36150U53X	HGL36150U53X	HJL36150U53X	HLL36150U53X	HRL36150U53X
			250 A[4]	JDL36250U53X	JGL36250U53X	JJL36250U53X	JLL36250U53X	JRL36250U53X
Ammeter	LSIG	6.2A	60 A[3]	HDL36060U44X	HGL36060U44X	HJL36060U44X	HLL36060U44X	HRL36060U44X
			100 A[3]	HDL36100U44X	HGL36100U44X	HJL36100U44X	HLL36100U44X	HRL36100U44X
			150 A[3]	HDL36150U44X	HGL36150U44X	HJL36150U44X	HLL36150U44X	HRL36150U44X
			250 A[4]	JDL36250U44X	JGL36250U44X	JJL36250U44X	JLL36250U44X	JRL36250U44X
Energy	LSIG	6.2E	60 A[3]	HDL36060U54X	HGL36060U54X	HJL36060U54X	HLL36060U54X	HRL36060U54X
			100 A[3]	HDL36100U54X	HGL36100U54X	HJL36100U54X	HLL36100U54X	HRL36100U54X
			150 A[3]	HDL36150U54X	HGL36150U54X	HJL36150U54X	HLL36150U54X	HRL36150U54X
			250 A[4]	JDL36250U54X	JGL36250U54X	JJL36250U54X	JLL36250U54X	JRL36250U54X
100% Rated Circuit Breakers, Three-Pole								
Standard	LI	3.2[2]	60 A[3] 100 A[3] 150 A[3]	HDL36060CU31X HDL36100CU31X HDL36150CU31X	HGL36060CU31X HGL36100CU31X HGL36150CU31X	HJL36060CU31X HJL36100CU31X HJL36150CU31X	HLL36060CU31X HLL36100CU31X HLL36150CU31X	HRL36060CU31X HRL36100CU31X HRL36150CU31X
			250 A[4]	JDL36250CU31X	JGL36250CU31X	JJL36250CU31X	JLL36250CU31X	JRL36250CU31X
Standard	LSI	3.2S[2]	60 A[3] 100 A[3] 150 A[3]	HDL36060CU33X HDL36100CU33X HDL36150CU33X	HGL36060CU33X HGL36100CU33X HGL36150CU33X	HJL36060CU33X HJL36100CU33X HJL36150CU33X	HLL36060CU33X HLL36100CU33X HLL36150CU33X	HRL36060CU33X HRL36100CU33X HRL36150CU33X
			250 A[4]	JDL36250CU33X	JGL36250CU33X	JJL36250CU33X	JLL36250CU33X	JRL36250CU33X
Ammeter	LSI	5.2A	60 A[3] 100 A[3] 150 A[3]	HDL36060CU43X HDL36100CU43X HDL36150CU43X	HGL36060CU43X HGL36100CU43X HGL36150CU43X	HJL36060CU43X HJL36100CU43X HJL36150CU43X	HLL36060CU43X HLL36100CU43X HLL36150CU43X	HRL36060CU43X HRL36100CU43X HRL36150CU43X
			250 A[4]	JDL36250CU43X	JGL36250CU43X	JJL36250CU43X	JLL36250CU43X	JRL36250CU43X
Energy	LSI	5.2E	60 A[3] 100 A[3] 150 A[3]	HDL36060CU53X HDL36100CU53X HDL36150CU53X	HGL36060CU53X HGL36100CU53X HGL36150CU53X	HJL36060CU53X HJL36100CU53X HJL36150CU53X	HLL36060CU53X HLL36100CU53X HLL36150CU53X	HRL36060CU53X HRL36100CU53X HRL36150CU53X
			250 A[4]	JDL36250CU53X	JGL36250CU53X	JJL36250CU53X	JLL36250CU53X	JRL36250CU53X

1 UL Listed/CSA Certified as current-limiting circuit breakers.

2 Three-pole circuit breakers with this trip unit can be used for two-pole applications.

3 Standard lug kit: AL150HD. Terminal wire range: 14–3/0 AWG Al or Cu.

4 Standard lug kit: AL250JD. Terminal wire range: 3/0 AWG–350 kcmil Al or Cu.
For smaller wire range (4–4/0 AWG Al or Cu), replace the lug's wire binding screws with the larger binding screws provided.

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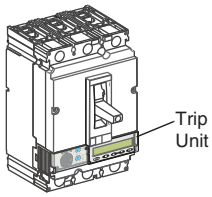
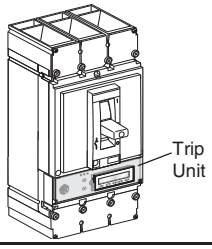
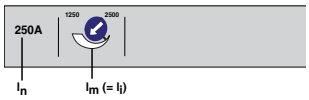
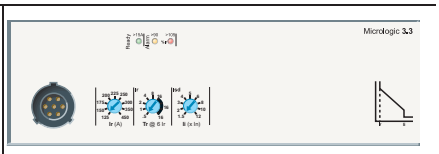
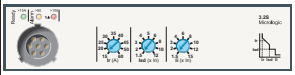
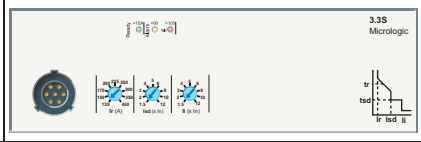
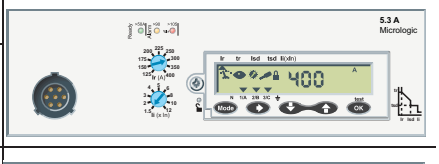
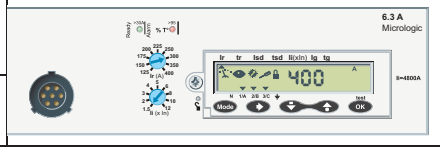
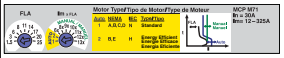
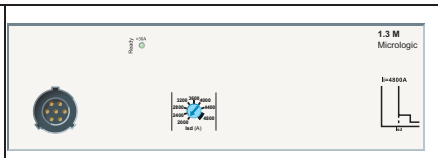
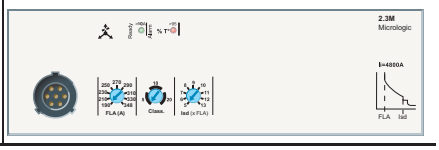
Table 62: Trip Unit Availability

Trip Unit Type	Trip Unit	H-, J-Frame	Trip Unit	L-Frame
				
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		Micrologic 3.3S and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

NOTE: W = mission critical trip unit.

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PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Units

Table 64: Micrologic 3 Trip Unit

Ratings	I_n at 104°F (40°C)[1]		60 A	100 A	150 A	250 A	400 A	600 A			
Circuit Breaker	H-frame		X	X	X						
	J-frame					X					
	L-frame					X	X	X			
Micrologic 3.2 / 3.3 trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	I_r		Value depending on sensor rating (I_n) and setting on rotary switch								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		0.5	1	2	4	8	16			
		1.5 x I_r	15	25	50	100	200	400			
		6 x I_r	0.5	1	2	4	8	16			
		7.2 x I_r	0.35	0.7	1.4	2.8	5.5	11			
Thermal memory			20 minutes before and after tripping								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								
Micrologic 3.2S / 3.3S trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	I_r		Value depending on sensor rating (I_n) and setting on rotary switch								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		non-adjustable								
		1.5 x I_r	400								
		6 x I_r	16								
		7.2 x I_r	11								
Thermal memory			20 minutes before and after tripping								
S Short-time protection											
Pick-up (A) accuracy ± 10%	I_{sd} - I_r x...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	t_{sd}		non-adjustable								
	Non-tripping time Maximum break time		20 80								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								

1 If the trip units are used in high-temperature environments, the Micrologic trip unit setting must take into account the thermal limitations of the circuit breaker. See the temperature derating information on page 150.

2 Mission Critical trip units have a "-W" at the end of the number (for example 3.2-W). All other protections are the same and have the same trip curves.

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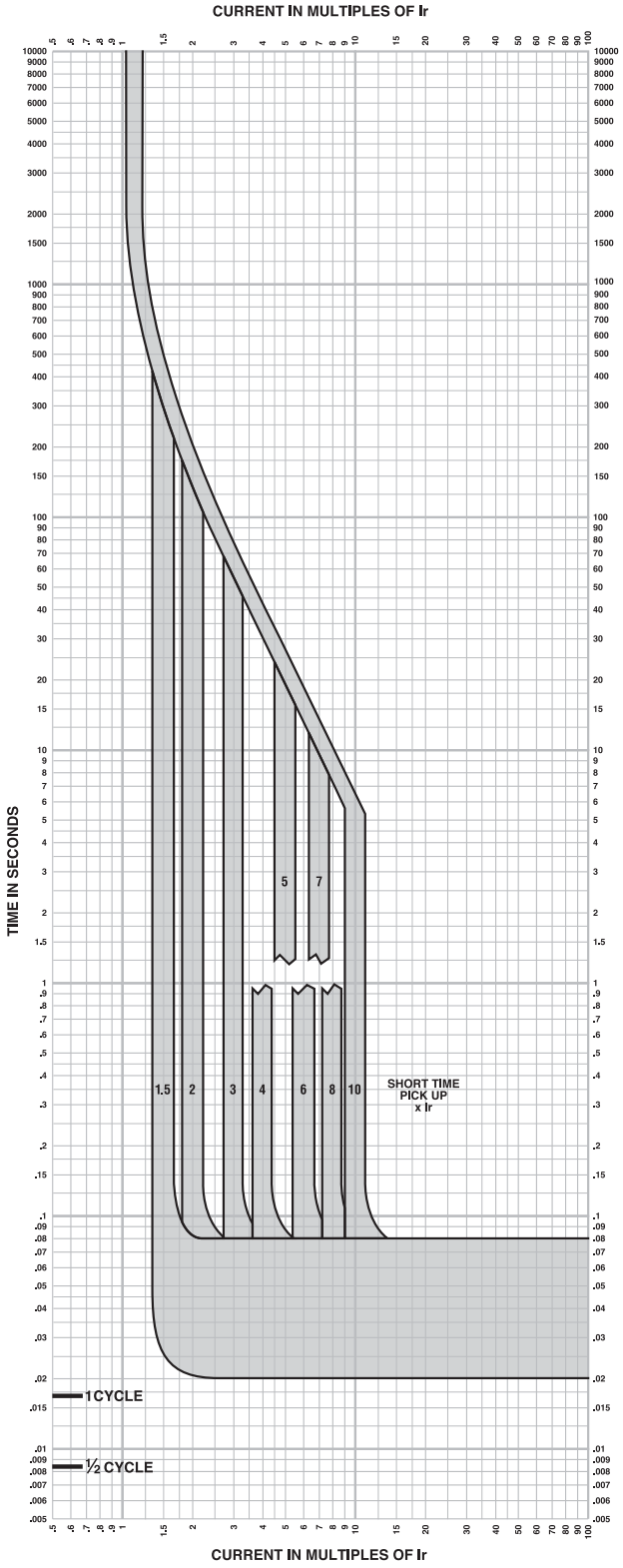
Figure 110: Micrologic 3.2S and 3.2S-W Electronic Trip Unit Long Time / Short Time Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.2S and 3.2S-W
Long Time/Short Time Trip Curve
250A J-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.

Curves apply from -35°C to +70°C (-31°F to +158°F) ambient temperature.

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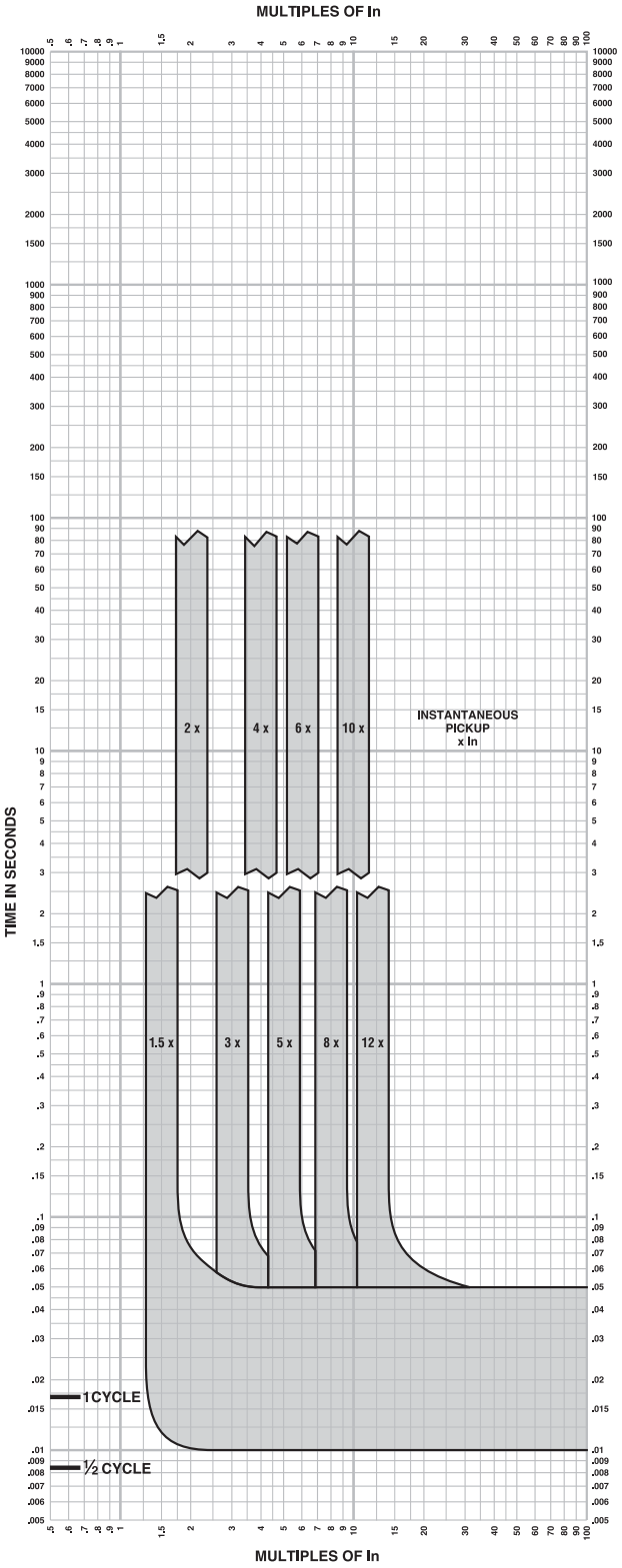
PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 111: Micrologic 3.2, 3.2-W, 3.2S, 3.2S-W, 5.2A, 5.2A-W, 5.2E, 5.2E-W, 6.2A, 6.2A-W, 6.2E, and 6.2E-W Electronic Trip Curve Instantaneous Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.2, 3.2-W, 3.2S, 3.2S-W, 5.2A, 5.2A-W, 5.2E, 5.2E-W, 6.2A, 6.2A-W, 6.2E, and 6.2E-W
Instantaneous Trip Curve
250A J-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. In = Maximum dial setting of Ir.
   250A J-Frame: In = 250A = Max Ir setting

Curves apply from -35°C to +70°C (-31°F to +158°F) ambient temperature.

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Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KV85-2	CB,Loc B,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KV86-2	CB,Loc B,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KV87-2	CB,Loc B,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KV88-2	CB,Loc B,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A
KV89-2	CB,Loc B,90A,3P,600VAC,80%,UL	A043K997	Schneider Electric	HDL36090	Thermal Magnetic	N/A
KV90-2	CB,Loc B,100A,3P,600VAC,80%,UL	A043L024	Schneider Electric	HDL36100	Thermal Magnetic	N/A
KV91-2	CB,Loc B,125A,3P,600VAC,80%,UL	A043K994	Schneider Electric	HDL36125	Thermal Magnetic	N/A
KV92-2	CB,Loc B,150A,3P,600VAC,80%,UL	A043K991	Schneider Electric	HDL36150	Thermal Magnetic	N/A
KV93-2	CB,Loc B,175A,3P,600VAC,80%,UL	A043L619	Schneider Electric	JDL36175	Thermal Magnetic	N/A
KV94-2	CB,Loc B,200A,3P,600VAC,80%,UL	A043L520	Schneider Electric	JDL36200	Thermal Magnetic	N/A
KV95-2	CB,Loc B,225A,3P,600VAC,80%,UL	A043L517	Schneider Electric	JDL36225	Thermal Magnetic	N/A
KV96-2	CB,Loc B,250A,3P,600VAC,80%,UL	A043L510	Schneider Electric	JDL36250	Thermal Magnetic	N/A
KX09-2	Circuit Breaker-250A,Right CB on Right side,3-Pole,UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX14-2	CirBrkr-250A,Left,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX15-2	CirBrkr-250A,Right,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX22-2	Circuit Breaker-250A,Left CB on Right side,3-Pole, UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX26-2	CB,Loc A,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A

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PowerPact H-, J-, and L-Frame Circuit Breakers

Catalog
0611CT1001 R02/16

2015
Class 0611

CONTENTS

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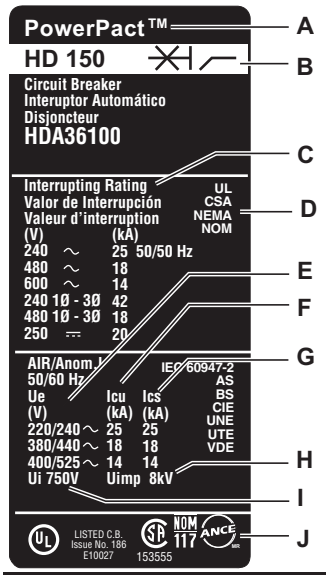
General Characteristics

Faceplate Label



Characteristics indicated on the faceplate label:

A. Circuit breaker type
B. Circuit breaker disconnector symbol
C. Performance levels
D. Standards
E. Ue: Operating voltage per IEC
F. Icu: Ultimate breaking capacity per IEC
G. Ics: Service breaking capacity per IEC
H. Uimp: Rated impulse withstand voltage per IEC
I. Ui: Insulation voltage per IEC
J. Certification marks

NOTE: When the circuit breaker is equipped with an extended rotary handle, the door must be opened to view the faceplate.

Codes and Standards

H-, J-, and L-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards.

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

Table 8: Codes and Standards (Domestic)

PowerPact H-, J-, and L-Frame Circuit Breakers	H-, J-, and L-Frame Switches	PowerPact H-, J-, and L-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 508
IEC 60947-2	IEC 60947-3	IEC 60947-2
CSA C22.2 No. 5[2]	CSA C22.2 No. 5[4]	CSA C22.2 No. 14
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Marking
CCC	CE Marking	
CE Marking		

1 PowerPact H- and J-frame circuit breakers are in UL File E10027. PowerPact L-frame circuit breakers are in UL File E63335.

2 PowerPact H- and J-frame circuit breakers are in CSA File LR40970. PowerPact L-frame circuit breakers are in CSA File 69561.

3 PowerPact H- and J-frame switches are in UL File E87159.

4 PowerPact H- and J-frame switches are in CSA File LR32390.

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H- and J-Frame Catalog Numbers

Unit-Mount Circuit Breaker Catalog Numbers

Table 18: PowerPact H-Frame 150 A Unit-Mount[1] Thermal-Magnetic Circuit Breakers (600 Vac, 250 Vdc) with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Current Rating at 104°F (40°C)	Fixed AC Magnetic Trip		Interrupting Rating							
			D		G		J[2]		L[2]	
	Hold	Trip	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated
H-Frame, 150 A, Two-Pole, 600 Vac 50/60 Hz, 250 Vdc[3]										
15 A	350 A	750 A	HDL26015	HDL26015C	HGL26015	HGL26015C	HJL26015	HJL26015C	HLL26015	HLL26015C
20 A	350 A	750 A	HDL26020	HDL26020C	HGL26020	HGL26020C	HJL26020	HJL26020C	HLL26020	HLL26020C
25 A	350 A	750 A	HDL26025	HDL26025C	HGL26025	HGL26025C	HJL26025	HJL26025C	HLL26025	HLL26025C
30 A	350 A	750 A	HDL26030	HDL26030C	HGL26030	HGL26030C	HJL26030	HJL26030C	HLL26030	HLL26030C
35 A	400 A	850 A	HDL26035	HDL26035C	HGL26035	HGL26035C	HJL26035	HJL26035C	HLL26035	HLL26035C
40 A	400 A	850 A	HDL26040	HDL26040C	HGL26040	HGL26040C	HJL26040	HJL26040C	HLL26040	HLL26040C
45 A	400 A	850 A	HDL26045	HDL26045C	HGL26045	HGL26045C	HJL26045	HJL26045C	HLL26045	HLL26045C
50 A	400 A	850 A	HDL26050	HDL26050C	HGL26050	HGL26050C	HJL26050	HJL26050C	HLL26050	HLL26050C
60 A	800 A	1450 A	HDL26060	HDL26060C	HGL26060	HGL26060C	HJL26060	HJL26060C	HLL26060	HLL26060C
70 A	800 A	1450 A	HDL26070	HDL26070C	HGL26070	HGL26070C	HJL26070	HJL26070C	HLL26070	HLL26070C
80 A	800 A	1450 A	HDL26080	HDL26080C	HGL26080	HGL26080C	HJL26080	HJL26080C	HLL26080	HLL26080C
90 A	800 A	1450 A	HDL26090	HDL26090C	HGL26090	HGL26090C	HJL26090	HJL26090C	HLL26090	HLL26090C
100 A	900 A	1700 A	HDL26100	HDL26100C	HGL26100	HGL26100C	HJL26100	HJL26100C	HLL26100	HLL26100C
110 A	900 A	1700 A	HDL26110	HDL26110C	HGL26110	HGL26110C	HJL26110	HJL26110C	HLL26110	HLL26110C
125 A	900 A	1700 A	HDL26125	HDL26125C	HGL26125	HGL26125C	HJL26125	HJL26125C	HLL26125	HLL26125C
150 A	900 A	1700 A	HDL26150	HDL26150C	HGL26150	HGL26150C	HJL26150	HJL26150C	HLL26150	HLL26150C
H-Frame, 150 A, Three-Pole, 600 Vac 50/60 Hz, 250 Vdc										
15 A	350 A	750 A	HDL36015	HDL36015C	HGL36015	HGL36015C	HJL36015	HJL36015C	HLL36015	HLL36015C
20 A	350 A	750 A	HDL36020	HDL36020C	HGL36020	HGL36020C	HJL36020	HJL36020C	HLL36020	HLL36020C
25 A	350 A	750 A	HDL36025	HDL36025C	HGL36025	HGL36025C	HJL36025	HJL36025C	HLL36025	HLL36025C
30 A	350 A	750 A	HDL36030	HDL36030C	HGL36030	HGL36030C	HJL36030	HJL36030C	HLL36030	HLL36030C
35 A	400 A	850 A	HDL36035	HDL36035C	HGL36035	HGL36035C	HJL36035	HJL36035C	HLL36035	HLL36035C
40 A	400 A	850 A	HDL36040	HDL36040C	HGL36040	HGL36040C	HJL36040	HJL36040C	HLL36040	HLL36040C
45 A	400 A	850 A	HDL36045	HDL36045C	HGL36045	HGL36045C	HJL36045	HJL36045C	HLL36045	HLL36045C
50 A	400 A	850 A	HDL36050	HDL36050C	HGL36050	HGL36050C	HJL36050	HJL36050C	HLL36050	HLL36050C
60 A	800 A	1450 A	HDL36060	HDL36060C	HGL36060	HGL36060C	HJL36060	HJL36060C	HLL36060	HLL36060C
70 A	800 A	1450 A	HDL36070	HDL36070C	HGL36070	HGL36070C	HJL36070	HJL36070C	HLL36070	HLL36070C
80 A	800 A	1450 A	HDL36080	HDL36080C	HGL36080	HGL36080C	HJL36080	HJL36080C	HLL36080	HLL36080C
90 A	800 A	1450 A	HDL36090	HDL36090C	HGL36090	HGL36090C	HJL36090	HJL36090C	HLL36090	HLL36090C
100 A	900 A	1700 A	HDL36100	HDL36100C	HGL36100	HGL36100C	HJL36100	HJL36100C	HLL36100	HLL36100C
110 A	900 A	1700 A	HDL36110	HDL36110C	HGL36110	HGL36110C	HJL36110	HJL36110C	HLL36110	HLL36110C
125 A	900 A	1700 A	HDL36125	HDL36125C	HGL36125	HGL36125C	HJL36125	HJL36125C	HLL36125	HLL36125C
150 A	900 A	1700 A	HDL36150	HDL36150C	HGL36150	HGL36150C	HJL36150	HJL36150C	HLL36150	HLL36150C

1 Standard lug kit: AL150HD. Terminal wire range: 14–3/0 AWG Al or Cu.

2 UL Listed/CSA Certified as current-limiting circuit breakers.

3 HD and HG circuit breakers are true two-pole construction.

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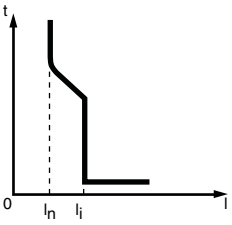
Protection of Distribution Systems

Thermal-Magnetic Trip Units

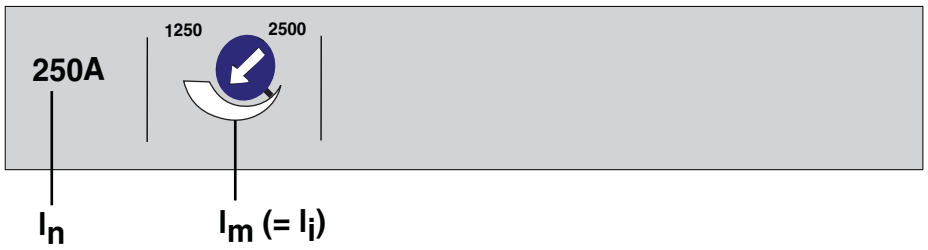
TM thermal-magnetic trip units can be used on PowerPact H and J-frame circuit breakers with interrupting levels D/G/J/L. Thermal-magnetic trip units are available in factory sealed or field-interchangeable constructions.

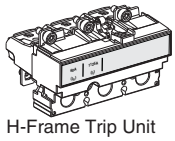


H-Frame Trip Curve

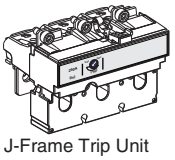
(I_n) Fixed threshold thermal protection against overload

(I_i) **Fixed** threshold instantaneous protection against short circuits





H-Frame Trip Unit



J-Frame Trip Unit

Table 63: H-Frame and J-Frame Three-Pole Field-Installable Thermal-Magnetic Trip Unit

15–60 A H-Frame		70–150 A H-Frame		150–250 A J-Frame	
Amperage	**Cat. No.**	**Amperage**	**Cat. No.**	**Amperage**	**Cat. No.**
15 A	**HT3015**	70 A	**HT3070**	150 A	**JT3150**
20 A	**HT3020**	80 A	**HT3080**	175 A	**JT3175**
25 A	**HT3025**	90 A	**HT3090**	200 A	**JT3200**
30 A	**HT3030**	100 A	**HT3100**	225 A	**JT3225**
35 A	**HT3035**	110 A	**HT3110**	250 A	**JT3250**
40 A	**HT3040**	125 A	**HT3125**	—	—
45 A	**HT3045**	150 A	**HT3150**	—	—
50 A	**HT3050**	—	—	—	—
60 A	**HT3060**	—	—	—	—

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Table 125: Mechanical Lug Kits for H-Frame and J-Frame Circuit Breakers

	Circuit Breaker Application				Number of Wires Per Lug and Wire Range	Kit Cat. No.	Qty Per Kit
	Standard	Ampere Rating	Optional	Ampere Rating			
Al Lugs for Use with Al or Cu Wire	HD, HG, HJ, HL	15–150 A			(1) 14–3/0 AWG Al or Cu	**AL150HD**	3
	JD, JG, JJ, JL	150–175 A			(1) 4-4/0 AWG Al or Cu	**AL175JD**	3
	JD, JG, JJ, JL	200–250 A	JD, JG, JJ, JL	150–175 A	(1) 3/0–350 kcmil Al or Cu	**AL250JD**	3
Cu Lugs for Use with Cu Wire Only			HD, HG, HJ, HL	15–150 A	(1) 14–2/0 AWG Cu	**CU150HD**	3
			JD, JG, JJ, JL	150–250 A	(1) 1/0–300 kcmil Cu	**CU250JD**	3
Control Wire Terminal for H-frame lug kit						**S37423**	2
Control Wire Terminal for J-frame lug kit						**S37424**	2

Table 126: Mechanical Lug Kits for L-Frame Circuit Breakers[1]

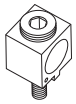
	Circuit Breaker Application				Number of Wires Per Lug and Wire Range[2]	Kit Cat. No.	Qty Per Kit	Type of Terminal Shield[3]
	Ampere Rating	Poles	Unit Mount	I-Line				
Al Lugs for Use with Al or Cu Wire	250	3	X	X	(1) 2 AWG–500 kcmil Al	**AL400L61K3**	3	Short
		4	X	—	(1) 2 AWG–600 kcmil Cu	**AL400L61K4**	4	Medium
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	**AL600LS52K3[4]**	3	Medium
		4	X	—		**AL600LS52K4[4]**	4	Medium
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	**AL600LF52K3[4]**	3	Short
Cu Lugs for Use with Cu Wire Only	250/400	3	X	X	(1) 2 AWG–500 kcmil Al	**CU400L61K3**	3	Short
		4	X	—	(1) 2 AWG–600 kcmil Cu	**CU400L61K4**	4	Medium
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	**CU600LS52K3[4]**	3	Medium
		4	X	—		**CU600LS52K4[4]**	4	Medium
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	**CU600LF52K3[4]**	3	Short

1 For lug pack information, see Figure 36 on page 177.

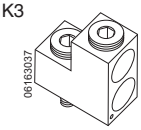
2 For control wire installation, use an 8-32 x 1/4 in. screw (not provided) into tapped control wire hole in lower left hand corner of lug.

3 For terminal shield dimensions, see Figure 36 on page 177.

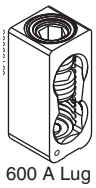
4 Terminal shields are included in mechanical lug kits.



400 A Lug
AL400L6IK3



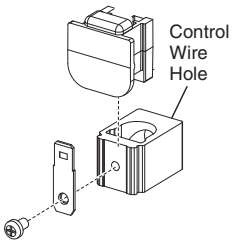
600 A Lug
AL600LS52K3



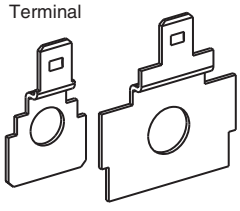
600 A Lug
AL600LF52K3

Voltage Takeoff (Control Wire Terminals) for Mechanical Lugs and Terminal Nuts

Mechanical Lug Control Wire Terminal



Busbar Control Wire Terminal



Powerpact H- and J-Frame mechanical lugs may be equipped with a separate control wire termination. The kit is available factory installed or as a field installable kit. The adaptor is secured underneath the lug and has a tab extension suitable for attachment of a 0.250 inch slip-on connector.

All L-frame mechanical lugs are pre-tapped for control wires. For control wire installation, use an 8-32 x 1/4 in. screw (not provided) into tapped control wire hole in lower left hand corner of the lug.

Fully insulated type connectors must be used to prevent live parts from extending into the wiring gutter area.

Table 127: Control Wire Terminals

Description	Frame	Cat. No.	Qty Per Kit
Mechanical Lugs			
Control Wire Terminal for H-Frame Lugs	HD/HG/HJ/HL	**S37423**	2
Control Wire Terminal for J-Frame Lugs	JD/JG/JJ/JL	**S37424**	2
Busbar Connection			
Control Wire Terminal for H-Frame Terminal Nut	HD/HG/HJ/HL	**S37429**	2
Control Wire Terminal for J-Frame Terminal Nut	JD/JG/JJ/JL	**S37430**	2

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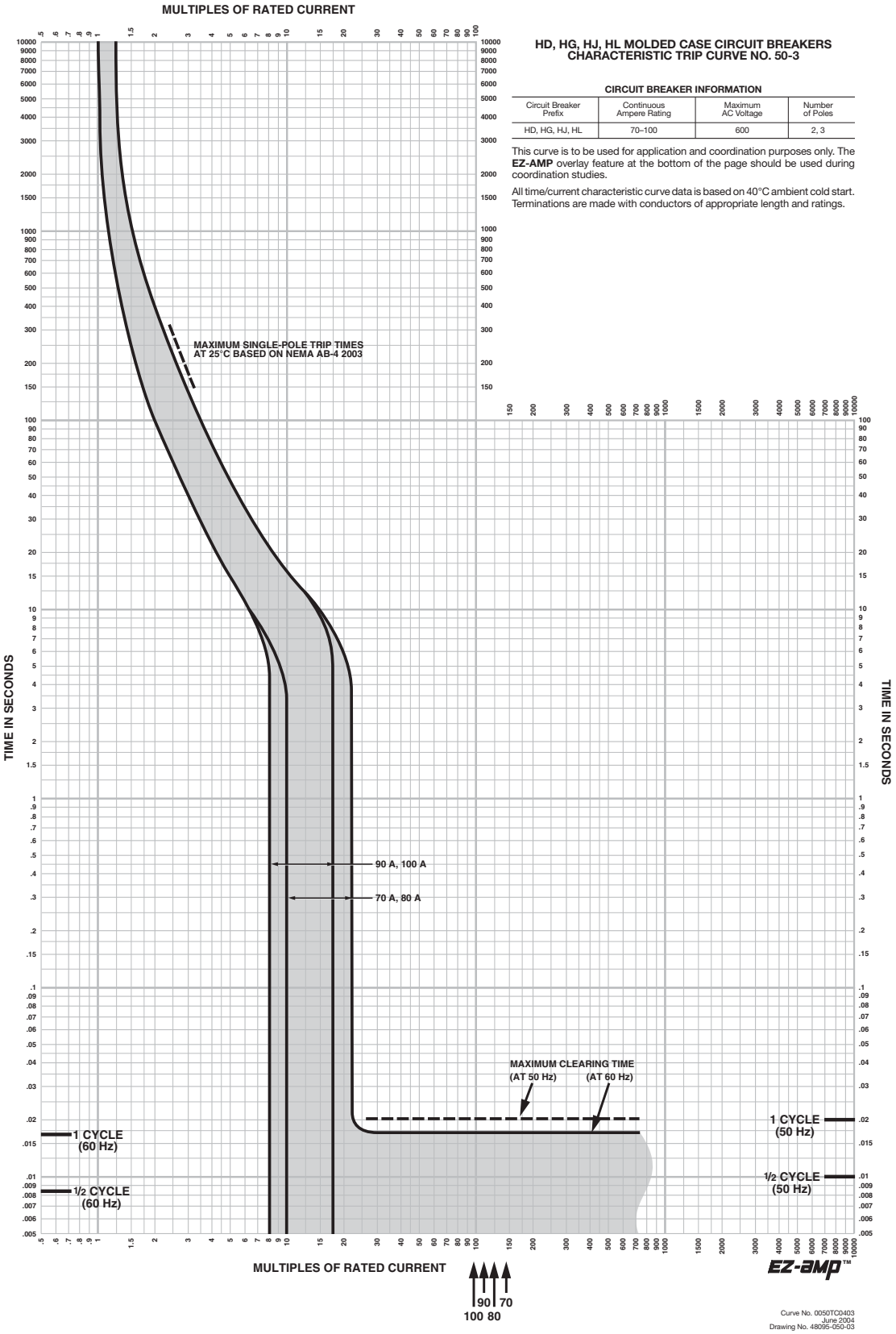
PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 72: H-Frame 70–100 A (HD, HG, HJ, and HL) Thermal-Magnetic Trip



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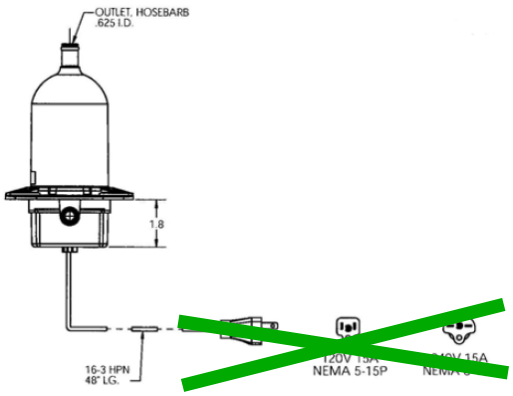
Specification Sheet

Coolant Heaters

Control thermostat range ON @ 80º F (27º C)
OFF @ 100º F (38º C)

Control thermostat tolerance ± 7.0º F (4º C) on close (ON)
± 5.0º F (3º C) on open (OFF)

Approvals UL listed
CSA compliant
CE compliant



Coolant heater kit	Critical component	Voltage	Wattage	Heater amps	Instruction sheet
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0541-0802-01	0333-0588-01	120	1000	8.3	000G-0539
0333-0548	0333-0588-01	120	1000	8.3	000G-0190
0179-4755-03	0333-0588-01	120	1000	8.3	000C-0703
0179-4938-03	0333-0588-01	120	1000	8.3	000G-0714
0333-0632-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0406
0333-0632-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0406
0541-0802-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0539
0333-0549	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0190
0179-4755-04	0333-0588-02	208/240	750/1000	3.6/4.16	000C-0703
0179-4938-04	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0714
0300-5420-01	0333-0588-03	120	1500	12.5	000G-0447
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0630-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0179-4902-03	0333-0588-03	120	1500	12.5	
0179-4908-03	0333-0588-03	120	1500	12.5	
0333-0713-03	0333-0588-03	120	1500	12.5	000G-0664
0300-5420-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0447
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0300-5422-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0453
0300-5422-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0453
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0179-4902-04	0333-0588-04	208/240	1125/1500	5.4/6.25	
0333-0713-04	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0664

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Specification sheet

Dual wall sub-base diesel fuel tanks -

10-200 kW generator sets

Description

Cummins® offers two series of fuel tanks (basic series and regional series) for the 10~125 kW diesel generator sets. The “basic” series of fuel tanks provide economical solutions for areas with no or minimal local/regional code requirements on diesel fuel tanks. The footprint of “basic” tanks matches the generator set’s footprint. The “regional” series of fuel tanks provide flexible and upgradable solutions for areas with extensive local/regional code requirements on diesel fuel tanks. The footprint of the “regional” series of fuel tanks extends beyond the generator set to allow room for installation of optional features at factory or accessories in the field for meeting local/regional code requirements or customer specification on diesel fuel tanks. All fuel tanks and optional features are compatible with factory installed enclosures.

These tanks are constructed of heavy gauge steel and include an internally reinforced baffle structure for supporting the generator set. The fuel tank design features fewer seams and welds for better corrosion resistance performance.

These tanks are pre-treated with a conversion coating and then finished with a textured powder paint. The paint has superior UV and chemical resistance with best-in-class adhesion, flexibility, and durability to resist chipping and substrate corrosion. Both interior compartments are treated with a rust preventative for extended corrosion protection.

These tanks are UL and ULC Listed as secondary containment generator base tanks. Inner and outer containments are leak checked per UL and ULC testing procedures to ensure their integrity.

These fuel tanks are offered in various sizes to satisfy different fuel capacities requirements.

Compatible generator set model

Engine	D1703M	V2203M	4BT3.3-G5	4BTAA3.3-G7	QSB5-G5	QSB7-G5
Generator set model names	C10D6	C20D6	C25D6	C50D6	C50D6C	C125D6D
	C15D6		C30D6	C60D6	C60D6C	C150D6D
			C35D6		C80D6C	C175D6D
			C40D6		C100D6C	C200D6D
					C125D6C	

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Regional fuel tanks

Standard features:

UL 142 and ULC-S601 listed - Minimum 110% secondary IBC 2012 and 2015 certified - All optional features are seismically certified with this range of tanks and generator sets. Requires factory-installed 2 ft vent extensions or higher.

UL 142 & ULC-S601 listed - Minimum 125% secondary containment capacity.

NFPA & IFC - Capable of meeting NFPA 30, NFPA 110, and IFC codes with available factory-installed optional features.

Emergency pressure relief vents - Ensure adequate ventilation of the primary and secondary tank compartments under extreme temperature and emergency conditions.

Normal atmospheric vent - "Mushroom" style vent ensures adequate venting of the primary tank during fill, generator set running, and temperature variations. Raised above fuel fill.

Raised fuel fill - Includes lockable sealed fuel cap.

Lifting eyes - Allow lifting of fuel tank with generator set installed.

Optional features:

Secondary containment basin switch (rupture switch) - Activates a warning in the event of a primary tank leak. Side Mounted.

Low fuel level switch - Activates a warning when 40% of the fuel is left in the tank.

Fuel level gauge - Provides direct reading of fuel level. Top mounted.

Electric fuel level sender with gauge - Allows remote electrical monitoring of fuel tank level. Flying leads for customer connection.

Tank to foundation clearance - 2-inch bolt-thru risers allow visual inspection under tank including rodent barrier.

Spill containment box for fuel fill - 5 gallon capacity with integral drain (to tank). Lockable lid.

Overfill prevention valve - Shuts off fuel flow during filling at approximately 95% full*. Includes fill down tube, as needed, to terminate within 6" of the bottom of the fuel tank. Uses a 2 inch type "F" cam lock adapter for filling.

High fuel switch - Activates at 90% of full fuel level. Flying leads for customer connection.

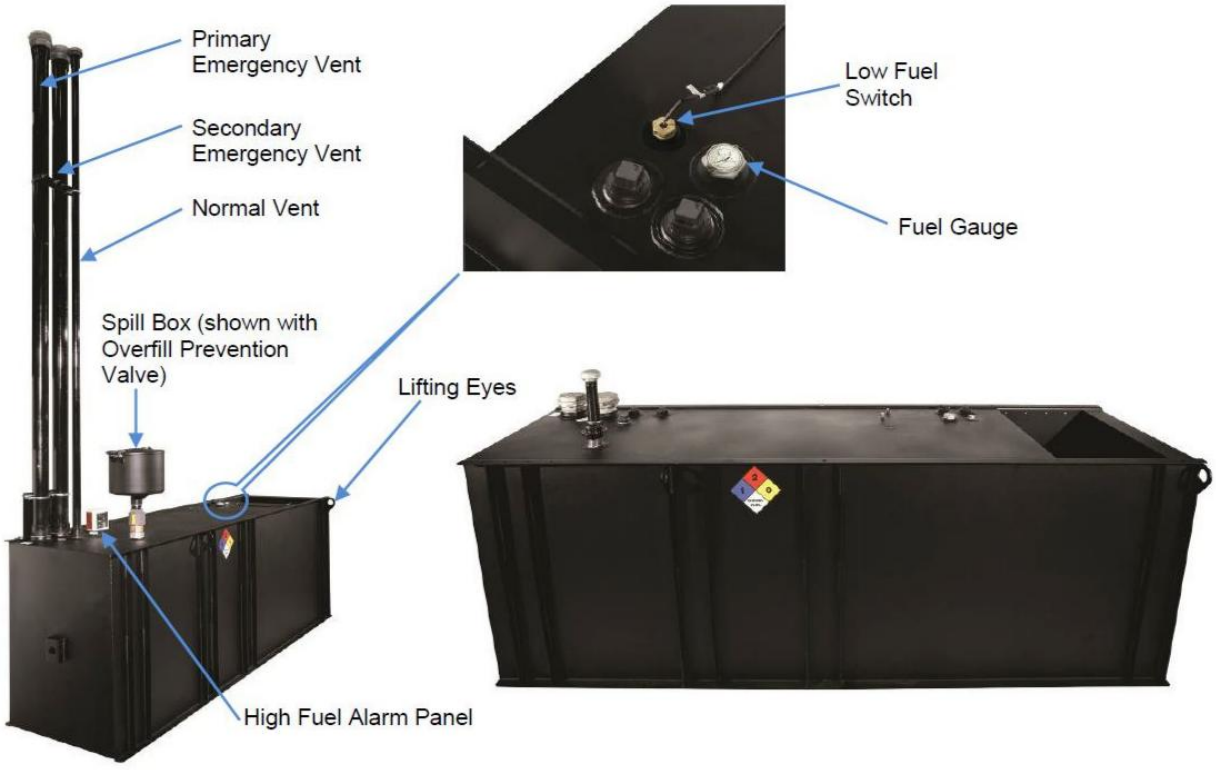
High fuel alarm panel - Provides audible & visual alarm when fuel level reaches 90% of full fuel level.

Fill drop tube - Terminates fuel fill location within 6" of the bottom of the fuel tank.

Vent extensions - Terminate normal and emergency vents (both primary and secondary) a minimum of 12 ft above the bottom of tank.

Seismic vent extensions - 2 ft normal and emergency (both primary & secondary) extensions to meet IBC/OSHPD seismic requirements.

* The OFPV inherently shuts off fuel at approximately 2" below the top of the fuel tank. Some tanks will shut off below this 95% fill level.



*Picture is for reference only. See outline drawing for tank specific information by model.

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Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
10	C10 D6	D1703M	1.12	C301-2	24	87.6 x 34 x 15	510	74	66	56
				C303-2	48	87.6 x 34 x 15	510	74	66	56
				C305-2	72	87.6 x 34 x 23	723	132	118	107
				C307-2	96	87.6 x 34 x 23	723	132	118	107
15	C15 D6	D1703M	1.38	C301-2	24	87.6 x 34 x 15	510	74	53	45
				C303-2	48	87.6 x 34 x 15	510	74	53	45
				C305-2	72	87.6 x 34 x 23	723	132	95	86
				C307-2	96	87.6 x 34 x 32	962	195	141	132
20	C20 D6	V2203M	1.81	C301-2	24	87.6 x 34 x 15	510	74	41	35
				C303-2	48	87.6 x 34 x 23	723	132	73	66
				C305-2	72	87.6 x 34 x 32	962	195	108	101
				C307-2	96	87.6 x 34 x 32	962	195	108	101
25	C25 D6	4BT3.3-G5	2.42	C301-2	24	121 x 34 x 10.5	514	74	31	25
				C303-2	48	121 x 34 x 16.2	686	132	54	47
				C305-2	72	121 x 34 x 22.1	879	195	80	73
				C307-2	96	121 x 34 x 29.5	1120	263	109	101
30	C30 D6	4BT3.3-G5	2.81	C301-2	24	121 x 34 x 10.5	514	74	26	21
				C303-2	48	121 x 34 x 22.1	879	195	69	63
				C305-2	72	121 x 34 x 29.5	1120	263	94	87
				C307-2	96	121 x 34 x 42.0	1461	389	138	132
35	C35 D6	4BT3.3-G5	3.16	C301-2	24	121 x 34 x 16.2	686	132	42	36
				C303-2	48	121 x 34 x 22.1	879	195	62	56
				C305-2	72	121 x 34 x 29.5	1120	263	83	77
				C307-2	96	121 x 34 x 42.0	1461	389	123	117
40	C40 D6	4BT3.3-G5	3.66	C301-2	24	121 x 34 x 16.2	686	132	36	31
				C303-2	48	121 x 34 x 22.1	879	195	53	48
				C305-2	72	121 x 34 x 42.0	1461	389	106	101
				C307-2	96	121 x 34 x 42.0	1461	389	106	101
50	C50 D6	4BTAA3.3-G7	4.25	C301-2	24	121 x 34 x 16.2	686	132	31	27
				C303-2	48	121 x 34 x 29.5	1120	263	62	58
				C305-2	72	121 x 34 x 42.0	1461	389	92	87
60	C60 D6	4BTAA3.3-G7	5.04	C301-2	24	121 x 34 x 16.2	686	132	26	23
				C303-2	48	121 x 34 x 29.5	1120	263	52	49
				C305-2	72	121 x 34 x 42.0	1461	389	77	73
50	C50D6C	QSB5-G5	5.30	C301-2	24	154 x 40 x 22	1388	250	47	45
				C303-2	48	154 x 40 x 32	1657	425	80	76
				C305-2	72	154 x 40 x 32	1657	425	80	76
				C307-2	96	154 x 40 x 46	2096	625	110	112
60	C60D6C	QSB5-G5	6.10	C301-2	24	154 x 40 x 22	1388	250	[redacted]	39
				C303-2	48	154 x 40 x 32	1657	425	70	80
				C305-2	72	154 x 40 x 46	2096	625	102	97
				C307-2	96	154 x 40 x 46	2096	625	102	97
80	C80D6C	QSB5-G5	7.30	C301-2	24	154 x 40 x 22	1388	250	34	33
				C303-2	48	154 x 40 x 32	1657	425	58	55
				C305-2	72	154 x 40 x 46	2096	625	85	81
100	C100D6C	QSB5-G5	8.90	C301-2	24	154 x 40 x 22	1388	250	28	27
				C303-2	48	154 x 40 x 32	1657	425	48	45
				C305-2	72	154 x 40 x 46	2096	625	70	66
125	C125D6C	QSB5-G6	10.30	C301-2	24	154 x 40 x 22	1388	250	24	23
				C303-2	48	154 x 40 x 46	2096	625	60	58

* All weights are approximate.

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Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
125	C125D6D	QSB7-G5	10.1	C301-2	24	180x40x21	1477	351	34	30
				C303-2	48	180x40x42	2302	737	72	69
				C305-2	72	180x40x42	2302	737	72	69
				C307-2	96	180x65.5x35.3	3552	1055	104	98
150	C150D6D		11.7	C301-2	24	180x40x21	1477	351	30	26
				C303-2	48	180x40x42	2302	737	63	59
				C305-2	72	180x65.5x35.3	3552	1055	90	84
175	C175D6D		13.3	C301-2	24	180x40x21	1477	351	26	23
				C303-2	48	180x40x42	2302	737	55	52
				C305-2	72	180x65.5x35.3	3552	1055	79	74
200	C200D6D		14.9	C301-2	24	180x40x21	1477	351	24	21
				C303-2	48	180x40x42	2302	737	49	47
				C305-2	72	180x65.5x35.3	3552	1055	72	66

Certifications/standards/codes

UL 142 Listed - Cummins dual wall sub-base tanks are UL Listed and constructed in accordance with Underwriters Laboratories Standard UL 142 “steel aboveground tanks for flammable and combustible liquids,” as a “secondary containment generator base tank”

NFPA - Cummins tanks are built in accordance with all applicable NFPA codes:

- NFPA 30 - Flammable and Combustible Liquids code
- NFPA 37 - Standard for Installation and use of Stationary Combustible Engine and Gas Turbines
- NFPA 110 - Standard for Emergency and Standby Power Systems

ISO9001 - This product was designed and manufactured in facilities certified to ISO9001.

ULC - Cummins tanks are built in accordance with all applicable ULC codes

For more information contact your local Cummins distributor or visit power.cummins.com

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NAAC-5868-EN PD00001466 (06/23)

Sound data
C60D6C
QSB5-G13 60Hz
Diesel Generator Set

Sound Pressure Level @ 7 meters, dB(A)

See notes 2,5,7-11 listed below

Configuration	Exhaust system	Position (Note 1)								8 Position Average
		1	2	3	4	5	6	7	8	
Standard – Unhoused	Infinite Exhaust	81.2	80.8	81.2	80.8	81.2	80.8	81.2	80.8	81.2
F216-2 Weather Protective Aluminium	Mounted	78.6	79.9	78.6	81.8	80.5	80.9	79.7	79.4	80.1
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	78.4	75.2	70.7	72.8	72.5	72.9	72	74.9	74.3
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	71.3	71	68.4	70.3	70.2	70.6	70.3	71.1	70.5

Sound Power Level, dB(A)

See notes 2-4, 7 and 8 listed below

Configuration		Octave Band Center Frequency (Hz)										Overall Sound Power Level
		31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	53.8	79.2	87.9	92.3	100.4	102.0	101.1	97.2	93.1	88.0	107.0
F216-2 Weather Protective Aluminium	Mounted	55.2	86.0	94.5	96.0	100.5	101.9	100.1	96.9	92.1	82.6	107.0
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	59.6	84.6	88.0	90.1	95.6	96.7	94.9	91.9	87.5	79.6	101.9
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	57.1	84.8	87.7	88.4	92.6	91.7	89.6	87.1	82.9	72.4	98.2

Exhaust Sound Power Level, dB(A)

See notes 4,6 and 9 listed below

Open Exhaust (No Muffler) @ Rated Load	Octave Band Center Frequency (Hz)									Overall Sound Power Level
	31.5	63	125	250	500	1000	2000	4000	8000	
	56	82	96	102	108	111	112	111	109	118

Note:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, ANSI S1.13, ANSI S12.1 and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa.
6. Reference Sound Power Level is 1 pW (10-12 Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Sound levels are subject to instrumentation, measurement, installation, and manufacturing variability

Sound data
C60D6C
QSB5-G13 60Hz
Diesel Generator Set

10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosuresinstalled over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.

Specification Sheet

Battery and Accessories

Battery Specifications

Battery Part Number	Group Size	CCA	Reserve Capacity	Battery	Voltage	Length	Width	Height	Ship Weight lbs.	Quarts Electrolyte
0416-1330	24XL	810	146	Wet	12	10.3	9.0	6.6	43	5.9
0416-1051	26	530	80	Wet	12	8.2	6.8	8.1	31	3.7
0416-0796	31	725	150	Wet	12	12.7	6.0	9.3	62	4.2
0416-0980	31	1000	185	Wet	12	13.0	6.8	9.5	59	4.2
A045P632	34	850	NA	Wet	12	10.3	6.6	8.0	NA	NA
0416-1291	34	800	100	Sealed	12	10.0	6.9	7.9	38	4.0
A030Y976	4D	1050	290	Wet	12	20.7	8.7	10.0	100	NA
0416-0439	8D	1400	430	Dry	12	20.8	10.7	9.5	110	16.0
0416-1105	8D	1400	430	Wet	12	20.8	10.8	9.5	125	16.0
~~A062X621~~	~~24~~	~~800~~	~~135~~	~~Wet~~	~~12~~	~~10.1~~	~~6.8~~	~~8.7~~	~~42~~	N/A
A062X622	34	800	120	Wet	12	10.2	6.9	7.9	38	N/A

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Specification Sheet

Battery Charger-6 Amp

A045D925 60Hz/50Hz

Description

Cummins® fully automatic battery chargers are designed to both recharge your batteries, and extend your battery's life in applications where it is stored for long periods of time. This charger can handle poor power quality, exposure to extreme weather and rough handling.

To maximize battery life, a 3-stage charging cycle is implemented. The three charging stages are bulk stage, absorption stage and maintenance stage. During the bulk stage, the charger uses its full amp output to do the heaviest charging, quickly bringing your battery to about 75% of capacity. In the absorption stage, the current slows, adjusting for maximum charging efficiency while it gently tops off the battery to about 98% of capacity.

During the maintenance stage, a lower, closely-regulated, constant voltage is applied to maintain full charge and prevent discharge.

Unlike some "trickle chargers," the float charger won't apply more current than necessary to maintain full charge. Batteries can be connected indefinitely, without harm; in fact, the float charge extends battery life.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Lightweight and Silent – Lighter than transformer types, completely silent but still provides full output when overloaded outlets drop AC voltage below the normal 115V.

Monitoring – Status LED indicators are provided to show the condition or charging status of the battery. When the red LED is on, it indicates that the battery is discharged and is recharging at the 'BULK' rate. When both the red and green LEDs are on, the battery is charging at the 'midrange' rate. When the green LED is on, the battery is 90% charged and ready for use.

Construction – Made using epoxy-potted cases making it the ultimate in durability, completely waterproof and able to withstand numerous caustic chemicals and gases, as well as being shockproof.

Fault Indication – The charger senses and indicates the following fault conditions: Defective or damaged cells, under-voltage at the battery, battery drawing more current than charger can replace, loss of power or extremely low AC voltage at the charger, other battery fault conditions and charger failure.

Compatibility – Works with Sealed Lead Acid (SLA), Absorbed Glass Mat (AGM) and Gel type batteries.

Low Electromagnetic and Radio

Frequency Interference – This product meets FCC class B for conducted and radiated emissions.

Listed – This product is UL listed according to the UL 1236 Standard.

Warranty – This product has a two-year warranty

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Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12 VDC
	Float voltage – 12 V batteries	13.0-13.6 VDC at 0-2 amps
	Maximum output current	6 A @ 12 VDC nom
Input:	Voltage AC	115, 208, 240 ±10%, 90-135
	Frequency	60 Hz ±5%
Battery:	Maximum battery size	150 Amp Hours
	Maximum recharge time	20 hours
Approximate net weight		4 lbs. (1.81 Kg)
Approximate dimensions: height x width x depth-in(mm)		2.25 x 6.4 x 3.5 (57 x 162 x 89)
Ambient temperature operation: At full rated output		-40°F to 122 °F (-40 °C to 50 °C)

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

Warning: For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.

For more information contact your local Cummins distributor or visit power.cummins.com

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Specification Sheet

Alternator Heaters A292 and A293

Alternator Heaters

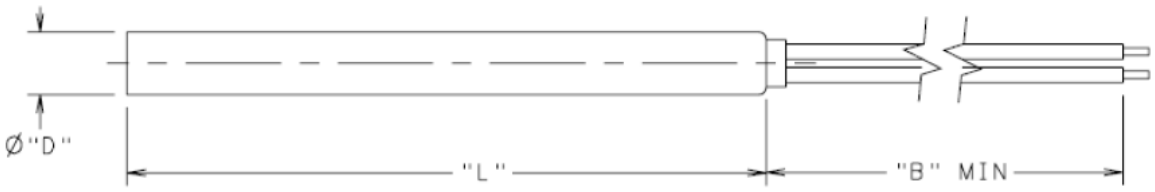
Alternator heaters help prevent corrosive damage of electrical and mechanical components in high humidity environments.

Alternator heater kit	Feature	Corresponding production part	Critical component	Voltage (AC)	Wattage	Instructions
0179-5074-02	A292-2	0179-5074-01	0333-0438-07	120	100	N/A
0300-4434	A292-2	0179-2699-01	0333-0550-01	120	100	000C-0449
0333-0443	A292-2	0179-2285-09	0333-0438-03 (qty 2)	120	150	000C-0437
0333-0444	A293-2	0179-2285-02	0333-0438-04 (qty 2)	240	150	000C-0437
0333-0445	A292-2	0179-2286-01	0333-0438-07	120	100	000C-0437
0333-0445	A292-2	0179-2667-01	0333-0438-07	120	100	000C-0437
0333-0446	A293-2	0179-2286-02	0333-0438-08	240	100	000C-0437
0333-0446	A293-2	0179-2667-02	0333-0438-08	240	100	000C-0437
0333-0447	A292-2	0179-2285-10	0333-0438-05	120	300	000C-0437
0333-0447	A292-2	0179-2285-03	0333-0438-05	120	300	000C-0437
0333-0448	A293-2	0179-2285-04	0333-0438-06	240	300	000C-0437

Component Drawings

Cartridge Heater

Component # 0333-0438-xx



Part #	Ø “D”	Dim “L”	Dim “B”
0333-0438-01	15.8	160	1200
0333-0438-02	15.8	160	1200
0333-0438-03	25.4	160	2200
0333-0438-04	25.4	160	2200
0333-0438-05	25.4	260	2200
0333-0438-06	25.4	260	2200
0333-0438-07	19	134	250
0333-0438-08	19	134	250

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Specification sheet

PowerCommand® input/output expansion module AUX 101 and AUX 102

Description

The PowerCommand AUX 101 input/output module and the AUX 102 input/output expansion module provide up to sixteen (16) relay output and up to twelve (12) discrete/analog inputs for auxiliary control and monitoring of the power system.

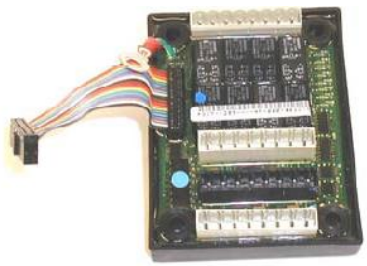
Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

Relay outputs can be used for controlling equipment such as motors, louvers, lamps, fans and pumps. The relays may be configured individually from the genset control operator interface or using InPower™ software.

The AUX 101 and AUX 102 modules are compatible with genset controls supporting a PCCNet network and require a twisted pair connection. This includes the PCC 1301 control.

AUX 101 - Contains eight (8) Form-C relay output sets and eight (8) discrete/analog inputs.

AUX 102 - Easily connects to the AUX 101 to provide an additional eight (8) Form-C relay outputs and (4) additional discrete inputs.



AUX 102 - Expansion

Features

- Up to sixteen (16) configurable Form-C relays provide easy control of system equipment such as lamps, louvers, motors and pumps. LED status of each relay.
- Up to twelve (12) configurable discrete inputs for monitoring equipment status and faults. Equipment status and faults will be annunciated.
- Up to eight (8) analog inputs. Analog inputs can be assigned one of seven preprogrammed functions:
  - Oil temperature
  - Exhaust temperature
  - Fuel level
  - Ambient temperature
  - Alternator RTD
  - Speed bias (for manual paralleling only)
  - Voltage bias (for manual paralleling only)
- Two 5 VDC voltage sources for use with active senders.
- Four programmable current sources for use with resistive senders.
- Two status LEDs:
  - DS1 (green) indicates the AUX 101 is connected to the network and operating normally
  - DS2 (red) indicates the AUX 101 has lost its connection or is not connected to the network
- Device number indicator. Seven segment LED used to uniquely define more than one AUX 101 on the same network.
- May be connected at any point in the PCCNet network.
- Plug-and-play networking - No binding required.
- Pluggable terminal blocks allow easy one-time wiring.
- Less wiring makes installation and system upgrades quick and easy
- PowerCommand controls are supported by a worldwide network of independent distributors who provide parts, service and warranty support.
- UL Listed and labeled; CSA certified; CE and UKCA compliant.

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Specifications

Signal requirements

Network connections: RS485, twisted-pair 78 kbps
Control power: 5-40 VDC
Current

- 200 mA typical at 12 V, no active relay
- 100 mA typical at 24 V, no active relay
- 800 mA at 12 V, all relays active

Terminations for control power accept wire up to 16 ga.

Environment

The AUX 101 and AUX 102 are designed for proper operation in ambient temperatures from -40 °C to +60 °C (-40 °F to +140 °F) and for storage from -40 °C to +80 °C (-40 °F to +176 °F). Modules will operate with humidity up to 95%, non-condensing

Relay ratings (AUX 101)

- Normally closed: 3 A at 250 VAC or 30 VDC
- Normally open: 5 A at 250 VAC or 30 VDC

Relay ratings (AUX 102)

- 2 A at 125 VAC, 2 A at 30 VDC

Input ratings (AUX 101)

- Active low inputs
- Maximum voltage 24 VDC (inputs 1 - 6)
- Maximum voltage 40 VDC (inputs 7 - 8)

Network length

Maximum 1219 m (4000 ft)

Approved wiring

Cat 4 or Cat 5 (stranded)

Configurations

All configurations are stored in the main genset control and are modified from the generator set control HMI or using InPower PC software.

Discrete/analog inputs:

Each AUX 101 input can be configured as discrete or analog. AUX 102 inputs are discrete only. Discrete inputs have the following configuration options:

- Active high or active low
- Event, warning or shutdown
- Programmable text (displayed on genset HMI and InPower software)

Analog inputs have a set of predefined functions and can only be configured on certain module inputs. Below is a list of functions and possible module inputs:

- Input 1 - Voltage bias (-3 to +3 VDC)*
- Input 2 - Speed bias (0 to +5 VDC)*
- Inputs 3 – 6
  - Oil temperature
  - Exhaust temperature
  - Ambient air temperature
  - Fuel level
  - Alternator temperature

Inputs are defaulted to disabled

* Please note that speed and voltage bias interfaces are for manual paralleling only and must not be used with automatic paralleling controls.

Relay outputs

Outputs can be configured to energize on occurrence of any event or fault code supported by the genset control. The relay outputs default to the following:

AUX 101

1 - Low oil pressure
2 - High engine temperature
3 - Charger AC failure
4 - Battery (low, weak, high)
5 - Engine overspeed
6 - Fail-to-start
7 - Not-in-auto
8 - Generator set running

AUX 102

9 - Pre-low oil pressure
10 - Pre-high engine temperature
11 - Low coolant level*
12 - Low fuel level*
13 - Low coolant temperature
14 - Common alarm
15 - Not defined
16 - Not defined

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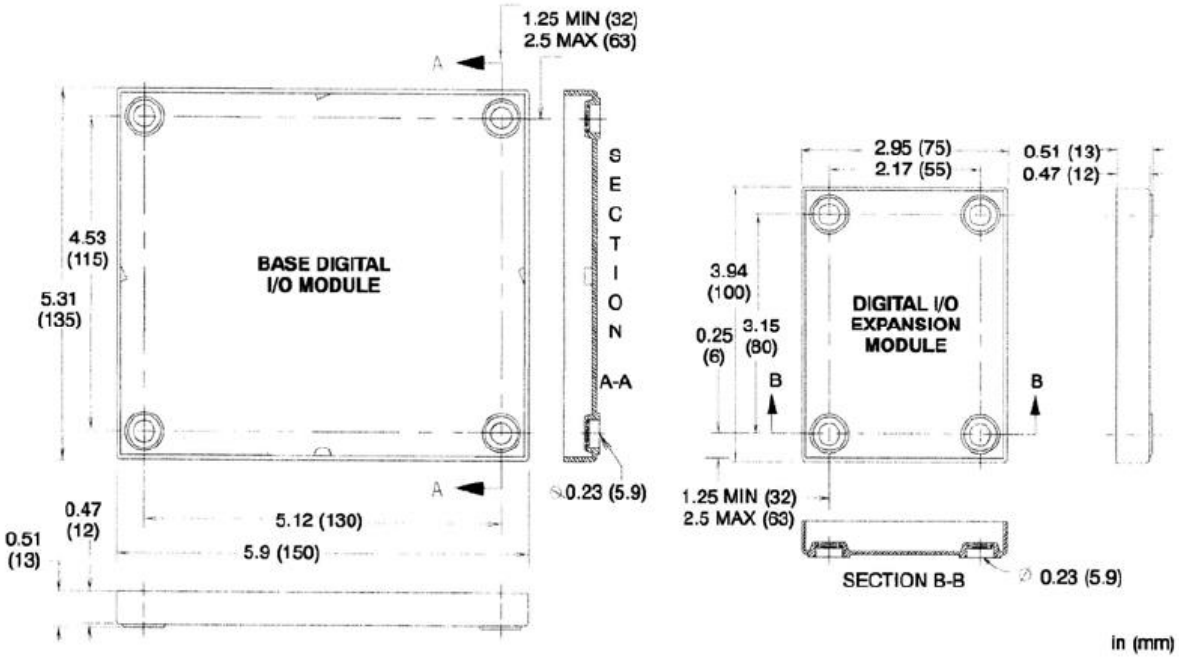
Dimensions



Ordering information

Part number	Description
0541-1291	AUX 101 Digital Input/output Module - Base – PCC 1301
0184-0263	AUX 101 Digital Input/output Module - Base – PCC 1301 on DN and GN model generator sets
0630-3142	AUX 102 Digital Input/output Module wiring diagram - Instruction sheet C693
0541-0772	AUX 102 Digital Input/output Module - Expansion

PCCNet logo

Look for this logo on spec sheets of PCCNet compatible devices.

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

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Specification sheet

PowerCommand® annunciator discrete input or PCCNet

Description

The Universal Annunciator Module provides visual and audible indication of up to 20 separate alarm or status conditions, based on discrete (relay) inputs or network inputs. Each LED can be controlled by either a discrete wire input or by a signal on the PCCNet network sent from an external device, such as a PCC1301 or PCC2100 (version 2.4 or later) control.

In addition to the LEDs, the annunciator can control four custom relays based on signals received over the PCCNet. When one of the annunciator's discrete inputs is activated, the annunciator will broadcast that information over the network. By taking advantage of the network, discrete inputs and custom relays, the annunciator can be used as expanded I/O for a genset controller.

Easily installed in a location to give immediate notification of an alarm or warning status. Designed to give operating/monitoring personnel quick-glance status information. The module directly senses battery voltage to provide green/yellow/red alarm and status information for that parameter.

Genset controller complies with NFPA level two requirements when used with the display but without the annunciator panel. When used with the annunciator it meets NFPA level one requirements (Emergency and Standby power systems). The annunciator module can also be used for monitoring of transfer switch or other equipment status.

Features

- Visual and audible warnings of up to 20 separate alarm or status conditions.
- LEDs can be controlled either via PCCNet or discrete input.
- Status of discrete inputs is broadcast on network.
- Four custom relays can be controlled over the PCCNet network.
- Configurable LED color (red, yellow or green) and selectable horn operation allows maximum flexibility.
- Standard NFPA 110 label, field configurable for other alarm status and conditions.
- Each audible alarm is annunciated, regardless of the number of existing alarm conditions displayed.
- Sealed membrane panel design provides environmental protection for internal components and is easy to clean.
- Configurable for negative (ground) input or positive input.
- Integral DC voltage sensing.
- Flush or surface mount provisions.
- UL Listed and labeled; CSA certified; CE and UKCA marked.

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Specifications

Signal requirements

Positive - Input impedance is 1.82 kOhms to ground; maximum input voltage = 31 VDC.

Negative - Input impedance is 1.82 kOhms to Bat+: inputs are at Bat+ level when open.

Sink/source current threshold for detection - 150 Ua minimum, 3 mA maximum.

Typical conductor size: 16 ga for 304.8 m (1000 ft)

Max conductor size for terminal: 12 ga

Relay outputs

0.2 A at 125 VAC and 1 A at 30 VDC

Network connections

Use Belden 9729 two pair, stranded, shielded 24 AWG twisted pair cable for all PCCNet connections. Total network length cannot exceed 1219 m (4000 ft). Up to 20 nodes can be connected to the network.

Note: Any communications wire connected to the generator set should be stranded cable.

Power

Maximum consumption: 15 watts

Battery voltage

Functional range - Audible and visual conditions operational from 6.5 to 31 VDC.

Low voltage setting - 12.0 VDC for 12 Volt nominal systems; 24.0 for 24 Volt nominal systems.

High voltage setting - 16.0 Volt for 12 Volt nominal systems; 32.0 Volt for 24 Volt nominal systems.

Alarm horn

Sound level: 90 dB at 30 cm

Physical

Weight (with enclosure): 1.4 kg (3.0 lbs)

Temperature

-20 °C to +70 °C (-4 °F to +158 °F)

Humidity

10% to 95% RH (non-condensing)

Default lamp configurations

Can be configured for current NFPA 110 standard or as a replacement for Legacy (pre-2001) NFPA 110 annunciator (300-4510 or 300 4511)

		NFPA 110		
Lamp	**Description**	**Color**	**Horn**	**Flash**
DS1	Customer fault 1	Green	No	No
DS2	Customer fault 2	Amber	No	No
DS3	Customer fault 3	Red	No	No
DS4	Genset supplying load	Amber	No	No
DS5	Charger AC failure	Amber	Yes	No
DS6	Low coolant level	Amber	Yes	No
DS7	Low fuel level	Red	Yes	No
DS8	Check generator set	Amber	No	No
DS9	Not in auto	Red	Yes	Yes
DS10	Generator set running	Amber	No	No
DS11	High battery voltage	Amber	Yes	No
DS12	Low battery voltage	Red	Yes	No
DS13	Weak battery	Red	Yes	No
DS14	Fail to start	Red	Yes	No
DS15	Low coolant temp	Red	Yes	No
DS16	Pre-high engine temp	Amber	Yes	No
DS17	High engine temp	Red	Yes	No
DS18	Pre-low oil pressure	Red	Yes	No
DS19	Low oil pressure	Red	Yes	No
DS20	Overspeed	Red	Yes	No

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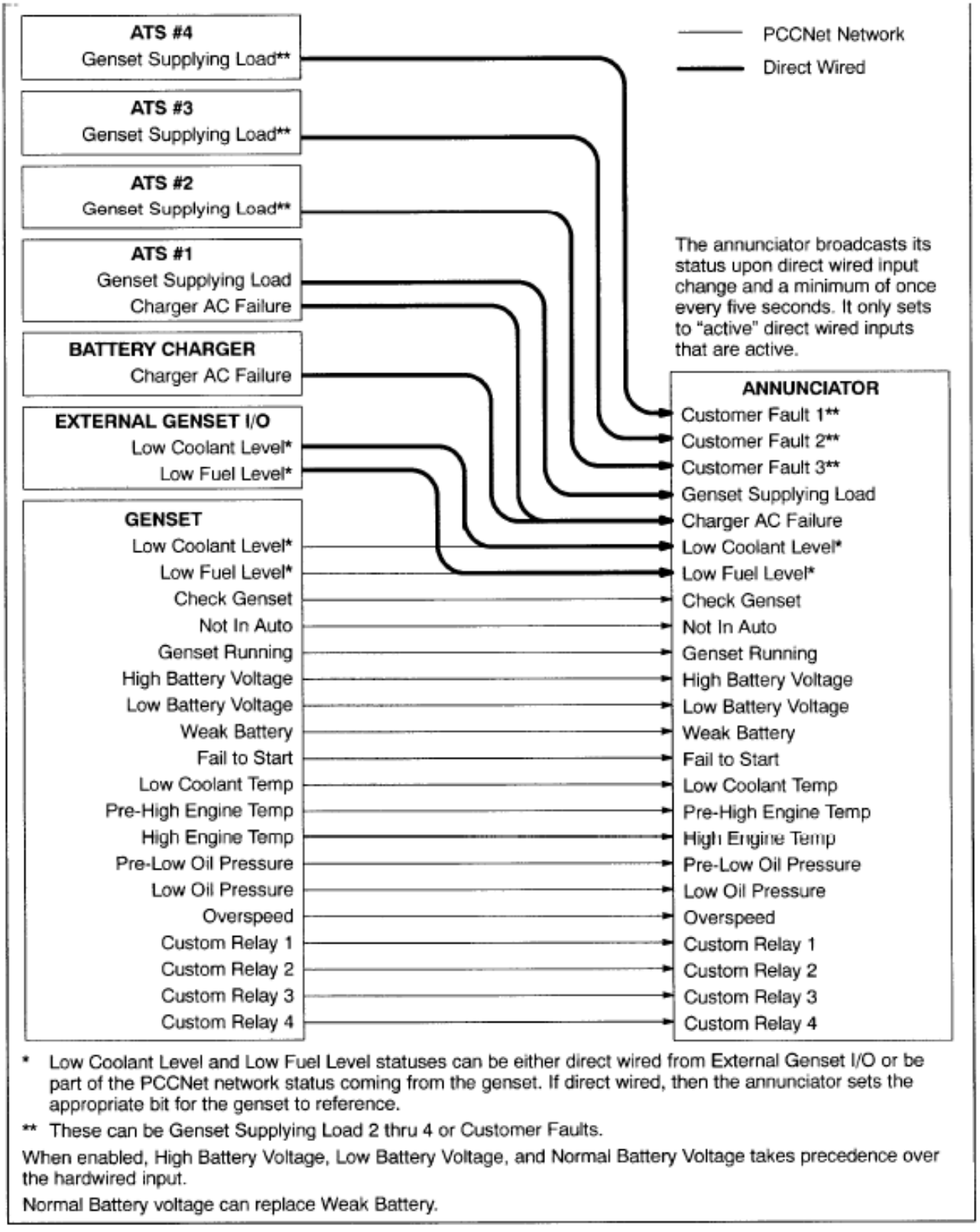
Typical installation



* Low Coolant Level and Low Fuel Level statuses can be either direct wired from External Genset I/O or be part of the PCCNet network status coming from the genset. If direct wired, then the annunciator sets the appropriate bit for the genset to reference.

** These can be Genset Supplying Load 2 thru 4 or Customer Faults.

When enabled, High Battery Voltage, Low Battery Voltage, and Normal Battery Voltage takes precedence over the hardwired input.

Normal Battery voltage can replace Weak Battery.

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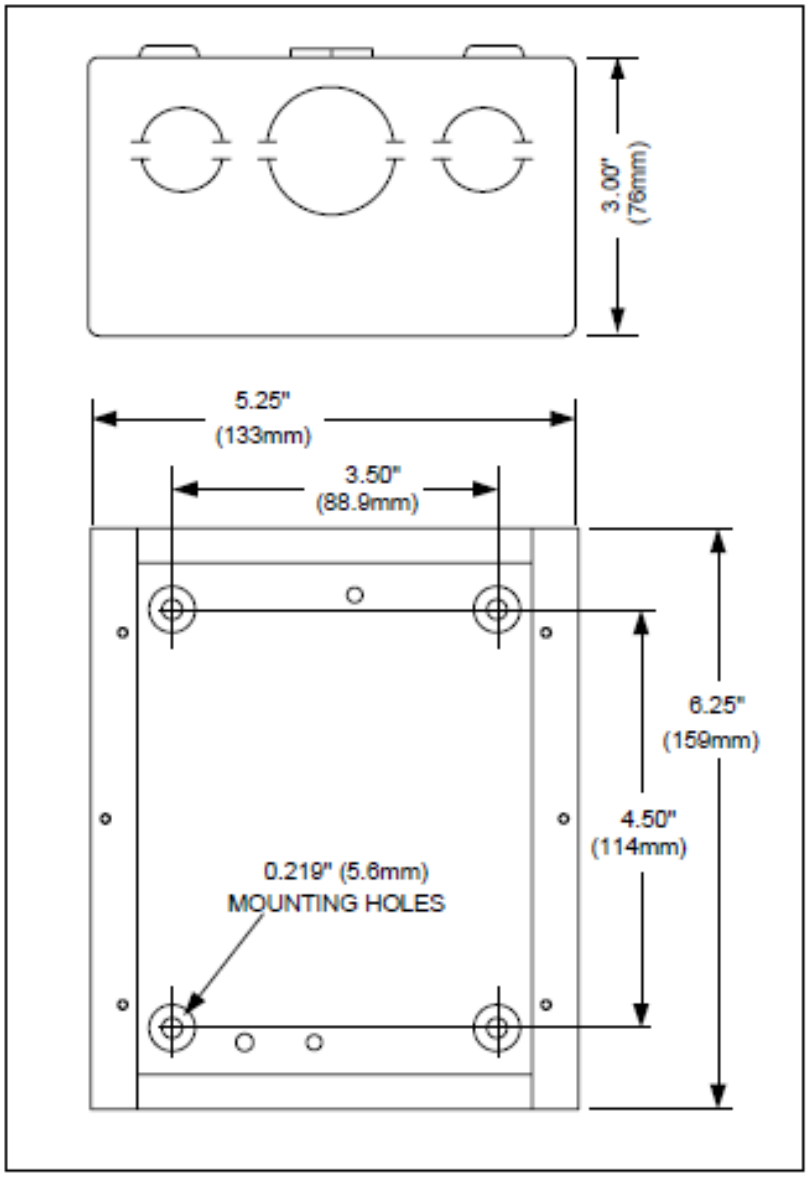
Dimensions



Dimensions: in (mm)

Ordering information

Part number	Description
0300-5929-01	Panel mount
0300-5929-02	Panel with enclosure

For more information contact your local Cummins distributor or visit power.cummins.com

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S-1472 (02/22)

A 2 Year maintenance agreement is included with 1 Full Service & 1 Inspection per year.

Power Generation System Planned Equipment Maintenance

Sales and Service

Scope of Services

INSPECTION
(MONTHLY, QUARTERLY, OR ONE-TIME PER YEAR)

Battery & Battery Charger System
- Check battery charger functions
- Cable connections, termination cleanliness and security
- Check electrolyte level, vent caps of all cells in the starting batteries
- Battery Conductance Test

Fuel System
- Inspect main tank/day tank fuel level
- Inspect day tank controls and pumps. Test operate day tank controls (where available)
- Inspect all fuel hoses, clamps, pipes, components, and fittings
- Inspect governor linkage
- Visually inspect rupture/containment basin
- Water in Fuel Test - Sub-base, day tanks
- Optional - fuel sample for laboratory analysis*

Engine Cooling System
- Inspect all hoses and clamps for leaks, coolant level and condition
- Inspect radiator cap and filler neck condition
- Inspect drive belts, observe alignment and deflection
- Observe coolant heater operations
- Utilize DCA test strip to record coolant properties
- Inspect radiator surfaces, shrouds, and barriers for obstruction
- Visually inspect low temperature after cooler coolant
- Optional –coolant sampling*

Engine & Lubrication System
- Inspect lubrication system (visually check oil level)
- Inspect crankcase ventilation system
- Inspect spark ignited ignition system

Intake/Exhaust System
- Inspect air cleaner element and entire intake system
- Inspect exhaust system and rain cap
- Inspect louver operations

Generator Controls & Power Connections
- Visually inspect all engine mounted wiring, senders, and devices
- Visually inspect all control mounted components and wiring
- Lamp test all lights and indicators
- Visually inspect breaker and power connections
- Manually operate generator main breaker(s) open and closed*

*NOTE: Will not exercise breakers or contactors on a paralleling device.

Generator Operations
- Start and observe generator and equipment operations
- Verify engine and generator safeties for proper operation
- System test with or without load

Automatic Transfer Switch
(Paralleling Switchgear, Bypass Switchgear, Manual Transfer Switches)
- Visually inspect all power and control wiring
- Visually inspect switch mechanism and enclosure
- Visually inspect controls and time delays settings
- Verify function of exercise clock

FULL SERVICE
(INCLUDES INSPECTION)

Operational & Functional Review of Generator Critical Components
- Inspect engine cooling fan & fan drives for excessive wear or shaft wobble
- Check all pulleys, belt tensioners, slack adjusters & idler pulleys for travel, wear & overall condition
- Inspect/lubricate drive bearings, gear or belt drives, lovejoy and other shaft connecting hardware

Lubrication Oil and Filtration Service
- Change engine lubrication oil
- Change primary lubrication and bypass filters
- Change fuel filters
- Post lube service operation of genset (unloaded) at rated temperature
- Optional - oil sample for laboratory analysis*

***Additional Charge**
Any additional repairs, parts or services which are required will be brought to the attention of the owner. Repairs will only be made after proper authorization from the owner is given to Cummins Sales and Service. Any additional repairs, maintenance or service performed by Cummins Sales and Service for a Planned Equipment Maintenance Agreement holder will be at current Cummins Sales and Service labor rates.

POWERCOMMAND®
OTEC TRANSFER SWITCH

POWERCOMMAND® 40-11 CONTROL | OPEN TRANSITION | 40 A-1000 A

AUTOMATIC TRANSFER SWITCH | SERVICE ENTRANCE RATED

DESCRIPTION

The OTEC series transfer switch provides the basic features typically required for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications. They are suitable for use in emergency, legally required, and optional standby circuits in commercial and light industrial applications. The OTEC transfer switch features the new PowerCommand® 40-11 control with a comprehensive feature list to suit a wide variety of ATS applications.

FEATURES

PowerCommand® 40-11 control – A fully featured microprocessor-based control with LCD digital display and tactile-feel soft-switches for easy operation and screen navigation. Control highlights include front panel PC software configuration, three phase sensing on both sources, sync check, phase rotation and imbalance sensing, and event logging. Additional optional features include load shed from standby source, Modbus RTU and TCP network communication, and configurable output contact modules. Completely network compatible with the new Cummins transfer switch remote annunciator. Please see the S-6560 PowerCommand® 40-11 control specification sheet for the full description, benefits, and features.

Overcurrent disconnect device – Square D UL Listed 489 molded case circuit breaker.

Programmed transition – Open transition timing can be adjusted to completely disconnect the load from both sources for a programmed time period, as recommended by NEMA MG-1 for transfer of inductive loads.

Advanced transfer switch mechanism – Unique bi-directional linear actuator provides virtually frictionless constant force, straight-line transfer switch action during automatic operation.

Positive interlocking – Mechanical and electrical interlocking prevent source-to-source connection through the power or control wiring.

Main contacts – Heavy-duty silver alloy contacts used with multi-leaf arc chutes are rated for motor loads or total system load transfer. They require no routine contact maintenance. Continuous load current not to exceed 80% of switch rating and tungsten loads not to exceed 30% of switch rating.

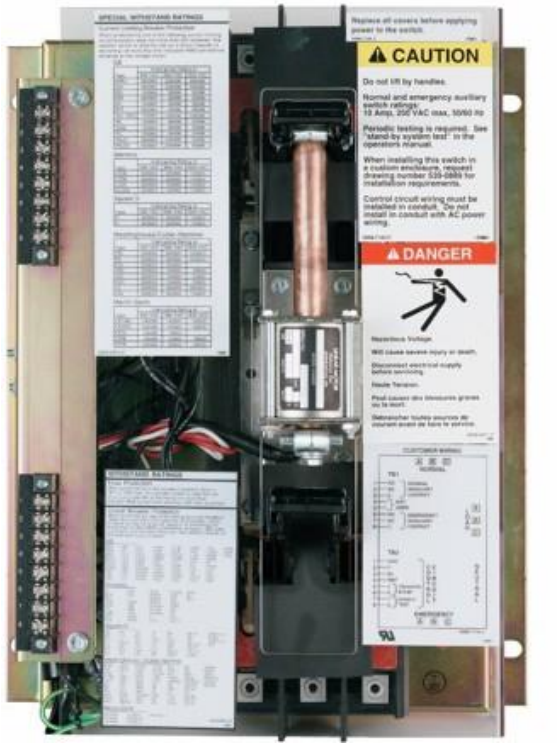
Ease of service and access – Single-plug harness connection and compatible terminal markings simplify servicing. Access space is ample. Door-mounted controls are field-programmable; no special tools are required.

Complete product line – Cummins is a single source supplier with a wide range of equipment, accessories, and services to suit virtually any backup power application.

Warranty and service - Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.

TRANSFER SWITCH MECHANISM

- A bi-directional linear motor actuator powers the transfer switch. This design provides virtually friction-free, constant force, straight-line transfer switch action with no complex gears or linkages.
- Independent break-before-make action is used for both 3-pole and 4- pole/switched neutral switches. On 4-pole/switched neutral switches, this action prevents objectionable ground currents and nuisance ground fault tripping that can result from overlapping designs.
- A mechanical interlock prevents simultaneous closing of normal and emergency contacts.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- High pressure silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contacts are mechanically held in both normal and emergency positions for reliable, quiet operation.
- Contact wear is reduced by multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases to prevent interphase flashover. A transparent protective cover allows visual inspection while inhibiting inadvertent contact with energized components.



- Switch mechanism, including contact assemblies, is UL 1008 certified to verify suitability for applications requiring high endurance switching capability for the life of the transfer switch. Withstand and closing ratings are validated using the same set of contacts, further demonstrating the robust nature of the design.

SPECIFICATIONS	
Voltage rating	Up to 480 V AC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes provide dependable arc interruption.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two isolated contacts (one for each source) indicating switch position are provided for customer use. Contacts are normally open, and close to indicate connection to the source. Wired to terminal block for easy access. Rated at 10 A Continuous and 250 V AC maximum.
Operating temperature	-13 ˚F (-25 ˚C) to 140 ˚F (60 ˚C)
Storage temperature	-40 ˚F (-40 ˚C) to 140 ˚F (60 ˚C)
Humidity	Up to 95 % relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m) without derating
Surge withstand ratings	Control tested to withstand voltage surges per EN60947-6-1.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition enabled.
Manual operation*	Transfer switch mechanisms are equipped with means to manually transfer. All sources must be de-energized before manual operation is attempted.
Overcurrent disconnect device	Service entrance switches have a Square D UL 489 listed molded case circuit breaker. 1000 Amp switches also have a current transformer and integral residual ground fault protection

**See Operator Manual for further details.*

TRANSITION MODES

Open delayed transition – In this transition mode the time required for the transfer switch to transfer between sources is adjustable so that the load- generated voltages decay to a safe level before connecting to an energized source. Recommended by NEMA MG-1 to prevent nuisance tripping breakers and load damage. Adjustable 0.5 secs - 10 minutes, and default 0.5 seconds.

Open in-phase transition – Initiates open transition transfer when in-phase monitor senses both sources are in phase (voltage, phase, and frequency). Operates in a break-before-make sequence. Includes ability to enable programmed transition as a backup. The module waits indefinitely for synchronization unless the 'Return to programmed transition' function is active in which case after 2 minutes it performs a programmed delayed transfer.

UL 1008 WITHSTAND AND CLOSING RATINGS (WCR)

Withstand and Closing Ratings (WCR) are stated in symmetrical RMS amperes.

Frame	Amperage	With specific MCCB (kA at 480V)	Square-D breaker part number	Cummins part number	Trip unit
A (3-pole only)	40	35	HGM36040	0320-2346-75	Standard Thermal Magnetic
	70		HGM36070	0320-2346-74	
	100		HGM36100	A035E003	
	125		HGM36125	0320-2346-73	
B	150, 200, 225, 250	65	LJM36250CU31X	A046F867	Micrologic 3.3 (LI)
C	300, 400, 600	65	PJM36060U31C	0320-2410-02	Micrologic 3.0 (LI)
D	800	65	RJF36080U31A	A058R115	Micrologic 3.0 (LI)
	1000	65	RJF36100U44A	0320-2563-01	Micrologic 6.0A (LSIG)

TRANSFER SWITCH LUG CAPACITIES

Frame	Amperage rating (A)	Emergency and load power cables		Emergency and load neutral cables		Service power cables		Service neutral	
		Cables per phase	Cable size	Number of Cables	Cable size	Cables per phase	Cable size	Number of Cables	Cable size
A	40, 70, 100, 125	1	Emerg: # 12 AWG-2/0 CU/AL Load: #14 AWG-2/0 CU/AL	2	#14 AWG-2/0 CU/AL	1	#14 AWG-3/0 CU/AL	1	#14 AWG-2/0 CU/AL
B	150, 200, 225, 250	1	#6 AWG-400 MCM CU/AL	2	#6 AWG-400 MCM CU/AL	1	#2 OWG-600 MCM CU or #2 AWG-500 MCM AL	1	#6 AWG - 400 MCM CU/AL
C	300, 400, 600	2	250-500 MCM CU/AL	4	250-500 MCM CU/AL	3	3/0-500 MCM CU/AL	2	250-500 MCM CU/AL
D	800, 1000	4	250-500 MCM CU/AL	8	250-500 MCM CU/AL	4	#2 AWG-600 MCM CU/AL	4	250-500 MCM CU/AL

**All lugs 90°C rated and accept copper or aluminum wire unless indicated otherwise.*
Refer to the latest NFPA 70 Article 310 - Conductors for general wiring for the ampacity calculations.

ENCLOSURE

The transfer switch and control are wall-mounted in a key-locking enclosure. Wire bend space complies with NEC.

OTEC SERVICE ENTRANCE DIMENSIONS – TRANSFER SWITCH IN UL TYPE 1 ENCLOSURE

Frame	Amperage rating (A)	Height		Width		Depth		Weight	
		in	mm	in	mm	in	mm	lb	kg
A	40, 70, 100, 125, 3-pole	45.8	1164	32	814	16.3	413	337	153
B	150, 200, 225, 250	73.6	1869	32.3	820	19.7	499	523	237
C	300, 400, 600	74.5	1892	34.4	873	20.1	510.4	562	255
D	800, 1000	90	2286	39	991	26.3	667	825	374

OTEC SERVICE ENTRANCE DIMENSIONS – TRANSFER SWITCH IN UL TYPE 3R ENCLOSURES

Frame	Amperage rating (A)	Height		Width		Depth		Weight	
		in	mm	in	mm	in	mm	lb	kg
A	40, 70, 100, 125, 3-pole	45.8	1164	32	814	16.3	413	364	165
B	150, 200, 225, 250	73.6	1869	32.3	820	19.7	499	611	277
C	300, 400, 600	74.5	1892	34.4	873	20.1	510.4	650	295
D	800, 1000	90	2286	39	991	26.3	667	1080	490

OTEC SERVICE ENTRANCEDIMENSIONS – TRANSFER SWITCH IN UL TYPE 12 ENCLOSURE

Frame	Amperage rating (A)	Height		Width		Depth		Weight	
		in	mm	in	mm	in	mm	lb	kg
A	40, 70, 100, 125, 3-pole	45.8	1164	32	814	16.3	413	346	157
B	150, 200, 225, 250	73.6	1869	32.3	820	19.7	499	593	269
C	300, 400, 600	74.5	1892	34.4	873	20.1	510.4	633	287
D	800, 1000	90	2286	39	991	26.3	667	1063	482

ENCLOSURE ACCESS FOR CABLE INSTALLATION AND MAINTENANCE

All frames allow for top, side, and bottom cable entry. NEC Requires Minimum 36” Front Access. Additional front clearance is needed to remove the mechanism. Refer to the outline drawing.

OTEC DRAWING PART NUMBERS

Frame	Amperage rating (A)	Outline Drawing
		Type 1, 3R, or 12
A	40, 70, 100, 125 (3-pole)	A074K704
B	150, 200, 225, 250	A074K715
C	300, 400, 600	A074K729
D	800, 1000	A074K743

WIRING DIAGRAM PART NUMBERS

Frame	Amperage rating (A)	Wiring Diagram	
		Utility to Genset (120 – 480 V)	Interconnection
A	40, 70, 100, 125 (3-pole)	A074P733	A065H780
B	150, 200, 225, 250	A074P729	
C	300, 400, 600		
D	800, 1000		

SUBMITTAL DETAIL

The Product codes below have been shortened for brevity. In long form, each four-letter product code will be preceded with an OTECSEX, where X = A, B, C, D. For example, OTECSEB_A045-7

Model

- 40, 70, 100, 125 A, (3-pole)
- 150, 200, 225, 250 A
- 300, 400, 600 A
- 800, 1000 A

Poles

- A028 Poles – 3 (solid neutral)
- A029 Poles – 4 (switched neutral) (not available for 40-125 A)

Application

- A035 Utility-to-genset

Frequency

- A044 60 Hz
- A045 50 Hz

Phase

- A041 single phase, 2-wire or 3-wire
- A042 three phase, 3-wire or 4-wire

Voltage ratings

- R020 120V
- R038 190V
- R021 208V
- R022 220V
- R023 240V
- R024 380V
- R025 416V
- R035 440 V
- R026 480 V

Enclosure

- B001 Type 1: Indoor use, provides some protection against dirt (similar to IEC type IP30)
- B002 Type 3R: Intended for outdoor use, provides some protection from dirt, rain and snow (similar to IEC type IP34)
- B010 Type 12: Indoor use, some protection from dust (similar to IEC type IP61).

Standards

- S043 Listing-UL 1008 certification
- A080 IBC seismic certification

Control voltage

- M033 12V, Genset starting voltage
- M034 24V, Genset starting voltage

Control options

- M032 Elevator signal relay
- M081 MODBUS RS485 Communication module
- M079 integral control power supply provides DC voltage to control from source power.
- M086 Ethernet communication module.
- L216 1X auxiliary relay I/O module
- L217 2X auxiliary relay I/O module

Auxiliary relays

Relays are UL Listed, and factory installed. All relays provide (2) normally closed isolated contacts rated 10A @ 600 VAC. Relay terminals accept (1) 18 gauge to (2) 12-gauge wires per terminal.

- L101 24 VDC coil - installed, not wired (for customer use).
- L102 24 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position.
- L103 24 VDC coil - normal position - relay energized when switch is in source 1 (normal) position
- L201 12 VDC coil installed, not wired (for customer use)
- L202 12 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position
- L203 12 VDC coil - normal position - relay energized when switch is in source 1 (normal) position

Optional features

- M080 Anti-condensation heater for outdoor enclosures.
- L214 Load shed from standby source
- M085 Load power monitoring

Accessories

- AC-170 Accessories specification sheet

Miscellaneous

- M003 Terminal block - 30 points (not wired)

Warranty

- G004 2-years, comprehensive
- G007 5-years, comprehensive
- G014 3-years, comprehensive
- G015 10-years, comprehensive

Shipping

- A051 Packing - export box (800 – 1000 A)
- Request for quotation (RFQ)
- Z555 Nonconfigurable spec [ETO]

CODES AND STANDARDS			
UL	All switches are UL 1008 Listed and labeled suitable only for use as service equipment – normal source only, with UL 50E Type Rated cabinets and UL Listed CU-AL terminals.	**NEC®**	Suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
NEMA	All switches comply with NEMA ICS 10.	**ISO®**	All switches are designed and manufactured in facilities certified to ISO 9001.
NFPA	All switches comply with NFPA 70, 99 and 110 (Level 1).	**IBC®**	All switches are certified to IBC 2021.
IEEE	All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.	**EMC**	Display controllers meet the following Electromagnetic Compatibility (EMC) standards: • EN 61000-6-2 Generic Immunity Standard for the Industrial Environment. • EN 61000-6-4 Generic Emission Standard for the Industrial Environment.

For more information, please contact your local Cummins distributor or visit cummins.com.

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S-6557 OTEC Spec Sheet Service Entrance - PD00000753 - Rev. 02/25

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POWERCOMMAND® 40-11 TRANSFER SWITCH CONTROL

OTEC TRANSFER SWITCHES

DESCRIPTION

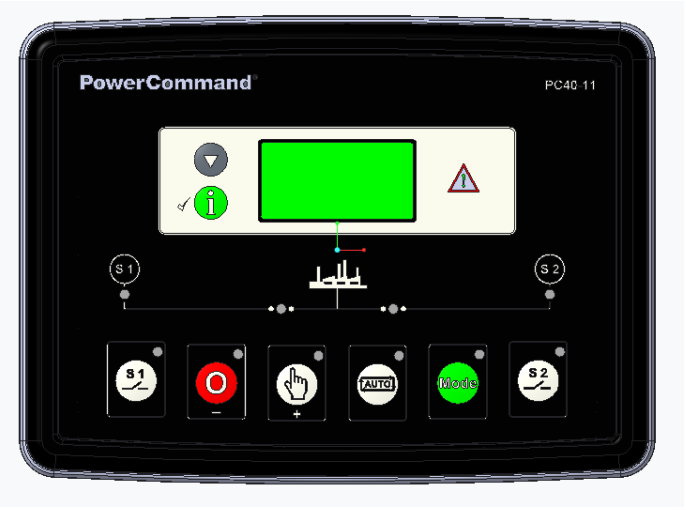
The PowerCommand® 40-11 Transfer Switch Control is a sophisticated microprocessor-based control with the basic features you need for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications.

The control human machine interface (HMI) includes a LCD display with tactile-feel soft-switches for easy operation and screen navigation. All data on the control can be viewed by scrolling through screens with a display scroll button. The control displays the current active fault, fault occurrences and time ordered history of the 10 previous faults with respect to Real Time Clock Stamp and Engine Running Time.

FEATURES

Digital display – The PowerCommand® 40-11 offers a clear back-lit LCD 4-line text display, showing system status, contextual icons and warnings. The display is also equipped with 5 red and 4 green LEDs indicating operational status.

Modbus network communication – Modbus network communications capable. Optional Modbus RTU RS485 connection (1 serial port) and TCP Ethernet communication module (1 RJ45 port).



Remote Annunciator – Completely network compatible with the new Cummins transfer switch remote annunciator (See Transfer Switch Remote Annunciator spec sheet AC-204 for additional details).

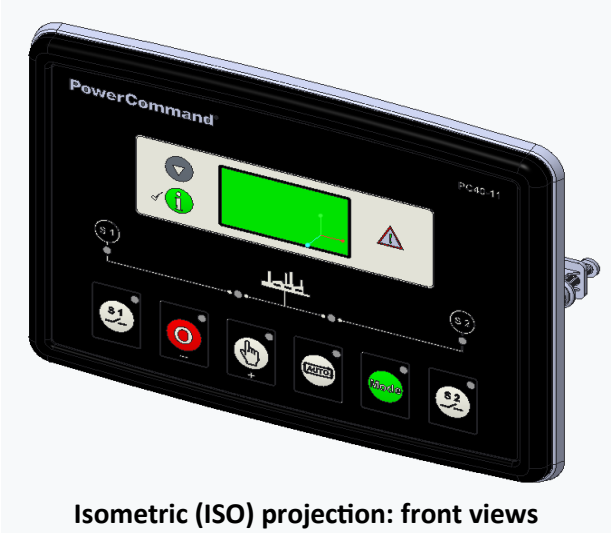
Diagnostics and reporting – Detailed event logging with enhanced fault codes, alert lists, power event history, and source statistics enhances diagnostic capability during service events and provides the ability to meet any reporting requirements.

PC & Front Panel Configurations – The modules can be easily configured using the PC software. Selected front panel editing is also available.

Ease of service and access – Built-in plug-and-play control with minimized point-to-point connections and compatible terminal markings simplify servicing.

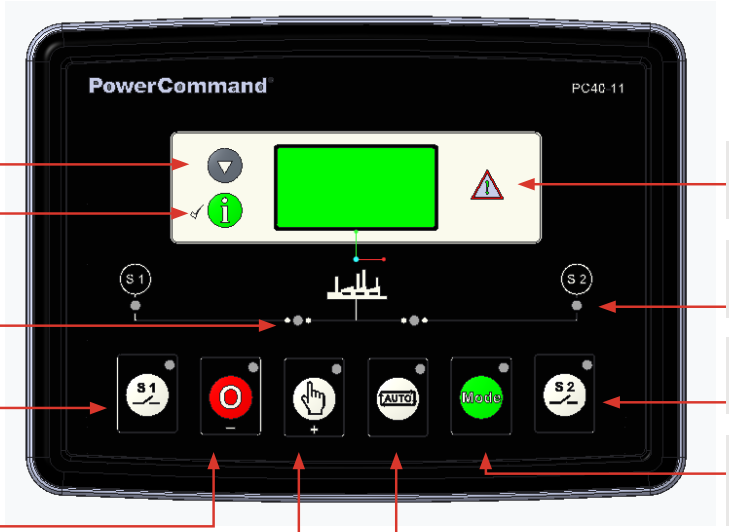
Complete product line – Cummins is a single source supplier with full scope of power system solutions, integration, and service capability, from paralleling to system level controls, switchgear, and remote connectivity.

Warranty and service – Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.



Isometric (ISO) projection: front views

HUMAN MACHINE INTERFACE (HMI) CAPABILITIES



- Display scroll button
- Info button
- LED indicates source power connected
- Tactile push button transfers load to S1
- Tactile push button selects '**STOP**' mode
- Tactile push button selects '**MANUAL**' mode
- Common Alarm Status LED
- LED indicates source available
- Tactile push button transfers load to S2
- Tactile push button to select '**MODE**' function
- Tactile push button to select '**AUTO**' mode

CONTROL FUNCTIONS

TRANSFER INHIBIT

When transfer inhibit external input is active, the control does not automatically transfer the transfer switch to a standby source even when the preferred source fails.

RETRANSFER INHIBIT

When retransfer inhibit external input is active, the control does not automatically retransfer the transfer switch to a preferred source even when the preferred source returns.

REAL TIME CLOCK

This feature is used by the control for fault and event time stamping and as a reference for exerciser schedules and exception schedules.

TEST – REMOTE

Test feature allows the user to automatically test the standby source and the transfer switch. The test command can be issued from the remote source.

The test has following types available:

- Remote Start On Load
- Remote Start Off Load

ELEVATOR SIGNAL

This optional feature allows an elevator connected to the system to come to a complete stop before the switch transfers.

EXERCISER SCHEDULER

The Scheduler allows the user to configure pre-set automatic starting and stopping of the Generator (when in Auto mode).

BANK 1 / BANK 2

Each Bank of the Exercise Scheduler is used to give up to 8 scheduled runs per bank, 16 in total. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). Do Not Transfer, Off Load and On Load. Each scheduler bank configured differently either to weekly or monthly based exercises.

SOURCE AVAILABILITY

This feature monitors the frequency and voltage sensors on the preferred and standby sources to determine and declare the availability status of the two sources, irrespective of which source is connected to the load. It declares the states as event codes. Preferred/Standby Available - active inactive.

VOLTAGE SENSING

3-phase sensing on Source 1 and Source 2 (up to 600 Vac with no need for additional PTs). Plant battery voltage monitoring.

ALPHANUMERIC DISPLAY

- S2 Voltage L1-N
- S2 Voltage L-L
- S2 Frequency
- S1 Voltage L1-N
- S1 Voltage L-L
- S1 Frequency
- Battery voltage
- Current alarms with icons
- Event log
- Scheduler
- About

LOAD SHED

This feature allows the user to shed/disconnect the electrical load from a standby source. This feature is typically used to reduce non-emergency load demand on the generator when the generator is in an overload condition.

LOAD POWER MONITORING

This feature allows the monitoring of the following parameters on the load side of the transfer switch using the display, or remotely via the optional communication modules:

- Amps: L1 - L2 - L3
- Watts: L1 - L2 - L3 - Total
- VA: L1 - L2 - L3 - Total
- Var: L1 - L2 - L3 - Total
- Power Factor: L1 - L2 - L3 – Average

RELAY EXPANSION MODULE DSE2157

This feature allows the user to provide additional output to the control system, up to 16 user configurable dry contact sets - 8 NO, 8 Form-C.

TIME DELAYS

The following adjustable time delays are built into the transfer switch control. External modules to accomplish these delays are not required.

- **Start Delay** (Also known as Time Delay Engine Start, TDES adjustable from 0 to 10 hours)
- **Warming** (Also known as Time Delay Normal to Emergency, TDNE adjustable from 0 to 1 hour)
- **Elevator Delay** (Also known as Time Delay Elevator, TDEL adjustable from 0 to 5 minutes)
- **Non-sync Transfer Time** (Also known as Time Delay Programmed Transition, TDPT adjustable from 0.5 s to 10 minutes)
- **Return Delay** (Also known as Time Delay Emergency to Normal, TDEN adjustable from 0 to 5 hours)
- **Cooling** (Also known as Time Delay Engine Cool-down, TDEC adjustable from 0 to 1 hour)

LED INDICATOR LIGHTS

- Auto mode (RED)
- Source 1 available (GREEN)
- Source 2 available (GREEN)
- Source 1 connected to load (GREEN)
- Source 2 connected to load (GREEN)
- Common Alarm indicator (RED)
- Select Operating mode (RED)
- Stop mode (RED)
- Manual Mode (RED)

EVENTS LOG

The control displays information on up to 10 events displayed in chronological order, beginning with the most recent event, about either source. The event information includes the following:

- Failure modes
- Warning
- Tests and exercises
- User-driven inputs (e.g., override, transfer inhibit)

SUPPORTED APPLICATIONS

APPLICATION TYPES

- Utility - Generator Set

COMMUNICATIONS

The PowerCommand® 40-11 Transfer Switch Control features an optional network communication module.

Features include:

- Optional Modbus® RTU RS485 communication module (1 isolated serial port) TCP Ethernet communication module (1 RJ45 port)
- USB port for service tool interface

PROTECTION

PHASE ROTATION AND VOLTAGE IMBALANCE SENSING

- Source 1 and Source 2

UNDER-VOLTAGE SENSING

- 3-phase normal, 3-phase emergency, Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 50Vac to 414Vac.
- Phase to phase voltage range 86Vac to 717Vac.

OVERVOLTAGE SENSING

- 3-phase normal, 3-phase emergency, Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 52Vac to 416Vac.
- Phase to phase voltage range 90Vac to 720Vac.

OVER/UNDER FREQUENCY SENSING

- Normal and emergency
- Accuracy: ±0.2 Hz
- Frequency range 3.5 – 75 Hz

SYNC CHECK

- For in-phase transfer

CONTROL OPERATING VOLTAGE

- Range: 8-35 Vdc.

ENVIRONMENT

Operating Temperature Range	Control operates over an ambient temperature range: -30 ºC to 70 ºC.
Storage Temperature Range	The control operates after being exposed to Storage Temperatures in the range of -40 ºC to 85ºC.
Ingress Protection	The front panel is to be IP65.
Sun Protection	Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water exposure and Immersion in accordance with UL 746C.

CODES AND STANDARDS

c UL us	The PC40-11 control is a UL Recognized Component Marked for United States and Canada.	NFPA	Capable of being used on systems compliant with NFPA 70, 99 and 110 (Level 1).
UK CA	The PC40-11 control fulfills the requirements of UKCA standard product directives.	NEMA	Control and display as installed in a transfer switch enclosure comply with NEMA 4X and IP65 at the transfer switch level - if the transfer switch enclosure is also NEMA 4X & IP65 compliant.
RoHS	The control is RoHS compliant.	NEC®	Capable of being used on systems suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
CE	Fulfills the requirements of relevant European product directives.	LVD	The unit is designed to comply with European directive 72/23/EEC by complying with harmonized European safety standard BS EN 60950.
CSA®	All switches are certified to CSA C22.2 No. 178.1 switching of electrical energy in emergency or other systems, up to 600 VAC and 4 kA.	IEEE	The control is IEEE C37.90.2 certified. Capable of being used on IEEE 446 compliant systems; Recommended Practice for Emergency and Standby Power Systems.
EMC	The control is tested to meet the following CE Electromagnetic Compatibility (EMC) standards for EN 61000 series (electromagnetic compatibility): • EN 61000-6-2 Generic Immunity Standard • EN 61000-6-4 Generic Emissions		

For more information, please contact your local Cummins distributor or visit cummins.com Our energy working for you™

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Warranty Statement

Generator Sets

Commercial Standby Extended Warranty

English
Original Instructions

7-2017

A058F886 (Issue 1)

Limited Standby 5 Year or 2,500 Hour Parts + Labor + Travel Extended Warranty – L189

Commercial Generating Set

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded commercial generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date or 2,500 hours, whichever occurs first.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode

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Limitations Continued:

- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

Items not covered by this limited extended warranty:

- Batteries
- Enclosures
- Coolant heaters
- Exhaust systems and aftertreatment components
- Maintenance items

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CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

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Warranty Statement

Transfer Switch Extended Warranty

English
Original Instructions
1-2017
1118-0003 (Issue 5)

Limited 5 Year Comprehensive Extended Warranty – G007

Transfer Switch and Paralleling Systems

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded Transfer Switches, Paralleling Systems and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.

Limitations Continued:

- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode
- Owner or operator abuse or neglect such as: operation without adequate coolant or

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lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.

- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

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CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

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IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

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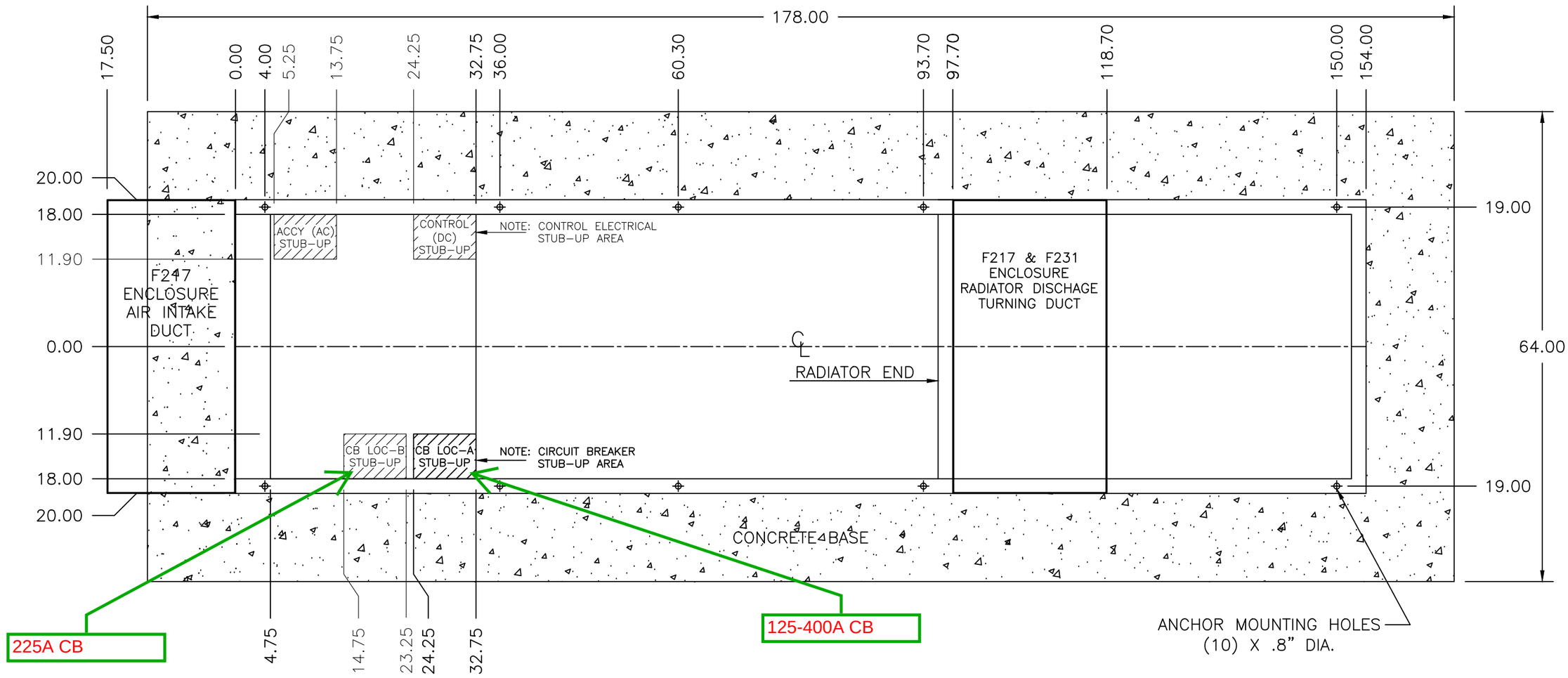


NOTE: SUGGESTED PAD LAYOUT SHOWN FOR REFERENCE.
SUGGESTED SERVICE ACCESS CLEARANCE 5 FEET.
ENCLOSURE INLET AIR FLOW SHALL BE UNOBSTRUCTED.
RADIATOR DISCHARGE AIR FLOW SHALL BE UNOBSTRUCTED.
F217 ENCLOSURE AIR INLET DUCT EXTENDS 17.5" BEYOND GENERATOR SET SKID.

REF: GENERATOR SET DRAWING A054Y897
REF: GENERATOR SET/ENCLOSURE DRAWING A051P365
REF: GENERATOR SET/FUEL TANK DRAWING A054B564

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES

TOLERANCES: FRACTIONAL: 1/4 .X: .06 .XX: .03 .XXX: .01 ANGLES: .5°

FINISH: N/A

–	A054B464	PREP. BY: KDU	10/25/23
–	A049J918	CHKD BY: –	–
	A051P365	MODIFIED BY: –	–
	A054Y897		
	A054B453		

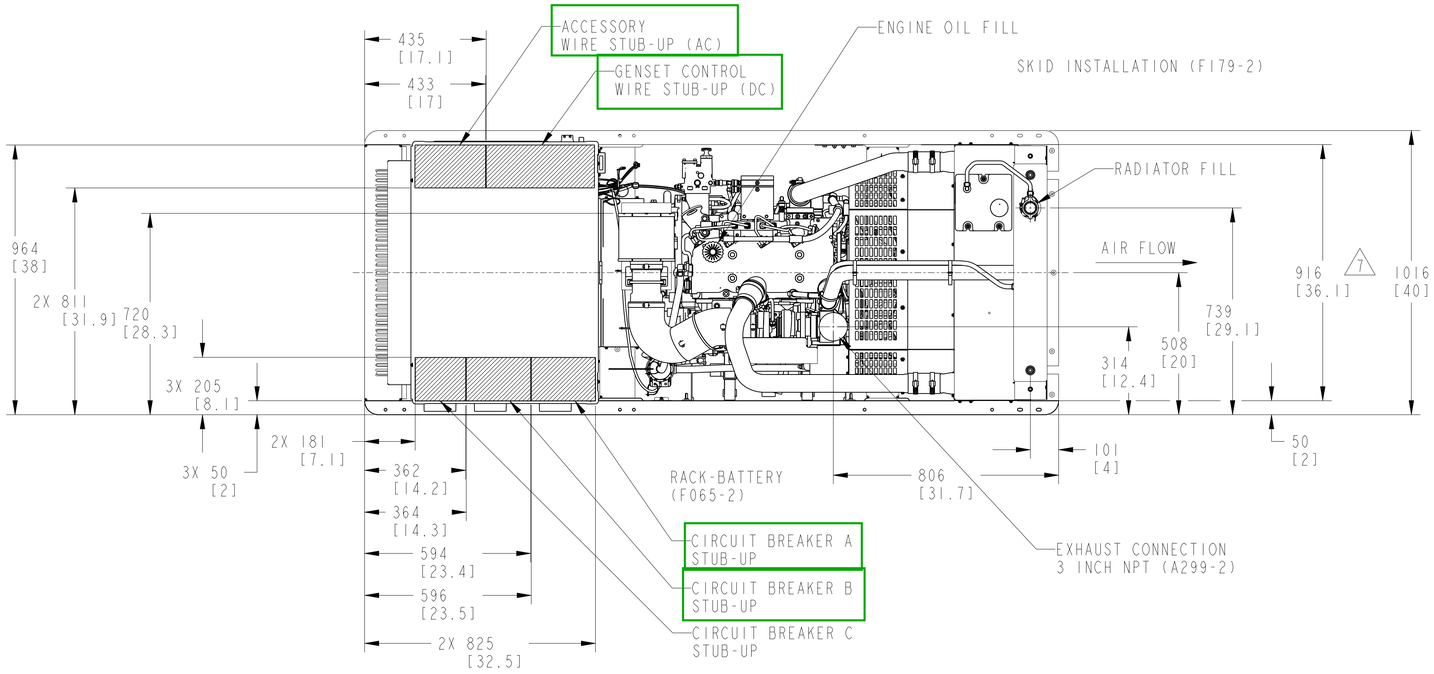
REFERENCES

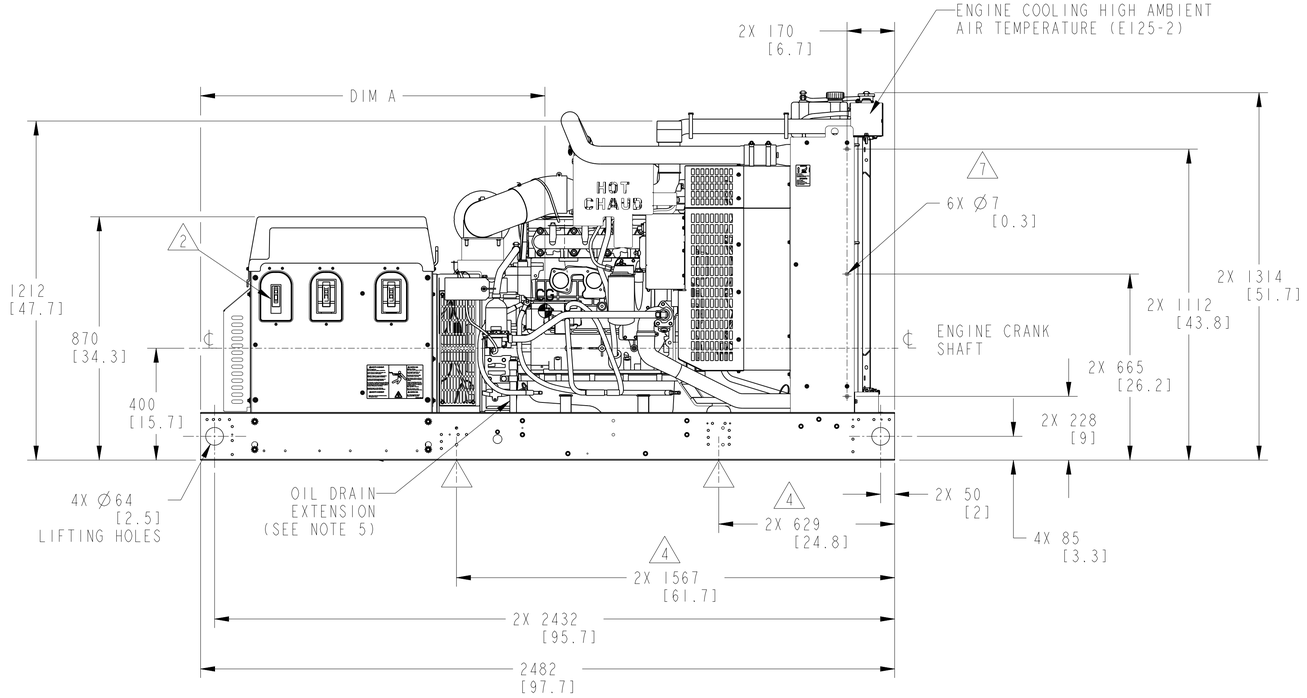
REGIONAL FUEL TANK

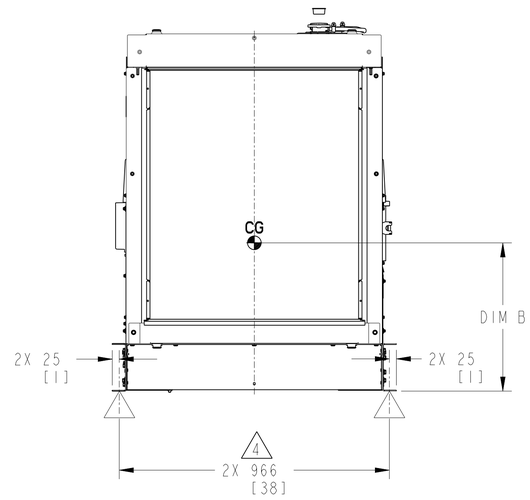
ENGINE FAMILY: QSB5 ENGINE

CSSNA POWERGEN

SITE NAME: – –	CONTACT NAME: –	CUSTOMER PROJECT NO: –	TITLE: 50 KW THRU 125 KW DIESEL GENERATOR SET ENCLOSURE & REGIONAL FUEL TANK
CONTRACTOR NAME: –	CONTACT NO: –	CSSNA PROJECT NO: –	SIZE: C DWG NO: C50 D6C THRU C125 D6C STUB-UP REV A
			SCALE: NONE DO NOT SCALE PRINT SHEET 1 OF 1







NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.
2. REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
3. CONTROL INTERFACE CONNECTION SHOULD BE MADE WITH FLEXIBLE CONNECTIONS.
4. Ø21 [0.8] HOLES MARKED BY △ FOR SECURING TO MOUNTING SURFACE.
5. OIL DRAIN EXTENSION: 5/8 INCH HOSE ID.
6. FOR IBC SEISMIC CERTIFIED INSTALLATION, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENT DRAWING.
7. Ø7.3 HOLES FOR OPTIONAL COOLING EXHAUST AIR DUCT ADAPTER.
8. REFER TO GENSET FOUNDATION OUTLINE FOR ELECTRICAL AND OTHER FOUNDATION SPECIFICS.
9. GENSET SUPPLIED WITH FLEXIBLE FUEL LINE(S) THAT CAN BE CONNECTED TO GENSET INTERFACE POINT(S).

   9.1 FUEL SUPPLY LINE: 686 [27.0] LONG WITH 5/16" JIC MALE TERMINATION.

TABULATION

ALT DATA SHEET #	DIM A	DIM B	GENSET WET WEIGHT	
			KG	LB
ADS-202	1092	456	1090	2403
ADS-203	1207	495	986	2173
ADS-204	1184	492	1006	2217
ADS-205	1125	486	1054	2324
ADS-206	1086	482	1082	2386
ADS-207	1060	480	1106	2439
ADS-208	998	473	1173	2586
ADS-209	958	469	1211	2670

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y897	PART REVISION: C
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 1 OF 3
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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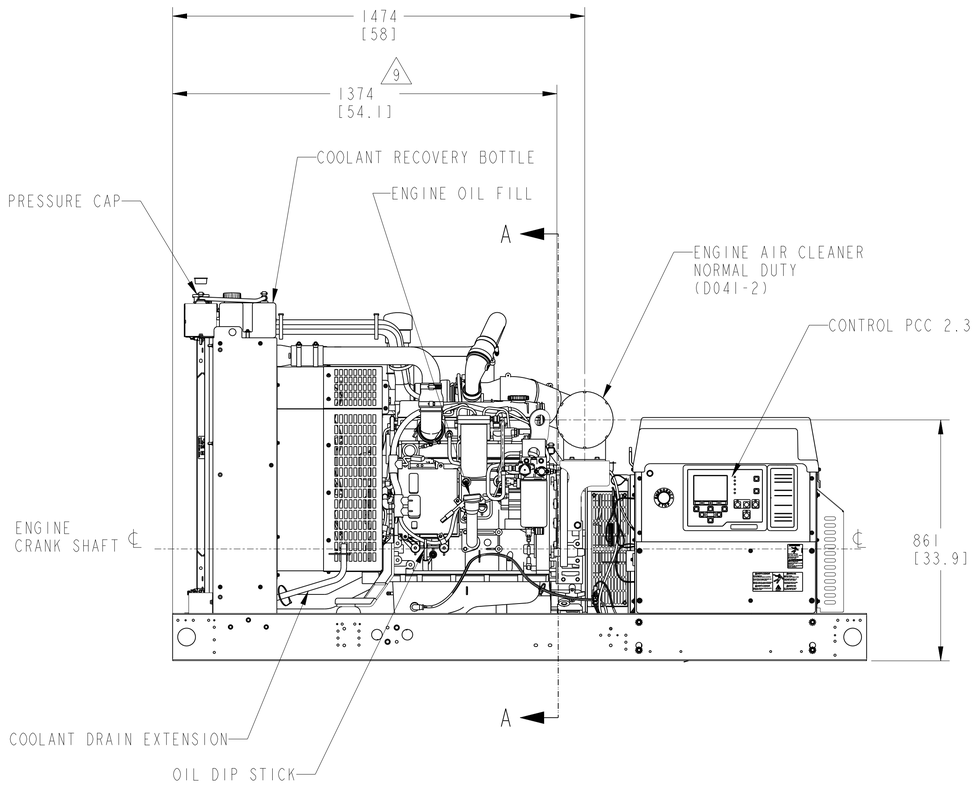
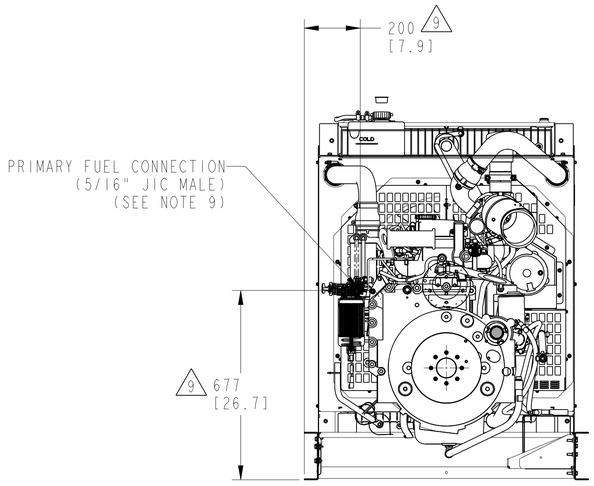
Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: D
SCALE:3:32
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM
PTC® Creo® Parametric





SECTION A-A

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y897	PART REVISION: C
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 2 OF 3
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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DIMENSIONS ARE IN: MILLIMETERS
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SIZE: D
SCALE:3:32

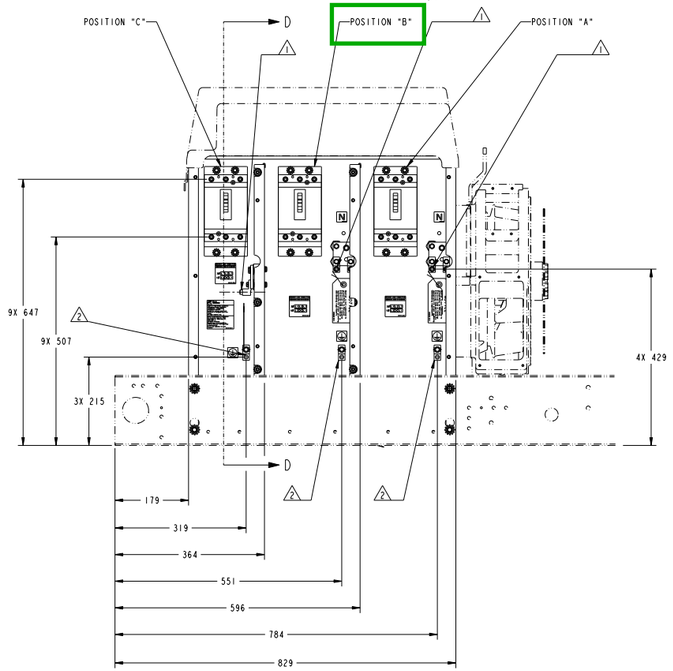
DIMENSIONING AND TOLERANCING PER:
ASME Y14.5-2009
THIRD ANGLE PROJECTION

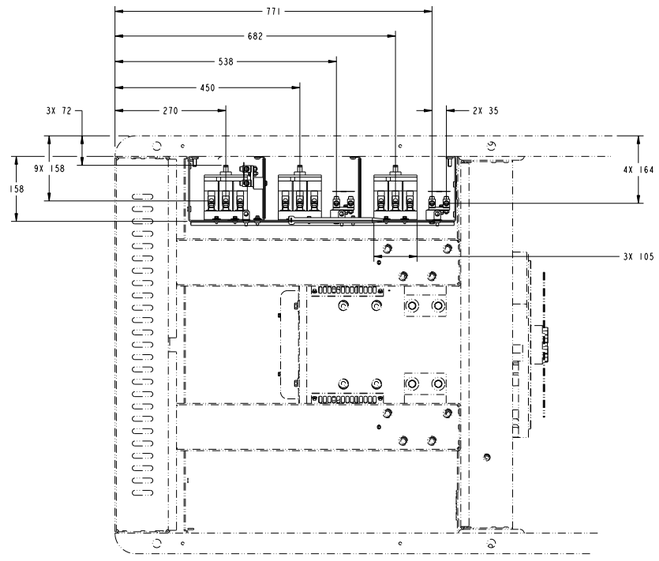
CAD SYSTEM
PTC® Creo® Parametric

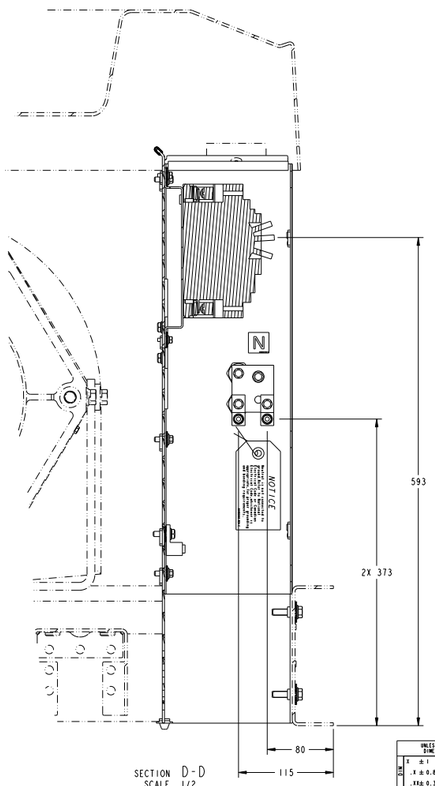
PTC® Creo® Parametric

REV. NO.	LTR	NO.	REVISION	BY	CHK	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		2	DRAWING HAS BEEN PICTORIALLY UPDATED	KD	PL	P.LARSON	20APR15
		3	RMV. C11 LABEL	KD	PL	P.LARSON	20APR15
		4	UPDATE NOTES & TAB - SEE ECO	KD	PL	P.LARSON	20APR15
		5	SEE SHEET 2	KD	PL	P.LARSON	20APR15
		6	SEE SHEET 3	KD	PL	P.LARSON	20APR15

"H" FRAME SHOWN (15 - 150 amp)







SECTION D-D
SCALE 1/2

NOTES:

1. NEUTRAL LUG (1) #14-2/0
2. GROUND LUG (1) #14-1/0
3. NEUTRAL LUG (1) #6-350 kcmil.
4. NEUTRAL LUG (2) #2-600 kcmil OR (4) 1/0-250 kcmil.

	FRAME	LUG	LUG WIRE RANGE	WIRE STRIP LENGTH	CB LUG TORQUE
B	H-FRAME THERMAL-MAGNETIC 15-150 AMP 80% RATED	AL150HD	(1) AL #14 - 3/0 AWG (1) CU #14 - 3/0 AWG	0.65 inch	#14 - #10 50 lb-in (6.0 Nm) #8 - 3/0 120 lb-in (14.0 Nm)
	J-FRAME THERMAL-MAGNETIC 175 AMP 80% RATED	AL175JD	(1) AL #4 - 4/0 AWG (1) CU #4 - 4/0 AWG	1.00 inch	225 lb-in (26.0 Nm)
	J-FRAME THERMAL-MAGNETIC 200-250 AMP 80% RATED	AL250JD	(1) AL 3/0 - 350 kcmil (1) CU 3/0 - 350 kcmil	1.00 inch	225 lb-in (26.0 Nm)
A	J-FRAME LSI ELECTRONIC TRIP ADJUSTABLE TRIP 70-250 AMP 100% RATED, COPPER CONDUCTORS ONLY	CU250JD	(1) CU 1/0 - 300 kcmil	1.00 inch	250 lb-in (28.0 Nm)
	L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 80% RATED	AL400LG1K3	(1) AL #2 - 500 kcmil (1) CU #2 - 600 kcmil	1.20 inch	442 lb-in (50 Nm)
	L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 100% RATED, COPPER CONDUCTORS ONLY	AL600LS52K3	(2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)
	L-FRAME (600) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 200-600 AMP 80% RATED	AL600LS52K3	(2) AL 2/0 - 500 kcmil (2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)

CIRCUIT BREAKER ACCESSORIES

1. SHUNT TRIP (MX) P/N A043X760
   12...
   COIL ...DEN < 5 WATTS
   10 AMP ...RUSH
2. AUXILIARY CONTACTS P/N ...43X785
   OPEN/CLOSED ...
   TRIP INDICATION ...
   FORM C CONTACTS
   RATING: 6 AMPS ... VAC, 48 VAC, 110 VAC
   6 AMPS AT 24 ...
   2 AMPS AT 48 ...
   2 AMPS AT 110 V...
   H & ...FRAME, MAXIMUM OF 4 CONTACTS PER CIRCUIT BREAKER
   ...FRAME, MAXIMUM OF 5 CONTACTS PER CIRCUIT BREAKER

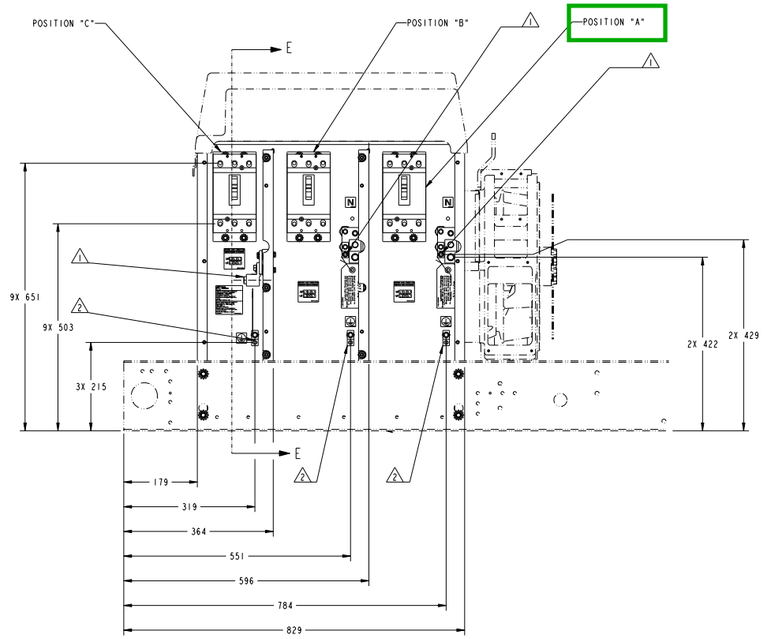
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	DO NOT SCALE PRINT
X ±1 / .X ±0.8 / .XXX ±0.38 / ANG TOL: ± 1.0°	0.00-4.99 +0.15/-0.00; 5.00-9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13
SCALE: 1/4	CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP
DRN K.DEIVASIGAMANI; CHK P.LARSON; APVD P.LARSON; DATE 21JAN15	FIRST USED IN ARROW
CUMMINS POWER GENERATION	
SITE CODE PGF	OUTLINE, CIRCUIT BREAKER
SIZE E	A049J918
SHEET 1 of 3	REV B

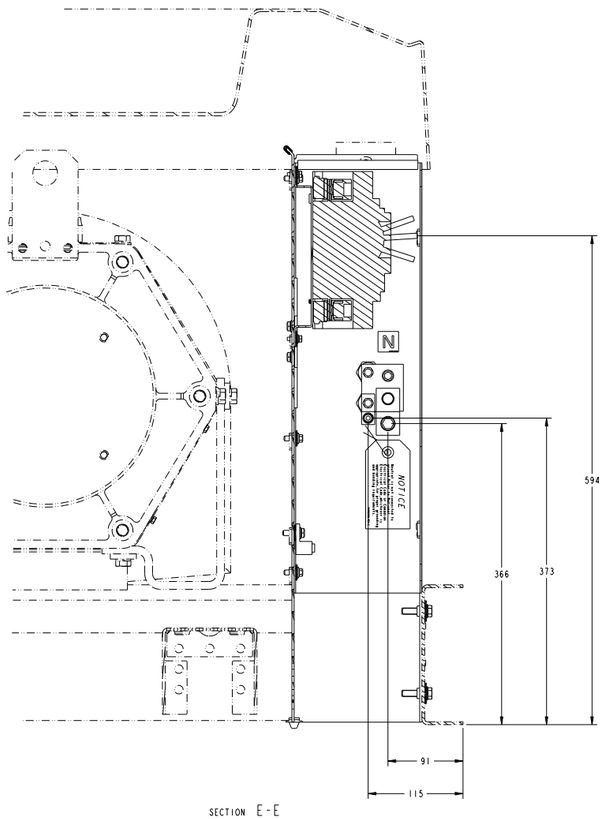
Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 1 of 4

PTC® Creo® Parametric

REV. NO.	LTR	NO.	REVISION	DRN	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		5	ZONE (D3) ADD PHRASE "(175-250 amp)"	--	--	--	
			TO "J" FRAME SHOWN"	KD	PL	P.LARSON	20APR15

"J" FRAME SHOWN (175 - 250 amp)





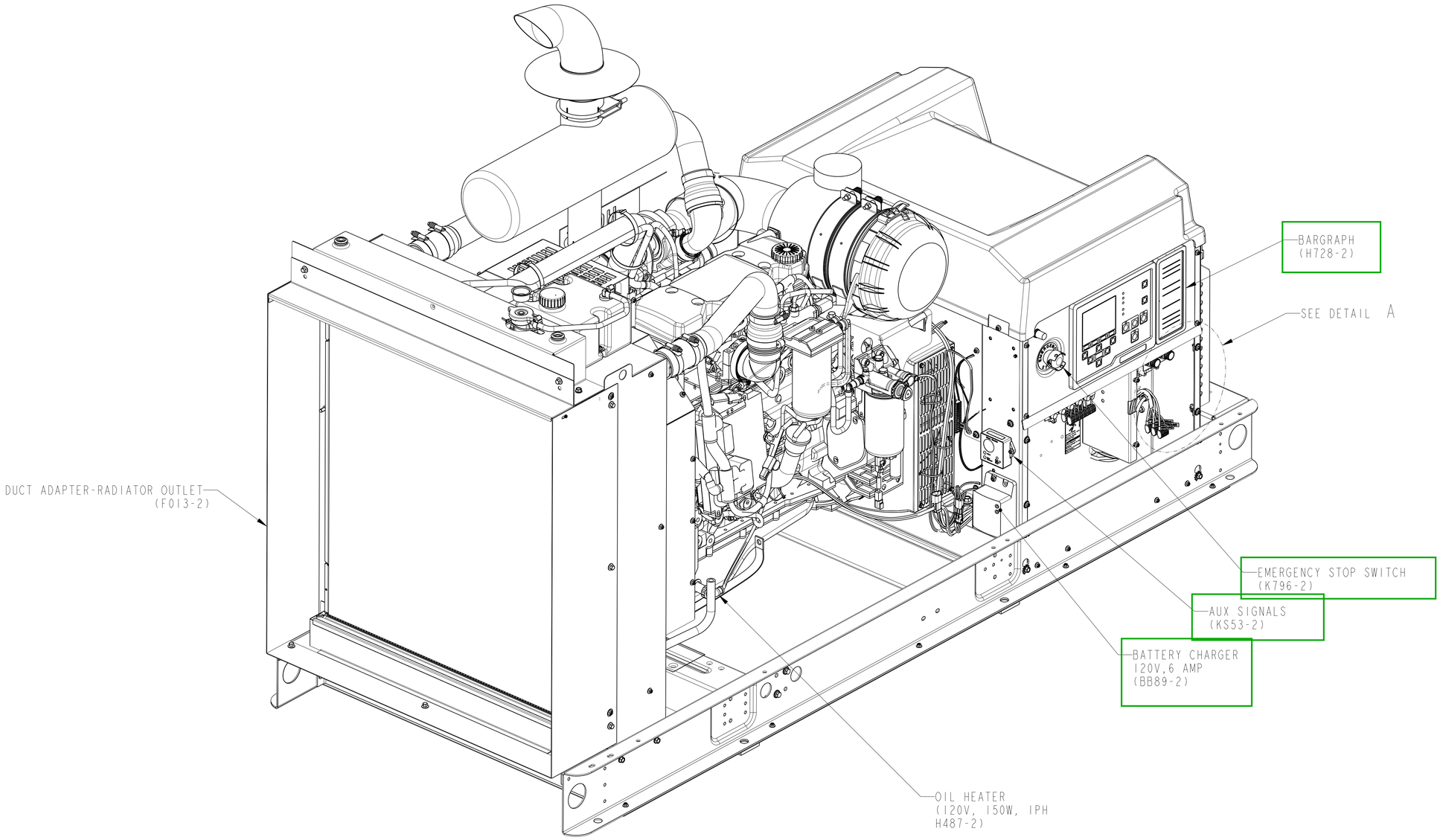
SECTION E-E
SCALE 1/2

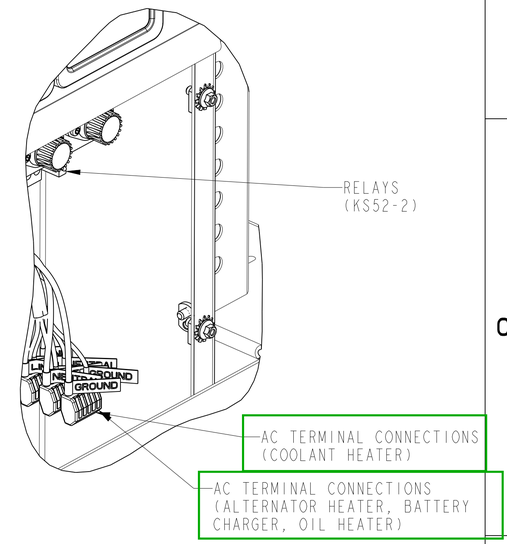
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN MILLIMETERS
X ±1
.X ±0.8
XX± 0.38
ANG TOL: ± 1.0°
SURFACE FINISH: 0.00-4.99 +0.15/-0.00; 5.00-9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13
SCALE: 1/4
DO NOT SCALE PRINT
CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP
DRN K.DEIVASIGAMANI
CHD P.LARSON
APVD P.LARSON
DATE 21JAN15
NEXT ASSY
USED ON ARROW
SITE CODE PGF
CUMMINS POWER GENERATION
OUTLINE, CIRCUIT BREAKER
SIZE E
A049J918
SHEET 2 OF 3
REV B

Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 2 of 4

NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.





DETAIL A
SCALE 1:2

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y899	PART REVISION: E
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 1 OF 4
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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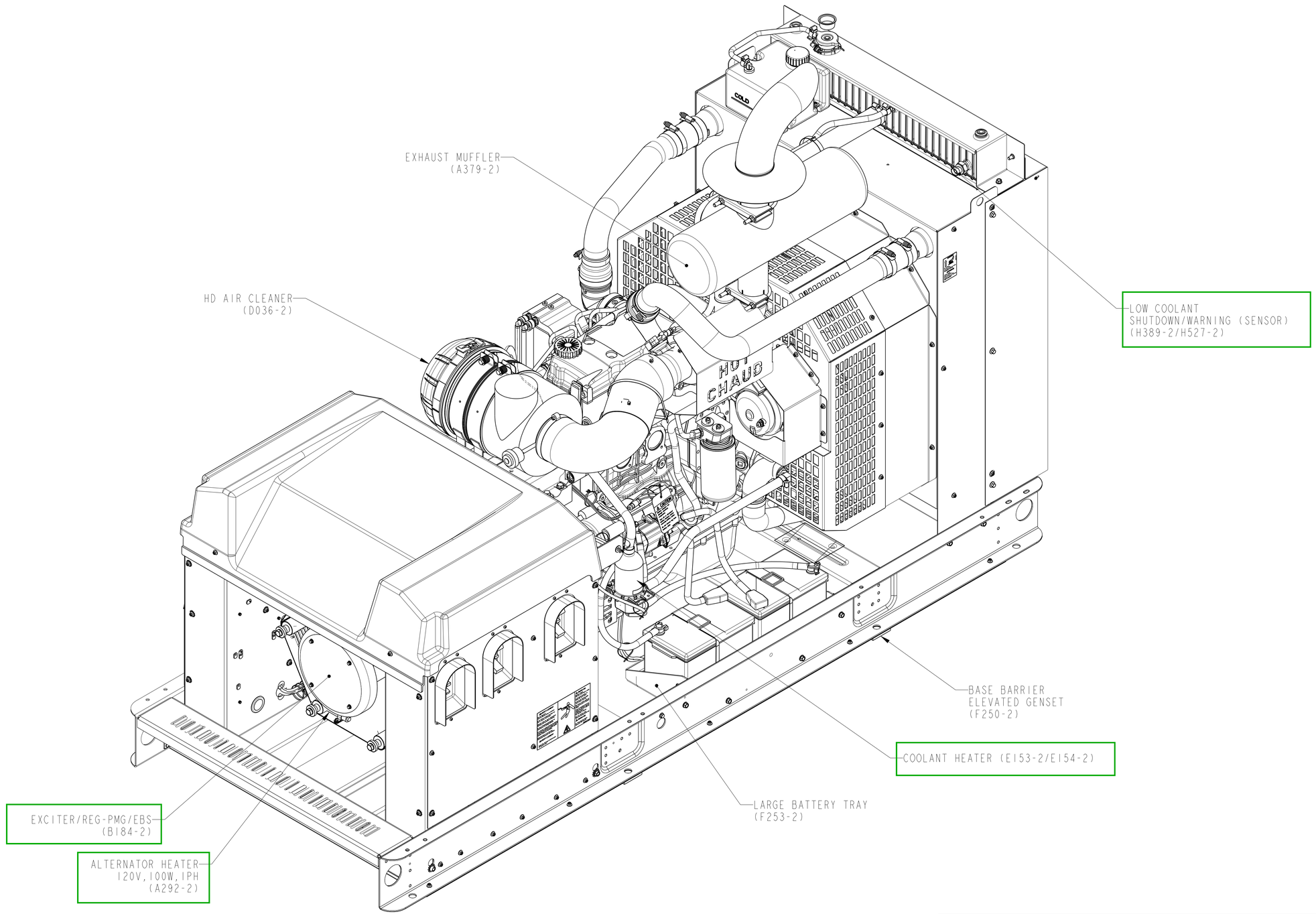
MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: NONE
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: D SCALE:3:16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric



C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y899	PART REVISION: E
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 2 OF 4
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: D
SCALE:3:16

DIMENSIONING AND TOLERANCING PER:
ASME Y14.5-2009
THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

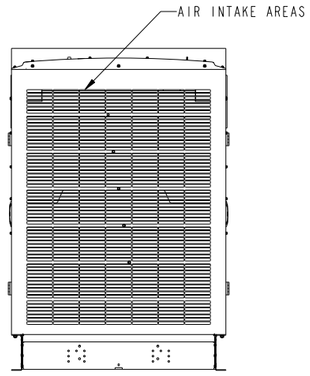
PTC® Creo® Parametric

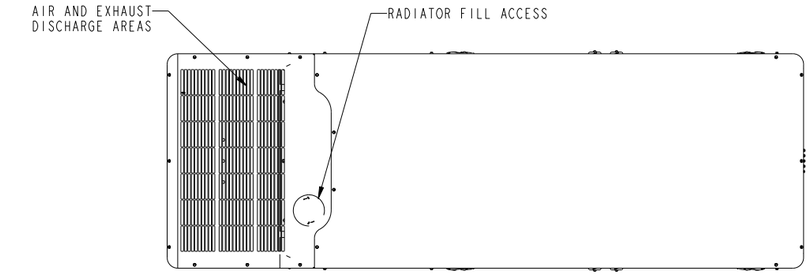
REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15

Estimated Total Package Weight:
Dry Fuel Tank - 4,220 lbs.
Wet Fuel Tank - 6,100 lbs.

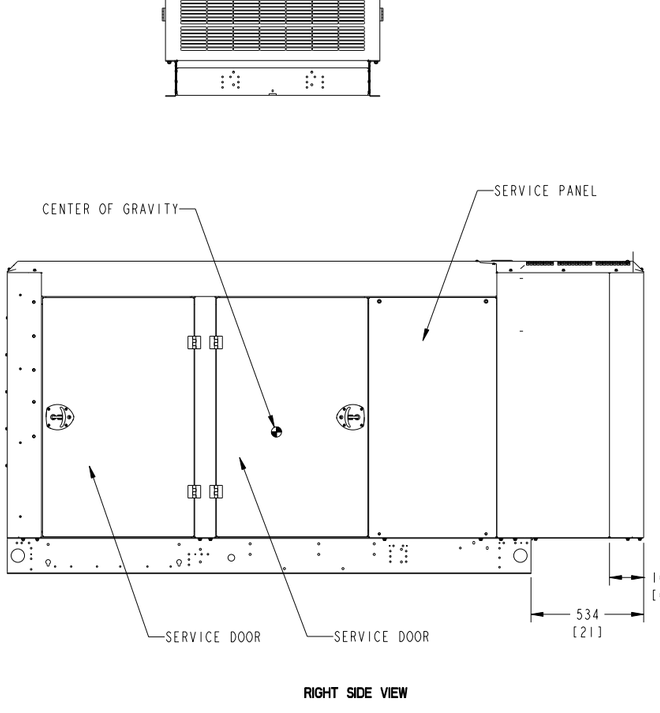
NOTES:

1. DIM [] IN INCHES
2. WHEN THE HOUSING INSTALLED ON AN OPEN GENERATOR SET, THE TOTAL WEIGHT WILL INCREASE BY 131.5 KG (290 LBS). THIS INCLUDES THE MUFFLER.
3. THE CENTER OF GRAVITY(CG) OF THE GENERATOR SET WHEN EQUIPPED WITH THIS HOUSING SHIFTS APPROXIMATELY 65mm (2.55 inch) TOWARDS THE AIR DISCHARGE END OF THE HOUSING AND 42MM (1.66 INCH) HIGHER FROM THE GROUND. COMPARED TO THE EQUIVALENT NON-HOUSED PRODUCT WITH THE F179 SKID. SEE HOUSING READY SKID BASE OUTLINE DRAWING FOR CG LOCATION OF NON HOUSED PRODUCT.

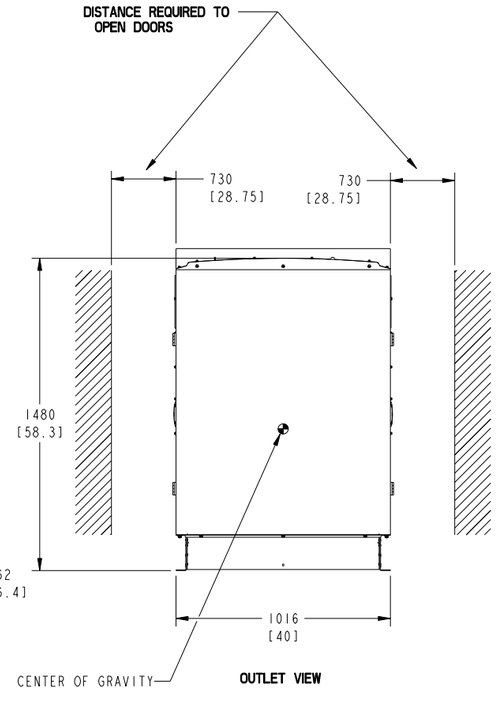




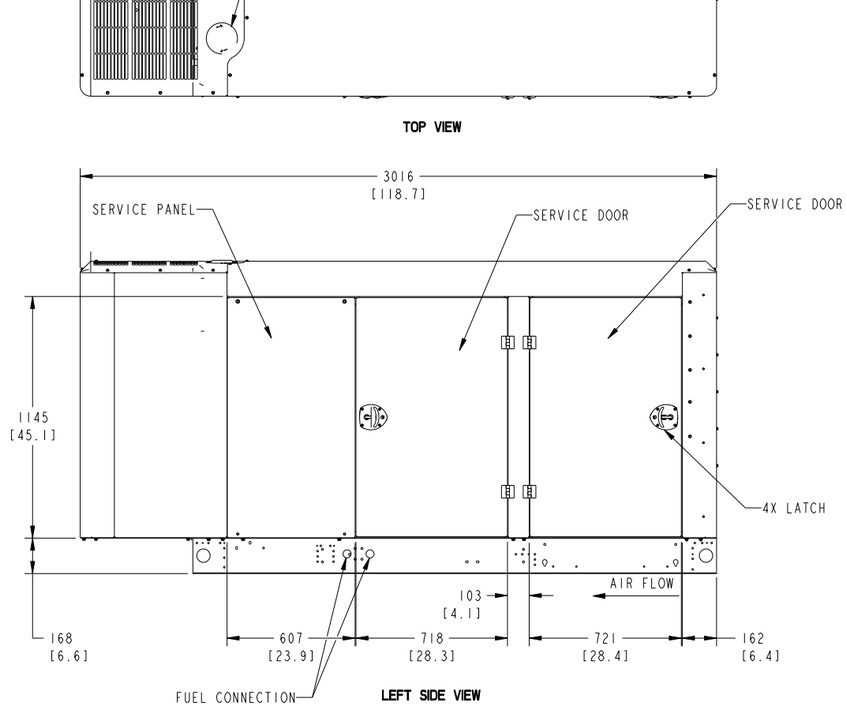
TOP VIEW



RIGHT SIDE VIEW



OUTLET VIEW



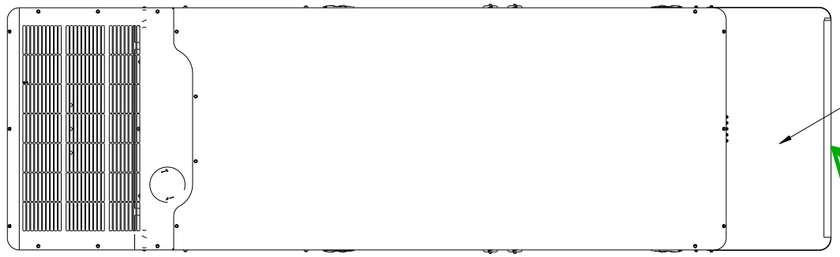
LEFT SIDE VIEW

F231-2 ENCLOSURE CONFIGURATION

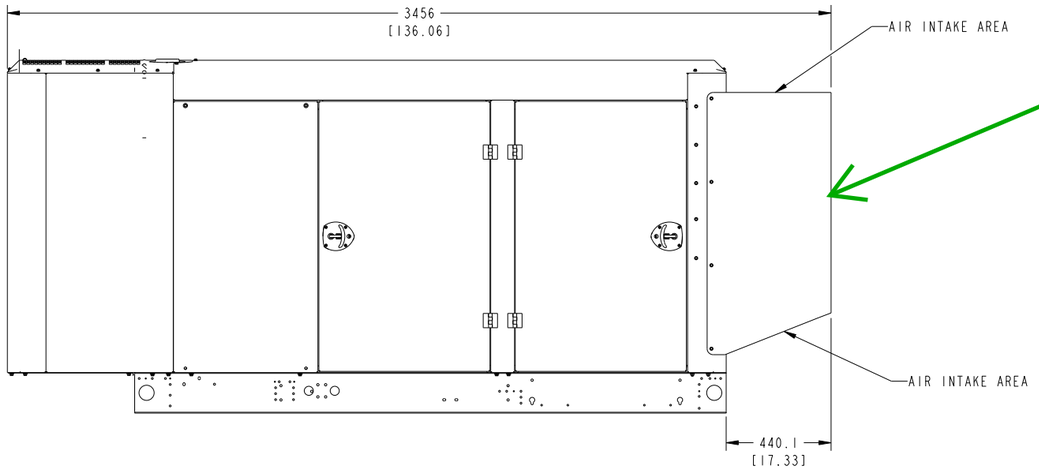
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
ANG TOL: ± 1.0°	SCALE: ~3/32	APVD M_WICKMANN	SITE CODE		
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		DATE 14MAY15	PGF	DWG SIZE D — A051P365	SHEET 1 OF 2 — DWG REV A
		FIRST USED ON ARROW	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994		

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15



AIR INTAKE AREA

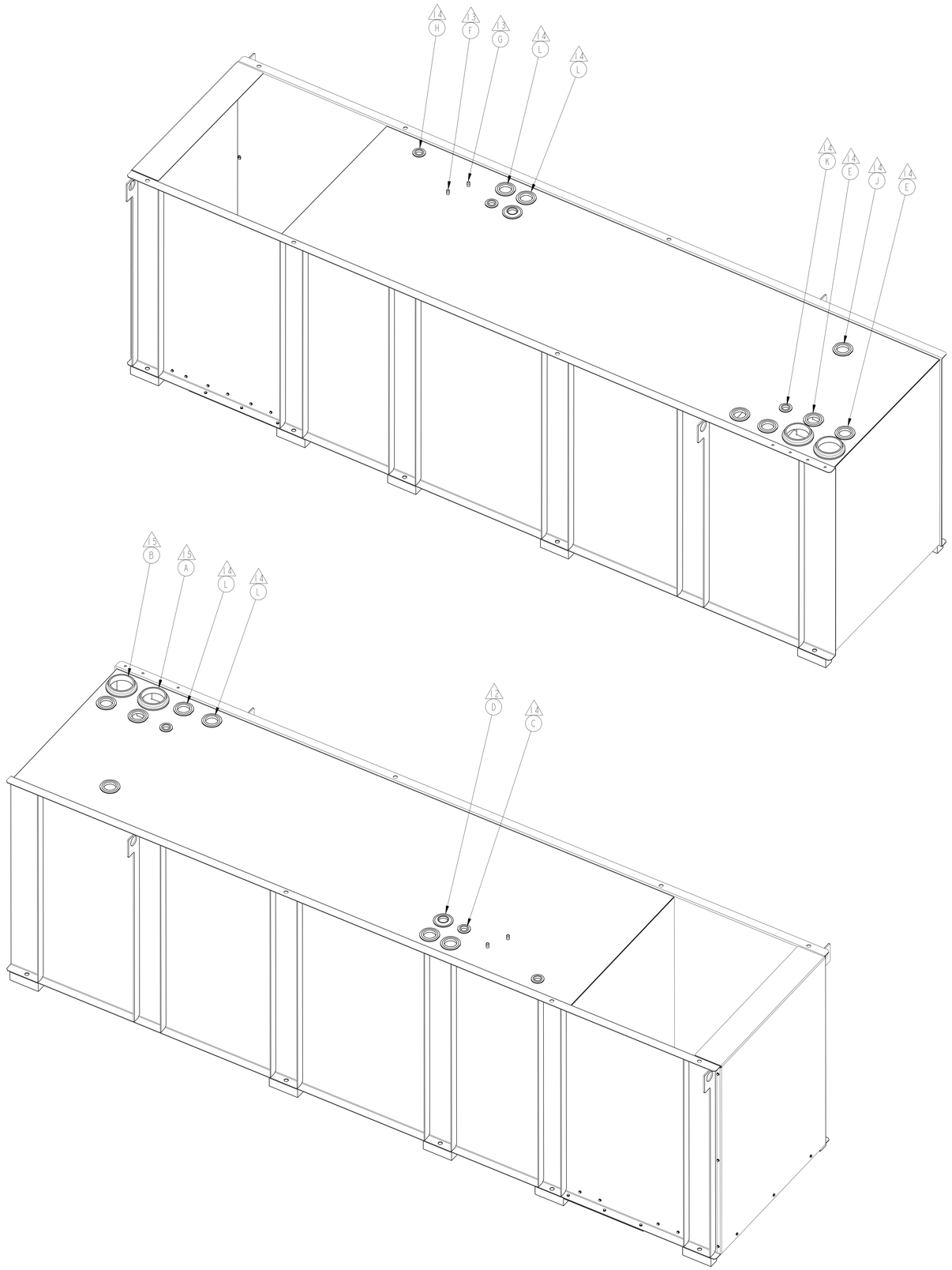


Hood Ships loose

F217-2 ENCLOSURE CONFIGURATION

REFER TO PAGE 1 (F231-2 ENCLOSURE FOR OTHER F217-2 ENCLOSURE DIMENSIONS.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08, 5.00- 9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
ANG TOL: ± 1.0° — SCALE: ~3/32	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD M_WICKMANN	SITE CODE PGF	DWG SIZE D — A051P365	SHEET 2 OF 2 — DWG REV A
		DATE 14MAY15			
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 — FIRST USED ON ARROW			



FUEL TANK COMPONENT LIST	
A	PRIMARY EMERGENCY VENT
B	SECONDARY EMERGENCY VENT
C	LOW FUEL SWITCH
D	FUEL GAUGE
E	NORMAL VENT
F	ENGINE SUPPLY
G	ENGINE RETURN
H	RUPTURE BASIN SWITCH
J	FUEL FILL
K	HIGH FUEL ALARM
L	SPARE

NOTES:

1. TANKS ARE UL142 LISTED, SECONDARY CONTAINMENT FUEL TANK. REFER TO TANK LABELS AND LOCAL CODE TO DETERMINE VENTING REQUIREMENTS FOR BOTH COMPARTMENTS.

2. SUBBASE FUEL TANK MOUNTING. EXCESSIVE TWISTING OF THE FUEL TANK MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO ENSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:

   2.1 REFER TO APPLICATION MANUAL T030 FOR GENERAL SET MOUNTING GUIDELINES.

   2.2 AFTER PLACING SET ON FOUNDATION, VERIFY ALL FOUR MOUNTING PADS CONTACT FOUNDATION.

   2.3 THERE ARE SHIMS ATTACHED TO EACH FUEL TANK. THESE ARE INTENDED TO FILL ANY GAP BETWEEN THE MOUNTING PADS AND FOUNDATION.

   2.4 INSERT THE MAXIMUM HEIGHT STACK OF SHIMS THAT WILL SLIDE INTO THE GAP.

   2.5 TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.

3. FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.

4. FUEL TANK HAS A FLANGE THICKNESS OF UP TO 10 mm [0.394 in], ALLOW EXTRA LENGTH ON HARDWARE FOR UNEVENNESS OF MOUNTING SURFACE.

5. LIFTING BASE OF FUEL TANK PERIMETER IS SHOWN. FOUNDATION SHOULD BE EXTENDED BEYOND THIS PERIMETER. SEE T-030 APPLICATION MANUAL FOR FURTHER INSTRUCTIONS.

6. REMOVABLE STUB-UP ACCESS PANEL.

7. MAINTAIN MIN 51 mm [2] CLEARANCE ABOVE E-VENT.

8. WEIGHT AND CENTER OF GRAVITY INFORMATION IS ESTIMATED AND CHANGES WITH TANK FEATURE INSTALLATION.

9. DRY WEIGHT REFERS TO TANK WITH NO LIQUID. WET WEIGHT REFERS TO TANK FILLED WITH DIESEL TO MAXIMUM USEABLE VOLUME.

10. NOMINAL TANK VOLUME REFERS TO OVERALL TANK VOLUME. USEABLE TANK VOLUME REFERS TO MAXIMUM FILL VOLUME OF TANK.

11. CENTER OF GRAVITY DIMENSIONS REFER TO A DRY TANK.

12. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 9.52 MM [0.37]

13. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 21.52 MM [0.84]

14. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 7.94 MM [0.31]

15. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 26.97 MM [1.06]

PART NUMBER: A054B564	PART REVISION: H
PART NAME: OUTLINE,TANK	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 1 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: "

SIZE: A0 SCALE: 1/8

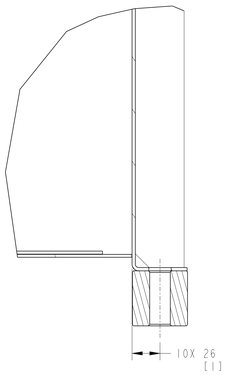
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

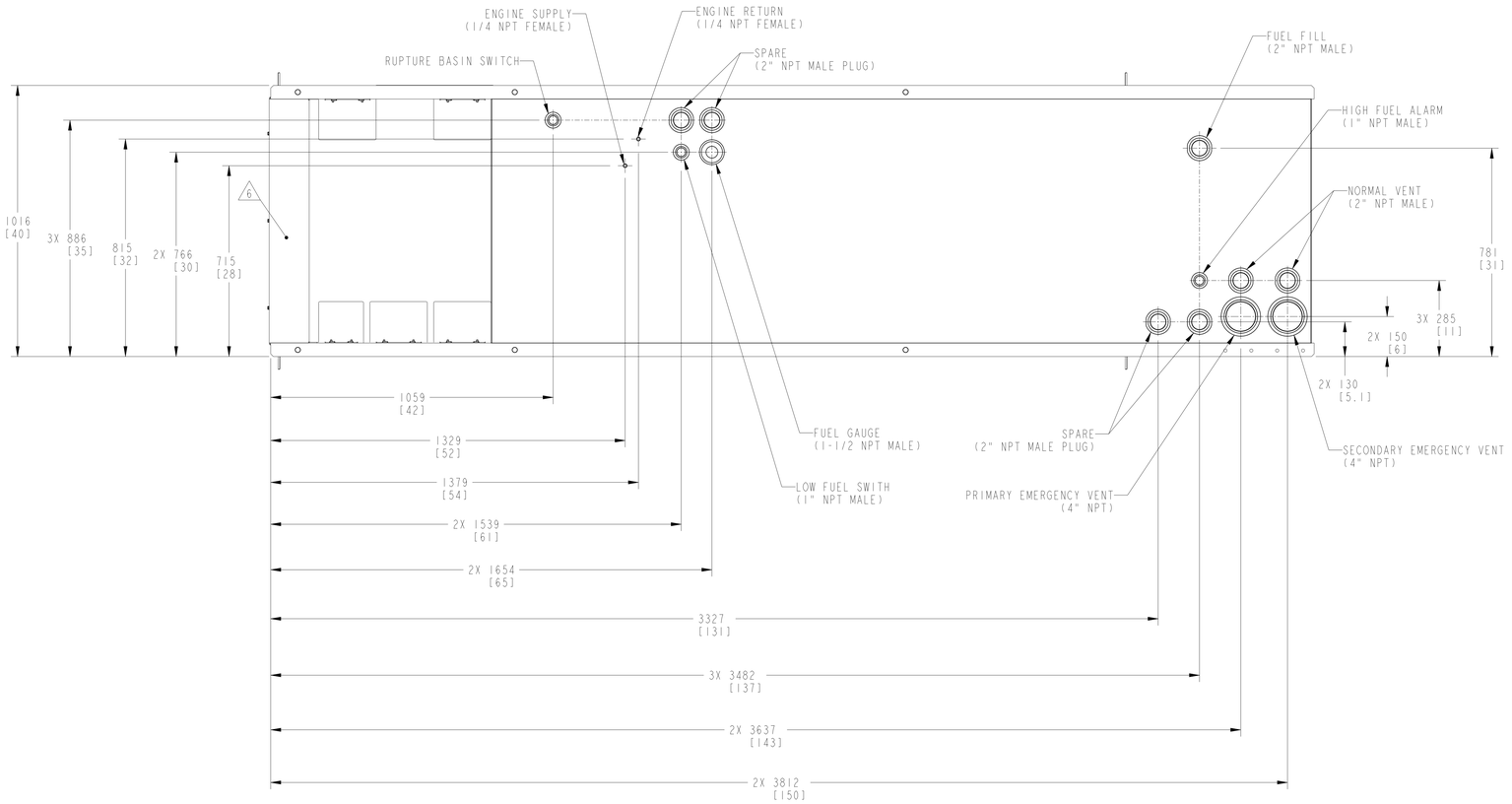
CAD SYSTEM
PTC® Creo® Parametric

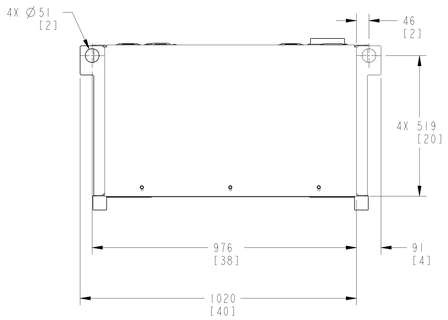
270 GALLON FUEL TANK (A053L909)

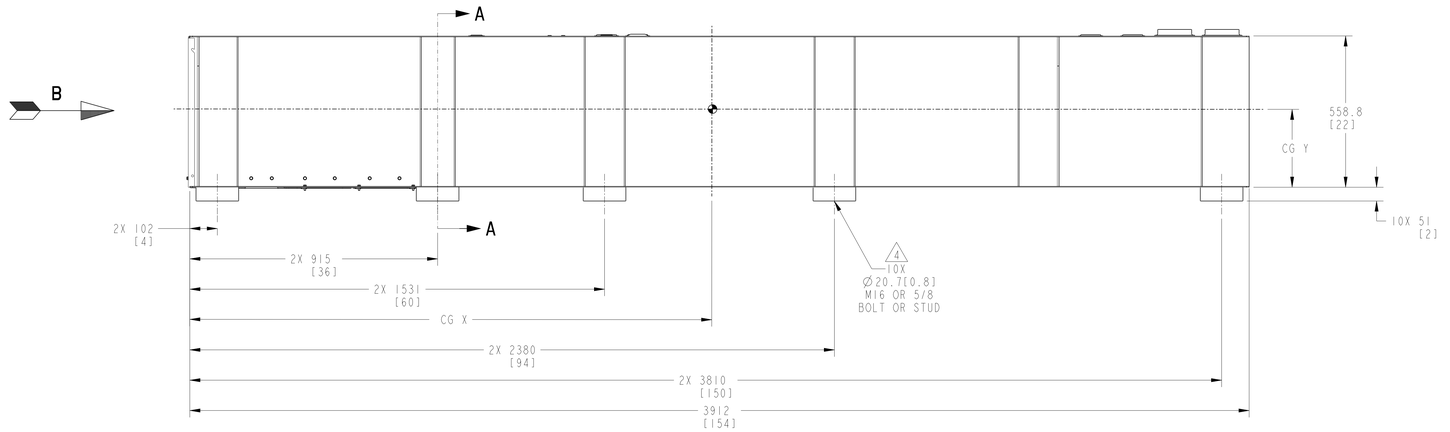
TABULATION							
WEIGHT KG [LBS]		TANK VOLUME LITERS [GAL]		TANK HEIGHT MM [IN]		CENTER OF GRAVITY MM [IN]	
DRY	WET	NOMINAL	USEABLE	EXTERNAL	INTERNAL	CG X	CG Y
607 [1338]	1457 [3213]	1045 [276]	1022 [270]	558 [22]	458.7 [18.06]	2170 [85]	283 [11]



SECTION A-A
SCALE 1/2
VIEW FROM B







PART NUMBER: A054B564	PART REVISION: H
PART NAME: OUTLINE,TANK	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 2 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: A0 SCALE: 1/8
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM
PTC® Creo® Parametric

A053L909 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	23	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18.06	458.7	270	276
20.3	515.62		310

A053L911 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	25	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18	457.2	269	275
20	508	300	305
22	558.8	330	336
24	609.6	361	366
26	660.4	391	397
28	711.2	422	427
28.21	716.5	425	431
30.3	769.62		463

A053L912 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	25	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18	457.2	269	275
20	508	300	305
22	558.8	330	336
24	609.6	361	366
26	660.4	391	397
28	711.2	422	427
30	762	452	458
32	812.8	483	489
34	863.6	513	519
36	914.4	544	550
38	965.2	574	580
40	1016	605	611
41.31	1049.3	625	631
44.3	1125.22		676

PART NUMBER: A054B564	PART REVISION: H
PART NAME: OUTLINE,TANK	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 5 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: A0
SCALE: 1/8

DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

COMES ON THE ENGINE

60 PIN CONN

CRANKSHAFT SPEED SENSOR
- CRANKSHAFT POSITION SIGNAL — 27
- CRANKSHAFT POSITION RETURN — 48
- CRANKSHAFT POSITION 5 VOLT SUPPLY — 16

CAMSHAFT POSITION SENSOR
- CAMSHAFT POSITION SIGNAL — 26
- CAMSHAFT POSITION RETURN
- CAMSHAFT POSITION 5 VOLT SUPPLY

RAIL FUEL PRESSURE SENSOR
- RAIL FUEL PRESSURE RETURN
- RAIL FUEL PRESSURE SIGNAL — 25
- RAIL FUEL PRESSURE 5 VOLT SUPPLY

WATER IN FUEL SENSOR
- WATER IN FUEL SIGNAL — 14
- WATER IN FUEL RETURN

INTAKE MANIFOLD PRESSURE/AIR TEMPERATURE SENSOR
- INTAKE MANIFOLD PRESSURE SIGNAL — 44
- INTAKE MANIFOLD PRESS/TEMP +5 VDC SUPPLY — 37
- INTAKE MANIFOLD AIR TEMP SIGNAL — 23
- INTAKE MANIFOLD PRESSURE/TEMP RETURN — 47

ENGINE OIL PRESSURE SENSOR
- ENGINE OIL PRESSURE SIGNAL — 13
- ENGINE OIL PRESSURE RETURN
- ENGINE OIL PRESSURE 5V SUPPLY

BAROMETRIC PRESSURE SENSOR
- BAROMETRIC PRESSURE SIGNAL — 03
- BAROMETRIC PRESSURE RETURN — 38
- BAROMETRIC PRESSURE 5 VOLT SUPPLY — 33

ENGINE COOLANT TEMPERATURE SENSOR
- ENGINE COOLANT TEMPERATURE SIGNAL — 15
- ENGINE COOLANT TEMPERATURE RETURN

FUEL PUMP ACTUATOR
- FUEL PUMP ACTUATOR SIGNAL — 02
- FUEL PUMP ACTUATOR RETURN — 32

SAE J1939 ENGINE DATALINK
- SAE J1939 ENGINE (+) — 08
- SAE J1939 ENGINE (-) — 06

6 CYLINDER ENGINES (QSB7 & QSL9)

PASS-THROUGH CONNECTORS

INJECTOR 1	CYLINDER NUMBER 1 DRIVER	45
	CYLINDER NUMBER 1 RETURN	53
INJECTOR 2	CYLINDER NUMBER 2 DRIVER	54
	CYLINDER NUMBER 2 RETURN	51
INJECTOR 3	CYLINDER NUMBER 3 DRIVER	55
	CYLINDER NUMBER 3 RETURN	52
INJECTOR 4	CYLINDER NUMBER 4 DRIVER	56
	CYLINDER NUMBER 4 RETURN	58
INJECTOR 5	CYLINDER NUMBER 5 DRIVER	46
	CYLINDER NUMBER 5 RETURN	60
INJECTOR 6	CYLINDER NUMBER 6 DRIVER	57
	CYLINDER NUMBER 6 RETURN	59

4 CYLINDER ENGINE (QSB5)

PASS-THROUGH CONNECTORS

INJECTOR 1	CYLINDER NUMBER 1 DRIVER	45
	CYLINDER NUMBER 1 RETURN	53
INJECTOR 2	CYLINDER NUMBER 2 DRIVER	57
	CYLINDER NUMBER 2 RETURN	59
INJECTOR 3	CYLINDER NUMBER 3 DRIVER	46
	CYLINDER NUMBER 3 RETURN	60
INJECTOR 4	CYLINDER NUMBER 4 DRIVER	55
	CYLINDER NUMBER 4 RETURN	52

CM850

C02 — SP1 — SP5 — W-13, W-14, W-15, W-18, W-19, W-17

TO BE USED ONLY BY AUTHORIZED PERSONNEL

C05 ECM PROGRAMMING CONNECTOR

P50

C01 — W-22, W-23, W-24, W-26, W-25, W-27, SP2, SP3, SP4, W-20, W-21, W-28, C2, 16, W-29, SP6, W-08

(-) BATTERY (+) — W-01, W-03, W-04, W-02, W-16, W-06, W-07, W-10

STARTER SWITCH — B+1 — STARTER — GND

CHRG ALT B+ — BATTERY CHARGING ALTERNATOR — CHRG ALT GND — W-05, W-12

W-09, W-31

PWR
- C02,C05 PWR
- POWER TO KEY SW,LCL/HMI
- STARTER B+
- CONTROL B+
- SWITCHED B+
- CRANK
- KEY SWITCH
- C02 PWR
- CONTROL GROUND
- C05 PWR

TO PAGE 2

LCL — W-32, W-33

SIG
- LCL B+
- LCL SIG

CAN+, CAN-, CAN SHIELD

TO PAGE 2

NOTES:
1. ALL DEVICES ARE SHOWN DE-ENERGIZED.
2. QSB5 AND QSB7: 12V SYSTEM BATTERIES CONNECTED IN PARALLEL. QSL9: 24V SYSTEM BATTERIES CONNECTED IN SERIES.
3. RELAYS RATED FOR 12V USED ON QSB5 AND QSB7. RELAYS RATED FOR 24V USED ON QSL9.
4. QSB5 AND QSB7: USE 12V BATTERY CHARGER. QSL9: USE 24V BATTERY CHARGER.

FOR QSB5 (12V), QSB7 (12V) AND QSL9 (24V) WITH PCC 2300

LEGEND:
ENGINE HARNESS
A053T310

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: -
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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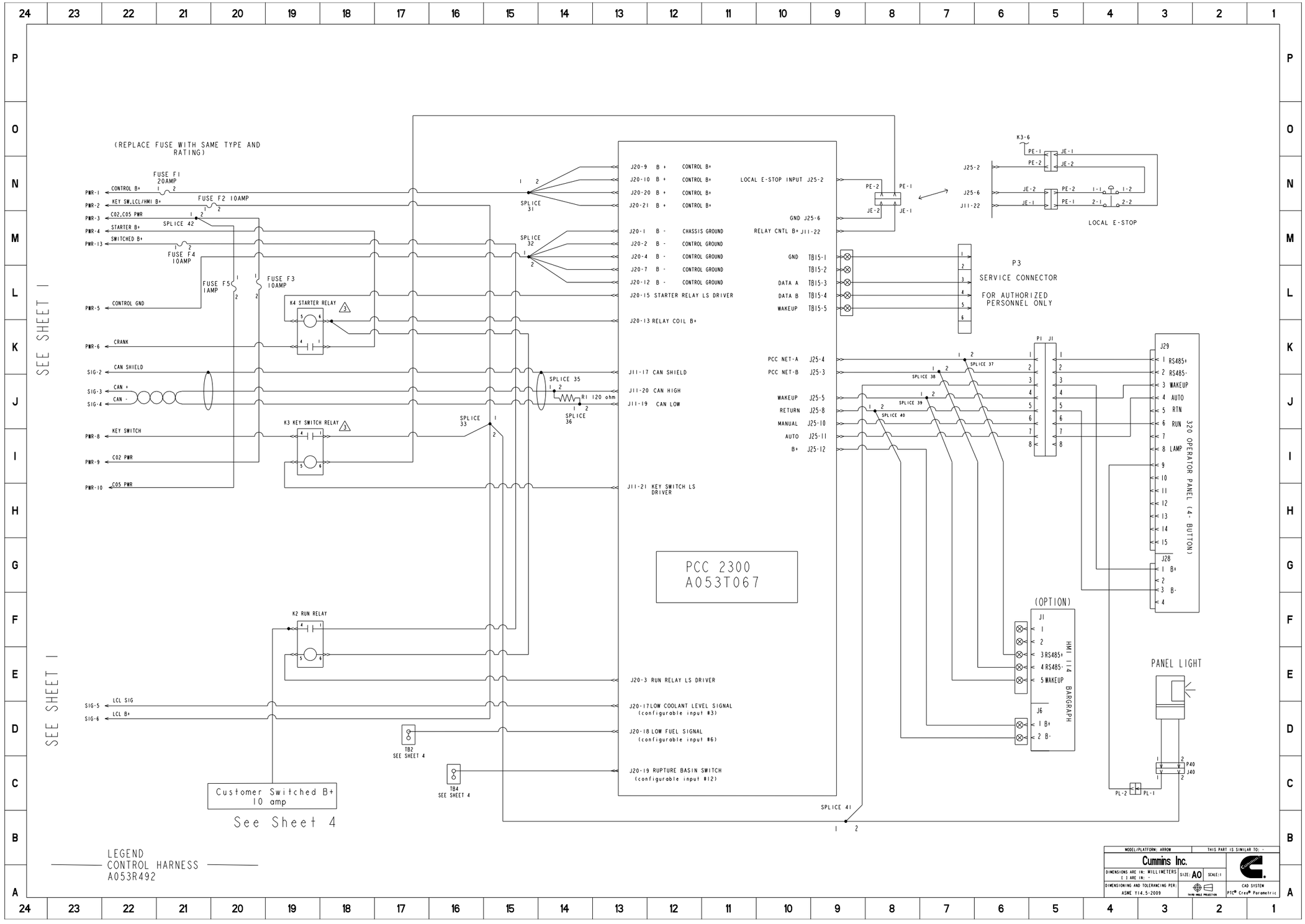
Part Number: **A054B421** Part Revision: **G**
Part Name: **DIAGRAM,GENSET SCHEMATIC**
Drawing Category: **Detail** State: **Released**



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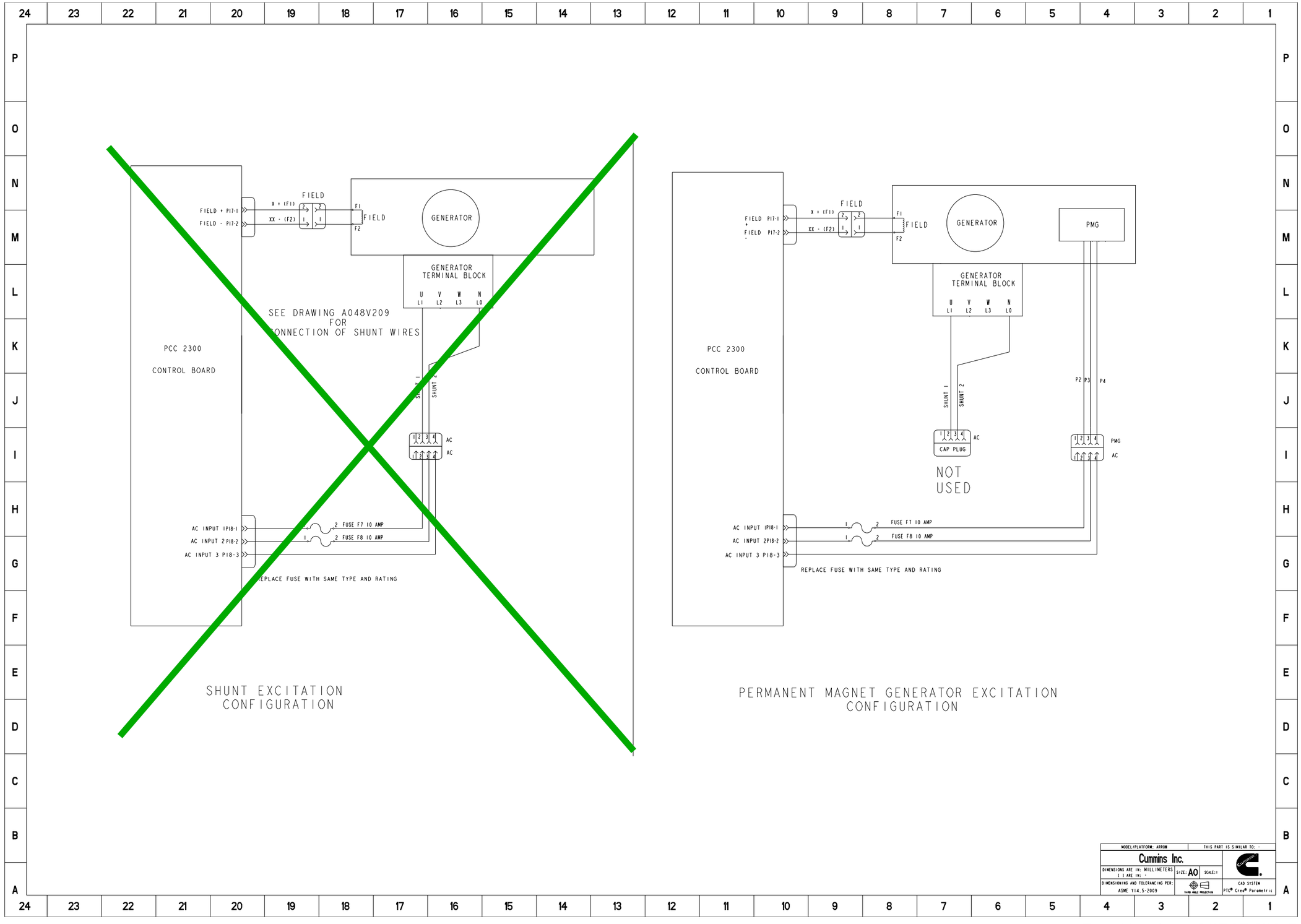

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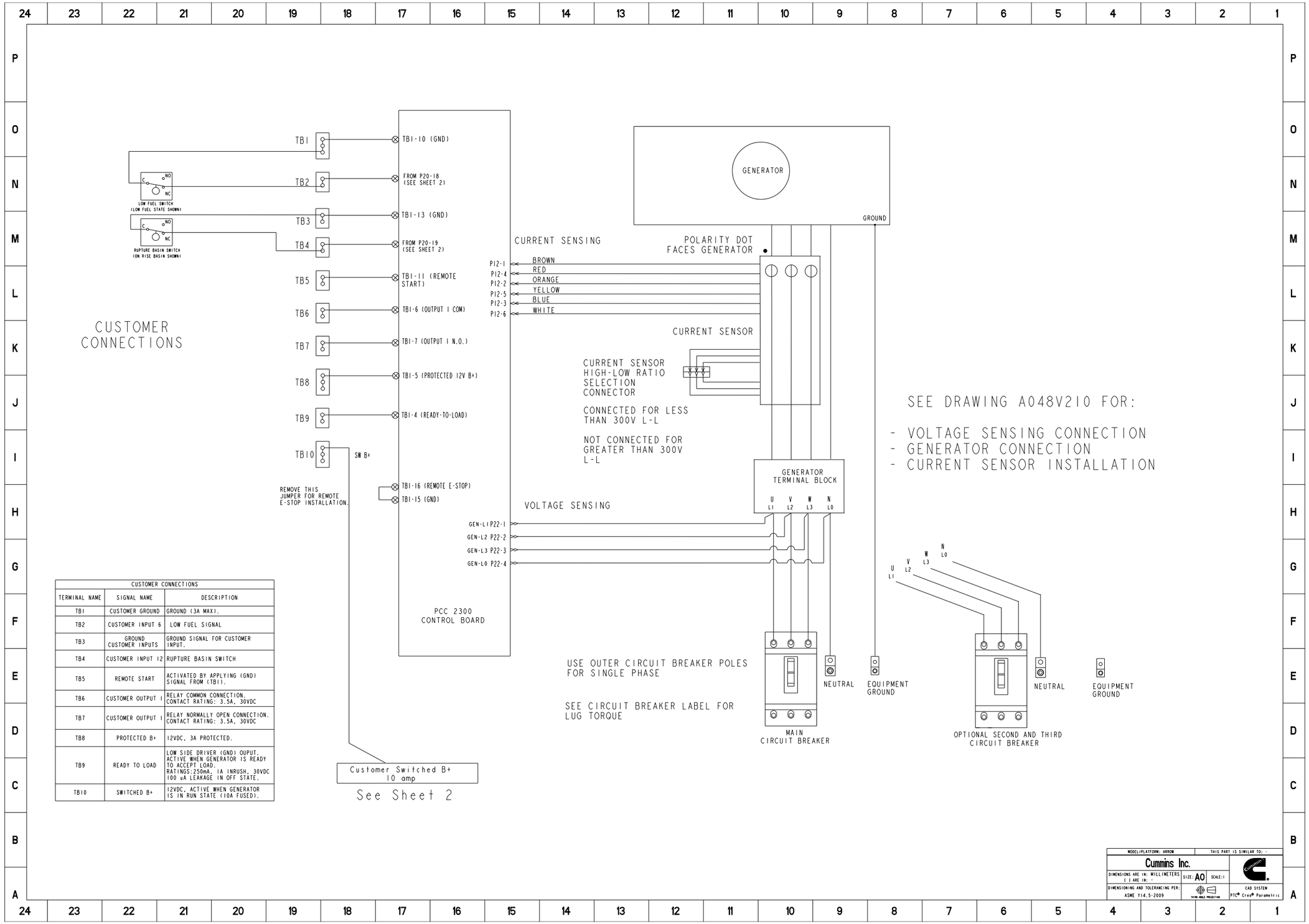

CUSTOMER CONNECTIONS		
TERMINAL NAME	SIGNAL NAME	DESCRIPTION
TB1	CUSTOMER GROUND	GROUND (3A MAX).
TB2	CUSTOMER INPUT 6	LOW FUEL SIGNAL
TB3	GROUND CUSTOMER INPUTS	GROUND SIGNAL FOR CUSTOMER INPUT.
TB4	CUSTOMER INPUT 12	RUPTURE BASIN SWITCH
TB5	REMOTE START	ACTIVATED BY APPLYING (GND) SIGNAL FROM (TB1).
TB6	CUSTOMER OUTPUT 1	RELAY COMMON CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB7	CUSTOMER OUTPUT 1	RELAY NORMALLY OPEN CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB8	PROTECTED B+	12VDC, 3A PROTECTED.
TB9	READY TO LOAD	LOW SIDE DRIVER (GND) OUPUT. ACTIVE WHEN GENERATOR IS READY TO ACCEPT LOAD. RATINGS:250mA, 1A INRUSH, 30VDC 100 uA LEAKAGE IN OFF STATE.
TB10	SWITCHED B+	12VDC, ACTIVE WHEN GENERATOR IS IN RUN STATE (10A FUSED).

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: -
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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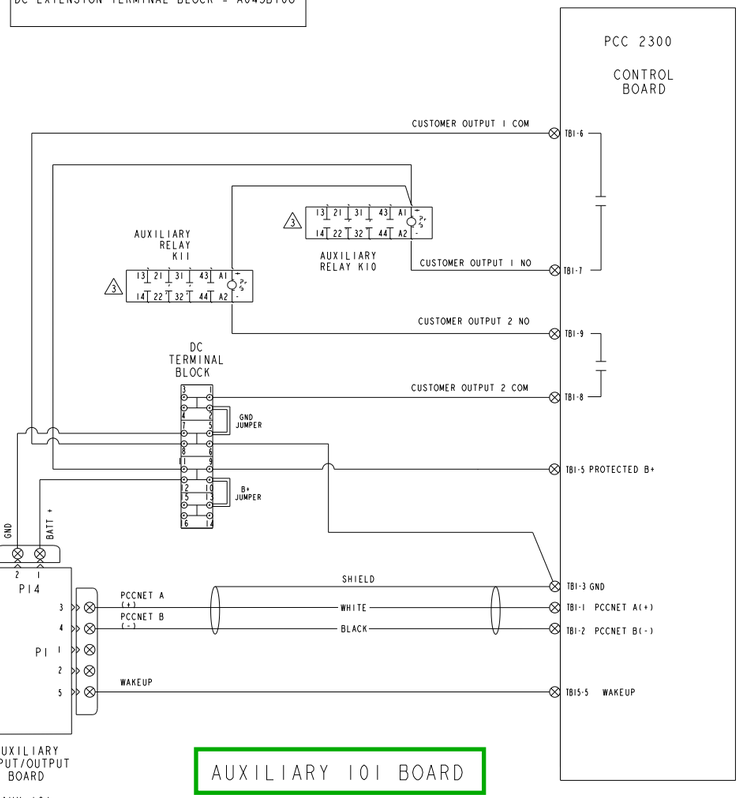
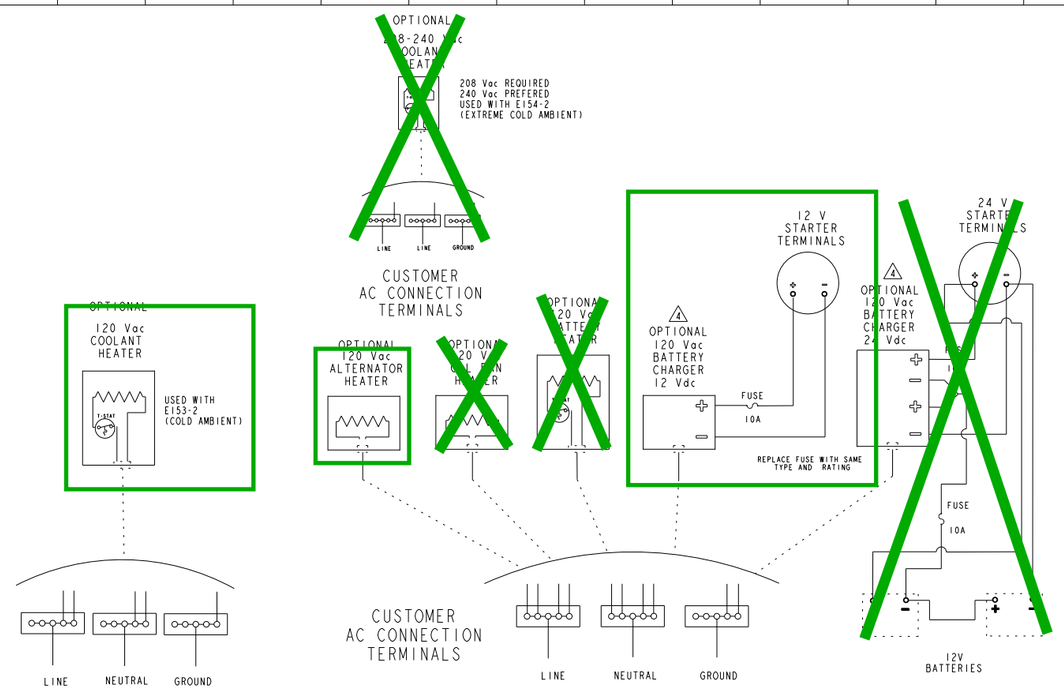
HARNESSES FOR OPTIONS
AUX 101 = A043A230
AUXILIARY RELAYS = A042Z041
DC EXTENSION TERMINAL BLOCK = A043B108



AUXILIARY 101 BOARD

AUXILIARY RELAYS

DC EXTENSION TERMINAL BLOCKS



INSTALLER TO PROVIDE BRANCH CIRCUITS TO POWER ALL ACCESSORIES

ALL ACCESSORIES ARE SINGLE PHASE 120/240 V Ac 60 Hz

FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRIC CODES FOR INSTALLATION

[redacted]
COOLANT HEATER [redacted] 1500 Watts, 120V Ac, 12.50 Amps
[redacted]
[redacted]
[redacted]
ALTERNATOR HEATER 100 Watts, 120V Ac, 0.83 Amps
BATTERY CHARGER (12V), 192 Watts, 120V Ac, 1.67 Amps (MAX)
[redacted]

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: -
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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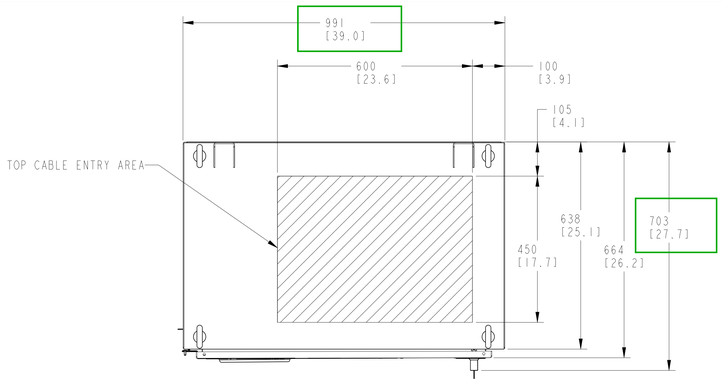
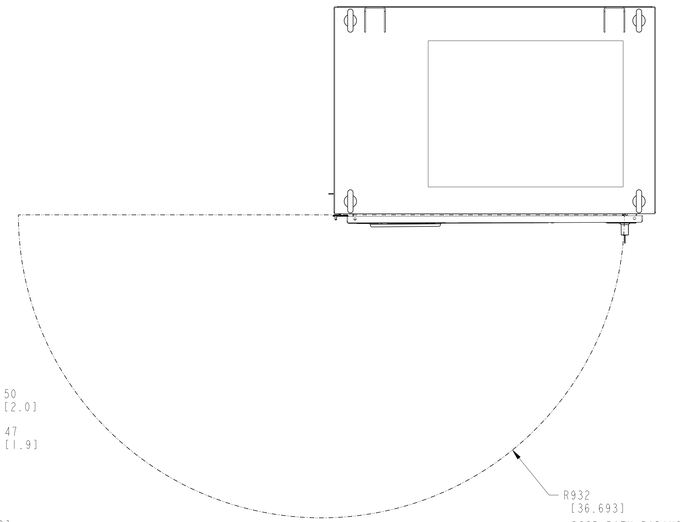
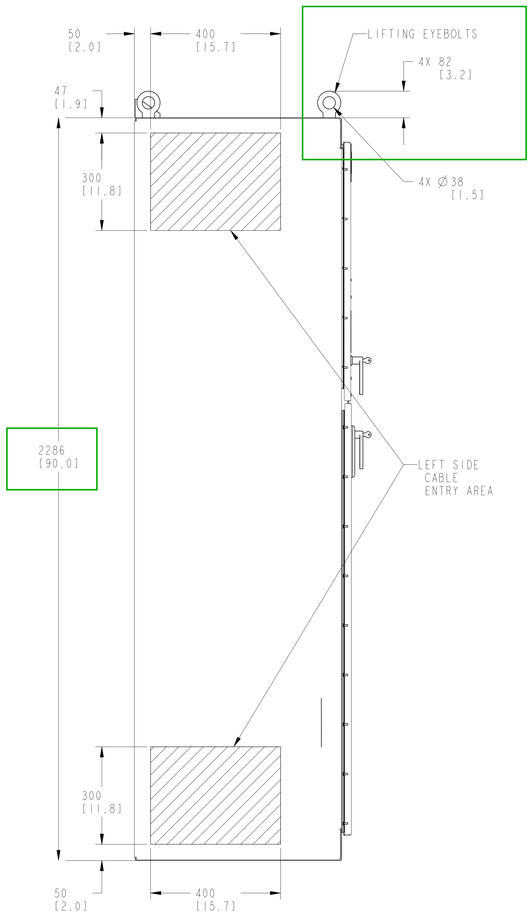
Part Name: **DIAGRAM,GENSET SCHEMATIC**
Drawing Category: **Detail** State: **Released**

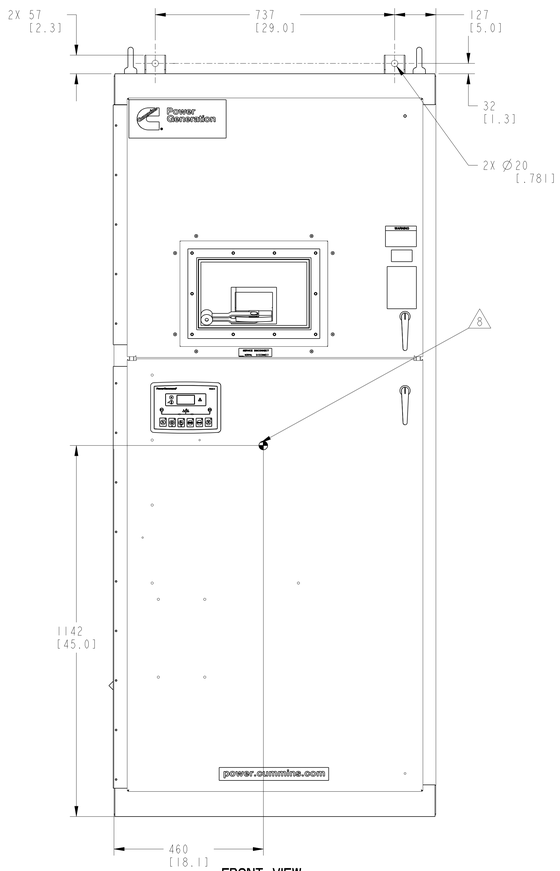


TOP VIEW

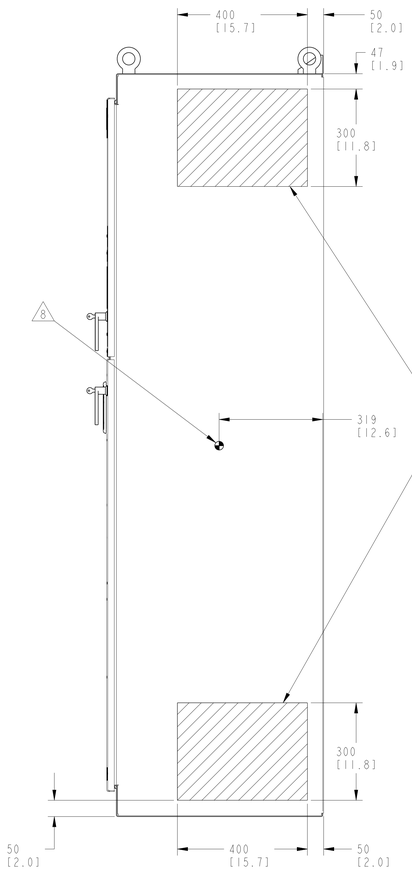




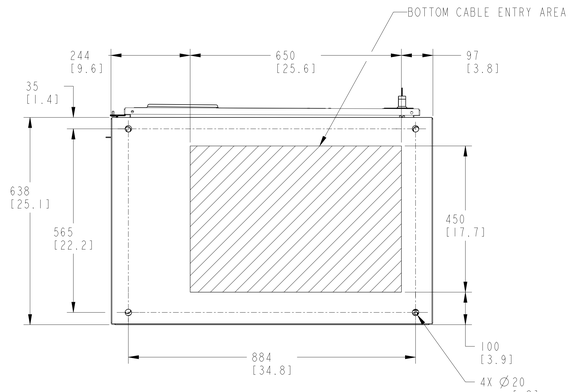
LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW



BOTTOM VIEW

NOTES:

1. APPROXIMATE WEIGHT BASED ON CAD MODEL (NOT FOR INSPECTION):
   3 POLE
   ~~FOR TYPE 1: 835.2 LBS (379 KG)~~
   FOR TYPE 3R: 1032.5 LBS (468 KG)
   ~~FOR TYPE 12: 1044.9 LBS (474 KG)~~
   4 POLE
   FOR TYPE 1: 851.7 LBS (386 KG)
   FOR TYPE 3R: 1050 LBS (476 KG)
   FOR TYPE 12: 1031.4 LBS (468 KG)
2. TYPE 1, 3R OR 12 FLOOR MOUNTED ENCLOSURE.
   ~~TYPE 1 - WITHOUT SEAL GASKET ON THE DOOR AND DRAIN HOLES~~
   TYPE 3R - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND DRAIN HOLES
   ~~TYPE 12 - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND WITHOUT DRAIN HOLES~~
3. LUG CAPACITY
   UTILITY CIRCUIT BREAKER - #2-600 MCM (4) CU/AL PER PHASE
   EMERGENCY, LOAD AND NEUTRAL - 250-500 MCM (4) CU/AL PER PHASE
   GROUND - #6-250 MCM (1) CU/AL
4. USE SEPARATE CONDUITS FOR CONTROL WIRING AND POWER WIRING. DO NOT COMBINE.
5. SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA. DO NOT INSTALL OUTSIDE OF SHADED AREA.
6. WIRE BENDING SPACE CONFORMS TO NATIONAL ELECTRIC CODE (NFPA70).
7. REFER TO THE NATIONAL ELECTRIC CODE FOR MINIMUM CLEAR SPACE IN FRONT OF THIS ENCLOSURE.
8. CENTER OF GRAVITY IS APPROXIMATE.
9. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.
10. FOR UNITS WITH BOLTED DOOR CLAMPS; DO NOT TIGHTEN WITH IMPACT DRIVER AND USE THE FOLLOWING TORQUE REQUIREMENTS: 5/16-18= 13.6-16.3 Nm
11. MANUAL OPERATOR SHOULD ONLY BE USED WHEN THE POWER IS DISCONNECTED FROM UTILITY AND GENERATOR PRIOR TO MOVEMENT OF THE OPERATOR.

PART NUMBER: A074K743	PART REVISION: C
PART NAME: OUTLINE,ENCLOSURE	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 1 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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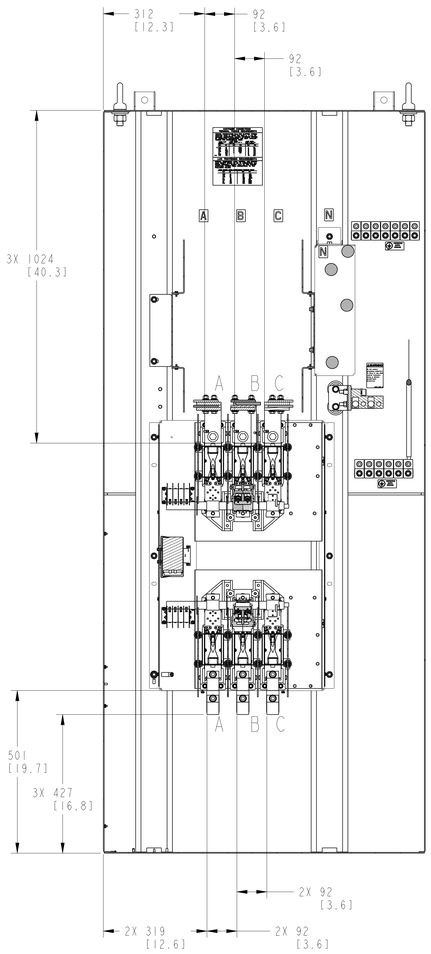
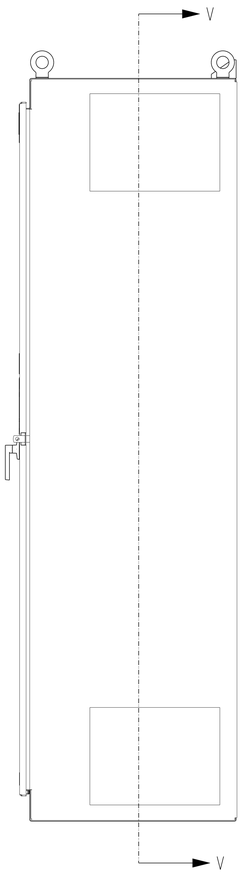
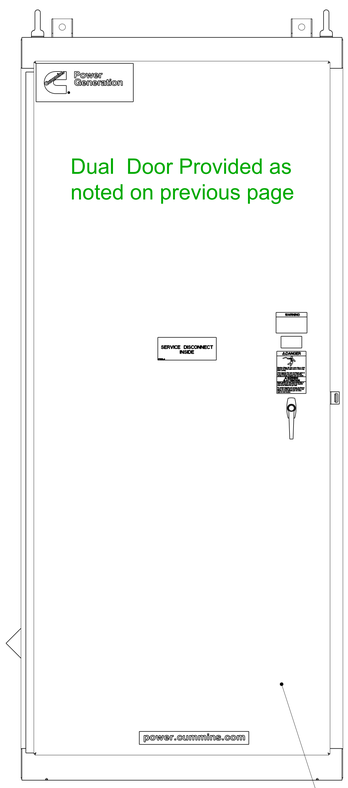
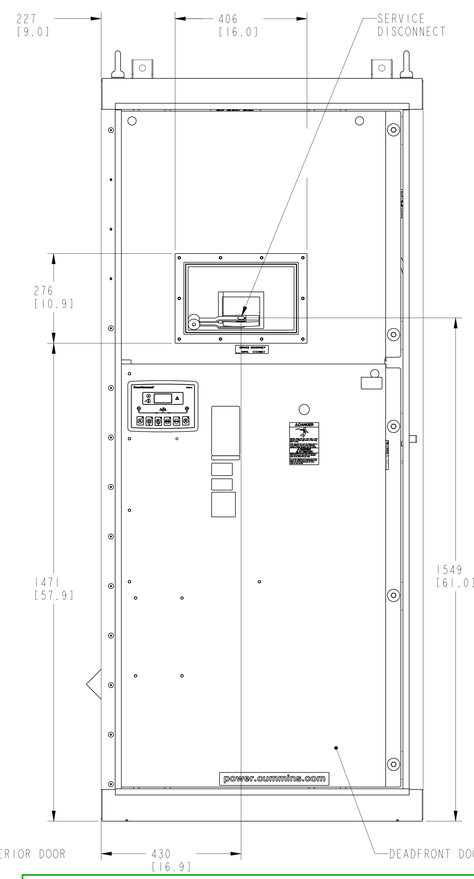
MODEL/PLATFORM:OTECSE 800-1000A	THIS PART IS SIMILAR TO: A0655436
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0 SCALE:0.15
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric





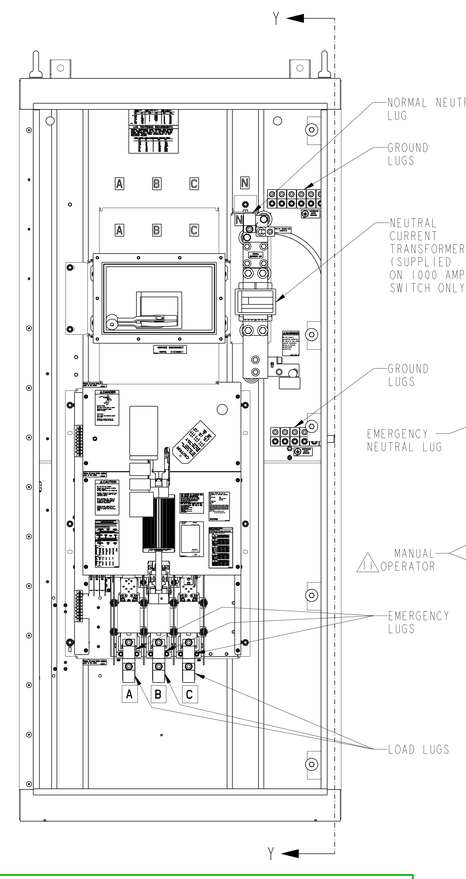


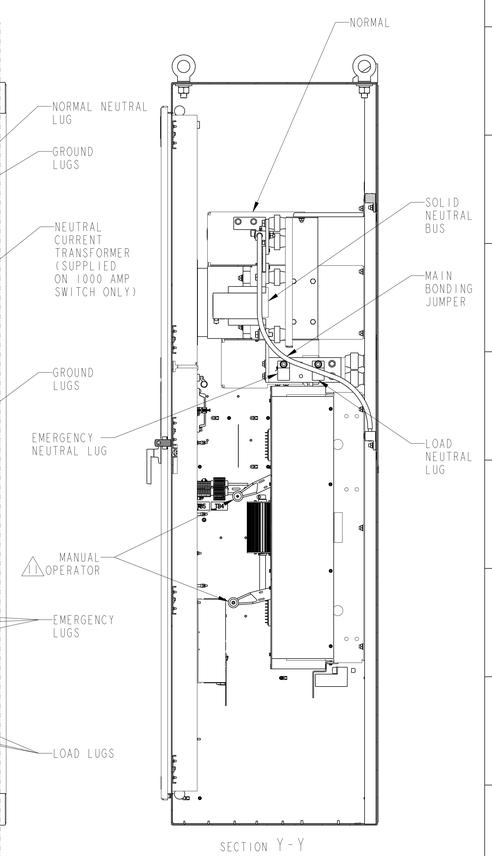
SECTION V-V
PART 0319_6812 HIDDEN FOR CLEAR VISUALIZATION



EXTERIOR DOOR HIDDEN FOR CLEAR VISUALIZATION

EXTERIOR DOOR & DEADFRONT DOOR HIDDEN FOR CLEAR VISUALIZATION





SECTION Y-Y

OTEC SE 800-1000A, 3 POLE, TYPE 3R & 12

PART NUMBER: A074K743	PART REVISION: C
PART NAME: OUTLINE,ENCLOSURE	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 4 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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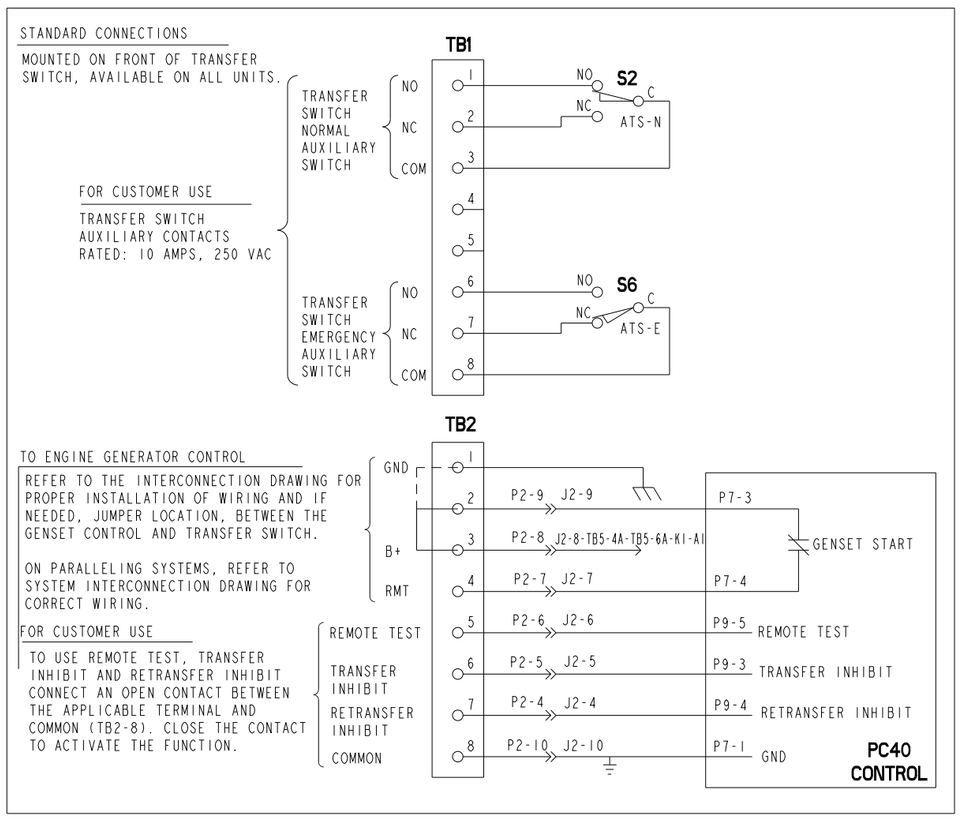
Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES | SIZE A0 | SCALE: 0.15

DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009 | THIRD ANGLE PROJECTION

CAD SYSTEM PTC® Creo® Parametric

CUSTOMER CONNECTIONS (STANDARD)

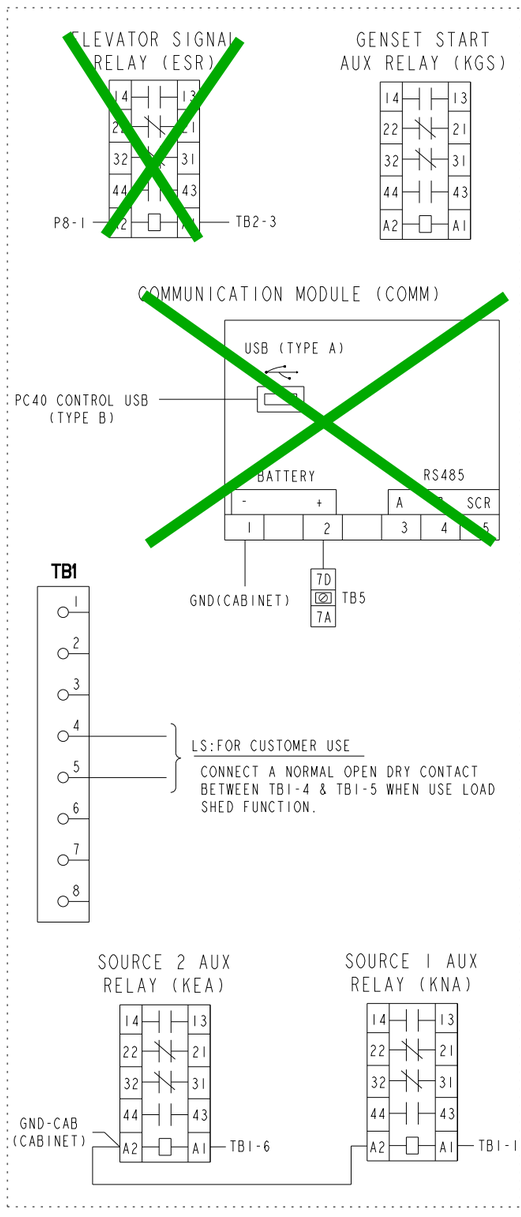


S2,S3,S4 AND S5 NORMAL POSITION AUXILIARY SWITCH
S6,S7,S8 AND S9 EMERGENCY POSITION AUXILIARY SWITCH
K1 OPEN EMERGENCY RELAY
K2 OPEN NORMAL RELAY
K3 CLOSE RELAY
CB MAIN CIRCUIT BREAKER
CB1 CIRCUIT BREAKER
M1 LINEAR MOTOR
C1 MOTOR RUN CAPACITOR

UTILITY TO GENSET
3 AND 4 POLE
OTEC 800-1200 AMP & OTECSE 150-1000 AMP
120 VOLT 1 PHASE L-N
220 VOLT 1 PHASE
240 VOLT 1 PHASE
190 VOLT 3 PHASE
208 VOLT 3 PHASE
220 VOLT 3 PHASE
240 VOLT 3 PHASE
380 VOLT 3 PHASE
415 VOLT 3 PHASE
440 VOLT 3 PHASE
480 VOLT 3 PHASE

OPTIONS:
COMM: COMMUNICATION MODULE
ESR: ELEVATOR SIGNAL RELAY
KGS: GENSET START AUX RELAY
KNA: SOURCE 1 AUX RELAY
KEA: SOURCE 2 AUX RELAY
LPCM: LOAD PHASE CURRENT MONITORING
LS: LOAD SHED

CUSTOMER CONNECTIONS (OPTIONAL)



NOTES:

1. TB1 AND TB2 ARE MOUNTED ON THE FRONT OF THE TRANSFER SWITCH.

⚠2 ALL DEVICES ARE SHOWN DE-ENERGIZED, WITH THE TRANSFER SWITCH CLOSED TO NORMAL. 4 POLE TRANSFER SWITCH SHOWN. ON 3 POLE MODELS THE SWITCHED NEUTRAL POLE IS REPLACED WITH A SOLID NEUTRAL BAR.
P1-11 AND P1-5 ARE CONNECTED TO NEUTRAL BAR ON 3 POLE MODELS.
ON SHEET 3.

3. FOR SINGLE PHASE UNITS:
120/240V, 3 WIRE - CONNECT POWER CABLES TO A AND C
120V L-N, 2 WIRE - CONNECT POWER CABLES TO A AND NEUTRAL.

4. FOR OTECSE MODEL, LIST OF MAIN CIRCUIT BREAKER TYPE SHOWN BELOW:
SWITCH RATING: MAIN CIRCUIT BREAKER TYPE
150-250A SQUARE D, TYPE 'LJ'.
300-600A SQUARE D, TYPE 'PJ'.
800-1000A SQUARE D, TYPE 'RJ'.

5. WIRING FOR RELAYS KNA AND KEA IS TYPICAL. POWER CONNECTIONS MAY VARY SLIGHTLY IF MORE OR LESS RELAYS ARE USED. ONLY 2 RELAYS CAN BE ORDERED.

⚠4 WHEN INSTALLING MULTIPLE RELAYS JUMPER GROUNDS TOGETHER INSTEAD OF RUNNING LEADS ALL THE WAY BACK TO GROUND. WHEN INSTALLING MULTIPLE RELAYS WITH THE SAME FUNCTION CONNECT TOGETHER FOR EASIER WIRING ON SHEET 5.

⚠5 KGS PROVIDED UNWIRED FOR ADDITIONAL GENSET START WIRING LOGIC TO MEET ANY LOCAL CODE OR INSTALLATION REQUIREMENTS. REFER TO THE INTERCONNECTION DRAWING FOR PROPER INSTALLATION OF WIRING.
ON SHEET 5.

⚠6 ON ALL SINGLE PHASE, 2 OR 3 WIRE UNITS:
THE WIRE CONNECTED FROM J1-2 TO P4-6 IS NOT PRESENT.
THE WIRE CONNECTED FROM J1-14 TO P4-2 IS NOT PRESENT.
IN ADDITION, ON 120 VOLT L-N, 2 WIRE UNITS:
THE WIRE CONNECTED FROM K1-33 TO TB4-2A WILL BE CONNECTED FROM K1-33 TO TB4-3A
THE WIRE CONNECTED FROM K2-33 TO TB4-5A WILL BE CONNECTED FROM K2-33 TO TB4-6A
ON SHEET 2.

9. ELEVATOR SIGNAL RELAY SHOWN DE-ENERGIZED.
RELAY CHANGES STATE DURING THE ELEVATOR DELAY TIME.

⚠10 CAUTION: DO NOT DISCONNECT THE CURRENT MODULE WHILE THE CURRENT TRANSFORMERS ARE ENERGIZED UNLESS THE SECONDARIES ARE SHORTED. TO SHORT SECONDARIES ATTACH THE SHORTING BAR TO THE CENTER OF TB6-4 TO TB6-7 BEING SURE TO TIGHTEN EACH SCREW.
ON SHEET 4, 5.

⚠11 THE CURRENT TRANSFORMERS ARE SHORTED DURING SHIPPING. TO ACTIVATE, REMOVE THE SHORTING BAR FROM THE CENTER OF TB6-4 TO TB6-7 BY LOOSENING ALL OF THE SCREWS AND LIFTING IT OUT OF THE TERMINAL BLOCK. SAVE FOR REUSE.
ON SHEET 4, 5.

⚠12 FOR SINGLE PHASE TWO WIRE SYSTEM, CT2 AND CT3 WILL BE REMOVED.
FOR SINGLE PHASE THREE WIRE SYSTEM, CT3 WILL BE REMOVED.
ON SHEET 4, 5.

MODEL/PLATFORM: OTEC	THIS PART IS SIMILAR TO: A065H781
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: - SIZE: A0 SCALE:1	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009 THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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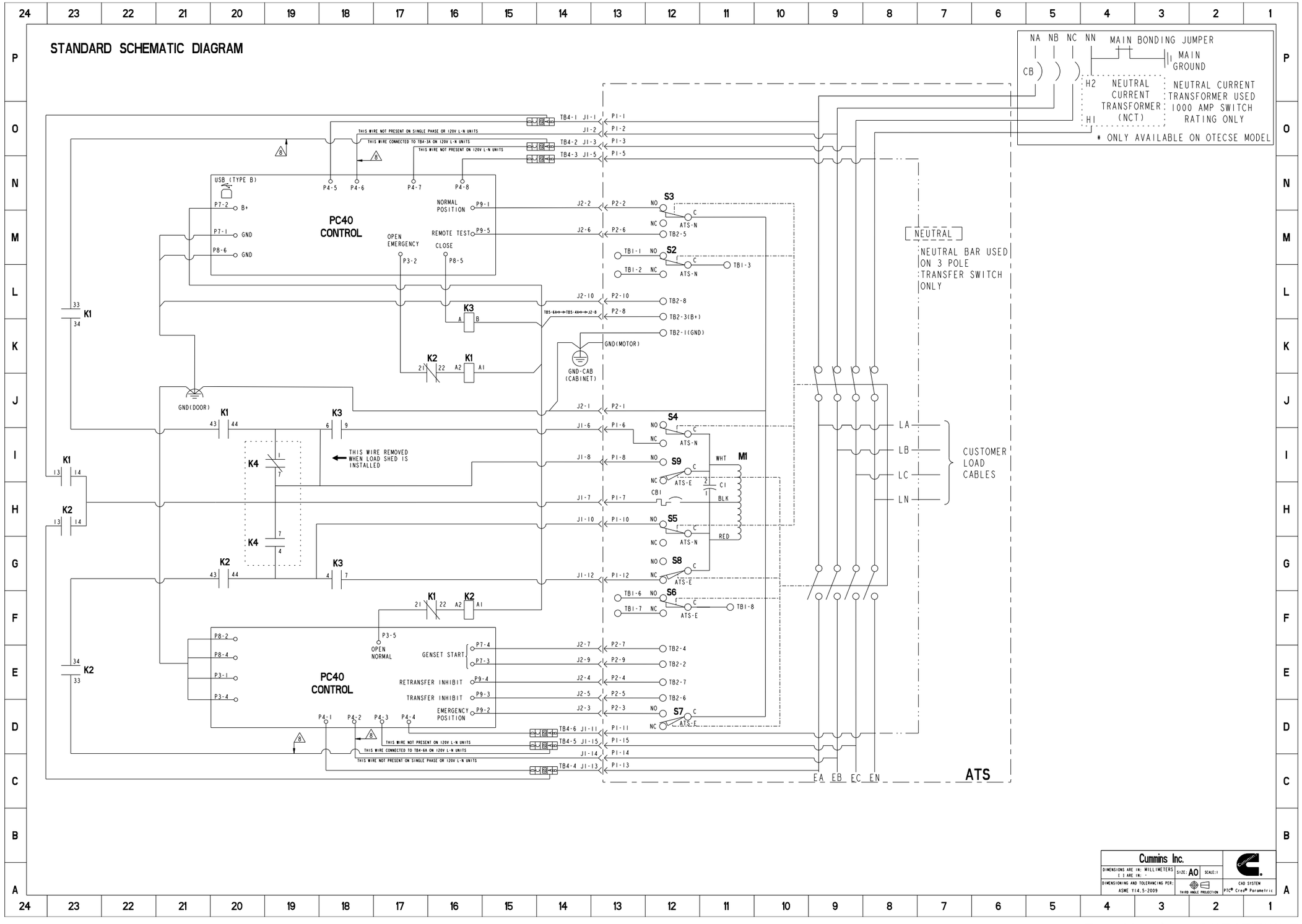
Part Number: **A074P729** Part Revision: **B**
Part Name: **DIAGRAM,SCHEMATIC**
Drawing Category: **Detail** State: **Released**

STANDARD SCHEMATIC DIAGRAM



Cummins Inc.	
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DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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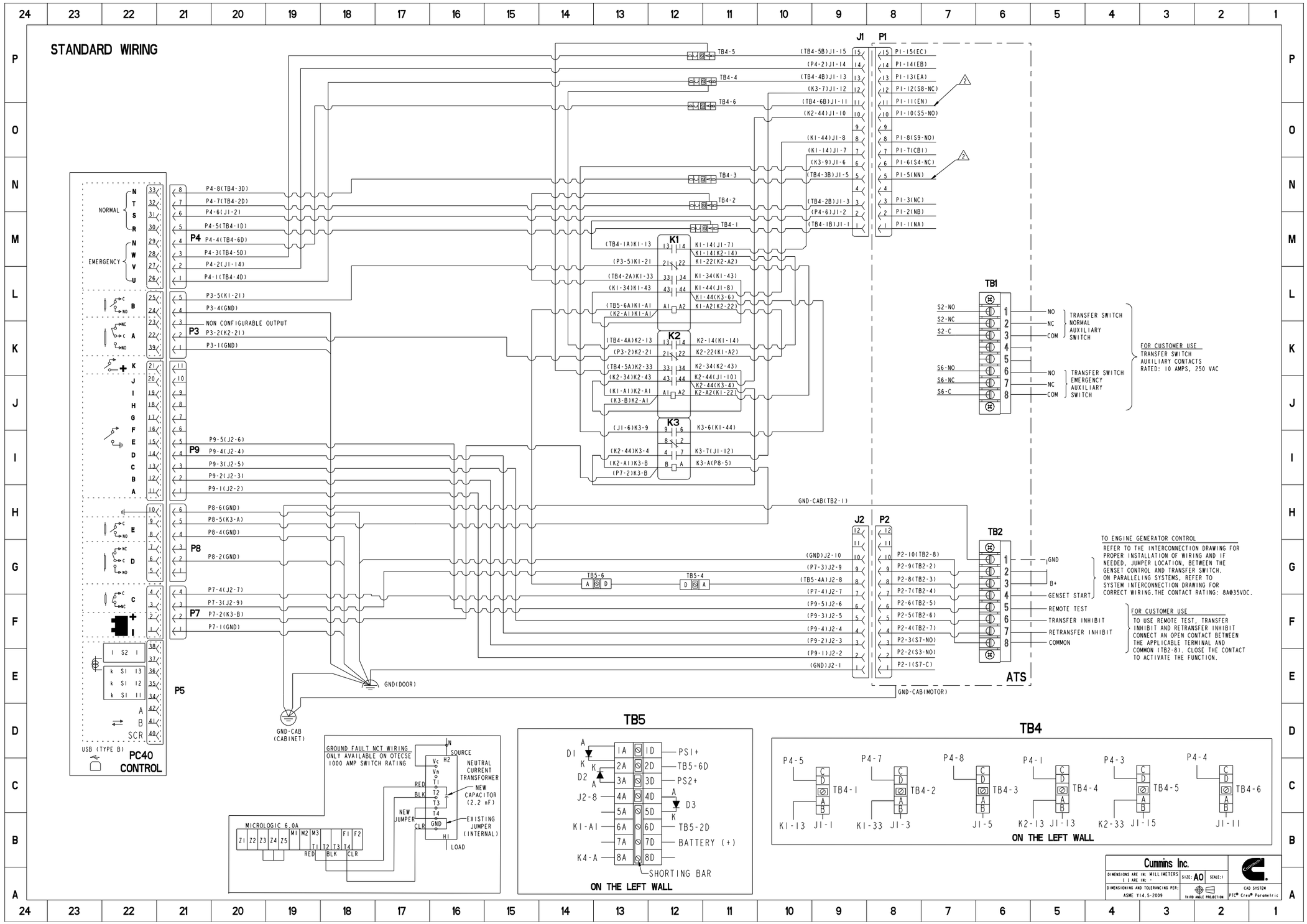

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Part Number: **A074P729** Part Revision: **B**

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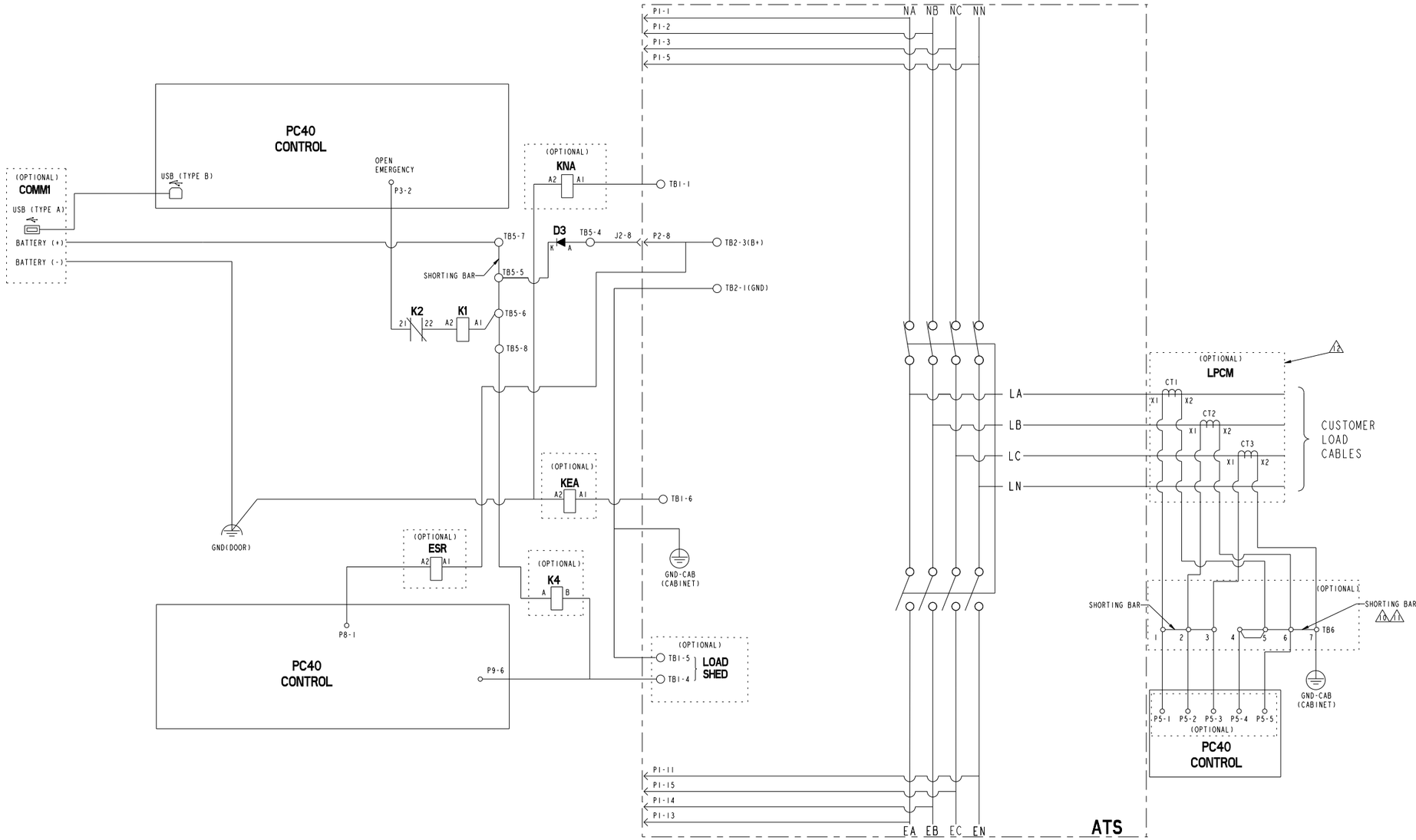
Drawing Category: **Detail** State: **Released**

OPTIONAL SCHEMATIC DIAGRAM



Cummins Inc.
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SIZE: A0 SCALE:1
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THIRD ANGLE PROJECTION
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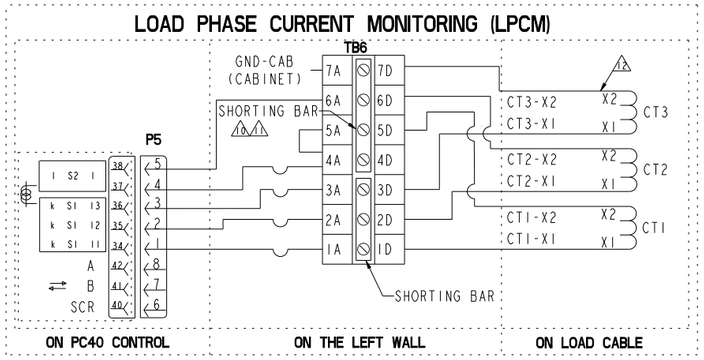
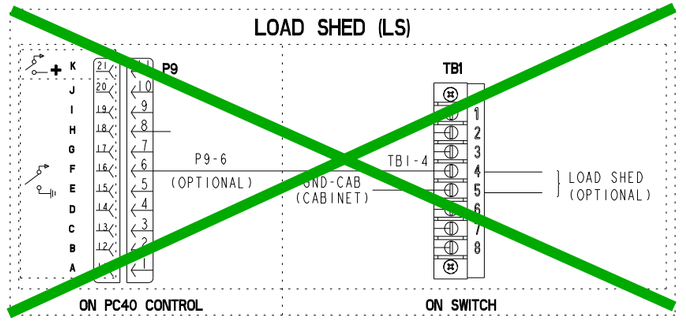
OPTIONAL WIRING

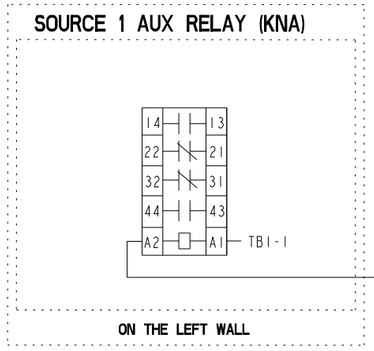
LOAD PHASE CURRENT MONITORING (LPCM)



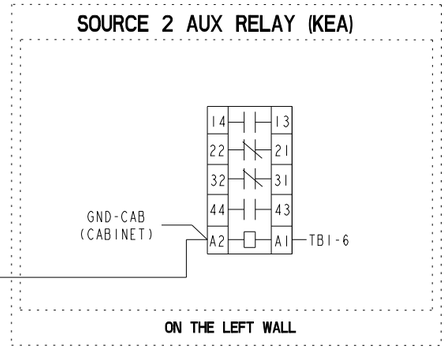
LOAD SHED (LS)



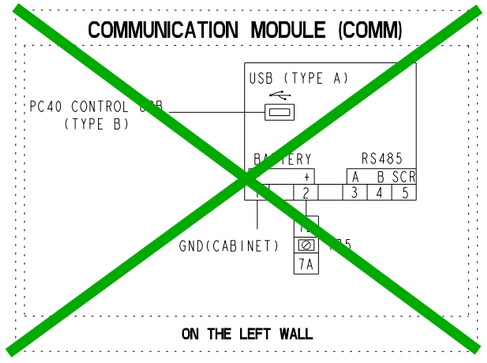
SOURCE 1 AUX RELAY (KNA)



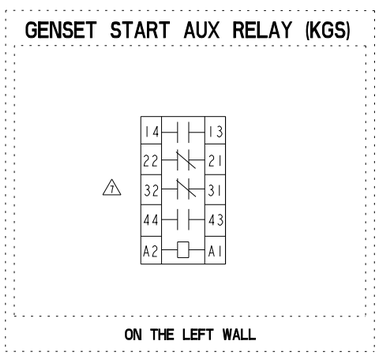
SOURCE 2 AUX RELAY (KEA)



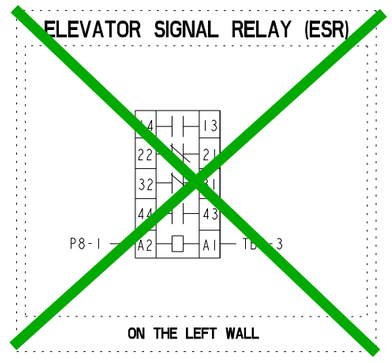
COMMUNICATION MODULE (COMM)



GENSET START AUX RELAY (KGS)



ELEVATOR SIGNAL RELAY (ESR)



Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: "	SIZE: A0	SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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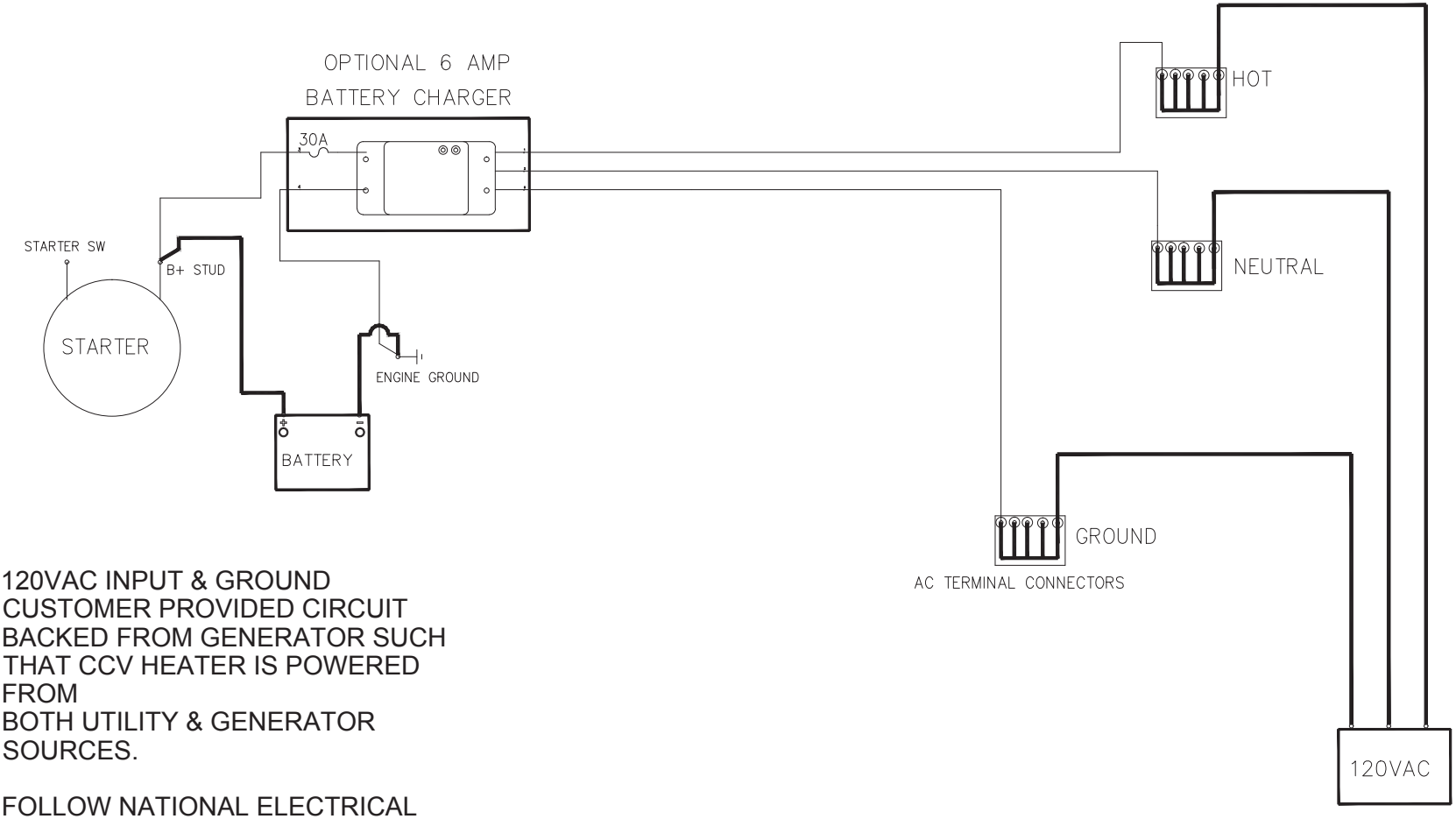
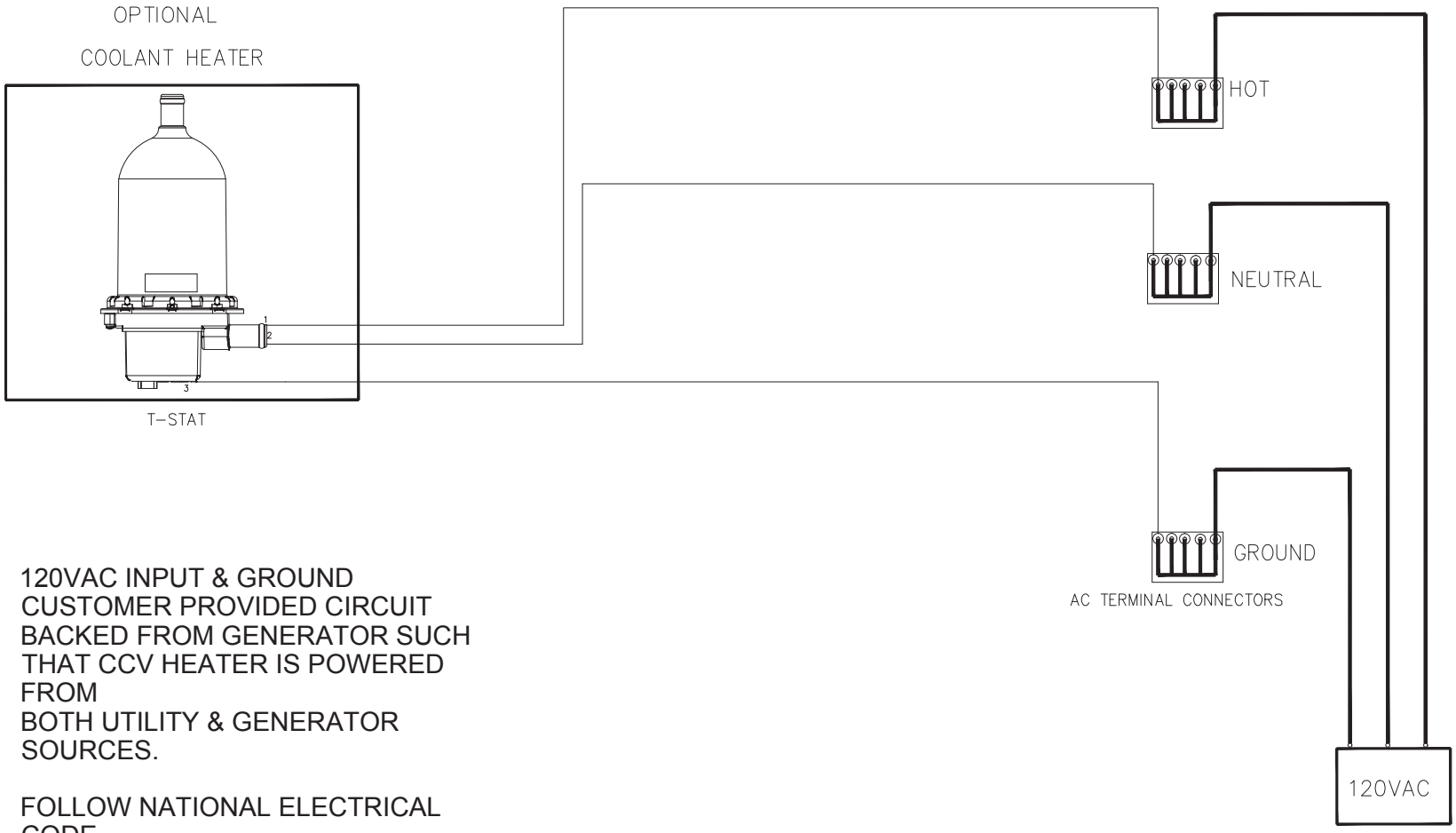


120VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
FROM
BOTH UTILITY & GENERATOR
SOURCES.

FOLLOW NATIONAL ELECTRICAL
CODE
FOR INSTALLATION.

CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA	AUTHOR: D.BAUER	DATE: 27SEPT2016
	DRAWING NAME: CONNECT SERIES BATT CHARGER 9030	PAGE:



120VAC INPUT & GROUND
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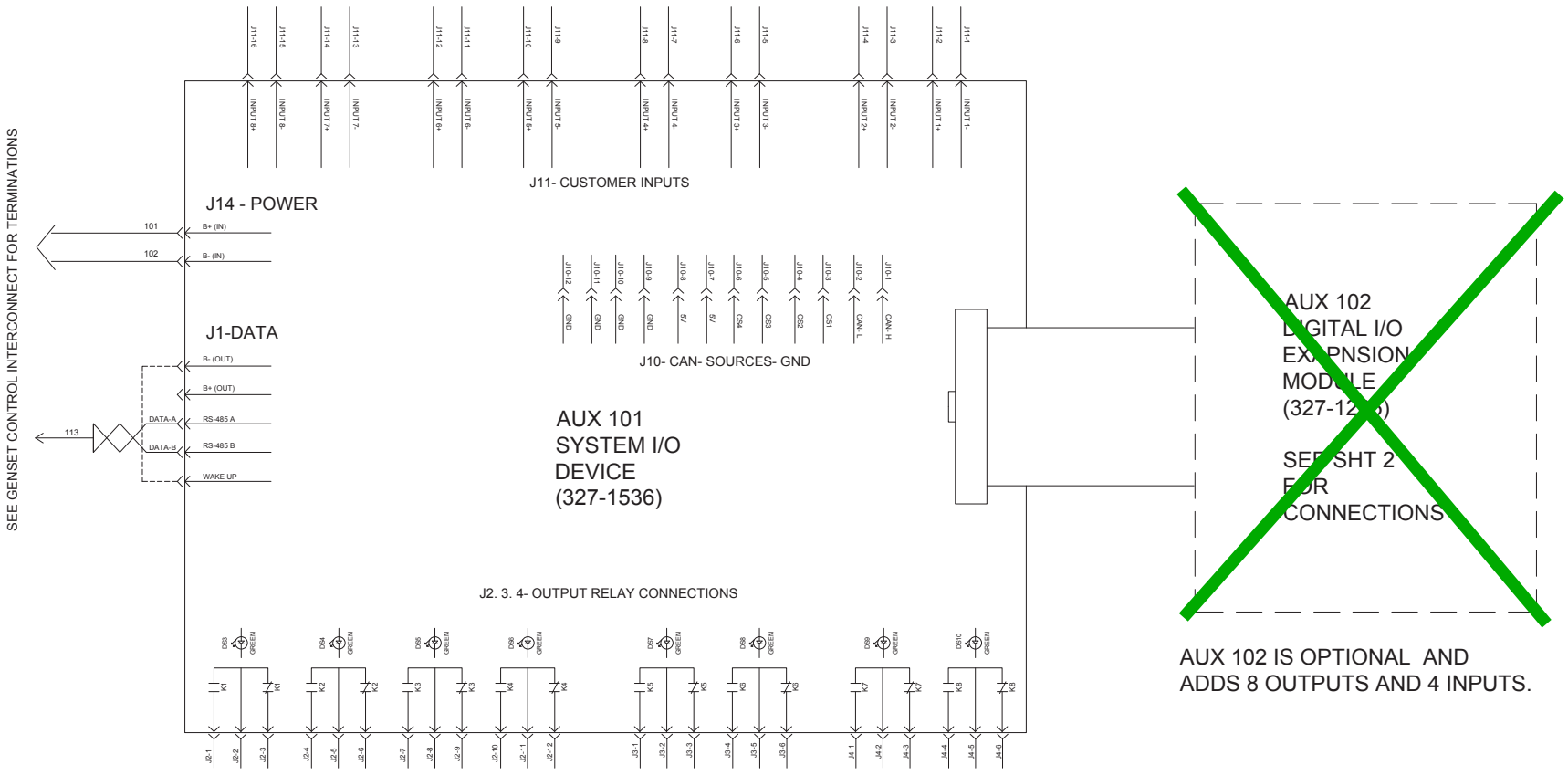
	DRAWING NAME: CONNECT SERIES BLOCK HEATER 9029	PAGE:

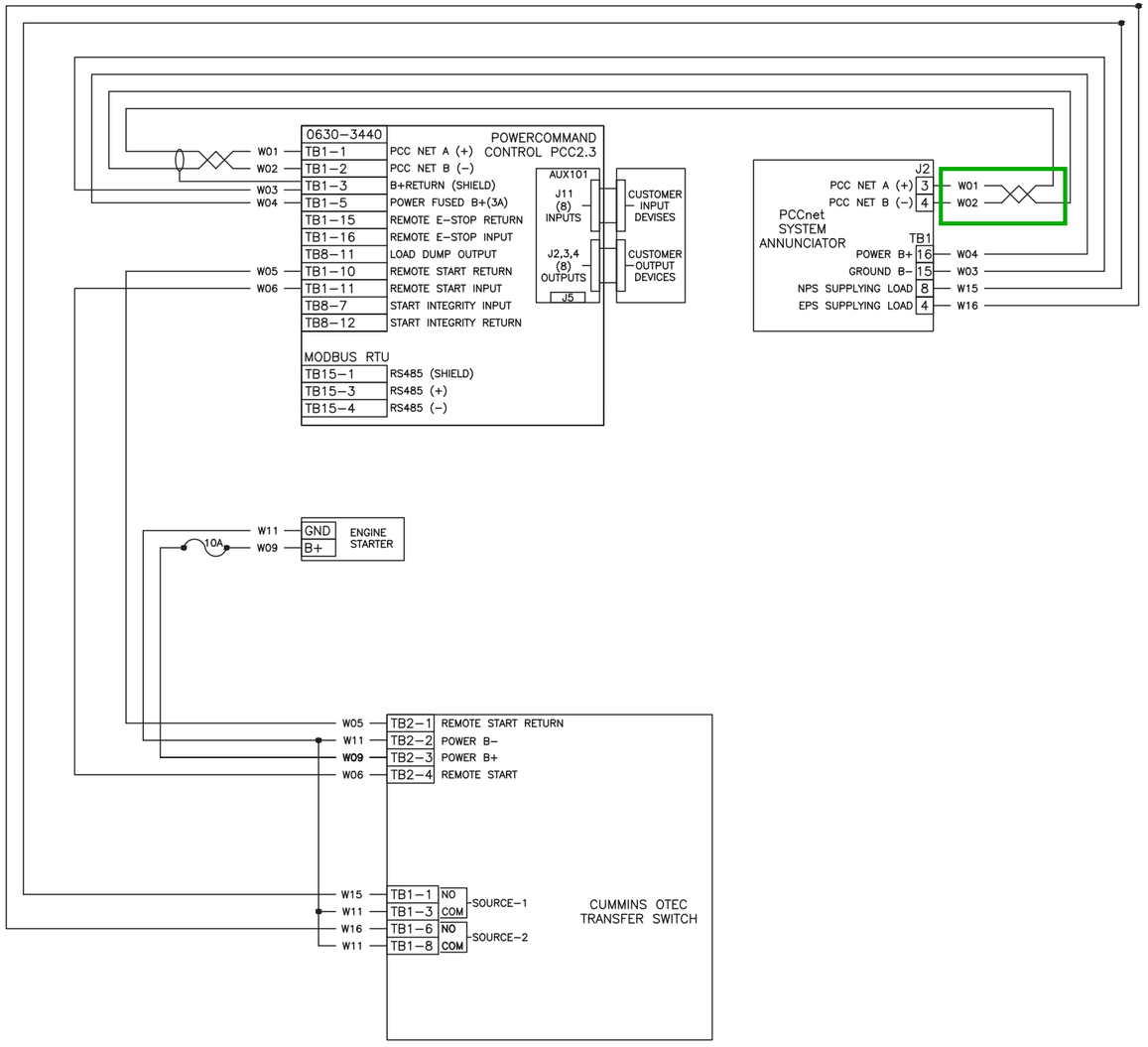


INPUTS AND OUTPUTS ARE
PROGRAMMABLE PER CUSTOMER
SPECIFICATION.

CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR:	DATE:
D.BAUER	27SEPT2016
DRAWING NAME:	PAGE:
TYP AUX 101 9013	



- ALL INTERCONNECT WIRING AND DATA CABLING IS TO BE DONE WITH STRANDED WIRE PER NFPA 37.
- PCC NET CABLE: BELDEN 9729. (24 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- OTEC PC40 MODBUS RS485 CABLE: BELDEN 9841. (22 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- TOTAL NETWORK LENGTH NOT TO EXCEED 4000 FT.
- ATS LOAD SHED WIRING IS SHOWN FOR REF.-----

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL:
.X: .06
.XX: .03
.XXX: .01
ANGLES: .5°

REFERENCES	PREP. BY:	CHKD BY:	MODIFIED BY:	
A065H780	KDU	–	–	–
0630-3440	10/16/24	–	–	–
A065K034				

FINISH: N/A

ENGINE FAMILY: PCC2300

OTEC ATS

CSSNA POWER GEN	SITE NAME: –	CONTACT NAME: –	CUSTOMER PROJECT NO: –
	CONTRACTOR NAME: –	CONTACT NO: –	CSSNA PROJECT NO: –

TITLE: PCC2.3 CONTROL / OTEC ATS QSB5 & QSB7

SIZE: B | DWG NO: PCC2.3 INTERCONNECT | REV 1

SCALE: NONE | DO NOT SCALE PRINT | SHEET 1 OF 1

Sales and Service

Rockland Green - Hillburn Scale House

1.0 - SUBMITTAL FOR APPROVAL

Transmittal

Name: Rockland Green

Address: 172 Main Street

City: Nanuet

Date: Dec 3, 2025

State: NY **Zip Code:** 10954

Phone: (845)753-2200 Ext. 613

Attention: Dee Louis **Email:** dlouis@rocklandgreen.com

SENDING THE FOLLOWING PAGE(S) ATTACHED: 69

PROJECT SUBMITTAL: ◉ PROJECT SCHEDULE: ○ SAMPLES: ○

DOCUMENT ORIGINALS: ○

CORRESPONDENCE: ○ ADDITIONAL INFO.: ○ OTHER: ○

SENDING VIA: FAX: ○ HAND DELIVERY: ○ MAIL: ○

OVERNIGHT: ○ E-MAIL: ◉

COPIES	DATED	DESCRIPTION
1	Dec 3, 2025	GENERATOR & DOCKING STATION SUBMITTALS – ONE ELECTRONIC FILE

TRANSMITTED BY: Mark Woodward **DIRECT: (339)216-8909**

COMMENTS: **Please do not hesitate to query.**

Sales and Service

Rockland Green - Hillburn Scale House

1.0 - SUBMITTAL FOR APPROVAL

Submittal Approvals

Date: **Dec 3, 2025**

Approval Actions:

Please send approval actions C/O:

Mark Woodward - Project Manager

Email: mark.n.woodward@cummins.com / Direct Line: 339-216-8909

Cummins Sales and Service - East Region

EDR, D.P.C.

EDR a better environment

- ☐ **APPROVED**
- ☑ **APPROVED AS CORRECTED**
- ☐ **REVISE AND RESUBMIT**
- ☐ **NOT ACCEPTED**
- ☐ **FOR INFORMATION ONLY**

Checking is only for conformance with the design intent of the project and compliance with the information given in the contract documents. Contractor is responsible for dimensions, correct information indicated, coordination of the work with all trades and all other requirements of the contract documents. This shop drawing is the product and the property of the contractor and is not a part of the contract documents.

BY jdulak **DATE** 12/10/2025

1. Manual transfer switch shall have 200A utility and generator circuit breakers.

Cummins Sales and Service

SUBMITTAL
POWER GENERATION EQUIPMENT

PROJECT NAME: Hillburn Scale House

PROJECT: Cummins Project# TBD

MODEL(s): C70DRE2 w/ 200A Docking Station

CUSTOMER: Rockland Green

REFERENCE PO #: TBD

SUPPLIER: Cummins Sales and Service

DATE: 12/03/25

SALES REPRESENTATIVE: Ed Cheung
718-502-1217
ed.cheung@cummins.com

PROJECT MANAGER: Mark Woodward
339-216-8909
mark.n.woodward@cummins.com

Serving Cummins Customers
in the
East Region

NOTICE

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED, PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS

For questions or comments regarding this submittal, please contact your Cummins Sales Representative listed on the Cover Page.

To inquire about factory ship dates, arranging delivery and to schedule start-up of your Cummins Power Generation equipment, please contact the Project Manager listed on the Cover Page of this submittal.

**** Start-Ups must be Scheduled 4 Weeks in Advance ****

- PLEASE NOTE WARRANTY STARTS ON THE DATE OF STARTUP OR 18 MONTHS AFTER SHIPMENT
- PLEASE NOTE IF THE EQUPMENT IS NOT GOING TO BE STARTED UP FOR 6 MONTHS OR LONGER IT MAY NEED TO HAVE LONGTERM STORAGE PROCEEDURES COMPLETED AND / OR PREVENATIVE MANTENANCE. THESE WOULD BE AT AN ADDITIONAL COST.

Sales and Service

Rockland Green - Hillburn Scale House

1.0 - SUBMITTAL FOR APPROVAL

Submittal

Bill of Materials:

Date: **Dec 3, 2025**

Project Description:	Cummins Sales and Service is pleased to present the following submittal for the above referenced project Facility Electrical Power Generation Equipment consisting of the following:
Generator Model:	C70 D2RE
Fuel Type / Fuel System:	Diesel
kW Rating:	70kW - Standby / 63kW - Prime
Phase:	(1) Single Phase and (3) Three Phase;
Voltage:	208/240/480;
Power Factor:	0.8 PF on Three Phase / 1.0 on Single Phase;
Power Ratings:	(PRP) Prime Power
Charging System:	24 Volt, Negative Ground Electrical Starting System.
Certifications and Listings:	The generator set is listed: - UL 2200, Stationary Engine Generator Assemblies.
Engine Data:	Model: Cummins Inc. QSB5-G11 Type: 4 Cycle, In-line, 4 Cylinder Diesel Displacement: 274.6 cu.in. (4.5 liters) Bore: 4.21 in. (107 mm), Stroke: 4.88 in. (124 mm) Compression Ratio: 17.2:1 Aspiration: Turbocharged and charged air cooled Emission Control Device: DOC and SCR
Cooling System:	Standard Set Mounted Radiator Cooling System
Radiator Ambient Temperature:	49 Degree C, High Ambient Radiator Provided

Sales and Service

Alternator:	Cummins revolving field, 4 pole, brushless design. Dynamically balanced rotor permanently aligned to engine by flexible disc coupling. Class H insulation throughout. Alternator specifics include: - 12 Lead - Broad Range - 125 Degree (C) Rise - Prime - UCI224g Alternator - Low Voltage - Alternator Heater not Required / Desired for this Project
Excitation:	Cummins PMG (Permanent Magnet Generator) excitation provided.
Bearing:	Heavy duty, prelubricated cartridge bearing.
Voltage Regulator:	Cummins PMG provides torque matched operation for improved motor starting and reduces engine stalling in overload situation.
Governor:	Electronic Isochronous frequency regulation
Engine Control Panel:	Power Command Control PC 3.3: Cummins' microprocessor based control system with: AmpSentry™ Protective Relay - UL Listed true alternator over current protection. See specification sheet for more detail.
Instrumentation, Controls, and Relays:	See specification sheet for details.
Charging System:	24 volt, negative ground electrical starting system:
Sub Base Fuel Tank:	UL 142 compliant, double wall, sub-base fuel tank with the following features / options: - 24 Hour Run Time at 75% Prime Load - Rupture Basin Switch - Low Fuel Level Switch

Sales and Service

Generator Enclosure:	Cummins generator enclosure with the following features / options: - Weather Protective Enclosure - Steel Construction - 67 Sound Pressure Levels @ 7 meters dB(A) - Maintenance Doors Mounted Both Sides & Rear - Lockable doors using key or padlock - Color: White, Power coated - Fixed Louver Openings - Internally Mounted Critical Exhaust
Structural Sub Base:	Provided for mounting of engine and generator
Exhaust System:	Provided with an Internally Mounted Exhaust System inside the Generator Enclosure: - Critical Type exhaust
Battery:	12 volt lead acid type, with welded battery rack, cables.
Battery Charger:	Float type, 2.5 amp, 24 volt D.C. output.
Circuit Breakers and Accessories:	- Breaker # 1 - Molded case type, mounted in enclosure and wired to generator, (1) 400A, 3 pole, LSI Trip, UL 600V, unit mounted
Coolant Heater:	120 Volt, Single Phase Thermostatically Controlled Coolant Heater Temperature Rated for below 40 Degrees F Ambient
GenSet Options, Accessories and Miscellaneous Items:	Other Options / and Accessories: - Camlock Distribution Panel - Roof mounted, single point lift - Engine Fluid Containment Reservoir - 4 Position voltage selector switch: (277/480, 139/240, 120/208 VAC - Three Phase) (120/240 VAC - Single Phase) - Shore Power (15A/120V) for coolant heater and battery charger - Auxiliary Fuel and DEF connections - DOT approved Hydraulic brake trailer with center jack and 3" pintle hitch. - (1) ESL 200A Docking Station
Lube, Oil, and Antifreeze:	Provided.

Sales and Service

Operations and Maintenance Manual:	One Provided. Additional copies per project specifications (If Applicable)
GenSet Warranty:	Base Standby 5 year / 5,000 hours
Automatic Transfer Switching:	Not in our Scope of Supply
Transfer Switch Warranty:	Not in our Scope of Supply
Start Up and Testing:	Provided by Cummins Trained Technicians: - Startup - 2hr Load Bank Test
Planned Maintenance:	A 2 year Maintenance contract is not included with 1 Inspection and 1 Full Service per year.

Specification sheet

Rental Power

70 kW

U.S EPA Tier IV Emissions

Description

This Cummins Power Generation rental package is a fully integrated mobile power generation system, providing optimum performance, reliability, and versatility for standby and prime power applications.

Features

Cummins diesel engines

- U.S. Tier IV Final and EU SIIIa certified Cummins QSB5-G11 engines which meet emissions limits without the use of a diesel particulate filter (DPF)
- Dual speed engine for operation at 50 or 60 Hz
- Advanced electronic engine controls with integrated aftertreatment system provide superior fuel efficiency while reducing emissions
- High-pressure common rail fuel system reduces engine noise and smoke
- Cummins Direct Flow™ air filtration offering improved air management, longer service life, and easier serviceability
- 2-stage fuel filtration with optimum particle and water separation

Control features

- The most advanced, reliable and capable generator set control system on the market today
- Controls provide precise frequency and voltage regulation, alarm and status message display in one easy to operate customer interface

Stamford alternators

- 12-lead reconnectable alternators fitted with voltage selection switch
- Permanent magnet excitation for improved performance in non-linear load applications

Engine controls

- Oil pressure and coolant temperature gauge
- Fuel level gauge, Diesel Exhaust Fluid (DEF) level gauge and battery voltage gauge
- Digital Hour meter (5-digit read out)
- Engine control module includes remote start capability

Rental package enclosure

- Camlock & busbar distribution panel
- Sound attenuated, white powder coated lockable enclosure
- 24-hour fuel tank (75% prime) with leak detection sensor
- Single wall fuel tank with 110% fluid containment basin
- Transport Canada Tank
- Roof mounted, single point lift
- Cooling system rated for 122 °F (50 °C) at 100% standby ambient
- Complete engine fluid containment reservoir
- 4 position voltage selector switch (60Hz: 277/480 or 139/240 or 120/208 VAC 3 phase or 120/240 VAC 1 phase). Also first position 50Hz: 230/400 VAC 3 phase)
- 2 position voltage selector (60Hz: 277/480 or 347/600 VAC 3 phase).
- Shore power (15A/120V) – for coolant heater, battery charger, engine oil heater and battery warmer
- Conveniently located analog gauges and heated Human Machine Interface (HMI) display

Rental package options

- Optional Auxiliary Fuel and DEF connections
- DOT approved electric brake trailer with heavy duty center mounted jack, ball or pintle hitch
- DOT approved hydraulic brake trailer with heavy duty center mounted jack, ball or pintle hitch

Model	Voltages	Standby Rating		Prime Rating		Sound Level Full load at 7m	Alternator Model
		60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)		
C70D2RE	480-600 Switchable	70 (87)	-	63 (78)	-	67 dB(A)	UCI274D
	208/240/480	70 (87)	[illegible]	63 (78)	[illegible]	67 dB(A)	UCI224G

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Engine specifications

Engine model	QSB5-G11
Alternator data sheet	UCI
Tier rating	Tier IV
Design	4 cycle, In-Line, turbocharged and after-cooled
Bore	107 mm (4.21 in.)
Stroke	124.0 mm (4.88 in.)
Displacement	4.5 liters (274.6 in^3)
Cylinder block	Cast iron, In-Line 4 cylinder
Battery capacity	2 x 760 cca
Battery charging alternator	70 amps
Starting voltage	24 volt, negative ground
Fuel system	Direct injection HPCR system
Fuel filter	Dual Spin on fuel filter with water separator
Air cleaner type	2-stage, dry replaceable element with dust ejector
Lube oil filter type(s)	Single spin-on, full flow
Standard cooling system	120 °F (49 °C) ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip proof revolving field
Stator	Double layer concentric, 2/3 winding pitch
Rotor	Singe bearing, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	125/40 ºC prime
Exciter type	PMG (permanent magnet generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 1.5% no load, < 5% non-distorting balance linear load
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 2%

Power capability specifications (Assume power factor = 0.80 for 3 phase amps)

	Standby rating					
	240 V, 1 Phase Amps 60Hz	**208 V, 3 Phase Amps 60Hz**	**480 V, 3 Phase Amps 60Hz**	**240 V, 3 Phase Amps 60Hz**	**400 V, 3 Phase Amps 50Hz**	**600 V, 3 Phase Amps 60Hz**
C70D2RE	195	243	105	210	114	84

Electrical power panel specifications

Model voltage	120 V duplex receptacles	240 V twist	Load lug connection (stud diameter)	Load lug circuit breakers
120/480 Volt	2 - 20 Amp GFCI	3 - 50 Amp	1/2 inch	400 Amp
[illegible]			[illegible]	[illegible]

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PowerCommand 3.3 Control System

An integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

Simplified display for rental operators - simplified display tailored for rental equipment operations for ease of use.

Power management – Control function provides battery monitoring and testing features and smart starting control system.

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Regulation compliant – Prototype tested: UL, CSA and CE compliant.

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily upgradeable – PowerCommand controls are designed with common control interfaces.

Reliable design – The control system is designed for reliable operation in harsh environment.

Operator panel features

Operator/display functions

- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Alternator data

- Line-to-neutral and line-to-line AC volts
- 3-phase AC current
- Frequency
- kW, kVar, power factor kVA (three phase and total)

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data

- Fault history
- Data logging and fault simulation (requires InPower)

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire line-to-line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse var shutdown
- Field overload shutdown

Engine protection

- Battery voltage monitoring, protection and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Cycle cranking
- Load shed
- Remote emergency stop

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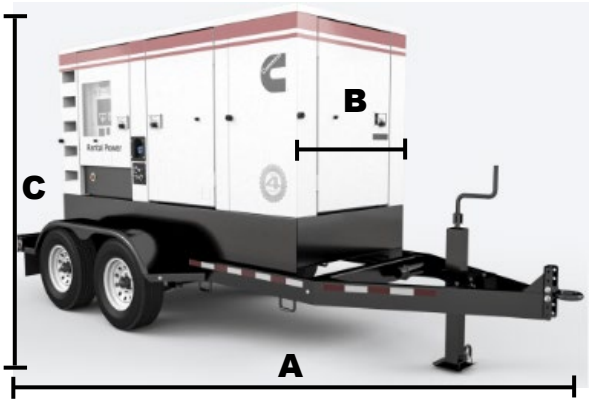
Ratings definitions

Standby:
Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271 and BS5514). Nominally rated.

Prime (unlimited running time):
Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514).



Dimensions

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Weight w/o fuel kg (lbs.) **	Weight with fuel kg (lbs.) **	Fuel capacity liters (gal)*
C70D2RE	3063 (121)	1262 (50)	1953 (77)	2522 (5560)	2976 (6560)	495 (131)
With trailer	4798 (189)	2106 (83)	2444 (96)	3221 (7100)	3674 (8100)	495 (131)

* Onboard DEF capacity is sized for 24 hours of operation at 10 gallons

** Weights are CAD determined & within +/- 2%

Fuel consumption

		Standby				Prime				
60 Hz Ratings, kW (kVA)		70 (87)				63 (78)				Hours of operation
	Load	¼	½	¾	Full	¼	½	¾	Full	75% PRP
	US Gal/hr.	2.3	4.0	5.9	8.0	2.1	3.8	5.3	7.2	27
	L/hr.	8.7	15.1	22.3	30.3	7.9	14.4	20.1	27.3	27

Note: DEF consumption less than 4% of fuel consumption

** Fuel consumption number are conservative pending final test.

Trailer information

Model	Tire size	Tire type	Load range	Number of tires per trailer	Lug pattern
C70D2RE	225/75-R15	Radial	2535 lbs. - each	4	8 hole

Certifications

These generator sets are certified to following standards:

CAN/CSA STD C22.2 NO. 100
CAN/CSA STD C22.2 NO. 14

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

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2025 EPA Tier4 Certified Exhaust Emission Compliance Statement

C70D2RE

EPA Tier 4/EU Stage IIIA

60Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 4 emissions limit of U.S. EPA Non-Road Engines under the provisions of 40 CFR part 1039 when tested per ISO8178 D2.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	SCEXL04.5AAJ-028
Effective Date:	12/16/2024
Date Issued:	12/16/2024
EPA Engine Family (Cummins Emissions Family):	SCEXL04.5AAJ

Engine Information:

Model:	QSB5-G11	Bore:	4.21 in. (107 mm)
Engine Nameplate HP:	169	Stroke:	4.88 in. (124 mm)
Type:	4 Cycle, Inline, 4 Cylinder Diesel	Displacement:	275 cu. in. (4.5 liters)
Aspiration:	Turbocharged, CAC and EGR	Compression Ratio:	17.2:1
Emission Control Device:	DOC and SCR	Exhaust Stack Diameter:	4 in.

Diesel Fuel Emissions Limits

D2 Cycle Exhaust Emissions	Grams per BHP-hr				Grams per kW_m-hr			
	NO_X	NMHC	CO	PM	NO_X	NMHC	CO	PM
EPA Emissions Limit	0.30	0.14	2.6	0.01	0.40	0.19	3.5	0.02

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50. Reference: ASTM D975 No. 2-D, 7-15 ppm sulfur.

Reference conditions: Air inlet temperature: 25°C (77°F), Fuel inlet temperature: 40°C (104°F). Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake restriction set to a maximum allowable limit for clean filter; Exhaust back pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.
Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Specification Sheet

PowerCommand® 3.3 Generator Set Digital Integrated Control System

Bargraph Optional

Introduction

The PowerCommand® 3.3 control system is a microprocessor-based generator set monitoring, metering, and control system, which is comprised of PowerCommand® Control 3300 and the Human Machine Interface 320. PCC3300 supports multiple operation modes including:

- Standalone,
- Synchronization only,
- Isolated bus paralleling,
- Utility single generator set paralleling,
- Utility multiple generator set paralleling,
- Utility single generator set paralleling with power transfer control (automatic mains failure),
- Isolated bus paralleling with Masterless Load Demand

PowerCommand® Control 3300 is designed to meet the exacting demands of the harsh and diverse environments of today's typical power generation applications for Full Authority Electronic or Hydromechanical engine power generator sets.

Offering enhanced reliability and performance over more conventional generator set controls via the integration of all generator control functions into a single system, PCC3300 is your Power of One generator set control solution.

Benefits and Features

- 320 x 240 pixels graphical LED backlit LCD
- Multiple languages supported
- AmpSentry™ protection provides industry-leading generator overcurrent protection
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr control
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing is provided on applicable platforms
- Generator set monitoring (including metering) and protection with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- 12 V (DC) and 24 V (DC) battery operation
- RS-485 Modbus® interface for interconnecting to customer equipment
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA, and CE standards

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PowerCommand® Generator Set Digital Control System PCC 3300

Introduction

PCC3300 is an industry-leading digital generator set control suitable for usage on a wide range of diesel and lean burn natural gas generator sets in both standalone as well as paralleling applications.

PowerCommand® is compatible with either shunt or PMG excitation, and is suitable for usage with reconnectable or non-reconnectable generators. Configuration for any frequency, voltage and power connection from 120 V (AC) to 600 V (AC) line-to-line or 601 V (AC) to 45k V (AC) with an external PT is supported. The PCC3300 derives its own power from the generator set starting batteries and functions over a voltage range of 8 V (DC) to 30 V (DC).

Features

- PCC3300 supports configurable control features via software download using InPower PC-compatible software
- 12 V (DC) and 24 V (DC) battery operation
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing on applicable platform is provided, which is capable of providing isochronous frequency regulation
- Full authority J1939 CANBus® prime mover communications and control is provided for platforms with an Engine Control Module (ECM)
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
  - Reduces the risk of Arc Flash due to thermal overload or electrical faults by inverse time protection
- Generator set monitoring offers status information for all critical prime mover and generator functions
- AC and DC digital generator set metering is provided. AC measurements are configurable for single or three phase sensing with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Battery monitoring system continually monitors the battery output and warns of the potential occurrence of a weak battery condition
- Relay drivers for prime mover starter, fuel shutoff (FSO), glow plug/spark ignition power and switched B+ applications are provided
- Integrated generator set protection is offered to protect the prime mover and generator
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr Control
- The synchronization check function provides adjustments for phase angle window, voltage window, frequency window and time delay
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Advanced serviceability is offered via InPower™, a PC-based software service tool
- PCC3300 is designed for reliable operation in harsh environments with the unit itself being a fully encapsulated module
- RS-485 ModBus interface for interconnecting to customer equipment
- Native on PCC3300: Four discrete inputs, two dry contact relay outputs and two low-side driver outputs are provided and are all configurable.
  - Optional extra PCC3300 input and output capability available via AUX101
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards

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Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

Operator adjustments: The HMI320 includes provisions for many set up and adjustment functions.

Genset hardware data: Access to the control and software part number, genset rating in kVA and genset model number is provided from the HMI320 or InPower.

Data logs: Information concerning all of the following parameters is periodically logged and available for viewing; engine run time, controller on time, number of start attempts, total kilowatt hours, and load profile. (Control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history: Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kW, kVAr, Power Factor, kVA (three phase and total)
- Frequency

For Lean Burn Natural Gas Engine applications:

- Alternator heater status
- Alternator winding temperature (per phase) as well as alternator drive end and non-drive end bearing

Utility/AC bus data

- Voltage (three phase line-to-line and line-to-neutral)
- Current (three phase and total)
- kW, kVAR, Power Factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1-Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Coolant temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Lean Burn Natural Gas (LBNG) application parameters include:

- Safety shutoff valve status
- Valve proving status
- Downstream gas pressure
- Gas inlet pressure
- Gas mass flow rate
- Control valve position
- Gas outlet pressure
- Manifold pressure and temperature
- Throttle position
- Compressor outlet pressure
- Turbo speed
- Compressor bypass position
- Cylinder configuration (e.g., drive end and non-drive end configurations)
- Coolant pressure 1 and 2 as well as coolant temperature 1 and 2 for both HT/LT respectively
- Exhaust port temperature (up to 18 cylinders)
- Pre-filter oil pressure
- Exhaust back pressure
- Parent ECM internal temperature and isolated battery voltage
- Speed bias
- Child ECM internal temperature and isolated battery voltage
- Knock level, spark advance, and knock count (for up to 18 cylinders)
- Auxiliary supply disconnector status
- Engine heater status
- Coolant circulating pump status
- Lube oil priming pump status
- Lube oil status
- Oil heater status
- Derate authorization status
- Start system status
- Ventilator fan status
- Ventilation louvre status
- Radiator fan status
- DC PSU status
- Start inhibit/enable status and setup

Service adjustments – The HMI320 includes provisions for adjustment and calibration of genset control functions. Adjustments are protected by a password. Functions include:

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable input and output set up
- Meter calibration
- Paralleling setup
- Display language and units of measurement

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Prime Mover Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data transfer between genset and engine controller for control, metering and diagnostics.

12 V (DC) or 24 V (DC) nominal battery voltage is supported by PCC3300 for normal operation.

Temperature dependant prime mover governing dynamics: This function is supported enabling the engine to be responsive when warm and more stable when operating at lower temperature via providing control and modification over electronic governing parameters as a function of engine temperature.

Isochronous governing is provided in order to control prime mover speed within ±0.25% of nominal rated speed for any steady state load from no load to full load. During operation frequency drift should not exceed ±0.5% of nominal frequency given a 33ºC (or 60ºF) chance in ambient temperature within an eight-hour period.

Droop electronic speed is governing capability is natively offered by PCC3300 to permit droop from 0% to 10% between no load to full load.

Remote start capability is built into the PCC3300 as the unit accepts a ground signal from remote devices to automatically command the starting of the generator set as well as the reaching of rated speed, voltage and frequency or otherwise run at idle speed until prime mover temperature is adequate. The presence of a remote start signal shall cause the PCC3300 to leave sleep mode and return to normal power mode. PCC3300 supports an option for delayed start or stop.

Remote Start Integrity: In compliance with NEC2017 Start Signal Integrity standard – NFPA70 Article 700.10(D)(3), the remote start circuit from ATS to PCC3300 is continuously monitored for signal disturbance due to broken, disconnected or shorted wires via a configurable input. Loss of signal integrity results in activation of a remote start signal.

Remote and local emergency stopping capability: PCC3300 accepts ground signal from a locally or remoted mounted emergency stop switch to cause the generator set to immediately shutdown. The generator set is prevented from either running or cranking with the emergency stop switch engaged. If PCC3300 is in sleep mode, then the activation of any emergency stop switch shall return PCC3300 is normal powered state along with the activation of the corresponding shutdown and run-prevention states.

Sleep mode: PowerCommand 3.3 supports a configurable low current draw state, which is design with consideration to the needs of prime applications or others application without a battery charger (in order to minimize battery current drain).

Automatic prime mover starting: Any generator set controlled by PCC3300 is capable of automatic starting achieved via either magnetic pickup or main alternator output frequency. PCC3300 additionally supports configurable glow plug control where applicable.

Prime mover cycle cranking: PCC3300 supports configurable starting cycles and rest periods. Built in starter protection are incorporated to prevent the operator from specifying a starting sequence that may be damaging.

Configurable time delay functionality: PCC3300 supports time delayed generator set starting and stopping (for cooldown). Permissible time delays are as follows (noting a default setting is 0 seconds):

1. Start delay: 0 seconds to 300 seconds prior to starting after receiving a remote start signal.
2. Stop delay: 0 seconds to 600 seconds prior to shut down after receiving a signal to stop in normal operation modes.

Lean Burn Natural Gas application specific parameters

PCC3300 supports prime mover inhibiting in order to permit application-specific processes (i.e. Auxiliaries) to be started first.

Generator Control

PCC3300 performs both Genset voltage sensing and Genset voltage regulation as follows:

- Voltage sensing is integrated into PCC3300 via three phase line-to-line sensing that is compatible with shunt or PMG excitation systems
- Automatic voltage regulation is accomplished by using a three phase fully rectified input and has a FET output for good motor starting capability.

Major features of generator control include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/-1.5% for a 40 ºC (104 ºF) change in temperature in an eight-hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level.

The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand® will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Cylinder Cut-off System (CCS): PCC 3300 supports Cylinder Cut-off System which is used to operate the engines on half bank at no load and light load conditions. CCS has below benefits on engine

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performance- improved emission standards, improved fuel efficiency, reduced hydrocarbons, reduced white smoke, reduced wet stacking and higher exhaust temperature at light loads to improve turbocharger operations and catalyst performance.

Step Timing Control (STC): PCC 3300 supports STC functionality which is used to advance the engine timing of a hydro-mechanical engine during start up and light load conditions. During ADVANCED injection timing, it:

- Improves cold weather idling characteristics
- Reduces cold weather white smoke
- Improves light load fuel economy
- Reduces injector carboning

Paralleling Functions

First Start Sensor™ system – PowerCommand® provides a unique control function that positively prevents multiple gensets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between the gensets that allows the gensets to work together to determine which genset is a system should be the first to close to the bus. The system includes an independent backup function, so that if the primary system is disabled the required functions are still performed.

Synchronizing – Control incorporates a digital synchronizing function to force the genset to match the frequency, phase and voltage of another source such as a utility grid. The synchronizer includes provisions to provide proper operation even with highly distorted bus voltage waveforms. The synchronizer can match other sources over a range of 60-110% of nominal voltage and -24 to +6 hertz. The synchronizer function is configurable for slip frequency synchronizing for applications requiring a known direction of power flow at instant of breaker closure or for applications where phase synchronization performance is otherwise inadequate.

Load sharing control – The genset control includes an integrated load sharing control system for both real (kW) and reactive (kVar) loads when the genset(s) are operating on an isolated bus. The control system determines kW load on the engine and kVar load on the alternator as a percent of genset capacity, and then regulates fuel and excitation systems to maintain system and genset at the same percent of load without impacting voltage or frequency regulation. The control can also be configured for operation in droop mode for kW or Kvar load sharing.

Load govern control– When PowerCommand® receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW values from 0-100% of standby rating, and 0.7-1.0 power factor (lagging). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAR load govern droop.

Load demand control – The control system includes the ability to respond to an external signal to initiate load demand operation. On command, the genset will ramp to no load, open its paralleling breaker, cool down, and shut down. On removal of the command, the genset will immediately start, synchronize, connect, and ramp to its share of the total load on the system.

Sync check – The sync check function decides when permissive conditions have been met to allow breaker closure. Adjustable criteria are: phase difference from 0.1-20 deg, frequency difference from 0.001-1.0 Hz, voltage difference from 0.5-10%, and a dwell time from 0.5-5.0 sec. Internally the sync check is used to perform closed transition operations. An external sync check output is also available.

Genset and utility/AC bus source AC metering – The control provides comprehensive three phase AC metering functions for both monitored sources, including: 3-phase voltage (L-L and L-N) and current, frequency, phase rotation, individual phase and totalized values of kW, kVAR, kVA and Power Factor; totalized positive and negative kW-hours, kVAR-hours, and kVA-hours. Three wire or four wire voltage connection with direct sensing of voltages to 600V, and up to 45kV with external transformers. Current sensing is accomplished with either 5 amp or 1 CT secondaries and with up to 10,000 amp primary. Maximum power readings are 32,000kW/kVAR/kVA.

Power transfer control – provides integrated automatic power transfer functions including source availability sensing, genset start/stop and transfer pair monitoring and control. The transfer/retransfer is configurable for open transition, fast closed transition (less than 100msec interconnect time), or soft closed transition (load ramping) sequences of operation. Utility source failure will automatically start genset and transfer load, retransferring when utility source returns. Test will start gensets and transfer load if test with load is enabled. Sensors and timers include:

Under voltage sensor: 3-phase L-N or L-L under voltage sensing adjustable for pickup from 85-100% of nominal. Dropout adjustable from 75-98% of pickup. Dropout delay adjustable from 0.1-30 sec.

Over voltage sensor: 3-phase L-N or L-L over voltage sensing adjustable for pickup from 95-99% of dropout. Dropout adjustable from 105-135% of nominal. Dropout delay adjustable from 0.5-120 sec. Standard configuration is disabled and is configurable to enabled in the field using the HMI or InPower service tools.

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Over/Under frequency sensor: Center frequency adjustable from 45-65 Hz. Dropout bandwidth adjustable from 0.3-5% of center frequency beyond pickup bandwidth. Pickup bandwidth adjustable from 0.3-20% of center frequency. Field configurable to enable.

Loss of phase sensor: Detects out of range voltage phase angle relationship. Field configurable to enable.

Phase rotation sensor: Checks for valid phase rotation of source. Field configurable to enable.

Breaker tripped: If the breaker tripped input is active, the associated source will be considered as unavailable.

Timers: Control provides adjustable start delay from 0 - 300sec, stop delay from 0 - 800sec, transfer delay from 0-120sec, retransfer delay from 0-1800sec, programmed transition delay from 0-60sec, and maximum parallel time from 0-1800sec.

Negative Sequence Current Protection: PCC3300 supports this protection natively in order to determine if the generator is at any point was running subject to negative phase sequencing.

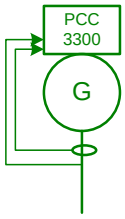
Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped. Upon breaker failure, appropriate control action is taken to maintain system integrity.

Exerciser clock –The exerciser clock (when enabled) allows the system to be operated at preset times in either test without load, test with load, or extended parallel mode. A Real Time Clock is built in. Up to 12 different programs can be set for day of week, time of day, duration, repeat interval, and mode. For example, a test with load for 1 hour every Tuesday at 2AM can be programmed. Up to 6 different exceptions can also be set up to block a program from running during a specific date and time period.

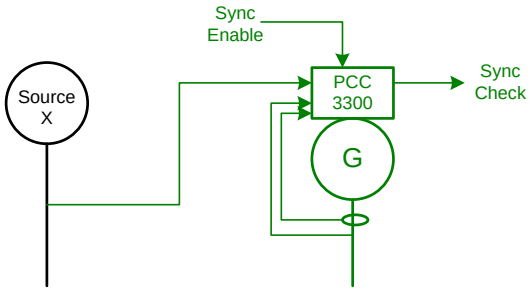
Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for either the genset metering point ("Base Load") or the utility metering point ("Peak Shave"). The control point for the reactive power (kVAR or Power Factor) can also be independently configured for either the genset metering point or the utility metering point. This flexibility would allow base kW load from the genset while maintaining the utility power factor at a reasonable value to avoid penalties due to low power factor. The System always operates within genset ratings. The control point can be changed while the system is in operation. Set points can be adjusted via hardwired analog input or adjusted through an operator panel display or service tool.

Application types – Controller is configured to operating in one of six possible application types. These topologies are often used in combinations in larger systems, with coordination of the controllers in the system either by external device or by interlocks provided in the control. Topologies that may be selected in the control include:

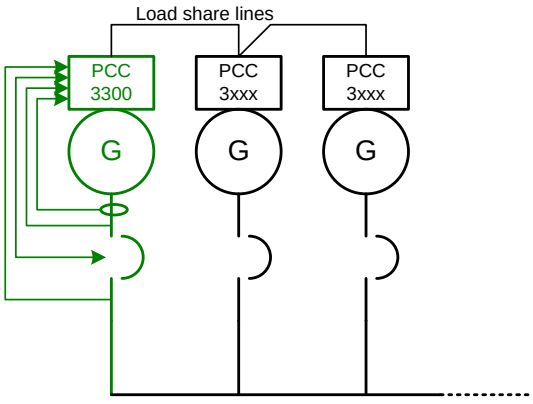
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.



Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



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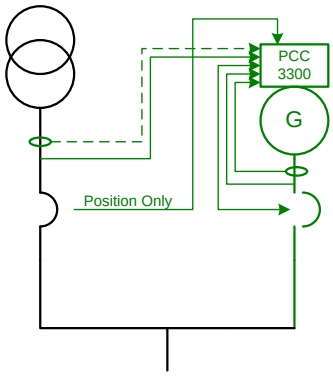
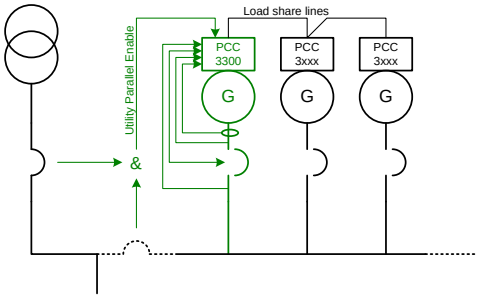
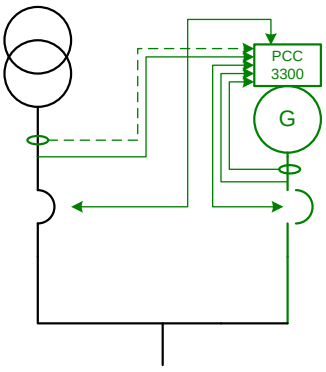
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



Utility Multiple: Supports all functionality of Isolated Bus and provides extended paralleling to the utility. Extended paralleling load set points follow a constant setting; dynamically follow an analog input, Modbus register or HMI.

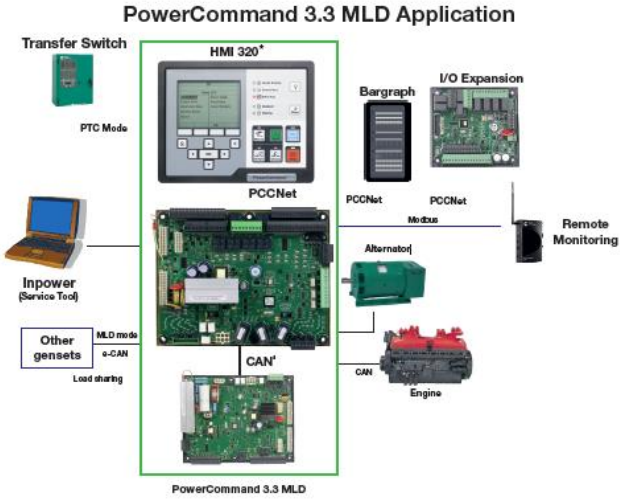


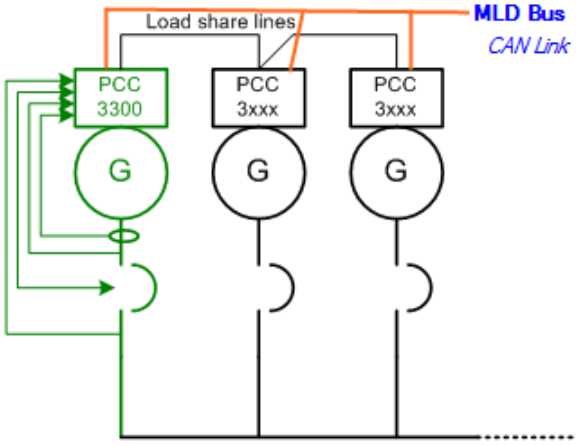
Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

PowerCommand® 3.3 with Masterless Load Demand (MLD) technology enables generator sets to start/stop automatically based on load demand. Masterless Load Demand-capable generators are equipped with an additional s-CAN network connection that allows sharing of information amongst paralleled generator sets. MLD has been designed for hassle-free installation, commissioning and operation. MLD functionality. Integrated on-board system logic provides the MLD topology control without the need for any additional system.





PCC3300 External Voltage and Frequency Biasing Inputs

PCC3300 supports externally driven voltage and frequency biasing capability in order to permit external paralleling (if intending to use this feature please contact your local distributor for further information).

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Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided. Protective functions include:

Battle short mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation (or are handled by the engine ECM) are not bypassed. Please refer to the Control Application Guide or Manual for list of these faults.

Derate

The Derate function reduces output power of the genset in response to a fault condition. If a Derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or Modbus. If a Derate command occurs while in utility parallel mode, the control will actively reduce power by lowering the base load kW to the derated target kW.

Configurable alarm and status inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, derate, shutdown, shutdown with cooldown or status indication and for labeling the input.

Emergency stop

Annunciated whenever either emergency stop signal is received from external switch.

General prime mover protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the genset is signaled to start and indicate a warning if the battery indicates impending failure.

Low coolant level warning – Can be set up to be a warning or shutdown.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

Fail to start (overcrank) shutdown - The control system will indicate a fault if the genset fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Fault simulation –The control in conjunction with InPower software, will accept commands to allow a technician to verify the proper operation of the control and its interface by simulating failure modes or by forcing the control to operate outside of its normal operating ranges. InPower also provides a complete list of faults and settings for the protective functions provided by the controller.

For Lean Burn Natural Gas Engine applications:

Off load running (protection) – This feature protects the engine in the event the genset is being called to go off load for too long.

Hydro Mechanical fuel system engine protection:

Overspeed shutdown – Default setting is 115% of nominal

Low lube oil pressure warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High lube oil temperature warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High engine temperature warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Full authority electronic engine protection:

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

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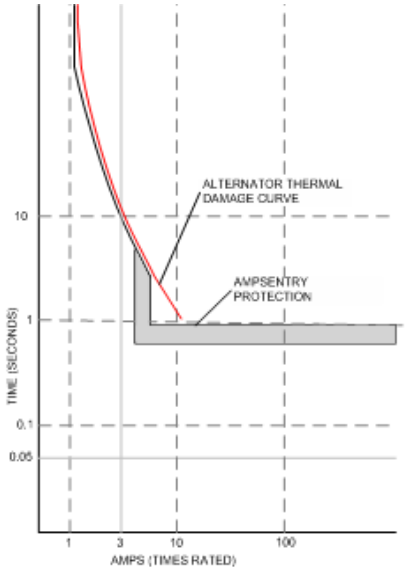
Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand® Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the genset or in the load. It also provides single and three phase fault current regulation (3x Current) so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3 phase short) or fixed timer (2sec for 1P short, 5sec for 2P short). See document R1053 for a full-size time over current curve. The control does not included protection required for interconnection to a utility (mains) service.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off or synchronizing.

Under frequency shutdown (81 u) - Genset output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5-20 second time delay. Default: 6 Hz, 10 seconds. Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81o) - Genset is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz, 20 seconds, disabled.

Overcurrent warning/shutdown (51) - Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Loss of sensing voltage shutdown - Shutdown of genset will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown genset when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point. Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown (40) - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Negative sequence overcurrent warning (46) – Control protects the generator from damage due to excessive imbalances in the three phase load currents and/or power factors.

Custom overcurrent warning/shutdown (51) – Control provides the ability to have a custom time overcurrent protection curve in addition to the AmpSentry protective relay function.

Ground fault overcurrent (51G) – Control detects a ground fault either by an external ground fault relay via a contact input or the control can measure the ground current from an external current transformer. Associated time delays and thresholds are adjustable via InPower or HMI.

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Paralleling Protection

Breaker fail to close Warning: When the control signals a circuit breaker to close, it will monitor the breaker auxiliary contacts and verify that the breaker has closed. If the control does not sense a breaker closure within an adjustable time period after the close signal, the fail to close warning will be initiated.

Breaker fail to open warning: The control system monitors the operation of breakers that have been signaled to open. If the breaker does not open within and adjustable time delay, a Breaker Fail to Open warning is initiated.

Breaker position contact warning: The controller will monitor both 'a' and 'b' position contacts from the breaker. If the contacts disagree as to the breaker position, the breaker position contact warning will be initiated.

Breaker tripped warning: The control accepts inputs to monitor breaker trip / bell alarm contact and will initiate a breaker tripped warning if it should activate.

Fail to disconnect warning: In the controller is unable to open either breaker, a fail to disconnect warning is initiated. Typically, this would be mapped to a configurable output, allowing an external device to trip a breaker.

Fail to synchronize warning: Indicates that the genset could not be brought to synchronization with the bus. Configurable for adjustable time delay of 10 -900 seconds, 120 default.

Phase sequence sensing warning: Verifies that the genset phase sequence matches the bus prior to allowing the paralleling breaker to close.

Maximum parallel time warning (power transfer control mode only): During closed transition load transfers, control independently monitors paralleled time. If time is exceeded, warning is initiated and genset is disconnected.

Bus or genset PT input calibration warning: The control system monitors the sensed voltage from the bus and genset output voltage potential transformers. When the paralleling breaker is closed, it will indicate a warning condition if the read values are different.

Field Control Interface

Input signals to the PowerCommand® control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Rupture basin
- Start type signal
- Battle short
- Load demand stop
- Synchronize enable
- Genset circuit breaker inhibit
- Utility circuit breaker inhibit
- Single mode verify
- Transfer inhibit – prevent transfer to utility (in power transfer control mode)
- Retransfer inhibit – prevent retransfer to genset (in power transfer control mode)
- kW and kVAR load setpoints

Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Input signals for Lean Burn Natural Gas Engine applications:

- Gearbox oil pressure/temperature protection
- Fire fault
- Earth fault support as a discrete input via an appropriate secondary detection device
- Differential fault
- DC power supply fault
- Genset Interface Box (GIB) isolator open fault
- Start inhibit/enable (x3)
- Radiator fan trip
- Ventilator fan trip
- Ventilation louvers closed
- Start system trip
- Alternator heater trip
- Alternator heater status
- Alternator winding temperature (PT100 RTDx3)
- Alternator drive end bearing temperature (PT100 RTD)
- Alternator non-drive end bearing temperature (PT100 RTD)

Output signals from the PowerCommand® control include:

- Load dump signal: Operates when the genset is in an overload condition.
- Delayed off signal: Time delay-based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 - 120 seconds. Default: 0 seconds.

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- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (genset running) signal: Operates when the genset has reached 90% of rated speed and voltage and latches until genset is switched to off or idle mode.
- Paralleling circuit breaker relays outputs: Control includes (4) relay output contacts (3.5A, 30 VDC) for opening and closing of the genset and utility breakers.

Output Signals for Lean Burn Natural Gas Engine applications:

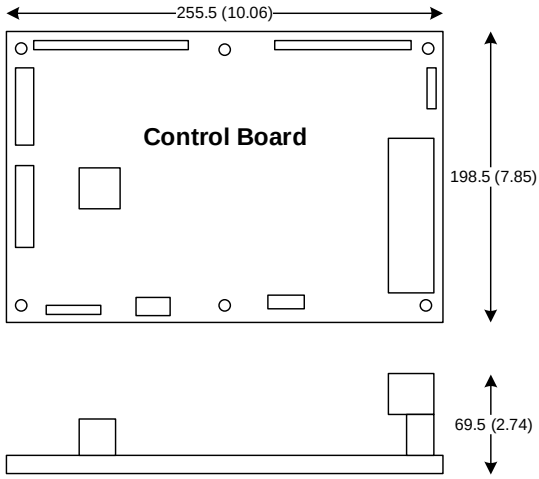
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

Communications connections include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins Power Generation products.

Mechanical Drawing



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PowerCommand® Human Machine Interface HMI320

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

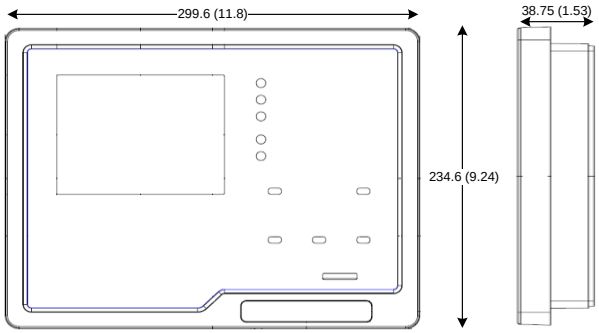
Features:

- LED indicating lamps
  - genset running
  - remote start
  - not in auto
  - shutdown
  - warning
  - auto
  - manual and stop
  - Circuit breaker open (if equipped)
  - Circuit breaker closed (if equipped)
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

Communications connections include:

- PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.
- This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



HMI

Dimensions: mm (inches)

Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand® gensets and transfer switches, to facilitate service and monitoring of these products.

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Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC (-40 ºF) to +70º C (158 ºF), and for storage from -55 ºC (-67 ºF) to +80 ºC (176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC (-4 ºF) to +70 ºC (158 ºF), and for storage from -30 ºC (-22 ºF) to +80 ºC (176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a genset. The control includes transient voltage surge suppression to provide compliance to referenced standards.

Certifications

PowerCommand® meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4:2005 compliance, controls and switchgear (second edition)
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking- The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN 61000-6-3,4 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized, suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand® control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.
- ROHS (Restriction of Hazardous substance) complaint both for HMI 320 & PCC3300v2.

Reference Documents

Please refer to the following reference documents available in the PowerSuite library:

- PowerCommand™ 3.3. Application Guide
- T-037: PowerCommand Control Application Manual (ANSI Protective Functions)
- T-040: PowerCommand 3.3 Paralleling Application Guide

Please refer to the following reference documents available on Cummins Quickserve:

- Service Manuals for PC3.3 (non-MLD) and PC3.3 (MLD)
- Modbus Register Mapping

Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

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Data sheet

Rental Circuit Breakers

Description

This data sheet provides circuit breaker manufacturer part numbers and specifications for Rental products. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.

2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16 – 17
H and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8 – 9

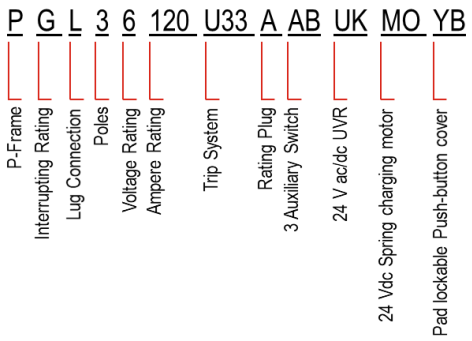
*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above.
http://products.schneider-electric.us/technical-library/

3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

Example

After finding your circuit breaker catalog number to be "PGL36120U33AABUKMOYB," navigate to the P-frame catalog by using the link provided. Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PGL36120."



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Genset	Voltages	Auto/Manual Breaker	Size	Cummins Part No.	Manufacturer	Manufacturer Part No.	Breaker Catalog No.	Trip Unit
C70D2RE	600	Manual	150A	A057G231	Schneider Electric	HGL36150U33XSO	0611CT1001	LSI 3.2S2
C70D2RE	480/208	Manual	400A	A057L891	Schneider Electric	LGL36400U33XSO	0611CT1001	LSI 3.3S2
C100D2RE	600	Manual	150A	A057G231	Schneider Electric	HGL36150U33XSO	0611CT1001	LSI 3.2S2
C100D2RE	480/208 switchable	Manual	400A	A057L891	Schneider Electric	LGL36400U33XSO	0611CT1001	LSI 3.3S2
C100D2RE	600	Auto	150A	A057L885	Schneider Electric	HGL36150U33XABUOMO	0611CT1001	LSI 3.2S2
C100D2RE	480/208 switchable	Auto	400A	A055A272	Schneider Electric	LGL36400U33XABUOMO	0611CT1001	LSI 3.3S2
C150D2RE	208/240/480	Auto	600A	A051C957	Schneider Electric	PGL36060U33AABUKMOYB	0612CT0101	Micrologic 5.0
C200D2RE	208/240/480	Auto	800A	A051C959	Schneider Electric	PGL36080U33AABUKMOYB	0612CT0101	Micrologic 5.0
C275D2RE	208/240/480	Auto	1200A	A051C966	Schneider Electric	PGL36120U33AABUKMOYB	0612CT0101	Micrologic 5.0

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PowerPact H-, J-, and L-Frame Circuit Breakers

Catalog
0611CT1001 R02/16
2015
Class 0611

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Table 11: Circuit Breakers

Circuit Breaker		150 A H-Frame					250 A J-Frame					400 A L-Frame					600 A L-Frame					1200 A L-Frame	
Circuit Breaker Type		HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR	LG	LL
Number of poles[1]		2, 3				3	2, 3				3	3, 4					3, 4					4	
Amperage Range (A)		15-150					70-250					70-400					200-600					700-1200	
UL 489 Circuit Breaker Ratings																							
Breaking Capacity (AIR) UL/CSA/NOM (kA rms)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	—	—
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	—	—
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	—	—
	250 Vdc[2]	20	20	20	20	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	20	—	50	—	—	20	—	—	50	—	20	—	—	50	—	20	—	20	—	20	50
IEC 947-2 Circuit Breaker Ratings																							
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	—	—
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75[4]	—	—
	690 Vac	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—
	250 Vdc[2]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%					—	—
Insulation Voltage	V_i	750 Vac					750 Vac					750 Vac					750 Vac					—	—
Impulse Withstand Voltage	V_{imp}	8 kVac					8 kVac					8 kVac					8 kVac					—	—
Operational Voltage	V_e	690 Vac					690 Vac					690 Vac					690 Vac					—	—
Sensor Rating	I_n	150 A					250 A					400 A					600 A					—	—
Utilization Category	—	A					A					A					A					—	—
Operations (Open-Close Cycles)																							
Without Current		4000					5000					5000					5000					—	
With Current		4000					1000					1000					1000					—	
Protection and Measurements																							
Short-circuit protection	Magnetic only	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Overload/short-circuit protection	Thermal-magnetic	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	X	X
	Electronic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with neutral protection (Off-0.5-1-OSN)[5]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with ground fault protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with zone selective interlocking (ZSI)[6]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Display / I, V, f, P, E, THD measurements / interrupted-current measurement		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Options	Front display module (FDM121)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Operating assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Counters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Histories and alarms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Metering Com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Device status/control com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Dimensions / Weight / Connections																							
Dimensions (Three-Pole Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)					13.38 (340)	
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)					5.51 (140)	
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)					4.33 (110)	
Weight - lb. (Kg)		4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)					13.7 (6.2)	
Connections / Terminations	Unit Mount	X					X					X					X					X	
	I-Line	X					X					X					X					—	
	Rear Connection	X					X					X					X					X[7]	
	Plug-In	X					X					X					X					—	
	Drawout	X					X					X					X					—	
	Optional Lugs	X					X					X					X					—	

1 H and J-frame breakers with Micrologic trip units available only with three poles. The HJ, HL and the J-Frame two pole circuit breakers are three pole modules.

2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.

3 500 Vdc specific catalog numbers, ungrounded UPS systems only.

4 I_{cs} for 600 A L-frame circuit breaker at 525 V is 19 kA.

5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

6 ZSI using restraint wires.

7 Rear connection is not available for 700–1200 A four pole L-frame circuit breakers.

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PowerPact H-, J-, and L-frame Circuit Breaker Trip Units

Table 12: Micrologic Trip Unit Features

Features	Micrologic Trip Unit (X = Standard Feature, O = Available Option					
	Standard		Ammeter		Energy	
	3.2/3.3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	X					
LSI[1]		X	X		X	
LSIG/Ground Fault Trip[2]				X		X
Ground-Fault Alarm Trip				X		X
Current Settings Directly in Amperes	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X
LED for Long-Time Pickup	X	X	X	X	X	X
LED for Long-Time Alarm	X	X	X	X	X	X
LED Green “Ready” Indicator	X	X	X	X	X	X
Up to 12 Alarms Used Together			X	X	X	X
Digital Ammeter			X	X	X	X
Zone-Selective Interlocking[3]			X	X	X	X
Communications	O	O	O	O	O	O
LCD Display			X	X	X	X
Front Display Module FDM121			O	O	O	O
Advanced User Interface			X	X	X	X
Neutral Protection			X	X	X	X
Contact Wear Indication[4]			X	X	X	X
Incremental Fine Tuning of Settings			X	X	X	X
Load Profile[4], [5]			X	X	X	X
Power Measurement					X	X
Power Quality Measurements					X	X

1 The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.

2 Requires neutral current transformer on three-phase four-wire loads.

3 ZSI for H/J-frame devices is only OUT. ZSI for L-frame devices is IN and OUT.

4 Indication available using the communication system only.

5 % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% I_n.

Thermal-Magnetic or Electronic Trip Unit?

Thermal-magnetic trip units (available on H- and J-frame circuit breakers only) protect against overcurrents and short-circuits using tried and true techniques. For applications requiring installation optimization and energy efficiency, electronic trip units offering more advanced protection functions combined with measurements.

Trip units using digital electronics are faster as well as more accurate. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate events and plan any necessary servicing.

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L-Frame Circuit Breaker Catalog Numbers

Unit-Mount Circuit Breaker Catalog Numbers

Table 32: L-Frame 600 A Electronic Trip UL Rated Three-Pole Circuit Breakers (600 Vac, 50/60 Hz) With Factory Sealed Trip Unit Suitable for Reverse Connection

Electronic Trip Unit			Sensor Rating	Interrupting Rating (2nd Letter of Catalog Number)				
Type	Function	Trip Unit		D	G	J[1]	L[1]	R[1]
Standard (80%) Rated, 600 Vac, 50/60 Hz								
Standard	LI	3.3[2]	250 A[3]	LDL36250U31X	LGL36250U31X	LJL36250U31X	LLL36250U31X	LRL36250U31X
			400 A[4]	LDL36400U31X	LGL36400U31X	LJL36400U31X	LLL36400U31X	LRL36400U31X
			600 A[4]	LDL36600U31X	LGL36600U31X	LJL36600U31X	LLL36600U31X	LRL36600U31X
Standard	LSI	3.3S[2]	250 A[3]	LDL36250U33X	LGL36250U33X	LJL36250U33X	LLL36250U33X	LRL36250U33X
			400 A[4]	LDL36400U33X	LGL36400U33X	LJL36400U33X	LLL36400U33X	LRL36400U33X
			600 A[4]	LDL36600U33X	LGL36600U33X	LJL36600U33X	LLL36600U33X	LRL36600U33X
Ammeter	LSI	5.3A	400 A[4]	LDL36400U43X	LGL36400U43X	LJL36400U43X	LLL36400U43X	LRL36400U43X
			600 A[4]	LDL36600U43X	LGL36600U43X	LJL36600U43X	LLL36600U43X	LRL36600U43X
Energy	LSI	5.3E	400 A[4]	LDL36400U53X	LGL36400U53X	LJL36400U53X	LLL36400U53X	LRL36400U53X
			600 A[4]	LDL36600U53X	LGL36600U53X	LJL36600U53X	LLL36600U53X	LRL36600U53X
Ammeter	LSIG	6.3A[5]	400 A[4]	LDL36400U44X	LGL36400U44X	LJL36400U44X	LLL36400U44X	LRL36400U44X
			600 A[4]	LDL36600U44X	LGL36600U44X	LJL36600U44X	LLL36600U44X	LRL36600U44X
Energy	LSIG	6.3E	400 A[4]	LDL36400U54X	LGL36400U54X	LJL36400U54X	LLL36400U54X	LRL36400U54X
			600 A[4]	LDL36600U54X	LGL36600U54X	LJL36600U54X	LLL36600U54X	LRL36600U54X
100% Rated, 600 Vac, 50/60 Hz								
Standard	LI	3.3[2]	250 A[3]	LDL36250CU31X	LGL36250CU31X	LJL36250CU31X	LLL36250CU31X	LRL36250CU31X
			400 A[4]	LDL36400CU31X	LGL36400CU31X	LJL36400CU31X	LLL36400CU31X	LRL36400CU31X
Standard	LSI	3.3S[2]	250 A[3]	LDL36250CU33X	LGL36250CU33X	LJL36250CU33X	LLL36250CU33X	LRL36250CU33X
			400 A[4]	LDL36400CU33X	LGL36400CU33X	LJL3640C0U33X	LLL36400CU33X	LRL36400CU33X
Ammeter	LSI	5.3A	400 A[4]	LDL36400CU43X	LGL36400CU43X	LJL36400CU43X	LLL36400CU43X	LRL36400CU43X
Energy	LSI	5.3E	400 A[4]	LDL36400CU53X	LGL36400CU53X	LJL36400CU53X	LLL36400CU53X	LRL36400CU53X
Ammeter	LSIG	6.3A[5]	400 A[4]	LDL36400CU44X	LGL36400CU44X	LJL36400CU44X	LLL36400CU44X	LRL36400CU44X
Energy	LSIG	6.3E	400 A[4]	LDL36400CU54X	LGL36400CU54X	LJL36400CU54X	LLL36400CU54X	LRL36400CU54X

1 UL Listed/CSA Certified as current-limiting circuit breakers.

2 Three-pole circuit breakers with this trip unit can be used for two-pole applications.

3 Standard lug kit: AL400L61K3. Terminal wire range: (1) 2 AWG–600 kcmil Cu or (1) 2 AWG–500 kcmil Al. Type of terminal shield: short.

4 Standard lug kit: AL600LS52K3. Terminal wire range: (2) 2/0 AWG–500 kcmil Al/Cu. Type of terminal shield: medium.

5 Three-pole circuit breakers with this trip unit can be used for two-pole applications in order to have ground fault protection. Additional metering capabilities will not work properly on the unconnected phase.

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Section 7—Trip Units

Available Trip Units

- PowerPact™ H-, J-, and L-Frame circuit breakers offer a range of thermal-magnetic and Micrologic™ electronic trip units in interchangeable cases. Thermal-magnetic trip units are designed to open automatically under overload or short circuit. H-frame and J-frame thermal-magnetic circuit breakers contain individual thermal (overload) and instantaneous (short circuit) sensing elements in each pole.
- Micrologic electronic trip units provide intelligent operation, with wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance to supply all of the information required to manage the electrical installation and optimize energy use.

  Micrologic trip units offer excellent measurement accuracy, using a new generation of current transformers combining “iron-core” sensors for self-powered electronics and “air-core” sensors (Rogowski coils) for measurements. The protection functions are managed by an ASIC component that is independent of the measurement functions. This independence ensures immunity to conducted and radiated disturbances and a high level of reliability.

  An LED on the front of the electronic trip units indicates the result of the self-test running continuously on the measurement system and the tripping release. When the green LED is flashing, the links between the CTs, the processing electronics and the Mitop release are operational. The circuit breaker is ready to protect. A minimum current of 15 to 50 A, depending on the device, is required for this function.

  The dual adjustment for protection functions on Micrologic 5/6 consists of:

  — an adjustment using rotary switches sets the maximum value

  — an adjustment, made using the keypad or remotely, fine-tunes the setting. This setting may not exceed the first one. It can be read directly on the Micrologic screen, to within one ampere and a fraction of a second.

NOTE: All the trip units have a transparent sealable cover that protects access to the adjustment rotary switches.

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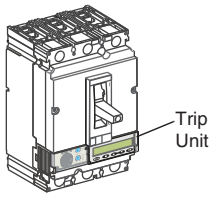
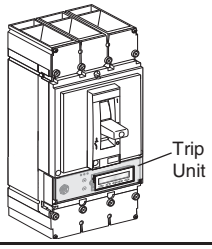
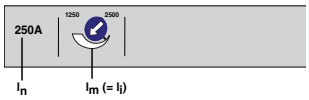
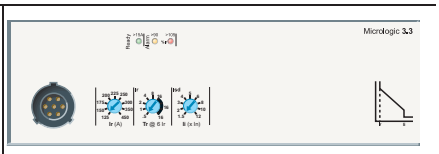
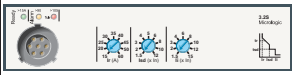
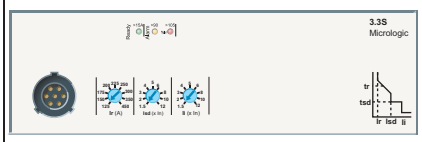
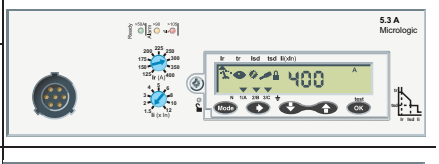
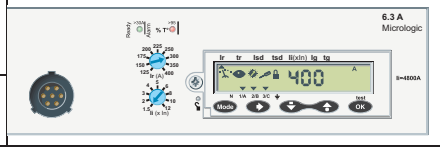
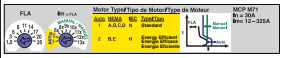
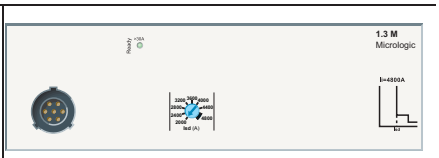
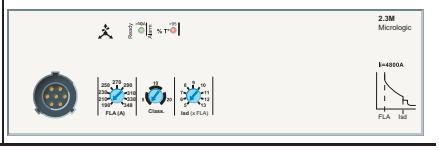
Table 62: Trip Unit Availability

Trip Unit Type	Trip Unit	H-, J-Frame	Trip Unit	L-Frame
				
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		Micrologic 3.3S and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

NOTE: W = mission critical trip unit.

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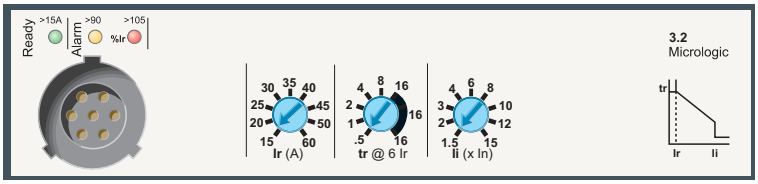
Micrologic 3 Trip Units

Micrologic 3 trip units can be used on PowerPact H-, J-, and L-Frame circuit breakers with performance levels D/G/J/L.



They provide:

- standard protection of distribution cables
- indication of:
  - — overloads (using LEDs)
  - — overload tripping (using the SDx relay module)

Circuit breakers equipped with Micrologic 3 trip units can be used to protect distribution systems supplied by transformers.

Protection

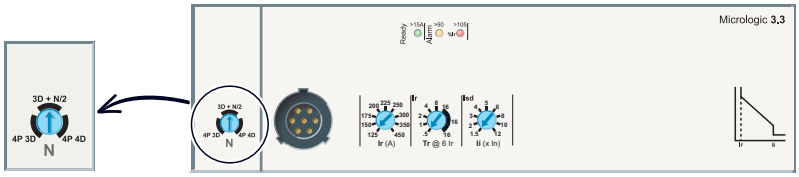
Settings are made using the adjustment rotary switches.

Overloads: Long time protection (I_r)

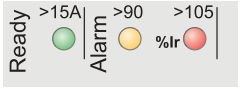
Inverse time protection against overloads with an adjustable current pick-up I_r set using a rotary switch and an adjustable time delay t_r.

Neutral protection

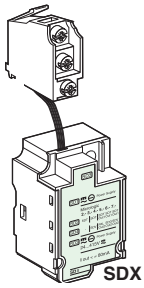
- On three-pole L-frame circuit breakers, neutral protection is not possible.
- On four-pole L-frame circuit breakers, neutral protection may be set using a three-position switch:
  - — switch position 4P 3D: neutral unprotected
  - — switch position 4P 3D + N/2: neutral protection at half the value of the phase pick-up, (0.5 x I_r)
  - — switch position 4P 3D: neutral fully protected at I_r



Indicators



Front Indicators



SDX Module

Front indicators

- The green “Ready” LED blinks slowly when the electronic trip unit is ready to provide protection. It indicates the trip unit is operating correctly.
- Orange overload pre-alarm LED: steady on when I > 90% I_r
- Red overload LED: steady on when I > 105% I_r

Remote indicators

An overload trip signal can be remotely checked by installing an SDx relay module inside the circuit breaker. This module receives the signal from the Micrologic electronic trip unit through an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. See page 120.

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PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Units

Table 64: Micrologic 3 Trip Unit

Ratings	I_n at 104°F (40°C)[1]		60 A	100 A	150 A	250 A	400 A	600 A			
Circuit Breaker	H-frame		X	X	X						
	J-frame					X					
	L-frame					X	X	X			
Micrologic 3.2 / 3.3 trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	**I_r**		**Value depending on sensor rating (I_n) and setting on rotary switch**								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		0.5	1	2	4	8	16			
		1.5 x I_r	15	25	50	100	200	400			
		6 x I_r	0.5	1	2	4	8	16			
		7.2 x I_r	0.35	0.7	1.4	2.8	5.5	11			
Thermal memory			20 minutes before and after tripping								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								
Micrologic 3.2S / 3.3S trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	**I_r**		**Value depending on sensor rating (I_n) and setting on rotary switch**								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		non-adjustable								
		1.5 x I_r	400								
		6 x I_r	16								
		7.2 x I_r	11								
Thermal memory			20 minutes before and after tripping								
S Short-time protection											
Pick-up (A) accuracy ± 10%	I_{sd} - I_r x...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	t_{sd}		non-adjustable								
	Non-tripping time Maximum break time		20 80								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								

1 If the trip units are used in high-temperature environments, the Micrologic trip unit setting must take into account the thermal limitations of the circuit breaker. See the temperature derating information on page 150.

2 Mission Critical trip units have a "-W" at the end of the number (for example 3.2-W). All other protections are the same and have the same trip curves.

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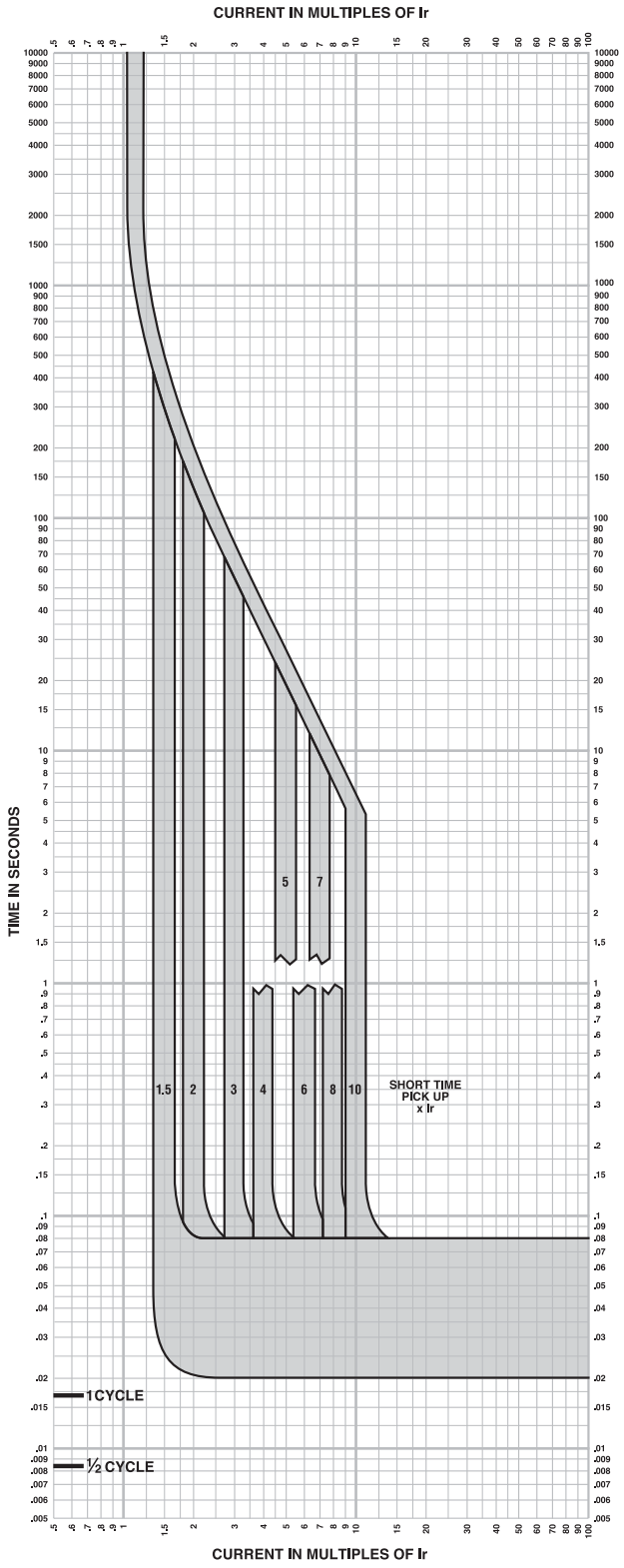
PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 117: Micrologic 3.3S and 3.3S-W Electronic Trip Unit Long Time/Short Time Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3S and 3.3S-W
Long Time/Short Time Trip Curve
250A, 400A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

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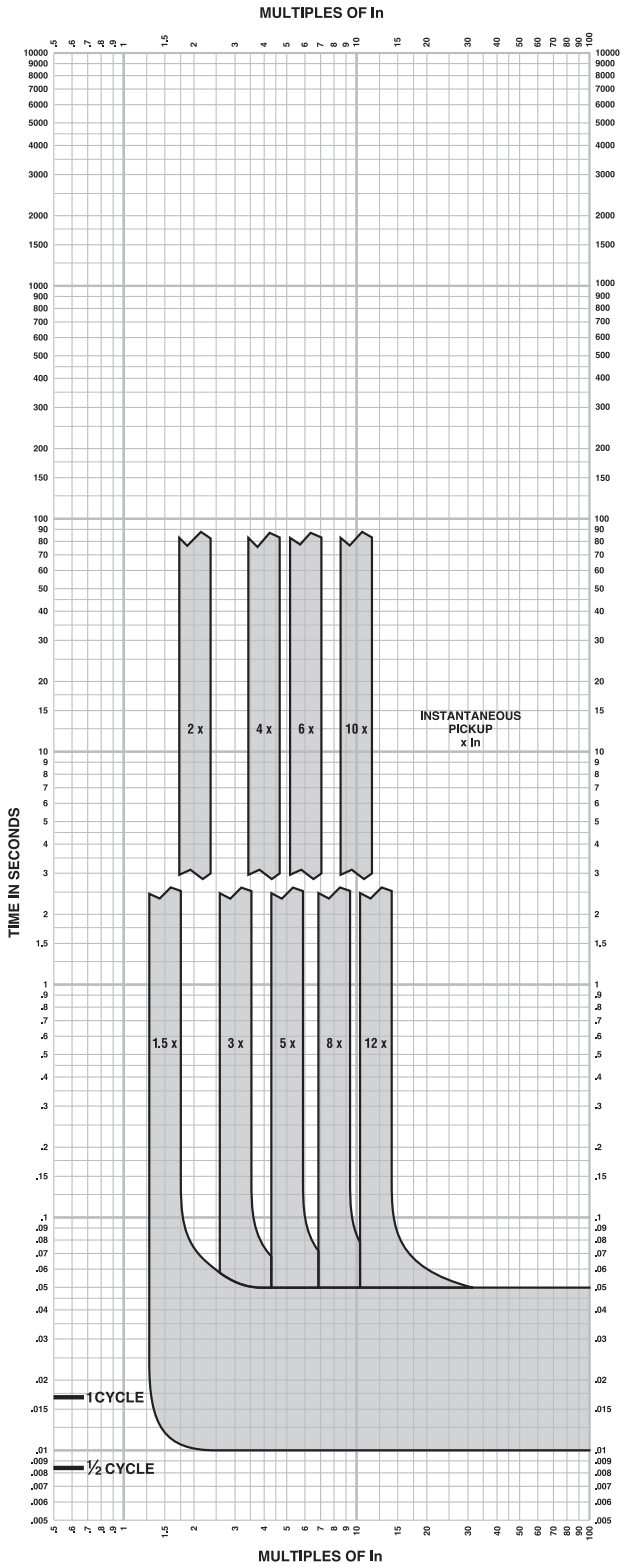
PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 119: Micrologic 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W Electronic Trip Unit Instantaneous Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W
Instantaneous Trip Curve
400A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. In = Maximum dial setting of Ir.
   400A L-Frame: In = 400A = Max Ir setting

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

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Sound Data
C70D2RE
QSB5-G11 60Hz
Diesel Generator Set

A-weighted Sound Pressure Level @ 7 meters, dB(A)

See notes 2, 5 and 7-11 listed below

Configuration	Exhaust	Applied Load	Position (Note 2)								8 Position Average
			1	2	3	4	5	6	7	8	
Housed with SCR and Trailer	Open	0 % Prime	67.8	67.0	62.6	63.2	64.2	68.0	65.0	68.1	66.2
		75% Prime	68.8	67.3	63.6	63.8	64.8	68.4	65.9	69.2	67.0
		100 % Prime	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		110 % Prime	69.6	68.0	64.9	65.0	65.4	68.6	66.6	69.7	67.6

Average A-weighted Sound Pressure Level @ 1 meter, dB(A)

See notes 1, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)										Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Housed with SCR and Trailer	Open	0 % Prime	N/A	33.8	58.8	66.9	71.3	70.2	69.5	69.2	63.2	55.9	40.4	76.9
		75% Prime	N/A	35.6	60.3	67.7	70.8	70.7	70.2	69.9	64.1	56.2	43.5	77.3
		100 % Prime	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		110 % Prime	N/A	36.8	62.2	69.0	71.2	71.0	70.0	69.7	64.5	56.5	47.2	77.6

A-weighted Sound Pressure Level @ Operator Location, dB(A)

See notes 1, 3, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)										Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Housed with SCR and Trailer	Open	100 % Prime	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		110 % Prime	N/A	38.3	63.4	72.6	76.8	69.6	69.1	66.6	60.9	54.2	47.4	79.6

Sound Data
C70D2RE
QSB5-G11 60Hz
Diesel Generator Set

A-weighted Sound Power Level, dB(A)

See notes 1, 3 and 6-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Housed with SCR and Trailer	Open	0 % Prime	N/A	52.8	78.4	84.9	86.6	86.5	86.8	86.1	79.1	73.0	56.0	93.5
		75% Prime	N/A	54.4	80.0	85.7	86.5	87.0	87.5	86.9	80.0	73.3	58.7	94.1
		100 % Prime	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		110 % Prime	N/A	55.3	81.8	87.1	87.0	87.3	87.2	86.6	80.4	73.8	61.7	94.5

Exhaust Sound Power Level, dB(A)

See notes 4 and 6-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Housed with SCR and Trailer	Open	0 % Prime	N/A	51.6	71.7	79.1	86.9	85.3	83.5	83.9	76.7	68.4	54.3	91.6
		75% Prime	N/A	54.1	75.5	80.1	88.0	85.2	83.5	84.5	77.7	68.7	56.4	92.2
		100 % Prime	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		110 % Prime	N/A	55.2	77.3	81.3	88.1	85.3	83.4	84.5	78.4	69.1	59.6	92.4

Notes:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, ANSI S1.13, ANSI S12.1 and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter-clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa.
6. Reference Sound Power Level is 1 pW (10^{-12} Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Published sound levels are measured at CE certified test site and are subject to instrumentation, measurement, installation and manufacturing variability.
10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind.
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosures installed over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.
12. Published sound levels meet the requirements India's Central Pollution Control Board (Ministry of Environment & Forests),vide GSR 371 (E), which states the A-weighted sound level at1meter from any diesel generator set up to a power output rating of 1000kVA shall not exceed 75dB(A)
13. For updated noise pollution information for India see website: http://www.envfor.nic.in/legis/legis.html
14. Sound levels must meet India's Ambient Air Noise Quality Standards detailed for Daytime/Night-time operation in Noise Pollution (Regulation and Control) Rules, 2000

A 2 Year maintenance agreement is included with 1 Full Service & 1 Inspection per year.

Power Generation System Planned Equipment Maintenance

Cummins Sales and Service

Scope of Services

INSPECTION
(MONTHLY, QUARTERLY, OR ONE-TIME PER YEAR)

Battery & Battery Charger System
- Check battery charger functions
- Cable connections, termination cleanliness and security
- Check electrolyte level, vent caps of all cells in the starting batteries
- Battery Conductance Test

Fuel System
- Inspect main tank/day tank fuel level
- Inspect day tank controls and pumps. Test operate day tank controls (where available)
- Inspect all fuel hoses, clamps, pipes, components, and fittings
- Inspect governor linkage
- Visually inspect rupture/containment basin
- Water in Fuel Test - Sub-base, day tanks
- Optional - fuel sample for laboratory analysis*

Engine Cooling System
- Inspect all hoses and clamps for leaks, coolant level and condition
- Inspect radiator cap and filler neck condition
- Inspect drive belts, observe alignment and deflection
- Observe coolant heater operations
- Utilize DCA test strip to record coolant properties
- Inspect radiator surfaces, shrouds, and barriers for obstruction
- Visually inspect low temperature after cooler coolant
- Optional –coolant sampling*

Engine & Lubrication System
- Inspect lubrication system (visually check oil level)
- Inspect crankcase ventilation system
- Inspect spark ignited ignition system

Intake/Exhaust System
- Inspect air cleaner element and entire intake system
- Inspect exhaust system and rain cap
- Inspect louver operations

Generator Controls & Power Connections
- Visually inspect all engine mounted wiring, senders, and devices
- Visually inspect all control mounted components and wiring
- Lamp test all lights and indicators
- Visually inspect breaker and power connections
- Manually operate generator main breaker(s) open and closed*

*NOTE: Will not exercise breakers or contactors on a paralleling device.

Generator Operations
- Start and observe generator and equipment operations
- Verify engine and generator safeties for proper operation
- System test with or without load

Automatic Transfer Switch
(Paralleling Switchgear, Bypass Switchgear, Manual Transfer Switches)
- Visually inspect all power and control wiring
- Visually inspect switch mechanism and enclosure
- Visually inspect controls and time delays settings
- Verify function of exercise clock

FULL SERVICE
(INCLUDES INSPECTION)

Operational & Functional Review of Generator Critical Components
- Inspect engine cooling fan & fan drives for excessive wear or shaft wobble
- Check all pulleys, belt tensioners, slack adjusters & idler pulleys for travel, wear & overall condition
- Inspect/lubricate drive bearings, gear or belt drives, lovejoy and other shaft connecting hardware

Lubrication Oil and Filtration Service
- Change engine lubrication oil
- Change primary lubrication and bypass filters
- Change fuel filters
- Post lube service operation of genset (unloaded) at rated temperature
- Optional - oil sample for laboratory analysis*

***Additional Charge**
Any additional repairs, parts or services which are required will be brought to the attention of the owner. Repairs will only be made after proper authorization from the owner is given to Cummins Sales and Service. Any additional repairs, maintenance or service performed by Cummins Sales and Service for a Planned Equipment Maintenance Agreement holder will be at current Cummins Sales and Service labor rates.

StormSwitch® Manual Transfer Switch

UL 1008 Listed

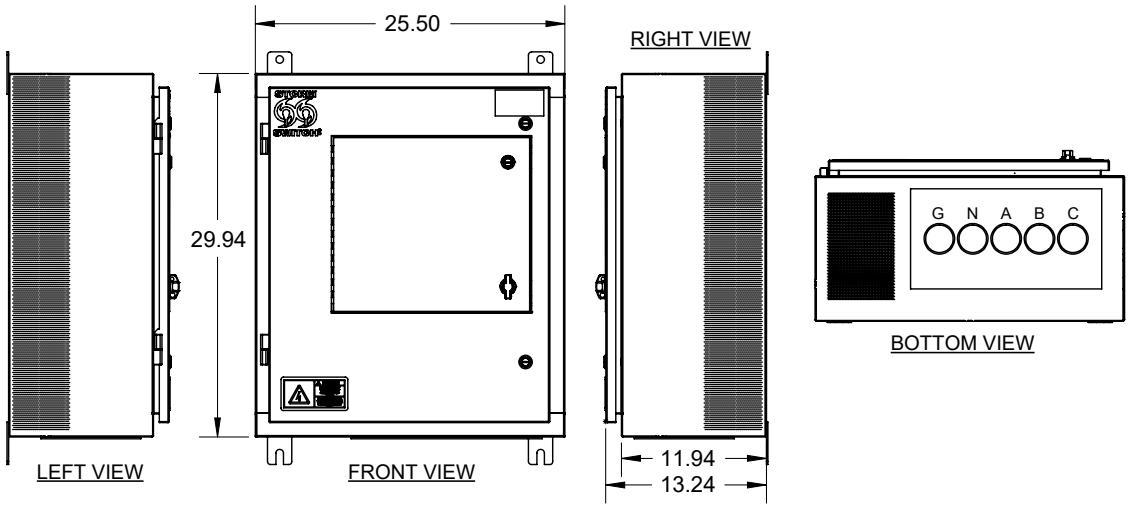
70 - 200A, up to 480VAC

Series: 3020

Features

- Quick connect solution for backup alternate power
- Mechanically interlocked mechanism prevents cross-connecting power sources
- Door & dead front panel for safe alternate power connection and operation
- Primary power and alternate power disconnects are 3-pole circuit breakers as standard
- Type 3R double coated, cold-rolled steel enclosure with gray powdercoat RAL 7035 (stainless steel & additional colors optional)
- Suitable for Use as Service Equipment (SUSE)
- Color-coded Series 16 cam style male connectors for easy alternate power connection
- Direct wire connection available for indoor installations (TempTap Generator Docking Station Required)
- Handle cover provides security from unauthorized use
- Wall mountable; leg kits optional
- Operating instructions silkscreened on door
- U.S. Patent 7462792

Drawing



Available incoming conduit entry locations shown shaded

Approvals

- UL/cUL 1008 Listed assembly
- UL 1691 Listed receptacles
- UL 489 Listed / CSA certified molded case circuit breaker
- UL 1087 Listed molded case switch
- OSHPD seismic certification (OSP)
- ICC-ES 156 shake-table tested/certified
- IBC 2015/ASCE 7-10 compliant

ESL Power Systems, Inc. | 2800 Palisades Dr. | Corona, CA 92878 | 800.922.4188 | +1.951.739.7000 | www.eslpwr.com | info@eslpwr.com

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Specifications

UL 1008 Listed

StormSwitch® Manual Transfer Switch
Series: 3020

Ordering Information & Options

System Voltage	120/240 (2-Phases + Neutral + Ground) 208Y/120 (3-Phases + Neutral + Ground) 208 (3-Phases + Ground) (no Neutral) 240 Delta (3-Phases + Ground) (no Neutral) 240/120 Delta (3-Phases + Neutral + Ground) (High Leg) 480 Delta (3-Phases + Ground) (no Neutral) 480Y/277 (3-Phases + Neutral + Ground)
Poles	3 (standard),
Assembly Rating	22kAic at 240VAC & 480VAC with Circuit Breakers (10kA with Switches)
Trip Type	LI (standard), Thermal Mag, LI Ammeter, LSI, LSI Ammeter, LSIG Ammeter, Automatic Switch
Circuit Breaker kAIC/ Switch kA	Standard: 65kA/240, 35kA/480, 18kA/600 Optional: 100kA/240, 65kA/480, 25kA/600 Optional: 125kA/240, 100kA/480, 50kA/600 Optional: 200kA/240, 200kA/480, 100kA/600
Disconnect Rating	80% Rated Disconnect (standard), 100% Rated Disconnect
Optional Shunt Trip Voltage	12 VDC, 24 VDC, 48 VDC, 125 VDC, 250 VDC, 24 VAC, 48 VAC, 120 VAC, 240 VAC, 277 VAC, 380 VAC, 480 VAC
Terminals	Disconnect line terminals: 70 - 150A (1) #14 - 3/0, 175A (1) #4 - 4/0, 200A (1) 3/0 - 350kcmil Load terminals: (2) #6 - 4/0 Ground lug: #6 - 300kcmil Neutral: (2) #6 - 4/0 Other options available
Disconnect Aux Contact	(1) N.O. / (1) N.C.(standard), (2) N.O. / (2) N.C (optional)
Optional Disconnect Bell Alarm	(1) N.O. / (1) N.C.
Enclosure Material	Double coated, cold-rolled steel (standard), 304SS, 316SS
Environmental Rating	3R (standard), 3RX
Enclosure Color	RAL-7035 – Wrinkle Light Gray (standard) RAL-1015 – Wrinkle Light Ivory RAL-1023 – Wrinkle Traffic Yellow RAL-2004 – Wrinkle Pure Orange RAL-3020 – Wrinkle Traffic Red RAL-5002 – Wrinkle Ultramarine Blue RAL-6024 – Wrinkle Traffic Green RAL-7004 – Wrinkle Signal Gray RAL-7038 – Wrinkle Agate Gray RAL-8017 – Wrinkle Chocolate Brown RAL-9003 – Wrinkle Signal White RAL-9005 – Wrinkle Jet Black
Standard Accessories	Phase Rotation Monitor Remote Start 3 Point TB
Optional Accessories	Pilot Light - Primary Source (Red) Pilot Light - Primary Source (Green) Pilot Light - Alternate Source (Red) Pilot Light - Alternate Source (Green) Surge Protection Device (SPD) Heater/Thermostat/De-Humidistat Receptacle - 20A, 120V Duplex Receptacle - 20A, 120V GFCI Duplex Receptacle - 20A, 120V Twist Lock Receptacle - 30A, 120V Twist Lock Receptacle - 20A, 120V Straight Blade Other options available
Optional Extended Depth Enclosure	Extended Depth (8”) for bottom conduit entry
Aproximate Product Weight: Aproximate Shipping Weight:	138 lbs. 170 lbs.

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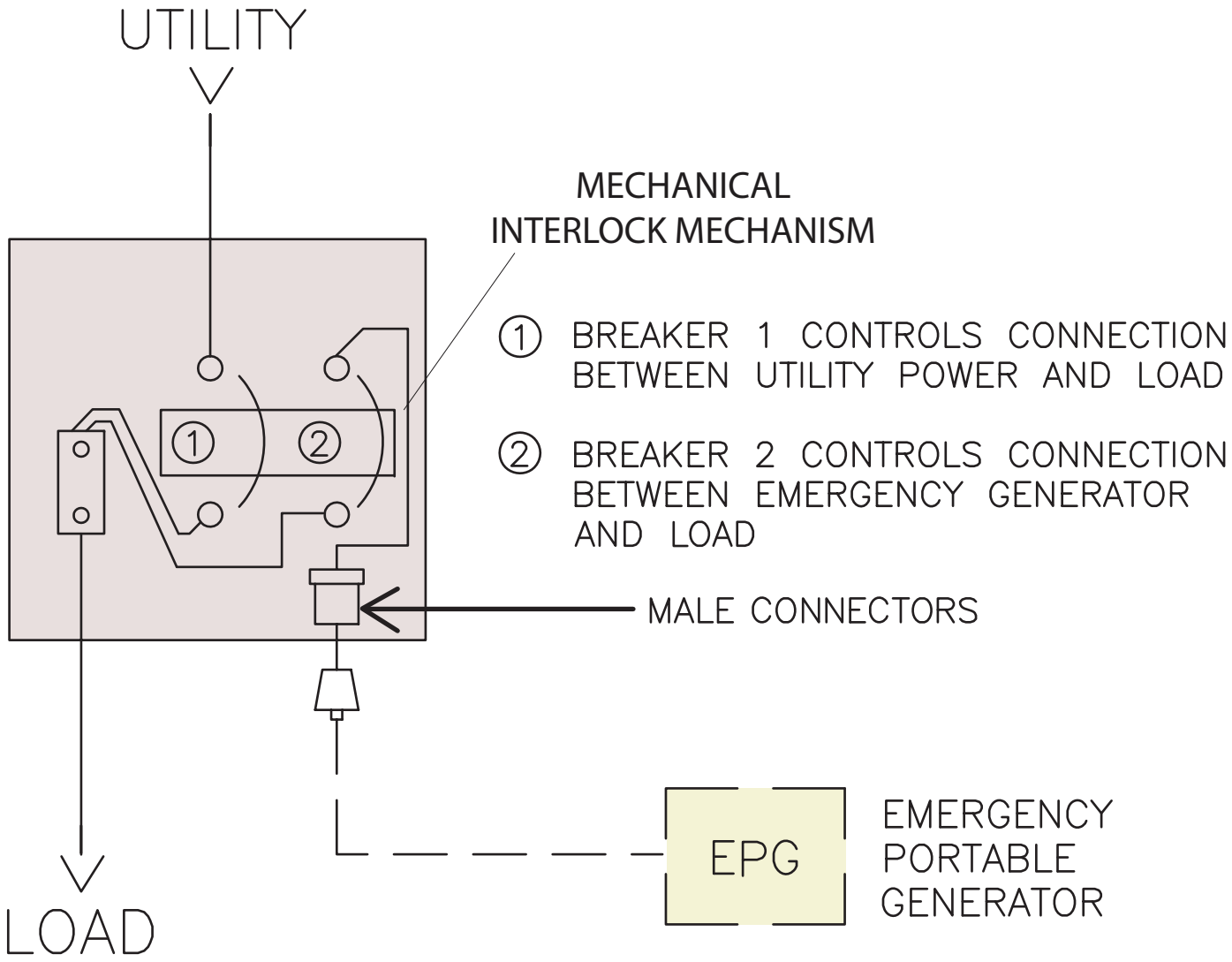
StormSwitch®
SINGLE LINE DIAGRAM



Warranty Statement

Generator Set

Global Industrial Mobile Extended Warranty

English
Original Instructions

5-2015

A040H849 Issue B

Limited Industrial Mobile 5 Year or 5,000 Hours Comprehensive Extended Warranty

Industrial Mobile Generating Set

This limited warranty applies to all Cummins Power Generation® branded Industrial Mobile generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of delivery to first retail purchaser, after 50 hours of demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date or 5,000 hours, whichever occurs first.

Prime Power (PRP) is defined as being the maximum power which a generating set is capable of delivering continuously whilst supplying a variable electrical load when operated for an unlimited number of hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. For applications requiring permissible average output higher than stated, a COP rating should be used.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location or Product transportation if required by Cummins.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence of delivery date for establishing start of coverage.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Normal wear and tear.
- Improper and/or unauthorized installation.
- Negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

Items not covered by this limited warranty:

- Batteries
- Enclosures
- Coolant heaters
- Exhaust systems and aftertreatment components
- Maintenance items

This limited warranty also does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.

Please contact your local Cummins Power Generation® Distributor for clarification concerning these limitations.

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

www.power.cummins.com

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited warranty shall be enforced to the maximum extent permitted by applicable law. This limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Coverage ID:_____

Product Model Number:_____

Product Serial Number:_____

Delivery Date:_____

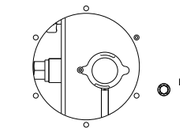
LIMITED WARRANTY

ESL warrants to Customer that the Products shall be free from defects in material and workmanship under normal use and service for a period of one (1) year from date of shipment. Written notice and an explanation of the circumstances of any claim that the Products are defective in material or workmanship shall be given promptly by Customer to ESL, and in all events written notice must be received by ESL within the one (1) year warranty period. ESL will not be liable for any misuse, improper operations, improper installation, improper maintenance, alteration, modification, accident or unusual degradation of the Products or parts due to an unsuitable installation or operating environment. No representation or other affirmation of facts, including but not limited to statements regarding capacity, suitability for use, or performance of the Products, shall be or be deemed to be a warranty or representation by ESL for any purpose, nor give rise to any liability or obligation of ESL whatsoever. Customer's sole and exclusive remedy in the event of breach of warranty, as set forth herein, is expressly limited to either (a) the correction of the defect by adjustment, repair, modification, or replacement; or (b) issuance of a credit or refund of the purchase price for the defective Products, at ESL's election. In the event that a Product is defective, Customer shall request a Return Merchandise Authorization (RMA) PRIOR TO RETURNING THE DEFECTIVE PRODUCT TO ESL. Returned Products must include ESL's RMA number and reason for the return. Freight for returning the Product to ESL is the responsibility of Customer. ESL will factory inspect, repair, modify or replace and return Product(s), or issue a credit or refund, under warranty within the above guidelines. EXCEPT AS SPECIFICALLY PROVIDED HEREIN, THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY EXTENDS ONLY TO CUSTOMER FROM ESL OR ITS AUTHORIZED DISTRIBUTOR OR SALES AGENT

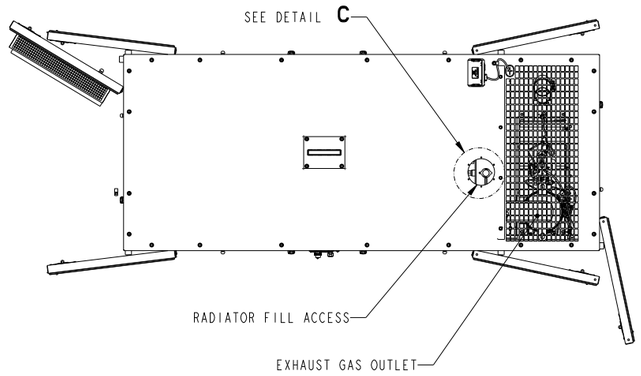
NOTES:

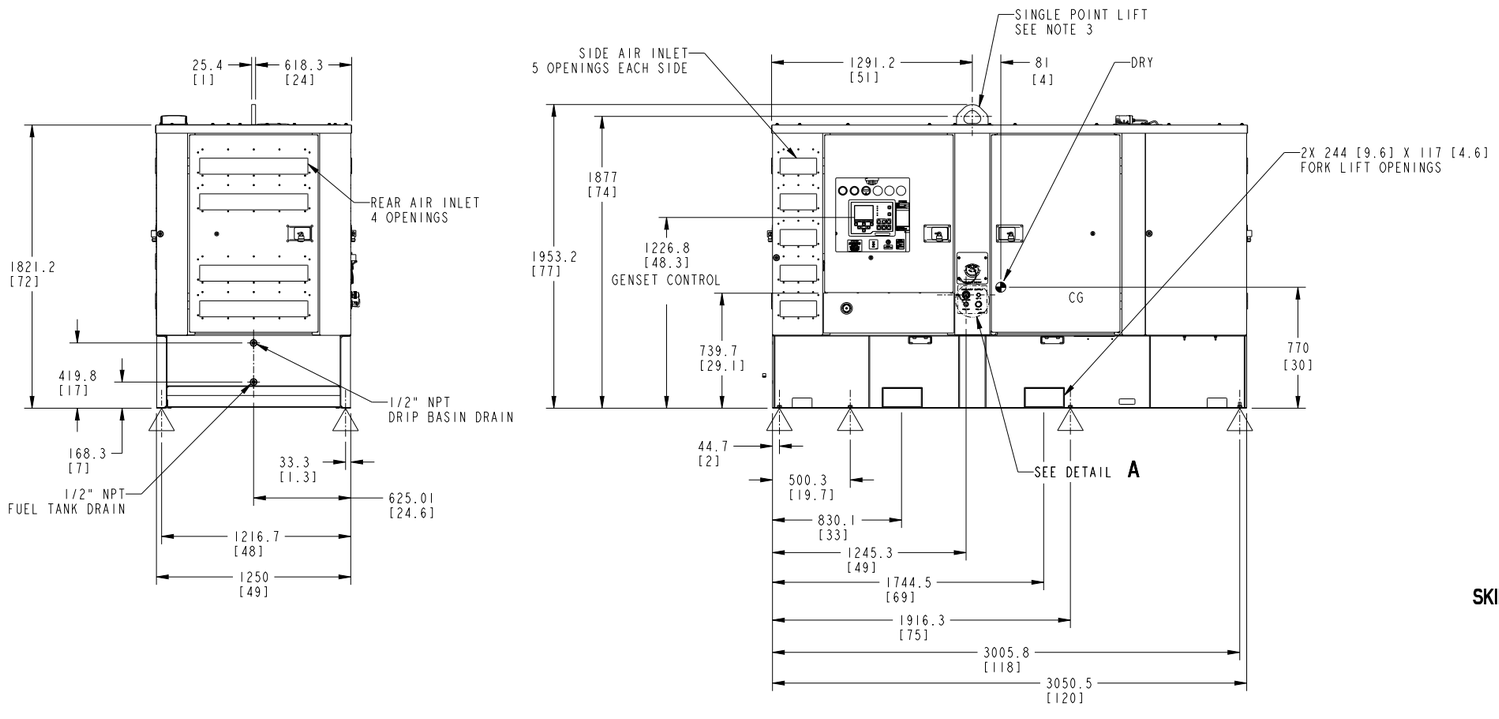
1. DIMENSIONS SHOWN IN [ ] ARE INCHES.
2. M16 X 2 THREADED HOLES MARKED BY △ ARE PROVISIONS FOR SECURING TO A MOUNTING SURFACE.
3. SINGLE POINT LIFT WILL ACCOMMODATE A Ø76.2 [3] LIFTING DEVICE.
4. FLUID CAPACITIES:
   ENGINE OIL: 10.97 LITERS (11.6 QUARTS)
   COOLANT: 32 LITERS (8.5 GALLONS)
   FUEL TANK: 534 LITERS (141 GALLONS)
5. EXHAUST OUTLET DIAMETER: 101.6 [4]

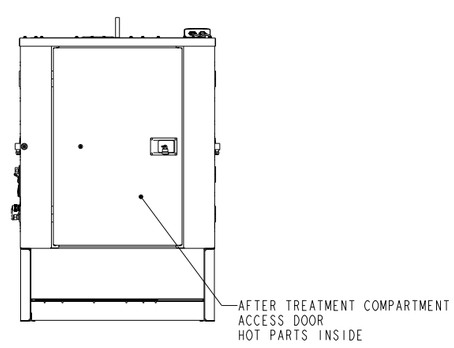
GENSET MASS		SKID MOUNTED	TRAILER MOUNTED	TONGUE WEIGHT
C100 & C70 FULL FEATURED	WITH FUEL	2976 KG [6560 LBS]	3674 KG [8100 LBS]	295 KG [650 LBS]
	WITHOUT FUEL	2522 KG [5560 LBS]	3221 KG [7100 LBS]	286 KG [630 LBS]
C100 & C70 600V FULL FEATURED	WITH FUEL	2976 KG [6560 LBS]	3674 KG [8100 LBS]	338 KG [745 LBS]
	WITHOUT FUEL	2522 KG [5560 LBS]	3221 KG [7100 LBS]	331 KG [730 LBS]



DETAIL C
SCALE 1/4
RADIATOR FILL ACCESS
COVER REMOVED







SKID MOUNTED GENSET (NO TRAILER)

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A1 SCALE: 1/16	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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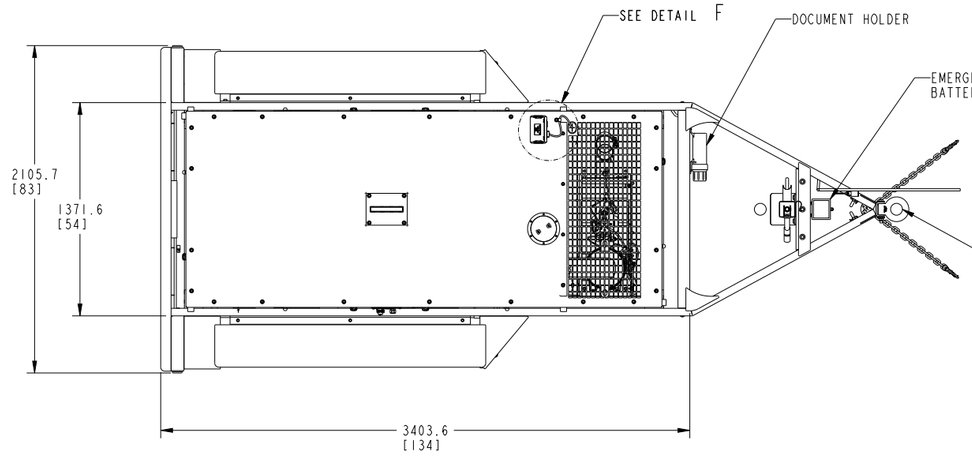
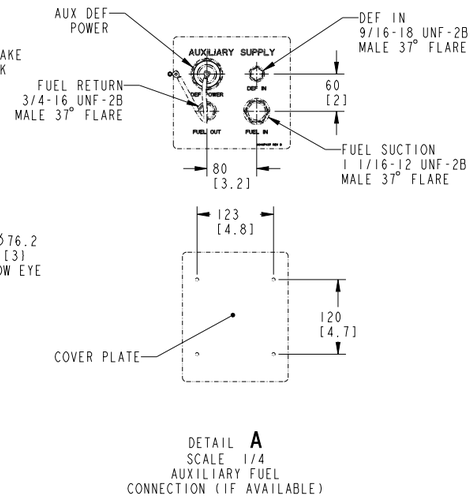
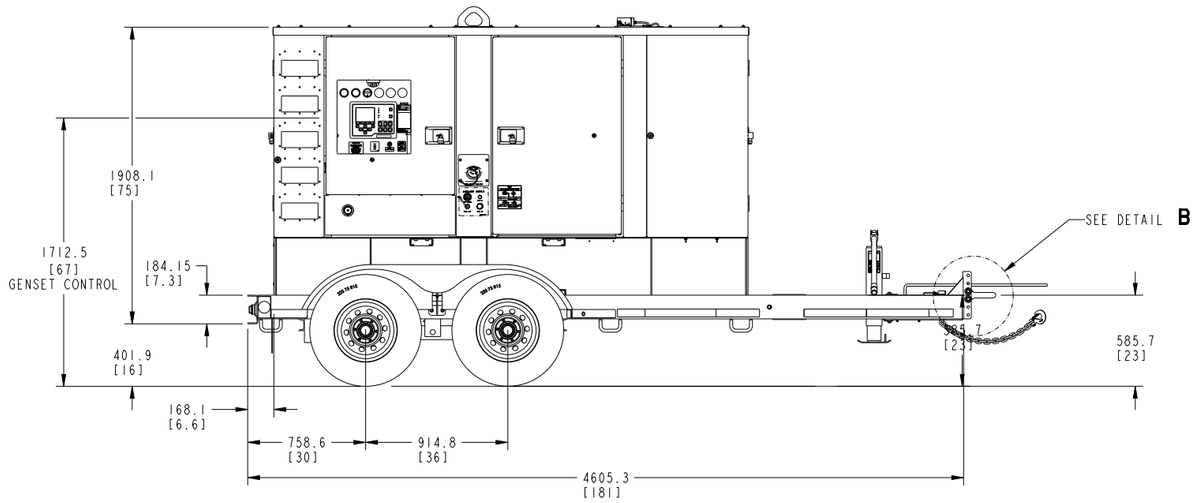
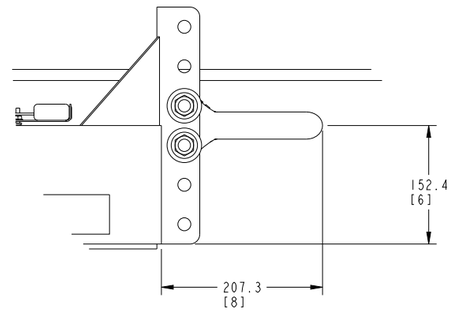
Part Number: **A058E446** Part Revision: **E**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Detail** State: **Released**





DETAIL A
SCALE 1/4
AUXILIARY FUEL
CONNECTION (IF AVAILABLE)





DETAIL B
SCALE 5/16

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A1	SCALE: 1/16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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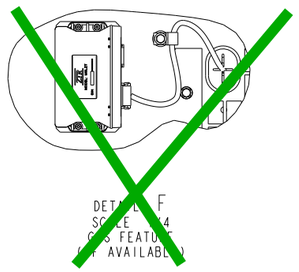

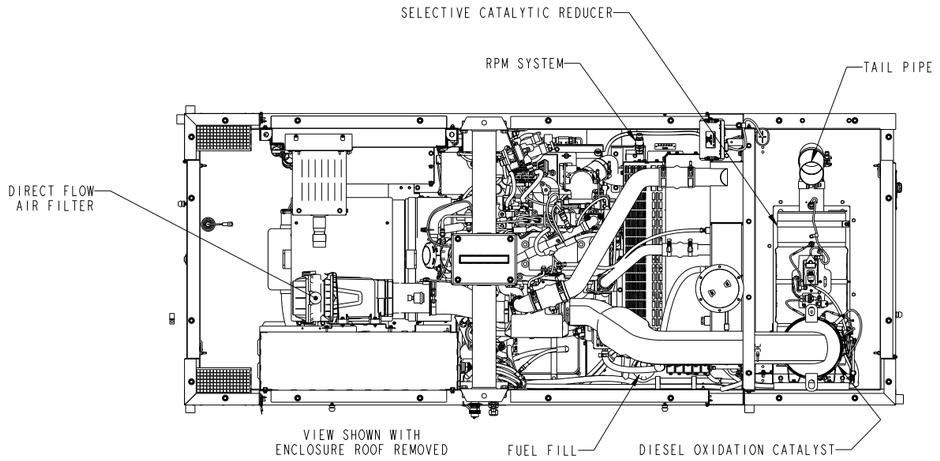

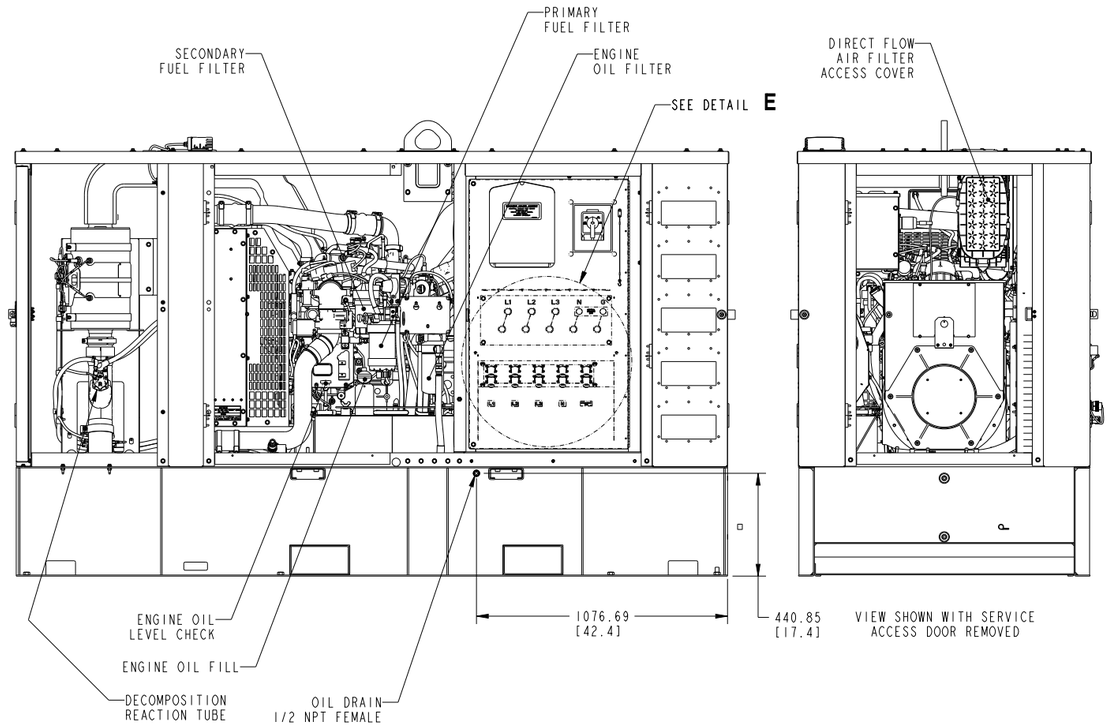

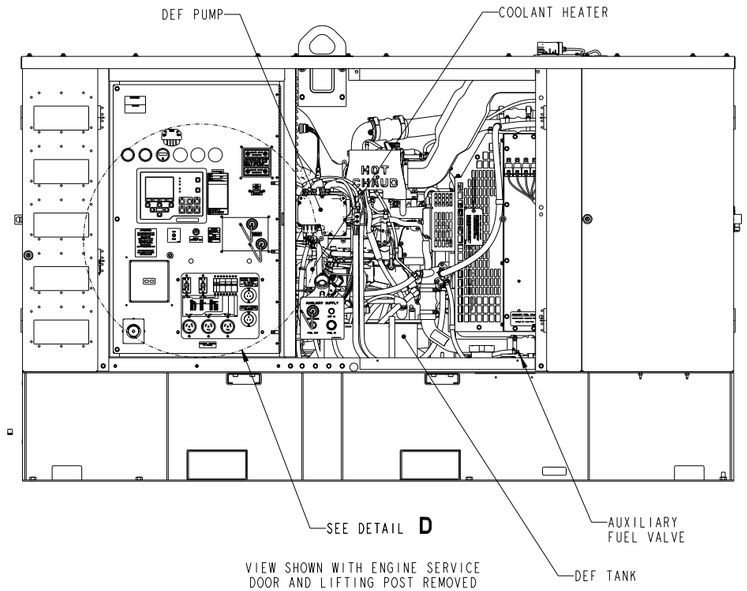

Cummins Inc.		
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DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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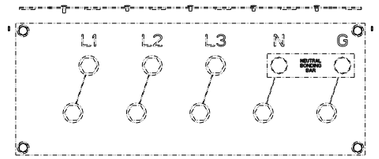
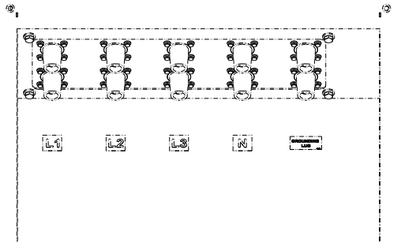
Part Number: **A058E446** Part Revision: **E**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Detail** State: **Released**

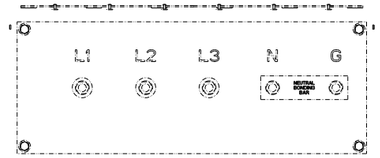
LUG CONNECTIONS



CAM LOCK CONNECTIONS



LUG CONNECTIONS



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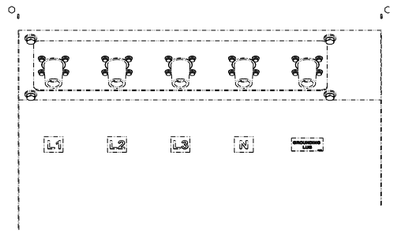
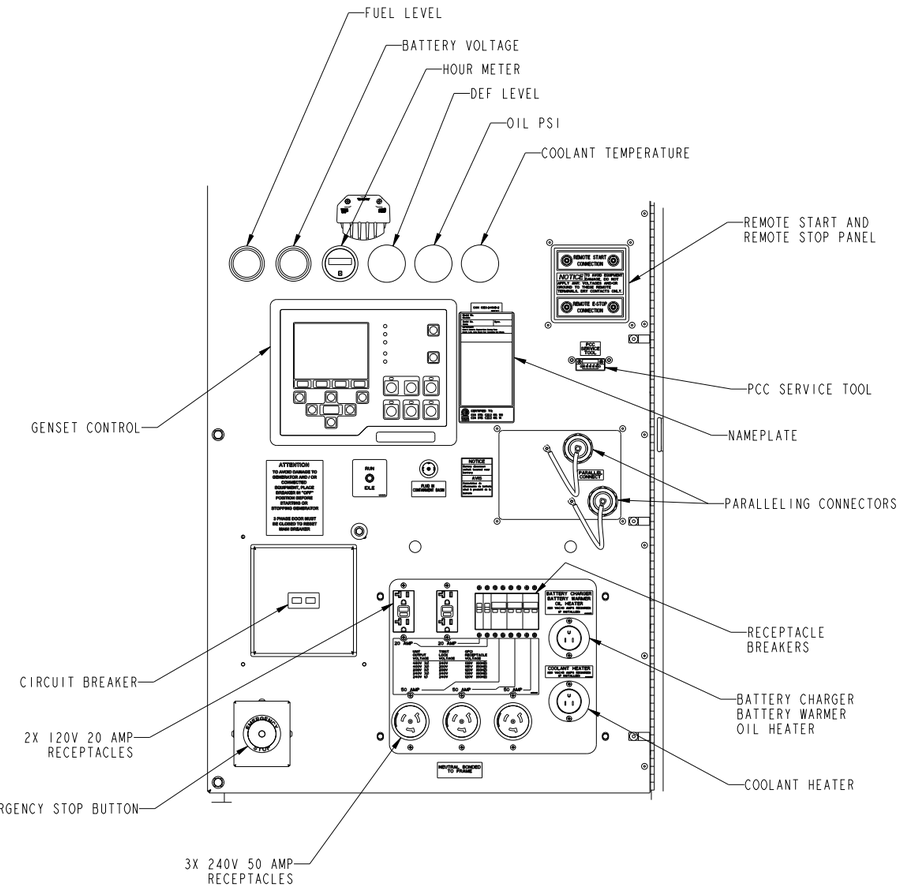


DETAIL **E**
SCALE 1/4
DISTRIBUTION PANEL
LOAD TERMINAL
CONNECTIONS
(IF AVAILABLE)



DETAIL **D**
SCALE 1/4
USER INTERFACE

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A1	SCALE:1/16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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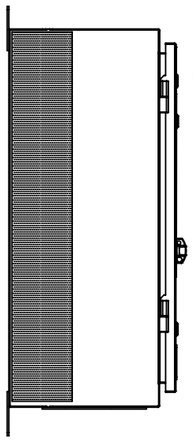
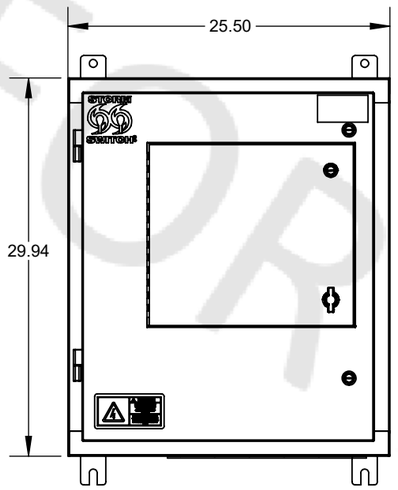
Part Number: **A058E446** Part Revision: **E**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Detail** State: **Released**

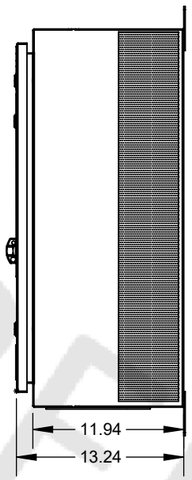
Document Generated: **08SEP2023 15:02 GMT**



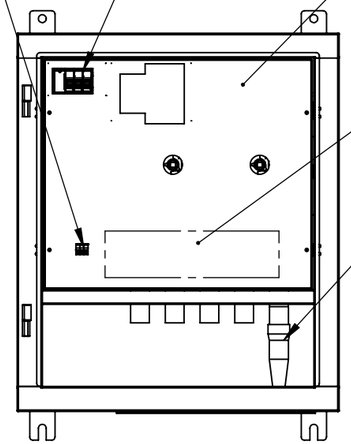
LEFT VIEW



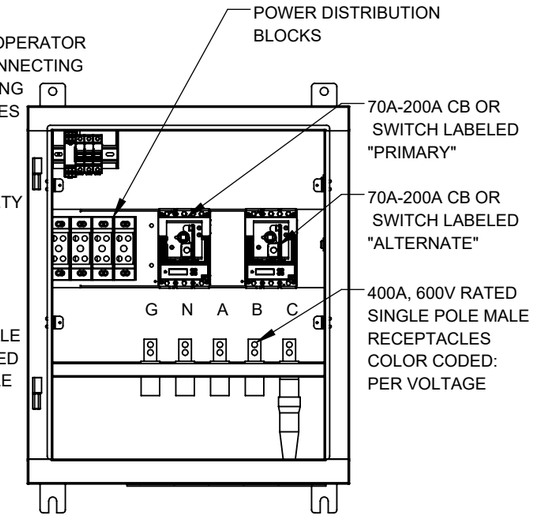
FRONT VIEW



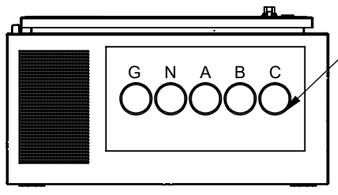
RIGHT VIEW



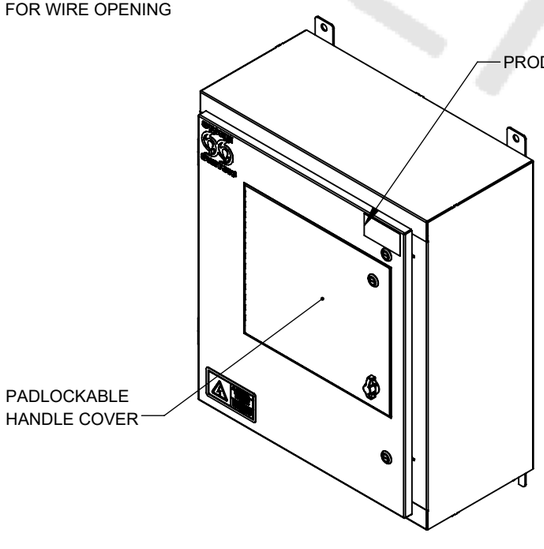
FRONT VIEW
(DOORS REMOVED)



FRONT VIEW
(DOORS & DEADFRONT REMOVED)



BOTTOM VIEW



ISOMETRIC VIEW

TABLE OF KAIC RATINGS

DISCONNECTS	SHORT CIRCUIT RATING
SWITCH	10KA
CIRCUIT BREAKER	22KAIC

NOTES:

1. COMPLETE ASSEMBLY IS UL LISTED AS A MANUAL TRANSFER SWITCH UNDER UL 1008 (TRANSFER SWITCH STANDARD)
2. STANDARD UNIT IS NON-SWITCHED NEUTRAL. FOR SWITCHED NEUTRAL PLEASE CONSULT FACTORY.
3. FINISH POWDER COATED SERIES W49. SEE TITLE BLOCK FOR COLOR.
4. TYPE 3R CONSTRUCTION
5. NOT FOR INDOOR USE
6. OPTIONAL PLUG KITS AVAILABLE
7. CONDUIT ENTRY AREA SHOWN SHADED
8. FOR AVAILABLE ACCESSORIES & OPTIONS SEE SPEC SHEET
9. FOR SINLGE LINE VISIT WWW.ESLPWR.COM

REV.	BY	DATE	DESCRIPTION
0	AD	3/27/2023	FOR REFERENCE

CREATED BY	AD
SCHEMATIC #:	0901-####
THICKNESS:	14GA
MATERIAL:	
FINISH:	WRINKLE GRAY (RAL7035)
REFERENCE:	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
DECIMALS .x ±.03 .XX ±.01 .XXX ±.005
ANGULAR ±1/2°
BREAK ALL SHARP EDGES .005 - .010
DO NOT SCALE

PROPRIETARY
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ESL
CORONA, CALIFORNIA
International: +1 (951) 739-7000
Phone: (800) 922-4188
eslpwr.com
info@eslpwr.com

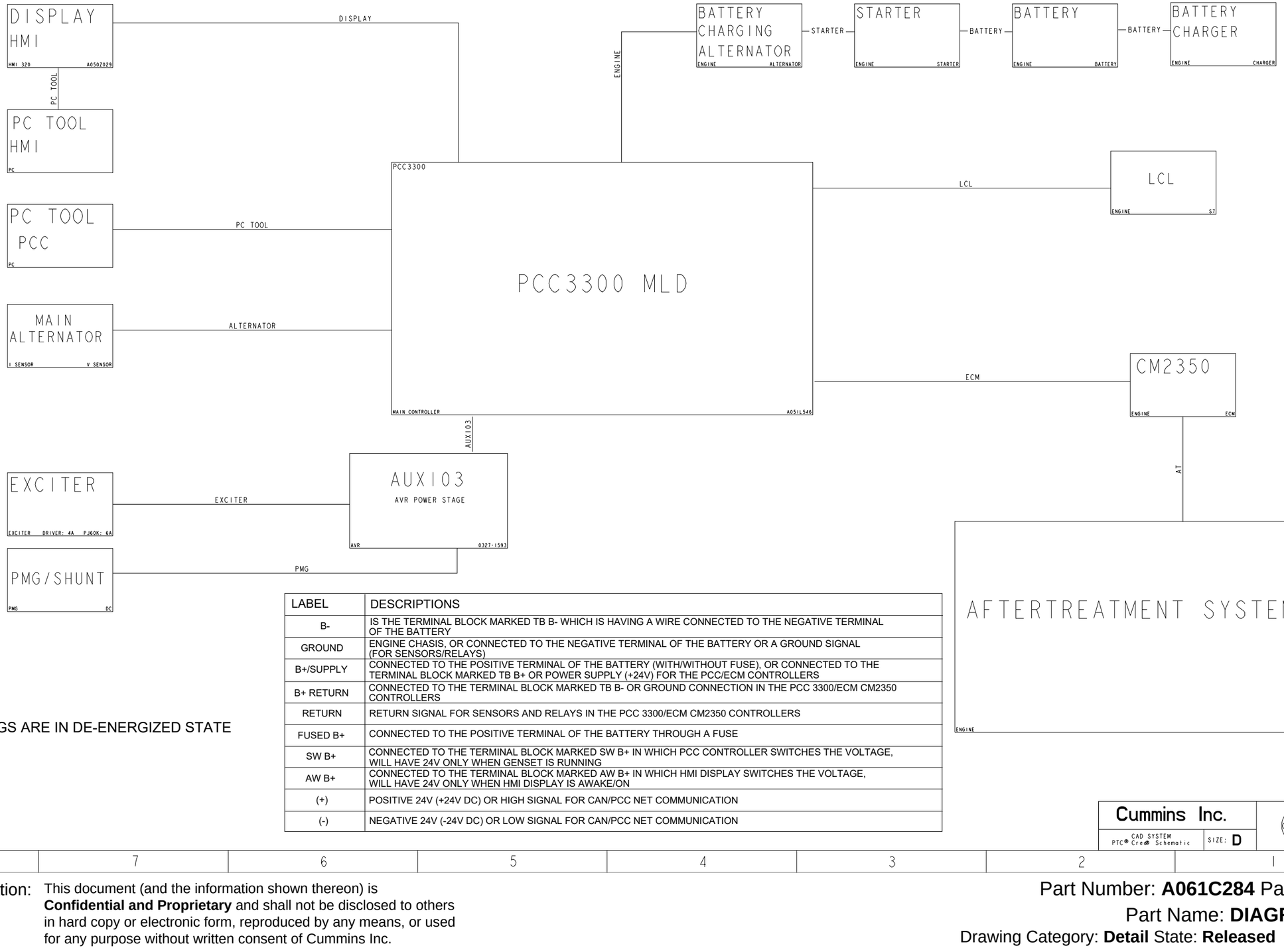
STORMSWITCH
ENCLOSURE RATED 200A

DWG NO. 3020-SERIES-A
REV. 0
WEIGHT: 123 lbs.
SHEET 1 of 1

STORM SWITCH®

FOR REFERENCE

SUPERIOR WIRING DIAGRAM WITH PCC3300 AND CM2350



ALL DRAWINGS ARE IN DE-ENERGIZED STATE

LABEL	DESCRIPTIONS
B-	IS THE TERMINAL BLOCK MARKED TB B- WHICH IS HAVING A WIRE CONNECTED TO THE NEGATIVE TERMINAL OF THE BATTERY
GROUND	ENGINE CHASIS, OR CONNECTED TO THE NEGATIVE TERMINAL OF THE BATTERY OR A GROUND SIGNAL (FOR SENSORS/RELAYS)
B+/SUPPLY	CONNECTED TO THE POSITIVE TERMINAL OF THE BATTERY (WITH/WITHOUT FUSE), OR CONNECTED TO THE TERMINAL BLOCK MARKED TB B+ OR POWER SUPPLY (+24V) FOR THE PCC/ECM CONTROLLERS
B+ RETURN	CONNECTED TO THE TERMINAL BLOCK MARKED TB B- OR GROUND CONNECTION IN THE PCC 3300/ECM CM2350 CONTROLLERS
RETURN	RETURN SIGNAL FOR SENSORS AND RELAYS IN THE PCC 3300/ECM CM2350 CONTROLLERS
FUSED B+	CONNECTED TO THE POSITIVE TERMINAL OF THE BATTERY THROUGH A FUSE
SW B+	CONNECTED TO THE TERMINAL BLOCK MARKED SW B+ IN WHICH PCC CONTROLLER SWITCHES THE VOLTAGE, WILL HAVE 24V ONLY WHEN GENSET IS RUNNING
AW B+	CONNECTED TO THE TERMINAL BLOCK MARKED AW B+ IN WHICH HMI DISPLAY SWITCHES THE VOLTAGE, WILL HAVE 24V ONLY WHEN HMI DISPLAY IS AWAKE/ON
(+)	POSITIVE 24V (+24V DC) OR HIGH SIGNAL FOR CAN/PCC NET COMMUNICATION
(-)	NEGATIVE 24V (-24V DC) OR LOW SIGNAL FOR CAN/PCC NET COMMUNICATION

Cummins Inc.
CAD SYSTEM PTC® Creo® Schematic
SIZE: D

Cummins Data Classification:
Cummins Confidential

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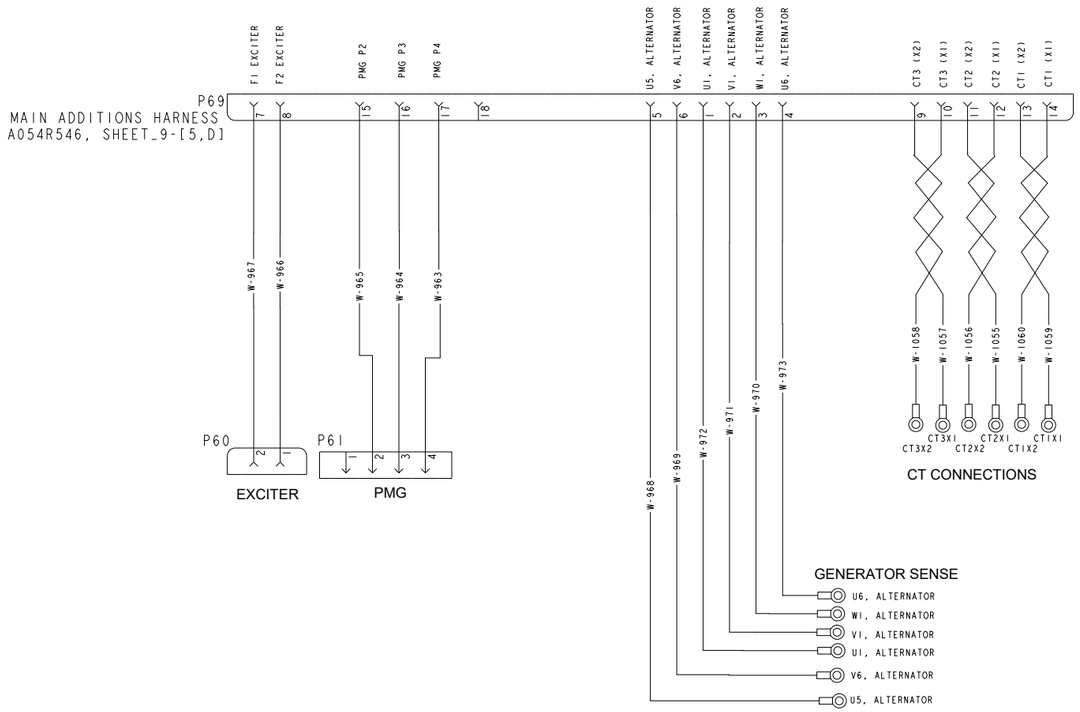
Part Number: **A061C284** Part Revision: **C**
Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **1** of **22**

Document Generated: **06JUN2025 13:09 GMT**

RS Designer

A054X756 SENSING HARNESS



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Part Number: **A061C284** Part Revision: **C**

Part Name: **DIAGRAM,WIRING**

Drawing Category: **Detail** State: **Released** Sheet **2** of **22**

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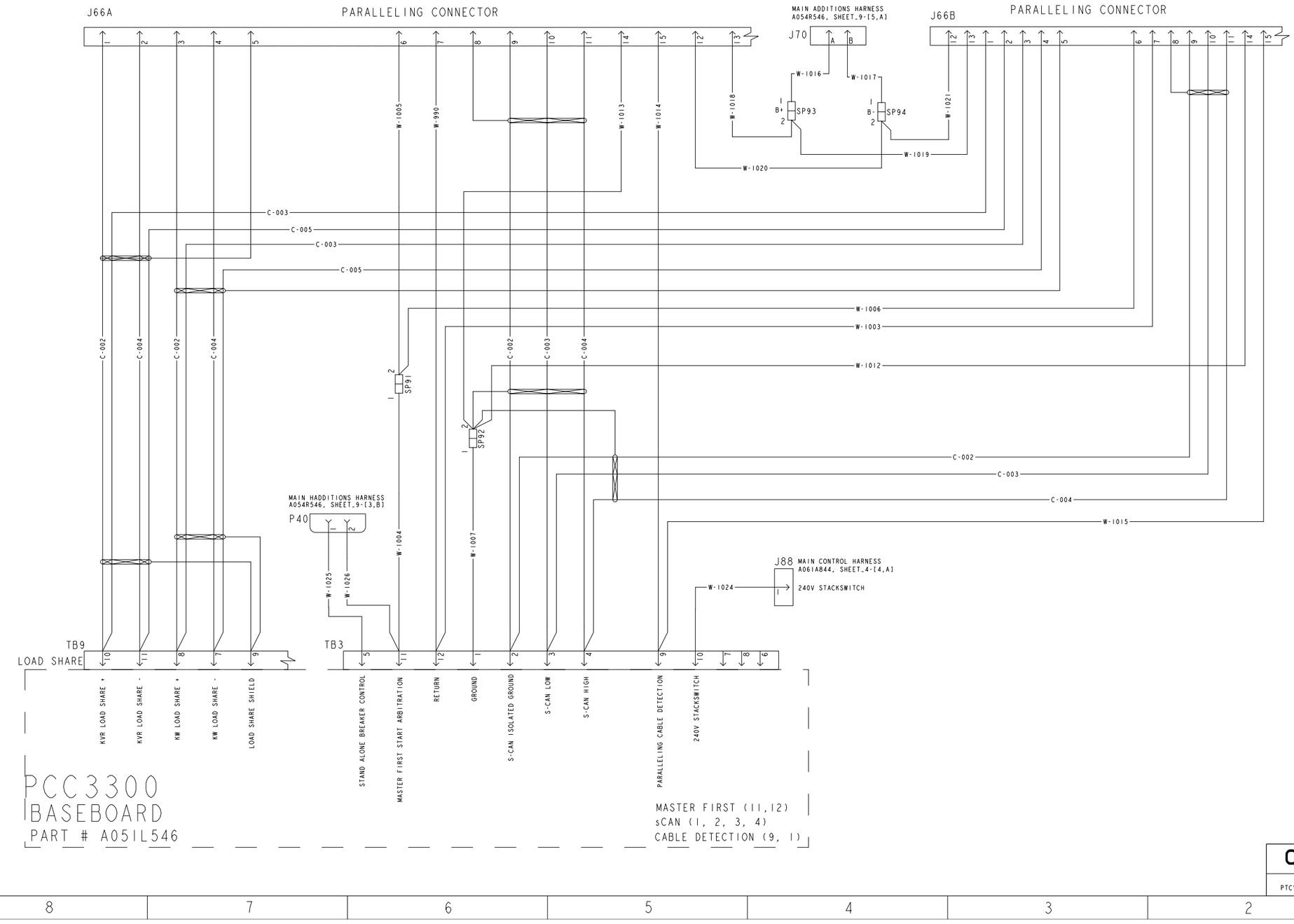
A054R544 PARALLELING COMMUNICATION HARNESS



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Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **3** of **22**

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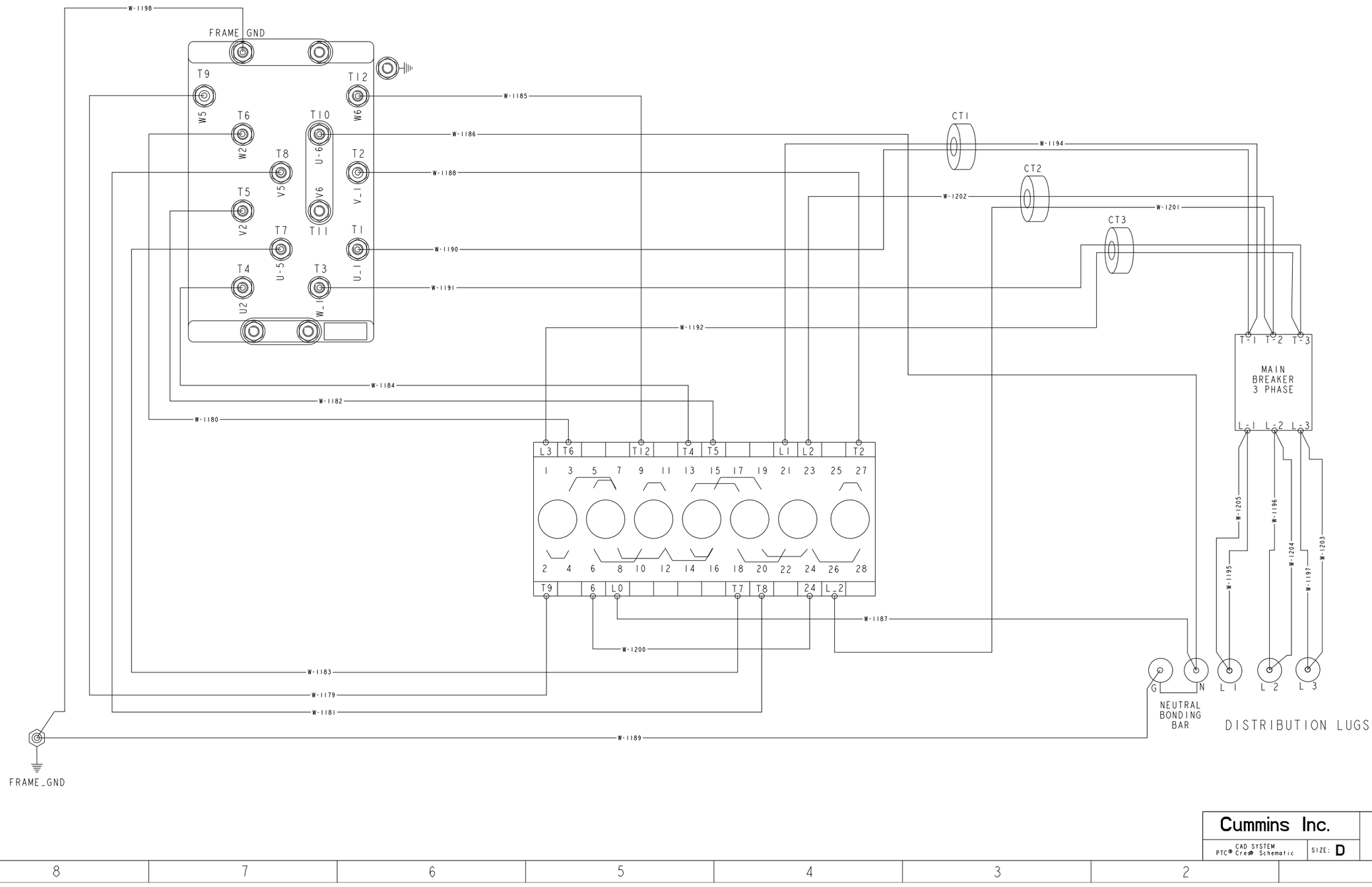
208/480V ALETERNATOR & CIRCUIT BREAKER CONFIGURATION



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Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **4** of **22**

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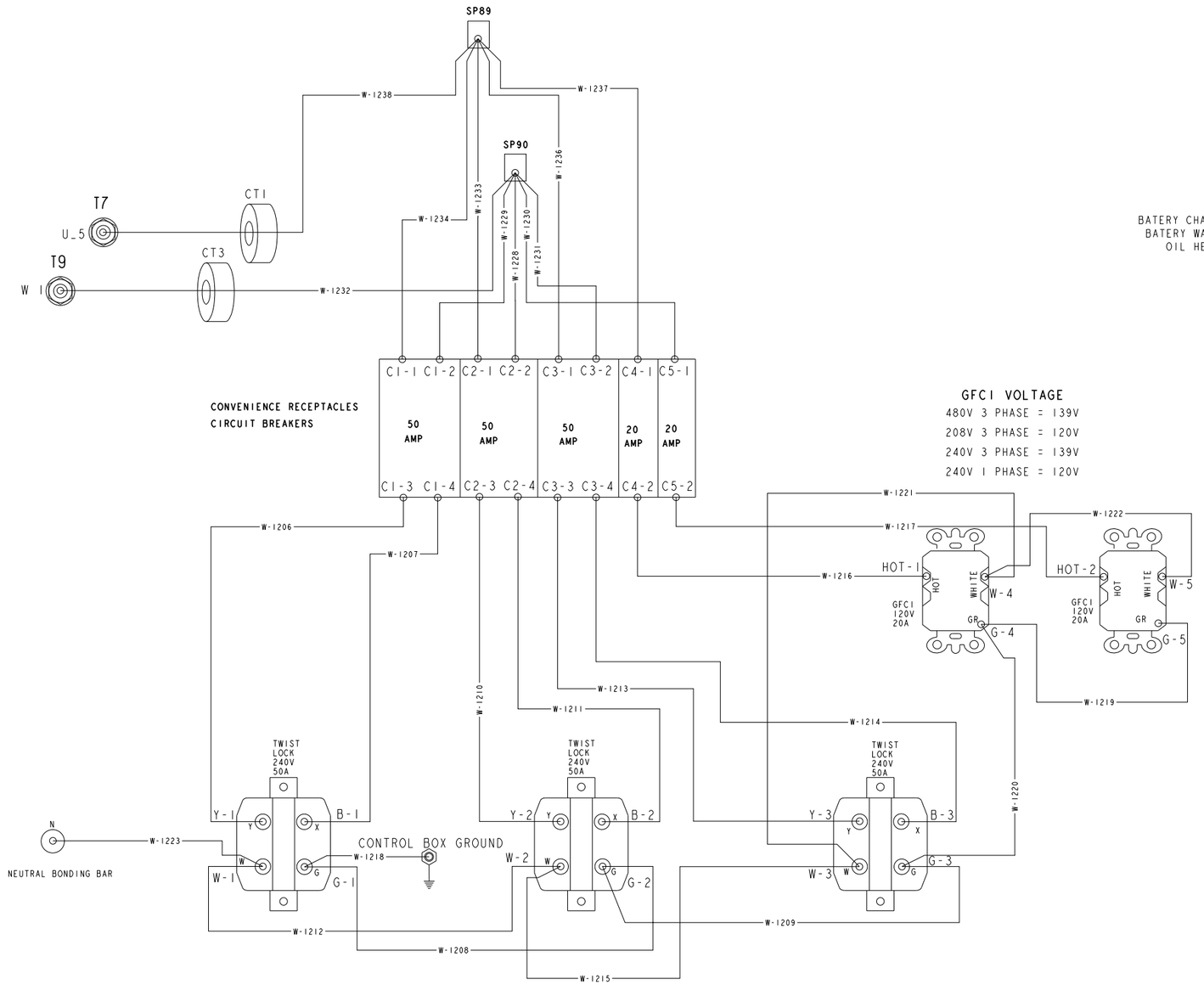
C100, C70, LOWER CONTROL PANEL WIRING



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Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **5** of **22**

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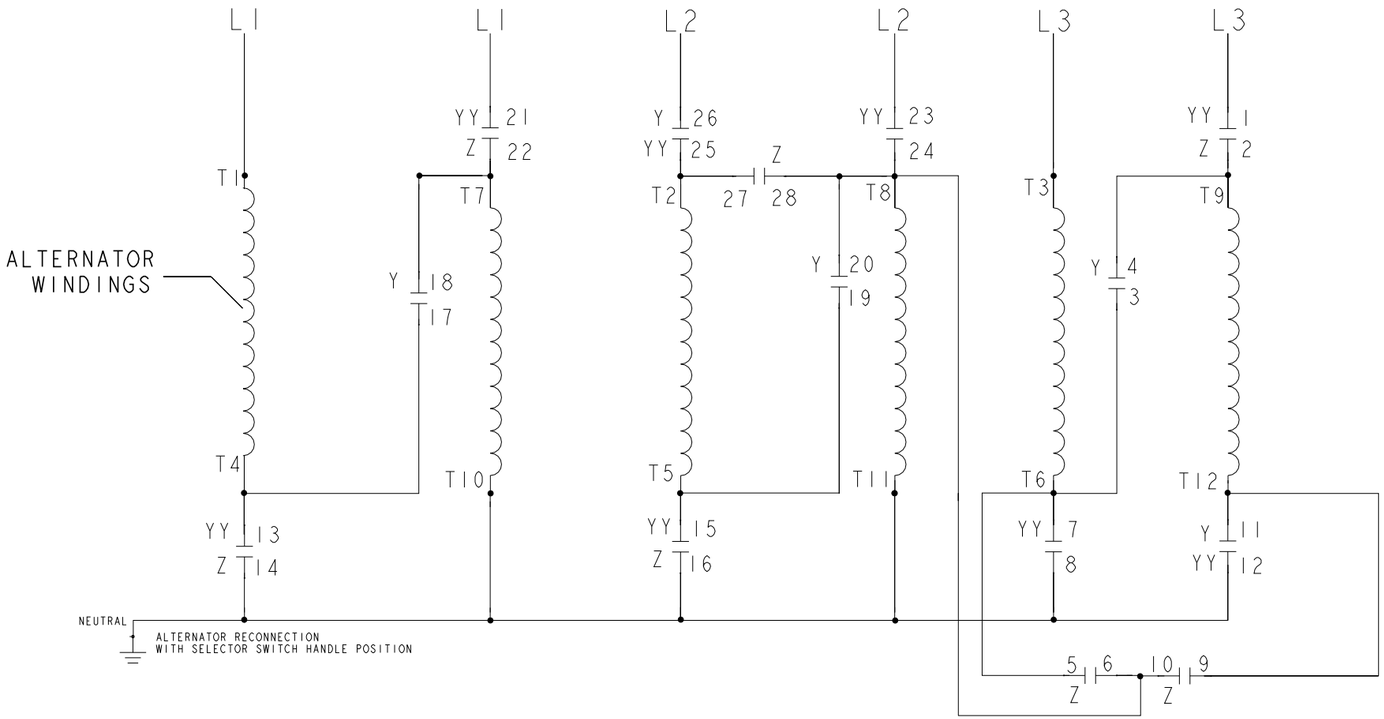
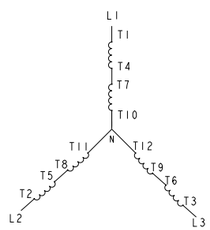
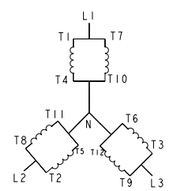
C100, C70, GENSET MODEL SELECTOR SWITCH



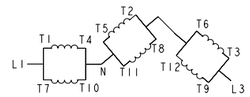
"Y" CONTACTS CLOSED
SERIES STAR (3 PHASE)
"HI WYE"
OUTPUT TERMINALS (U.V.W.N)



"YY" CONTACTS CLOSED
PARALLEL STAR (3 PHASE)
"LOW WYE"
OUTPUT TERMINALS (U.V.W.N)



"Z" CONTACTS CLOSED
PARALLEL ZIG-ZAG (SINGLE PHASE)
OUTPUT TERMINALS (U.W.N)



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Part Name: **DIAGRAM,WIRING**
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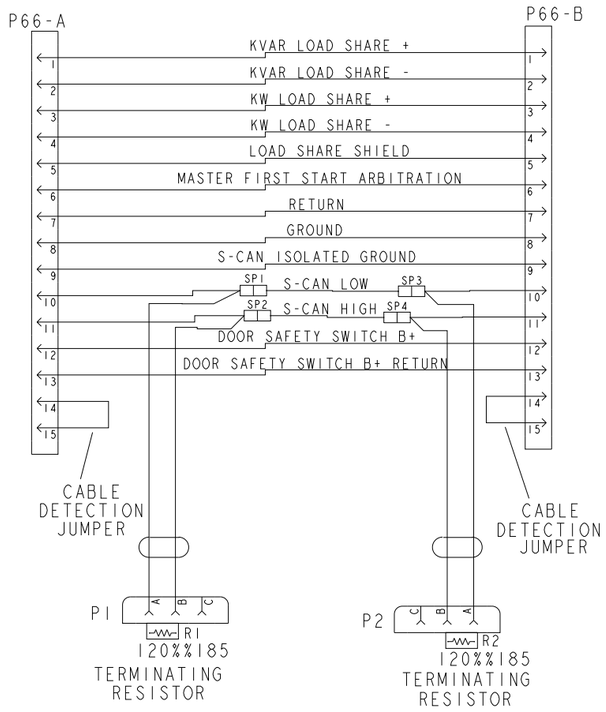
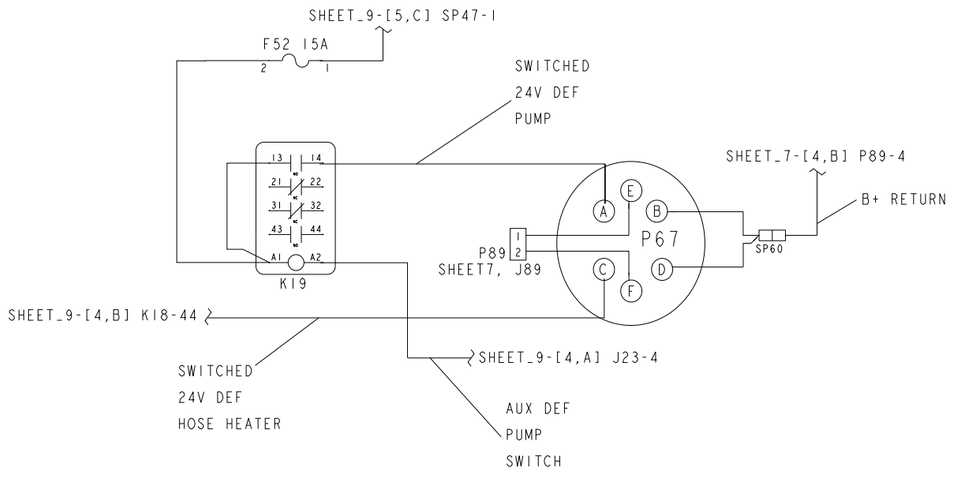
PARALLELING CONNECTIONS A050Y686

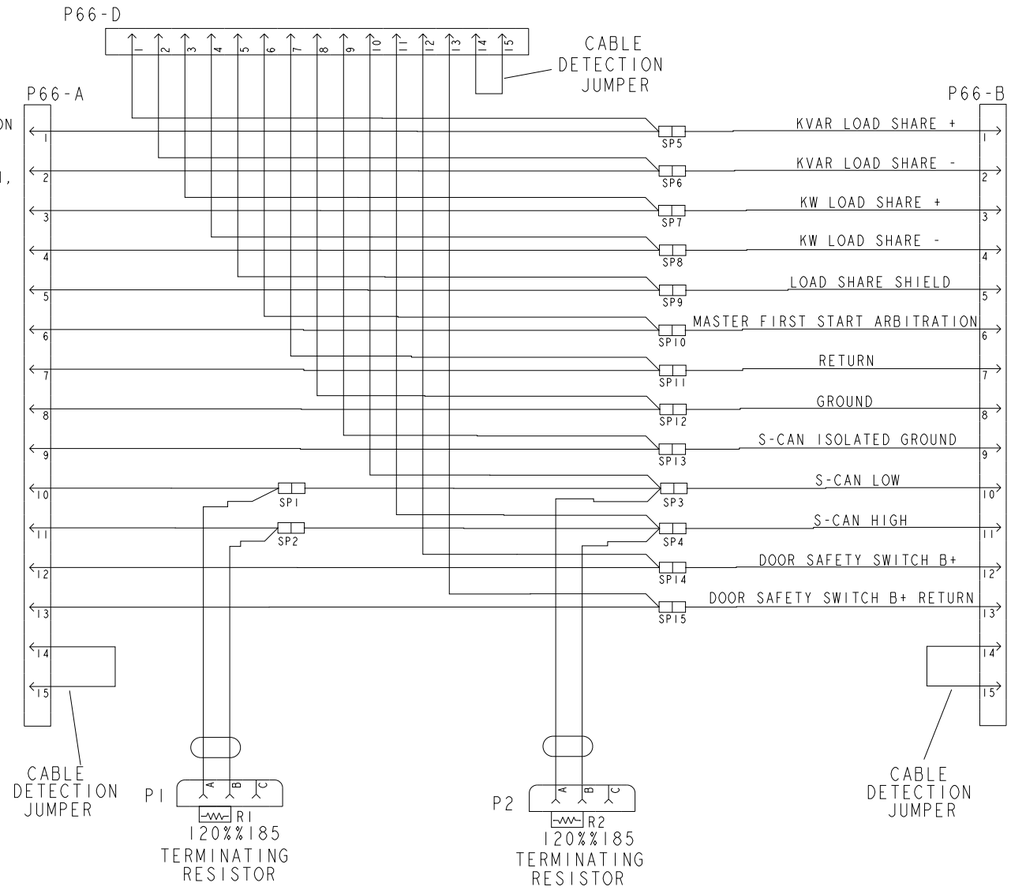


AUX DEF CONNECTIONS A054R546



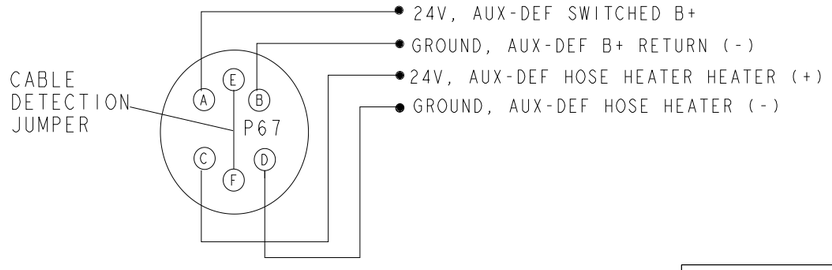
PARALLELING CONNECTIONS A047D735

PARALLELING COMMUNICATION HARNESS
A054R544, SHEET_11-[5,D],



PARALLELING COMMUNICATION HARNESS
A054R544, SHEET_11-[2,D],

OPTIONAL AUX-DEF EXTERNAL WIRING (PROVIDED BY THE CUSTOMER)



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A058E949 MANUAL MAIN CIRCUIT BREAKER CONTROL

MAIN CONTROL HARNESS
A061A844, SHEET_4-[2,D]

P95M
TBB-
P51
A
B
C

W-1309
W-1308

CIRCUIT BREAKER SHUNT TRIP OPERATION

C1
SHT
C2

MAIN HADDITIONS HARNESS
A054R546, SHEET_9-[3,B]

P40M
1
2

W-1311
W-1312

J88M
MAIN CONTROL HARNESS
A061A844, SHEET_4-[4,A]
1
240V STACKSWITCH

W-1310

TB3M
5
11
12
1
2
3
4
9
10
7
8
6

PCC3300
BASEBOARD
PART # A051L546

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Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **8** of **22**

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A061A844 MAIN CONTROL HARNESS

HMI 320
DISPLAY

J28 P28
HMI FUSED B+ — W-953 >> SHEET_4-[0,0] TBB+3-2
B+ RETURN — W-004 — RTN SP2 — W-005

J29 P29
PCCNet B (-) — C-003 — (SHLD) SP3 — (-) SP4
PCCNet A (+) — C-002 — (+) SP5
SYSTEM WAKE UP — W-011
RUN (WAKE-UP) — W-007
AUTO — W-008

J2
AW_B+
TB_B-

TB15
WAKE UP
PCCNET A
PCCNET B
SHIELD

PART # A050Z029

P25 J25
B+ RETURN
DISCRETE INPUT RETURN
LOCAL E-STOP
PCCNet B (BLACK WIRE)
PCCNet A (WHITE WIRE)
PCCNet SHLD
PCCNet SYSTEM WAKEUP
MANUAL
AUTO

PCC3300
BASEBOARD
PART # A051L546

LOCAL
E-STOP SWITCH
P41A J41A
J41B P41B
W-746
W-745
W-947 >> SHEET_3-[0,0] P11-5
W-944 >> SHEET_3-[0,0] R12-86

TB15 P15
RETURN
RS485 A
RS485 B
PCCNet WAKE UP
J65
C-003
C-002
W-244
W-1513 >> SHEET_4-[0,0] J99-2
SHEET_4-[0,0] J99-3
SHEET_4-[0,0] J99-4
W-1514
W-1515

PC TOOL

GAUGES

P74
24V BULB
BATTERY VOLTAGE
GAUGE
P80
P76
W-777
W-768

HOURMETER
A053R389
DEF LEVEL
GAUGE
P154A
W-779
C-002
C-003
SHEET_4-[0,0] AWB+3-2
SHEET_3-[0,0] SP12-2
SHEET_3-[0,0] SP13-2

W-776
SHEET_4-[0,0] J99-7
W-775
W-878
FUEL LEVEL
GAUGE
P75
P84
P78
P83
R21
SP59
AW B+
RESISTOR 100 OHM (2W)
24 VOLT SYSTEM
MODELS ONLY
RTN SP58
W-774
SHEET_4-[0,0] TBB-4-2 << W-769
W-956
SHEET_4-[0,0] AWB+2-1 << W-955

ENGINE TEMP
GAUGE
A054R548
ENGINE OIL
PRESSURE GAUGE
P102

POWER SUPPLY
P101
V IN (6-32 VDC)
GROUND
GROUND
V OUT (5 VDC)
W-764
W-765
W-908
SHEET_4-[0,0] AWB+3-1 <<

W-006
C-003
C-002

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A061A844 MAIN CONTROL HARNESS

J20 P20

B+ INPUT
B+ INPUT
B+ INPUT
B+ INPUT
RELAY COIL B+
RUPTURE BASIN RETURN
STARTER RELAY DRIVER
SWITCHED B+ LOW SIDE DRIVER
B+ RETURN
B+ RETURN
B+ RETURN
B+ RETURN
CHASSIS GND

W-059
W-060
W-061
W-062
W-065
W-366
W-075
W-076
W-077
W-078

B+ SP18 2
RTN SP17 2 1

W-860 >> SHEET_4-[0,0] TBB+6-1
W-736 >> SHEET_4-[0,0] TBB-10-1

SHEET_4-[0,0] TB_B+4-2 << W-902

B+ SP15 1 2

W-899
W-900 >> W-927 >> SHEET_4-[0,0] J99-10
W-901 >> W-944 >> SHEET_2-[0,0] P41B-2

R12 ECM RELAY KEY SWITCH
30 87 87a 85 86

R11 START RELAY
30 87 87a 85 86
W-740 >> SHEET_4-[0,0] J99-1

W-946
W-922

SHEET_4-[0,0] TBB+2-1 << W-923 << B+ SP14 2 1 >> W-921 >> W-919 >> SHEET_4-[0,0] SWB+2-2
W-949

R13 HOUR METER
30 87 87a 85 86

TERMINATING RESISTOR
P57 C B A

(SHLD) SP11 1 2
(+) SP12 1 2
(-) SP13 1 2

C-002 >> SHEET_2-[0,0] P154A-2
C-002 >> SHEET_4-[0,0] J99-11
C-003 >> SHEET_2-[0,0] P154A-3
C-003 >> SHEET_4-[0,0] J99-9

A054R548 JUMPER PCC & AVR HARNESS

J26 P26 — J11 P11

J1939 SHIELD
J1939 HIGH
J1939 LOW
PCCNet SHIELD
N/A
B+ RETURN
PCCNET A
PCCNET B
N/A
KEY SWITCH B+
KEY SWITCH LOW SIDE
AVR B+
AVR B+ RETURN
AVR PWM+
AVR PWM-
FIELD CURRENT +
FIELD CURRENT -
BACKUP START DISC +

C-002
C-003
(NOT USED)
W-947 >> SHEET_2-[0,0] P41B-1
W-081
W-084

MAIN ADDITIONS HARNESS A061A844, SHEET_4-[2,C]
TB B-
GND
W-371

W-370
W-372
W-086
W-087
W-088
W-089
W-090

AUX103
AVR POWER STAGE
PART # 0327-1593
P19 J19

CHASSIS GND
AVR B+
AVR B+ RETURN
AVR PWM+
AVR PWM-
FIELD CURRENT +
FIELD CURRENT -
BACKUP START DISC +

PCC3300 BASEBOARD

PART # A051L546

MAIN ADDITIONS HARNESS A054R546, SHEET_9-[2,C]
P79

B+
SINGLE PHASE SWITCH

W-930 >> SHEET_4-[0,0] TBB+5-2
W-929

PCC3300 BASEBOARD
P8 TB8

SINGLE PHASE SWITCH
240/120V
COMMON
AUX DEF PUMP SWITCH
RUN/IDLE SWITCH RETURN
RUN/IDLE SWITCH

SHEET_4-[0,0] J99-26 << W-931
SHEET_4-[0,0] J99-27 << W-932
SHEET_4-[0,0] P23-4 << W-916
W-925
W-926

RUN/IDLE SWITCH
P62 P63 P64 P65

SHEET_4-[0,0] P23-6 << W-942
W-943 >> SHEET_4-[0,0] SW_B+3

RUN = OPEN
IDLE = CLOSE

PART # A051L546

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A061A844 MAIN CONTROL HARNESS

CONTAINMENT BASIN LEVEL WARNING LIGHT

PANEL LAMP

MAIN ADDITIONS HARNESS A061B659 SHEET_8-[1,D]

J99

SHEET_2-[0,0] P84

SHEET_3-[0,0] SP13-2

SHEET_3-[0,0] SP12-2

P48 P49 J112 J113

SP6 FUEL SENDER 7 W-878

J1939 (-) 9 C-003

J1939 (+) 11 C-002

J1939 SHIELD 12

P44-2 FUEL SPILL 20 W-903

P44-1 FUEL SPILL 19 W-816

P73 GPS 31 W-819

P54-2 BREATHER HEATER 22 W-820

F1 30A 1 W-740 >> SHEET_3-[0,0] R11-87

SP27 KEY SWITCH 10 W-927 >> SHEET_3-[0,0] R12-87

P55-1 BREATHER HEATER 21 W-818 W-818

P6 STARTER (-) 6 W-814 W-814

R7 TIMER RELAY

P58 J58

P58-1 TIMER RELAY 16 W-807

P58-2 TIMER RELAY 17 W-806

P58-3 TIMER RELAY 15 W-805

P58-4 TIMER RELAY 18 W-804

NO

COMMON

T6

T2

P43-2 DOOR SWITCH 13 W-809 W-809

F6 35A 8 W-808 W-808

P91-D 240/120 VOLTAGE 26 W-931 >> SHEET_3-[0,0] TB8-7

P91-E COMMON 27 W-932 >> SHEET_3-[0,0] TB8-12

P43-1 DOOR SWITCH 14 W-803

P91-A 480/400 VOLTAGE 23 W-802

P91-B 208 VOLTAGE 24 W-801

P91-C 240 VOLTAGE 25 W-948

P88 240V STACKSWITCH

PARALLELING HARNESS A054R544, SHEET_11-[3,B]

SP36 HEATER RELAY 29 W-800

SP30 HEATER RELAY 30 W-799

P72 BLANKET HEATER RELAY B+

MAIN ADDITIONS HARNESS A054R546, SHEET_9-[4,B]

5

28

MODBUS B 4 W-1515 >> SHEET_2-[0,0] P15-4

MODBUS A 3 W-1514 >> SHEET_2-[0,0] P15-3

MODBUS SHIELD 2 W-1513 >> SHEET_2-[0,0] P15-1

R16

W-830

W-905

AW B+ SP75

W-904

W-906

SP74 B-

W-816

W-826

W-827

W-864

W-866

W-809

W-808

W-828

W-803

W-802

W-801

W-917

W-907

W-840

W-839

W-842

W-841

AWB+1 HMI HEATER, RED J2

SHEET_2-[0,0] SP59-1 W-955

SHEET_2-[0,0] P101-1 W-908

AWB+2

AWB+3 W-779 >> SHEET_2-[0,0] P154A-1

AWB+4

AWB+5 W-843

SWB+1 W-796

SWB+2 W-919 >> SHEET_3-[0,0] R13-87

SWB+3 W-943 >> SHEET_3-[0,0] P65

SWB+4

SWB+5

TBB-1 W-798

TBB-2

TBB-3 HMI HEATER, BLACK J2

TBB-4 W-769 >> SHEET_2-[0,0] SP58-1

TBB-5 W-852 CONTROL BOX P3

TBB-6

TBB-7 W-834

TBB-8 W-1171 GND

TBB-9 W-832

SHEET_3-[0,0] SP17-1 W-736

TBB-10 W-876

TBB+1 W-877 EMI SUPPRESSOR

SHEET_3-[0,0] SP14-2 W-923

TBB+2

TBB+3 W-953 >> SHEET_2-[0,0] P28-1

TBB+4 W-902 >> SHEET_3-[0,0] SP15-1

TBB+5 W-930 >> SHEET_3-[0,0] P79-1

SHEET_3-[0,0] SP18-2 W-860

TBB+6

TBB+7

TBB+8

TBB+9

TBB+10

P51

P52 W-914

P53

SHEET_3-[0,0] P64 W-942

MAIN ADDITIONS HARNESS A054R546, SHEET_9-[4,A]

P23

JUMPER PCC & AVR HARNESS A054R548, SHEET_3-[4,A]

CIRCUIT BREAKER CONTROL HARNESS A054R552, SHEET_5-[5,D]

J95

W-1172

W-1173

W-1197

W-913

W-916

SHEET_3-[0,0] P8-9

HMI HEATER

HMI R

HMI B

REMOTE START

REMOTE E-STOP

J39 P39

AWB+ SP72

W-845

W-844

W-838

W-837

W-836

W-835

B- SP73

R14

R15

P1 TB1

208V 14 12

480/400V 12 1

1 2 3 4 5 6 7 8 9 10 11 13 15 16

SHUNT TRIP ENABLE

AW.B+ SWITCH

AW.B+ SWITCH OUTPUT

REMOTE START RETURN

REMOTE START

REMOTE E-STOP RETURN

REMOTE E STOP

PCC3300 BASEBOARD PART # A05IL546

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Part Number: **A061C284** Part Revision: **C**

Part Name: **DIAGRAM,WIRING**

Drawing Category: **Detail** State: **Released** Sheet **16** of **22**

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A054R552 MAIN CIRCUIT BREAKER CONTROL

MAIN CONTROL HARNESS
A061A844, SHEET_4-[2,D]

MAIN ADDITIONS HARNESS
A054R546, SHEET_9-[5,B]

P27

P95

J24

SP51

SP50

K16

K17

TB5 P5

GENSET CB CLOSE
GENSET CB CLOSE RETURN
N/A
GENSET CB OPEN
GENSET CB OPEN RETURN
UTILITY CB CLOSE
UTILITY CB CLOSE RETURN
UTILITY CB OPEN
UTILITY CB OPEN RETURN

MAIN ADDITIONS HARNESS
A054R546, SHEET_9-[2,A]

P96

GEN BREAKER RETURN
GEN BREAKER OPENED
GEN BREAKER CLOSED

TB7 P7

L1
L2
L3
LN

PCC3300
BASEBOARD
PART # A05IL546

A054R542 MAIN CIRCUIT BREAKER

P24

CIRCUIT BREAKER OPERATION

MN
TC TRIP COIL
CC CLOSE COIL
CM CHARGING MOTOR

SP52

CIRCUIT BREAKER STATUS

OF1
OF1-1
OF1-2
GEN BREAKER OPENED

OF2
OF2-1
OF2-4
GEN BREAKER CLOSED

SP53

F1 0.5A
F2 0.5A
F3 0.5A

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Part Number: **A061C284** Part Revision: **C**
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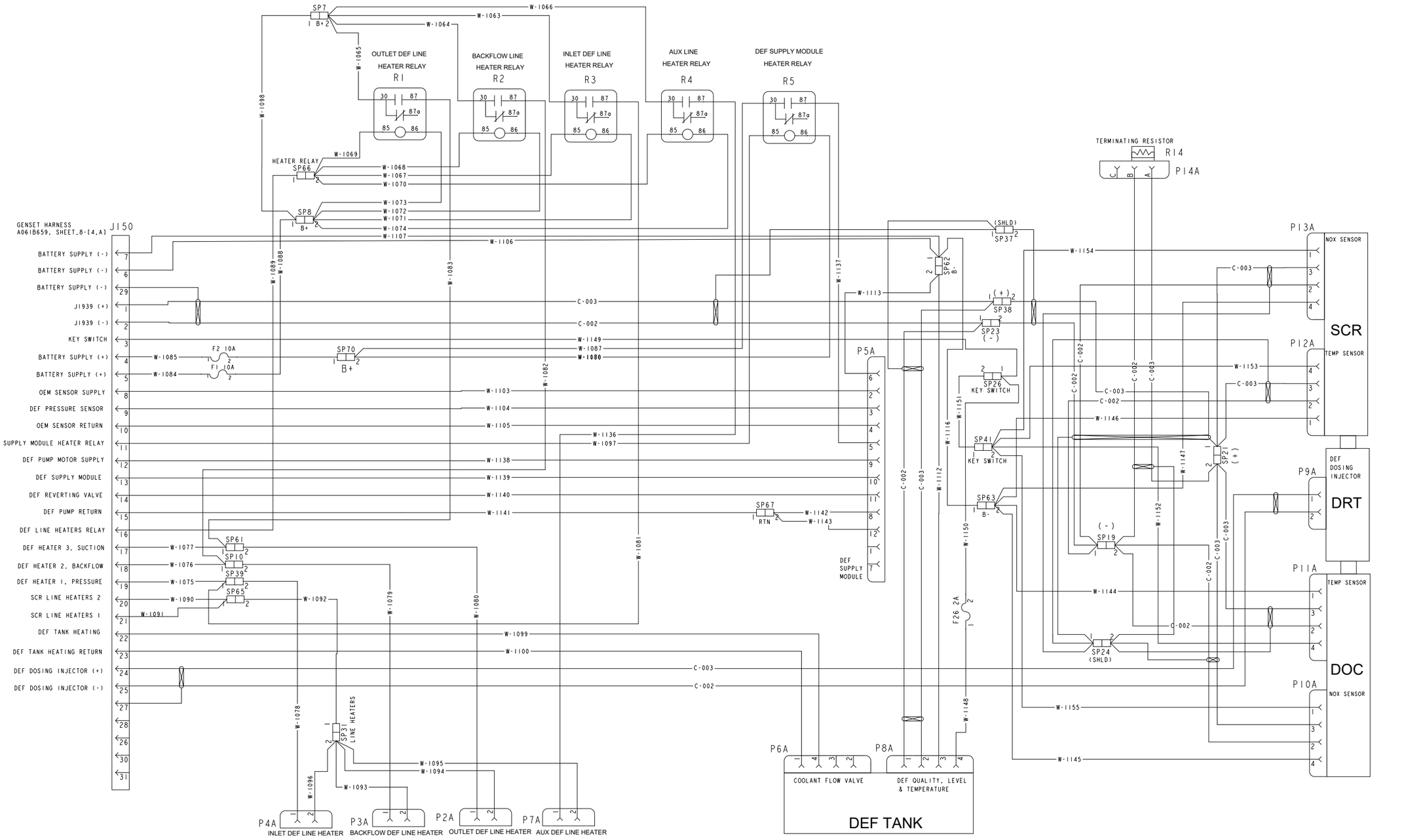
RS Designer

A054R540 AFTERTREATMENT HARNESS



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CAD SYSTEM PTC® Creo® Schematic | SIZE: D

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Part Number: **A061C284** Part Revision: **C**

Part Name: **DIAGRAM,WIRING**

Drawing Category: **Detail** State: **Released** Sheet **18** of **22**

RS Designer

A061B655 GPS HARNESS

P16

BATTERY POSSITIVE — 1 — W-334 — SP55 (1) F16_3A SP56 (2) — W-337 — P56
BATTERY NEGATIVE — 2 — W-338 — SP99 (2) — W-1503 — P55
CHASSIS GND — 3 — W-1504 — SP99 (1)
SWB+ — 4 — W-1502 — J73 GENSET HARNESS A061B659, SHEET_8-[1,A] SW B+
5
FUEL SENDER — 6 — W-1501 — J81 GENSET HARNESS A061B659, SHEET_8-[3,C] SENDER
7
MODBUS A — 8 — W-1512 — J250 GENSET HARNESS A061B659, SHEET_8-[2,D] (1,2)
MODBUS B — 9 — W-1511 — J250 (3,4)
10
CAN H — 11 — W-1509 — J200 GENSET HARNESS A061B659, SHEET_8-[2,A] (1)
CAN L — 12 — W-1510 — J200 (2)

A054R720 MAIN AUX HARNESS

MAIN ADDITIONS HARNESS A054R546, SHEET_9-[1,B]

HEATER SLEEVES (L) — P59 C — W-623 — J98 1 L — P98 1
HEATER SLEEVES (N) — P59 D — W-624 — J98 2 N — P98 2

PROVIDED BY THE CUSTOMER WITH THE HEATER SLEEVES, PLUG, WEDGE & SOCKETS
(1 PLUG 0323-1504 (MEP# DT06-2S), 1 WEDGE 0323-2531 (MEP# W2S)
(2 SOCKETS 0323-2513 (MEP# 1062-16-0144)

A054X754 AUX DEF HARNESS

AUX DEF JUMPER 1	P59 H	W-625	J89 P89 1	W-1488	J67 H	AUX DEF JUMPER 1
AUX DEF JUMPER 2	P59 J	W-626	J89 P89 2	W-1489	J67 I	AUX DEF JUMPER 2
AUX DEF SWITCHED B+	P59 G	W-627	J89 P89 3	W-1490	J67 G	AUX DEF SWITCHED B+
AUX DEF B+ RETURN	P59 F	W-628	J89 P89 4	W-633 — SP60 (1,2) — W-1491	J67 E	AUX DEF B+ RETURN
24V, AUX DEF HOSE HEATER	P59 E	W-629	J89 P89 5	W-1492	J67 F	AUX DEF B+ RETURN
	P59 A		J89 P89 6	W-1493	J67 A	24V, AUX DEF HOSE HEATER
	P59 B				J67 B	
					J67 C	
					J67 J	
					J67 K	
					J67 L	
					J67 M	
					J67 N	

MATES WITH THE CUSTOMER CONNECTOR

J67 CUMMINS PART # A053K662
MATES WITH P67 TO BE PROVIDED BY CUSTOMER:
CUMMINS PART# A054G955
MEP PART# HD36-18-14SN

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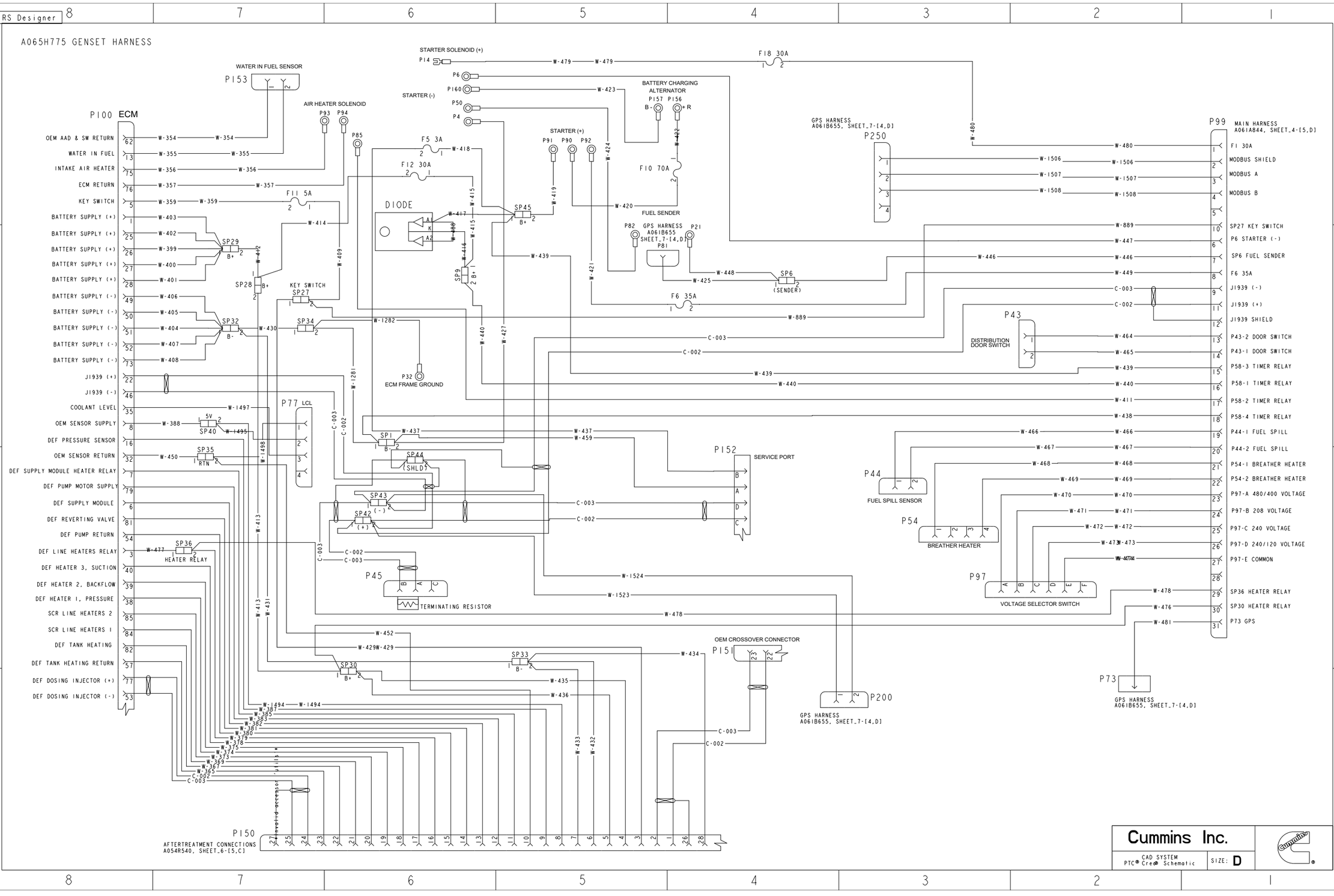
RS Designer

A065H775 GENSET HARNESS



Cummins Inc.	
CAD SYSTEM PTC® Creo® Schematic	SIZE: D

Document Generated: 06JUN2025 13:09 GMT

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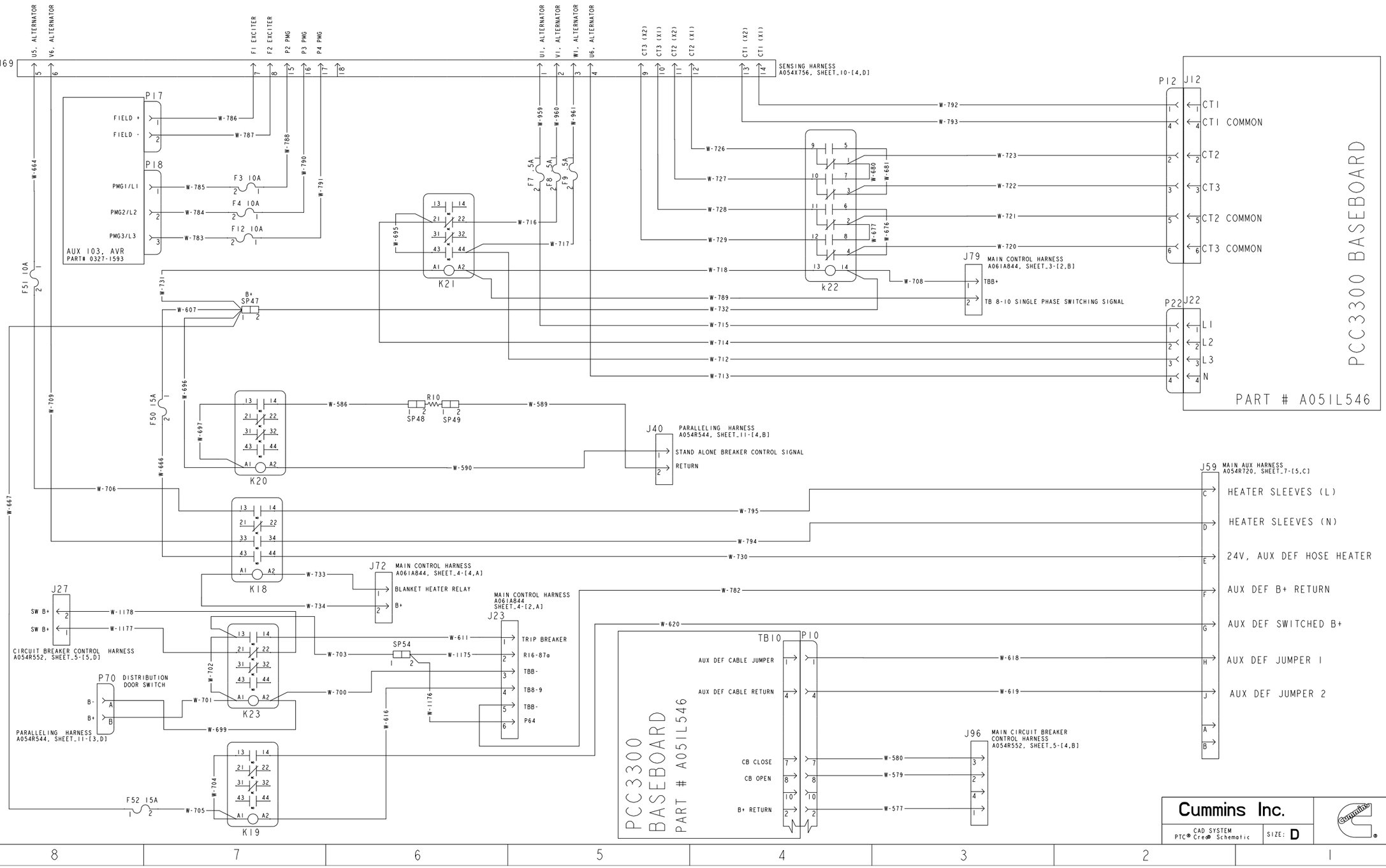
Part Number: **A061C284** Part Revision: **C**
Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **20** of **22**

RS Designer

A054R546 MAIN ADDITIONS



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CAD SYSTEM PTC® Creo® Schematic | SIZE: D

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Part Number: **A061C284** Part Revision: **C**
Part Name: **DIAGRAM,WIRING**
Drawing Category: **Detail** State: **Released** Sheet **21** of **22**

December 11, 2025

Rockland Green
172 Main Street
Nanuet, NY 10954

RE: Rockland Green – Hillburn Scale House - 1.0 Submittal Review

Dear Dee,

We have reviewed the submittal comments, please see formal responses

1. Manual transfer switch shall have 200A utility and generator circuit breakers..

   RESPONSE: ESL confirmed both breakers on utility and generator are 200 amps

EDR, D.P.C.

☑ APPROVED
☐ APPROVED AS CORRECTED
☐ REVISE AND RESUBMIT
☐ NOT ACCEPTED
☐ FOR INFORMATION ONLY

EDR a better environment

Checking is only for conformance with the design intent of the project and compliance with the information given in the contract documents. Contractor is responsible for dimensions, correct information indicated, coordination of the work with all trades and all other requirements of the contract documents. This shop drawing is the product and the property of the contractor and is not a part of the contract documents.

BY jdulak DATE 12/12/2025

Regards,

Mark N. Woodward

Project Manager

CC: Ed Cheung

Cummins Sales and Service
890 Zerega Avenue
Bronx, NY 10473-1122
Tel (718) 892-2400
Fax (718) 892-0055
cumminssalesandservice.com

1	EH	8/6/24	UPDATED LOAD CALL OUT ON SCHEMATIC
0	CP	10/31/23	FOR APPROVAL
REV.	BY	DATE	DESCRIPTION

APPROVED
BY: _____
DATE: _____
FOR FABRICATION BY ESL

NOTES:
PART NUMBER ASSIGNED AFTER RECEIPT OF PO
* = STANDARD

VOLTAGE	
120/240 (2-Phases + Neutral + Ground) ASSEMBLY RATED 22kA	□
208Y/120 (3-Phases + Neutral + Ground) ASSEMBLY RATED 22kA	□
208 Delta (3-Phases + Ground) ASSEMBLY RATED 22kA	□
240 Delta (3-Phases + Ground) ASSEMBLY RATED 22kA	□
240/120 Delta (3-Phases + Neutral + Ground) ASSEMBLY RATED 22kA	●
480 Delta (3-Phases + Ground) ASSEMBLY RATED 22kA	□
480Y/277 (3-Phases + Neutral + Ground) ASSEMBLY RATED 22kA	□

MATERIAL	
*STEEL (TYPE 3R)	□
304SS (TYPE 3RX)	●
316SS (TYPE 3RX)	□

ACCESSORIES	
*PHASE MONITOR	●
*3-POINT TERMINAL BLOCK STRIP FOR REMOTE START/STOP	●
THERMOSTAT/DE-HUMIDISTAT/HEATER	□
SURGE PROTECTION DEVICE	□
PRIMARY SOURCE AVAILABLE INDICATING LIGHT	□ RED (OR) □ GREEN
ALTERNATE SOURCE AVAILABLE INDICATING LIGHT	□ RED (OR) □ GREEN
RECEPTACLE TOTAL OF 4 MAX	**QTY**
120VAC GFI DUPLEX RECEPTACLE (SERVICE PROVIDED BY OTHERS)	
120VAC GFCI DUPLEX RECEPTACLE (SERVICE PROVIDED BY OTHERS)	
20A TWIST LOCK RECEPTACLE (SERVICE PROVIDED BY OTHERS)	
30A TWIST LOCK RECEPTACLE (SERVICE PROVIDED BY OTHERS)	

DISCONNECT SELECTION

	PRIMARY	ALETERNATE
AMPERAGE (15A-200A)	200A	200A
POLES	● *3-POLE (FOR 4-POLE APPLICATIONS CONSULT FACTORY)	
TRIP TYPE	□ AUTOMATIC SWITCH (ASSEMBLY RATED 10kA) ● *THERMAL MAGNETIC □ LI □ LSI	□ AUTOMATIC SWITCH (ASSEMBLY RATED 10kA) ● *THERMAL MAGNETIC □ LI □ LSI
RATED	● *80% □ 100%	● *80% □ 100%
SCCR	● *65kA/240VAC,35kA/480VAC,18kA/600VAC □ 100kA/240VAC,65kA/480VAC,25kA/600VAC □ 125kA/240VAC,100kA/480VAC,50kA/600VAC □ 200kA/240VAC,200kA/480VAC,100kA/600VAC	● *65kA/240VAC,35kA/480VAC,18kA/600VAC □ 100kA/240VAC,65kA/480VAC,25kA/600VAC □ 125kA/240VAC,100kA/480VAC,50kA/600VAC □ 200kA/240VAC,200kA/480VAC,100kA/600VAC
CONNECTION TYPE	● *(1) 3/0-350 kcmil (200A Standard) □ (1) #4-4/0 AWG (175A Standard) □ (1) #14-3/0 AWG (<150A Standard)	● *16-SERIES CAM-LOK RECEPTACLE □ 16-SERIES CAM-LOK (FEMALE GROUND) □ (1) 3/0-350 kcmil (200A Standard) □ (1) #4-4/0 AWG (175A Standard) □ (1) #14-3/0 AWG (<150A Standard)
DISCONNECT ACCESSORIES		
AUX CONTACT	● *(1) N.O./N.C □ (2) N.O./N.C	● *(1) N.O./N.C □ (2) N.O./N.C

FIELD CONNECTION	
LOAD PDB PER PHASE AND NEUTRAL	(4) #6AWG- 4/0AWG AL/CU
GROUND	(1) #6-300kcmil □ DOUBLE GROUND PROVISION

STORM SWITCH®

EDR, D.P.C.
EDR a better environment
☑ APPROVED
☐ APPROVED AS CORRECTED
☐ REVISE AND RESUBMIT
☐ NOT ACCEPTED
☐ FOR INFORMATION ONLY

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BY jdulak DATE 12/19/2025

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
DECIMALS .x ±.03 .XX ±.01 .XXX±.005
ANGULAR ±1/2°
BREAK ALL SHARP EDGES .005 - .010
DO NOT SCALE
PROPRIETARY
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FINISH: WRINKLE GRAY (RAL 7035)
THICKNESS: 14 GAUGE

ESL
CORONA, CALIFORNIA
International: +1 (951) 739-7000
Phone: (800) 922-4188
eslpwr.com
info@eslpwr.com

ESL STORMSWITCH ORDER FORM

DWG NO. 3020-ORDER-DWG
REV. 0
WEIGHT:
SHEET 1 of 3

APPROVED

BY: _____

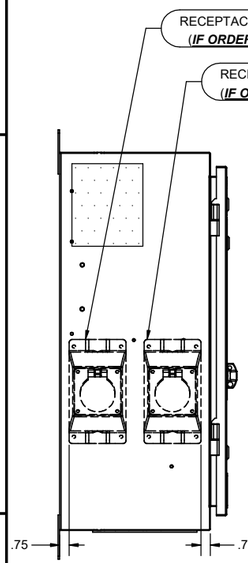
DATE: _____

FOR FABRICATION BY ESL

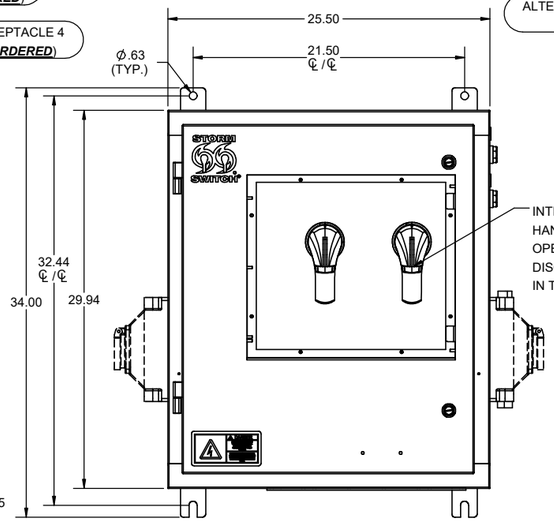
NOTES:

1. **COMPLETE ASSEMBLY IS UL LISTED AS A MANUAL TRANSFER SWITCH UNDER UL 1008 3NZT (TRANSFER SWITCH STANDARD)**
2. FINISH POWDER COATED SERIES W49. SEE TITLE BLOCK FOR COLOR.
3. SUITABLE FOR USE AS SERVICE EQUIPMENT IN USA ONLY
4. OPTIONAL PLUG KITS AVAILABLE
5. NOT FOR INDDOR USE (SUITABLE FOR INDOOR USE WITHOUT CAM-LOK RECEPTALES)
6. UNIT SHOWN WITH ALL ACCESSORIES INSTALLED AND 3-POLE BREAKER CONFIGURATION WITH 16 SERIES CAM-LOK RECEPTACLES
7. DOTTED AREAS ARE RECOMMENDED CONDUIT ENTRY

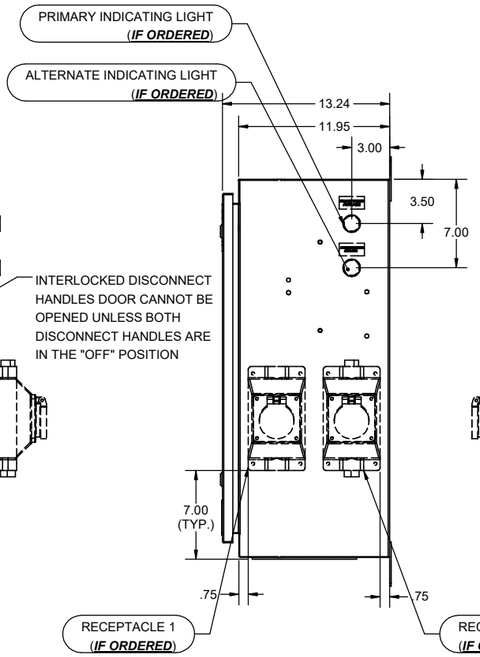
REV.	BY	DATE	DESCRIPTION
1	EH	8/6/24	UPDATED LOAD CALL OUT ON SCHEMATIC
0	CP	10/31/23	FOR APPROVAL

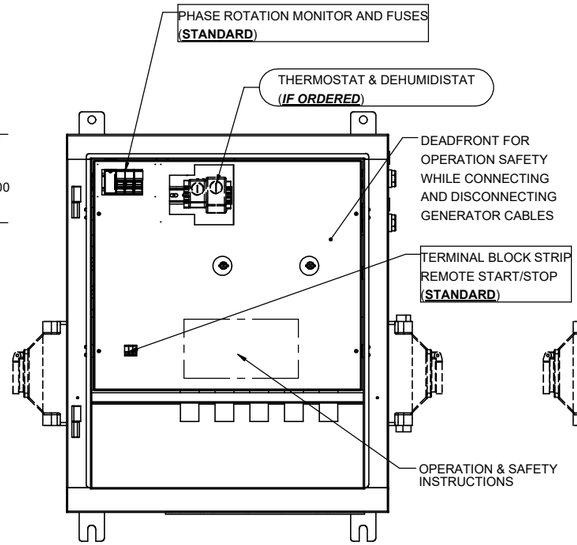


LEFT VIEW

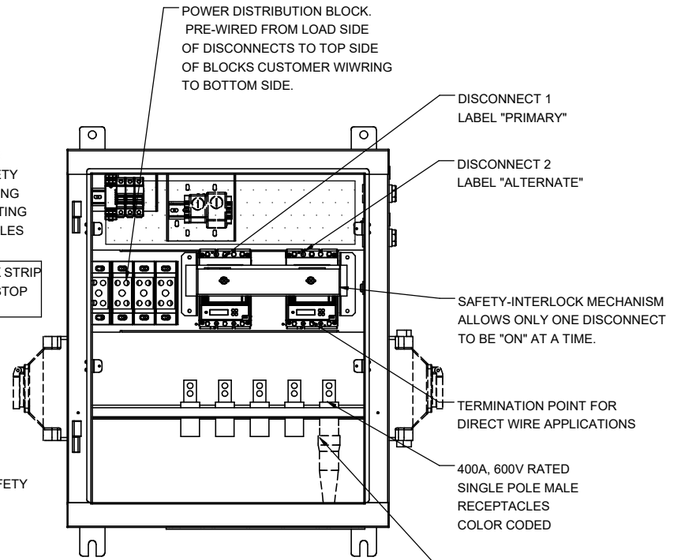


FRONT VIEW
(HANDLE COVER NOT SHOWN)

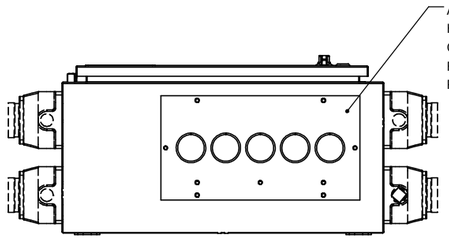




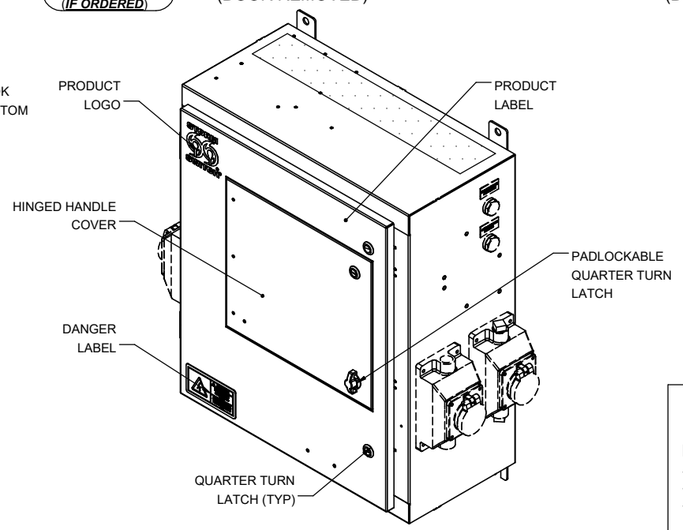
FRONT VIEW
(DOOR REMOVED)



FRONT VIEW
(DOOR AND DEADFRONT REMOVED)



BOTTOM VIEW



ISOMETRIC VIEW

STORM SWITCH®

SEISMIC CERTIFIED

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:

DECIMALS
.x ±.03
.XX ±.01
.XXX±.005

ANGULAR
±1/2°

BREAK ALL SHARP EDGES
.005 - .010

DO NOT SCALE

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ESL

CORONA, CALIFORNIA
International: +1 (951) 739-7000
Phone: (800) 922-4188
eslpwr.com
info@eslpwr.com

ESL STORMSWITCH
ENCLOSURE REFERENCE

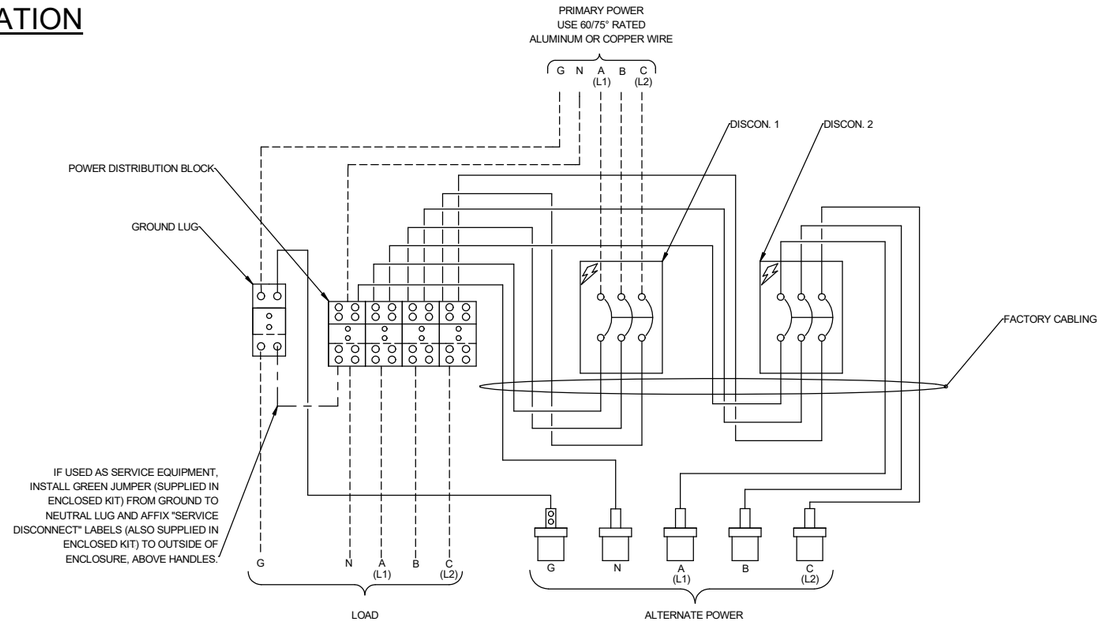
FINISH: WRINKLE GRAY (RAL 7035)	DWG NO. 3020-ORDER-DWG	REV. 0
THICKNESS: 14 GAUGE	WEIGHT: 150 LBS.	SHEET 2 of 3

APPROVED
BY:_____
DATE:_____
FOR FABRICATION BY ESL

NOTE:
1. DASHED LINES REPRESENT FIELD WIRING. SOLID LINES REPRESENT FACTORY WIRING.
2. CONTROL WIRING IS #14AWG UNLESS OTHERWISE NOTED.
3. ⚡ = LINE SIDE
4. L1 & L2 ARE 120/240VAC SINGLE PHASE SYSTEM
5. BREAKER CAT# TO BE SUPPLIED UPON RECIEPT OF PO
6. FIELD TORQUE VALUES TO SUPPLIED UPON RECIEPT OF PO
7. * PHASE B IS THE HIGH LEG ENDS OF ALL PHASE B WIRES WILL BE MARKED WITH ORANGE TAPE

REV.	BY	DATE	DESCRIPTION
1	EH	8/6/24	UPDATED LOAD CALL OUT ON SCHEMATIC
0	CP	10/31/23	FOR APPROVAL

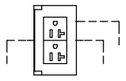
3-POLE CONFIGURATION

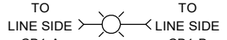


ACCESSORY WIRING - IF ORDERED

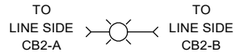
20A, 120VAC
L5-20R RECEPTACLE
(120VAC SUPPLIED BY OTHERS)
20A TWIST-LOCK

30A, 120VAC
L5-30R RECEPTACLE
(120VAC SUPPLIED BY OTHERS)
30A TWIST-LOCK

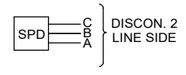

20A DUPLEX
RECEPTACLE
(120VAC SUPPLIED BY OTHERS)
20A GFI OR 20A GFCI



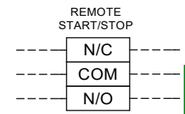
PRIMARY POWER
AVAILABLE



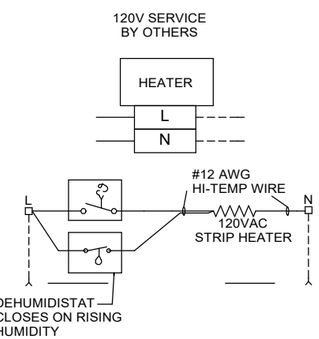
ALTERNATE POWER
AVAILABLE



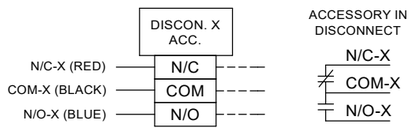
SURGE PROTECTION DEVICE



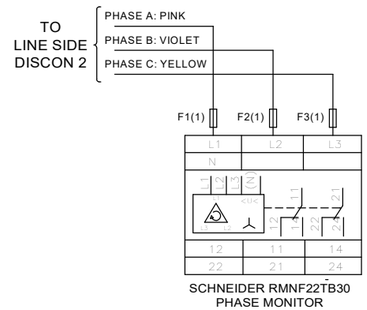
REMOTE START STOP



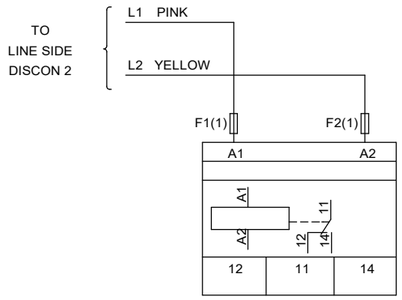
THERMOSTAT, DEHUMIDISTAT AND HEATER



AUX CONTACT



SCHNEIDER RMNF22TB30
PHASE MONITOR
PHASE MONITOR WIRING FOR 3-PHASE SYSTEM



SCHNEIDER RM17UBE15
PHASE MONITOR
PHASE MONITOR WIRING FOR 2-PHASE SYSTEM

VOLTAGE	COLOR CODE GROUND - GREEN NEUTRAL - WHITE
120/240 (2-Phases + Neutral + Ground)	L1 - BLACK L2- RED
208Y/120 (3-Phases + Neutral + Ground)	PHASE A - BLACK PHASE B - RED PHASE C - BLUE
240/120 Delta (3-Phases + Neutral + Ground)	PHASE A - BLACK PHASE B - ORANGE* (HIGH LEG) PHASE C - BLUE
480 Delta (3-Phases + Ground) 480Y/277 (3-Phases + Neutral + Ground)	PHASE A - BROWN PHASE B - ORANGE PHASE C - YELLOW

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International: +1 (951) 739-7000
Phone: (800) 922-4188
eslpwr.com
info@eslpwr.com

ESL STORMSWITCH
ENCLOSURE RATED 200A

DWG NO. 3020-ORDER-DWG
REV. 0
WEIGHT: LBS.
SHEET 13 OF 13

Sales and Service

Rockland Green - West Haverstraw Transfer Station

1.0 - SUBMITTAL FOR APPROVAL

Transmittal

Name: Rockland Green

Address: 172 Main Street

City: Nanuet

Date: Dec 2, 2025

State: NY **Zip Code:** 10954

Phone:

Attention: Dee Louis **Email:** dlouis@rocklandgreen.com

SENDING THE FOLLOWING PAGE(S) ATTACHED: 115

PROJECT SUBMITTAL: ◉ PROJECT SCHEDULE: ○ SAMPLES: ○

DOCUMENT ORIGINALS: ○

CORRESPONDENCE: ○ ADDITIONAL INFO.: ○ OTHER: ○

SENDING VIA: FAX: ○ HAND DELIVERY: ○ MAIL: ○

OVERNIGHT: ○ E-MAIL: ◉

COPIES	DATED	DESCRIPTION
1	Dec 2, 2025	GENERATOR & ATS SUBMITTALS – ONE ELECTRONIC FILE

TRANSMITTED BY: Mark Woodward **DIRECT: (339)216-8909**

COMMENTS: **Please do not hesitate to query.**

Sales and Service

Rockland Green - West Haverstraw Transfer Station

1.0 - SUBMITTAL FOR APPROVAL

Submittal Approvals

Date: **Dec 2, 2025**

Approval Actions:

Please send approval actions C/O:

Mark Woodward - Project Manager

Email: mark.n.woodward@cummins.com / Direct Line: 339-216-8909

Cummins Sales and Service - East Region

EDR, D.P.C.

EDR a better environment

- [x] **APPROVED**
- [ ] **APPROVED AS CORRECTED**
- [ ] **REVISE AND RESUBMIT**
- [ ] **NOT ACCEPTED**
- [ ] **FOR INFORMATION ONLY**

Checking is only for conformance with the design intent of the project and compliance with the information given in the contract documents. Contractor is responsible for dimensions, correct information indicated, coordination of the work with all trades and all other requirements of the contract documents. This shop drawing is the product and the property of the contractor and is not a part of the contract documents.

BY jdulak **DATE** 12/10/2025

Cummins Sales and Service

SUBMITTAL
POWER GENERATION EQUIPMENT

PROJECT NAME: West Haverstraw Transfer Station

PROJECT: Cummins Project# TBD

MODEL(s): C60D6C w/ OTECC 400A ATS

CUSTOMER: Rockland Green

REFERENCE PO #: TBD

SUPPLIER: Cummins Sales and Service

DATE: 12/02/25

SALES REPRESENTATIVE: Ed Cheung
718-502-1217
ed.cheung@cummins.com

PROJECT MANAGER: Mark Woodward
339-216-8909
mark.n.woodward@cummins.com

Serving Cummins Customers
in the
East Region

NOTICE

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED, PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS

For questions or comments regarding this submittal, please contact your Cummins Sales Representative listed on the Cover Page.

To inquire about factory ship dates, arranging delivery and to schedule start-up of your Cummins Power Generation equipment, please contact the Project Manager listed on the Cover Page of this submittal.

**** Start-Ups must be Scheduled 4 Weeks in Advance ****

- PLEASE NOTE WARRANTY STARTS ON THE DATE OF STARTUP OR 18 MONTHS AFTER SHIPMENT
- PLEASE NOTE IF THE EQUPMENT IS NOT GOING TO BE STARTED UP FOR 6 MONTHS OR LONGER IT MAY NEED TO HAVE LONGTERM STORAGE PROCEEDURES COMPLETED AND / OR PREVENATIVE MANTENANCE. THESE WOULD BE AT AN ADDITIONAL COST.

Sales and Service

Rockland Green - West Haverstraw Transfer Station

1.0 - SUBMITTAL FOR APPROVAL

Submittal

Bill of Materials:

Date: **Dec 2, 2025**

Project Description:	Cummins Sales and Service is pleased to present the following submittal for the above referenced project Facility Electrical Power Generation Equipment consisting of the following:
Generator Model:	C60 D6C
Fuel Type / Fuel System:	Diesel
kW Rating:	60kW
Phase:	(3) Three Phase;
Voltage:	120/208;
Power Factor:	0.8 PF;
Power Ratings:	(ESP) Emergency Standby Power
Charging System:	12 volt, Negative Ground Electrical Starting System.
Certifications and Listings:	The generator set is listed: - UL 2200, Stationary Engine Generator Assemblies.
Engine Data:	Model: Cummins Inc. QSB5-G13 Type: 4 Cycle, In-line, 4 Cylinder Diesel Displacement: 272 cu. In. (4.5 liters) Bore: 4.21 in. (107.0 mm), Stroke: 4.88 in. (124 mm) Compression Ratio: 17.3:1 Aspiration: Turbocharged and charge air-cooled Emission Control Device: Turbocharged and charge air-cooled
Cooling System:	Standard Set Mounted Radiator Cooling System with the following features / options: - Shutdown on Low Coolant Level option.
Radiator Ambient Temperature:	50 Degree C, High Ambient Radiator Provided

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Alternator:	Cummins revolving field, 4 pole, brushless design. Dynamically balanced rotor permanently aligned to engine by flexible disc coupling. Class H insulation throughout. Alternator specifics include: - 12 Lead - Upper Broad Range - 105 Degree (C) Rise - ads-207 UC3D Alternator - Low Voltage - (1) 120 volt, 100W Alternator Heater Provided.
Excitation:	Cummins PMG (Permanent Magnet Generator) excitation provided.
Bearing:	Heavy duty, prelubricated cartridge bearing.
Voltage Regulator:	Cummins PMG provides torque matched operation for improved motor starting and reduces engine stalling in overload situation.
Governor:	Electronic Isochronous frequency regulation - Random frequency variation +/- 0.5% - Voltage Regulation, no load to full load +/- 1.0%
Engine Control Panel:	Power Command Control PC 2.3: Cummins' microprocessor based control system with: AmpSentry™ Protective Relay - UL Listed true alternator over current protection. See specification sheet for more detail.
Instrumentation, Controls, and Relays:	See specification sheet for details.
Charging System:	12 volt, negative ground electrical starting system:
Sub Base Fuel Tank:	UL 142 compliant, double wall, sub-base fuel tank with the following features / options: - 250 Gallon Tank Size - 39 Hour Run Time at Full Load - Rupture Basin Switch - Low Fuel Level Switch - High Fuel Level Switch - Fuel Gauge - OFPV - 5 Gal. Spill Fill - Vent Extensions

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Generator Enclosure:	Cummins generator enclosure with the following features / options: - Weather Protective Enclosure - Aluminum Construction - Sound Attenuated Level 2 - 70.5 Sound Pressure Levels @ 7 meters dB(A) - Maintenance Doors Mounted Both Sides & Rear - Lockable doors using key or padlock - Color: Green, - Fixed Louver Openings - Internally Mounted Critical Exhaust - Wind Rating 180 m.p.h.
Structural Sub Base:	Provided for mounting of engine and generator - with Coolant Drain and Oil Drain Extensions.
Exhaust System:	Provided: - Critical Type exhaust
Battery:	12 volt lead acid type, with welded battery rack, cables.
Battery Charger:	Float type, 6 amp, 12 volt D.C. output
Circuit Breakers and Accessories:	- Breaker # A - Molded case type, mounted in enclosure and wired to generator, (1) 125-400A, LSI Adjustable Trip, 3 pole, UL 600V, 100% rated, unit mounted: Right Side of Alternator. - Breaker # B - Molded case type, mounted in enclosure and wired to generator, (1) 225A, Thermal Trip, 3 pole, UL 600V, 80% rated, unit mounted: Right Side of Alternator.
Coolant Heater:	1500 Watt, 120 Volt, Single Phase Thermostatically Controlled Coolant Heater Temperature Rated for below 40 Degrees F Ambient
GenSet Options, Accessories and Miscellaneous Items:	Annunciator: - Cummins 20 light, Annunciator provided. See specification sheet for details. Vibration Isolators: - Integral Isolation provided. Other Options / and Accessories: - Larger Battery Rack - Control Meters

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- Control E-Stop
- Aux. Contacts in Control
- Fuel Water Separator
- Oil Pressure Gauge

Lube, Oil, and Antifreeze:	Provided.
Operations and Maintenance Manual:	One Provided. Additional copies per project specifications (If Applicable)
GenSet Warranty:	Standby 5 year / 2,500 hours, Parts, Labor, Travel
Automatic Transfer Switching:	(1) Cummins Model OTECC, 400 amp, Automatic Transfer Switch with all standard accessories including the following: - 3 pole - Application – Utility to Genset - UL 1008/CSA Certification - 60 Hz, - (3) Phase, - 208 Volt - NEMA Type 12 Enclosure - Auxiliary Relay-Switch In Emergency & Normal Position-12 VDC - Integral Control Power Supply - Load Monitoring - Standard Time Delays
Transfer Switch Warranty:	5 Year Comprehensive Extended Warranty
Start Up and Testing:	Provided by Cummins Trained Technicians: - Factory Testing: - Safety Shutdowns - On-Site Testing: - Startup - 2hr Load Bank
Planned Maintenance:	A 2 Year Maintenance contract is included with 1 Inspection and 1 Full service per year.

Specification Sheet

Diesel Generator Set

QSB5 Series Engine
50-125 kW Standby
EPA Tier 3 Emissions

Description

Cummins® generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby applications.

Features

Heavy duty engine - Rugged 4-cycle industrial diesel delivers reliable power and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 1.1 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance. The PowerCommand 2.3 control is also optional and is UL 508 Listed and provides AmpSentry™ protection.

Cooling system - Standard cooling package provides reliable running at up to 50 ℃ (122 ℉) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminium material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7 -10. The design has hinged doors to provide easy access for service and maintenance.

Fuel tanks - Dual wall sub-base fuel tanks are offered as optional features, providing economical and flexible solutions to meet extensive code requirements on diesel fuel tanks.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby 60 Hz		Prime 60 Hz		
Model	**kW**	**kVA**	**kW**	**kVA**	**Data sheets**
~~C50D6C~~	~~50~~	~~63~~	45	56	NAD-6333-EN
C60D6C	60	75	54	68	NAD-6334-EN
~~C80D6C~~	~~80~~	~~100~~	72	90	NAD-6335-EN
C100D6C	100	125	90	113	NAD-6336-EN
C125D6C	125	156	112.5	141	NAD-6216-EN

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Generator Set Specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.50%
Radio frequency emissions compliance	FCC code title 47 part 15 class A and B

Engine Specifications

Design	Turbocharged and charge air cooled
Bore	107 mm (4.21 in.)
Stroke	124 mm (4.88 in.)
Displacement	4.5 L (272 in^3)
Cylinder block	Cast iron, in-line 4 cylinder
Battery capacity	850 amps per battery at ambient temperature of 0 ℃ (32 ℉)
Battery charging alternator	100 amps
Starting voltage	2 x 12 volt in parallel, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	High ambient radiator
Rated speed	1800 rpm

Alternator Specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 ºC (248 ℉) Standby
Exciter type	Torque match (shunt) with PMG as option
Alternator cooling	Direct drive centrifugal blower
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3%

Available Voltages

1-phase	3-phase				
• 120/240	• 120/208	• 120/240	• 277/480	• 347/600	• 127/220

Generator Set Options

Fuel system

- Basic fuel tanks
- Regional fuel tanks

Engine

- Engine air cleaner – normal or heavy duty
- Shut down – low oil pressure
- Extension – oil drain
- Engine oil heater

Alternator

- 120 ℃ temperature rise alternator
- 105 ℃ temperature rise alternator
- PMG excitation
- Alternator heater, 120 V
- Reconnectable full 1 phase output alternator

Control

- AC output analog meters
- Stop switch – emergency
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)

Electrical

- One, two or three circuit breaker configurations
- 80% rated circuit breakers
- 80% or 100% rated LSI circuit
- breakers
- Battery charger

Enclosure

- Sound Level 1 or Level 2 enclosure, sandstone or green color
- Weather protective enclosure with muffler installed, green color
- Winter protective enclosure, green color

Cooling system

- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Coolant heater options:
  - <4 ℃ (40 ℉) – cold weather
  - <-18 ℃ (0 ℉) – extreme cold

Exhaust system

- Exhaust connector NPT
- Exhaust muffler mounted

Generator set application

- Base barrier – elevated genset
- Radiator outlet duct adapter

Warranty

- Base warranty – 2 year/1000 hours, Standby
- Base warranty – 1 year/unlimited hours, Prime
- 3 year Standby warranty options
- 5 year Standby warranty options

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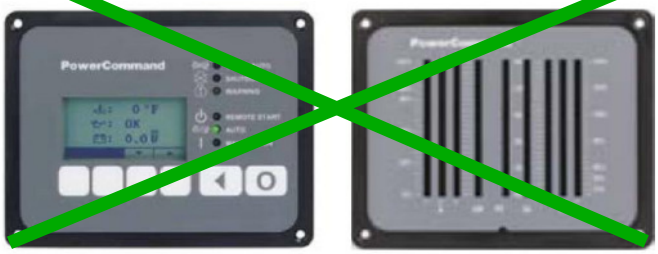
Generator Set Accessories

- Coolant heater
- Battery heater kit
- Engine oil heater
- Remote control displays
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- Audible alarm
- Remote monitoring device – PowerCommand 500/550
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Base barrier – elevated generator set
- Mufflers – industrial, residential or critical
- Alternator PMG excitation
- Alternator heater

Control System PowerCommand 1.1



PowerCommand control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 °C to +70 °C
- Bargraph display (optional)

AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (over crank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown

Alternator data

- Line-to-Line and Line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total kVA

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase Line-to-Line sensing
- Configurable torque matching

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop
- Automatic Transfer Switch (ATS) control
- Generator set exercise, field adjustable

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Options

- Auxiliary output relays (2)
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)
- AC output analog meters (bargraph)
  - Color-coded graphical display of:
    - 3-phase AC voltage
    - 3-phase current
    - Frequency
    - kVa
- Remote operator panel
- PowerCommand 2.3 control with AmpSentry protection

Ratings Definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):

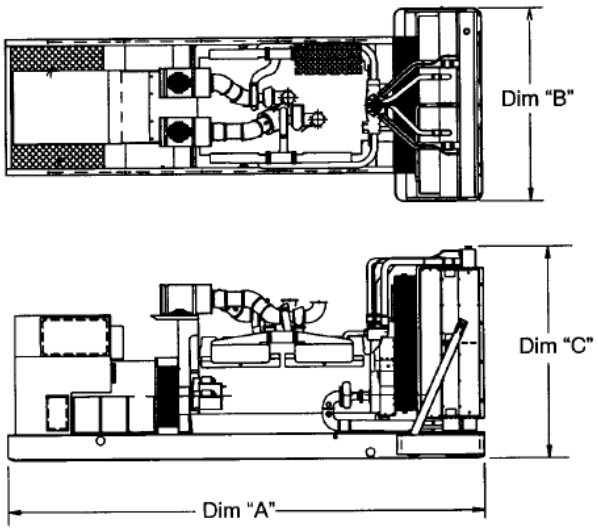
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

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Codes and Standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	**U.S. EPA**	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.
	All low voltage models are CSA certified to product class 4215-01.	**International Building Code**	The generator set is certified to International Building Code (IBC) 2012.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

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Generator set data sheet

Model:	C60D6C
Frequency:	60 Hz
Fuel type:	Diesel
KW rating:	60 standby 54 prime
Emissions level:	EPA Tier 3, Stationary emergency

Exhaust emission data sheet:	EDS-2027
Exhaust emission compliance sheet:	EPA-3034
Sound performance data sheet:	MSP-1301
Cooling performance data sheet:	MCP-1401
Prototype test summary data sheet:	PTS-450

Fuel consumption

	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	60 (75)				54 (68)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	2.20	3.30	4.60	6.10	2.1	3.00	4.20	5.50
L/hr	8.33	12.49	17.41	23.09	7.95	11.36	15.90	20.82

Engine

	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	QSB5-G13	
Configuration	Cast iron, in-line, 4 cylinder	
Aspiration	Turbocharged and charge air cooled	
Gross engine power output, kWm (bhp)	129 (173)	113 (152)
BMEP at set rated load, kPa (psi)	1205 (174.7)	1083 (157.1)
Bore, mm (in)	107 (4.21)	
Stroke, mm (in)	124 (4.88)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	7.44 (1464)	
Compression ratio	17.3:1	
Lube oil capacity, L (qt)	12.2 (12.9)	
Overspeed limit, rpm	2250	

Fuel flow

Maximum fuel flow, L/hr (US gph)	133 (35.0)
Maximum fuel inlet restriction with clean filter, mm Hg (in Hg)	127 (5.0)

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Air

	Standby rating	Prime rating
Combustion air, m3/min (scfm)	9.63 (340)	9.34 (330)
Maximum air cleaner restriction with clean filter, kPa (in H2O)	1.25 (5)	

Exhaust

Exhaust flow at set rated load, m^3/min (cfm)	20 (696)	18.52 (654)
Exhaust temperature, °C (°F)	370 (697)	341 (645)
Maximum back pressure, kPa (in H_2O)	10 (40.18)	10(40.18)
Available exhaust back pressure with CPG sound level 2 enclosure muffler, kPa (in H_2O)	3.5 (14.1)	4.5 (18.1)
Available exhaust back pressure with CPG weather enclosure muffler, kPa (in H_2O)	4.5 (18.1)	5 (20.1)

Standard set-mounted radiator cooling

Ambient design, ° C (° F)	50 (122)	
Fan load, kW_m (HP)	5.22 (7)	
Coolant capacity (with radiator), L (US Gal)	16 (4.2)	
Cooling system air flow, m^3/min (scfm)	218.04 (7700)	
Total heat rejection, MJ/min (Btu/min)	8.96 (8491)	8.38 (7943)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)	

Weight[2]

Unit wet weight, kg (lb)	1000 (2211)

Notes:
[1] For non-standard remote installations contact your local Cummins Power Generation representative.
[2] Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Engine power available to 3581 m (11750 ft) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 2.2% per 300 m (1000 ft) and 16.1% per 10° C (18° F)
Prime	Engine power available to 4343 m (14250 ft) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 2.3% per 300 m (1000 ft) and 18.8% per 10° C (18° F)

Ratings definitions

Emergency standby power (ESP):	Limited-time running power (LTP):	Prime power (PRP):	Base load (continuous) power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

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Alternator data

Standard Alternators	Single phase[2]		Three phase[1]				
Maximum temperature rise above 40 °C ambient	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C
Feature code	BB88-2[3]	BB90-2	B946-2	B986-2	B943-2	B952-2	BB86-2
Alternator data sheet number	ADS-205	ADS-204	ADS-204	ADS-204	ADS-204	ADS-202	ADS-204
Voltage ranges	120/240	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	69.3	71.0	73.3	73.3	73.9	72.6	73.5
Motor starting kVA (at 90% sustained voltage) Shunt			231	231	231	188	231
Motor starting kVA (at 90% sustained voltage) PMG			272	272	272	221	272
Full load current amps at standby rating	250	250	208	181	90	72	197

Alternator data

Standard Alternators	Single phase[2]		Three phase[1]				
Maximum temperature rise above 40 °C ambient	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C
Feature code	BB87-2[3]	BB91-2	BB93-2	BB94-2	BB95-2	BB92-2	BB85-2
Alternator data sheet number	ADS-207	ADS-205	ADS-204	ADS-204	ADS-204	ADS-204	ADS-204
Voltage ranges	120/240	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	70.2	71.7	73.3	73.3	73.9	73.9	73.5
Motor starting kVA (at 90% sustained voltage) Shunt			231	231	231	231	231
Motor starting kVA (at 90% sustained voltage) PMG			272	272	272	272	272
Full load current amps at standby rating	250	250	208	181	90	72	197

Notes:
[1] Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor
[2] Full single phase output up to full set rated 3-phase kW at 1.0 power factor
[3] Reconnectable option

Formulas for calculating full load currents:

Three phase output

$$\frac{kW \times 1000}{Voltage \times 1.73 \times 0.8}$$

Single phase output

$$\frac{kW \times SinglePhaseFactor \times 1000}{Voltage}$$

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Power Generation

Cummins Certified Shop Testing Procedures

GENSET MODEL: C60D6C
GENSET VOLTAGE: 208 VAC
GENSET RATING: 60 KW

INTRODUCTION

This test procedure details the testing to be performed as part of Cummins Power Generation's Standard Test Procedure. For this standard test, all data is to be recorded on the Cummins Power Generation INDUSTRIAL PRODUCTS TEST RECORD - CERTIFICATE OF TEST.

TEST PROCEDURE

1. Record the following information on the Certificate of Test:

A. Genset Model
B. Genset Serial Number
C. Customer (Distributor sold to)
D. Order Number
E. Service Rating
F. Fuel Type
G. Governor Type
H. Cooling System
I. Ambient Temp
J. Barometric Pressure
K. Genset rated voltage, frequency and number of phases

2. PowerCommand Control Set-up Test

A. During control set-up, perform the following tests:

(1) Verify flashing red LED when control switch is in "non-automatic" position.
(2) Press "Emergency Stop" switch and check that control panel display reads Emergency Stop.

B. Prior to running the genset, verify that the control indications are functioning properly by spot checking items such as:

(1) Oil pressure (approximately 0 psi)
(2) Coolant temperature (check only for a reading. Depending upon when the unit was previously operated, it could be anywhere between ambient and 215 deg F).
(3) Battery voltage (approximately 24 vdc)
(4) RPM (approximately 0 rpm)
(5) Volts, line to line (approximately 0 volts)
(6) Amps (approximately 0 amps)

C. Check "Remote Start" box if remote start switch operates properly (i.e. displays no flashing light and no error message).

3. Generator Set Start-Up and Standard Production Testing

A. If engine is not already close to operating temperature, warm up engine and conduct testing with coolant temperature at normal operating temperature. Warm-up procedure will be:

(1) Low idle speed (no load): approx. 1 minute
(2) Rated speed (no load): approx. 1 minute
(3) Rated speed (50% load): approx. 5 minutes

B. No Load Testing: Verify that the no-load output voltages are close to nominal, and then adjust voltage at the genset control if necessary to meet the voltage requirement. Utilize Test Cell AC metering as the standard for adjustment.

C. Check the following at no load (1800 RPM or 1500RPM), and record the following items on Certificate of Test form.

(1) Battery Voltage (must be greater than 24vdc)
(2) Voltage Regulator Adjustment at PowerCommand Control (+/- 5% adjustment)
(3) All line-to-line and line-to-neutral voltages
(4) Frequency
(5) Coolant Temperature
(6) Oil Pressure
(7) Phase Sequence (A-B-C)

D. Full Load Testing: After loading the genset to 100% of rated load and power factor as determined with Test Cell metering, check the AC metering at the control and calibrate as necessary. When this is done, check the “Meter Accuracy” box on Certificate of Test form.

E. Check the following at full rated load level and rated RPM, and record the following on Certificate of Test form:

(1) Battery Voltage (greater than 24vdc)
(2) All line-to-line and line-to-neutral voltages
(3) All line currents
(4) KW Load
(5) Frequency
(6) Power Factor (reflects rated 0.8 pf)
(7) Oil Pressure
(8) Coolant Temperature

F. Check maximum power of the genset at 1.0 PF. Record maximum power (KW), frequency and one L-L voltage. Note that ISO correction factor is 1.0.

G. Verify steady-state stability

(1) At both no load and full load, run a brief chart recording of one L-L voltage and frequency. Verify steady-state frequency regulation remains isochronous (+/- 0.25%) at no load and full load.
(2) Verify voltage regulation remains within +/- 0.5% of rated voltage at no load and full load.
(3) Check "Governor" and "Voltage Regulation" boxes if these PowerCommand functions maintained required steady-state control. Do not retain strip chart recordings after verifying that they meet the required steady state stability requirements.

H. Verify full-load pick-up capability

(1) Utilizing the chart recorder to measure frequency and one L-L voltage, apply full rated load at rated power factor in one step.
(2) Verify that the generator set will pick up full load in one step, and that the voltage and frequency dips and recovery times meet the stated requirements for this generator set model.
(3) After completion of this test, do not retain strip chart recordings.

Power Generation

Factory Generator Set Production Tests Provided

L020 – Extended Run Tests

1. Run genset at stated load conditions for the length of time specified. All load percentages are to be percentage of rated load. All kW loads to be at 0.8 power factor.
2. Every 15 minutes during the test, record the following:

A. Time of Day
B. Oil Pressure
C. Coolant Temperature
D. kW
E. Power Factor
F. Frequency
G. All L-L and L-N voltages
H. All line currents

3. Duration of test is as follows:
L020 – 1 hr. at 75% of Stated Rating & 1 hr. at 100% of Stated Rating (2 hours total)

L023 – Safety Shutdowns

1. The following safety shutdowns will be simulated using service tools:

A. Pre-low oil pressure warning
B. Oil pressure shutdown
C. Pre-high engine temperature warning
D. High engine temperature shutdown
E. Overspeed

L024 – Exhaust Temperature

1. Exhaust temperature (both banks if dual manifolds) will be recorded every 15 minutes during the running at rated load.
2. If pyrometers are not ordered, hook-up to pyrometers in the test cell exhaust system near the exhaust elbows will be accomplished.

2025 EPA Tier 3 Exhaust Emission Compliance Statement C60D6C Stationary Emergency

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 3 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	SCEXL0275AAK-037
Effective Date:	1/27/2025
Date Issued:	1/27/2025
EPA Engine Family (Cummins Emissions Family):	SCEXL0275AAK

Engine Information:

Model:	QSB5-G13	Bore:	4.21 in. (106.9 mm)
Engine Nameplate HP:	173	Stroke:	4.88 in. (123.9 mm)
Type:	4 cycle, in-line, 4 cylinder	Displacement:	272 cu. in. (4.45 liters)
Diesel Aspiration:	Turbocharged	Compression Ratio:	17.3:1
Emission Control Device:		Exhaust Stack Diameter:	4 in. (102 mm)

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NO_x + NMHC	CO	PM	NO_x + NMHC	CO	PM
EPA Emissions Limit	3.0	2.6	0.15	4.0	3.5	0.20

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50, Reference: ASTM D975 No. 2-D, 300-500 ppm Sulphur

Reference conditions: Air Inlet Temperature: 25 °C (77 °F), Fuel Inlet Temperature: 40 °C (104 °F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Prototype Test Support (PTS)
60 Hz test summary

Generator set models

C50D6C C80D6C
C60D6C C100D6C

Representative prototype

Model: C100D6C
Alternator: UC27 D
Engine: QSB5-G5

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity. Prototype testing is conducted only on generator sets not sold as new equipment.

Maximum surge power: 117.5 kW

The generator set was evaluated to determine the stated maximum surge power.

Maximum motor starting: 146.3 kVA

The generator set was tested to simulate motor starting by applying the specified kVA load at low lagging power factor (0.4 or lower). With this load applied, the generator set recovered to a minimum of 90% rated voltage.

Alternator temperature rise:

The highest rated temperature rise (120 °C) test results are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with the rated voltages. Only the highest temperatures are reported.

Location	Maximum rise (ºC)
Alternator stator	N/A
Alternator rotor	N/A
Exciter stator	N/A
Exciter rotor	N/A

Torsional analysis and testing:

The generator set was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted.

Cooling system: 50 °C ambient
0.5 in. H_2O restriction

The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load in elevated ambient temperature under static restriction conditions.

Durability:

The C100D6C generator set was subjected to a minimum 500 hour endurance test operating at variable load up to the Standby rating based upon MIL-STD-705 to verify structural soundness and durability of the design.

Electrical and mechanical strength:

The generator set was tested to several single phase and three phase faults to verify that the generator can safely withstand the forces associated with short circuit conditions. The generator set was capable of producing full rated output at the conclusion of the testing.

Steady state performance:

The generator set was tested to verify if the steady state operating performance was within the specified maximum limits.

Voltage regulation:	± 1%
Random voltage variation:	± 1%
Frequency regulation:	± Isochronous
Random frequency variation:	± 0.5%

Transient performance:

The generator set was tested to verify single step loading capability as required by NFPA 110 and verify acceptable voltage and frequency response on load addition or rejection. The following results were recorded at 1.0 power factor:

Full load acceptance:

Voltage dip:	28%
Recovery time:	1.3 seconds
Frequency dip:	9.1%
Recovery time:	2.6 seconds

Full load rejection:

Voltage rise:	20.2%
Recovery time:	0.6 seconds
Frequency rise:	7.0%
Recovery time:	1.7 seconds

Harmonic analysis:

(per MIL-STD-705B, method 601.4)

	Line to Line		Line to Neutral	
Harmonic	No load	Full load	No load	Full load
3	0.04	0.15	0.15	0.15
5	0.2	0.2	0.2	0.2
7	0.6	0.6	0.6	0.6
9	0.02	0.04	0.04	0.04
11	0.52	0.52	0.52	0.52
13	0.26	0.26	0.26	0.26
15	0.0	0.0	0.0	0.0

Alternator Data Sheet
Frame Size: UC3D
(CGT Frame Name: UCI274D)

Characteristics

	No of Bearings:	**1-bearing**		**2-bearing**	
Weights:	Stator assembly:	8521 lb	3865 kg	8521 lb	3865 kg
	Rotor assembly:	4392 lb	1992 kg	4246 lb	1926 kg
	Complete assembly:	12912 lb	5857 kg	12767 lb	5791 kg
Maximum speed:		2250 rpm			
Excitation current:	Full load:	Wdg 12: 3.6; Wdg 13: 3.6; Wdg 19: 3.14			
	No load:	Wdg 12: 0.86; Wdg 13: 0.86; Wdg 19: 0.86			
Insulation system:	Class H throughout				

3 Ø Ratings (0.8 power factor)			**60 Hz** (winding no)								
			190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
163° C rise ratings	@ 27° C	kW	114	114	114	127	100	114	120	120	127
		kVA	142.5	142.5	142.5	158.8	125	142.5	150	150	158.8
150° C rise ratings	@ 40° C	kW	110	110	110	124	98.4	110	116	116	125
		kVA	137.5	137.5	137.5	155	123	137.5	145	145	156.3
125° C rise ratings	@ 40° C	kW	105	105	105	117	96	105	110	110	117
		kVA	131.3	131.3	131.3	146.3	120	131.3	137.5	137.5	146.3
105° C rise ratings	@ 40° C	kW	96	96	96	105	88	96	100	100	105
		kVA	120	120	120	131.3	110	120	125	125	131.3
80° C rise ratings	@ 40° C	kW	80	80	80	88	72	80	87	87	88
		kVA	100	100	100	110	90	100	108.8	108.8	110

3 Ø Reactances (Based on full load at 125° C rise rating)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	208/416 (311)	220/440 (311)	230/460 (311)	240/480 (311)
Synchronous	3.08	2.79	2.58	2.02	2.38	2.52	2.36	2.16	2.11
Transient	0.25	0.23	0.21	0.17	0.17	0.21	0.20	0.18	0.17
Subtransient	0.17	0.16	0.14	0.11	0.16	0.15	0.14	0.13	0.12
Negative sequence	0.21	0.19	0.18	0.13	0.11	0.17	0.16	0.15	0.14
Zero sequence	0.12	0.11	0.10	0.08	0.08	0.10	0.09	0.09	0.08

3 Ø Motor starting Maximum kVA (90% sustained voltage)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
(Shunt)	360	360	[illegible]	360	360	360	360	360	360
(PMG)	423	423	423	423	423	423	423	423	423

Time constants (sec)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
Transient	0.03	0.03	0.03	0.03	0.031	0.031	0.031	0.031	0.031
Subtransient	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Open circuit	0.82	0.82	0.82	0.82	0.85	0.85	0.85	0.85	0.85
DC	0.007	0.007	0.007	0.007	0.0073	0.0073	0.0073	0.0073	0.0073

Windings (@22° C)	190/380 (14)	200/400 (14)	208/416 (14)	600 (17)	190/380 (311)	200/400 (311)	220/440 (311)	230/460 (311)	240/480 (311)
Stator resistance (L-L Ohms)	0.546	0.546	0.546	0.103	0.088	0.088	0.088	0.088	0.088
Rotor resistance (Ohms)	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
Number of leads	12	12	12	12	12	12	12	12	12

Specification Sheet

PowerCommand® 2.3 Control System

Control System Description

The PowerCommand control system is a microprocessor-based generator set monitoring, metering and control system designed to meet the demands of today's engine driven generator sets. The integration of all control functions into a single control system provides enhanced reliability and performance, compared to conventional generator set control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied.

Features

- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support.
- AmpSentry™ protective relay - true alternator overcurrent protection.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Digital voltage regulation. Three phase full wave FET type regulator compatible with either shunt or PMG systems.
- Generator set monitoring and protection.
- 12 and 24 VDC battery operation.
- Modbus® interface for interconnecting to customer equipment.
- Warranty and service. Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE, UKCA and CSA standards.

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PowerCommand Digital Genset Control PCC 2300

Description

The PowerCommand generator set control is suitable for use on a wide range of generator sets in non-paralleling applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC Line-to-Line.

Power for this control system is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 30 VDC.

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation - Three phase full wave FET type regulator compatible with either shunt or PMG systems. Sensing is three phase.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine
- due to thermal Control Module (ECM).
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
- Reduces the risk of Arc Flash overload or electrical faults by inverse time protection
- Common harnessing - with higher feature Cummins controls. Allows for easy field upgrades.
- Generator set monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system to sense and warn against a weak battery condition.
- Configurable for single or three phase AC metering.
- Engine starting - Includes relay drivers for starter, Fuel Shut Off (FSO), glow plug/spark ignition power and switch B+ applications.
- Generator set protection – Protects engine and alternator.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Advanced serviceability - using InPower™, a PC-based software service tool.
- Environmental protection - The control system is designed for reliable operation in harsh environments. The main control board is a fully encapsulated module that is protected from the elements.
- Modbus interface for interconnecting to customer equipment.
- Configurable inputs and outputs - Four discrete inputs and four dry contact relay outputs.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

Base Control Functions

HMI Capability

Operator adjustments - The HMI includes provisions for many set up and adjustment functions.

Generator set hardware data - Access to the control and software part number, generator set rating in kVA and generator set model number is provided from the HMI or InPower.

Data logs - Includes engine run time, controller on time, number of start attempts, total kWh, and load profile (control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history - Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase Line-to-Line and Line-to-Neutral)
- Current (single or three phase)
- kW, kVar, power factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1- Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Service adjustments - The HMI includes provisions for adjustment and calibration of generator set control functions. Adjustments are protected by a password. Functions include:

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Service adjustments (continued)

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable output set up
- Meter calibration
- Display language and units of measurement

Engine Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data swapping between genset and engine controller for control, metering and diagnostics.

12 VDC/24 VDC battery operations - PowerCommand will operate either on 12 VDC or 24 VDC batteries.

Temperature dependent governing dynamics (with electronic governing) - modifies the engine governing control parameters as a function of engine temperature. This allows the engine to be more responsive when warm and more stable when operating at lower temperature levels.

Isochronous governing - (where applicable) Capable of controlling engine speed within +/-0.25% for any steady state load from no load to full load. Frequency drift will not exceed +/-0.5% for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

Droop electronic speed governing - Control can be adjusted to droop from 0 to 10% from no load to full load.

Remote start mode - It accepts a ground signal from remote devices to automatically start the generator set and immediately accelerate to rated speed and voltage. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

Remote and local emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either emergency stop switch will wakeup the control.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating. The control can also be configured to go into a low current state while in auto for prime applications or applications without a battery charger.

Engine starting - The control system supports automatic engine starting. Primary and backup start disconnects are achieved by one of two methods: magnetic pickup or main alternator output frequency. The control also supports configurable glow plug control when applicable.

Cycle cranking - Is configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shut down after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Alternator Control

The control includes an integrated three phase Line-to-Line sensing voltage regulation system that is compatible with shunt or PMG excitation systems. The voltage regulation system is a three phase full wave rectified and has an FET output for good motor starting capability.

Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/- 1.5% for a 40 ºC (104 ºF) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level. The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided.

Protective functions include:

Battle Short Mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation are not bypassed. Please refer to the control application guide or manual for list of these faults.

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Derate

The derate function reduces output power of the genset in response to a fault condition. If a derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or modbus.

Configurable Alarm and Status Inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, shutdown or status indication and for labeling the input.

Emergency Stop

Annunciated whenever either emergency stop signal is received from external switch.

Full Authority Electronic Engine Protection

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

General Engine Protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the generator set is signaled to start and indicate a warning if the battery indicates impending failure.

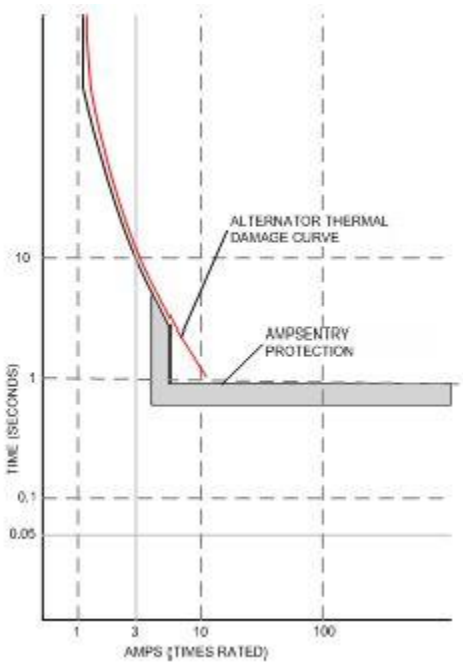
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the generator set or in the load. It also provides single and three phase fault current regulation so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3-Phase short) or fixed timer (2 sec for 1-Phase short, 5 sec for 2-Phase short). See document R1053 for a full-size time over current curve.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off during synchronizing.

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5- 20 second time delay. Default: 6 Hz, 10 seconds.

Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81 o) - Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz,
20 seconds, disabled.

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Overcurrent warning/shutdown - Thresholds and time delays are configurable. Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Loss of sensing voltage shutdown - Shutdown of generator set will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown generator set when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point.

Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Field Control Interface

Input signals to the PowerCommand control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Battleshort
- Rupture basin
- Start type signal
- Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Output signals from the PowerCommand control include:

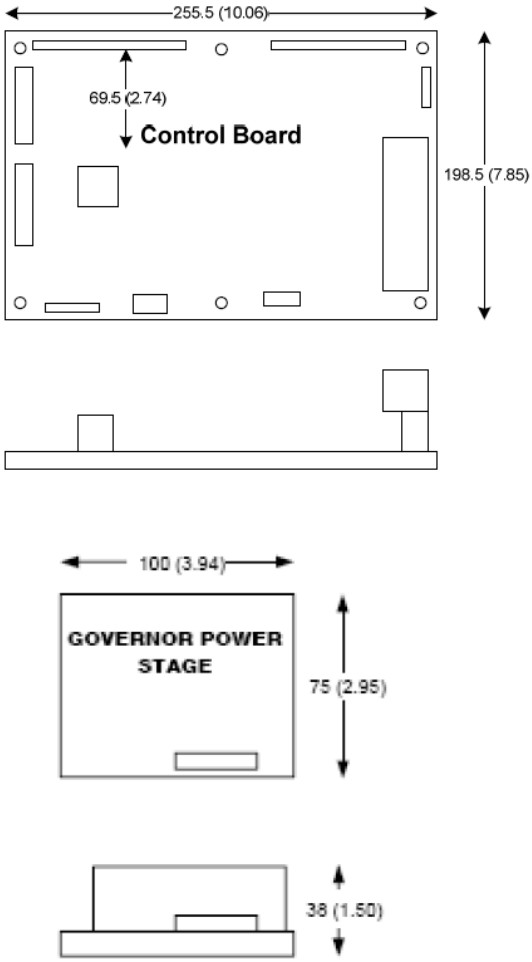
- Load dump signal: Operates when the generator set is in an overload condition.
- Delayed off signal: Time delay based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 – 120 seconds. Default: 0 seconds.
- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30 VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (generator set running) signal: Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

Communications Connections Include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins products.

Mechanical Drawings



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PowerCommand Human Machine Interface HMI320

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

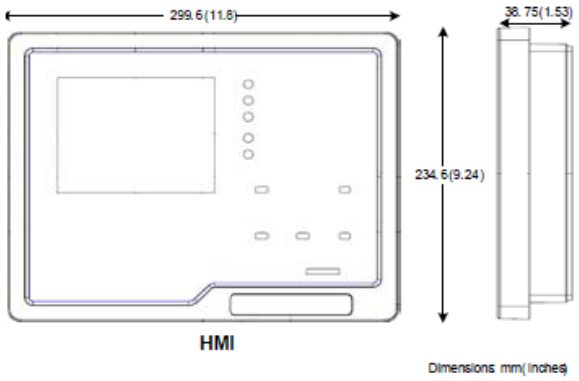
Features

- LED indicating lamps:
  - Genset running
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.
- LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian and Chinese Characters.

Communications connections include:

- PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.
- This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand generator sets and transfer switches, to facilitate service and monitoring of these products.

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC to +70º C (-40 ºF to 158 ºF) and for storage from -55 ºC to +80 ºC (-67 ºF to 176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC to +70 ºC (-4 ºF to 158 ºF) and for storage from -30 ºC to +80 ºC (-22 ºF to 176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

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Certifications

PowerCommand meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4: 1993 compliance, controls and switchgear.
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking: The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN50081-1,2 residential/light industrial emissions or industrial emissions.
- EN50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

Warranty

All components and subsystems are covered by an express limited one year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

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Data Sheet

Circuit Breakers

Description

This Data sheet provides circuit breaker manufacturer part numbers and specifications. The Circuit breaker box description is the rating of that breaker box installation on a Cummins Generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable Models

Engine	Models					
Kubota	C10D6	C15D6	C20D6			
QSJ2.4	C20N6	C25N6	C30N6	C30N6H	C36N6	C36N6H
	C40N6	C40N6H	C50N6H	C60N6H		
B3.3	C25D6	C30D6	C35D6	C40D6	C50D6	C60D6
QSJ5.9G	C45N6	C50N6	C60N6	C70N6	C80N6	C100N6
QSJ8.9G	C125N6	C150N6	C175N6B	C200N6B		
QSB5	DSFAC	DSFAD	DSFAE	C50D6C	C60D6C	C80D6C
	C100D6C	C125D6C				
QSB7	DSGAA	DSGAB	DSGAC	DSGAD	DSGAE	
		C125D6D	C150D6D	C175D6D	C200D6D	
QSL9	DSHAD	DQDAA	DQDAB	DQDAC		
QSM11	DQHAB					
QSX15	DFEJ	DFEK				

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.

2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an “N”, use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Please refer to the catalog numbering systems page, which is given in the chart, to understand the nomenclature of the catalog number.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16-17
H, J, and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8-9
Q	0734CT0201 http://www.schneider-electric.us/en/download/document/0734CT0201/	4

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above. http://products.schneider-electric.us/technical-library/

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3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

*If the catalog number starts with “N”, skip the N and begin your search with the second letter.

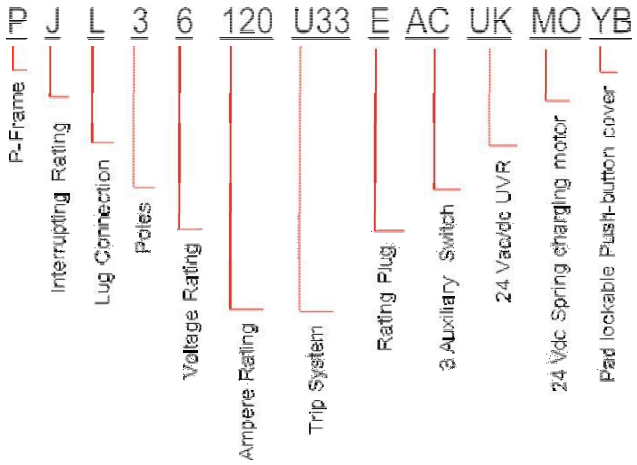
*If the first 3 letters are “PJP,” the search will not work. You will need to start with just “PJ” and use the description pages to obtain the information you are looking for on the “PJP.”

Example

After finding your circuit breaker catalog number to be "PJL36120U33EACUKMOYB," navigate to the P-frame catalog by using the link provided.

Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PJL36120.”



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Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KX28-2	CB,Loc B,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX29-2	CB,Loc C,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX30-2	CB,Loc A,125A-400A,3P,LSI,600VAC,100%,UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX31-2	CB,Loc B,125A-400A,3P,LSI,600VAC,100%,UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX32-2	CB,Loc A,200A-600A,3P,LSI,600VAC,80%,UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX33-2	CB,Loc B,200A-600A,3P,LSI,600VAC,80%,UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX34-2	CB,Loc C,15A,3P,600VAC,80%,UL	A043L506	Schneider Electric	HDL36015	Thermal Magnetic	N/A
KX35-2	CB,Loc C,20A,3P,600VAC,80%,UL	A043L480	Schneider Electric	HDL36020	Thermal Magnetic	N/A
KX36-2	CB,Loc C,25A,3P,600VAC,80%,UL	A043L508	Schneider Electric	HDL36025	Thermal Magnetic	N/A
KX37-2	CB,LoC C,30A,3P,600VAC,80%,UL	A043L475	Schneider Electric	HDL36030	Thermal Magnetic	N/A
KX38-2	CB,Loc C,40A,3P,600VAC,80%,UL	A043L464	Schneider Electric	HDL36040	Thermal Magnetic	N/A
KX39-2	CB,Loc C,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KX40-2	CB,Loc C,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KX41-2	CB,Loc C,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KX42-2	CB,Loc C,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A

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PowerPact H-, J-, and L-Frame Circuit Breakers

Catalog
0611CT1001 R02/16

2015

Class 0611

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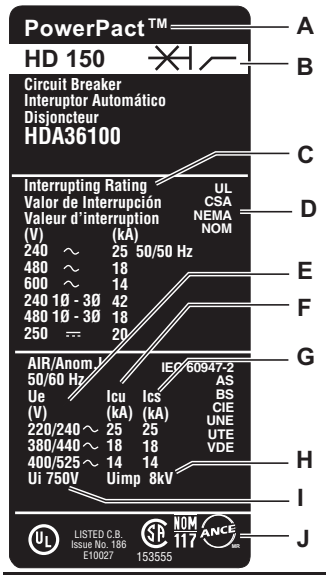
General Characteristics

Faceplate Label



Characteristics indicated on the faceplate label:

A. Circuit breaker type
B. Circuit breaker disconnector symbol
C. Performance levels
D. Standards
E. Ue: Operating voltage per IEC
F. Icu: Ultimate breaking capacity per IEC
G. Ics: Service breaking capacity per IEC
H. Uimp: Rated impulse withstand voltage per IEC
I. Ui: Insulation voltage per IEC
J. Certification marks

NOTE: When the circuit breaker is equipped with an extended rotary handle, the door must be opened to view the faceplate.

Codes and Standards

H-, J-, and L-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards.

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

Table 8: Codes and Standards (Domestic)

PowerPact H-, J-, and L-Frame Circuit Breakers	H-, J-, and L-Frame Switches	PowerPact H-, J-, and L-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 508
IEC 60947-2	IEC 60947-3	IEC 60947-2
CSA C22.2 No. 5[2]	CSA C22.2 No. 5[4]	CSA C22.2 No. 14
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Marking
CCC	CE Marking	
CE Marking		

1 PowerPact H- and J-frame circuit breakers are in UL File E10027. PowerPact L-frame circuit breakers are in UL File E63335.

2 PowerPact H- and J-frame circuit breakers are in CSA File LR40970. PowerPact L-frame circuit breakers are in CSA File 69561.

3 PowerPact H- and J-frame switches are in UL File E87159.

4 PowerPact H- and J-frame switches are in CSA File LR32390.

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Table 11: Circuit Breakers

Circuit Breaker		150 A H-Frame					250 A J-Frame					400 A L-Frame					600 A L-Frame					1200 A L-Frame	
Circuit Breaker Type		HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR	LG	LL
Number of poles[1]		2, 3				3	2, 3				3	3, 4					3, 4					4	
Amperage Range (A)		15-150					70-250					70-400					200-600					700-1200	
UL 489 Circuit Breaker Ratings																							
Breaking Capacity (AIR) UL/CSA/NOM (kA rms)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	—	—
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	—	—
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	—	—
	250 Vdc[2]	20	20	20	20	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	20	—	50	—	—	20	—	—	50	—	20	—	—	50	—	20	—	20	—	20	50
IEC 947-2 Circuit Breaker Ratings																							
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	—	—
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75[4]	—	—
	690 Vac	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—
	250 Vdc[2]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%					—	—
Insulation Voltage	V_i	750 Vac					750 Vac					750 Vac					750 Vac					—	—
Impulse Withstand Voltage	V_{imp}	8 kVac					8 kVac					8 kVac					8 kVac					—	—
Operational Voltage	V_e	690 Vac					690 Vac					690 Vac					690 Vac					—	—
Sensor Rating	I_n	150 A					250 A					400 A					600 A					—	—
Utilization Category	—	A					A					A					A					—	—
Operations (Open-Close Cycles)																							
Without Current		4000					5000					5000					5000					—	
With Current		4000					1000					1000					1000					—	
Protection and Measurements																							
Short-circuit protection	Magnetic only	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Overload/short-circuit protection	Thermal-magnetic	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	X	X
	Electronic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with neutral protection (Off-0.5-1-OSN)[5]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with ground fault protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with zone selective interlocking (ZSI)[6]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Display / I, V, f, P, E, THD measurements / interrupted-current measurement		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Options	Front display module (FDM121)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Operating assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Counters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Histories and alarms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Metering Com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Device status/control com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Dimensions / Weight / Connections																							
Dimensions (Three-Pole Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)					13.38 (340)	
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)					5.51 (140)	
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)					4.33 (110)	
Weight - lb. (Kg)		4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)					13.7 (6.2)	
Connections / Terminations	Unit Mount	X					X					X					X					X	
	I-Line	X					X					X					X					—	
	Rear Connection	X					X					X					X					X[7]	
	Plug-In	X					X					X					X					—	
	Drawout	X					X					X					X					—	
	Optional Lugs	X					X					X					X					—	

1 H and J-frame breakers with Micrologic trip units available only with three poles. The HJ, HL and the J-Frame two pole circuit breakers are three pole modules.

2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.

3 500 Vdc specific catalog numbers, ungrounded UPS systems only.

4 I_{cs} for 600 A L-frame circuit breaker at 525 V is 19 kA.

5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

6 ZSI using restraint wires.

7 Rear connection is not available for 700–1200 A four pole L-frame circuit breakers.

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PowerPact H-, J-, and L-frame Circuit Breaker Trip Units

Table 12: Micrologic Trip Unit Features

Features	Micrologic Trip Unit (X = Standard Feature, O = Available Option					
	Standard		Ammeter		Energy	
	3.2/3.3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	X					
LSI[1]		X	X		X	
LSIG/Ground Fault Trip[2]				X		X
Ground-Fault Alarm Trip				X		X
Current Settings Directly in Amperes	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X
LED for Long-Time Pickup	X	X	X	X	X	X
LED for Long-Time Alarm	X	X	X	X	X	X
LED Green “Ready” Indicator	X	X	X	X	X	X
Up to 12 Alarms Used Together			X	X	X	X
Digital Ammeter			X	X	X	X
Zone-Selective Interlocking[3]			X	X	X	X
Communications	O	O	O	O	O	O
LCD Display			X	X	X	X
Front Display Module FDM121			O	O	O	O
Advanced User Interface			X	X	X	X
Neutral Protection			X	X	X	X
Contact Wear Indication[4]			X	X	X	X
Incremental Fine Tuning of Settings			X	X	X	X
Load Profile[4], [5]			X	X	X	X
Power Measurement					X	X
Power Quality Measurements					X	X

1 The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.

2 Requires neutral current transformer on three-phase four-wire loads.

3 ZSI for H/J-frame devices is only OUT. ZSI for L-frame devices is IN and OUT.

4 Indication available using the communication system only.

5 % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% I_n.

Thermal-Magnetic or Electronic Trip Unit?

Thermal-magnetic trip units (available on H- and J-frame circuit breakers only) protect against overcurrents and short-circuits using tried and true techniques. For applications requiring installation optimization and energy efficiency, electronic trip units offering more advanced protection functions combined with measurements.

Trip units using digital electronics are faster as well as more accurate. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate events and plan any necessary servicing.

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L-Frame Circuit Breaker Catalog Numbers

Unit-Mount Circuit Breaker Catalog Numbers

Table 32: L-Frame 600 A Electronic Trip UL Rated Three-Pole Circuit Breakers (600 Vac, 50/60 Hz) With Factory Sealed Trip Unit Suitable for Reverse Connection

Electronic Trip Unit			Sensor Rating	Interrupting Rating (2nd Letter of Catalog Number)				
Type	Function	Trip Unit		D	G	J[1]	L[1]	R[1]
Standard (80%) Rated, 600 Vac, 50/60 Hz								
Standard	LI	3.3[2]	250 A[3]	**LDL36250U31X**	**LGL36250U31X**	**LJL36250U31X**	**LLL36250U31X**	**LRL36250U31X**
			400 A[4]	**LDL36400U31X**	**LGL36400U31X**	**LJL36400U31X**	**LLL36400U31X**	**LRL36400U31X**
			600 A[4]	**LDL36600U31X**	**LGL36600U31X**	**LJL36600U31X**	**LLL36600U31X**	**LRL36600U31X**
Standard	LSI	3.3S[2]	250 A[3]	**LDL36250U33X**	**LGL36250U33X**	**LJL36250U33X**	**LLL36250U33X**	**LRL36250U33X**
			400 A[4]	**LDL36400U33X**	**LGL36400U33X**	**LJL36400U33X**	**LLL36400U33X**	**LRL36400U33X**
			600 A[4]	**LDL36600U33X**	**LGL36600U33X**	**LJL36600U33X**	**LLL36600U33X**	**LRL36600U33X**
Ammeter	LSI	5.3A	400 A[4]	**LDL36400U43X**	**LGL36400U43X**	**LJL36400U43X**	**LLL36400U43X**	**LRL36400U43X**
			600 A[4]	**LDL36600U43X**	**LGL36600U43X**	**LJL36600U43X**	**LLL36600U43X**	**LRL36600U43X**
Energy	LSI	5.3E	400 A[4]	**LDL36400U53X**	**LGL36400U53X**	**LJL36400U53X**	**LLL36400U53X**	**LRL36400U53X**
			600 A[4]	**LDL36600U53X**	**LGL36600U53X**	**LJL36600U53X**	**LLL36600U53X**	**LRL36600U53X**
Ammeter	LSIG	6.3A[5]	400 A[4]	**LDL36400U44X**	**LGL36400U44X**	**LJL36400U44X**	**LLL36400U44X**	**LRL36400U44X**
			600 A[4]	**LDL36600U44X**	**LGL36600U44X**	**LJL36600U44X**	**LLL36600U44X**	**LRL36600U44X**
Energy	LSIG	6.3E	400 A[4]	**LDL36400U54X**	**LGL36400U54X**	**LJL36400U54X**	**LLL36400U54X**	**LRL36400U54X**
			600 A[4]	**LDL36600U54X**	**LGL36600U54X**	**LJL36600U54X**	**LLL36600U54X**	**LRL36600U54X**
100% Rated, 600 Vac, 50/60 Hz								
Standard	LI	3.3[2]	250 A[3]	**LDL36250CU31X**	**LGL36250CU31X**	**LJL36250CU31X**	**LLL36250CU31X**	**LRL36250CU31X**
			400 A[4]	**LDL36400CU31X**	**LGL36400CU31X**	**LJL36400CU31X**	**LLL36400CU31X**	**LRL36400CU31X**
Standard	LSI	3.3S[2]	250 A[3]	**LDL36250CU33X**	**LGL36250CU33X**	**LJL36250CU33X**	**LLL36250CU33X**	**LRL36250CU33X**
			400 A[4]	**LDL36400CU33X**	**LGL36400CU33X**	**LJL3640C0U33X**	**LLL36400CU33X**	**LRL36400CU33X**
Ammeter	LSI	5.3A	400 A[4]	**LDL36400CU43X**	**LGL36400CU43X**	**LJL36400CU43X**	**LLL36400CU43X**	**LRL36400CU43X**
Energy	LSI	5.3E	400 A[4]	**LDL36400CU53X**	**LGL36400CU53X**	**LJL36400CU53X**	**LLL36400CU53X**	**LRL36400CU53X**
Ammeter	LSIG	6.3A[5]	400 A[4]	**LDL36400CU44X**	**LGL36400CU44X**	**LJL36400CU44X**	**LLL36400CU44X**	**LRL36400CU44X**
Energy	LSIG	6.3E	400 A[4]	**LDL36400CU54X**	**LGL36400CU54X**	**LJL36400CU54X**	**LLL36400CU54X**	**LRL36400CU54X**

1 UL Listed/CSA Certified as current-limiting circuit breakers.

2 Three-pole circuit breakers with this trip unit can be used for two-pole applications.

3 Standard lug kit: AL400L61K3. Terminal wire range: (1) 2 AWG–600 kcmil Cu or (1) 2 AWG–500 kcmil Al. Type of terminal shield: short.

4 Standard lug kit: AL600LS52K3. Terminal wire range: (2) 2/0 AWG–500 kcmil Al/Cu. Type of terminal shield: medium.

5 Three-pole circuit breakers with this trip unit can be used for two-pole applications in order to have ground fault protection. Additional metering capabilities will not work properly on the unconnected phase.

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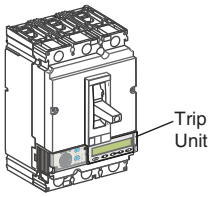
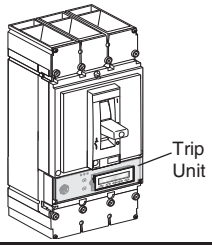
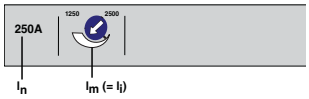
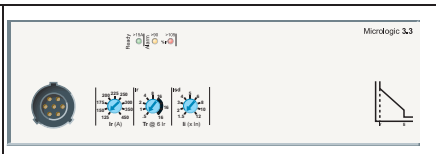
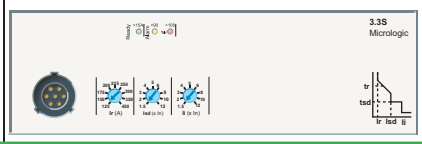
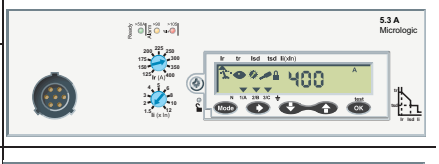
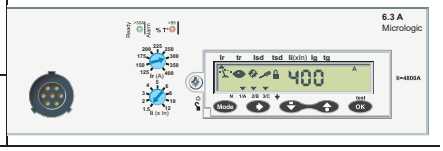
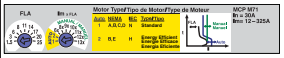
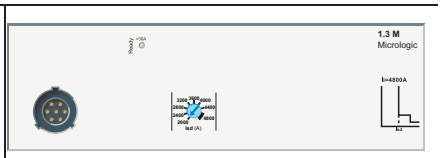
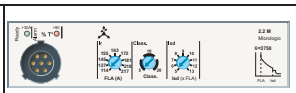
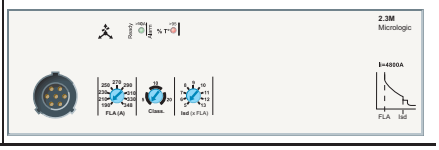
Table 62: Trip Unit Availability

Trip Unit Type	Trip Unit	H-, J-Frame 	Trip Unit	L-Frame 
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		Micrologic 3.3S and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

NOTE: W = mission critical trip unit.

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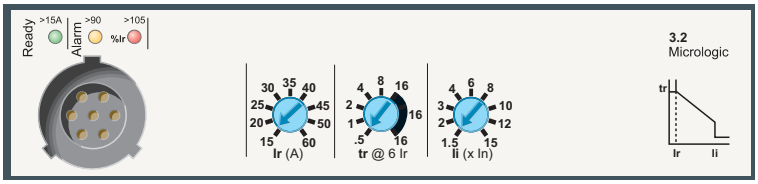
Micrologic 3 Trip Units

Micrologic 3 trip units can be used on PowerPact H-, J-, and L-Frame circuit breakers with performance levels D/G/J/L.



They provide:

- standard protection of distribution cables
- indication of:
  - — overloads (using LEDs)
  - — overload tripping (using the SDx relay module)

Circuit breakers equipped with Micrologic 3 trip units can be used to protect distribution systems supplied by transformers.

Protection

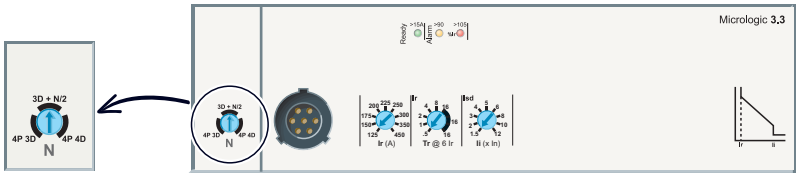
Settings are made using the adjustment rotary switches.

Overloads: Long time protection (I_r)

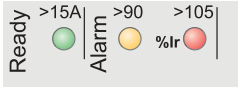
Inverse time protection against overloads with an adjustable current pick-up I_r set using a rotary switch and an adjustable time delay t_r.

Neutral protection

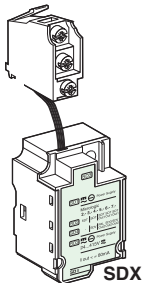
- On three-pole L-frame circuit breakers, neutral protection is not possible.
- On four-pole L-frame circuit breakers, neutral protection may be set using a three-position switch:
  - — switch position 4P 3D: neutral unprotected
  - — switch position 4P 3D + N/2: neutral protection at half the value of the phase pick-up, (0.5 x I_r)
  - — switch position 4P 3D: neutral fully protected at I_r



Indicators



Front Indicators



SDX Module

Front indicators

- The green “Ready” LED blinks slowly when the electronic trip unit is ready to provide protection. It indicates the trip unit is operating correctly.
- Orange overload pre-alarm LED: steady on when I > 90% I_r
- Red overload LED: steady on when I > 105% I_r

Remote indicators

An overload trip signal can be remotely checked by installing an SDx relay module inside the circuit breaker. This module receives the signal from the Micrologic electronic trip unit through an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. See page 120.

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PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Units

Table 64: Micrologic 3 Trip Unit

Ratings	I_n at 104°F (40°C)[1]		60 A	100 A	150 A	250 A	400 A	600 A			
Circuit Breaker	H-frame		X	X	X						
	J-frame					X					
	L-frame					X	X	X			
Micrologic 3.2 / 3.3 trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	I_r		Value depending on sensor rating (I_n) and setting on rotary switch								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		0.5	1	2	4	8	16			
		1.5 x I_r	15	25	50	100	200	400			
		6 x I_r	0.5	1	2	4	8	16			
		7.2 x I_r	0.35	0.7	1.4	2.8	5.5	11			
Thermal memory			20 minutes before and after tripping								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								
Micrologic 3.2S / 3.3S trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	I_r		Value depending on sensor rating (I_n) and setting on rotary switch								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		non-adjustable								
		1.5 x I_r	400								
		6 x I_r	16								
		7.2 x I_r	11								
Thermal memory			20 minutes before and after tripping								
S Short-time protection											
Pick-up (A) accuracy ± 10%	I_{sd} - I_r x...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	t_{sd}		non-adjustable								
	Non-tripping time Maximum break time		20 80								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								

1 If the trip units are used in high-temperature environments, the Micrologic trip unit setting must take into account the thermal limitations of the circuit breaker. See the temperature derating information on page 150.

2 Mission Critical trip units have a "-W" at the end of the number (for example 3.2-W). All other protections are the same and have the same trip curves.

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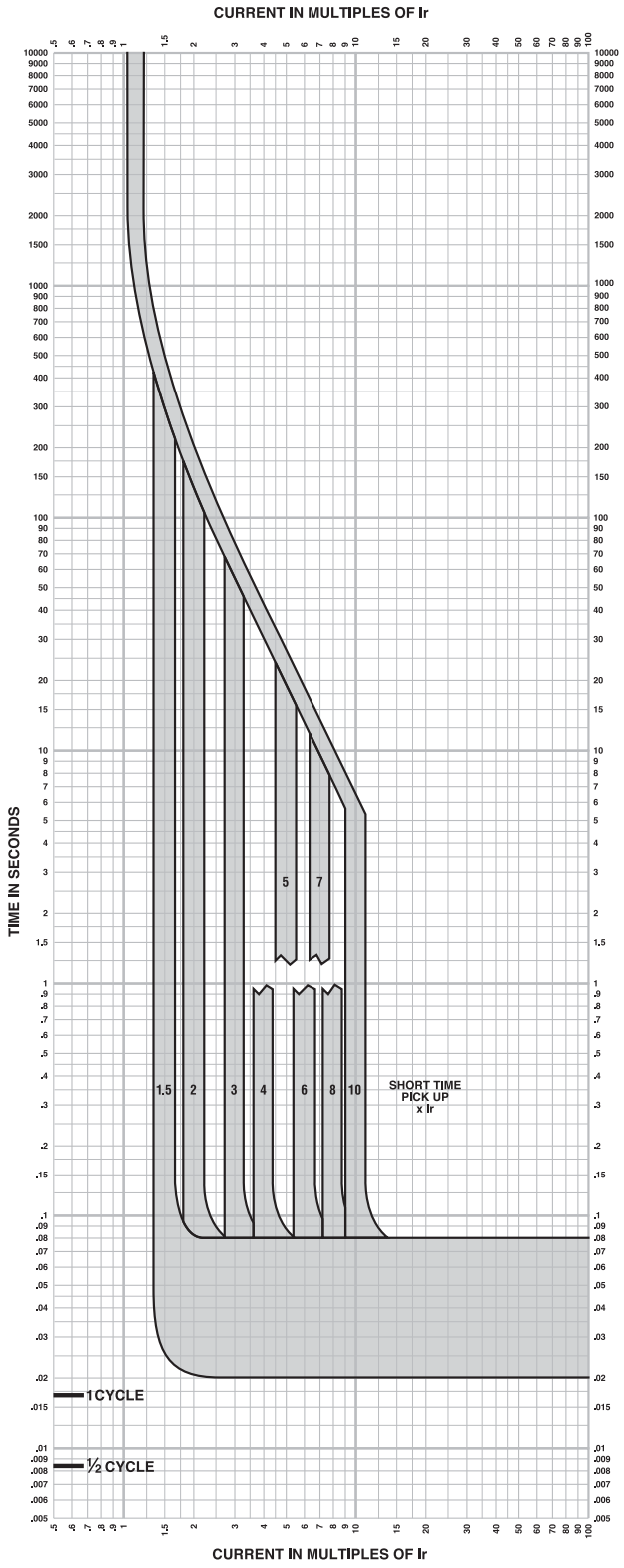
PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 117: Micrologic 3.3S and 3.3S-W Electronic Trip Unit Long Time/Short Time Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3S and 3.3S-W
Long Time/Short Time Trip Curve
250A, 400A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

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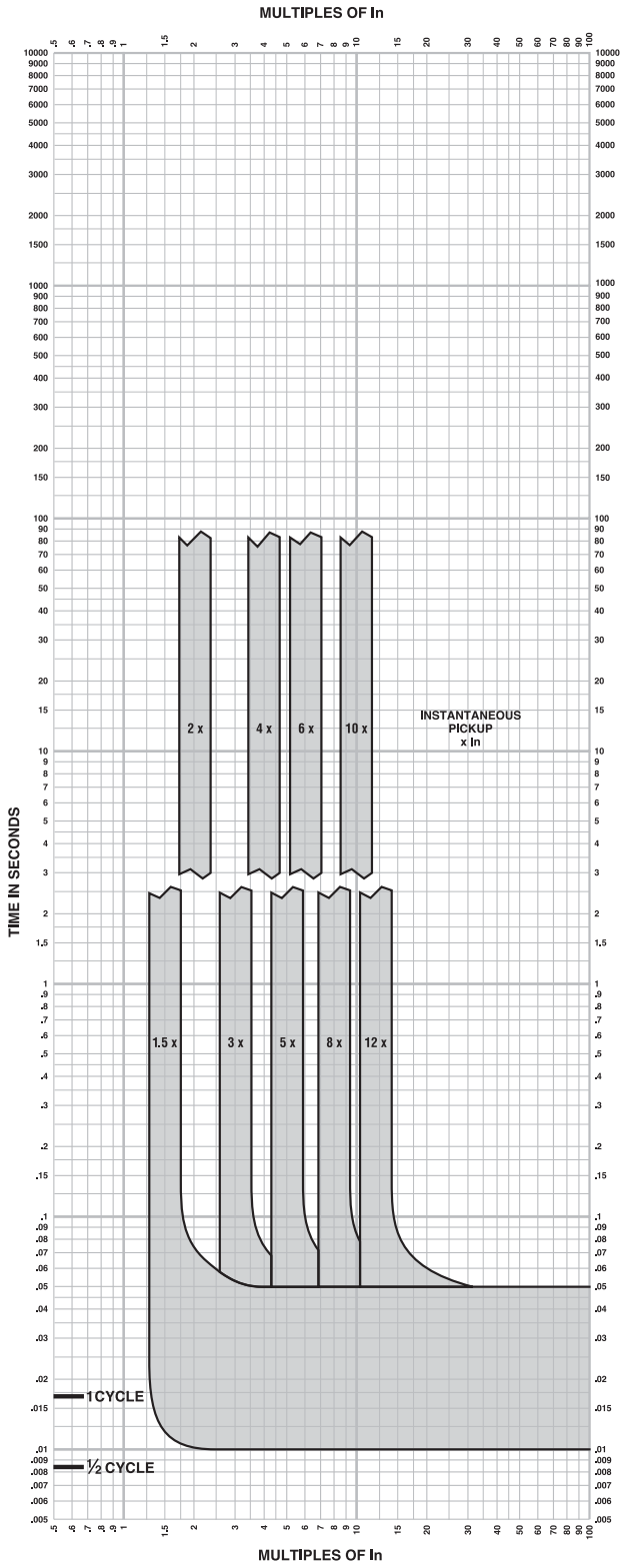
PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 119: Micrologic 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W Electronic Trip Unit Instantaneous Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W
Instantaneous Trip Curve
400A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. In = Maximum dial setting of Ir.
   400A L-Frame: In = 400A = Max Ir setting

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

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Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KV85-2	CB,Loc B,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KV86-2	CB,Loc B,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KV87-2	CB,Loc B,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KV88-2	CB,Loc B,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A
KV89-2	CB,Loc B,90A,3P,600VAC,80%,UL	A043K997	Schneider Electric	HDL36090	Thermal Magnetic	N/A
KV90-2	CB,Loc B,100A,3P,600VAC,80%,UL	A043L024	Schneider Electric	HDL36100	Thermal Magnetic	N/A
KV91-2	CB,Loc B,125A,3P,600VAC,80%,UL	A043K994	Schneider Electric	HDL36125	Thermal Magnetic	N/A
KV92-2	CB,Loc B,150A,3P,600VAC,80%,UL	A043K991	Schneider Electric	HDL36150	Thermal Magnetic	N/A
KV93-2	CB,Loc B,175A,3P,600VAC,80%,UL	A043L619	Schneider Electric	JDL36175	Thermal Magnetic	N/A
KV94-2	CB,Loc B,200A,3P,600VAC,80%,UL	A043L520	Schneider Electric	JDL36200	Thermal Magnetic	N/A
KV95-2	CB,Loc B,225A,3P,600VAC,80%,UL	A043L517	Schneider Electric	JDL36225	Thermal Magnetic	N/A
KV96-2	CB,Loc B,250A,3P,600VAC,80%,UL	A043L516	Schneider Electric	JDL36250	Thermal Magnetic	N/A
KX09-2	Circuit Breaker-250A,Right CB on Right side,3-Pole,UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX14-2	CirBrkr-250A,Left,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX15-2	CirBrkr-250A,Right,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX22-2	Circuit Breaker-250A,Left CB on Right side,3-Pole, UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX26-2	CB,Loc A,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A

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PowerPact H-, J-, and L-Frame Circuit Breakers

Catalog
0611CT1001 R02/16

2015

Class 0611

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SQUARE D™
by Schneider Electric

PowerPact H-, J-, and L-Frame Circuit Breakers
Circuit Breakers

Table 19: PowerPact J-Frame 250 A Unit-Mount Thermal-Magnetic Circuit Breakers with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Current Rating at 104°F (40°C)	Adjustable AC Magnetic Trip		Interrupting Rating									
			D		G		J[1]		L[1]		R[1]	
	Hold	Trip	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated
J-Frame, 250 A, Two-Pole, 600 Vac 50/60 Hz, 250 Vdc												
150 A[2]	750 A	1500 A	JDL26150	JDL26150C	JGL26150	JGL26150C	JJL26150	JJL26150C	JLL26150	JLL26150C	—	—
175 A[2]	875 A	1750 A	JDL26175	JDL26175C	JGL26175	JGL26175C	JJL26175	JJL26175C	JLL26175	JLL26175C	—	—
200 A[3]	1000 A	2000 A	JDL26200	JDL26200C	JGL26200	JGL26200C	JJL26200	JJL26200C	JLL26200	JLL26200C	—	—
225 A[3]	1125 A	2250 A	JDL26225	JDL26225C	JGL26225	JGL26225C	JJL26225	JJL26225C	JLL26225	JLL26225C	—	—
250 A[3]	1250 A	2500 A	JDL26250	JDL26250C	JGL26250	JGL26250C	JJL26250	JJL26250C	JLL26250	JLL26250C	—	—
J-Frame, 250 A, Three-Pole, 600 Vac 50/60 Hz, 250 Vdc												
150 A[2]	750 A	1500 A	JDL36150	JDL36150C	JGL36150	JGL36150C	JJL36150	JJL36150C	JLL36150	JLL36150C	JRL36150	JRL36150C
175 A[2]	875 A	1750 A	JDL36175	JDL36175C	JGL36175	JGL36175C	JJL36175	JJL36175C	JLL36175	JLL36175C	JRL36175	JRL36175C
200 A[3]	1000 A	2000 A	~~JDL36200~~	JDL36200C	JGL36200	JGL36200C	JJL36200	JJL36200C	JLL36200	JLL36200C	JRL36200	JRL36200C
225 A[3]	1125 A	2250 A	JDL36225	JDL36225C	JGL36225	JGL36225C	JJL36225	JJL36225C	JLL36225	JLL36225C	JRL36225	JRL36225C
250 A[3]	1250 A	2500 A	~~JDL36250~~	JDL36250C	JGL36250	JGL36250C	JJL36250	JJL36250C	JLL36250	JLL36250C	JRL36250	JRL36250C

1 UL Listed/CSA Certified as current-limiting circuit breakers.

2 Standard lug kit: AL175JD. Terminal wire range: 4–4/0 AWG Al or Cu.

3 Standard lug kit: AL250JD. Terminal wire range: 3/0 AWG–350 kcmil Al or Cu.

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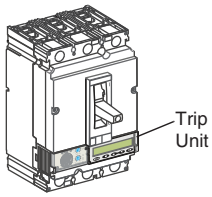
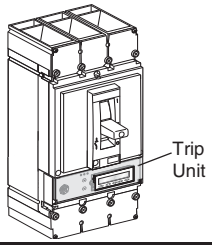
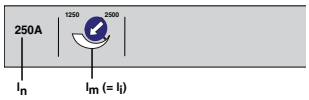
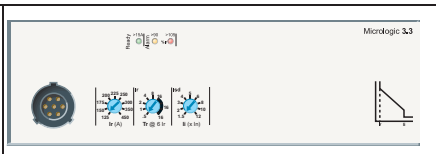
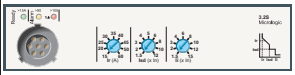
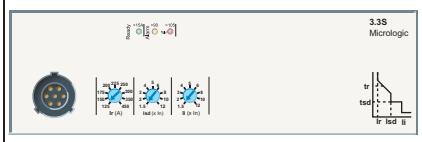
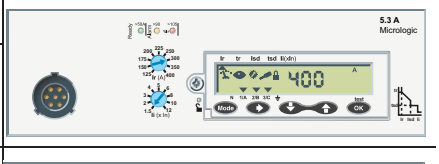
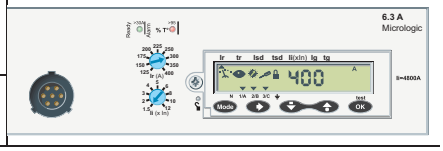
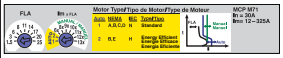
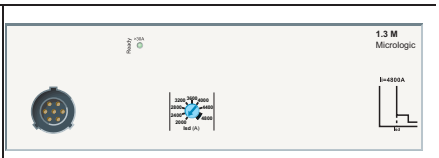
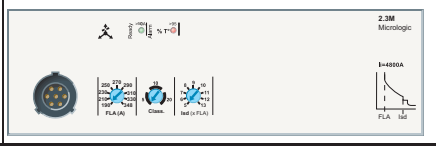
Table 62: Trip Unit Availability

Trip Unit Type	Trip Unit	H-, J-Frame	Trip Unit	L-Frame
				
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		Micrologic 3.3S and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

NOTE: W = mission critical trip unit.

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Table 125: Mechanical Lug Kits for H-Frame and J-Frame Circuit Breakers

	Circuit Breaker Application				Number of Wires Per Lug and Wire Range	Kit Cat. No.	Qty Per Kit
	Standard	Ampere Rating	Optional	Ampere Rating			
Al Lugs for Use with Al or Cu Wire	HD, HG, HJ, HL	15–150 A			(1) 14–3/0 AWG Al or Cu	**AL150HD**	3
	JD, JG, JJ, JL	150–175 A			(1) 4-4/0 AWG Al or Cu	**AL175JD**	3
	JD, JG, JJ, JL	200–250 A	JD, JG, JJ, JL	150–175 A	(1) 3/0–350 kcmil Al or Cu	**AL250JD**	3
Cu Lugs for Use with Cu Wire Only			HD, HG, HJ, HL	15–150 A	(1) 14–2/0 AWG Cu	**CU150HD**	3
			JD, JG, JJ, JL	150–250 A	(1) 1/0–300 kcmil Cu	**CU250JD**	3
Control Wire Terminal for H-frame lug kit						**S37423**	2
Control Wire Terminal for J-frame lug kit						**S37424**	2

Table 126: Mechanical Lug Kits for L-Frame Circuit Breakers[1]

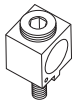
	Circuit Breaker Application				Number of Wires Per Lug and Wire Range[2]	Kit Cat. No.	Qty Per Kit	Type of Terminal Shield[3]
	Ampere Rating	Poles	Unit Mount	I-Line				
Al Lugs for Use with Al or Cu Wire	250	3	X	X	(1) 2 AWG–500 kcmil Al	**AL400L61K3**	3	Short
		4	X	—	(1) 2 AWG–600 kcmil Cu	**AL400L61K4**	4	Medium
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	**AL600LS52K3[4]**	3	Medium
		4	X	—		**AL600LS52K4[4]**	4	Medium
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	**AL600LF52K3[4]**	3	Short
Cu Lugs for Use with Cu Wire Only	250/400	3	X	X	(1) 2 AWG–500 kcmil Al	**CU400L61K3**	3	Short
		4	X	—	(1) 2 AWG–600 kcmil Cu	**CU400L61K4**	4	Medium
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	**CU600LS52K3[4]**	3	Medium
		4	X	—		**CU600LS52K4[4]**	4	Medium
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	**CU600LF52K3[4]**	3	Short

1 For lug pack information, see Figure 36 on page 177.

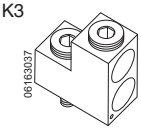
2 For control wire installation, use an 8-32 x 1/4 in. screw (not provided) into tapped control wire hole in lower left hand corner of lug.

3 For terminal shield dimensions, see Figure 36 on page 177.

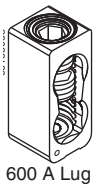
4 Terminal shields are included in mechanical lug kits.



400 A Lug
AL400L6IK3



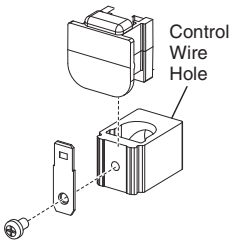
600 A Lug
AL600LS52K3



600 A Lug
AL600LF52K3

Voltage Takeoff (Control Wire Terminals) for Mechanical Lugs and Terminal Nuts

Mechanical Lug Control Wire Terminal



Powerpact H- and J-Frame mechanical lugs may be equipped with a separate control wire termination. The kit is available factory installed or as a field installable kit. The adaptor is secured underneath the lug and has a tab extension suitable for attachment of a 0.250 inch slip-on connector.

All L-frame mechanical lugs are pre-tapped for control wires. For control wire installation, use an 8-32 x 1/4 in. screw (not provided) into tapped control wire hole in lower left hand corner of the lug.

Fully insulated type connectors must be used to prevent live parts from extending into the wiring gutter area.

Busbar Control Wire Terminal

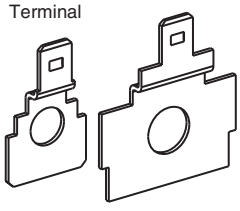


Table 127: Control Wire Terminals

Description	Frame	Cat. No.	Qty Per Kit
Mechanical Lugs			
Control Wire Terminal for H-Frame Lugs	HD/HG/HJ/HL	**S37423**	2
Control Wire Terminal for J-Frame Lugs	JD/JG/JJ/JL	**S37424**	2
Busbar Connection			
Control Wire Terminal for H-Frame Terminal Nut	HD/HG/HJ/HL	**S37429**	2
Control Wire Terminal for J-Frame Terminal Nut	JD/JG/JJ/JL	**S37430**	2

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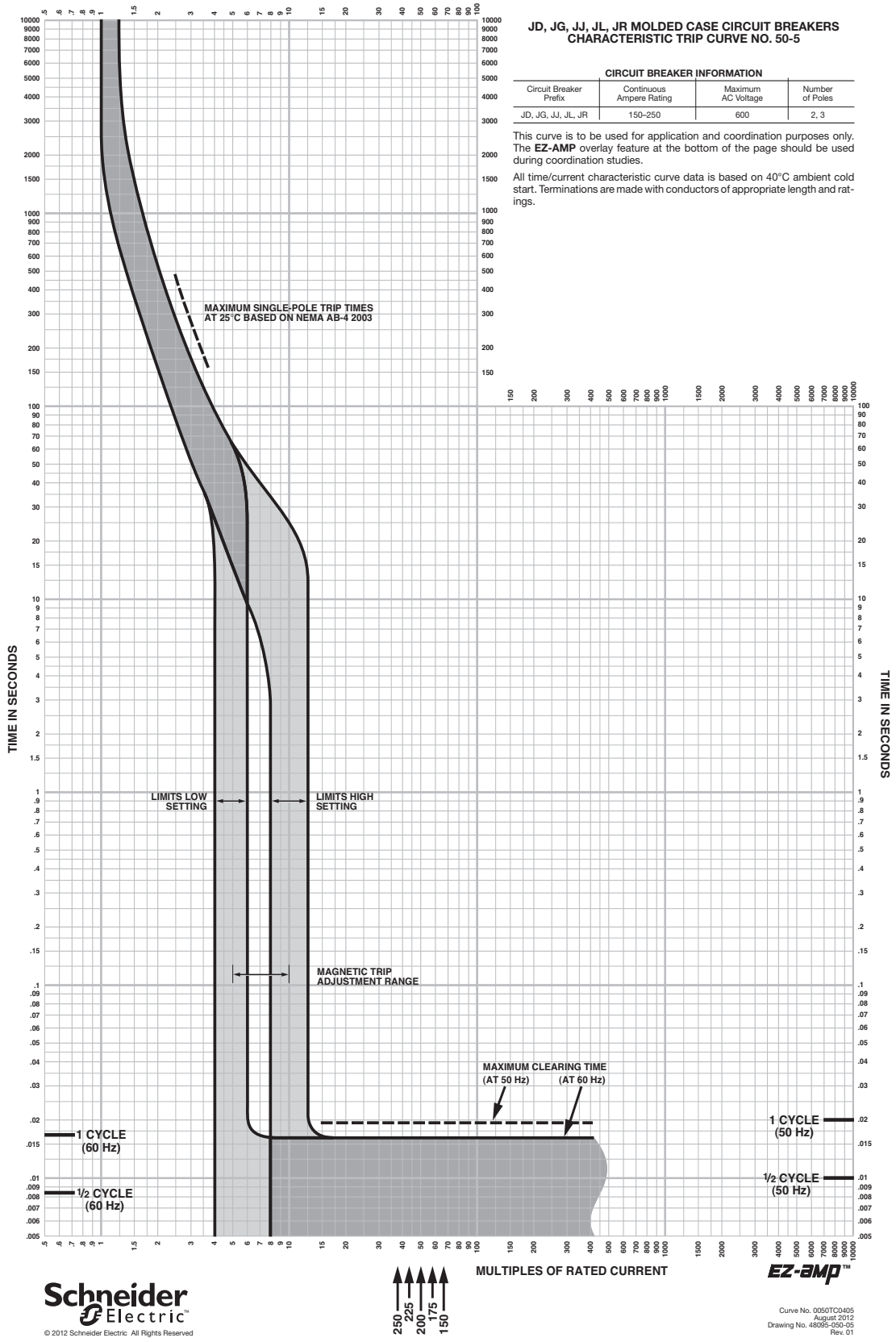
Figure 77: J-Frame 150–250 A (JD, JG, JJ, JL, and JR) Thermal-Magnetic Trip



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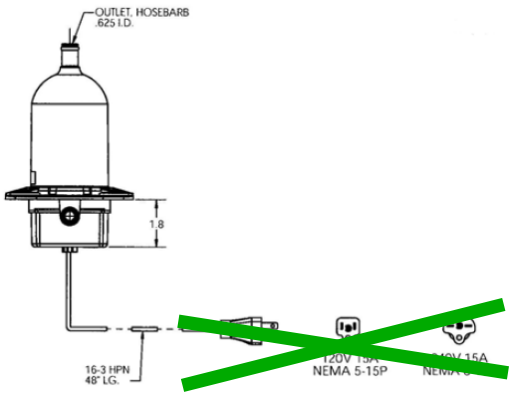
Specification Sheet

Coolant Heaters

Control thermostat range ON @ 80º F (27º C)
OFF @ 100º F (38º C)

Control thermostat tolerance ± 7.0º F (4º C) on close (ON)
± 5.0º F (3º C) on open (OFF)

Approvals UL listed
CSA compliant
CE compliant



Coolant heater kit	Critical component	Voltage	Wattage	Heater amps	Instruction sheet
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0541-0802-01	0333-0588-01	120	1000	8.3	000G-0539
0333-0548	0333-0588-01	120	1000	8.3	000G-0190
0179-4755-03	0333-0588-01	120	1000	8.3	000C-0703
0179-4938-03	0333-0588-01	120	1000	8.3	000G-0714
0333-0632-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0406
0333-0632-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0406
0541-0802-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0539
0333-0549	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0190
0179-4755-04	0333-0588-02	208/240	750/1000	3.6/4.16	000C-0703
0179-4938-04	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0714
0300-5420-01	0333-0588-03	120	1500	12.5	000G-0447
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0630-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0179-4902-03	0333-0588-03	120	1500	12.5	
0179-4908-03	0333-0588-03	120	1500	12.5	
0333-0713-03	0333-0588-03	120	1500	12.5	000G-0664
0300-5420-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0447
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0300-5422-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0453
0300-5422-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0453
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0179-4902-04	0333-0588-04	208/240	1125/1500	5.4/6.25	
0333-0713-04	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0664

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Specification sheet

Dual wall sub-base diesel fuel tanks -

10-200 kW generator sets

Description

Cummins® offers two series of fuel tanks (basic series and regional series) for the 10~125 kW diesel generator sets. The “basic” series of fuel tanks provide economical solutions for areas with no or minimal local/regional code requirements on diesel fuel tanks. The footprint of “basic” tanks matches the generator set’s footprint. The “regional” series of fuel tanks provide flexible and upgradable solutions for areas with extensive local/regional code requirements on diesel fuel tanks. The footprint of the “regional” series of fuel tanks extends beyond the generator set to allow room for installation of optional features at factory or accessories in the field for meeting local/regional code requirements or customer specification on diesel fuel tanks. All fuel tanks and optional features are compatible with factory installed enclosures.

These tanks are constructed of heavy gauge steel and include an internally reinforced baffle structure for supporting the generator set. The fuel tank design features fewer seams and welds for better corrosion resistance performance.

These tanks are pre-treated with a conversion coating and then finished with a textured powder paint. The paint has superior UV and chemical resistance with best-in-class adhesion, flexibility, and durability to resist chipping and substrate corrosion. Both interior compartments are treated with a rust preventative for extended corrosion protection.

These tanks are UL and ULC Listed as secondary containment generator base tanks. Inner and outer containments are leak checked per UL and ULC testing procedures to ensure their integrity.

These fuel tanks are offered in various sizes to satisfy different fuel capacities requirements.

Compatible generator set model

Engine	D1703M	V2203M	4BT3.3-G5	4BTAA3.3-G7	QSB5-G5	QSB7-G5
Generator set model names	C10D6	C20D6	C25D6	C50D6	C50D6C	C125D6D
	C15D6		C30D6	C60D6	C60D6C	C150D6D
			C35D6		C80D6C	C175D6D
			C40D6		C100D6C	C200D6D
					C125D6C	

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Regional fuel tanks

Standard features:

UL 142 and ULC-S601 listed - Minimum 110% secondary IBC 2012 and 2015 certified - All optional features are seismically certified with this range of tanks and generator sets. Requires factory-installed 2 ft vent extensions or higher.

UL 142 & ULC-S601 listed - Minimum 125% secondary containment capacity.

NFPA & IFC - Capable of meeting NFPA 30, NFPA 110, and IFC codes with available factory-installed optional features.

Emergency pressure relief vents - Ensure adequate ventilation of the primary and secondary tank compartments under extreme temperature and emergency conditions.

Normal atmospheric vent - "Mushroom" style vent ensures adequate venting of the primary tank during fill, generator set running, and temperature variations. Raised above fuel fill.

Raised fuel fill - Includes lockable sealed fuel cap.

Lifting eyes - Allow lifting of fuel tank with generator set installed.

Optional features:

Secondary containment basin switch (rupture switch) - Activates a warning in the event of a primary tank leak. Side Mounted.

Low fuel level switch - Activates a warning when 40% of the fuel is left in the tank.

Fuel level gauge - Provides direct reading of fuel level. Top mounted.

Electric fuel level sender with gauge - Allows remote electrical monitoring of fuel tank level. Flying leads for customer connection.

Tank to foundation clearance - 2-inch bolt-thru risers allow visual inspection under tank including rodent barrier.

Spill containment box for fuel fill - 5 gallon capacity with integral drain (to tank). Lockable lid.

Overfill prevention valve - Shuts off fuel flow during filling at approximately 95% full*. Includes fill down tube, as needed, to terminate within 6" of the bottom of the fuel tank. Uses a 2 inch type "F" cam lock adapter for filling.

High fuel switch - Activates at 90% of full fuel level. Flying leads for customer connection.

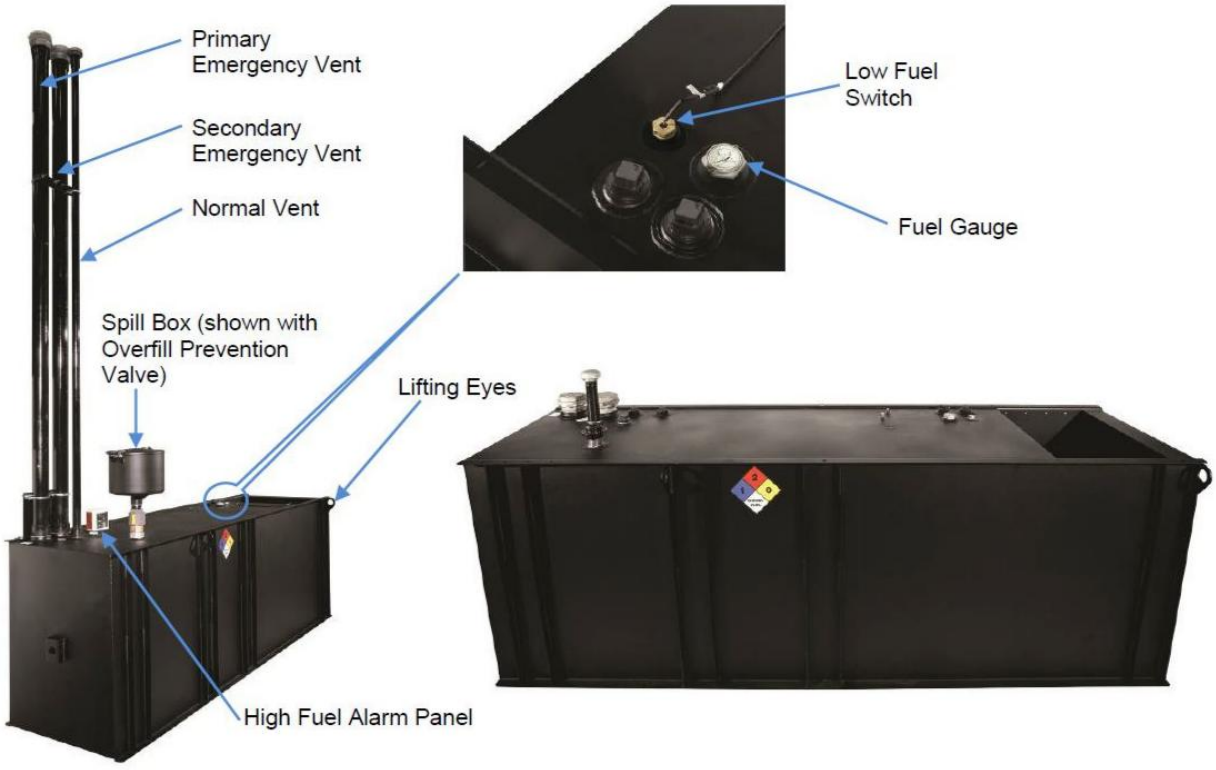
High fuel alarm panel - Provides audible & visual alarm when fuel level reaches 90% of full fuel level.

Fill drop tube - Terminates fuel fill location within 6" of the bottom of the fuel tank.

Vent extensions - Terminate normal and emergency vents (both primary and secondary) a minimum of 12 ft above the bottom of tank.

Seismic vent extensions - 2 ft normal and emergency (both primary & secondary) extensions to meet IBC/OSHPD seismic requirements.

* The OFPV inherently shuts off fuel at approximately 2" below the top of the fuel tank. Some tanks will shut off below this 95% fill level.



*Picture is for reference only. See outline drawing for tank specific information by model.

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Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
10	C10 D6	D1703M	1.12	C301-2	24	87.6 x 34 x 15	510	74	66	56
				C303-2	48	87.6 x 34 x 15	510	74	66	56
				C305-2	72	87.6 x 34 x 23	723	132	118	107
				C307-2	96	87.6 x 34 x 23	723	132	118	107
15	C15 D6	D1703M	1.38	C301-2	24	87.6 x 34 x 15	510	74	53	45
				C303-2	48	87.6 x 34 x 15	510	74	53	45
				C305-2	72	87.6 x 34 x 23	723	132	95	86
				C307-2	96	87.6 x 34 x 32	962	195	141	132
20	C20 D6	V2203M	1.81	C301-2	24	87.6 x 34 x 15	510	74	41	35
				C303-2	48	87.6 x 34 x 23	723	132	73	66
				C305-2	72	87.6 x 34 x 32	962	195	108	101
				C307-2	96	87.6 x 34 x 32	962	195	108	101
25	C25 D6	4BT3.3-G5	2.42	C301-2	24	121 x 34 x 10.5	514	74	31	25
				C303-2	48	121 x 34 x 16.2	686	132	54	47
				C305-2	72	121 x 34 x 22.1	879	195	80	73
				C307-2	96	121 x 34 x 29.5	1120	263	109	101
30	C30 D6	4BT3.3-G5	2.81	C301-2	24	121 x 34 x 10.5	514	74	26	21
				C303-2	48	121 x 34 x 22.1	879	195	69	63
				C305-2	72	121 x 34 x 29.5	1120	263	94	87
				C307-2	96	121 x 34 x 42.0	1461	389	138	132
35	C35 D6	4BT3.3-G5	3.16	C301-2	24	121 x 34 x 16.2	686	132	42	36
				C303-2	48	121 x 34 x 22.1	879	195	62	56
				C305-2	72	121 x 34 x 29.5	1120	263	83	77
				C307-2	96	121 x 34 x 42.0	1461	389	123	117
40	C40 D6	4BT3.3-G5	3.66	C301-2	24	121 x 34 x 16.2	686	132	36	31
				C303-2	48	121 x 34 x 22.1	879	195	53	48
				C305-2	72	121 x 34 x 42.0	1461	389	106	101
				C307-2	96	121 x 34 x 42.0	1461	389	106	101
50	C50 D6	4BTAA3.3-G7	4.25	C301-2	24	121 x 34 x 16.2	686	132	31	27
				C303-2	48	121 x 34 x 29.5	1120	263	62	58
				C305-2	72	121 x 34 x 42.0	1461	389	92	87
60	C60 D6	4BTAA3.3-G7	5.04	C301-2	24	121 x 34 x 16.2	686	132	26	23
				C303-2	48	121 x 34 x 29.5	1120	263	52	49
				C305-2	72	121 x 34 x 42.0	1461	389	77	73
50	C50D6C	QSB5-G5	5.30	C301-2	24	154 x 40 x 22	1388	250	47	45
				C303-2	48	154 x 40 x 32	1657	425	80	76
				C305-2	72	154 x 40 x 32	1657	425	80	76
				C307-2	96	154 x 40 x 46	2096	625	110	112
60	C60D6C	QSB5-G5	6.10	C301-2	24	154 x 40 x 22	1388	250	[redacted]	39
				C303-2	48	154 x 40 x 32	1657	425	70	80
				C305-2	72	154 x 40 x 46	2096	625	102	97
				C307-2	96	154 x 40 x 46	2096	625	102	97
80	C80D6C	QSB5-G5	7.30	C301-2	24	154 x 40 x 22	1388	250	34	33
				C303-2	48	154 x 40 x 32	1657	425	58	55
				C305-2	72	154 x 40 x 46	2096	625	85	81
100	C100D6C	QSB5-G5	8.90	C301-2	24	154 x 40 x 22	1388	250	28	27
				C303-2	48	154 x 40 x 32	1657	425	48	45
				C305-2	72	154 x 40 x 46	2096	625	70	66
125	C125D6C	QSB5-G6	10.30	C301-2	24	154 x 40 x 22	1388	250	24	23
				C303-2	48	154 x 40 x 46	2096	625	60	58

* All weights are approximate.

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Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
125	C125D6D	QSB7-G5	10.1	C301-2	24	180x40x21	1477	351	34	30
				C303-2	48	180x40x42	2302	737	72	69
				C305-2	72	180x40x42	2302	737	72	69
				C307-2	96	180x65.5x35.3	3552	1055	104	98
150	C150D6D		11.7	C301-2	24	180x40x21	1477	351	30	26
				C303-2	48	180x40x42	2302	737	63	59
				C305-2	72	180x65.5x35.3	3552	1055	90	84
175	C175D6D		13.3	C301-2	24	180x40x21	1477	351	26	23
				C303-2	48	180x40x42	2302	737	55	52
				C305-2	72	180x65.5x35.3	3552	1055	79	74
200	C200D6D		14.9	C301-2	24	180x40x21	1477	351	24	21
				C303-2	48	180x40x42	2302	737	49	47
				C305-2	72	180x65.5x35.3	3552	1055	72	66

Certifications/standards/codes

UL 142 Listed - Cummins dual wall sub-base tanks are UL Listed and constructed in accordance with Underwriters Laboratories Standard UL 142 “steel aboveground tanks for flammable and combustible liquids,” as a “secondary containment generator base tank”

NFPA - Cummins tanks are built in accordance with all applicable NFPA codes:

- NFPA 30 - Flammable and Combustible Liquids code
- NFPA 37 - Standard for Installation and use of Stationary Combustible Engine and Gas Turbines
- NFPA 110 - Standard for Emergency and Standby Power Systems

ISO9001 - This product was designed and manufactured in facilities certified to ISO9001.

ULC - Cummins tanks are built in accordance with all applicable ULC codes

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NAAC-5868-EN PD00001466 (06/23)

Sound data
C60D6C
QSB5-G13 60Hz
Diesel Generator Set

Sound Pressure Level @ 7 meters, dB(A)

See notes 2,5,7-11 listed below

Configuration	Exhaust system	Position (Note 1)								8 Position Average
		1	2	3	4	5	6	7	8	
Standard – Unhoused	Infinite Exhaust	81.2	80.8	81.2	80.8	81.2	80.8	81.2	80.8	81.2
F216-2 Weather Protective Aluminium	Mounted	78.6	79.9	78.6	81.8	80.5	80.9	79.7	79.4	80.1
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	78.4	75.2	70.7	72.8	72.5	72.9	72	74.9	74.3
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	71.3	71	68.4	70.3	70.2	70.6	70.3	71.1	70.5

Sound Power Level, dB(A)

See notes 2-4, 7 and 8 listed below

Configuration		Octave Band Center Frequency (Hz)										Overall Sound Power Level
		31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	53.8	79.2	87.9	92.3	100.4	102.0	101.1	97.2	93.1	88.0	107.0
F216-2 Weather Protective Aluminium	Mounted	55.2	86.0	94.5	96.0	100.5	101.9	100.1	96.9	92.1	82.6	107.0
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	59.6	84.6	88.0	90.1	95.6	96.7	94.9	91.9	87.5	79.6	101.9
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	57.1	84.8	87.7	88.4	92.6	91.7	89.6	87.1	82.9	72.4	98.2

Exhaust Sound Power Level, dB(A)

See notes 4,6 and 9 listed below

Open Exhaust (No Muffler) @ Rated Load	Octave Band Center Frequency (Hz)									Overall Sound Power Level
	31.5	63	125	250	500	1000	2000	4000	8000	
	56	82	96	102	108	111	112	111	109	118

Note:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, ANSI S1.13, ANSI S12.1 and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa.
6. Reference Sound Power Level is 1 pW (10-12 Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Sound levels are subject to instrumentation, measurement, installation, and manufacturing variability

10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosuresinstalled over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.

Specification Sheet

Battery and Accessories

Battery Specifications

Battery Part Number	Group Size	CCA	Reserve Capacity	Battery	Voltage	Length	Width	Height	Ship Weight lbs.	Quarts Electrolyte
0416-1330	24XL	810	146	Wet	12	10.3	9.0	6.6	43	5.9
0416-1051	26	530	80	Wet	12	8.2	6.8	8.1	31	3.7
0416-0796	31	725	150	Wet	12	12.7	6.0	9.3	62	4.2
0416-0980	31	1000	185	Wet	12	13.0	6.8	9.5	59	4.2
A045P632	34	850	NA	Wet	12	10.3	6.6	8.0	NA	NA
0416-1291	34	800	100	Sealed	12	10.0	6.9	7.9	38	4.0
A030Y976	4D	1050	290	Wet	12	20.7	8.7	10.0	100	NA
0416-0439	8D	1400	430	Dry	12	20.8	10.7	9.5	110	16.0
0416-1105	8D	1400	430	Wet	12	20.8	10.8	9.5	125	16.0
~~A062X621~~	~~24~~	~~800~~	~~135~~	~~Wet~~	~~12~~	~~10.1~~	~~6.8~~	~~8.7~~	~~42~~	N/A
A062X622	34	800	120	Wet	12	10.2	6.9	7.9	38	N/A

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Specification Sheet

Battery Charger-6 Amp

A045D925 60Hz/50Hz

Description

Cummins® fully automatic battery chargers are designed to both recharge your batteries, and extend your battery's life in applications where it is stored for long periods of time. This charger can handle poor power quality, exposure to extreme weather and rough handling.

To maximize battery life, a 3-stage charging cycle is implemented. The three charging stages are bulk stage, absorption stage and maintenance stage. During the bulk stage, the charger uses its full amp output to do the heaviest charging, quickly bringing your battery to about 75% of capacity. In the absorption stage, the current slows, adjusting for maximum charging efficiency while it gently tops off the battery to about 98% of capacity.

During the maintenance stage, a lower, closely-regulated, constant voltage is applied to maintain full charge and prevent discharge.

Unlike some "trickle chargers," the float charger won't apply more current than necessary to maintain full charge. Batteries can be connected indefinitely, without harm; in fact, the float charge extends battery life.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Lightweight and Silent – Lighter than transformer types, completely silent but still provides full output when overloaded outlets drop AC voltage below the normal 115V.

Monitoring – Status LED indicators are provided to show the condition or charging status of the battery. When the red LED is on, it indicates that the battery is discharged and is recharging at the 'BULK' rate. When both the red and green LEDs are on, the battery is charging at the 'midrange' rate. When the green LED is on, the battery is 90% charged and ready for use.

Construction – Made using epoxy-potted cases making it the ultimate in durability, completely waterproof and able to withstand numerous caustic chemicals and gases, as well as being shockproof.

Fault Indication – The charger senses and indicates the following fault conditions: Defective or damaged cells, under-voltage at the battery, battery drawing more current than charger can replace, loss of power or extremely low AC voltage at the charger, other battery fault conditions and charger failure.

Compatibility – Works with Sealed Lead Acid (SLA), Absorbed Glass Mat (AGM) and Gel type batteries.

Low Electromagnetic and Radio

Frequency Interference – This product meets FCC class B for conducted and radiated emissions.

Listed – This product is UL listed according to the UL 1236 Standard.

Warranty – This product has a two-year warranty

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Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12 VDC
	Float voltage – 12 V batteries	13.0-13.6 VDC at 0-2 amps
	Maximum output current	6 A @ 12 VDC nom
Input:	Voltage AC	115, 208, 240 ±10%, 90-135
	Frequency	60 Hz ±5%
Battery:	Maximum battery size	150 Amp Hours
	Maximum recharge time	20 hours
Approximate net weight		4 lbs. (1.81 Kg)
Approximate dimensions: height x width x depth-in(mm)		2.25 x 6.4 x 3.5 (57 x 162 x 89)
Ambient temperature operation: At full rated output		-40°F to 122 °F (-40 °C to 50 °C)

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

Warning: For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.

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Specification Sheet

Alternator Heaters A292 and A293

Alternator Heaters

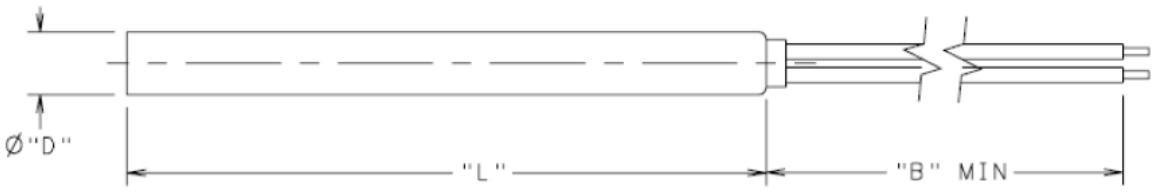
Alternator heaters help prevent corrosive damage of electrical and mechanical components in high humidity environments.

Alternator heater kit	Feature	Corresponding production part	Critical component	Voltage (AC)	Wattage	Instructions
0179-5074-02	A292-2	0179-5074-01	0333-0438-07	120	100	N/A
0300-4434	A292-2	0179-2699-01	0333-0550-01	120	100	000C-0449
0333-0443	A292-2	0179-2285-09	0333-0438-03 (qty 2)	120	150	000C-0437
0333-0444	A293-2	0179-2285-02	0333-0438-04 (qty 2)	240	150	000C-0437
0333-0445	A292-2	0179-2286-01	0333-0438-07	120	100	000C-0437
0333-0445	A292-2	0179-2667-01	0333-0438-07	120	100	000C-0437
0333-0446	A293-2	0179-2286-02	0333-0438-08	240	100	000C-0437
0333-0446	A293-2	0179-2667-02	0333-0438-08	240	100	000C-0437
0333-0447	A292-2	0179-2285-10	0333-0438-05	120	300	000C-0437
0333-0447	A292-2	0179-2285-03	0333-0438-05	120	300	000C-0437
0333-0448	A293-2	0179-2285-04	0333-0438-06	240	300	000C-0437

Component Drawings

Cartridge Heater

Component # 0333-0438-xx



Part #	Ø “D”	Dim “L”	Dim “B”
0333-0438-01	15.8	160	1200
0333-0438-02	15.8	160	1200
0333-0438-03	25.4	160	2200
0333-0438-04	25.4	160	2200
0333-0438-05	25.4	260	2200
0333-0438-06	25.4	260	2200
0333-0438-07	19	134	250
0333-0438-08	19	134	250

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Specification sheet

PowerCommand® input/output expansion module AUX 101 and AUX 102

Description

The PowerCommand AUX 101 input/output module and the AUX 102 input/output expansion module provide up to sixteen (16) relay output and up to twelve (12) discrete/analog inputs for auxiliary control and monitoring of the power system.

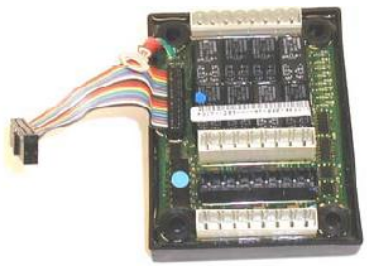
Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

Relay outputs can be used for controlling equipment such as motors, louvers, lamps, fans and pumps. The relays may be configured individually from the genset control operator interface or using InPower™ software.

The AUX 101 and AUX 102 modules are compatible with genset controls supporting a PCCNet network and require a twisted pair connection. This includes the PCC 1301 control.

AUX 101 - Contains eight (8) Form-C relay output sets and eight (8) discrete/analog inputs.

AUX 102 - Easily connects to the AUX 101 to provide an additional eight (8) Form-C relay outputs and (4) additional discrete inputs.



AUX 102 - Expansion

Features

- Up to sixteen (16) configurable Form-C relays provide easy control of system equipment such as lamps, louvers, motors and pumps. LED status of each relay.
- Up to twelve (12) configurable discrete inputs for monitoring equipment status and faults. Equipment status and faults will be annunciated.
- Up to eight (8) analog inputs. Analog inputs can be assigned one of seven preprogrammed functions:
  - Oil temperature
  - Exhaust temperature
  - Fuel level
  - Ambient temperature
  - Alternator RTD
  - Speed bias (for manual paralleling only)
  - Voltage bias (for manual paralleling only)
- Two 5 VDC voltage sources for use with active senders.
- Four programmable current sources for use with resistive senders.
- Two status LEDs:
  - DS1 (green) indicates the AUX 101 is connected to the network and operating normally
  - DS2 (red) indicates the AUX 101 has lost its connection or is not connected to the network
- Device number indicator. Seven segment LED used to uniquely define more than one AUX 101 on the same network.
- May be connected at any point in the PCCNet network.
- Plug-and-play networking - No binding required.
- Pluggable terminal blocks allow easy one-time wiring.
- Less wiring makes installation and system upgrades quick and easy
- PowerCommand controls are supported by a worldwide network of independent distributors who provide parts, service and warranty support.
- UL Listed and labeled; CSA certified; CE and UKCA compliant.

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Specifications

Signal requirements

Network connections: RS485, twisted-pair 78 kbps
Control power: 5-40 VDC
Current

- 200 mA typical at 12 V, no active relay
- 100 mA typical at 24 V, no active relay
- 800 mA at 12 V, all relays active

Terminations for control power accept wire up to 16 ga.

Environment

The AUX 101 and AUX 102 are designed for proper operation in ambient temperatures from -40 °C to +60 °C (-40 °F to +140 °F) and for storage from -40 °C to +80 °C (-40 °F to +176 °F). Modules will operate with humidity up to 95%, non-condensing

Relay ratings (AUX 101)

- Normally closed: 3 A at 250 VAC or 30 VDC
- Normally open: 5 A at 250 VAC or 30 VDC

Relay ratings (AUX 102)

- 2 A at 125 VAC, 2 A at 30 VDC

Input ratings (AUX 101)

- Active low inputs
- Maximum voltage 24 VDC (inputs 1 - 6)
- Maximum voltage 40 VDC (inputs 7 - 8)

Network length

Maximum 1219 m (4000 ft)

Approved wiring

Cat 4 or Cat 5 (stranded)

Configurations

All configurations are stored in the main genset control and are modified from the generator set control HMI or using InPower PC software.

Discrete/analog inputs:

Each AUX 101 input can be configured as discrete or analog. AUX 102 inputs are discrete only. Discrete inputs have the following configuration options:

- Active high or active low
- Event, warning or shutdown
- Programmable text (displayed on genset HMI and InPower software)

Analog inputs have a set of predefined functions and can only be configured on certain module inputs. Below is a list of functions and possible module inputs:

- Input 1 - Voltage bias (-3 to +3 VDC)*
- Input 2 - Speed bias (0 to +5 VDC)*
- Inputs 3 – 6
  - Oil temperature
  - Exhaust temperature
  - Ambient air temperature
  - Fuel level
  - Alternator temperature

Inputs are defaulted to disabled

* Please note that speed and voltage bias interfaces are for manual paralleling only and must not be used with automatic paralleling controls.

Relay outputs

Outputs can be configured to energize on occurrence of any event or fault code supported by the genset control. The relay outputs default to the following:

AUX 101

1 - Low oil pressure
2 - High engine temperature
3 - Charger AC failure
4 - Battery (low, weak, high)
5 - Engine overspeed
6 - Fail-to-start
7 - Not-in-auto
8 - Generator set running

AUX 102

9 - Pre-low oil pressure
10 - Pre-high engine temperature
11 - Low coolant level*
12 - Low fuel level*
13 - Low coolant temperature
14 - Common alarm
15 - Not defined
16 - Not defined

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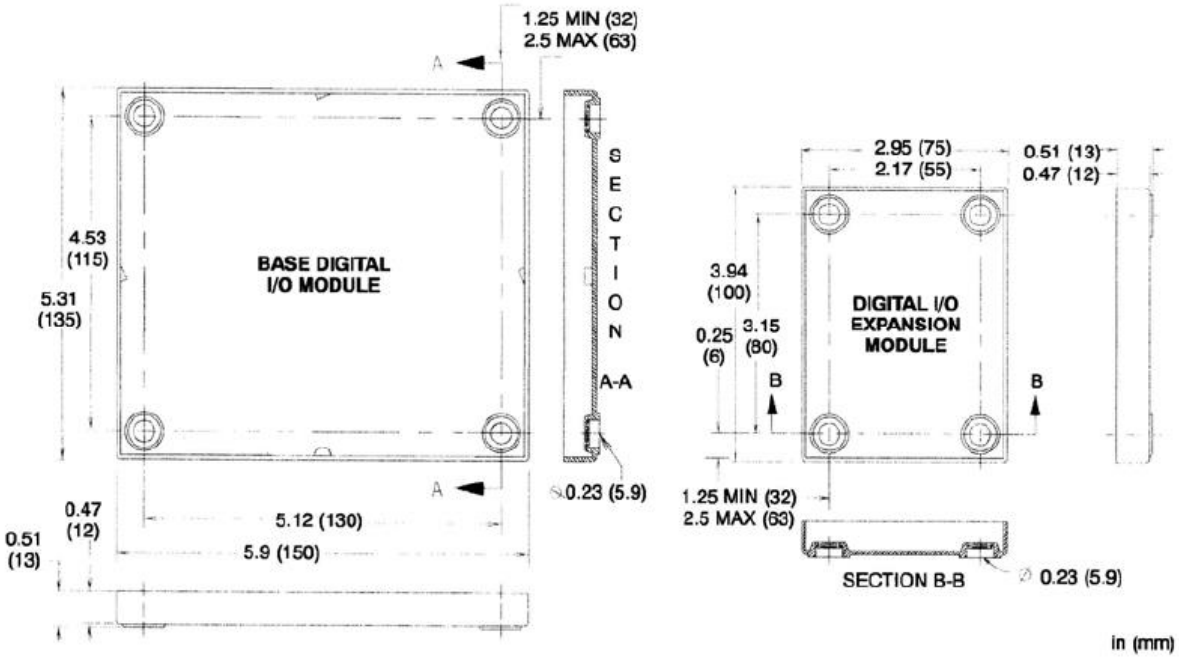
Dimensions



Ordering information

Part number	Description
0541-1291	AUX 101 Digital Input/output Module - Base – PCC 1301
0184-0263	AUX 101 Digital Input/output Module - Base – PCC 1301 on DN and GN model generator sets
0630-3142	AUX 102 Digital Input/output Module wiring diagram - Instruction sheet C693
0541-0772	AUX 102 Digital Input/output Module - Expansion

PCCNet logo

Look for this logo on spec sheets of PCCNet compatible devices.

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

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Specification sheet

PowerCommand® annunciator discrete input or PCCNet

Description

The Universal Annunciator Module provides visual and audible indication of up to 20 separate alarm or status conditions, based on discrete (relay) inputs or network inputs. Each LED can be controlled by either a discrete wire input or by a signal on the PCCNet network sent from an external device, such as a PCC1301 or PCC2100 (version 2.4 or later) control.

In addition to the LEDs, the annunciator can control four custom relays based on signals received over the PCCNet. When one of the annunciator's discrete inputs is activated, the annunciator will broadcast that information over the network. By taking advantage of the network, discrete inputs and custom relays, the annunciator can be used as expanded I/O for a genset controller.

Easily installed in a location to give immediate notification of an alarm or warning status. Designed to give operating/monitoring personnel quick-glance status information. The module directly senses battery voltage to provide green/yellow/red alarm and status information for that parameter.

Genset controller complies with NFPA level two requirements when used with the display but without the annunciator panel. When used with the annunciator it meets NFPA level one requirements (Emergency and Standby power systems). The annunciator module can also be used for monitoring of transfer switch or other equipment status.

Features

- Visual and audible warnings of up to 20 separate alarm or status conditions.
- LEDs can be controlled either via PCCNet or discrete input.
- Status of discrete inputs is broadcast on network.
- Four custom relays can be controlled over the PCCNet network.
- Configurable LED color (red, yellow or green) and selectable horn operation allows maximum flexibility.
- Standard NFPA 110 label, field configurable for other alarm status and conditions.
- Each audible alarm is annunciated, regardless of the number of existing alarm conditions displayed.
- Sealed membrane panel design provides environmental protection for internal components and is easy to clean.
- Configurable for negative (ground) input or positive input.
- Integral DC voltage sensing.
- Flush or surface mount provisions.
- UL Listed and labeled; CSA certified; CE and UKCA marked.

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Specifications

Signal requirements

Positive - Input impedance is 1.82 kOhms to ground; maximum input voltage = 31 VDC.

Negative - Input impedance is 1.82 kOhms to Bat+: inputs are at Bat+ level when open.

Sink/source current threshold for detection - 150 Ua minimum, 3 mA maximum.

Typical conductor size: 16 ga for 304.8 m (1000 ft)

Max conductor size for terminal: 12 ga

Relay outputs

0.2 A at 125 VAC and 1 A at 30 VDC

Network connections

Use Belden 9729 two pair, stranded, shielded 24 AWG twisted pair cable for all PCCNet connections. Total network length cannot exceed 1219 m (4000 ft). Up to 20 nodes can be connected to the network.

Note: Any communications wire connected to the generator set should be stranded cable.

Power

Maximum consumption: 15 watts

Battery voltage

Functional range - Audible and visual conditions operational from 6.5 to 31 VDC.

Low voltage setting - 12.0 VDC for 12 Volt nominal systems; 24.0 for 24 Volt nominal systems.

High voltage setting - 16.0 Volt for 12 Volt nominal systems; 32.0 Volt for 24 Volt nominal systems.

Alarm horn

Sound level: 90 dB at 30 cm

Physical

Weight (with enclosure): 1.4 kg (3.0 lbs)

Temperature

-20 °C to +70 °C (-4 °F to +158 °F)

Humidity

10% to 95% RH (non-condensing)

Default lamp configurations

Can be configured for current NFPA 110 standard or as a replacement for Legacy (pre-2001) NFPA 110 annunciator (300-4510 or 300 4511)

		NFPA 110		
Lamp	**Description**	**Color**	**Horn**	**Flash**
DS1	Customer fault 1	Green	No	No
DS2	Customer fault 2	Amber	No	No
DS3	Customer fault 3	Red	No	No
DS4	Genset supplying load	Amber	No	No
DS5	Charger AC failure	Amber	Yes	No
DS6	Low coolant level	Amber	Yes	No
DS7	Low fuel level	Red	Yes	No
DS8	Check generator set	Amber	No	No
DS9	Not in auto	Red	Yes	Yes
DS10	Generator set running	Amber	No	No
DS11	High battery voltage	Amber	Yes	No
DS12	Low battery voltage	Red	Yes	No
DS13	Weak battery	Red	Yes	No
DS14	Fail to start	Red	Yes	No
DS15	Low coolant temp	Red	Yes	No
DS16	Pre-high engine temp	Amber	Yes	No
DS17	High engine temp	Red	Yes	No
DS18	Pre-low oil pressure	Red	Yes	No
DS19	Low oil pressure	Red	Yes	No
DS20	Overspeed	Red	Yes	No

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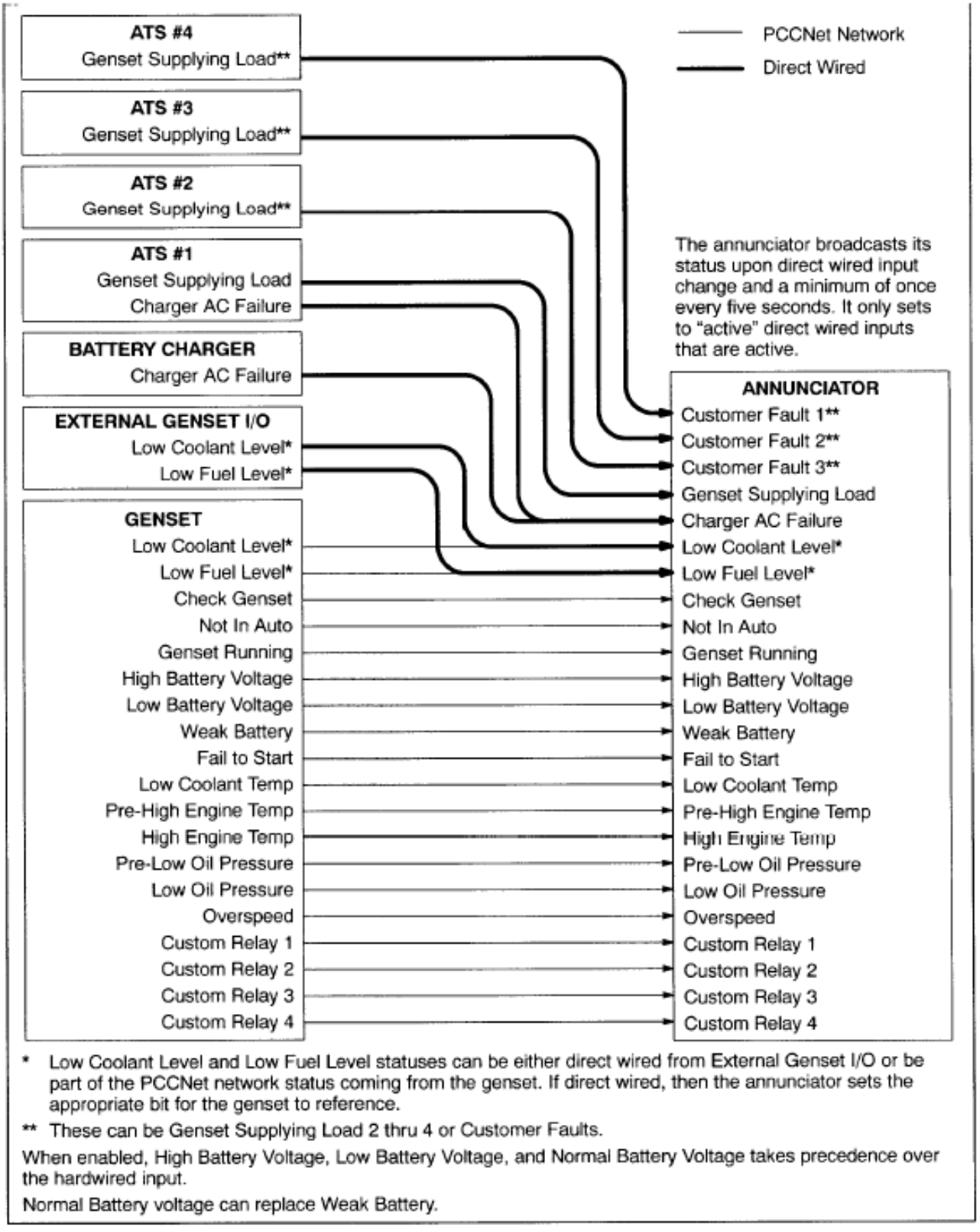
Typical installation



* Low Coolant Level and Low Fuel Level statuses can be either direct wired from External Genset I/O or be part of the PCCNet network status coming from the genset. If direct wired, then the annunciator sets the appropriate bit for the genset to reference.

** These can be Genset Supplying Load 2 thru 4 or Customer Faults.

When enabled, High Battery Voltage, Low Battery Voltage, and Normal Battery Voltage takes precedence over the hardwired input.

Normal Battery voltage can replace Weak Battery.

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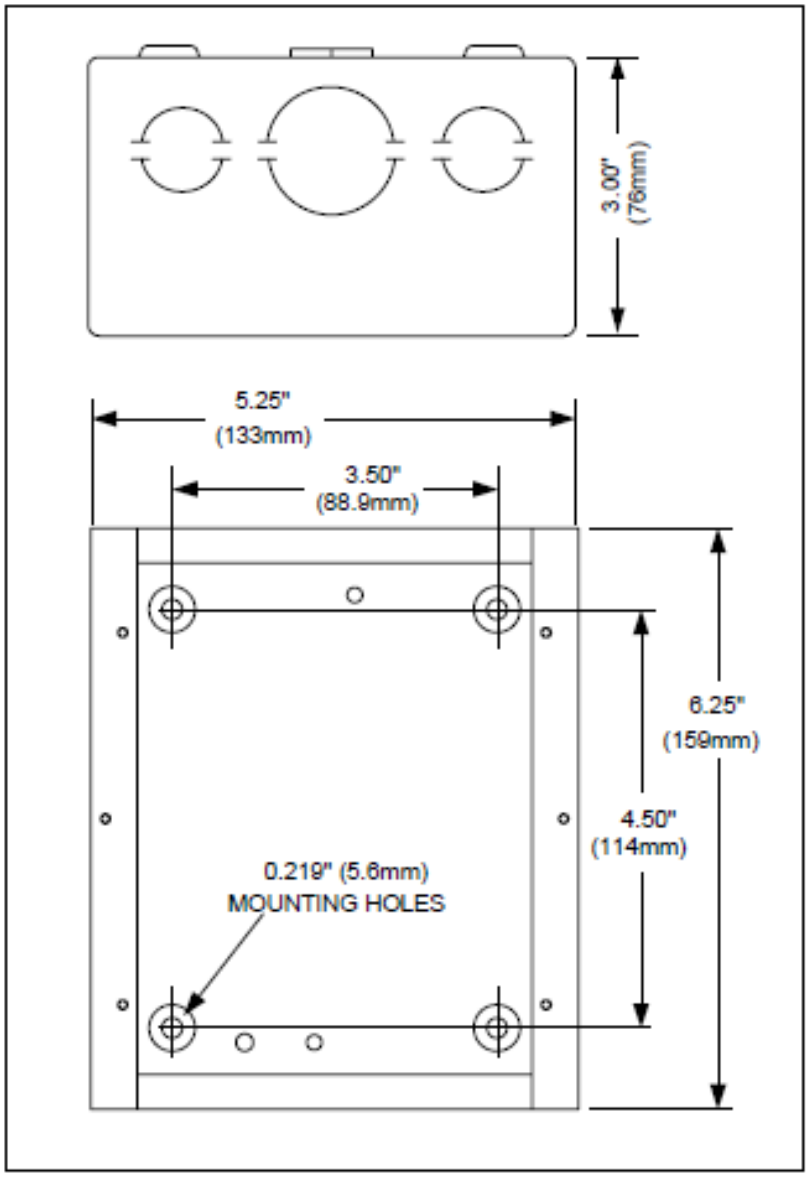
Dimensions



Dimensions: in (mm)

Ordering information

Part number	Description
0300-5929-01	Panel mount
0300-5929-02	Panel with enclosure

For more information contact your local Cummins distributor or visit power.cummins.com

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A 2 Year maintenance agreement is included with 1 Full Service & 1 Inspection per year.

Power Generation System Planned Equipment Maintenance

Cummins Sales and Service

Scope of Services

INSPECTION
(MONTHLY, QUARTERLY, OR ONE-TIME PER YEAR)

Battery & Battery Charger System
- Check battery charger functions
- Cable connections, termination cleanliness and security
- Check electrolyte level, vent caps of all cells in the starting batteries
- Battery Conductance Test

Fuel System
- Inspect main tank/day tank fuel level
- Inspect day tank controls and pumps. Test operate day tank controls (where available)
- Inspect all fuel hoses, clamps, pipes, components, and fittings
- Inspect governor linkage
- Visually inspect rupture/containment basin
- Water in Fuel Test - Sub-base, day tanks
- Optional - fuel sample for laboratory analysis*

Engine Cooling System
- Inspect all hoses and clamps for leaks, coolant level and condition
- Inspect radiator cap and filler neck condition
- Inspect drive belts, observe alignment and deflection
- Observe coolant heater operations
- Utilize DCA test strip to record coolant properties
- Inspect radiator surfaces, shrouds, and barriers for obstruction
- Visually inspect low temperature after cooler coolant
- Optional –coolant sampling*

Engine & Lubrication System
- Inspect lubrication system (visually check oil level)
- Inspect crankcase ventilation system
- Inspect spark ignited ignition system

Intake/Exhaust System
- Inspect air cleaner element and entire intake system
- Inspect exhaust system and rain cap
- Inspect louver operations

Generator Controls & Power Connections
- Visually inspect all engine mounted wiring, senders, and devices
- Visually inspect all control mounted components and wiring
- Lamp test all lights and indicators
- Visually inspect breaker and power connections
- Manually operate generator main breaker(s) open and closed*

*NOTE: Will not exercise breakers or contactors on a paralleling device.

Generator Operations
- Start and observe generator and equipment operations
- Verify engine and generator safeties for proper operation
- System test with or without load

Automatic Transfer Switch
(Paralleling Switchgear, Bypass Switchgear, Manual Transfer Switches)
- Visually inspect all power and control wiring
- Visually inspect switch mechanism and enclosure
- Visually inspect controls and time delays settings
- Verify function of exercise clock

FULL SERVICE
(INCLUDES INSPECTION)

Operational & Functional Review of Generator Critical Components
- Inspect engine cooling fan & fan drives for excessive wear or shaft wobble
- Check all pulleys, belt tensioners, slack adjusters & idler pulleys for travel, wear & overall condition
- Inspect/lubricate drive bearings, gear or belt drives, lovejoy and other shaft connecting hardware

Lubrication Oil and Filtration Service
- Change engine lubrication oil
- Change primary lubrication and bypass filters
- Change fuel filters
- Post lube service operation of genset (unloaded) at rated temperature
- Optional - oil sample for laboratory analysis*

***Additional Charge**
Any additional repairs, parts or services which are required will be brought to the attention of the owner. Repairs will only be made after proper authorization from the owner is given to Cummins Sales and Service. Any additional repairs, maintenance or service performed by Cummins Sales and Service for a Planned Equipment Maintenance Agreement holder will be at current Cummins Sales and Service labor rates.

POWERCOMMAND®
OTEC TRANSFER SWITCH

POWERCOMMAND® 40-11 CONTROL | OPEN TRANSITION | 40 A-1200 A

AUTOMATIC TRANSFER SWITCH

DESCRIPTION

The OTEC series transfer switch provides the basic features typically required for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications. They are suitable for use in emergency, legally required, and optional standby circuits in commercial and light industrial applications. The OTEC transfer switch features the new PowerCommand® 40-11 control with a comprehensive feature list to suit a wide variety of ATS applications.

FEATURES

PowerCommand® 40-11 control – A fully featured microprocessor-based control with LCD digital display and tactile-feel soft-switches for easy operation and screen navigation. Control highlights include front panel PC software configuration, three phase sensing on both sources, sync check, phase rotation and imbalance sensing, and event logging. Additional optional features include load shed from standby source, Modbus RTU and TCP network communication, and configurable output contact modules. Completely network compatible with the new Cummins transfer switch remote annunciator. Please see the S-6560 PowerCommand® 40-11 control specification sheet for the full description, benefits, and features.

Programmed transition – Open transition timing can be adjusted to completely disconnect the load from both sources for a programmed time period, as recommended by NEMA MG-1 for transfer of inductive loads.

Advanced transfer switch mechanism – Unique bi-directional linear actuator provides virtually frictionless constant force, straight-line transfer switch action during automatic operation.

Positive interlocking – Mechanical and electrical interlocking prevent source-to-source connection through the power or control wiring.

Main contacts – Heavy-duty silver alloy contacts used with multi-leaf arc chutes are rated for motor loads or total system load transfer. They require no routine contact maintenance. Continuous load current not to exceed 100% of switch rating and tungsten loads not to exceed 30% of switch rating.

Ease of service and access – Single-plug harness connection and compatible terminal markings simplify servicing. Access space is ample. Door-mounted controls are field-programmable; no special tools are required.

Complete product line – Cummins is a single source supplier with a wide range of equipment, accessories, and services to suit virtually any backup power application.

Warranty and service - Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.

TRANSFER SWITCH MECHANISM

- Transfer switch mechanism is electrically operated and mechanically held in the Source 1 and Source 2 positions. The transfer switch incorporates electrical and mechanical interlocks to prevent inadvertent interconnection of the sources.
- Independent break-before-make action is used for both 3-pole and 4-pole simultaneously switched neutral. This design allows use of sync check operation when required, or control of the operating speed of the transfer switch for proper transfer of motor and rectifier-based loads (programmed transition feature).
- True 4-pole switching allows for proper ground (earth) fault sensing and consistent, reliable operation for the life of the transfer switch. The neutral poles of the transfer switch have the same ratings as the phase poles and are operated by a common crossbar mechanism, eliminating the possibility of incorrect neutral operation at any point in the operating cycle, or due to failure of a neutral operator.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- High pressure silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contact wear is reduced by multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases to prevent interphase flashover. A transparent protective cover allows visual inspection while inhibiting inadvertent contact with energized components.

- Switch mechanism, including contact assemblies, is UL 1008 certified to verify suitability for applications requiring high endurance switching capability for the life of the transfer switch. Withstand and closing ratings are validated using the same set of contacts, further demonstrating the robust nature of the design.

SPECIFICATIONS	
Voltage rating	Up to 600 V AC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes provide dependable arc interruption.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two isolated contacts (one for each source) indicating switch position are provided for customer use. Contacts are normally open, and close to indicate connection to the source. Wired to terminal block for easy access. Rated at 10 A Continuous and 250 V AC maximum.
Operating temperature	-22 ˚F (-30 ˚C) to 140 ˚F (60 ˚C)
Storage temperature	-40 ˚F (-40 ˚C) to 140 ˚F (60 ˚C)
Humidity	Up to 95 % relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m) without derating
Surge withstand ratings	Voltage surge performance and testing in compliance with the requirements of IEEE C62.41 (Category B3) and IEEE C62.45.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition enabled.
Manual operation*	Transfer switch mechanisms are equipped with means to manually transfer. All sources must be de-energized before manual operation is attempted.

**See Operator Manual for further details.*

TRANSITION MODES

Open delayed transition – In this transition mode the time required for the transfer switch to transfer between sources is adjustable so that the load- generated voltages decay to a safe level before connecting to an energized source. Recommended by NEMA MG-1 to prevent nuisance tripping breakers and load damage. Adjustable 0.5 secs - 10 minutes, and default 0.5 seconds.

Open in-phase translation – Initiates open transition transfer when in-phase monitor senses both sources are in phase (voltage, phase, and frequency). Operates in a break-before-make sequence. Includes ability to enable programmed transition as a backup. The module waits indefinitely for synchronization unless the 'Return to programmed transition' function is active in which case after 2 minutes it performs a programmed delayed transfer.

UL 1008 WITHSTAND AND CLOSING RATINGS (WCR)

The transfer switches listed below must be protected by circuit breakers or fuses. Referenced drawings include detailed listings of specific breakers or fuse types that must be used with the respective transfer switches. Consult with your distributor/dealer to obtain the necessary drawings. Withstand and Closing Ratings (WCR) are stated in symmetrical RMS amperes.

BREAKER PROTECTION

Frame	Amperage rating (A)	MOLDED CASE CIRCUIT BREAKER (MCCB) PROTECTION				SPECIAL CIRCUIT BREAKER PROTECTION		
		With specific manufacturers MCCB (kA at 480V)	With specific manufacturers MCCB (kA at 600V)	Max MCCB ratings (A)	Drawing reference	With specific Current limiting breakers (kA at 600V)	Max. Current limiting breakers CLB rating (A)	Drawing reference
A	40, 70, 125 (3-pole only)	14	14	225	A050J441	200	225	A048J566
	40, 70, 125 (4-pole only)	30	30	400	A048E949	200	400	A051D533
B	150, 225, 260	30	30	400	A048E949	200	400	A051D533
C	300, 400, 600	65	65	1200	A056M829	200	1200	A048J564
D	800, 1000	65	50	1400	A056M821	200	1400	A048J562
E	1200	85	65	1600	A056M825	200	1600	A048P186

FUSE PROTECTION

Frame	Amperage rating (A)	WCR with current limiting fuses (kA)	Fuse size and type	Drawing reference
A	40, 70, 125 (3-pole only)	200	200 A, Class: J, RK1, RK5	A050J441
	40, 70, 125 (4-pole only)	200	1200 A Class L or T, or 600A class J, RK1, RK5	A048E949
B	150, 225, 260	200	1200 A Class L or T, or 600A class J, RK1, RK5	A048E949
C	300, 400, 600	200	1200 A Class L or T, or 600A class J, RK1, RK5	A056M829
D	800, 1000	200	2000 A Class L or 1200 A Class T or 600 A Class J, RK1, RK5	A056M821
E	1200	200	2000 A Class L or 1200 A Class T or 600 A Class J, RK1, RK5	A056M825

All WCR values are at 600 V

TIME BASED RATINGS: 0.05S (3-CYCLES AT 60 HZ)				
Frame	Amperage rating (A)	WCR (kA at Vmax and below)	Max. MCCB rating (A)	Drawing reference
C	300, 400, 600	25 at 600 V	1200	A056M829
D	800, 1000	35 at 600 V	1400	A056M821
E	1200	42 at 600 V	1600	A056M825

TRANSFER SWITCH LUG CAPACITIES				
Frame	Amperage rating (A)	Cables per phase	Certified Cable Size	Part Number
A	40, 70, 3-pole	1	#14 AWG - 2/0	0332-3084 **
			#12 AWG - 2/0	0332-3085 ***
	40, 4-pole	1	#14 AWG - 2/0	0332-3514-01
	70, 4-pole	1	#6 AWG - 300MCM	0332-3038
	125, 3-pole	1	#14 AWG - 2/0	0332-3084 **
			#12 AWG - 2/0	0332-3085 ***
	125, 4-pole	1	#6 AWG - 300MCM	0332-3038
B	150, 225	1	#6 AWG - 300MCM	0332-3038
	260	1	#6 AWG - 400MCM	0332-3039
C	300, 400	2*	3/0 - 600MCM & #4 AWG - 250MCM	0332-2704
	600	2	250 - 500MCM	0332-2660
D	800, 1000	4	250 - 500MCM	0332-2736
E	1200	4	500-750MCM ^	0332-2736 ****
			#2 AWG – 600MCM ^^	0332-1557 ****
			1/0 - 750MCM ^^^	0332-3036

All lugs 90°C rated and accept copper or aluminum wire unless indicated otherwise.
Refer to the latest NFPA 70 Article 310 - Conductors for general wiring for the ampacity calculations.
** One cable for each lug range listed*
*** Load*
**** Emergency and normal*
***** See A030H735 drawing for lugs specifications*
^ Compression lug adapter suitable for 500-750MCM (Optional feature N032-7)
^^ #2 AWG – 600MCM (Standard feature N045-7)
^^^1/0 - 750MCM (Optional feature N066-7)

ENCLOSURE

The transfer switch and control are wall-mounted in a key-locking enclosure. Wire bend space complies with NEC.

DIMENSIONS – TRANSFER SWITCH IN UL TYPE 1 ENCLOSURE									
Frame	Amperage rating (A)	Height		Width		Depth		Weight	
		in	mm	in	mm	in	mm	lb	kg
A	40, 70, 125 3-pole	27	686	20.5	521	12	305	148	67
	40, 70, 125 4-pole	35.5	902	26	660	16	406	214	97
B	150, 225	35.5	902	26	660	16	406	214	97
	260	43.5	1105	28.5	724	16	406	238	108
C	300, 400, 600	54	1372	25.5	648	18	457	322	146
D	800, 1000	68	1727	30	762	19.5	495	448	203
E	1200	90	2286	39	991	27	698	862	391

DIMENSIONS – TRANSFER SWITCH IN UL TYPE 3R, 4, 4X, OR 12 ENCLOSURES										
Frame	Amperage rating (A)	Height		Width		Depth		Weight		Cabinet Type
		in	mm	in	mm	in	mm	lb	kg	
A	40, 70, 125 3-pole	34	864	26.5	673	12.5	318	220	100	3R, 4
		46	1168	32	813	16	406	307	139	4X
		34	864	26.5	673	12.5	318	201	91	12
	40, 70, 125 4-pole	42.5	1080	30.5	775	16	406	304	138	3R, 4
		46	1168	32	813	16	406	335	152	4X
		42.5	1080	30.5	775	16	406	287	130	12
B	150, 225	42.5	1080	30.5	775	16	406	304	138	3R, 4
		46	1168	32	813	16	406	335	152	4X
		42.5	1080	30.5	775	16	406	287	130	12
	260	46	1168	32	813	16	406	322	146	3R, 4
		46	1168	32	813	16	406	335	152	4X
		46	1168	32	813	16	406	304	138	12
C	300, 400, 600	59	1499	27.5	699	16.5	419	415	188	3R, 4
		73.5	1867	32.5	826	19.5	495	520	236	4X
		59	1499	27.5	699	16.5	419	397	180	12
D	800, 1000	73.5	1867	32.5	826	19.5	495	588	267	3R, 4
		73.5	1867	32.5	826	19.5	495	588	267	4X
		73.5	1867	32.5	826	19.5	495	556	252	12
E	1200	90	2286	39	991	27	698	891	404	3R, 4
		90	2286	39	991	27	698	891	404	4X
		90	2286	39	991	27	698	873	396	12

ENCLOSURE ACCESS FOR CABLE INSTALLATION AND MAINTENANCE

All frames allow for top, side, and bottom cable entry. NEC Requires Minimum 36” Front Access. Additional front clearance is needed to remove the mechanism. Refer to the outline drawing.

OTEC DRAWING PART NUMBERS				
Frame	Amperage rating (A)	Outline Drawing		
		Type 1, 3R, 12, 4, 4X (3 Pole)	Type 1, 3R, 12, 4, 4X (4 Pole)	Open Construction
A	40, 70, 125	A074K565	A074K632	A074K681
B	150, 225	A074K575	A074K587	
	260	A074K613	A074K634	
C	300, 400, 600	A074K635	A074K645	
D	800, 1000	A074K646	A074K658	
E	1200	A074K659		A074K695

WIRING DIAGRAM PART NUMBERS

Frame	Amperage rating (A)	Wiring Diagram				
		Utility to Genset (120 – 480 V)	Utility to Genset (600 V)	Interconnection	Utility to Genset, Open Construction (120 – 480 V)	Utility to Genset, Open Construction (600 V)
A	40, 70, 125 (3-pole)	A074P733	A074P730	A065H780	A074P731	A074P732
	40, 70, 125 (4-pole)					
B	150, 225					
	260					
C	300, 400, 600					
D	800, 1000	A074P729				
E	1200					

SUBMITTAL DETAIL

Model

- 40, 70, 125 A, (3- and 4-pole)
- 150, 225, 260 A
- 300, 400, 600 A
- 800, 1000 A
- 1200 A

Poles

- A028 Poles – 3 (solid neutral)
- A029 Poles – 4 (switched neutral)

Application

- A035 Utility-to-genset

Frequency

- A044 60 Hz
- A045 50 Hz

Phase

- A041 single phase, 2-wire or 3-wire
- A042 three phase, 3-wire or 4-wire

Voltage ratings

- R020 120V
- R038 190V
- R021 208V
- R022 220V
- R023 240V
- R024 380V
- R025 416V
- R035 440 V
- R026 480 V
- R027 600 V

Enclosure

- B001 Type 1: Indoor use, provides some protection against dirt (similar to IEC type IP30)
- B002 Type 3R: Intended for outdoor use, provides some protection from dirt, rain, and snow (similar to IEC type IP34)
- B003 Type 4: Indoor or outdoor use, provides some protection from wind-blown dust and water spray (similar to IEC type IP65)
- B004 open construction: no enclosure - includes automatic transfer switch and controls.
- B010 Type 12: Indoor use, some protection from dust (similar to IEC type IP61).
- B025 Type 4X: Stainless steel, indoor or outdoor use, provides some protection from corrosion (similar to IEC Type IP65).

Standards

- A046 UL 1008/CSA certification
- A080 IBC seismic certification

Control voltage

- M033 12V, Genset starting voltage.
- M034 24V, Genset starting voltage.

Control options

- M032 Elevator signal relay
- M081 MODBUS RS485 Communication module
- M079 integral control power supply provides DC voltage to control from source power.
- M086 Ethernet communication module
- L216 1X auxiliary relay I/O module
- L217 2X auxiliary relay I/O module

Auxiliary relays

- Relays are UL Listed, and factory installed. All relays provide (2) normally closed isolated contacts rated 10A @ 600 VAC. Relay terminals accept (1) 18 gauge to (2) 12-gauge wires per terminal.
- L101 24 VDC coil - installed, not wired (for customer use).
- L102 24 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position.
- L103 24 VDC coil - normal position - relay energized when switch is in source 1 (normal) position.
- L201 12 VDC coil installed, not wired (for customer use)
- L202 12 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position.
- L203 12 VDC coil - normal position - relay energized when switch is in source 1 (normal) position.

Optional Cable Lugs

- N032 Lug adapters, compression, ½ stab (1200A only)
- N045 Cable lugs, mechanical, 600 MCM, 4 per pole (1200A only)
- N066 Cable lugs, mechanical, 750 MCM, 4 per pole (1200A only)

Miscellaneous

- C027 Cover - guard
- M003 Terminal block - 30 points (not wired)

Optional features

- M080 Anti-condensation heater for outdoor enclosures
- L214 Load shed from standby source
- M085 Load power monitoring

Accessories

- AC-170 Accessories specification sheet
- A065L320 Control panel cover guard

Request for quotation (RFQ)

- Z555 Nonconfigurable spec [ETO]

Warranty

- G004 2-years, comprehensive
- G007 5-years, comprehensive
- G014 3-years, comprehensive
- G015 10-years, comprehensive

Shipping

- A051 Packing - export box (800 – 1000 A)

CODES AND STANDARDS

UL	All switches are UL 1008 Listed with UL 50E Type Rated cabinets and UL Listed CU-AL terminals.	**NEC®**	Suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
NEMA	All switches comply with NEMA ICS 10.	**ISO®**	All switches are designed and manufactured in facilities certified to ISO 9001.
CSA®	All switches are certified to CSA C22.2 No. 178.1 switching of electrical energy in emergency or other systems, up to 600 VAC and 4 kA.	**IBC®**	All switches are certified to IBC 2018.
IEEE	All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.	**EMC**	Display controllers meet the following Electromagnetic Compatibility (EMC) standards: • EN 61000-6-2 Generic Immunity Standard for the Industrial Environment. • EN 61000-6-4 Generic Emission Standard for the Industrial Environment.
NFPA®	All switches comply with NFPA 70, 99 and 110 (Level 1).		

For more information, please contact your local Cummins distributor or visit cummins.com.

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S-6556 OTEC Spec Sheet NSE - PD00000752 - Rev. 02/25

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POWERCOMMAND® 40-11 TRANSFER SWITCH CONTROL

OTEC TRANSFER SWITCHES

DESCRIPTION

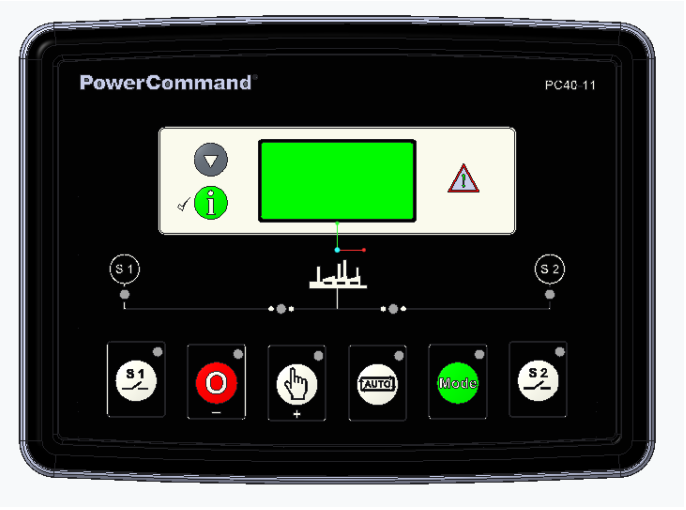
The PowerCommand® 40-11 Transfer Switch Control is a sophisticated microprocessor-based control with the basic features you need for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications.

The control human machine interface (HMI) includes a LCD display with tactile-feel soft-switches for easy operation and screen navigation. All data on the control can be viewed by scrolling through screens with a display scroll button. The control displays the current active fault, fault occurrences and time ordered history of the 10 previous faults with respect to Real Time Clock Stamp and Engine Running Time.

FEATURES

Digital display – The PowerCommand® 40-11 offers a clear back-lit LCD 4-line text display, showing system status, contextual icons and warnings. The display is also equipped with 5 red and 4 green LEDs indicating operational status.

Modbus network communication – Modbus network communications capable. Optional Modbus RTU RS485 connection (1 serial port) and TCP Ethernet communication module (1 RJ45 port).



Remote Annunciator – Completely network compatible with the new Cummins transfer switch remote annunciator (See Transfer Switch Remote Annunciator spec sheet AC-204 for additional details).

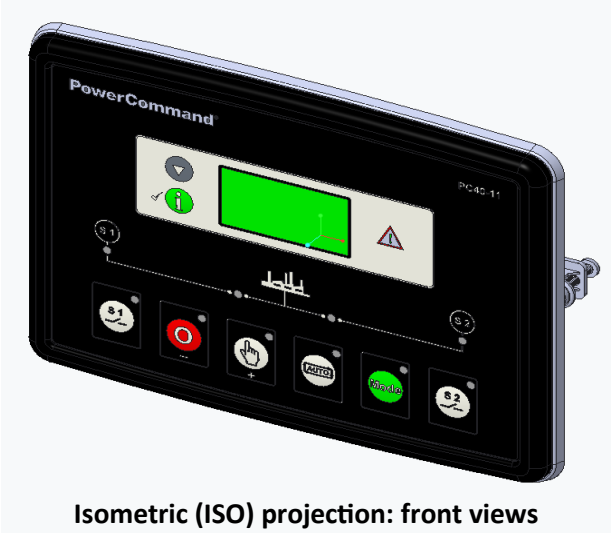
Diagnostics and reporting – Detailed event logging with enhanced fault codes, alert lists, power event history, and source statistics enhances diagnostic capability during service events and provides the ability to meet any reporting requirements.

PC & Front Panel Configurations – The modules can be easily configured using the PC software. Selected front panel editing is also available.

Ease of service and access – Built-in plug-and-play control with minimized point-to-point connections and compatible terminal markings simplify servicing.

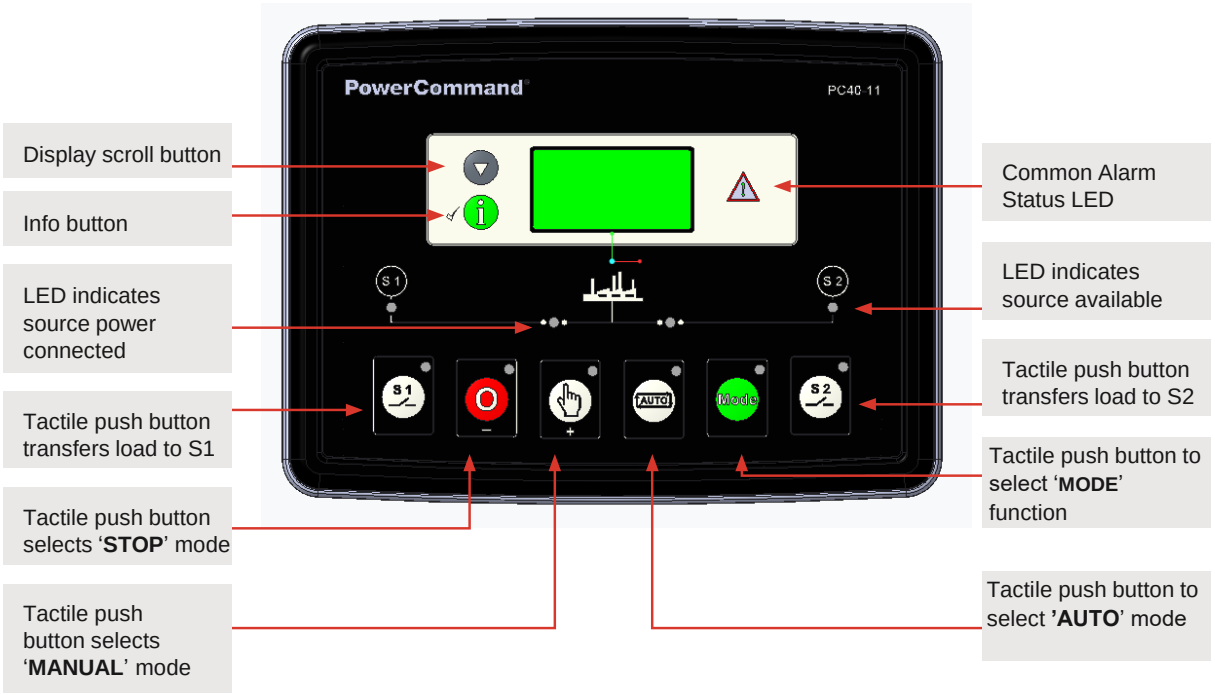
Complete product line – Cummins is a single source supplier with full scope of power system solutions, integration, and service capability, from paralleling to system level controls, switchgear, and remote connectivity.

Warranty and service – Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.



Isometric (ISO) projection: front views

HUMAN MACHINE INTERFACE (HMI) CAPABILITIES



CONTROL FUNCTIONS

TRANSFER INHIBIT

When transfer inhibit external input is active, the control does not automatically transfer the transfer switch to a standby source even when the preferred source fails.

RETRANSFER INHIBIT

When retransfer inhibit external input is active, the control does not automatically retransfer the transfer switch to a preferred source even when the preferred source returns.

REAL TIME CLOCK

This feature is used by the control for fault and event time stamping and as a reference for exerciser schedules and exception schedules.

TEST – REMOTE

Test feature allows the user to automatically test the standby source and the transfer switch. The test command can be issued from the remote source.

The test has following types available:

- Remote Start On Load
- Remote Start Off Load

ELEVATOR SIGNAL

This optional feature allows an elevator connected to the system to come to a complete stop before the switch transfers.

EXERCISER SCHEDULER

The Scheduler allows the user to configure pre-set automatic starting and stopping of the Generator (when in Auto mode).

BANK 1 / BANK 2

Each Bank of the Exercise Scheduler is used to give up to 8 scheduled runs per bank, 16 in total. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). Do Not Transfer, Off Load and On Load. Each scheduler bank configured differently either to weekly or monthly based exercises.

SOURCE AVAILABILITY

This feature monitors the frequency and voltage sensors on the preferred and standby sources to determine and declare the availability status of the two sources, irrespective of which source is connected to the load. It declares the states as event codes. Preferred/Standby Available - active inactive.

VOLTAGE SENSING

3-phase sensing on Source 1 and Source 2 (up to 600 Vac with no need for additional PTs). Plant battery voltage monitoring.

ALPHANUMERIC DISPLAY

- S2 Voltage L1-N
- S2 Voltage L-L
- S2 Frequency
- S1 Voltage L1-N
- S1 Voltage L-L
- S1 Frequency
- Battery voltage
- Current alarms with icons
- Event log
- Scheduler
- About

LOAD SHED

This feature allows the user to shed/disconnect the electrical load from a standby source. This feature is typically used to reduce non-emergency load demand on the generator when the generator is in an overload condition.

LOAD POWER MONITORING

This feature allows the monitoring of the following parameters on the load side of the transfer switch using the display, or remotely via the optional communication modules:

- Amps: L1 - L2 - L3
- Watts: L1 - L2 - L3 - Total
- VA: L1 - L2 - L3 - Total
- Var: L1 - L2 - L3 - Total
- Power Factor: L1 - L2 - L3 – Average

RELAY EXPANSION MODULE DSE2157

This feature allows the user to provide additional output to the control system, up to 16 user configurable dry contact sets - 8 NO, 8 Form-C.

TIME DELAYS

The following adjustable time delays are built into the transfer switch control. External modules to accomplish these delays are not required.

- **Start Delay** (Also known as Time Delay Engine Start, TDES adjustable from 0 to 10 hours)
- **Warming** (Also known as Time Delay Normal to Emergency, TDNE adjustable from 0 to 1 hour)
- **Elevator Delay** (Also known as Time Delay Elevator, TDEL adjustable from 0 to 5 minutes)
- **Non-sync Transfer Time** (Also known as Time Delay Programmed Transition, TDPT adjustable from 0.5 s to 10 minutes)
- **Return Delay** (Also known as Time Delay Emergency to Normal, TDEN adjustable from 0 to 5 hours)
- **Cooling** (Also known as Time Delay Engine Cool-down, TDEC adjustable from 0 to 1 hour)

LED INDICATOR LIGHTS

- Auto mode (RED)
- Source 1 available (GREEN)
- Source 2 available (GREEN)
- Source 1 connected to load (GREEN)
- Source 2 connected to load (GREEN)
- Common Alarm indicator (RED)
- Select Operating mode (RED)
- Stop mode (RED)
- Manual Mode (RED)

EVENTS LOG

The control displays information on up to 10 events displayed in chronological order, beginning with the most recent event, about either source. The event information includes the following:

- Failure modes
- Warning
- Tests and exercises
- User-driven inputs (e.g., override, transfer inhibit)

SUPPORTED APPLICATIONS

APPLICATION TYPES

- Utility - Generator Set

COMMUNICATIONS

The PowerCommand® 40-11 Transfer Switch Control features an optional network communication module.

Features include:

- Optional Modbus® RTU RS485 communication module (1 isolated serial port) TCP Ethernet communication module (1 RJ45 port)
- USB port for service tool interface

PROTECTION

PHASE ROTATION AND VOLTAGE IMBALANCE SENSING

- Source 1 and Source 2

UNDER-VOLTAGE SENSING

- 3-phase normal, 3-phase emergency, Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 50Vac to 414Vac.
- Phase to phase voltage range 86Vac to 717Vac.

OVERVOLTAGE SENSING

- 3-phase normal, 3-phase emergency, Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 52Vac to 416Vac.
- Phase to phase voltage range 90Vac to 720Vac.

OVER/UNDER FREQUENCY SENSING

- Normal and emergency
- Accuracy: ±0.2 Hz
- Frequency range 3.5 – 75 Hz

SYNC CHECK

- For in-phase transfer

CONTROL OPERATING VOLTAGE

- Range: 8-35 Vdc.

ENVIRONMENT

Operating Temperature Range	Control operates over an ambient temperature range: -30 ºC to 70 ºC.
Storage Temperature Range	The control operates after being exposed to Storage Temperatures in the range of -40 ºC to 85ºC.
Ingress Protection	The front panel is to be IP65.
Sun Protection	Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water exposure and Immersion in accordance with UL 746C.

CODES AND STANDARDS

c UL us	The PC40-11 control is a UL Recognized Component Marked for United States and Canada.	NFPA	Capable of being used on systems compliant with NFPA 70, 99 and 110 (Level 1).
UK CA	The PC40-11 control fulfills the requirements of UKCA standard product directives.	NEMA	Control and display as installed in a transfer switch enclosure comply with NEMA 4X and IP65 at the transfer switch level - if the transfer switch enclosure is also NEMA 4X & IP65 compliant.
RoHS	The control is RoHS compliant.	NEC®	Capable of being used on systems suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
CE	Fulfills the requirements of relevant European product directives.	LVD	The unit is designed to comply with European directive 72/23/EEC by complying with harmonized European safety standard BS EN 60950.
CSA®	All switches are certified to CSA C22.2 No. 178.1 switching of electrical energy in emergency or other systems, up to 600 VAC and 4 kA.	IEEE	The control is IEEE C37.90.2 certified. Capable of being used on IEEE 446 compliant systems; Recommended Practice for Emergency and Standby Power Systems.
EMC	The control is tested to meet the following CE Electromagnetic Compatibility (EMC) standards for EN 61000 series (electromagnetic compatibility): • EN 61000-6-2 Generic Immunity Standard • EN 61000-6-4 Generic Emissions		

For more information, please contact your local Cummins distributor or visit cummins.com Our energy working for you™

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Cummins Inc.
Box 3005
Columbus, IN 47202-3005 U.S.A.
1-800-CUMMINS™ (1-800-286-6467) cummins.com
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Warranty Statement

Generator Sets

Commercial Standby Extended Warranty

English
Original Instructions

7-2017

A058F886 (Issue 1)

Limited Standby 5 Year or 2,500 Hour Parts + Labor + Travel Extended Warranty – L189

Commercial Generating Set

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded commercial generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date or 2,500 hours, whichever occurs first.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode

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Limitations Continued:

- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

Items not covered by this limited extended warranty:

- Batteries
- Enclosures
- Coolant heaters
- Exhaust systems and aftertreatment components
- Maintenance items

www.power.cummins.com

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

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Warranty Statement

Transfer Switch Extended Warranty

English
Original Instructions
1-2017
1118-0003 (Issue 5)

Limited 5 Year Comprehensive Extended Warranty – G007

Transfer Switch and Paralleling Systems

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded Transfer Switches, Paralleling Systems and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.

Limitations Continued:

- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode
- Owner or operator abuse or neglect such as: operation without adequate coolant or

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lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.

- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

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CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

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IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

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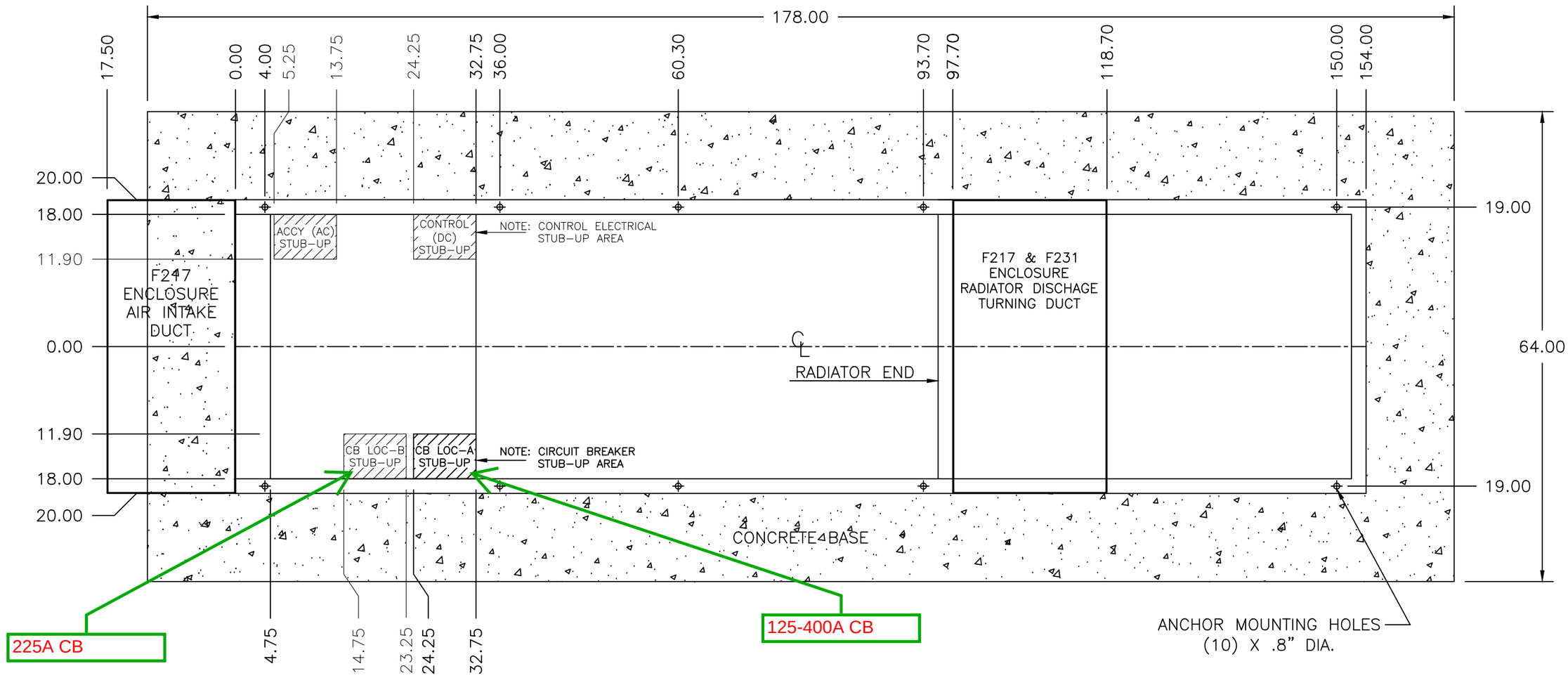


NOTE: SUGGESTED PAD LAYOUT SHOWN FOR REFERENCE.
SUGGESTED SERVICE ACCESS CLEARANCE 5 FEET.
ENCLOSURE INLET AIR FLOW SHALL BE UNOBSTRUCTED.
RADIATOR DISCHARGE AIR FLOW SHALL BE UNOBSTRUCTED.
F217 ENCLOSURE AIR INLET DUCT EXTENDS 17.5" BEYOND GENERATOR SET SKID.

REF: GENERATOR SET DRAWING A054Y897
REF: GENERATOR SET/ENCLOSURE DRAWING A051P365
REF: GENERATOR SET/FUEL TANK DRAWING A054B564

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES

TOLERANCES: FRACTIONAL: 1/4 .X: .06 .XX: .03 .XXX: .01 ANGLES: .5°

FINISH: N/A

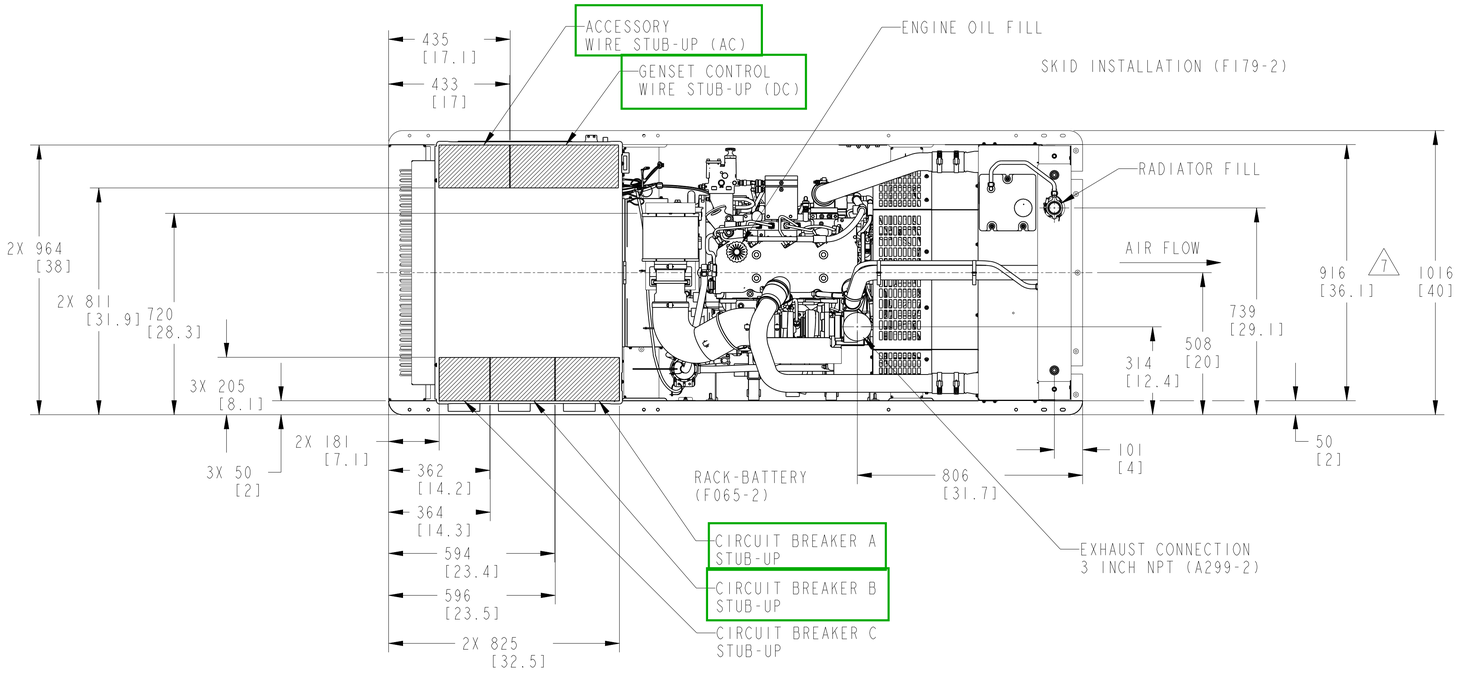
REFERENCES	PREP. BY:	CHKD BY:	MODIFIED BY:	
A054Y897	KDU	–	–	–
A051P365	10/25/23	–	–	–
A054B564				
A049J918				
A054B464				
–				

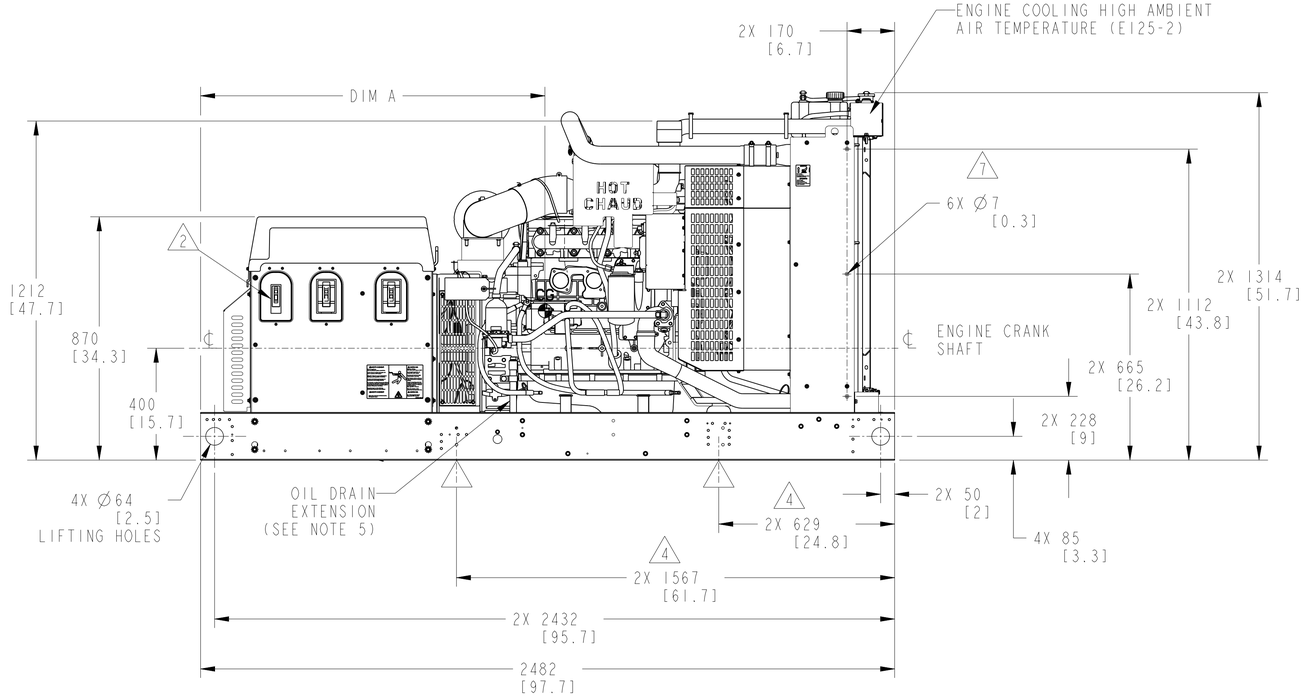
ENGINE FAMILY: QSB5 ENGINE

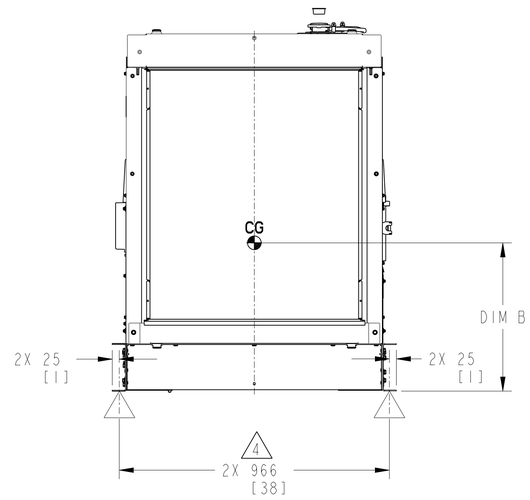
REGIONAL FUEL TANK

CSSNA POWERGEN

SITE NAME: – –	CONTACT NAME: –	CUSTOMER PROJECT NO: –	TITLE: 50 KW THRU 125 KW DIESEL GENERATOR SET ENCLOSURE & REGIONAL FUEL TANK
CONTRACTOR NAME: –	CONTACT NO: –	CSSNA PROJECT NO: –	SIZE: C DWG NO: C50 D6C THRU C125 D6C STUB-UP REV A
			SCALE: NONE DO NOT SCALE PRINT SHEET 1 OF 1







NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.
2. REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
3. CONTROL INTERFACE CONNECTION SHOULD BE MADE WITH FLEXIBLE CONNECTIONS.
4. Ø21 [0.8] HOLES MARKED BY △ FOR SECURING TO MOUNTING SURFACE.
5. OIL DRAIN EXTENSION: 5/8 INCH HOSE ID.
6. FOR IBC SEISMIC CERTIFIED INSTALLATION, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENT DRAWING.
7. Ø7.3 HOLES FOR OPTIONAL COOLING EXHAUST AIR DUCT ADAPTER.
8. REFER TO GENSET FOUNDATION OUTLINE FOR ELECTRICAL AND OTHER FOUNDATION SPECIFICS.
9. GENSET SUPPLIED WITH FLEXIBLE FUEL LINE(S) THAT CAN BE CONNECTED TO GENSET INTERFACE POINT(S).

   9.1 FUEL SUPPLY LINE: 686 [27.0] LONG WITH 5/16" JIC MALE TERMINATION.

TABULATION

ALT DATA SHEET #	DIM A	DIM B	GENSET WET WEIGHT	
			KG	LB
ADS-202	1092	456	1090	2403
ADS-203	1207	495	986	2173
ADS-204	1184	492	1006	2217
ADS-205	1125	486	1054	2324
ADS-206	1086	482	1082	2386
ADS-207	1060	480	1106	2439
ADS-208	998	473	1173	2586
ADS-209	958	469	1211	2670

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y897	PART REVISION: C
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 1 OF 3
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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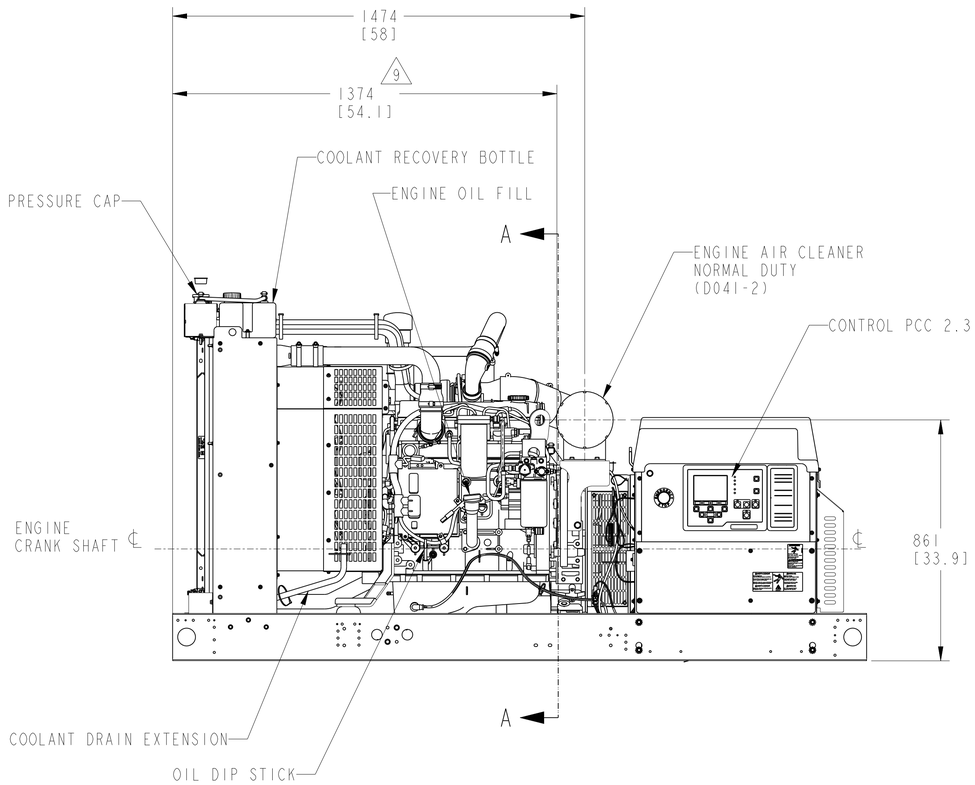
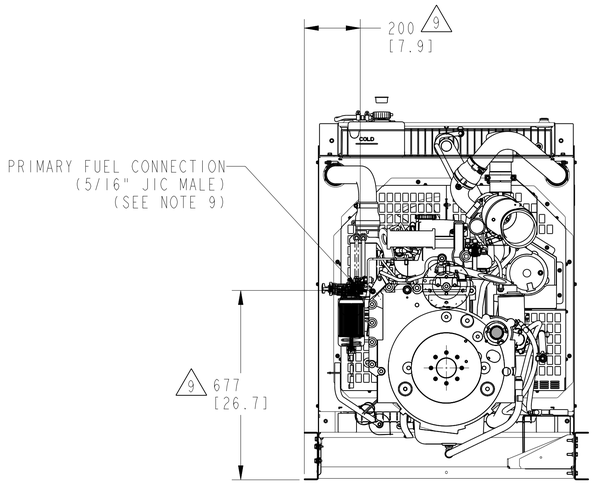
Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: D
SCALE:3:32
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM
PTC® Creo® Parametric





SECTION A-A

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y897	PART REVISION: C
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 2 OF 3
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: D
SCALE:3:32

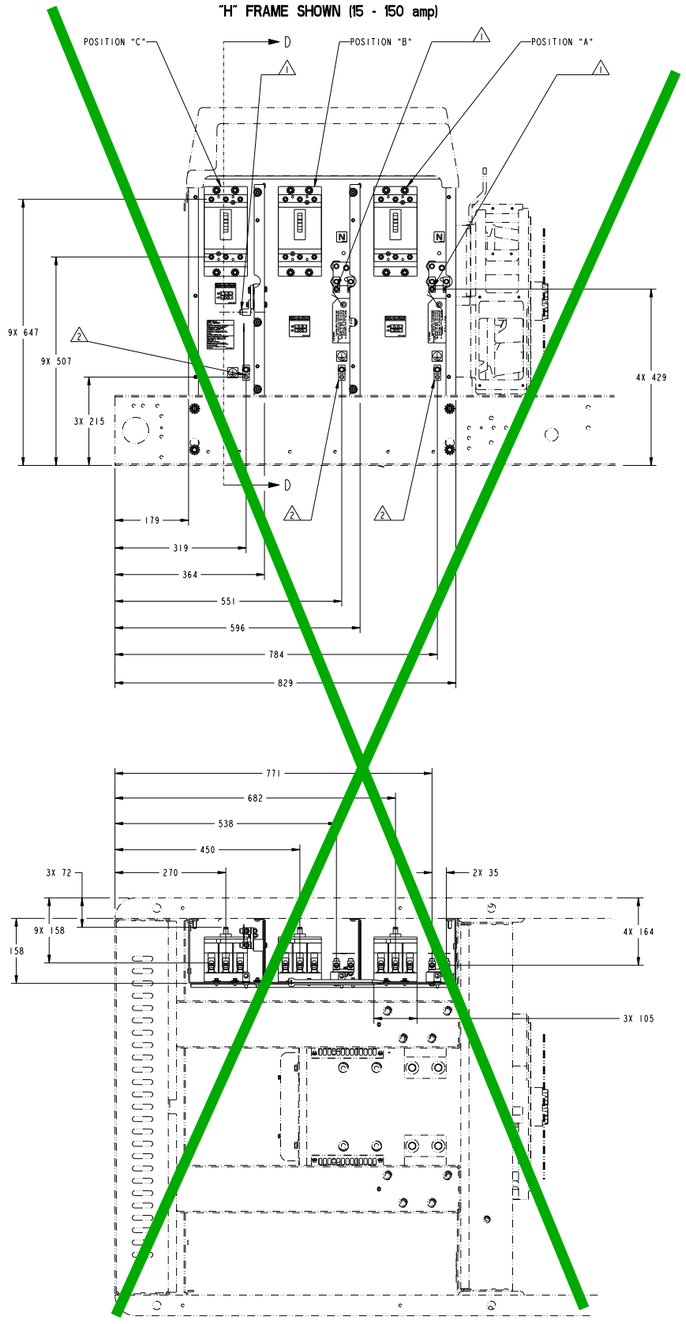
DIMENSIONING AND TOLERANCING PER:
ASME Y14.5-2009
THIRD ANGLE PROJECTION

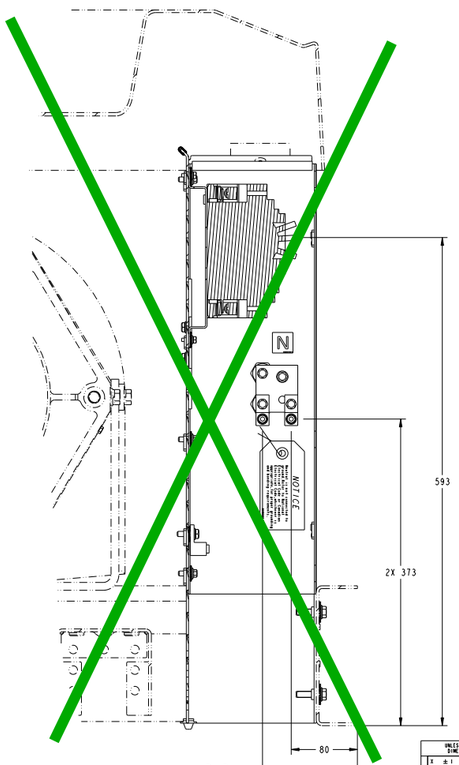
CAD SYSTEM
PTC® Creo® Parametric

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	BM	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		2	DRAWING HAS BEEN PICTORIALLY UPDATED	KD	PL	P.LARSON	20APR15
		3	RMV C11 LABEL	KD	PL	P.LARSON	20APR15
		4	UPDATE NOTES & TAB - SEE ECO	KD	PL	P.LARSON	20APR15
		5	SEE SHEET 2	KD	PL	P.LARSON	20APR15
		6	SEE SHEET 3	KD	PL	P.LARSON	20APR15

"H" FRAME SHOWN (15 - 150 amp)





SECTION D-D
SCALE 1/2

NOTES:

1. NEUTRAL LUG (1) #14-2/0
2. GROUND LUG (1) #14-1/0
3. NEUTRAL LUG (1) #6-350 kcmil.
4. NEUTRAL LUG (2) #2-600 kcmil OR (4) 1/0-250 kcmil.

	FRAME	LUG	LUG WIRE RANGE	WIRE STRIP LENGTH	CB LUG TORQUE
	H-FRAME THERMAL-MAGNETIC 15-150 AMP 80% RATED	AL150HD	(1) AL #14 - 3/0 AWG (1) CU #14 - 3/0 AWG	0.65 inch	#14 - #10 50 lb-in (6.0 Nm) #8 - 3/0 120 lb-in (14.0 Nm)
	J-FRAME THERMAL-MAGNETIC 175 AMP 80% RATED	AL175HD	(1) AL #4 - 4/0 AWG (1) CU #4 - 4/0 AWG	1.00 inch	225 lb-in (26.0 Nm)
B	J-FRAME THERMAL-MAGNETIC 200-250 AMP 80% RATED	AL250JD	(1) AL 3/0 - 350 kcmil (1) CU 3/0 - 350 kcmil	1.00 inch	225 lb-in (26.0 Nm)
	J-FRAME LSI ELECTRONIC TRIP ADJUSTABLE TRIP 70-250 AMP 100% RATED, COPPER CONDUCTORS ONLY	CU250JD	(1) CU 1/0 - 300 kcmil	1.00 inch	250 lb-in (28.0 Nm)
	L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 80% RATED	AL400L61K3	(1) AL #2 - 500 kcmil (1) CU #2 - 600 kcmil	1.20 inch	442 lb-in (50 Nm)
A	L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 100% RATED, COPPER CONDUCTORS ONLY	AL600LS52K3	(2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)
	L-FRAME (600) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 200-600 AMP 80% RATED	AL600LS52K3	(2) AL 2/0 - 500 kcmil (2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)

CIRCUIT BREAKER ACCESSORIES

1. SHUNT TRIP (MX) P/N A043X760
   12 [illegible]
   COIL [illegible]DEN ≤ 5 WATTS
   10 AMP PUSH
   AUXILIARY CONTACTS P/N [illegible]43X785
   OPEN/CLOSED
   TRIP INDICATION
   FORM C CONTACTS
   RATING: 6 AMPS [illegible]VAC, 48 VAC, 110 VAC
   6 AMPS AT 24 VDC
   2 AMPS AT 48 VDC
   2 AMPS AT 110 VDC
2. H & J FRAME, MAXIMUM OF 4 CONTACTS PER CIRCUIT BREAKER
   L FRAME, MAXIMUM OF 5 CONTACTS PER CIRCUIT BREAKER

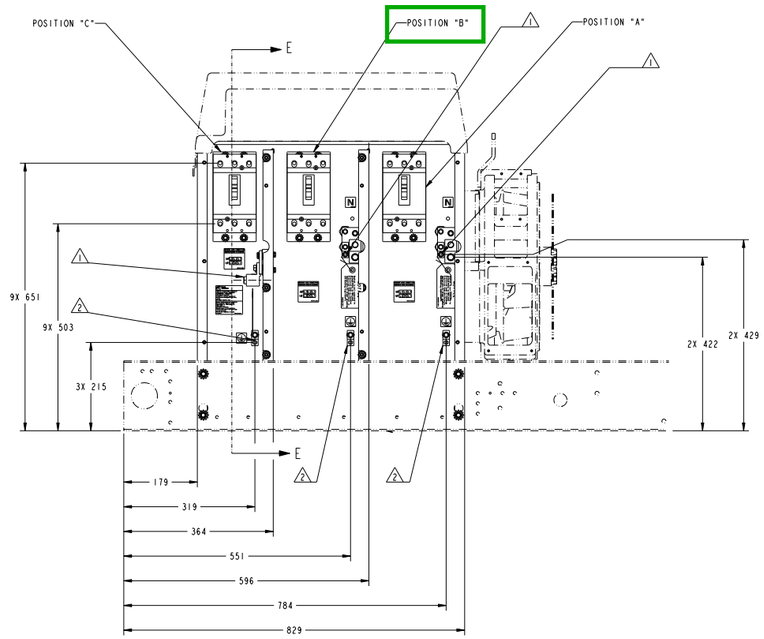
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	DO NOT SCALE PRINT
DIM TOL: X ±1, .X ±0.8, .XXX ±0.38	0.00-4.99 +0.15/-0.08; 5.00-9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13
ANG TOL: ± 1.0°	SCALE: 1/4
CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	FIRST USED IN: ARROW
DRN K.DEIVASIGAMANI	
CHD P.LARSON	
APVD P.LARSON	
DATE 21JAN15	
CUMMINS POWER GENERATION	
SITE CODE	
OUTLINE,CIRCUIT BREAKER	
PGF	SIZE E, A049J918, SHEET 1 of 3, REV B

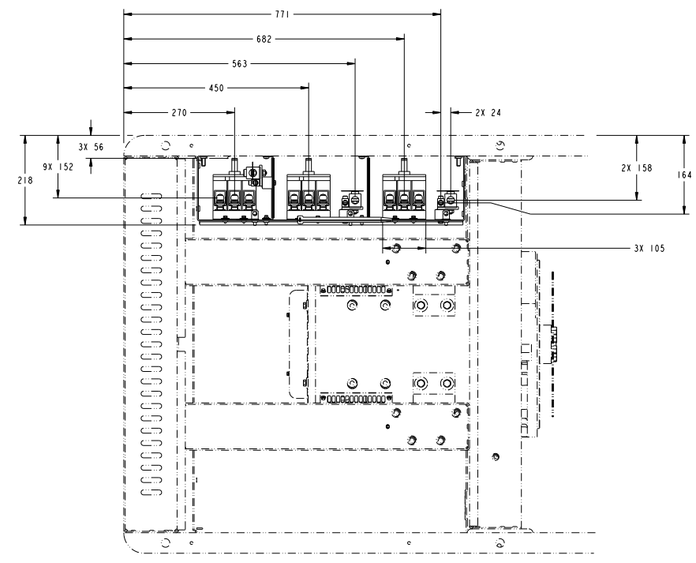
Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 1 of 4

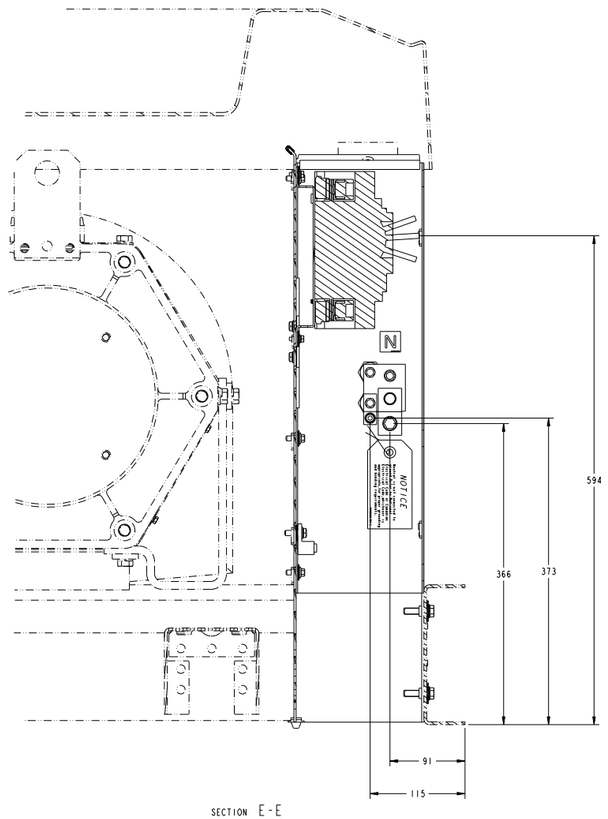
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		5	ZONE (D3) ADD PHRASE "(175-250 amp)" TO "J" FRAME SHOWN"	KD	PL	P.LARSON	20APR15

"J" FRAME SHOWN (175 - 250 amp)







SECTION E-E
SCALE 1/2

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN MILLIMETERS
X ±1
.X ±0.8
XX± 0.38
ANG TOL: ± 1.0°
SCALE: 1/4

DO NOT SCALE PRINT

CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DRN K.DEIVASIGAMANI
CHD P.LARSON
APVD P.LARSON
DATE 21JAN15

NEXT ASSY ARROW

SITE CODE PGF

CUMMINS POWER GENERATION

OUTLINE, CIRCUIT BREAKER

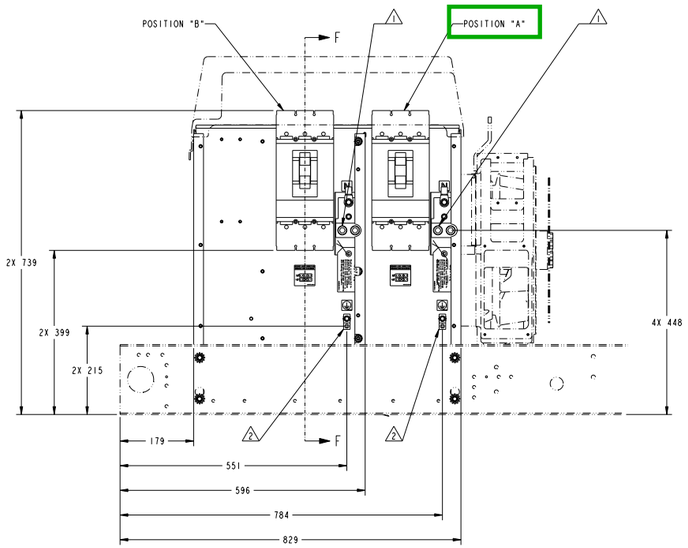
SIZE E | DWG NO A049J918 | SHEET 2 of 3 | REV B

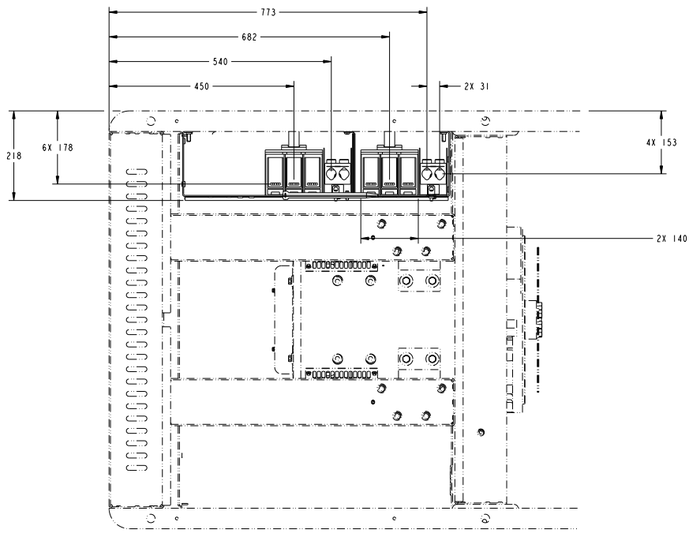
Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 2 of 4

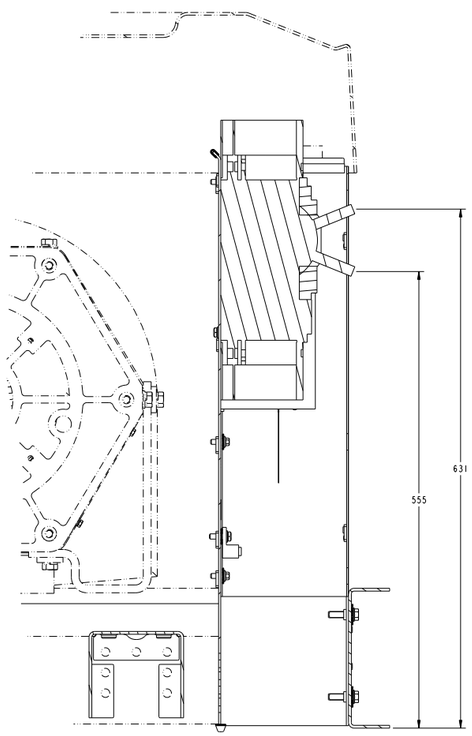
PTC® Creo® Parametric

REV. NO.	LTR	NO.	REVISION	DRN	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		6	ZONE (D3) ADD PHRASE "(400-600 amp)"	"	"	"	"
			TO "L" FRAME SHOWN"	KD	PL	P.LARSON	20APR15

"L" FRAME SHOWN (400 - 600 amp)





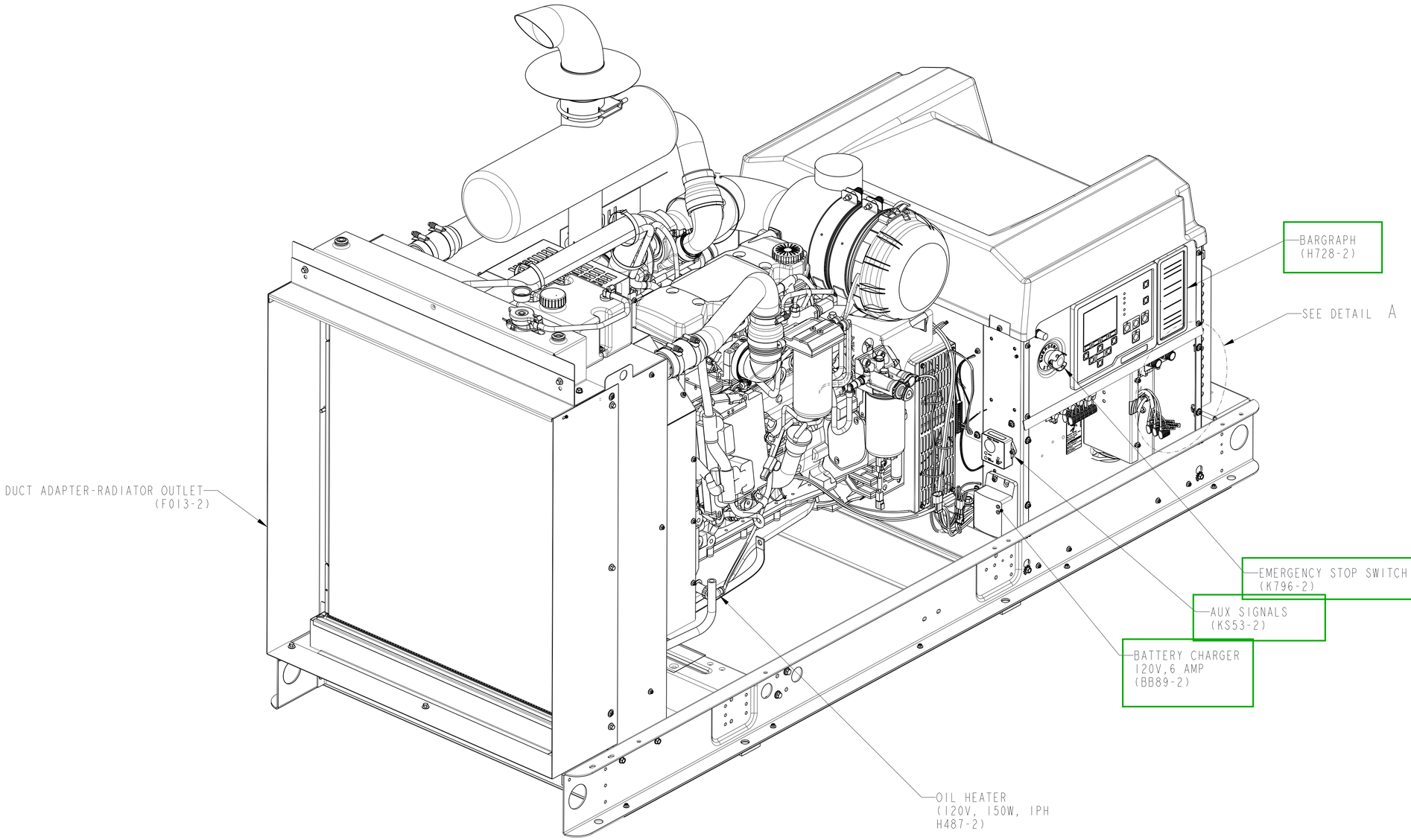


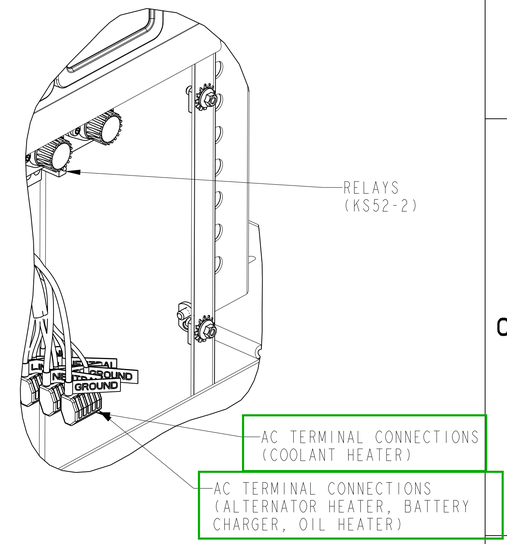
SECTION F-F
SCALE 1/2

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN MILLIMETERS	DO NOT SCALE PRINT	DRN K.DEIVASIGAMANI	CUMMINS POWER GENERATION
X ±1 / .X ±0.8 / .XXX ±0.38	0.00-4.99 ±0.15/-0.08; 5.00-9.99 ±0.20/-0.10; 10.00-17.49 ±0.25/-0.13; 17.50-24.99 ±0.30/-0.13	CHD P.LARSON; APVD P.LARSON; DATE 21JAN15	SITE CODE: PGF
ANG TOL: ± 1.0°	SCALE: 1/4	CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	OUTLINE,CIRCUIT BREAKER
		DFX INTERPRETATION ELEMENTS NOT USED IN THIS DRAWING	FIRST USED ON: ARROW
			SIZE: D; DWG NO: A049J918; SHEET 3 OF 3; REV: B

NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.





DETAIL A
SCALE 1:2

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y899	PART REVISION: E
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 1 OF 4
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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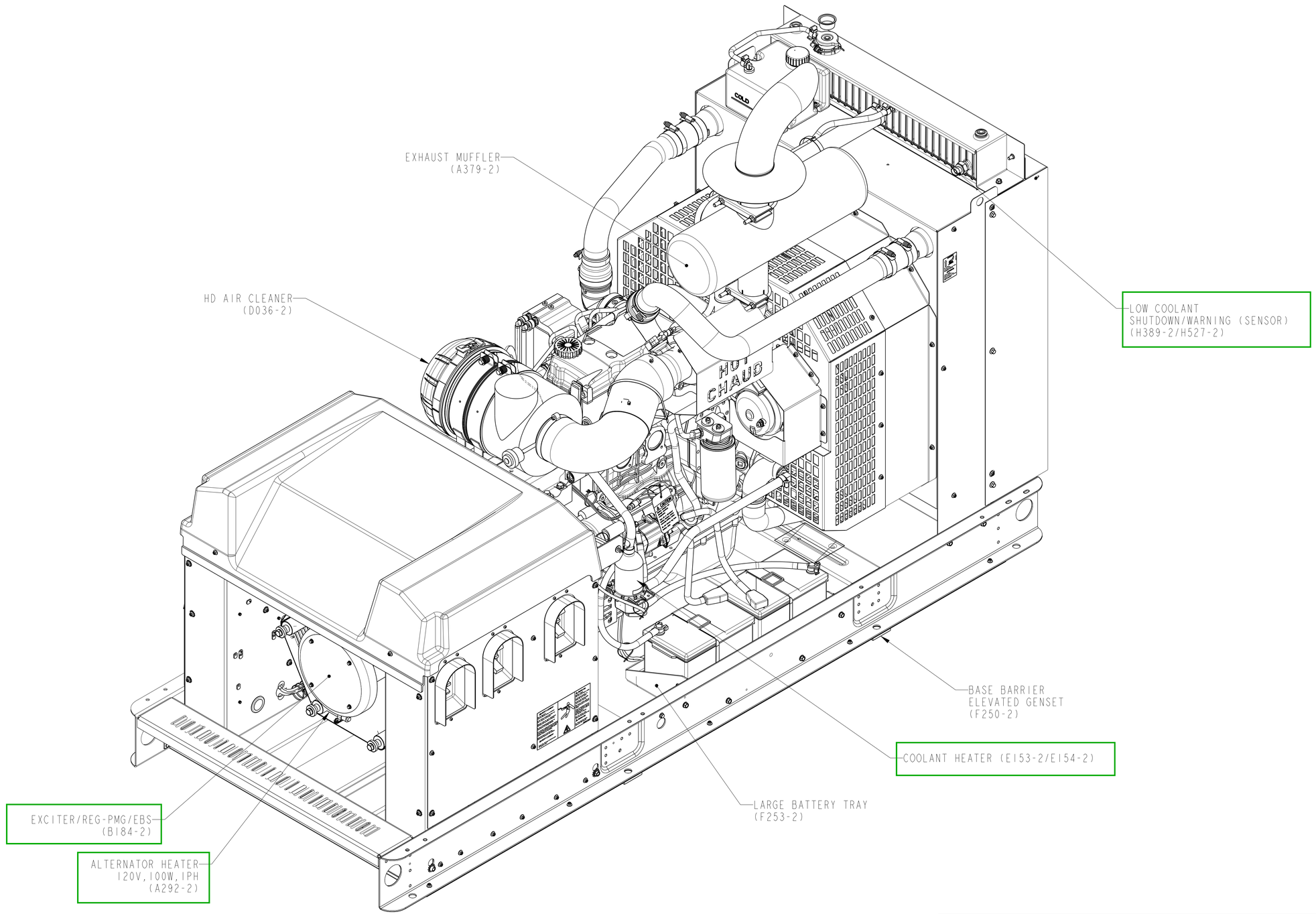
MODEL/PLATFORM: ARROW		THIS PART IS SIMILAR TO: NONE
Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: D	SCALE:3:16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric



C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

PART NUMBER: A054Y899	PART REVISION: E
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 2 OF 4
CUMMINS DATA CLASSIFICATION: CUMMINS INTERNAL USE ONLY	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: D
SCALE:3:16

DIMENSIONING AND TOLERANCING PER:
ASME Y14.5-2009
THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

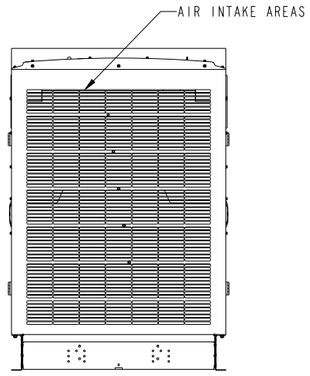
PTC® Creo® Parametric

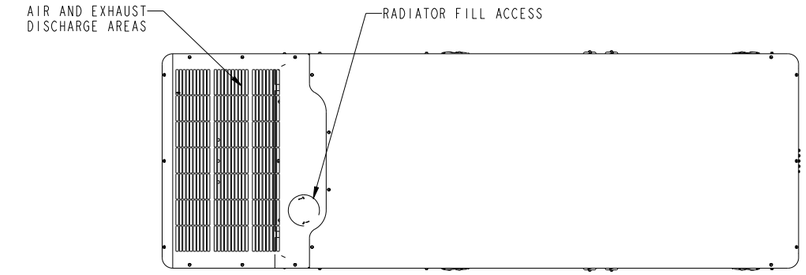
REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15

Estimated Total Package Weight:
Dry Fuel Tank - 4,220 lbs.
Wet Fuel Tank - 6,100 lbs.

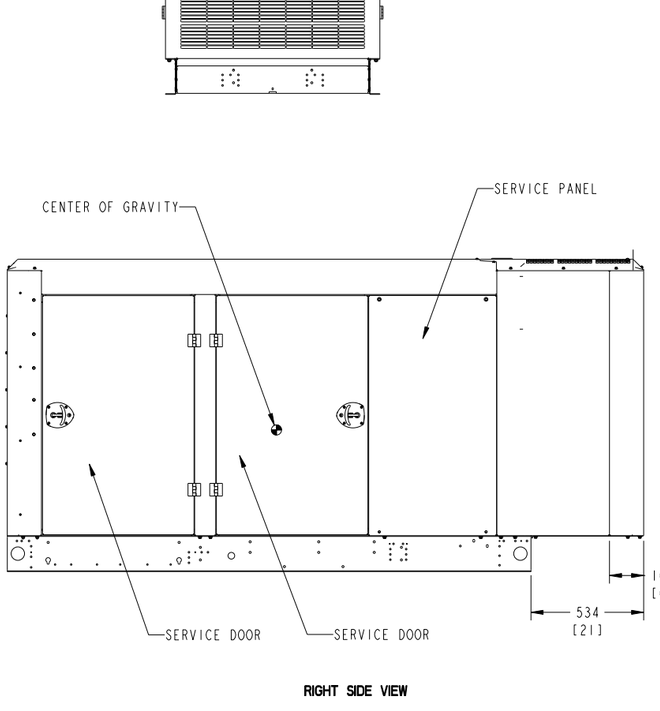
NOTES:

1. DIM [] IN INCHES
2. WHEN THE HOUSING INSTALLED ON AN OPEN GENERATOR SET, THE TOTAL WEIGHT WILL INCREASE BY 131.5 KG (290 LBS). THIS INCLUDES THE MUFFLER.
3. THE CENTER OF GRAVITY(CG) OF THE GENERATOR SET WHEN EQUIPPED WITH THIS HOUSING SHIFTS APPROXIMATELY 65mm (2.55 inch) TOWARDS THE AIR DISCHARGE END OF THE HOUSING AND 42MM (1.66 INCH) HIGHER FROM THE GROUND. COMPARED TO THE EQUIVALENT NON-HOUSED PRODUCT WITH THE F179 SKID. SEE HOUSING READY SKID BASE OUTLINE DRAWING FOR CG LOCATION OF NON HOUSED PRODUCT.

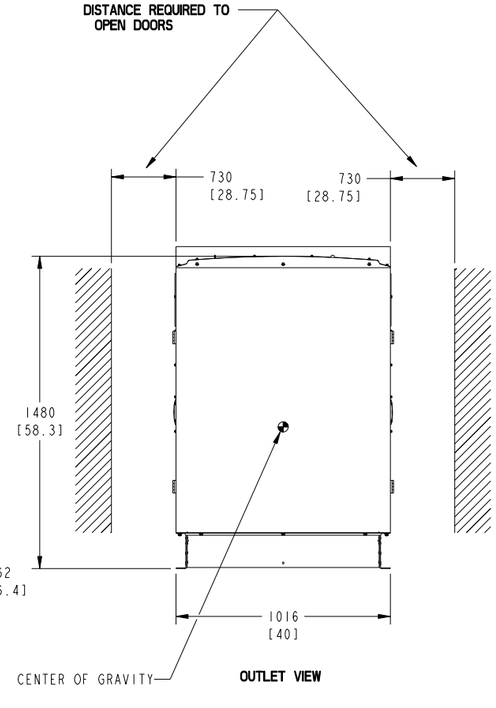




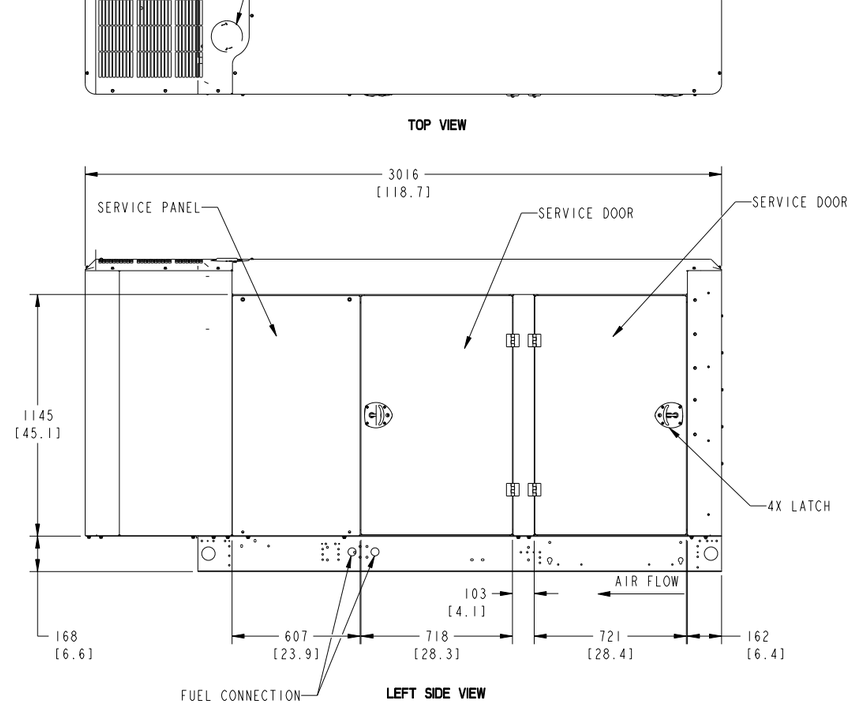
TOP VIEW



RIGHT SIDE VIEW



OUTLET VIEW



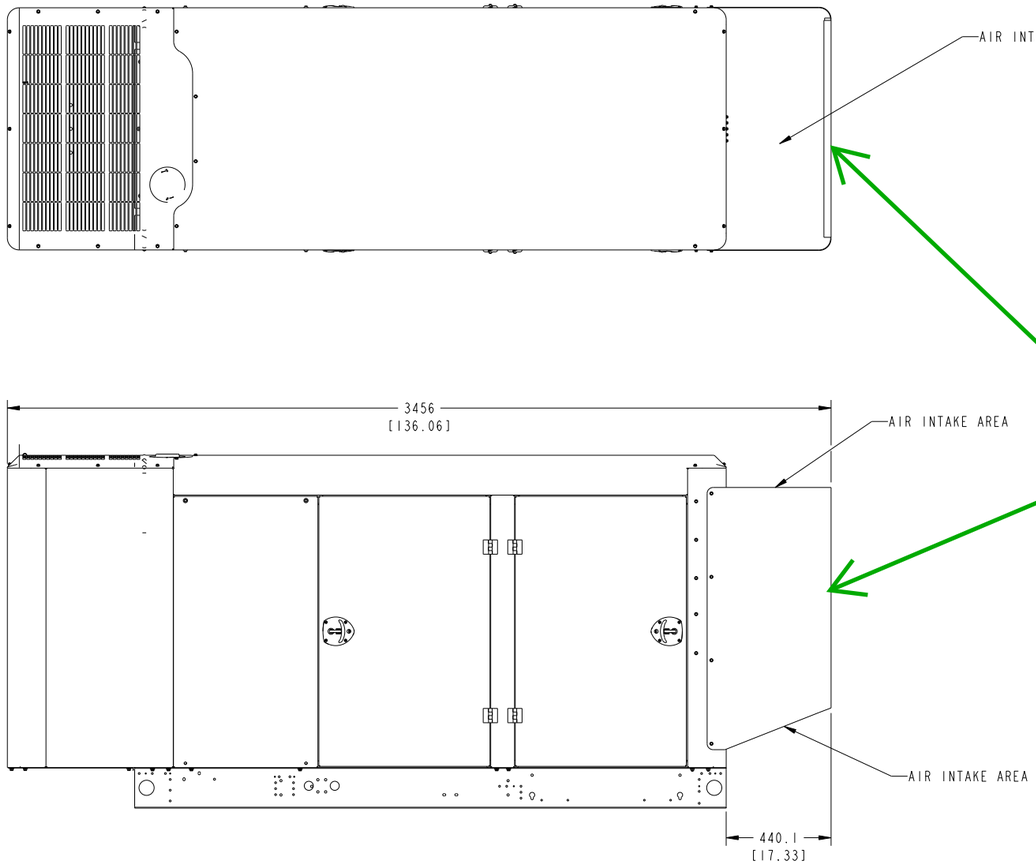
LEFT SIDE VIEW

F231-2 ENCLOSURE CONFIGURATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
ANG TOL: ± 1.0°	SCALE: ~3/32	APVD M_WICKMANN		SITE CODE	
	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	DATE 14MAY15	FIRST USED ON ARROW	PGF	DWG SIZE D — A051P365 — SHEET 1 OF 2 — DWG REV A
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994			

PTC® Creo® Parametric

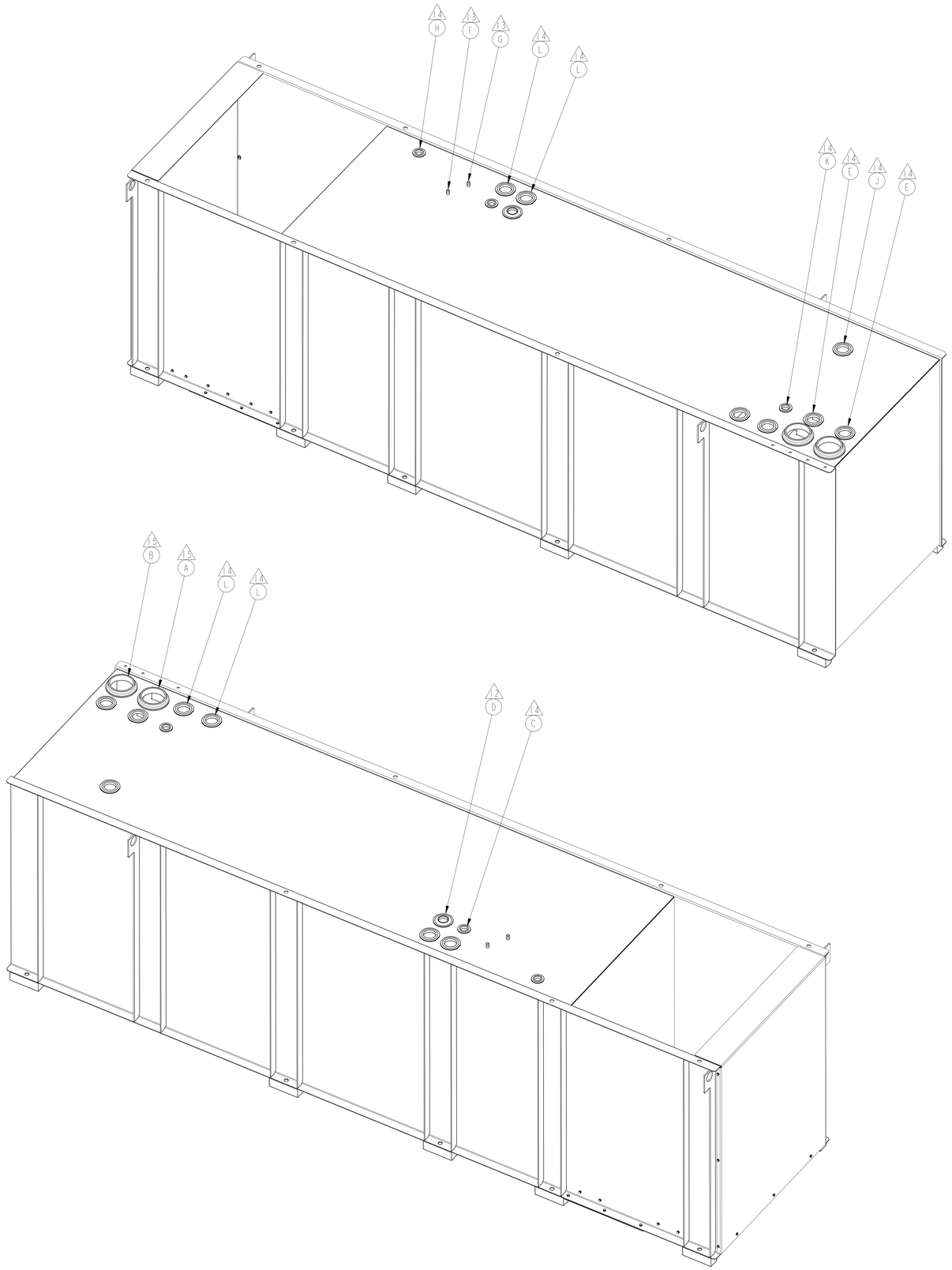
REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15



F217-2 ENCLOSURE CONFIGURATION

REFER TO PAGE 1 (F231-2 ENCLOSURE FOR OTHER F217-2 ENCLOSURE DIMENSIONS.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08, 5.00- 9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
ANG TOL: ± 1.0° — SCALE: ~3/32	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD M_WICKMANN	SITE CODE PGF	DWG SIZE D	A051P365 — SHEET 2 OF 2 — DWG REV A
		DATE 14MAY15			
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 — FIRST USED ON ARROW			



FUEL TANK COMPONENT LIST	
A	PRIMARY EMERGENCY VENT
B	SECONDARY EMERGENCY VENT
C	LOW FUEL SWITCH
D	FUEL GAUGE
E	NORMAL VENT
F	ENGINE SUPPLY
G	ENGINE RETURN
H	RUPTURE BASIN SWITCH
J	FUEL FILL
K	HIGH FUEL ALARM
L	SPARE

NOTES:

1. TANKS ARE UL142 LISTED, SECONDARY CONTAINMENT FUEL TANK. REFER TO TANK LABELS AND LOCAL CODE TO DETERMINE VENTING REQUIREMENTS FOR BOTH COMPARTMENTS.

2. SUBBASE FUEL TANK MOUNTING. EXCESSIVE TWISTING OF THE FUEL TANK MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO ENSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:

   2.1 REFER TO APPLICATION MANUAL T030 FOR GENERAL SET MOUNTING GUIDELINES.

   2.2 AFTER PLACING SET ON FOUNDATION, VERIFY ALL FOUR MOUNTING PADS CONTACT FOUNDATION.

   2.3 THERE ARE SHIMS ATTACHED TO EACH FUEL TANK. THESE ARE INTENDED TO FILL ANY GAP BETWEEN THE MOUNTING PADS AND FOUNDATION.

   2.4 INSERT THE MAXIMUM HEIGHT STACK OF SHIMS THAT WILL SLIDE INTO THE GAP.

   2.5 TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.

3. FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.

4. FUEL TANK HAS A FLANGE THICKNESS OF UP TO 10 mm [0.394 in], ALLOW EXTRA LENGTH ON HARDWARE FOR UNEVENNESS OF MOUNTING SURFACE.

5. LIFTING BASE OF FUEL TANK PERIMETER IS SHOWN. FOUNDATION SHOULD BE EXTENDED BEYOND THIS PERIMETER. SEE T-030 APPLICATION MANUAL FOR FURTHER INSTRUCTIONS.

6. REMOVABLE STUB-UP ACCESS PANEL.

7. MAINTAIN MIN 51 mm [2] CLEARANCE ABOVE E-VENT.

8. WEIGHT AND CENTER OF GRAVITY INFORMATION IS ESTIMATED AND CHANGES WITH TANK FEATURE INSTALLATION.

9. DRY WEIGHT REFERS TO TANK WITH NO LIQUID. WET WEIGHT REFERS TO TANK FILLED WITH DIESEL TO MAXIMUM USEABLE VOLUME.

10. NOMINAL TANK VOLUME REFERS TO OVERALL TANK VOLUME. USEABLE TANK VOLUME REFERS TO MAXIMUM FILL VOLUME OF TANK.

11. CENTER OF GRAVITY DIMENSIONS REFER TO A DRY TANK.

12. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 9.52 MM [0.37]

13. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 21.52 MM [0.84]

14. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 7.94 MM [0.31]

15. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 26.97 MM [1.06]

PART NUMBER: A054B564	PART REVISION: H
PART NAME: OUTLINE,TANK	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 1 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: "

SIZE: A0 SCALE: 1/8

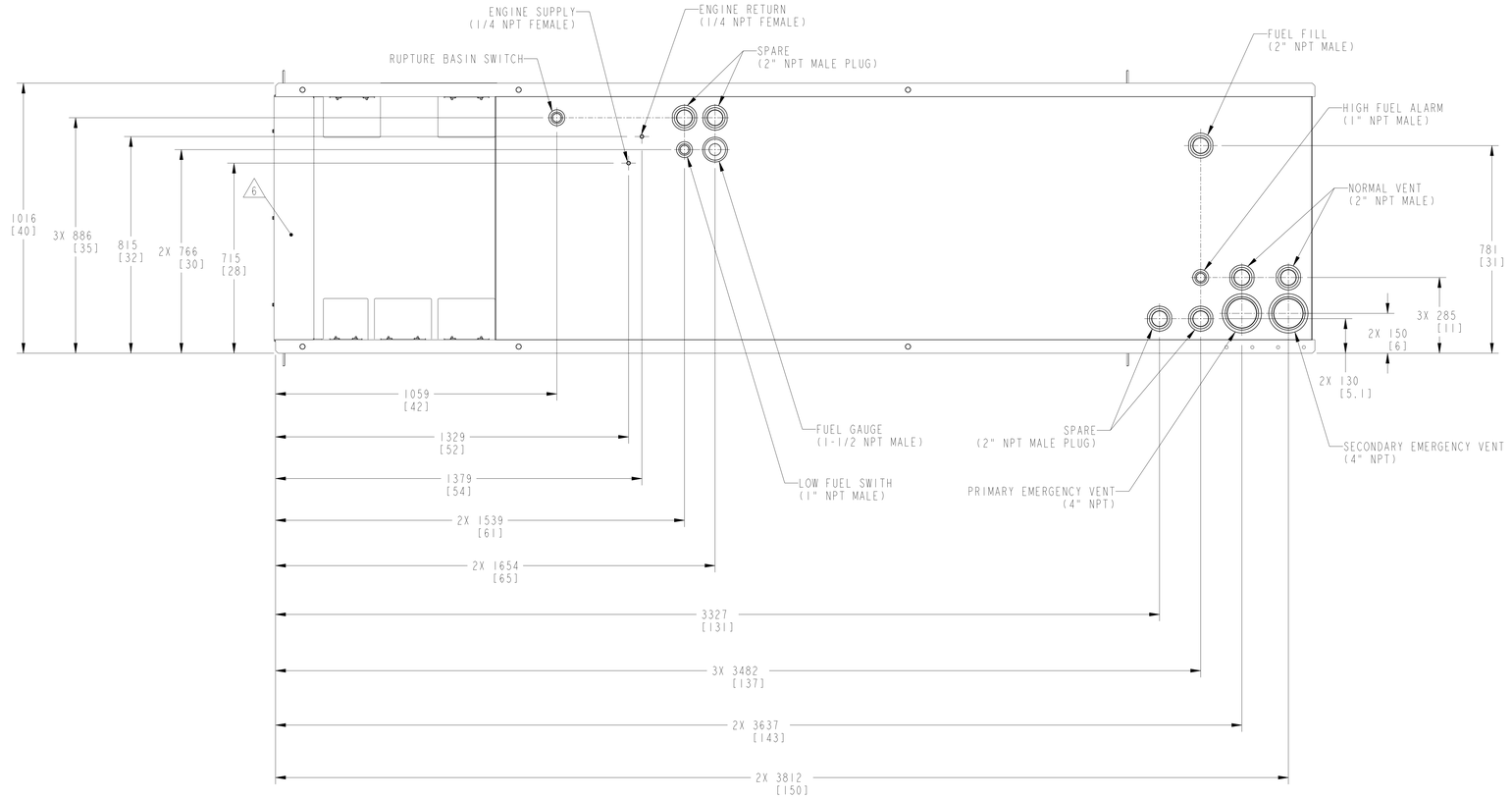
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

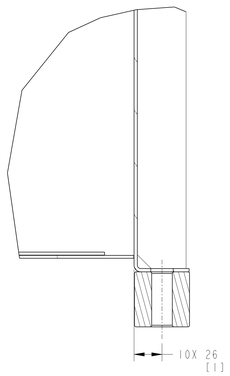
THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

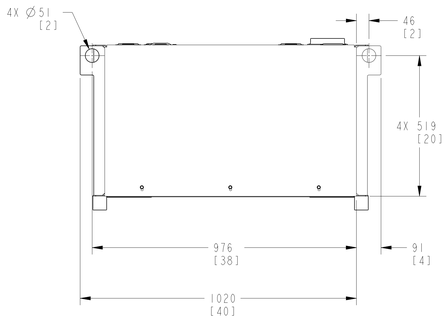
270 GALLON FUEL TANK (A053L909)

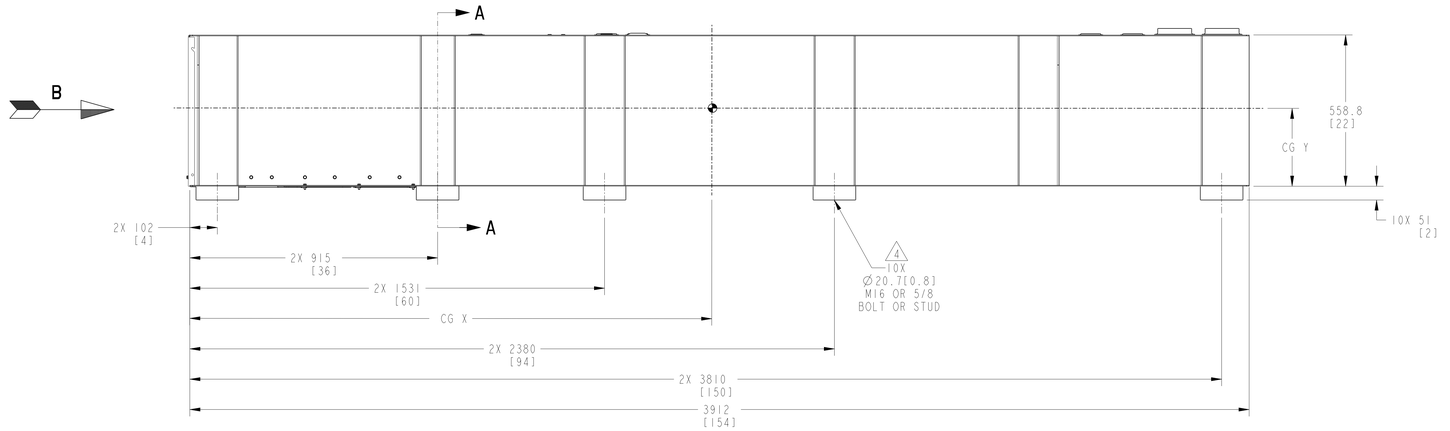
TABULATION							
WEIGHT KG [LBS]		TANK VOLUME LITERS [GAL]		TANK HEIGHT MM [IN]		CENTER OF GRAVITY MM [IN]	
DRY	WET	NOMINAL	USEABLE	EXTERNAL	INTERNAL	CG X	CG Y
607 [1338]	1457 [3213]	1045 [276]	1022 [270]	558 [22]	458.7 [18.06]	2170 [85]	283 [11]





SECTION A-A
SCALE 1/2
VIEW FROM B





PART NUMBER: A054B564	PART REVISION: H
PART NAME: OUTLINE,TANK	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 2 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -
SIZE: A0 SCALE: 1/8
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM PTC® Creo® Parametric

A053L909 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	23	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18.06	458.7	270	276
20.3	515.62		310

A053L911 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	25	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18	457.2	269	275
20	508	300	305
22	558.8	330	336
24	609.6	361	366
26	660.4	391	397
28	711.2	422	427
28.21	716.5	425	431
30.3	769.62		463

A053L912 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	25	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18	457.2	269	275
20	508	300	305
22	558.8	330	336
24	609.6	361	366
26	660.4	391	397
28	711.2	422	427
30	762	452	458
32	812.8	483	489
34	863.6	513	519
36	914.4	544	550
38	965.2	574	580
40	1016	605	611
41.31	1049.3	625	631
44.3	1125.22		676

PART NUMBER: A054B564	PART REVISION: H
PART NAME: OUTLINE,TANK	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 5 OF 6
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -
SIZE: A0
SCALE: 1/8

DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

COMES ON THE ENGINE

NOTES:

1. ALL DEVICES ARE SHOWN DE-ENERGIZED.
2. QSB5 AND QSB7: 12V SYSTEM BATTERIES CONNECTED IN PARALLEL. QSL9: 24V SYSTEM BATTERIES CONNECTED IN SERIES.
3. RELAYS RATED FOR 12V USED ON QSB5 AND QSB7. RELAYS RATED FOR 24V USED ON QSL9.
4. QSB5 AND QSB7: USE 12V BATTERY CHARGER. QSL9: USE 24V BATTERY CHARGER.

60 PIN CONN

CRANKSHAFT SPEED SENSOR
- CRANKSHAFT POSITION SIGNAL — 27
- CRANKSHAFT POSITION RETURN — 48
- CRANKSHAFT POSITION 5 VOLT SUPPLY — 16

CAMSHAFT POSITION SENSOR
- CAMSHAFT POSITION SIGNAL — 26
- CAMSHAFT POSITION RETURN
- CAMSHAFT POSITION 5 VOLT SUPPLY

RAIL FUEL PRESSURE SENSOR
- RAIL FUEL PRESSURE RETURN
- RAIL FUEL PRESSURE SIGNAL — 25
- RAIL FUEL PRESSURE 5 VOLT SUPPLY

WATER IN FUEL SENSOR
- WATER IN FUEL SIGNAL — 14
- WATER IN FUEL RETURN

INTAKE MANIFOLD PRESSURE/AIR TEMPERATURE SENSOR
- INTAKE MANIFOLD PRESSURE SIGNAL — 44
- INTAKE MANIFOLD PRESS/TEMP +5 VDC SUPPLY — 37
- INTAKE MANIFOLD AIR TEMP SIGNAL — 23
- INTAKE MANIFOLD PRESSURE/TEMP RETURN — 47

ENGINE OIL PRESSURE SENSOR
- ENGINE OIL PRESSURE SIGNAL — 13
- ENGINE OIL PRESSURE RETURN
- ENGINE OIL PRESSURE 5V SUPPLY

BAROMETRIC PRESSURE SENSOR
- BAROMETRIC PRESSURE SIGNAL — 03
- BAROMETRIC PRESSURE RETURN — 38
- BAROMETRIC PRESSURE 5 VOLT SUPPLY — 33

ENGINE COOLANT TEMPERATURE SENSOR
- ENGINE COOLANT TEMPERATURE SIGNAL — 15
- ENGINE COOLANT TEMPERATURE RETURN

FUEL PUMP ACTUATOR
- FUEL PUMP ACTUATOR SIGNAL — 02
- FUEL PUMP ACTUATOR RETURN — 32

SAE J1939 ENGINE DATALINK
- SAE J1939 ENGINE (+) — 08
- SAE J1939 ENGINE (-) — 06

6 CYLINDER ENGINES (QSB7 & QSL9)

PASS-THROUGH CONNECTORS

- INJECTOR 1: CYLINDER NUMBER 1 DRIVER — 45; CYLINDER NUMBER 1 RETURN — 53
- INJECTOR 2: CYLINDER NUMBER 2 DRIVER — 54; CYLINDER NUMBER 2 RETURN — 51
- INJECTOR 3: CYLINDER NUMBER 3 DRIVER — 55; CYLINDER NUMBER 3 RETURN — 52
- INJECTOR 4: CYLINDER NUMBER 4 DRIVER — 56; CYLINDER NUMBER 4 RETURN — 58
- INJECTOR 5: CYLINDER NUMBER 5 DRIVER — 46; CYLINDER NUMBER 5 RETURN — 60
- INJECTOR 6: CYLINDER NUMBER 6 DRIVER — 57; CYLINDER NUMBER 6 RETURN — 59

4 CYLINDER ENGINE (QSB5)

PASS-THROUGH CONNECTORS

- INJECTOR 1: CYLINDER NUMBER 1 DRIVER — 45; CYLINDER NUMBER 1 RETURN — 53
- INJECTOR 2: CYLINDER NUMBER 2 DRIVER — 57; CYLINDER NUMBER 2 RETURN — 59
- INJECTOR 3: CYLINDER NUMBER 3 DRIVER — 46; CYLINDER NUMBER 3 RETURN — 60
- INJECTOR 4: CYLINDER NUMBER 4 DRIVER — 55; CYLINDER NUMBER 4 RETURN — 52

CM850

BATTERY (+) (-)

STARTER SWITCH

STARTER: B+1, GND

C02: W-13, W-14, W-18, W-19, SP1, SP5, W-15, W-17

TO BE USED ONLY BY AUTHORIZED PERSONNEL

C05 ECM PROGRAMMING CONNECTOR

C01: W-22, W-23, W-24, W-26, W-25, W-27, SP2, SP3, SP4, P50, W-28, W-29, SP6, W-20, W-21, W-08

W-01, W-03, W-04, W-02, W-16, W-06, W-07, W-09, W-10, W-05, W-12, W-31

BATTERY CHARGING ALTERNATOR: CHRG ALT B+, CHRG ALT GND

PWR
- C02,C05 PWR
- POWER TO KEY SW,LCL/HMI
- STARTER B+
- CONTROL B+
- SWITCHED B+
- CRANK
- KEY SWITCH
- C02 PWR
- CONTROL GROUND
- C05 PWR

TO PAGE 2

LCL: W-32, W-33

SIG
- LCL B+
- LCL SIG

CAN+, CAN-, CAN SHIELD

TO PAGE 2

FOR QSB5 (12V), QSB7 (12V) AND QSL9 (24V) WITH PCC 2300

LEGEND:
ENGINE HARNESS
A053T310

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: -
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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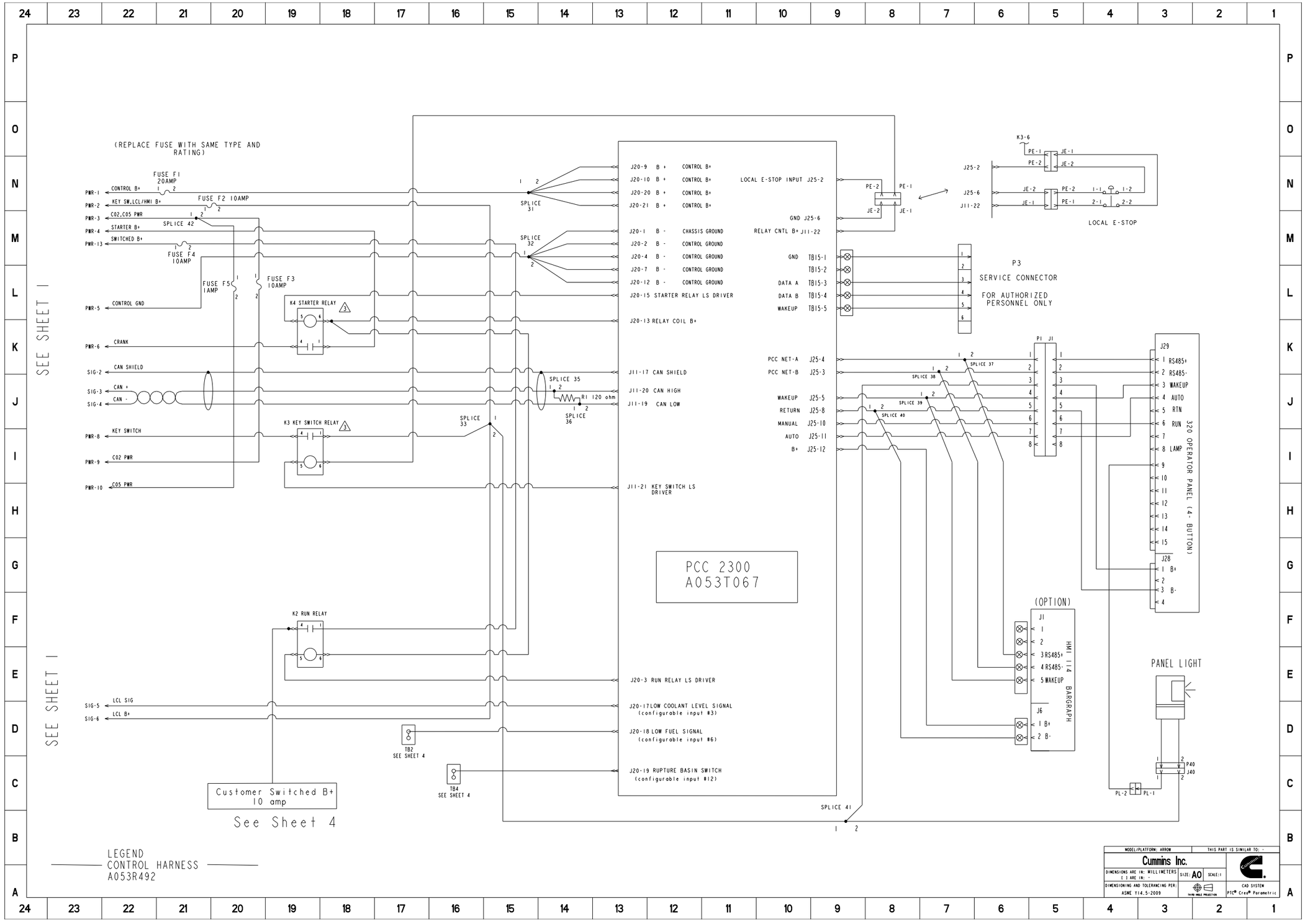
Part Number: **A054B421** Part Revision: **G**
Part Name: **DIAGRAM,GENSET SCHEMATIC**
Drawing Category: **Detail** State: **Released**



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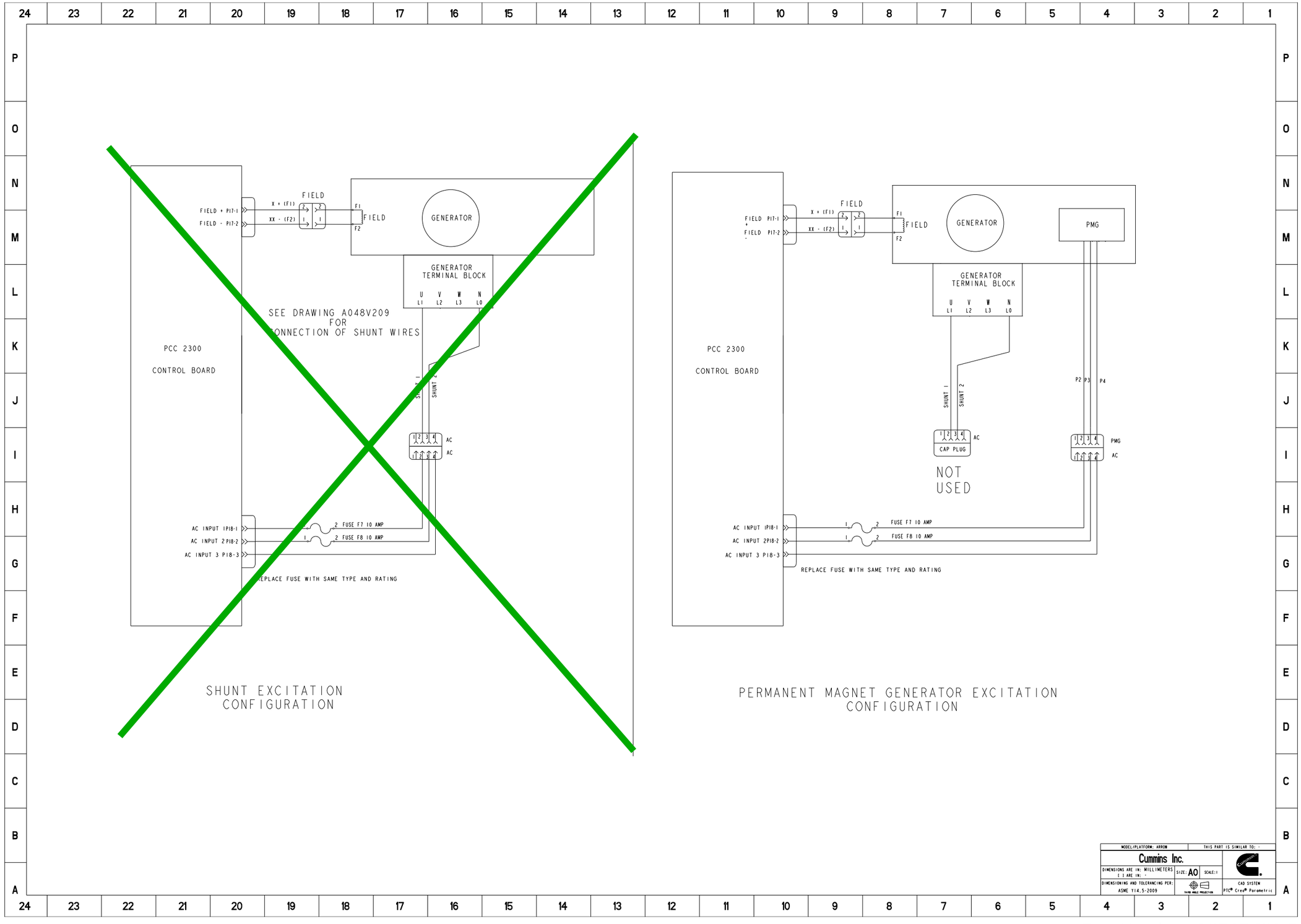

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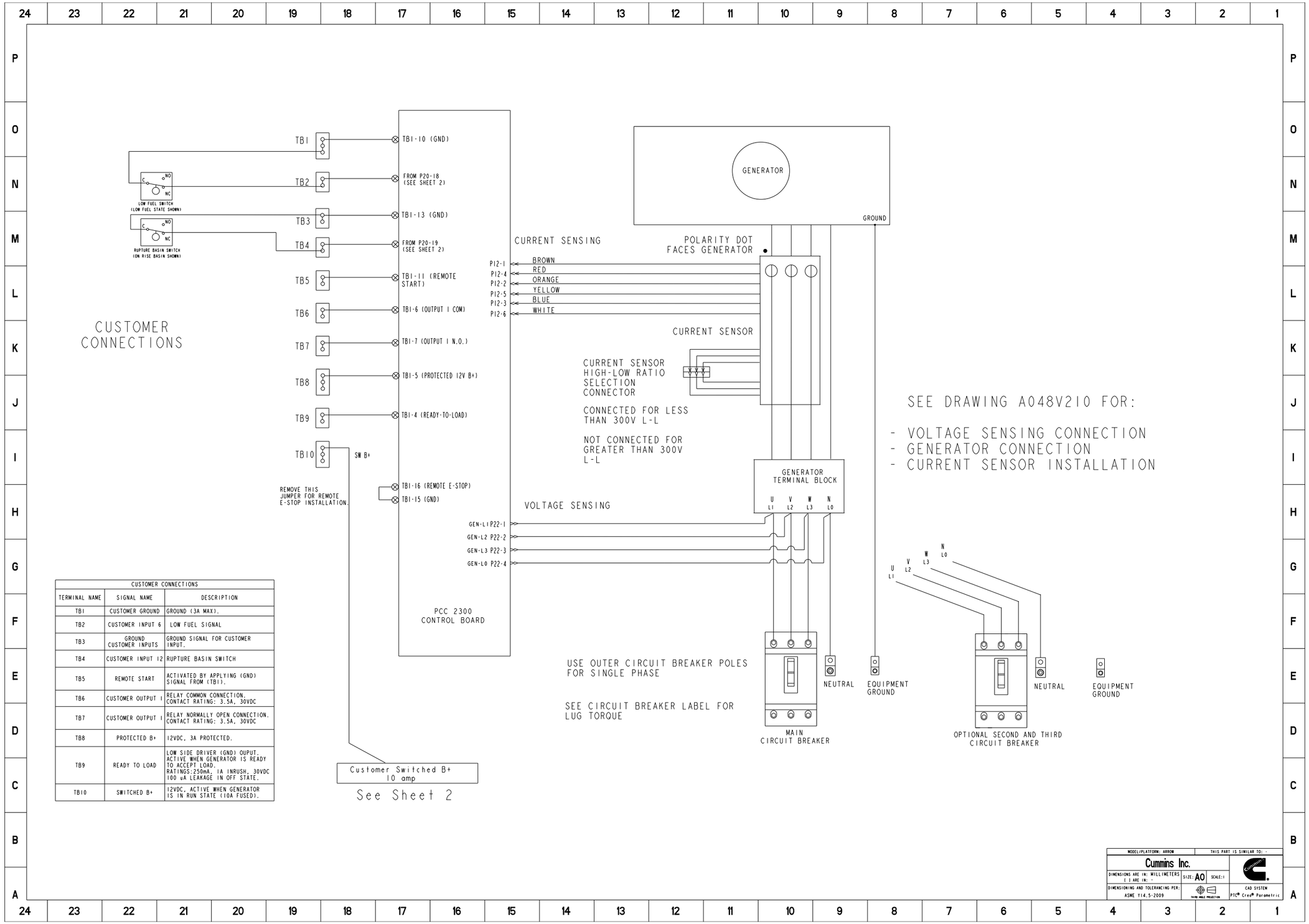

CUSTOMER CONNECTIONS		
TERMINAL NAME	SIGNAL NAME	DESCRIPTION
TB1	CUSTOMER GROUND	GROUND (3A MAX).
TB2	CUSTOMER INPUT 6	LOW FUEL SIGNAL
TB3	GROUND CUSTOMER INPUTS	GROUND SIGNAL FOR CUSTOMER INPUT.
TB4	CUSTOMER INPUT 12	RUPTURE BASIN SWITCH
TB5	REMOTE START	ACTIVATED BY APPLYING (GND) SIGNAL FROM (TB1).
TB6	CUSTOMER OUTPUT 1	RELAY COMMON CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB7	CUSTOMER OUTPUT 1	RELAY NORMALLY OPEN CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB8	PROTECTED B+	12VDC, 3A PROTECTED.
TB9	READY TO LOAD	LOW SIDE DRIVER (GND) OUPUT. ACTIVE WHEN GENERATOR IS READY TO ACCEPT LOAD. RATINGS:250mA, 1A INRUSH, 30VDC 100 uA LEAKAGE IN OFF STATE.
TB10	SWITCHED B+	12VDC, ACTIVE WHEN GENERATOR IS IN RUN STATE (10A FUSED).

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: -
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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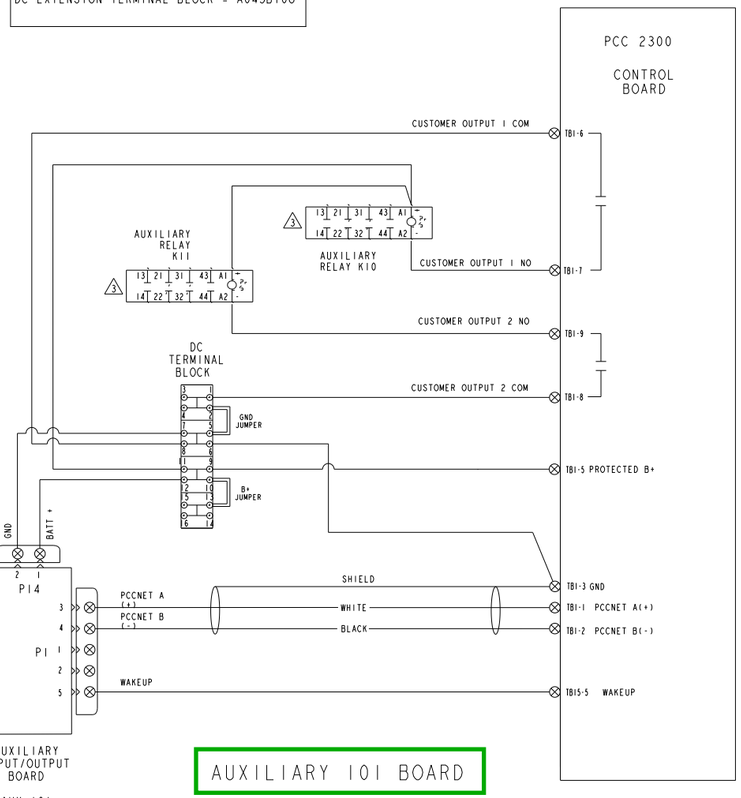
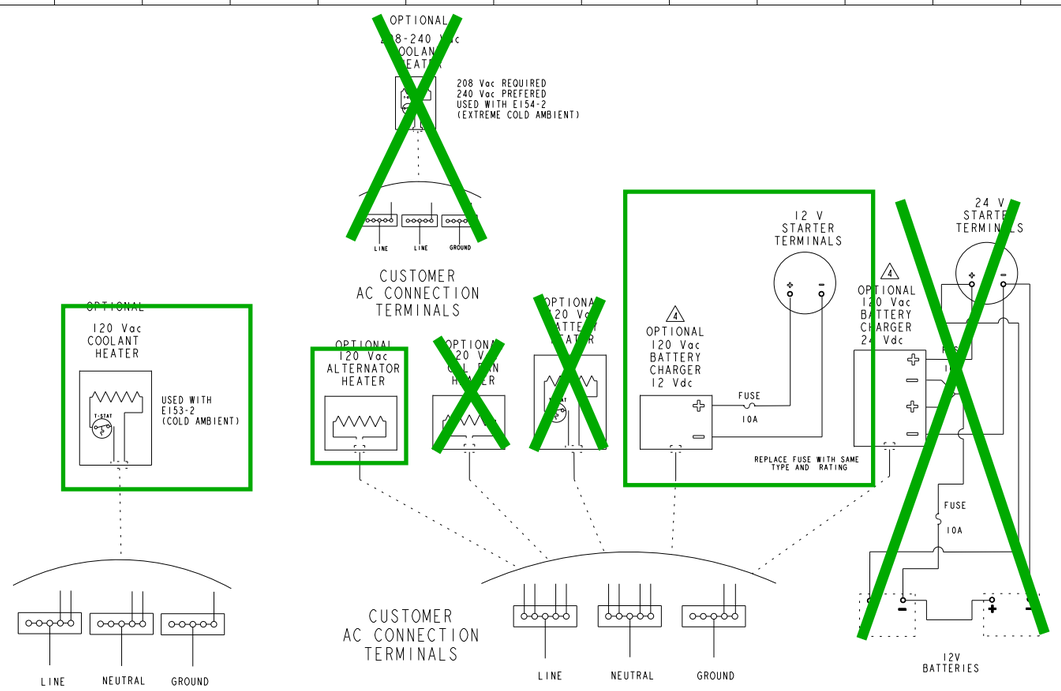
HARNESSES FOR OPTIONS
AUX 101 = A043A230
AUXILIARY RELAYS = A042Z041
DC EXTENSION TERMINAL BLOCK = A043B108



AUXILIARY 101 BOARD

AUXILIARY RELAYS

DC EXTENSION TERMINAL BLOCKS



INSTALLER TO PROVIDE BRANCH CIRCUITS TO POWER ALL ACCESSORIES

ALL ACCESSORIES ARE SINGLE PHASE 120/240 V Ac 60 Hz

FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRIC CODES FOR INSTALLATION

[redacted] COOLANT HEATER [redacted] 1500 Watts, 120V Ac, 12.50 Amps

[redacted]

[redacted]

ALTERNATOR HEATER 100 Watts, 120V Ac, 0.83 Amps

BATTERY CHARGER (12V), 192 Watts, 120V Ac, 1.67 Amps (MAX)

[redacted]

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: -
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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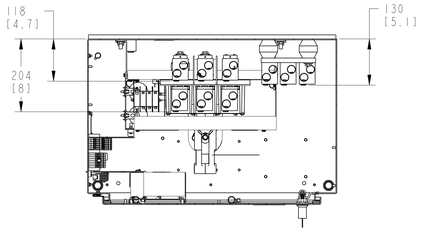


SECTION W-W

NOTES:

1. APPROXIMATE WEIGHT BASED ON CAD MODEL (NOT FOR INSPECTION):
   FOR TYPE 1: 288.7 LBS (131 KG)
   FOR TYPE 3R: 378.8 LBS (171.9 KG)
   FOR TYPE 4: 380.8 LBS (172.7 KG)
   FOR TYPE 4X: 473.3 LBS (214.7 KG)
   FOR TYPE 12: 361.2 LBS (163.9 KG)

2. MECHANICAL LUG CAPACITY:
   FOR 300,400 AMP
   3/0-600 MCM CU-AL (QTY 1 WIRE)
   3/0-250 MCM CU-AL (QTY 2 WIRES)
   FOR 600 AMP
   250-500 MCM CU-AL (QTY 2 WIRES)

3. USE SEPARATE CONDUITS FOR CONTROL WIRING AND POWER WIRING. DO NOT COMBINE.

4. SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA. DO NOT INSTALL OUTSIDE OF SHADED AREA.

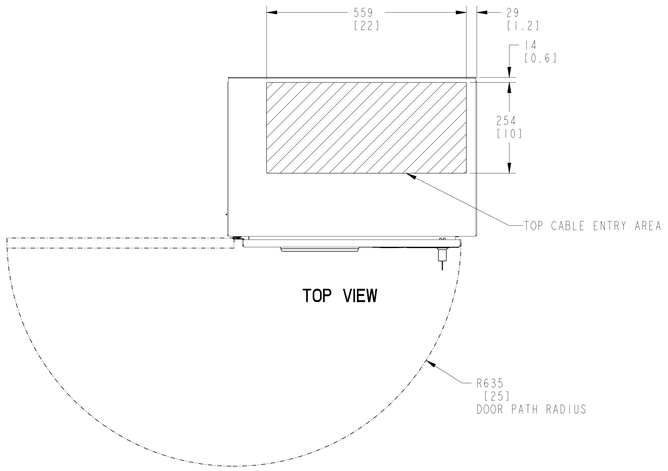
5. WIRE BENDING SPACE CONFORMS TO NATIONAL ELECTRIC CODE (NFPA70).

6. CLEARANCE: NEC REQUIRED MINIMUM 36 INCHES FOR FRONT CLEARANCE.

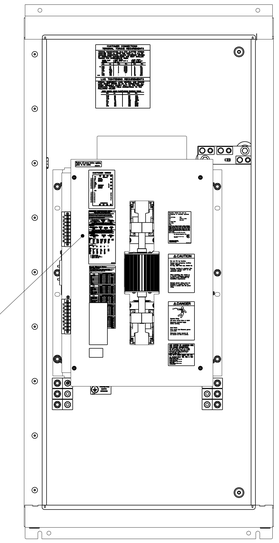
7. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.

8. CENTER OF GRAVITY IS APPROXIMATE.

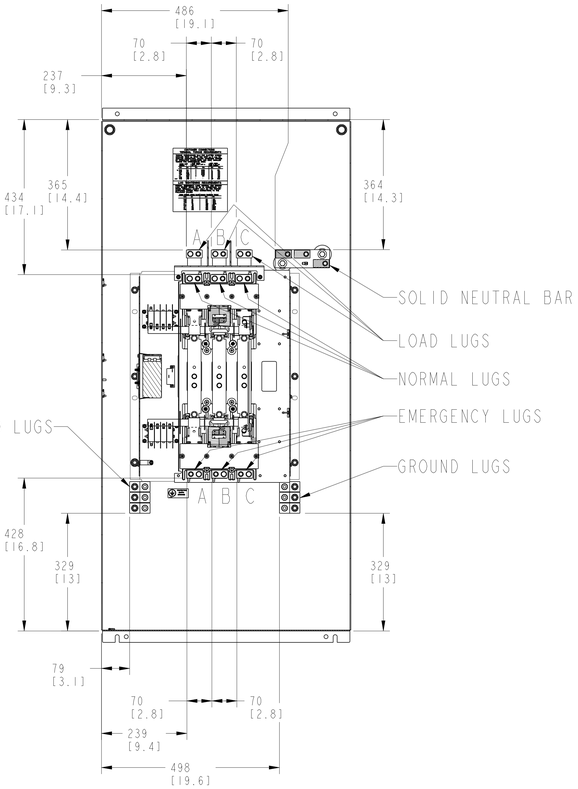
9. FOR UNITS WITH BOLTED DOOR CLAMPS; DO NOT TIGHTEN WITH IMPACT DRIVER AND USE THE FOLLOWING TORQUE REQUIREMENTS: 5/16-18= 13.6-16.3 Nm



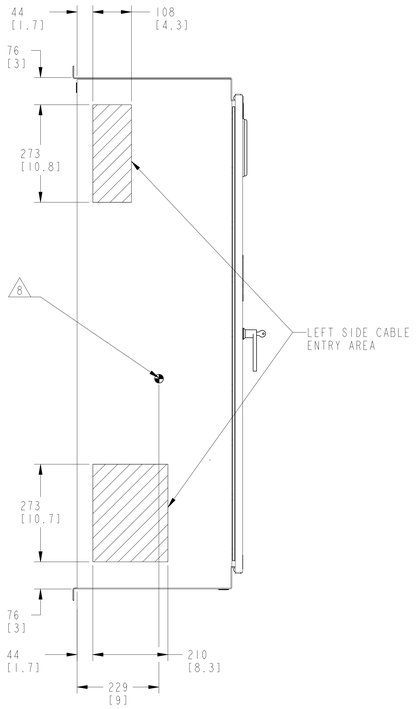
TOP VIEW



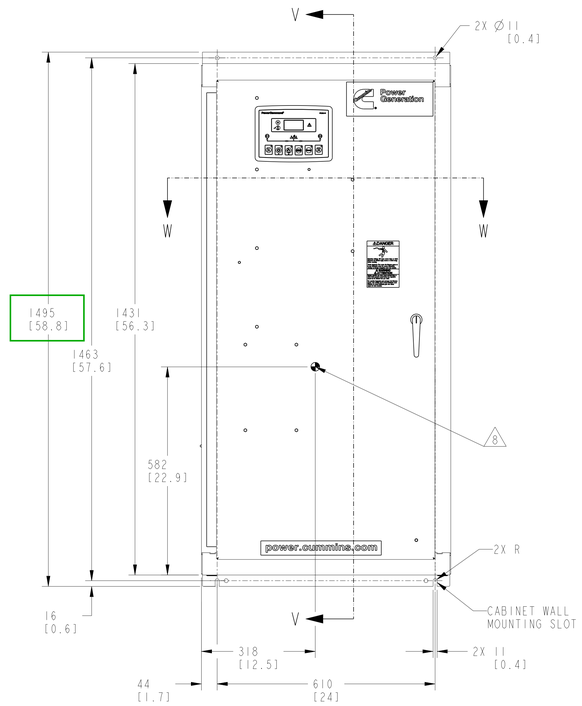
FRONT VIEW
DOOR HIDDEN FOR CLEAR VISUALIZATION



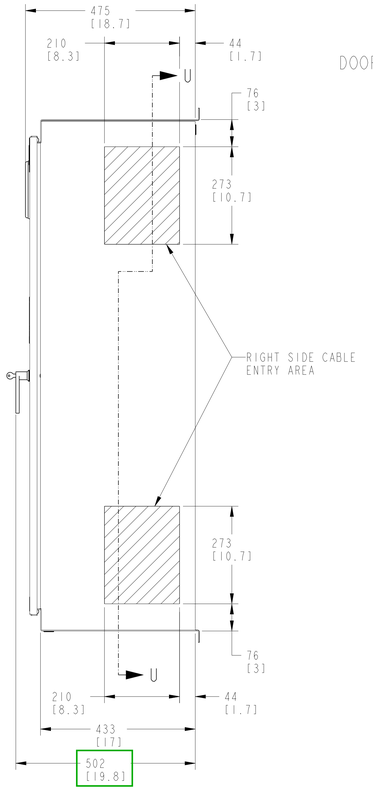
SECTION U-U



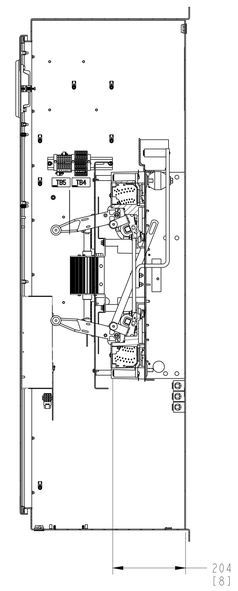
LEFT SIDE VIEW



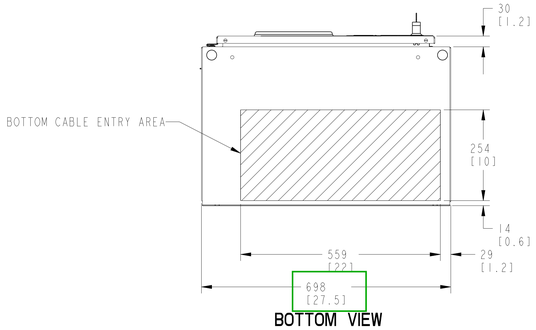
FRONT VIEW



RIGHT SIDE VIEW



SECTION V-V



BOTTOM VIEW

OTEC 300-600A, 3 POLE, TYPE 3R & 12

PART NUMBER: A074K635	PART REVISION: B
PART NAME: OUTLINE,ENCLOSURE	
DRAWING CATEGORY: OUTLINE	
STATE: RELEASED	SHEET: 2 OF 5
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

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DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES | SIZE A0 | SCALE:0.165

DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009 | THIRD ANGLE PROJECTION

CAD SYSTEM PTC® Creo® Parametric

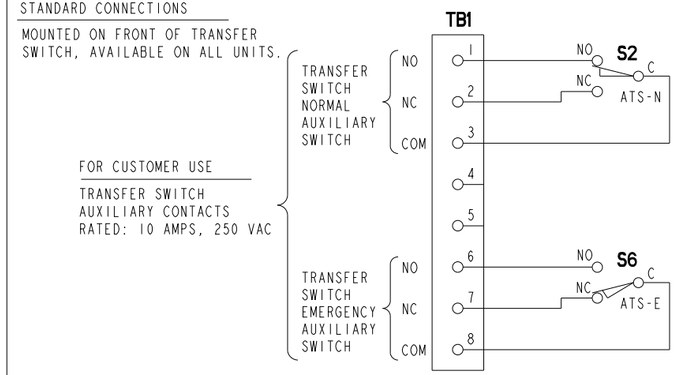
CUSTOMER CONNECTIONS (STANDARD)

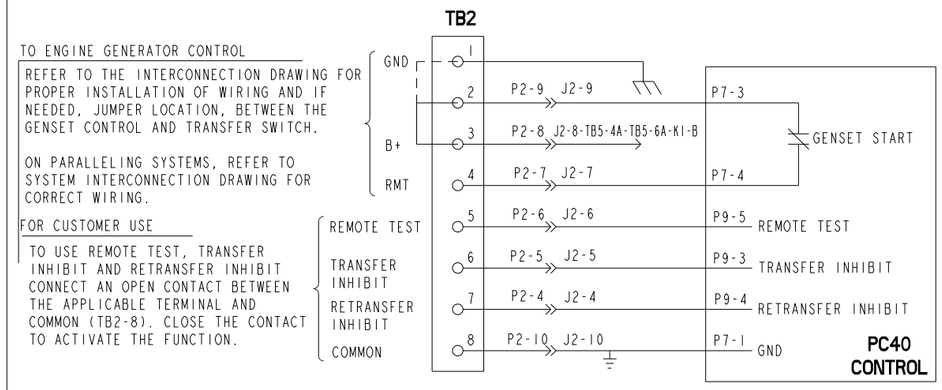
STANDARD CONNECTIONS

MOUNTED ON FRONT OF TRANSFER SWITCH, AVAILABLE ON ALL UNITS.

FOR CUSTOMER USE

TRANSFER SWITCH AUXILIARY CONTACTS RATED: 10 AMPS, 250 VAC



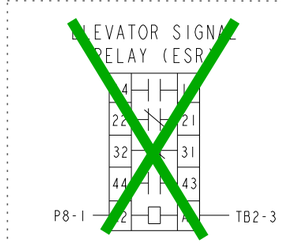


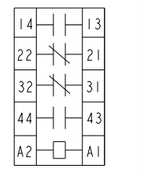
S2,S3,S4 AND S5 NORMAL POSITION AUXILIARY SWITCH
S6,S7,S8 AND S9 EMERGENCY POSITION AUXILIARY SWITCH
K1 OPEN EMERGENCY RELAY
K2 OPEN NORMAL RELAY
K3 CLOSE RELAY
CB MAIN CIRCUIT BREAKER
CB1 CIRCUIT BREAKER
M1 LINEAR MOTOR
C1 MOTOR RUN CAPACITOR

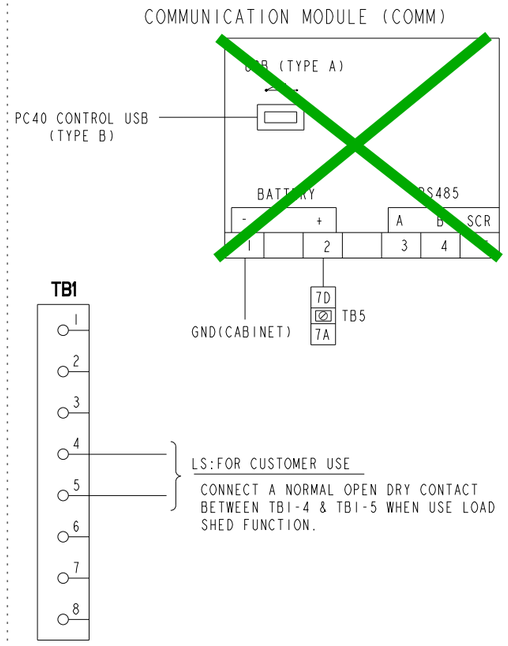
UTILITY TO GENSET
3 AND 4 POLE
OTEC 40-600 AMP & OTECSE 40-125 AMP
120 VOLT 1 PHASE L-N
220 VOLT 1 PHASE
240 VOLT 1 PHASE
190 VOLT 3 PHASE
208 VOLT 3 PHASE
220 VOLT 3 PHASE
240 VOLT 3 PHASE
380 VOLT 3 PHASE
415 VOLT 3 PHASE
440 VOLT 3 PHASE
480 VOLT 3 PHASE

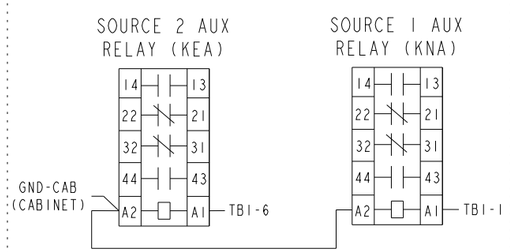
OPTIONS:
COMM: COMMUNICATION MODULE
ESR: ELEVATOR SIGNAL RELAY
KGS: GENSET START AUX RELAY
KNA: SOURCE 1 AUX RELAY
KEA: SOURCE 2 AUX RELAY
LPCM: LOAD PHASE CURRENT MONITORING
LS: LOAD SHED

CUSTOMER CONNECTIONS (OPTIONAL)









NOTES:

1. TB1 AND TB2 ARE MOUNTED ON THE FRONT OF THE TRANSFER SWITCH.
2. ALL DEVICES ARE SHOWN DE-ENERGIZED, WITH THE TRANSFER SWITCH CLOSED TO NORMAL. 4 POLE TRANSFER SWITCH SHOWN. ON 3 POLE MODELS THE SWITCHED NEUTRAL POLE IS REPLACED WITH A SOLID NEUTRAL BAR. P1-11 AND P1-5 ARE CONNECTED TO NEUTRAL BAR ON 3 POLE MODELS. ON SHEET 3.
3. FOR SINGLE PHASE UNITS: 120/240V, 3 WIRE - CONNECT POWER CABLES TO A AND C 120V L-N, 2 WIRE - CONNECT POWER CABLES TO A AND NEUTRAL.
4. FOR OTECSE MODEL, LIST OF MAIN CIRCUIT BREAKER TYPE SHOWN BELOW: SWITCH RATING: MAIN CIRCUIT BREAKER TYPE 40-125A SQUARE D, TYPE 'HG'.
5. WIRING FOR RELAYS KNA AND KEA IS TYPICAL. POWER CONNECTIONS MAY VARY SLIGHTLY IF MORE OR LESS RELAYS ARE USED.
6. WHEN INSTALLING MULTIPLE RELAYS JUMPER GROUNDS TOGETHER INSTEAD OF RUNNING LEADS ALL THE WAY BACK TO GROUND. WHEN INSTALLING MULTIPLE RELAYS WITH THE SAME FUNCTION CONNECT TOGETHER FOR EASIER WIRING ON SHEET 5.
7. KGS PROVIDED UNWIRED FOR ADDITIONAL GENSET START WIRING LOGIC TO MEET ANY LOCAL CODE OR INSTALLATION REQUIREMENTS. REFER TO THE INTERCONNECTION DRAWING FOR PROPER INSTALLATION OF WIRING. ON SHEET 5.
8. ON ALL SINGLE PHASE, 2 OR 3 WIRE UNITS: THE WIRE CONNECTED FROM J1-2 TO P4-6 IS NOT PRESENT. THE WIRE CONNECTED FROM J1-14 TO P4-2 IS NOT PRESENT. IN ADDITION, ON 120 VOLT L-N, 2 WIRE UNITS: THE WIRE CONNECTED FROM K1-4 TO TB4-2A WILL BE CONNECTED FROM K1-4 TO TB4-3A THE WIRE CONNECTED FROM K2-4 TO TB4-5A WILL BE CONNECTED FROM K2-4 TO TB4-6A ON SHEET 2.
9. ELEVATOR SIGNAL RELAY SHOWN DE-ENERGIZED. RELAY CHANGES STATE DURING THE ELEVATOR DELAY TIME.
10. CAUTION: DO NOT DISCONNECT THE CURRENT MODULE WHILE THE CURRENT TRANSFORMERS ARE ENERGIZED UNLESS THE SECONDARIES ARE SHORTED. TO SHORT SECONDARIES ATTACH THE SHORTING BAR TO THE CENTER OF TB6-4 TO TB6-7 BEING SURE TO TIGHTEN EACH SCREW. ON SHEET 4, 5.
11. THE CURRENT TRANSFORMERS ARE SHORTED DURING SHIPPING. TO ACTIVATE, REMOVE THE SHORTING BAR FROM THE CENTER OF TB6-4 TO TB6-7 BY LOOSENING ALL OF THE SCREWS AND LIFTING IT OUT OF THE TERMINAL BLOCK. SAVE FOR REUSE. ON SHEET 4, 5.
12. FOR SINGLE PHASE TWO WIRE SYSTEM, CT2 AND CT3 WILL BE REMOVED. FOR SINGLE PHASE THREE WIRE SYSTEM, CT3 WILL BE REMOVED. ON SHEET 4, 5.

MODEL/PLATFORM: OTEC	THIS PART IS SIMILAR TO: A065K034
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: "	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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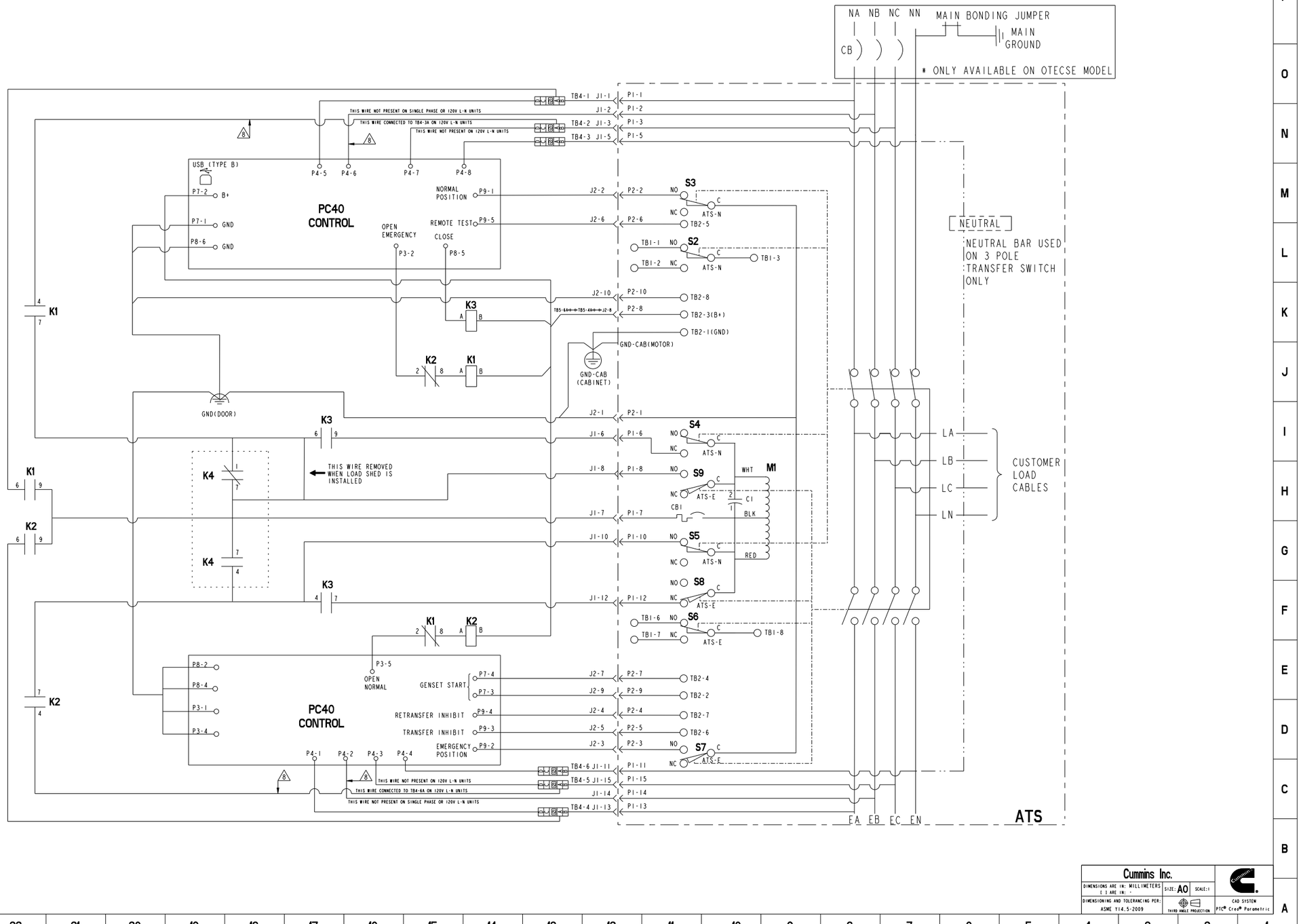
Part Number: **A074P733** Part Revision: **B**
Part Name: **DIAGRAM,SCHEMATIC**
Drawing Category: **Detail** State: **Released**

STANDARD SCHEMATIC DIAGRAM



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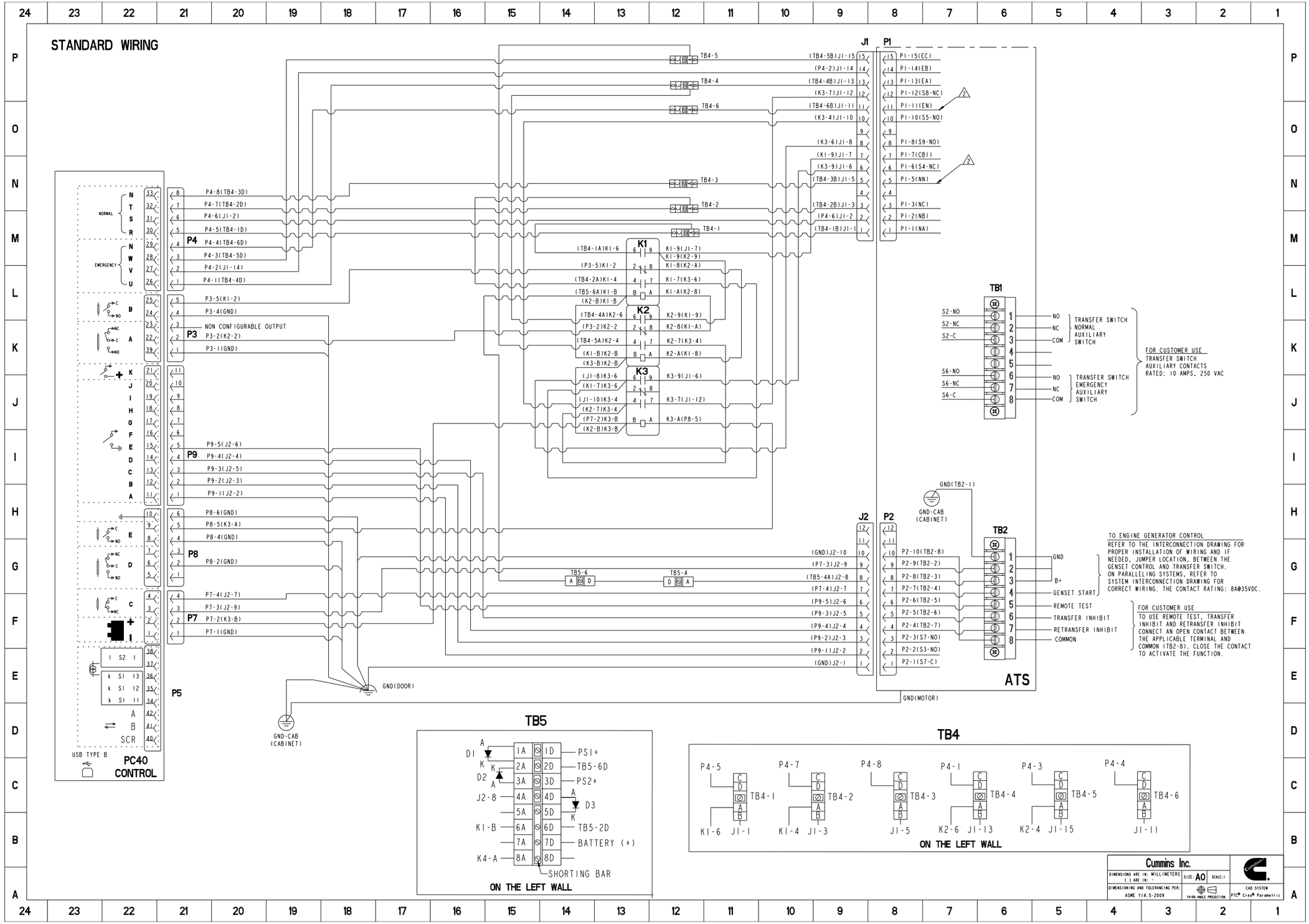

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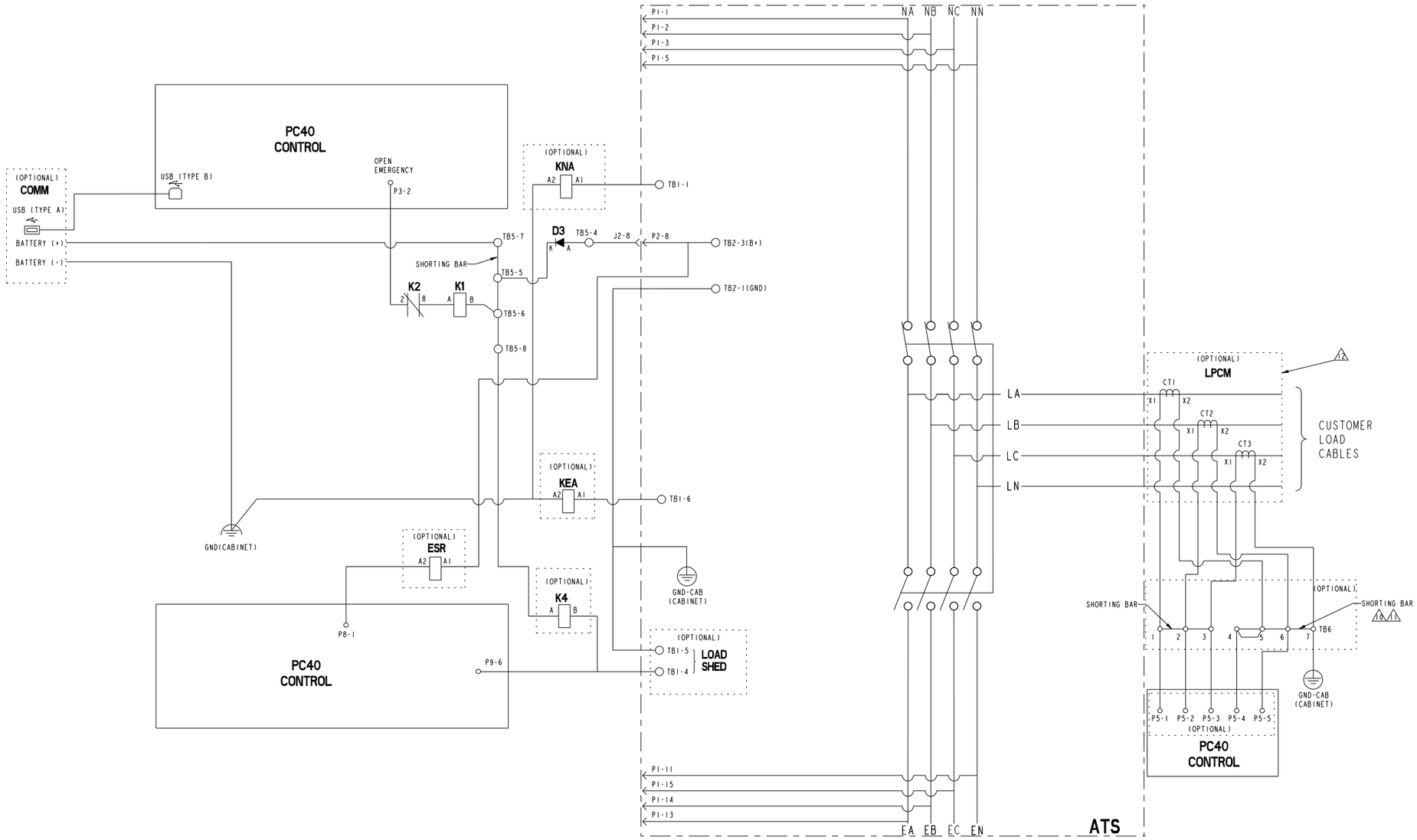
OPTIONAL SCHEMATIC DIAGRAM



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OPTIONAL WIRING

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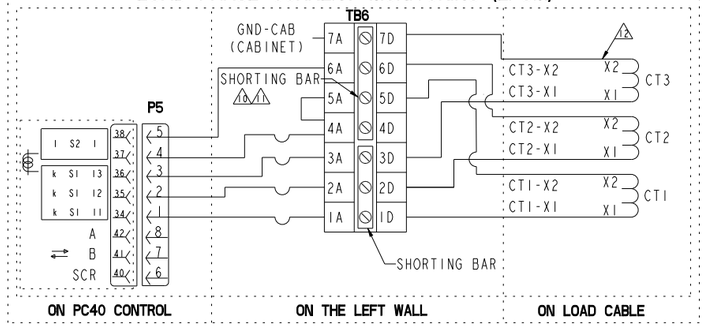

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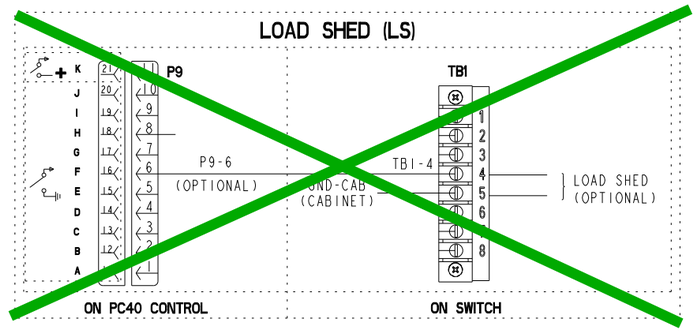

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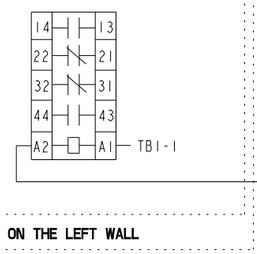

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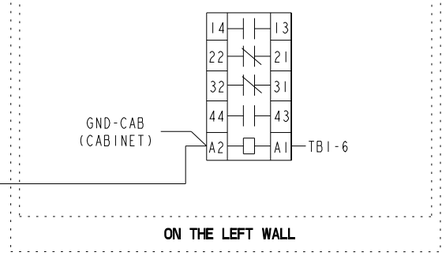

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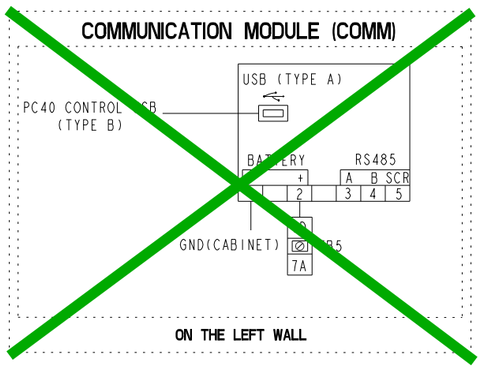

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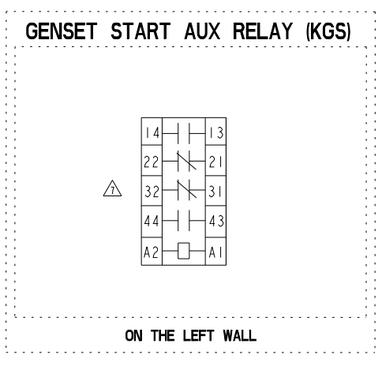

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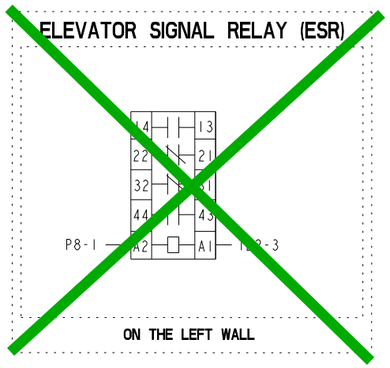

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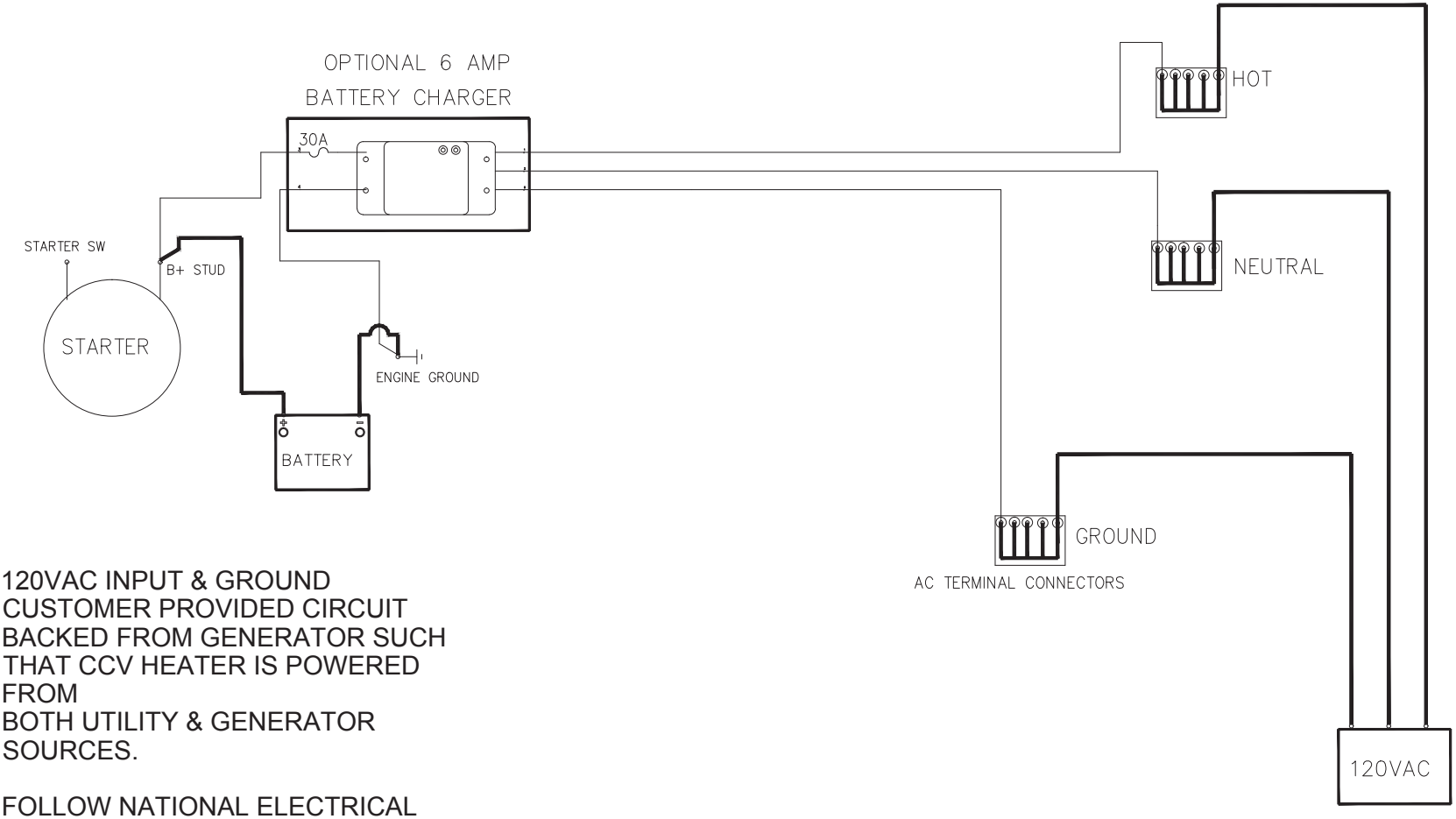
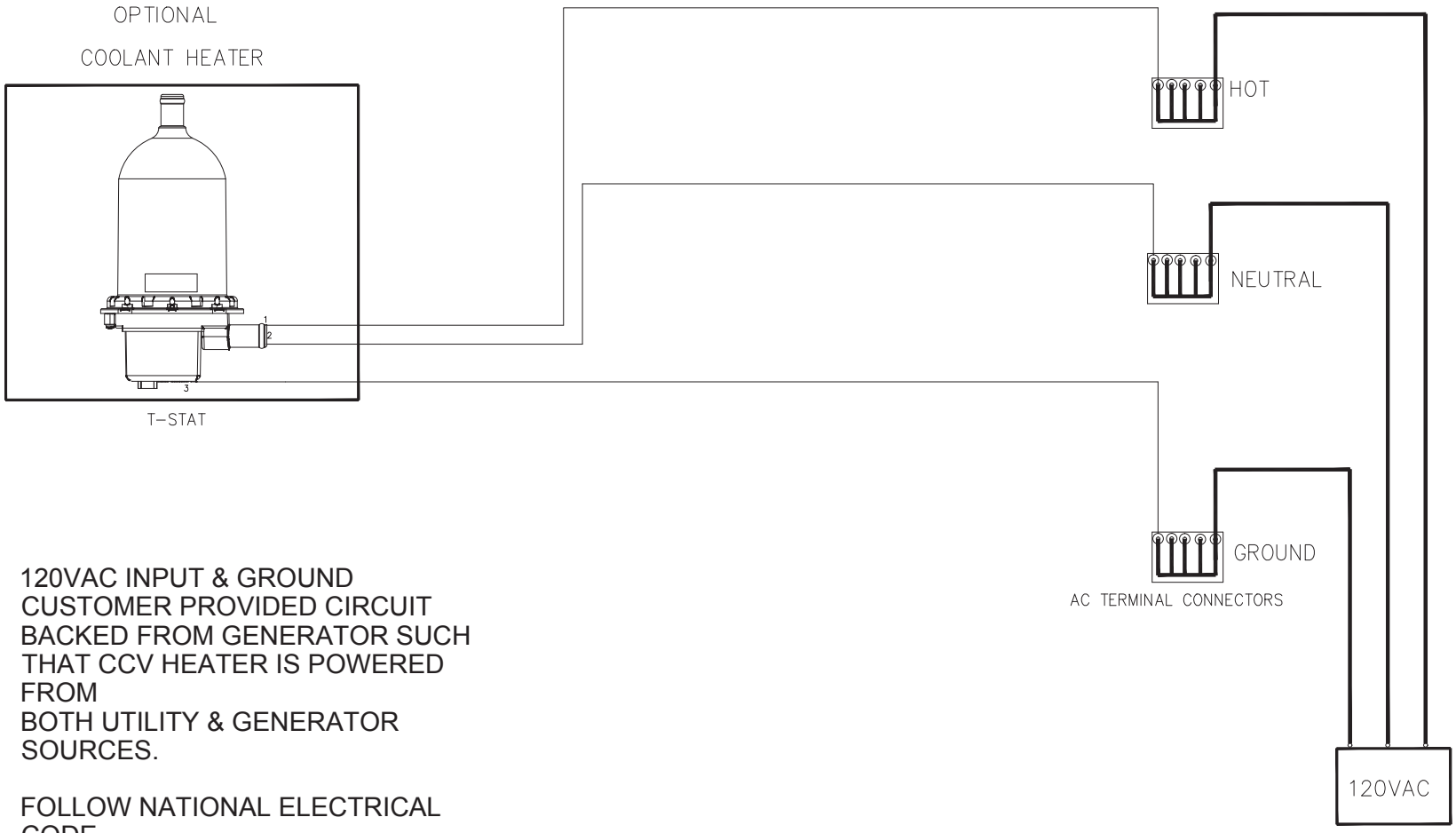


120VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
FROM
BOTH UTILITY & GENERATOR
SOURCES.

FOLLOW NATIONAL ELECTRICAL
CODE
FOR INSTALLATION.

CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA	AUTHOR: D.BAUER	DATE: 27SEPT2016
	DRAWING NAME: CONNECT SERIES BATT CHARGER 9030	PAGE:



120VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
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FOR INSTALLATION.

CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA	AUTHOR: D.BAUER	DATE: 27SEPT2016
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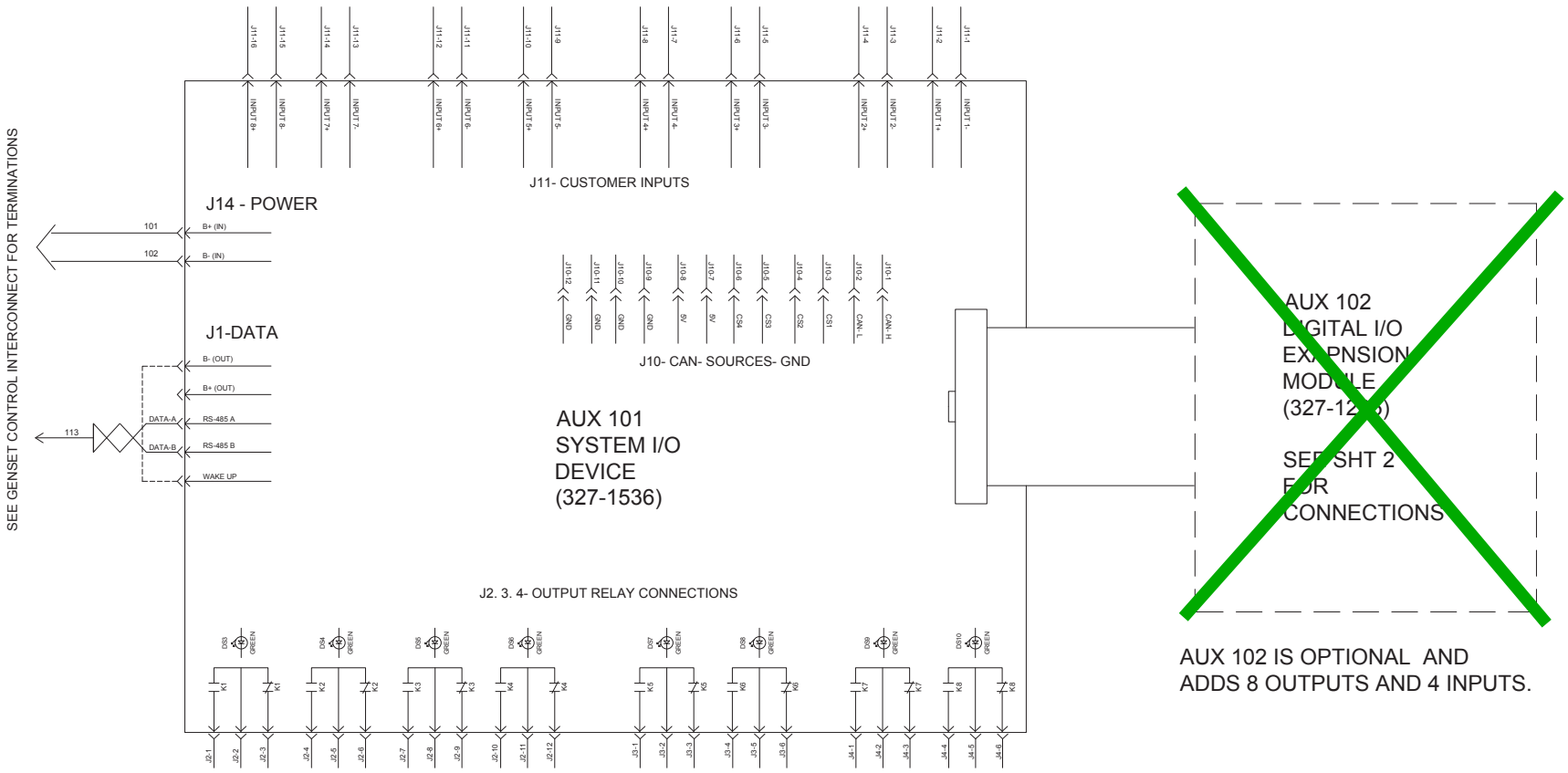
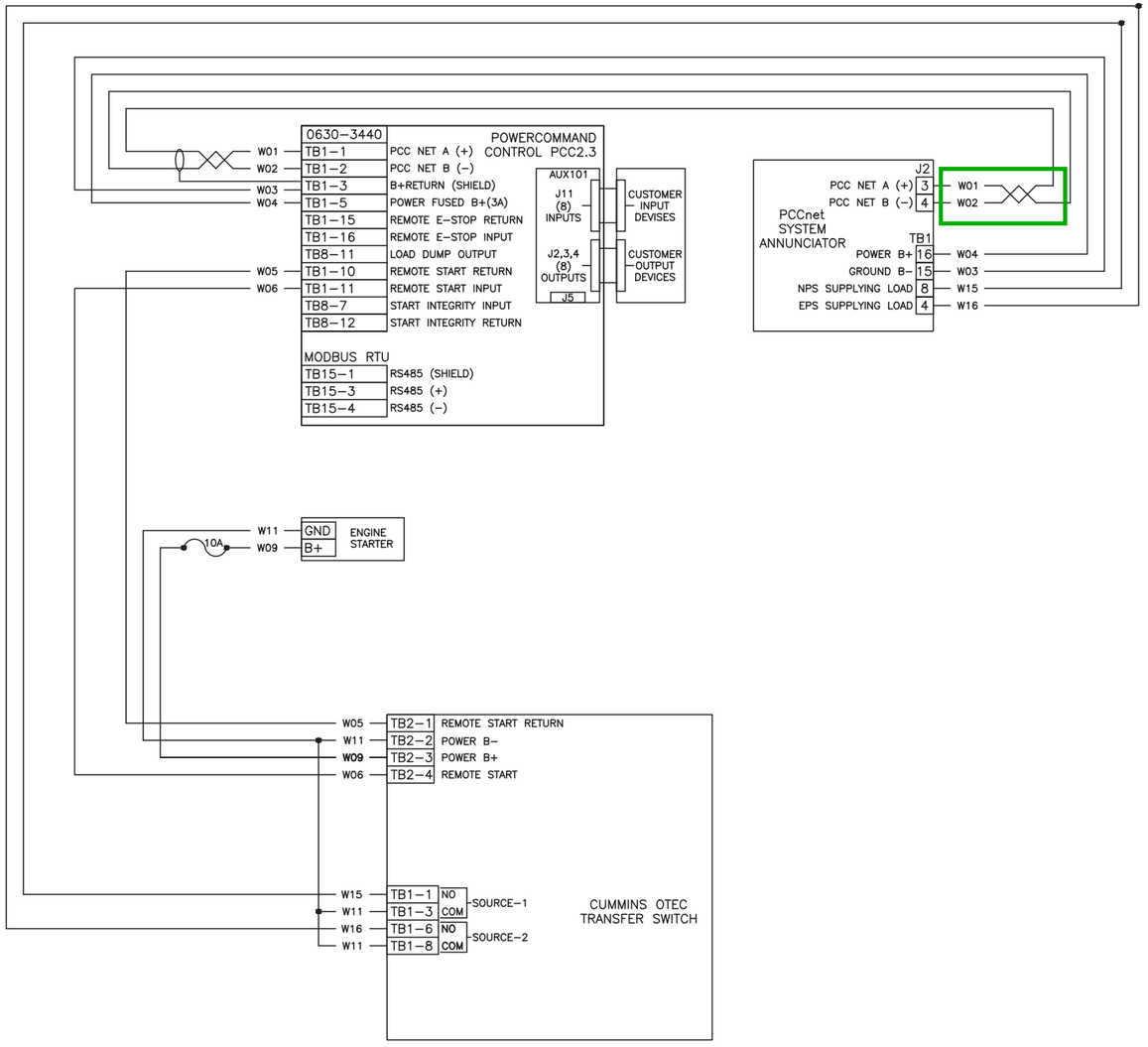


INPUTS AND OUTPUTS ARE
PROGRAMMABLE PER CUSTOMER
SPECIFICATION.

CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR:	DATE:
D.BAUER	27SEPT2016
DRAWING NAME: TYP AUX 101 9013	PAGE:



- ALL INTERCONNECT WIRING AND DATA CABLING IS TO BE DONE WITH STRANDED WIRE PER NFPA 37.
- PCC NET CABLE: BELDEN 9729. (24 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- OTEC PC40 MODBUS RS485 CABLE: BELDEN 9841. (22 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- TOTAL NETWORK LENGTH NOT TO EXCEED 4000 FT.
- ATS LOAD SHED WIRING IS SHOWN FOR REF.-----

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL:
.X: .06
.XX: .03
.XXX: .01
ANGLES: .5°

REFERENCES	PREP. BY:	CHKD BY:	MODIFIED BY:	
0630-3440	KDU	–	–	10/16/24
A065K034				
A065H780				

FINISH: N/A

OTEC ATS

ENGINE FAMILY: PCC2300

CSSNA POWER GEN	SITE NAME: –	CONTACT NAME: –	CUSTOMER PROJECT NO: –
	CONTRACTOR NAME: –	CONTACT NO: –	CSSNA PROJECT NO: –

TITLE: PCC2.3 CONTROL / OTEC ATS QSB5 & QSB7

SIZE: B | DWG NO: PCC2.3 INTERCONNECT | REV 1

SCALE: NONE | DO NOT SCALE PRINT | SHEET 1 OF 1

APPENDIX G

Draft Contract

CONTRACT

FOR

INSTALLATION OF PRE-PURCHASED
BACKUP POWER GENERATORS
AT THE HILLBURN TRANSFER STATION,
HILLBURN SCALE HOUSE AND
BOWLINE TRANSFER STATION
(RFP 2026-02)

BETWEEN

THE ROCKLAND COUNTY SOLID WASTE MANAGEMENT AUTHORITY
d/b/a ROCKLAND GREEN

and

_____

Dated as of , 2026

DRAFT

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CONTRACT

INSTALLATION OF PRE-PURCHASED BACKUP POWER GENERATORS AT THE HILLBURN TRANSFER STATION, HILLBURN SCALE HOUSE AND BOWLINE TRANSFER STATION

(RFP 2026-02)

This Contract for the Installation of Installation of Pre-Purchased Backup Power Generators at the Hillburn Transfer Station, Hillburn Scale House and Bowline Transfer Station (RFP 2026-02) is made and entered into as of ___ , 2026 between the Rockland Green, a body corporate and politic constituting a public benefit corporation of the State of New York and _____, a Corporation organized and existing under the laws of the State of _____ and duly licensed and registered with the State of New York and in accordance with Applicable Law (the "Contractor").

R E C I T A L S

WHEREAS, Rockland Green owns the Hillburn Transfer Station, located at 420 Torne Valley Road, Hillburn, New York; and

WHEREAS, Rockland Green owns the Hillburn Scale House, located at ___ Torne Valley Road, Hillburn, New York; and

WHEREAS, Rockland Green owns the Haverstraw Bowline Transfer Station, located at 200 Beach Road, West Haverstraw, New York; and

WHEREAS, Rockland Green issued Request for Proposals No. 2026-02 ("RFP") on February 24, 2026, for the solicitation of proposals from firms qualified to install generators; and

WHEREAS, Rockland Green provided potential proposers with reasonable access to the project sites to allow them the opportunity to conduct such inspections and reviews as proposers deemed necessary to become familiar with the project sites and to review related documentation prior to submission of the proposals; and

WHEREAS, on March 31, 2026 Rockland Green received ____ proposals in response to the RFP; and

WHEREAS, on April 22, 2026 Rockland Green selected the Contractor, as having submitted the most advantageous proposal, to enter into this Contract; and

WHEREAS, the Contractor will be responsible for the installation of two pre-purchased 60 kW stationary electrical generators and automatic transfer switches and one (1) pre-purchased 70 kW trailer mounted electrical generator and manuel transfer switch , including modified electrical services , at the Hillburn Transfer Station, located at 420 Torne Valley Road, Hillburn, NY, the Hillburn Scale house located at Torne Valley Road, Hillburn, Ny and the Haverstraw Bowline Transfer Station located at 200 Beach Road, West Haverstraw, NY. Tin accordance with the terms of this Contract; and

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NOW, THEREFORE, in consideration of the mutual covenants contained in this Contract, the Parties hereto, intending to be legally bound, agree as follows:

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ARTICLE I.
DEFINITIONS AND INTERPRETATION

SECTION 1.1 DEFINITIONS. As used in this Contract the following terms shall have the meanings set forth below:

"Act" means the Rockland County Solid Waste Management Authority Act codified as Title 13-M, Section 2053-a, et seq. of the Public Authorities Law of the State of New York.

"Affiliate" means any person, corporation or other entity directly or indirectly controlling or controlled by another person, corporation or other entity or under direct or indirect common control with such person, corporation or other entity.

"Applicable Law" means any law, rule, codes, standards, regulation, requirement, policy, consent decree, consent order, consent agreement, permit, guideline, action, determination or order of, or Legal Entitlement issued by, any Governmental Body having jurisdiction, applicable from time to time to any activities associated with the subject matter of this Contract, or any other transaction or matter contemplated hereby (including any of the foregoing which concern health, safety, fire, environmental protection, labor relations, mitigation monitoring plans, building codes, non-discrimination and the payment of prevailing wages, including the Prevailing Wage Law).

"Bowline Transfer Station" means the Transfer Station owned by Rockland Green located at 200 Beach Road, West Haverstraw, NY 10933, New York.

"Certificate of Final Completion" shall mean a document, issued by Rockland Green, certifying that all requirements of the Contract have been satisfied and all punch list items have been resolved, and that Final Completion has been achieved.

"Change in Law" means any of the following events or conditions which has a material and adverse effect on the performance by the parties of their respective obligations under this Contract (except for payment obligations):

(A) Inclusions: A "Change in Law" shall include:

(1) the enactment, adoption, promulgation, issuance, modification or written change in administrative or judicial interpretation on or after the effective date of this Contract of any federal, State or local law (except as set forth in the exclusions in (B) below), regulation, rule, requirement, guideline, ruling or ordinance, unless such law, regulation, rule, requirement, ruling or ordinance was, on or prior to the effective date of this Contract, proposed and published in the Federal or New York Register or was duly adopted, promulgated, issued or otherwise officially modified or changed in interpretation;

(2) the order or judgment of any federal, State or local court, administrative agency or Governmental Body, on or after the effective date of this Contract, to the extent such order or judgment is not the result of willful or negligent action, error or omission or lack of reasonable diligence of the Contractor or of

DRAFT

Rockland Green, whichever is asserting the occurrence of a Change in Law; provided, however, that the contesting in good faith or the failure in good faith to contest any such order or judgment shall not constitute or be construed as such a willful or negligent action, error or omission or lack of reasonable diligence; or

(3) the denial of an application for, delay in the review, issuance or renewal of, or suspension, termination, interruption, imposition of a term, condition or requirement which is more stringent or burdensome in connection with the issuance, renewal or failure of issuance or renewal on or after the effective date of this Contract of any Legal Entitlement to the extent that such denial, delay, suspension, termination, interruption or imposition materially and adversely affects the performance of this Contract, if and to the extent that such denial, delay, suspension, termination, interruption or imposition is not the result of willful or negligent action, error or omission or a lack of reasonable diligence of the Contractor or of Rockland Green, whichever is asserting the occurrence of a Change in Law; provided, however, that the contesting in good faith or the failure in good faith to contest any such denial, delay, suspension, termination, interruption or imposition shall not be construed as such a willful or negligent action, error or omission or lack of reasonable diligence.

(B) Exclusions: A "Change in Law" shall not include:

(1) a change in Applicable Law pertaining to taxes;

(2) a change in the law of any foreign country;

(3) any Change in Law (including the issuance of any Legal Entitlement, the enactment of any statute, or the promulgation of any regulation) the terms and conditions of which do not impose more stringent or burdensome requirements on the Contractor than those set forth in the obligations contained herein;

(4) any change in interpretation, however stringent, by a Governmental Body of the meaning of the terms and conditions of the Legal Entitlements in force as of the effective date of this Contract;

(5) union work rules, demands or requirements, which modify the number of employees required to be employed and causes an increase in Contractor's projected or actual cost of providing the Contract Services; or

(6) a change in law pertaining to prevailing wages including the Prevailing Wage Law.

"Change Order" means a written order to the Contractor executed by the Parties after execution of this Contract, directing a change in the Work.

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“

“Construction Change Directive” has the meaning set forth under Section 8.2 hereof.

“Construction and Demolition Debris” means wastes which are generated as a result of construction, remodeling or demolition activities and includes, but is not limited to, dirt, tree stumps, tree trunks, rock, brick, concrete, asphalt, drywall, roofing materials, lumber, ceiling tiles, and insulation.

“Contract” means this Contract for Installation of Pre-Purchased Backup Power Generators.

“Contract Amendment” means modification of the terms of this Contract as approved by Rockland Green and signed by both Parties.

“Contract Award” means the date upon which this Contract is awarded to the Contractor, as selected pursuant to the RFP.

“Contract Date” means the date this Contract has been executed and delivered by the Parties.

“Contract Documents” means the Contract, Specifications, and Contract Drawings.

“Contract Drawings” means the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams, as set forth in Appendix 1.

“Contract Modification” means a Contract Amendment, Change Order, Contract Change Directive or any other written alteration in provisions of the Contract accomplished by mutual action of the Parties to the Contract.

“Contract Price” means the price to be paid by Rockland Green to the Contractor for the performance of the Contract Services, as set forth in Appendix 3.

“Contractor” means

“Contractor Fault” means the falsity of any material representation made by the Contractor under this Contract or any breach, failure, non-performance or non-compliance by the Contractor with its obligations hereunder caused by any willful or negligent act, error or omission by the Contractor, its officials, agents, employees, representatives or independent contractors or Subcontractors which materially and adversely affects Rockland Green’s performance or rights or obligations under this Contract.

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"Contract Services" means everything required to be furnished and completed for and relating to the services to be provided by the Contractor pursuant to this Contract, including, but not limited to, the Work and the provision of security for performance.

"Contract Standards" means the standards, terms, conditions, methods, techniques and practices imposed or required by: (i) Applicable Law, (ii) the Specifications, (iii) the Contract Drawings, (iv) Prudent Engineering and Construction Practice, (v) Good Industry Practice, (vi) applicable equipment manufacturers' specifications, (vii) applicable Insurance Requirements, and (viii) any other standard, term, condition or requirement specifically provided in the Contract to be observed by the Contractor.

"County" means the County of Rockland, New York.

"Disposal Facility" means any of the three Rockland Green transfer stations. the facilities at which the Contractor will be required to dispose of the Construction and Demolition debris generated in the performance of the Work, or such other facility as designated by Rockland Green.

"Disputed Decision" shall have the meaning set forth in Section 11.1.

"Engineer" means the engineering firm and individuals, licensed in the State and hired by Rockland Green for this project.

"Final Completion" means the date on which the Work is complete in accordance with the Contract Documents, including, but not limited to, any punch list items, and the submission of all documentation required by the Contract Documents.

"Fees and Costs" means reasonable fees and expenses of attorneys, expert witnesses, consultants and other persons, and costs of transcripts, printing of briefs and records on appeal, copying and other reimbursed expenses, and expenses reasonably incurred in connection with any Legal Proceeding.

"General Submittals" shall have the meaning set forth in the Specifications in Appendix 2.

"Good Industry Practice" means those methods, techniques, standards and practices which, at the time they are to be employed and in light of the circumstances known or reasonably believed to exist at such time, are generally accepted as good in the construction and demolition industry.

"Governmental Body" means any federal, state, regional or local legislative, executive, judicial or other governmental board, agency, authority, commission, administration, court or other body, or any official thereof having jurisdiction.

"Hazardous Waste" means (a) any waste which is defined or regulated as a hazardous waste, toxic substance, hazardous chemical substance or mixture, or asbestos under Applicable Law, as amended from time to time, including, but not limited to (1) the Resource Conservation and Recovery Act and the regulations contained in 40 CFR Parts 260-281; (2) the Toxic Substance Control Act (15 U.S.C. Section 2601 et seq.) and the regulations contained in 40 CFR Parts 761-

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766; (3) 6 NYCRR Part 379-373; and (4) future additional or substitute federal, state or local laws pertaining to the identification, treatment, storage or disposal of toxic substances or hazardous wastes; and (b) Radioactive materials which are source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954 (42 U.S.C. Section 2011 et seq.) and the regulations contained in 10 CFR Part 40, except that Hazardous Waste does not include Qualified Household Hazardous Waste.

"Hillburn Scale House" means the Scale House owned by Rockland Green located at ____ Torne Valley Road, Hillburn, New York.

"Hillburn Transfer Station" means the Transfer Station owned by Rockland Green located at 420 Torne Valley Road, Hillburn, New York 10931.

"Insurance Requirement" means any rule, regulation, code, or requirement issued by any fire insurance rating bureau or any body having similar functions or by any insurance company which has issued an insurance policy as required under this Contract, as in effect during the Term of the Contract, compliance with which is a condition to the effectiveness of such policy.

"Legal Entitlement" means all permits, licenses, registrations, approvals, authorizations, consents, and entitlements of whatever kind and however described which are required under Applicable Law to be obtained or maintained by any person with respect to the Contract Services under this Contract.

"Legal Proceeding" means every action, suit, litigation, administrative proceeding, and other legal or equitable proceeding arising out of the obligations of the parties under this Contract.

"Loss-and-Expense" means any and all actual losses, liabilities, forfeitures, obligations, damages, fines, penalties, judgments, deposits, costs, expenses, charges, Taxes, or expenses, including all Fees and Costs, except as explicitly excluded or limited under any provision of this Contract.

"Notice of Contract Award" means a notice issued by Rockland Green to the Contractor awarding this Contract to the Contractor, as selected pursuant to the RFP.

"Notice to Proceed" means a notice issued by Rockland Green for the Contractor to commence the Work as set forth in Section 3.1 hereof.

"NYSDEC" means the New York State Department of Environmental Conservation.

"NYSDOT" means the New York State Department of Transportation.

"Owner" means Rockland Green.

"Party" means Rockland Green and/or the Contractor as applicable.

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"Payment Bond" means the labor and materials payment bond required under Section 12.2 hereof.

"Payment Request" shall have the meaning set forth in Article V hereof.

"Performance Bond" means a performance bond required under Section 12.2 hereof.

"Prevailing Wage Law" means Articles 8 and 9 of the New York Labor Law, as amended.

"Project" means this project for the replacement of the concrete push wall that is further detailed in the Contract Documents.

"Project Schedule" shall have the meaning set forth in the Specifications in Appendix 2.

"Project Site" or "Site" means the real property owned by Rockland Green, including the Bowline Transfer Station,Hillburn Transfer Station and Hillburn Scale House and all ancillary property up to and including the fence lines, upon which the aforementioned sites are located, as more specifically described in Appendix 1.

"Prudent Engineering and Construction Practice" means those methods, techniques, standards and practices which, at the time they are to be employed and in light of the circumstances known or reasonably believed to exist at such time, are generally accepted as good engineering, equipping, installation, construction, demolition and commissioning practices for the construction industries as followed in the Northeast region of the United States.

"Qualified Household Hazardous Waste" means waste materials having hazardous characteristics which are contained within Solid Waste and which are exempt from special handling or disposal requirements under Applicable Law. Qualified Household Hazardous Waste shall not constitute Hazardous Waste.

"Rating Service" means Moody's Investors Service, Inc., Fitch, Inc. or Standard & Poor's Rating Services, a division of the McGraw-Hill Companies, Inc., or any of their respective successors and assigns and, if such corporation shall be dissolved or liquidated or shall no longer perform the functions of a securities rating agency, "Rating Service" shall be deemed to refer to any other nationally recognized securities rating agency designated by Rockland Green.

"Request for Proposals" or "RFP" means Rockland Green's Request for Proposals No. 2026- 02 issued February 24, 2026 for proposals for replacement of the concrete push wall, including any addenda thereto.

"Required Insurance" has the meaning specified in Appendix 4.

"Rockland Green" means the Rockland County Solid Waste Management Authority.

"Rockland Green Fault" means any breach (including the falsity of any material representation made by Rockland Green under this Contract), failure, non-performance or non-

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compliance by Rockland Green with its obligations under this Contract to the extent not directly attributable to any Uncontrollable Circumstance or Contractor Fault that materially and adversely affects the Contractor's performance or rights or obligations under this Contract.

"Rockland Green Indemnitee" has the meaning specified in Section 12.3 hereof.

"Schedule of Values" has the meaning set forth in Section 5.2.

"Scheduled Substantial Completion Date" shall mean the scheduled date for the achievement of Substantial Completion, which shall be Eighty (80) ? Calendar days following the Notice to Proceed.

"Scrap Metal" means all metal not considered salvaged equipment.

"Security Instruments" means the Performance Bond and the Payment Bond, as applicable.

"Site" or "Project Site" means the real property owned by Rockland Green, including the Bowline Transfer Station, and all ancillary property up to and including the fence line, upon which the Transfer Station is located, as more specifically described in Appendix 1.

"Specifications" means those technical specifications for installation of pre-purchased backup power generators as set forth in Appendix 2.

"State" means the State of New York.

"Subcontract" means an agreement by the Contractor, or a Subcontractor to the Contractor, as applicable.

"Subcontractor" means every person (other than employees of the Contractor) employed or engaged by the Contractor or any person directly or indirectly in privity with the Contractor (including all subcontractors and every sub-subcontractor of whatever tier) for any portion of the Work, whether for the furnishing of labor, materials, equipment, supplies, services or otherwise.

"Submittals" means sketches, working drawings, shop drawings, studies and analysis, specifications, and calculations as required to adequately perform the Contract Services.

"Substantial Completion" means the date upon which the Work is sufficiently complete in accordance with the Contract Documents.

"Tax" or "Taxes" means any tax, fee, levy, duty, impost, charge, surcharge, assessment or withholding, or any payment-in-lieu thereof, and any related interest, penalty or addition to tax.

"Technical Submittals Schedule" shall have the meaning set forth in the Specifications as set forth in Appendix 2.

"Term" means the term of this Contract as set forth in Section 7.1 hereof.

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"Uncontrollable Circumstance" means any act, event or condition that is beyond the reasonable control of the Party relying thereon as justification for not performing an obligation or complying with any condition required of such Party under this Contract, and that materially interferes with or materially increases the cost or time required for performing its obligations thereunder (other than payment obligations), to the extent that such act, event or condition is not the result of the willful or negligent act, error or omission, failure to exercise reasonable diligence, or breach of this Contract on the part of such Party.

(A) Inclusions: Subject to the foregoing, Uncontrollable Circumstances shall include the following:

(1) a Change in Law;

(2) naturally occurring events (except weather conditions normal for the northeast region of the United States) such as landslides, underground movement, earthquakes, fires, tornadoes, floods, epidemics, lightning, and other acts of God;

(3) explosion, sabotage or similar occurrence, acts of a declared public enemy, extortion, war, terrorism, blockade or insurrection, riot or civil disturbance;

(4) the failure of any appropriate federal, State, Authority or local public agency or private utility having operational jurisdiction in the area in which the Contract Services are being provided; and

(5) acts of terror of a public enemy.

(B) Exclusions: It is specifically understood that none of the following acts, events or circumstances shall constitute Uncontrollable Circumstances:

(1) any act, event, or circumstance that would not have occurred if the affected Party had complied with its obligations hereunder;

(2) general economic conditions, interest or inflation rates, or currency fluctuation;

(3) with respect to Rockland Green, any changes in the financial condition of Rockland Green and with respect to the Contractor, any changes in the financial condition of the Contractor, or their Affiliates or Subcontractors affecting their ability to perform their respective obligations;

(4) the consequences of error, neglect or omissions by the Contractor or any of its employees, agents, suppliers, Subcontractors or Affiliates in the performance of the Contract Services;

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(5) the failure of the Contractor to secure patents or licenses or similar authorizations in connection with the technology necessary to perform its obligations hereunder;

(6) strikes;

(7) labor disputes involving employees of the Contractor, its Affiliates or Subcontractors;

(8) any increase for any reason in premiums charged by the Contractor's insurers or the insurance markets generally for the Required Insurance;

(9) any impact of prevailing wages, laws or rates on the Contractor's costs with respect to wages and benefits; and

(10) any increase in the tip fee at any disposal facility.

"USEPA" means the United States Environmental Protection Agency.

"Warranty" means the warranty provided by the Contractor to Rockland Green that the Work and all materials, equipment, and structures furnished or fabricated, in connection therewith shall: (i) be new, of recent manufacture and of high quality, (ii) conform to the requirements of this Contract, (iii) be free of defects or faults in design, materials, equipment, performance and workmanship, and (iv) meet the Specifications during the Warranty Period, as further detailed in Article XIII.

"Warranty Period" means the period commencing on the date of Final Completion and continuing through the first anniversary of the date of Final Completion, unless otherwise extended as provided herein.

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"Work" means the installation of the pre-purchased backup power generators , all as further described in the Contract Documents.

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SECTION 1.2 INTERPRETATION. In this Contract, unless the context otherwise requires:

A. References Hereto. The terms "hereby," "hereof," "herein," "hereunder" and any similar terms refer to this Contract, and the term "hereafter" means after, and the term "heretofore" means before the Contract Date.

B. Gender and Plurality. Words of the masculine gender mean and include correlative words of the feminine and neuter genders and words importing the singular number mean and include the plural number and vice versa.

C. Persons. Words importing persons include firms, companies, associations, general partnerships, limited partnerships, trusts, business trusts, corporations and other legal entities, including public bodies, as well as individuals.

D. Headings. Any headings preceding the text of the sections and subsections of this Contract shall be solely for convenience of reference and shall not constitute a part of this Contract, nor shall they affect its meaning, construction or effect.

E. Entire Agreement. This Contract contains the entire agreement between the parties hereto with respect to the transactions contemplated by this Contract and nothing in this Contract is intended to confer on any person other than the parties hereto and their respective permitted successors and assigns hereunder any rights or remedies under or by reason of this Contract. Without limiting the generality of the foregoing, this Contract shall completely and fully supersede all other understandings and agreements among the parties with respect to such transactions.

F. Standards of Workmanship and Materials. Any reference in this Contract to materials, equipment, systems or supplies (whether such references are in lists, notes, design requirements, schedules, or otherwise) shall be construed to require the Contractor to furnish the same in accordance with the grades and standards indicated in this Contract. Where this Contract does not specify any explicit quality or standard for materials or workmanship, the Contractor shall use only workmanship and new materials of a quality consistent with that of workmanship and materials specified herein.

G. Technical Standards and Codes. References in this Contract to all professional and technical standards and codes are to the most recent published professional and technical standards and codes of the institute, organization, association, authority or society specified, all as in effect as of the Contract Date. Unless otherwise specified to the contrary, (1) all such professional and technical standards and codes shall apply as if incorporated herein, and (2) if any material revision occurs, to the Contractor's knowledge, after the Contract Date, the Contractor shall notify Rockland Green.

H. Governing Law. This Contract shall be governed by and construed in accordance with the applicable laws of the State of New York, and disputes between the parties shall be handled in the manner provided herein.

I. Severability. If any clause, provision, subsection, or Section or Article of this Contract shall be ruled invalid by any court of competent jurisdiction, then the parties shall: (1) promptly meet and negotiate a substitute for such clause, provision, subsection, Section or Article (2) if necessary or desirable to accomplish item (1) above, apply to the court having declared such invalidity for a judicial construction of the invalidated portion of this Contract; and

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(3) negotiate such changes in, substitutions for or additions to the remaining provisions of this Contract as may be necessary in addition to and in conjunction with items (1) and (2) above to effect the intent of the parties in the invalid provision. The invalidity of such clause, provision, subsection, Section or Article shall not affect any of the remaining provisions hereof, and this Contract shall be construed and enforced as if such invalid portion did not exist.

J. Causing Performance. A party shall itself perform, or shall cause to be performed, subject to any limitations specifically imposed hereby with respect to Subcontractors or otherwise, the obligations affirmatively undertaken by such party under this Contract.

K. Party Bearing Cost of Performance. All obligations undertaken by each party hereto shall be performed at the cost of the party undertaking the obligation or responsibility, unless the other party has explicitly agreed herein to bear all or a portion of the cost either directly, by reimbursement to the other party or through an adjustment to the Contract Price.

L. Cost of Performance Excludes Cost from Legal Proceeding. The "cost of performing" a party's obligations hereunder, when used with respect to one party's obligation to pay additional costs incurred by the other party, shall not include any loss and expense incurred by the party resulting from any third-party Legal Proceeding, including but not limited to any and all actual losses, liabilities, forfeitures, obligations, damages, fines, penalties, judgments, deposits, costs, expenses, charges, taxes, reasonable fees and expenses of attorneys, expert witnesses, consultants and other persons, and costs of transcripts, printing of briefs and records on appeal, copying and other reimbursed expenses, and expenses reasonably incurred in connection with any third-party Legal Proceeding. Notwithstanding the foregoing, each party retains its rights to bring any Legal Proceeding or to implead the other party as to any matter arising hereunder.

M. Assistance. The obligations of a party to cooperate with, to assist or to provide assistance to the other party hereunder shall be construed as an obligation to use the party's personnel resources to the extent reasonably available in the context of performance of their normal duties, and not incur material additional overtime or third party expense unless requested and reimbursed by the assisted party.

N. Interpolation. If any calculation hereunder is to be made by reference to a chart or table of values, and the reference calculation falls between two stated values, the calculation shall be made on the basis of linear interpolation.

O. Delivery of Documents in Digital Format. In this Contract, the Contractor may be obligated to deliver reports, records, designs, plans, drawings, specifications, proposals and other documentary submittals in connection with the performance of its duties hereunder. The Contractor agrees that all such documents shall be submitted to Rockland Green both in printed form (in the number of copies indicated) and, at Rockland Green's request, in digital form.

P. References to Including. All references to "including" herein shall be interpreted as meaning "including without limitation."

Q. References to Days. All references to days herein are to calendar days, including Saturdays, Sundays and holidays, except as otherwise specifically provided.

R. References to Knowledge. All references to "acknowledge," "knowing," "know" or "knew" shall be interpreted as references to a party having actual knowledge.

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Contract Documents and Order of Precedence. The Contract Documents, including any subsequent, duly authorized modification of these Contract Documents, comprise the entire and exclusive agreements between the Parties with reference to the Contract Services, and said Contract Documents supersede any and all prior discussions, communications, representations, understandings, negotiations, or agreements. The Contract Documents shall consist of (1) this Contract, including its Appendices, (2) the Specifications, (3) Contract Modifications, (4) Contract Drawings, (5) and the Contractor's Proposal.

With respect to a conflict, error, or discrepancy within the Contract Documents, the interpretation most favorable to Rockland Green shall apply, and the Contract Documents shall be given precedence in the following order with Change Orders being the highest precedence:

1. Change Orders
2. Construction Change Directives
3. Contract Amendments
4. Contract, including Appendices
5. Contract Drawings
6. Specifications
7. Contractor's Proposal, including Proposal Forms

S. Anything that may be required, implied or reasonably inferred by the Contract Documents which make up this Contract, or any one or more of them, shall be provided by the Contractor for the Contract Price.

T. Nothing contained in the Contract Documents shall create, nor be interpreted to create, privity or any other relationship whatsoever between Rockland Green and any person except the Contractor.

U. When a word, term, or phrase is used in this Contract, it shall be interpreted or construed first, as defined herein; second, if not defined, according to its generally accepted meaning in the construction industry; and third, if there is no generally accepted meaning in the construction industry, according to its common and customary usage.

V. Wherever this Contract calls for "strict" compliance or conformance with the Contract Documents as to matters other than compliance with time limits, providing an updated Project Schedule, and claim and Change Order procedures, the term shall mean within tolerances as described specifically in the Contract Documents, or if not specifically described, within industry standards and tolerances for deviation for the specific item or procedure in question.

W. The listing herein of any items as constituting a material breach of this Contract shall not imply that any other, non-listed item will not constitute a material breach of this Contract.

X. Each and every provision of law and clauses required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, and if through mistake, or otherwise, any such provision is not

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inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion".

ARTICLE II.
REPRESENTATIONS AND WARRANTIES

SECTION 2.1 REPRESENTATIONS AND WARRANTIES OF ROCKLAND GREEN. Rockland Green represents and warrants that:

A. Existence and Powers. Rockland Green is a body politic and corporate constituting a public benefit corporation of the State, with full legal right, power and authority to enter into and perform its obligations under this Contract.

B. Due Authorization and Binding Obligation. Rockland Green has duly authorized the execution and delivery of this Contract. This Contract has been duly executed and delivered by Rockland Green and constitutes a legal, valid and binding obligation of Rockland Green, enforceable against Rockland Green in accordance with its terms except insofar as such enforcement may be limited by bankruptcy, insolvency, or other similar laws affecting creditors' rights in effect and by equitable principles of general application.

C. No Conflict. The execution, delivery or performance by Rockland Green of this Contract does not conflict with, violate or result in a breach of any law or governmental regulation currently in effect applicable to Rockland Green or any term or condition of any judgment, decree, agreement or instrument to which Rockland Green is a party or by which Rockland Green or any of its properties or assets are bound or constitutes a default under any of the foregoing.

D. No Approvals Required. No approval, authorization, order or consent of, or declaration, registration or filing with, any Governmental Body is required for the valid execution and delivery of this Contract by Rockland Green or the performance of its payment obligations hereunder except as such have been duly obtained or made.

E. No Legal Prohibition. Rockland Green has no knowledge of any Applicable Law in effect on the date as of which this representation is being made which would prohibit the performance by Rockland Green of this Contract and the transactions contemplated hereby.

F. Information Pertaining to the Site. To the best of its knowledge, Rockland Green has made available to the Contractor significant studies, reports and other information pertaining to the Site which Rockland Green has developed in connection with its planning and preparation work with respect to the RFP and which, in Rockland Green's opinion, may reasonably be material to the performance by the Contractor of the Contract Services. Rockland Green makes no representation, however as to the accuracy or completeness of any such information.

G. Title to the Sites. Rockland Green owns, or is expressly authorized to use, all of the assets, improvements and other interests comprising the Sites, and has all necessary right, power and authority to provide Contractor access thereto as provided in this Contract for the purpose of performing the Contract Services.

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SECTION 2.2 REPRESENTATIONS AND WARRANTIES OF THE CONTRACTOR. Contractor hereby represents and warrants that:

A. Qualification. The Contractor is fully qualified to act as the general contractor for the Contract Services and has, and shall maintain, any and all licenses, permits or other authorizations necessary to act as the general contractor for, and to perform the Work.

B. Project Site Familiarity. The Contractor has become familiar with the Site and facilities and the local conditions under which the Work is to be constructed and operated.

C. Existence and Powers. The Contractor is duly organized and validly existing as a corporation under the laws of Connecticut, with full legal right, power and authority to enter into and perform its obligations under this Contract, and duly licensed and registered with the State of New York and in accordance with Applicable Law.

D. Contract Documents. The Contractor has received, reviewed, and examined all of the documents which make up the Contract Documents, and has found them to the best of its knowledge, to be complete, accurate, adequate, consistent, coordinated and sufficient for the Project and Contractor has based its Contract Price for the Work upon its complete understanding of the requirements of the Contract Documents.

E. Due Authorization and Binding Obligation. The Contractor has duly authorized the execution and delivery of this Contract. This Contract has been duly executed and delivered by the Contractor and constitutes the legal, valid and binding obligation of the Contractor, enforceable against the Contractor in accordance with its terms except insofar as such enforcement may be affected by bankruptcy, insolvency, moratorium and other laws affecting creditors' rights generally.

F. No Conflict. The execution, delivery and performance by the Contractor of this Contract does not conflict with, violate or result in a breach of any law or governmental regulation applicable to the Contractor or any term condition of any judgment, decree, agreement (including, without limitation, the Contractor's certificate of incorporation) or instrument to which the Contractor is a party or by which the Contractor or any of its properties or assets are bound, or constitutes a default under any of the foregoing.

G. No Approvals Required. No approval, authorization, order or consent of, or declaration, registration or filing with, any Governmental Body is required for the valid execution and delivery of this Contract by the Contractor or the performance of its payment or other obligations hereunder except as such have been duly obtained or made.

H. No Litigation. There is no Legal Proceeding, at law or in equity, before or by any court, pending or, to the Contractor's knowledge, threatened against the Contractor which could reasonably be expected to have a material and adverse effect on the execution or delivery of this Contract or the validity or enforceability of this Contract or on the ability by the Contractor to perform any of its obligations hereunder.

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I. No Legal Prohibition. The Contractor has no knowledge of any Applicable Law in effect on the date as of which this representation is being made which would prohibit the performance by the Contractor of this Contract and the transactions contemplated hereby.

J. Patents and Licenses. The Contractor owns, or is expressly authorized to use under patent rights, licenses, franchises, trademarks or copyrights, the technology necessary for the Contract Services without any known material conflict with the rights of others.

K. Information Supplied by the Contractor. The information supplied and representations and warranties made by the Contractor in all submittals made in response to the RFP and in all post-proposal submittals, if any, with respect to the Contractor (and to the best of its knowledge, all information supplied in such submittals with respect to any Subcontractor) are true, correct and complete in all material respects.

L. Compliance. The Contractor represents and warrants that as of the Contract Date the Contractor is in substantial compliance with all laws, regulations, rules and orders applicable to its respective business, noncompliance with which would have a material and adverse effect upon its business or its ability to perform its respective obligations under this Contract.

M. Notice of Default. The Contractor shall provide to Rockland Green, promptly following the receipt thereof, copies of any notice of default, breach or noncompliance received under or in connection with any Applicable Law, Legal Entitlement, or Subcontract pertaining to this Contract.

N. Familiarity with Applicable Law. The Contractor is familiar with and is satisfied as to all Applicable Law, including federal, state, and local laws and regulations that may affect cost, progress, and performance of the Contract Services.

O. Provision of Conflicts, Errors, Ambiguities and Discrepancies. As further described in Section 3.8 hereof, the Contractor shall have a continuing duty to read, examine, review, compare and contrast each of the documents comprising the Contract (including drawings and other submittals). The Contractor has given the Engineer written notice of all conflicts, errors, omissions, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by the Engineer is acceptable to Contractor. If Contractor discovers any conflicts, errors, omissions, ambiguities, or discrepancies in the Contract Documents while performing the Contract Services, Contractor warrants that it shall immediately bring such conflict, error, omission, ambiguity or discrepancy to the Engineer's attention in writing. The express or implied approval by the Engineer of any drawings or other submittals shall not relieve the Contractor of the continuing duties imposed hereby, nor shall any such approval be evidence of the Contractor's compliance with this Contract.

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ARTICLE III.
CONTRACT SERVICES AND CONTRACTOR'S OBLIGATIONS

SECTION 3.1 NOTICE OF CONTRACT AWARD AND NOTICE TO PROCEED.

A. The Contractor shall submit, within ten (10) days after Notice of Contract Award: (i) a signed Contract; (ii) proof of Required Insurance, as specified in Appendix 4 hereto; and (iii) the Security Instruments (Performance Bond and Payment Bond). The Contractor shall commence the performance of the Contract Services only after Rockland Green's execution of the Contract and receipt of the Notice to Proceed. The Notice to Proceed shall be issued by the Engineer, and the Contractor shall diligently continue its performance to and until Final Completion of the Work. The Contractor shall satisfy the following conditions after issuance of the Notice to Proceed:

B. Project Schedule. Within fifteen (15) days after receipt of the Notice to Proceed, the Contractor shall prepare a preliminary issue of the Project Schedule for the Engineer's review and comment. The Project Schedule shall indicate any requirements for work by others required to support the Contractor's schedule. The Contractor shall submit the Project Schedule for formal approval within five (5) days after receipt comments from the Engineer.

C. Technical Submittals Schedule. Within fourteen (14) calendar days of Notice of Award, Contractor shall prepare and submit a Technical Submittals Schedule listing all technical submittals required by the Contract Documents, as set forth in the Specifications.

D. General Submittals. Within fourteen (14) calendar day of Notice to Proceed, the Contractor shall provide the Engineer with initial copies of the General Submittals, set forth in the Specifications.

SECTION 3.2 CONTRACT TIME. The Contractor shall accomplish Substantial Completion by 90 calendar days from the issuance of the Notice to Proceed and shall achieve Final Completion within 30 days from the date of Substantial Completion. By signing this Contract, the Contractor agrees that the Contract Time is a reasonable time for accomplishing completion of the Work.

SECTION 3.3 DELAY LIQUIDATED DAMAGES. Time is of the essence in the performance and completion of the Work and the Contractor shall achieve Substantial Completion by the Scheduled Substantial Completion Date. Except as otherwise excused due to Uncontrollable Circumstances or Rockland Green Breach, the Contractor shall pay daily delay liquidated damages to Rockland Green commencing on the 45th day after the Scheduled Substantial Completion Date, if all Work has not been completed by such date and Substantial Completion has not been achieved. The delay liquidated damages for delays in completing the Work shall be Five Hundred Dollars ($500) per day. The Contractor shall also indemnify Rockland Green in accordance with and subject to the limitations set forth in Section 12.3 hereof against all Loss-and-Expense resulting from any Legal Proceeding originated by any third-party arising from such failure to complete the Work except to the extent such failure is caused by an Uncontrollable Circumstance.

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SECTION 3.4 PERFORMANCE OF THE WORK. The Contractor shall perform all of the Work required, implied or reasonably inferable from the Contract Documents. The Contractor will complete the Work described in the Contract Documents, except as specifically identified therein as the work of other parties, in accordance with the terms herein, all as may be amended by written agreement of the Parties from time to time, for the Contract Price. All Work shall strictly conform to the requirements of the Contract Documents. To that end, the Contractor shall be solely responsible for and have control over means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, unless otherwise specified in the Contract Documents.

SECTION 3.5 PROVISIONS AND PAYMENT OF LABOR, MATERIALS, AND EQUIPMENT. The Contractor shall provide all labor, supervision, services, materials, supplies, equipment, fixtures, appliances, facilities, tools, transportation, storage, disposal, power, fuel, heat, light, cooling, or other utilities, required for performance of the Work and shall obtain, at its sole cost, all necessary building permits and other permits or licenses required for the Project and ensure the prompt payment for each of these obligations.

SECTION 3.6 MAINTENANCE OF RECORDS AND OTHER DOCUMENTS AND DRAWINGS.

A. Maintenance of Updated Contract Documents at Project Site. The Contractor shall keep an updated copy of the Contract Documents at the Project Site. Additionally, the Contractor shall keep a copy of approved drawings and other Submittals at the Project Site. All of these items shall be available to the Engineer during all regular business hours. The Contractor shall ensure the creation and maintenance of a detailed and comprehensive copy of the drawings, specifications, addenda, Change Orders and other modifications depicting the Work. Said items shall be submitted to Rockland Green, along with other required Submittals upon Final Completion of the Project, or as otherwise provided in the Contract Documents, and receipt of same by Rockland Green shall be a condition precedent to final payment to the Contractor.

B. Contractor Drawings. Drawings and other such Submittals from the Contractor shall not constitute a part of the Contract Documents unless specifically provided for otherwise herein. The Contractor shall not do any work requiring drawings or other submittals unless such has been approved in writing by the Engineer or as required by the Contract Documents. All work requiring approved drawings or other submittals shall be done in strict compliance with such approved documents or Contract requirements. Approval by Rockland Green's Engineer, however, shall not be evidence that work completed pursuant thereto conforms with the requirements of this Contract, and shall not relieve the Contractor of responsibility for deviations from the Contract Documents unless the Engineer has been specifically informed of the deviation by a writing incorporated in the Submittals, if any, and has approved such deviation in writing.

C. Delivery of Submittals. The delivery of Submittals shall constitute a representation by the Contractor that it has verified that such Submittals meet the requirements of the Contract Documents, or will do so, including field measurements, materials, and field construction criteria related thereto.

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SECTION 3.7 REVIEW. The Contractor shall have the duty to carefully review, inspect, examine, and physically stamp and sign any and all Submittals before submission of same to the Engineer.

SECTION 3.8 DUTY TO EXAMINE CONTRACT DOCUMENTS. The Contractor has a continuing duty to, and shall carefully, examine all figures and dimensions on the Contract Drawings and Specifications and shall note all conflicts, errors, omissions, ambiguities or discrepancies. The Contractor will be held responsible for any conflict, error or discrepancy not discovered before the Work is executed, unless the Contractor could not have reasonably known about the conflict, error or discrepancy. The Contractor has given the Engineer written notice of all conflicts, errors, omissions, ambiguities or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by the Engineer is acceptable to Contractor. If the Contractor discovers any conflicts, errors, omissions, ambiguities or discrepancies in the Contract Documents while performing the Contract Services, the Contractor warrants that it shall immediately bring such conflict, error, omission ambiguity or discrepancy to the Engineer's attention in writing. The express or implied approval by the Engineer of any drawings or other submittals shall not relieve the Contractor of the continuing duties imposed hereby, nor shall any such approval be evidence of the Contractor's compliance with this Contract. The Contractor shall not alter Specifications, Contract Drawings or figures, or make any alterations in or additions to the quantity, character or arrangement of the materials or Work, whether same shall involve additional expense or not, unless same shall be agreed upon first, in writing, as a Change Order. This provision, however, shall not abridge in any way the Engineer's rights as to the interpretation of the Specifications, plans and figures thereon. The divisions and sections of the Specifications and the identification of any drawings shall not control the work of the Contractor in dividing the work among Subcontractors or suppliers or delineating the work to be performed by any specific trade. The division of the Specifications are complementary and anything mentioned or shown in a division of the Specifications or in a specific trade drawing shall be of like effect as if shown in all divisions of the Specifications and in all drawings. In all cases figured dimensions shall govern over scaled dimensions, detail drawings shall govern over general drawings, larger scale details take precedence over smaller scale drawings, change order drawings govern contract drawings, and contract drawings govern over standard or shop drawings. Further, in all cases where details in two drawings conflict, the more restrictive or stringent requirement shall be binding upon the Contractor.

SECTION 3.9 QUALIFICATIONS OF PERSONNEL. The Contractor shall provide experienced and qualified personnel to provide the Contract Services, and all persons engaged by the Contractor, including any Subcontractors, for the Work shall have requisite skills, licensing and training for the tasks assigned. The Contractor shall provide Rockland Green documentation that its employees, and its Subcontractors, are properly trained in performing the Work, including, but not limited to, certificates, and licenses to operate specific classes of vehicles. The Contractor shall enforce discipline and good order at all times among the Contractor's employees and all Subcontractors.

SECTION 3.10 SUBCONTRACTORS. Rockland Green shall have the right to approve any and all Subcontractors. Contractor must submit all information regarding Subcontractors as required by Rockland Green. The Contractor shall negotiate and execute any and all Subcontracts with Subcontractors as may be necessary for the Contractor to fulfill its obligations under this

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Contract and as are approved by Rockland Green in writing. The Contractor shall not enter into a Subcontract with any Subcontractor to whom Rockland Green reasonably objects. If at any time Rockland Green objects to a Subcontractor, the Contractor shall solicit proposals from potential replacements and shall submit the names of the replacement Subcontractor to Rockland Green for approval without an increase in the Contract Price. The Contractor shall retain full responsibility to Rockland Green under this Contract for all matters notwithstanding the execution or terms and conditions of any Subcontract. No failure of any Subcontractor used by the Contractor in connection with the provision of the Work shall relieve the Contractor from its obligations hereunder. The Contractor shall pay or cause to be paid to all direct Subcontractors all amounts due in accordance with their respective Subcontracts. No Subcontractor shall have any right against Rockland Green for labor, services, materials or equipment furnished. The approval or withholding thereof by Rockland Green of any Subcontractor shall not create any liability of Rockland Green to the Contractor, to third parties or otherwise.

SECTION 3.11 EXPANSION AND REDUCTION OF SERVICES. Rockland Green shall have the right to expand or reduce the scope of Contract Services to be performed by the Contractor during the Term of this Contract. Rockland Green may request that the Contractor provide additional services to Rockland Green, which are similar to the Work specified in this Contract. Prior to the commencement of such services, Rockland Green and the Contractor shall mutually agree in writing as to the terms and conditions relating to such additional services. If such additional services are agreed to, this Contract shall be amended by the Parties to provide for such additional services. Rockland Green shall be under no obligation to request that the Contractor provide any such additional services, and any services outside the scope of the Contract Services may be provided by Rockland Green or a third party. If Rockland Green reduces the scope of the Work during the Term of this Contract, then the Parties will mutually agree as to the terms of such reduction and any modification in the Contract Price.

SECTION 3.12 COMPLIANCE WITH APPLICABLE LAW.

A. Compliance with Law and Equipment Operating Requirements. The Contractor shall perform the Contract Services in accordance with the Contract Standards, which shall include performing such services in accordance with Applicable Law, including, but not limited to, all Occupational Safety and Health Administration (OSHA) 29 U.S.C. § 651 et seq. requirements and New York State Department of Labor requirements, applicable to the Work.

B. Compliance with Conditions in Governmental Approvals. The Contractor shall comply with all conditions and requirements of all Governmental Approvals and Legal Entitlements required to be made, obtained or maintained under Applicable Law in connection with the Contract Services and this Contract.

C. Governmental Approvals Necessary for Contract Services. The Contractor shall, at its sole cost and expense, make all filings, applications and reports necessary to obtain and maintain all Governmental Approvals and Legal Entitlements required to be made, obtained or maintained under Applicable Law in connection with the performance of the Contract Services. Rockland Green shall cooperate with the Contractor in connection with the foregoing undertaking and shall provide the Contractor with such relevant data or documents as are within its control, which are reasonably required for such purpose.

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D. Prevailing Wage Law. All Work shall be performed in accordance the Prevailing Wage Law. The prevailing wage schedule contained in Appendix 5 sets forth the prevailing wage and benefits schedule for the Work as of the Contract Date. It shall be the Contractor's responsibility to ensure that prevailing wages and benefits are paid as required pursuant to the Prevailing Wage Law throughout the Term and to ensure that all Subcontractors comply with the Prevailing Wage Law. Any increase to wages and benefits pursuant to the Prevailing Wage Law which the Contractor is required to pay during the Term shall not affect the Contract Price. Certified payrolls and other relevant information shall be furnished to Rockland Green with each Payment Request in compliance with the Prevailing Wage Law.

E. NYHRL. Contractor shall have in place sexual harassment policies that are compliant with the New York Human Rights Law ("NYHRL"), and shall provide annual training to all of their employees in accordance with the NYHRL.

SECTION 3.13 PERFORMANCE, INFORMATION, AND SITE CONDITION Practicability of Performance. The Contractor, in the performance of the Contract Services set forth herein, shall have exclusive responsibility for compliance with the Contract Standards. The Contractor assumes the risk of the practicability and possibility of performance of the Contract Services. No impracticability or impossibility of any of the foregoing shall be deemed to constitute an Uncontrollable Circumstance. The Contractor acknowledges that the Contractor's agents and representatives have visited, inspected and are familiar with the Site and that the Contractor is familiar with all local and other conditions which may be material to the Contractor's performance of its obligations under this Contract. The execution of this Contract shall be deemed to constitute the granting of a license to the Contractor to access the Site for the purposes of preparing for any and all obligations hereunder.

A. Rockland Green-Supplied Information. The Contractor shall be responsible for the independent verification and confirmation of all information supplied to it by or on behalf of Rockland Green. No error or omission in any such information shall constitute an Uncontrollable Circumstance or relieve the Contractor from any of its obligations or entitle the Contractor to any increase in compensation hereunder. Any information supplied by Rockland Green is only for the Contractor's convenience, and Rockland Green makes no representations as to the accuracy or completeness thereof.

B. Site Conditions. The Contractor has conducted analyses of the Sites as necessary to prepare for and perform the Work in accordance with this Contract.

C. Rockland Green Monitoring. Rockland Green shall have the right, but not the obligation, to monitor the Contractor's performance of the Work during the Term of this Contract.

D. Hours of Operation. Except as otherwise provided in the Contract Documents, all Work must be performed between the hours of 7:00 a.m. and 5:30 p.m. Monday through Friday. and with prior approval from Rockland Green, any later hours during the week and any weekend hours exclusive of Rockland Green, State and federal holidays unless more restrictive hours are required by Applicable Law or permit conditions governing the Contractor's performance of the Work. Rockland Green has the right to impose further restrictions on working

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hours reasonably related to safety, maintenance of traffic to the use of occupied facilities. No delays resulting from compliance with the Contract Standards, including Applicable Laws or regulations or conditions of permits may form the basis for any claim by the Contractor for delay damages or additional compensation or for any increase in the Contract Time; any delays arising from restrictions related to the use of occupied facilities are non-compensable and any requests for an increase in the Contract Time relating to them must be filed in accordance with Article VIII (Change Orders) or the same will be conclusively deemed to have been waived. The Contractor must not permit Work outside of such hours or on a weekend or other Rockland Green, State or Federal holiday without the written consent of Rockland Green. Such consent, if given, may be conditioned upon payment by the Contractor of Rockland Green's and the Engineer's additional costs and fees incurred in monitoring such off-hours Work. The Contractor must notify Rockland Green and obtain Rockland Green's approval, as soon as possible if Work must be performed outside such times in the interest of the safety and protection of persons or property at the Site or adjacent thereto, or in the event of an emergency. For any work performed after 6:30 p.m., the Contractor shall obtain temporary lighting and all other necessary facilities for performing and inspecting the Work, and as otherwise required herein and by Rockland Green Engineer. In no event shall the Contractor (or any Subcontractor) be entitled to additional compensation for any required overtime. In no event shall the Contractor permit Work to be performed at the Project Site without the presence of the Contractor's superintendent and/or persons responsible for the protection of persons and property at the Project Site and compliance with all Applicable Laws (including applicable regulations) and Prudent Engineering and Construction Practice. Notwithstanding any other provisions of this Contract, Rockland Green may order the Contractor to suspend work for any continuing violation of this section.

SECTION 3.14 PROTECTION OF PERSONS AND PROPERTY.

A. Safety Programs and Precautions. It shall be the sole responsibility of the Contractor to initiate, continue and supervise all safety programs and precautions in the performance of the Contract Services at all times. The Contractor shall take reasonable and necessary precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to its employees, Subcontractors' employees, employees of Rockland Green and members of the public, the Work itself, and other property at the Project Site or adjacent thereto. As part of the Contractor's obligations hereunder, the Contractor shall erect and maintain reasonable safeguards, barriers, signs, warnings, and any other safety measure required by Applicable Law and in accordance with Prudent Engineering and Construction Practice, Good Industry Practice, and any other Contract Standards. Contractor shall be familiar with and enforce the Engineer's safety policies and regulations as set forth and/or references in the Specifications.

B. Notice to the Engineer. The Contractor shall promptly remedy loss or damage to the Work or any person or property described herein caused in whole or in part by the acts of the Contractor or any Subcontractor, sub-subcontractor or material man. The Engineer may direct the Contractor to remedy violations of Applicable Laws, rules, regulations, and interpretations related to safety when and if observed on the Site. However, through exercising this authority the Engineer shall not incur any obligations to monitor, initiate, continue, or supervise safety programs and precautions such to diminish the Contractor's primary role in same. The Engineer shall have the right to report suspected safety violations to the Occupational Safety and Health Administration.

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SECTION 3.15 SUPERVISION OF THE WORK.

A. Contractor Responsibility. The Work shall be strictly supervised, the Contractor bearing full responsibility for any and all acts, errors or omissions of those engaged in the Work on behalf of the Contractor, including, but not limited to, all Subcontractors and their employees. The Contractor shall maintain an on-site superintendent while any portion of the Work is being performed.

B. Supervisory Personnel. The Contractor shall employ and maintain at the Site only competent, qualified full time supervisory personnel, augmented with part time and offsite supervision, approved by Rockland Green.

C. Contractor Warranty. In addition to any other warranties or assurance provided in the Contract Documents or by Applicable Law, the Contractor hereby warrants that all laborers furnished under this Contract shall be qualified and competent to perform the tasks undertaken, that all materials and equipment provided shall be new (unless otherwise specified) and of the highest quality, that the completed work will be complete and of the highest quality, without defects, and that all Work strictly complies with the requirements of the Contract Documents, including the Contract Standards. Any work not strictly complying with the requirements of this Article shall constitute a breach of this Contractor's warranty.

D. Replacement of Employee at Rockland Green Request. If at any time Rockland Green reasonably determines that any employee of the Contractor is not properly performing any work in the best interest of the Project, or is hindering the progress of the Work, or is otherwise objectionable, Rockland Green shall so notify the Contractor, whom shall replace the employee as soon as possible, at no increased cost to Rockland Green

SECTION 3.16 COORDINATION OF OTHER WORK. The Contractor shall not impede the existing operations of the Transfer Station. The Contractor must cooperate in coordinating its Work with the work, if any, of Rockland Green, its operators, separate contractors, and any other forces permitted by Rockland Green to perform work at the Project Site, or enter the Project Site, without an increase in the Contract Time or the Contract Price.

ARTICLE IV.
COMPLETION AND INSPECTION

SECTION 4.1 SUBSTANTIAL COMPLETION.

A. Substantial Completion. Substantial completion shall be achieved when all of the following conditions have been satisfied:

(i) The Contractor has completed the Contract Services to the point where Rockland Green can take beneficial use of the area described in the Contact Documents;

(ii) The Contractor has obtained any required Governmental Approvals and such approvals have not been withdrawn, revoked, superseded, suspended, or materially impaired or amended;

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(iii) The Contractor and Rockland Green have agreed in writing upon the final punch list (or, if are unable to agree, Rockland Green shall have prepared and issued the final punch list to the Contractor within fifteen (15) business days of the Contractor having submitted its final punch list to Rockland Green);

(iv) Rockland Green has received and indicated, in writing, that it has no objection to the certification by the Contractor that all Contract Services pertaining to the Project, excepting the items on the final punch list, are complete and in all respects is in compliance with the Contract;

(v) The Contractor has delivered to Rockland Green a claims statement setting forth in detail all claims of every kind whatsoever of the Contractor connected with, or arising out of, the Contract Services pertaining to the Work, and arising out of or based on events prior to the date when the Contractor provides such statement to Rockland Green, and the Contractor shall certify that all Subcontractors and material suppliers have been paid in full and upon Rockland Green's request will provide any discharge or other proof of satisfaction of liens or wage claims; and

(vi) The Contractor has submitted written certification that all of the foregoing conditions have been satisfied and Rockland Green has received and indicated, in writing, that it has no objection to the Contractor's certification.

B. Alternative Substantial Completion. Alternatively, Substantial Completion shall occur on any date certified by Rockland Green, which shall have discretion to waive any of the foregoing conditions.

SECTION 4.2 FINAL COMPLETION. When the Work is complete and all final punch list items have been resolved and the Contractor is ready for a final review, the Contractor shall notify the Engineer thereof in writing. Thereupon, the Engineer will perform a final inspection of the Work. If the Engineer concurs that (i) the Project is complete and in full accordance with the Contract Documents, and (ii) the Contractor has performed all of its obligations to Rockland Green hereunder, the Contractor will furnish a Certificate of Final Completion for approval by Rockland Green. The Engineer will also review for approval the final Payment Request to Rockland Green certifying to Rockland Green that the Project is complete and the Contractor is entitled to the remainder of the unpaid Contract Price, less any amount withheld pursuant to the Contract Documents. If the Engineer reasonably determines that final approval for payment should not be issued and is required to repeat the final inspection of the Work, the Contractor shall bear the cost of such repeat inspection(s), which costs may be deducted by Rockland Green from the Contractor's final payment. No claim by the Contractor for an adjustment hereunder shall be allowed if asserted after final payment under this Contract.

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ARTICLE V.
CONTRACT PAYMENTS

SECTION 5.1 CONTRACT PRICE PAYMENT. Rockland Green shall pay the Contractor the Contract Price in exchange for the Contract Services in accordance with Appendix 3 to this Contract. The Contractor will be paid progress payments on a schedule of values basis.

SECTION 5.2 SCHEDULE OF VALUES. Prior to review of the first request for payment ("Payment Request"), the Contractor must submit to Rockland Green and receive Rockland Green's approval for the schedule of values apportioning the entire Contract Price among the different elements of the Work (hereinafter the "Schedule of Values") for purposes of periodic and final payment. The Schedule of Values shall be presented in whatever format, with such detail including labor and material breakout, and backed-up with whatever supporting information Rockland Green may reasonably request. The Contractor shall not imbalance the Schedule of Values nor artificially inflate any element thereof. The violation of this provision by the Contractor shall constitute a material breach of this Contract. The Schedule of Values will be utilized for the Contractor's Payment Requests but shall only be so utilized after it has been approved in writing by Rockland Green and Rockland Green Engineer.

SECTION 5.3 ENTIRE COMPENSATION. The Contractor agrees that the Contract Price shall be the Contractor's entire compensation and reimbursement for the performance of the Contract Services.

SECTION 5.4 COSTS AND COST SUBSTANTIATION.

A. Costs. The Contract Price has been negotiated by the Parties and fixed by the terms of this Contract. Any other cost shall only be permitted in the event of a request from Rockland Green pursuant to Section 3.12 hereof or as a result of a Change Order. Any such cost proposed or incurred by the Contractor, which is directly or indirectly chargeable to Rockland Green in whole or in part hereunder, shall be (i) calculated in accordance with Section 8.8 or, if such cost is not calculable in accordance with the provisions of Section 8.8, then (ii) the fair market price for the good or service provided, or, if there is no market, shall be a just and reasonable price agreed upon by the Parties the fair market price for the good or service provided, or, if there is no market, shall be a just and reasonable price agreed upon by the Parties.

B. Cost Substantiation. To substantiate any costs, other than the Contract Price, described in this Article V, the Contractor shall supply Rockland Green with a certificate signed by a senior management officer of the Contractor, which (1) shall state the amount of such cost and the provisions of this Contract under which such cost is properly chargeable to Rockland Green, and (2) if not calculable pursuant to Section 8.8, as provided above, than Contractor, shall describe the competitive or other process utilized by the Contractor to obtain a fair market price, and shall state that such cost is a fair market price for the service or materials to be supplied (or, if there is no market, that such cost is commercially reasonable) and that such services and materials are reasonably required pursuant to this Contract. The certificate shall be accompanied by copies of such documentation as shall be reasonably required by Rockland Green which shall include reasonably detailed information necessary to substantiate any cost described in this subsection. To the extent reasonably necessary to confirm direct costs required to be cost substantiated, copies of

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timesheets, invoices, canceled checks, expense reports, receipts and other documents, as appropriate, shall be delivered to Rockland Green with the request for reimbursement of such costs.

SECTION 5.5 CONTRACTOR PROJECT SCHEDULE AS A CONDITION OF PAYMENT. The Contractor's Project Schedule shall be updated no less frequently than monthly (unless the parties otherwise agree in writing) and shall be updated to reflect conditions encountered from time to time and shall apply to the total Project. Each such revision shall be furnished to the Engineer. Strict compliance with the requirements of this Section shall be a condition precedent to payment to the Contractor and failure by the Contractor to strictly comply with said requirements shall constitute a material breach of this Contract. No update to the Project Schedule can alter the Contract Time without the express, written approval of Rockland Green.

SECTION 5.6 PAYMENT AND RETAINAGE.

A. Payment Frequency. Rockland Green shall make payments of the Contract Price to the Contractor in accordance with the procedures set forth herein. On or before the tenth (10th) calendar day of each month after commencement of performance, but no more frequently than once monthly, the Contractor may submit a Payment Request for the period ending the last calendar day of the previous month. Said Payment Request shall be in such format and include whatever supporting information as may be reasonably required by the Engineer.

B. Payment Request. In its Payment Request, the Contractor may request payment for ninety percent (90%) of that element of the Contract Price allocable to the Contract Services that have been properly provided, including labor, materials and equipment properly incorporated in the Work, and materials or equipment necessary for the Work and properly stored at the Project Site (or elsewhere if offsite storage is approved in writing by the Engineer), less the total amount of previous payments received from Rockland Green. Payment for materials stored offsite shall be at the discretion of Rockland Green and if approved, the Contractor shall provide appropriate documentation to substantiate materials are stored in a bonded warehouse or facility, title or other proof of ownership has been transferred to Rockland Green, and that materials have been purchased and paid for by the Contractor (copies of paid invoices must be submitted to the Engineer with Payment Request). Risk of loss shall be borne by, and insurance must be provided by, the Contractor while in storage and in transit, for all such materials purchased and paid for by the Contractor. With each Payment Request, Contractor shall submit certified payrolls in accordance with Section 3.13(D) herein, and to the extent requested by Rockland Green, an affidavit that the Project and/or Site is free of all liens and encumbrances.

C. Change Orders and Payment Requests. Amounts reflected in Change Orders may be included in Payment Requests to the extent they are not in dispute and subject to final approval of cost to Rockland Green for such changes in the Work.

D. Certification by Contractor. Each Payment Request shall be signed by the Contractor and shall constitute the Contractor's representation that the quantity of Work has reached the level for which payment is requested, that the Work has been properly performed in strict compliance with the Contract Documents, and that the Contractor knows of no reason why payment should not be made as requested.

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E. Rockland Green Review. Upon receipt of a properly completed Payment Request, the Engineer shall review the Payment Request and may also review the Work at the Project Site or elsewhere to determine whether the quantity and quality of the Work is as represented in the Payment Request and is as required by this Contract. Such review of the Payment Request and any related work shall be performed by the Engineer within two (2) weeks from the date Rockland Green receives such Payment Request. The amount of each such payment shall be the amount approved for payment by the Engineer, less such amounts, if any, otherwise owing by the Contractor to Rockland Green or which Rockland Green shall have the right to withhold as authorized by the Contract Documents, subject to approval by Rockland Green. Approval of the Contractor's Payment Requests shall not preclude Rockland Green from the exercise of any of its rights, including those related to authorized withholdings, offsets and reclamation, as set forth herein below.

F. Payment Request as Representation and Warranty of Work. The submission by the Contractor of a Payment Request also constitutes an affirmative representation and warranty that all work for which Rockland Green has previously paid is free and clear of any lien, claim, or other encumbrance of any person whatsoever. As a condition precedent to payment, the Contractor shall, as required by Rockland Green, also furnish to the Engineer properly executed waivers of lien or claim, in a form acceptable to Rockland Green, from all Subcontractors, materialmen, suppliers or others having lien or claim rights, wherein said subcontractors, materialmen, suppliers or others having lien or claim rights, shall acknowledge receipt of all sums due pursuant to all prior Payment Requests and waive and relinquish any liens, lien rights or other claims relating to the Work and the Project Site. Furthermore, the Contractor warrants and represents that, upon payment of the Payment Request submitted, title to all Work included in such payment shall be vested in Rockland Green, even though responsibility for the care and maintenance of said Work rests with Contractor until Substantial Completion of the Project has been achieved.

SECTION 5.7 PROMPT PAYMENT. When payment is received from Rockland Green, the Contractor shall promptly pay all Subcontractors, materialmen, laborers and suppliers the amounts they are due for the work covered by such payment.

SECTION 5.8 NO APPROVALS, CONSENTS OR WAIVERS IMPLIED IN PAYMENTS. Neither payment to the Contractor, utilization of the Project Site for any purpose by Rockland Green, nor any other act or omission by Rockland Green shall be interpreted or construed as an acceptance of any Work of the Contractor not strictly in compliance with the Contract Documents.

SECTION 5.9 PAYMENT WITHHOLDING. After written notice to the Contractor and a reasonable opportunity to cure, Rockland Green shall have the right to refuse to make payment, in whole or in part, and, if necessary, may demand the return of a portion or the entire amount previously paid to the Contractor due to:

(i) The quality of a portion, or all, of the Contractor's Work not being in compliance with the requirements of the Contract Documents;

(ii) The quantity of the Contractor's work not being as represented in the Contractor's Payment Request, or otherwise;

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(iii) The Contractor's rate of progress being such that, in the reasonable opinion of the Engineer, Final Completion may be inexcusably delayed;

(iv) The Contractor's failure to use Contract funds, previously paid the Contractor by Rockland Green to pay Contractor's project-related obligations including, but not limited to, Subcontractors, laborers and material and equipment suppliers;

(v) Claims made, or claims likely to be made as evidenced by a claimant filing a demand, notice of intent to file a claim, including a duly filed mechanic's lien for labor or materials provided or a notice of intent to file a mechanic's lien, against Rockland Green or its property for which the Contractor or its agents or Subcontractors or others for whom it is responsible are, or reasonably appear to be at fault;

(vi) Loss caused by the Contractor; or

(vii) The Contractor's failure or refusal to perform any of its obligations to Rockland Green after written notice and a reasonable opportunity to cure as set forth above.

In the event that Rockland Green makes written demand upon the Contractor for amounts previously paid by Rockland Green as contemplated in this Section, the Contractor shall promptly comply with such demand. Rockland Green's rights hereunder survive the term of this Contract, are not waived by final payment and/or issuance of the Certificate for Final Completion, and are in addition to Contractor's obligations elsewhere in this Contract.

SECTION 5.10 PAYMENT UPON FINAL COMPLETION. Upon Final Completion, Rockland Green shall pay the Contractor an amount sufficient to increase total payments to the Contractor to one hundred percent (100%) of the Contract Price less any amounts attributable to damages, and less one hundred fifty percent (150%) of the costs, as reasonably determined by Rockland Green for completing all incomplete work, correcting and bringing into conformance all defective and nonconforming work, and handling any outstanding or threatened claims. Such a calculation by the Engineer of costs for completing all incomplete work, correcting and bringing into conformance all defective and nonconforming work, and handling any outstanding or threatened claims shall not bar Rockland Green from exercise of its rights elsewhere herein, or otherwise as provided by law for any incomplete, defective or nonconforming work or claims which are discovered by Rockland Green after the date of making such calculation or after the date of any partial or final payment, whether or not such incomplete, defective or nonconforming work or claims were obvious or should have been discovered earlier. Final payment shall be made only upon completion of the final inspection and issuance of a Certificate of Final Completion in accordance with Section 4.2 and the delivery and approval of information, as required herein.

SECTION 5.11 FAILURE TO MEET SUBSTANTIAL COMPLETION. In addition to other remedies of Rockland Green, Liquidated Damages may be withheld or collected for failure to meet the date for Substantial Completion as set forth in Section 3.3 above.

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SECTION 5.12 FINAL PAYMENT. Rockland Green shall endeavor to make final payment of all sums due the Contractor within thirty (30) days of the final Payment Request, with the exception of items disputed in good faith or concerning which the Engineer has reasonably exercised any of his rights to investigate.

ARTICLE VI.
CONTRACT ADMINISTRATION

SECTION 6.1 THE ENGINEER. The Engineer is lawfully licensed to practice engineering in the State. The duties, responsibilities, and authority of the Engineer are set forth in the Contract Documents and shall not be restricted, modified or extended without the written consent of Rockland Green. Such consent shall not be unreasonably withheld.

SECTION 6.2 CONTRACT ADMINISTRATION. The Engineer will provide administration of the Contract as described in the Contract Documents, and will be Rockland Green's representative during the Term. The Engineer will have authority to act on behalf of Rockland Green to the extent provided in the Contract Documents.

SECTION 6.3 SITE VISITS. The Engineer will visit the Site at intervals appropriate to the stage of the Contractor's Work (1) to become generally familiar with and to keep Rockland Green informed about the progress and quality of the portion of the Work completed, (2) to guard Rockland Green against defects and deficiencies in the Work, and (3) to determine in general if the Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. the Engineer will neither have control over or charge of, nor be responsible for, the means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as otherwise provided.

SECTION 6.4 FAILURE TO PERFORM. The Engineer will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Engineer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractor, or their agents or employees or any other persons or entities performing portions of the Work.

SECTION 6.5 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION. Rockland Green and Contractor shall communicate with each other about matters arising out of or relating to this Contract. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Engineer.

SECTION 6.6 MEETINGS. The Contractor shall conduct meetings in accordance with the Specifications or as reasonably requested by Rockland Green.

SECTION 6.7 CERTIFICATES OF PAYMENT. Based on the Engineer's evaluation of the Contractor's Payment Requests, the Engineer will review and certify the amount due and

Rockland Green will issue payments in response to Payment Requests in accordance with Article V.

SECTION 6.8 REVIEW OF SUBMITTALS. The Engineer will take appropriate action upon the Contractor's Submittals, but only for the limited purpose of checking for conformance with information given and the Work expressed in the Contract Documents. The Engineer's actions will be taken in accordance with the submittals schedule as set forth in the Specifications, while allowing sufficient time in the Engineer's professional judgment to permit adequate review. Review of such documents is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions or quantities or for substantiating instructions for equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Engineer's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Engineer, of any means, methods, techniques, sequences, or procedures.

SECTION 6.9 REJECTION OF WORK. The Engineer will have authority to reject Work that does not conform to the Contract Documents. Whenever the Engineer considers it necessary or advisable, the Engineer will have authority to require inspection or testing of the Work. However, neither this authority of the Engineer nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Engineer to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

SECTION 6.10 PREPARATION OF CHANGE ORDERS AND CONSTRUCTION CHANGE DIRECTIVES. The Engineer will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work in accordance with Article VIII hereof.

SECTION 6.11 INSPECTIONS. The Engineer will conduct inspections to determine the date or dates of Substantial Completion and the date of Final Completion, will receive and forward to Rockland Green, for Rockland Green's review and records, written warranties and related documents required by the Contract Documents and assembled by the Contractor, and will issue a final certificate for payment upon compliance with the requirements of the Contract Documents.

SECTION 6.12 INTERPRETATIONS. The Engineer will interpret and decide matters concerning performance under, and the requirements of, the Contract Documents on written request of either Rockland Green or the Contractor. The Engineer's response to such request will be made in writing. Delay shall not be recognized on account of failure by the Engineer to furnish such interpretations. Interpretations and decisions of the Engineer will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and initial decisions, the Engineer will endeavor to secure faithful performance by both Rockland Green and the Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith. The Engineer's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

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ARTICLE VII.
TERM

SECTION 7.1 EFFECTIVE DATE AND TERM. This Contract shall become effective on the Contract Date and shall continue in effect until all Contract Services have been completed, or this Contract is earlier terminated, as applicable (the "Term"). All rights, obligations and liabilities of the Parties hereto shall commence on the Contract Date, subject to the terms and conditions hereto.

ARTICLE VIII.
CHANGE ORDERS

SECTION 8.1 AUTHORITY TO ISSUE CHANGE ORDERS. One or more changes to the Work within the general scope of this Contract may be ordered by Change Order. Rockland Green may also issue written directions for minor changes in the Work and may issue Construction Change Directives, as set forth below. The Contractor shall proceed with any such Change Orders or Construction Change Directives without delay and in a diligent manner, and same shall be accomplished in strict accordance with the following terms and conditions.

SECTION 8.2 CHANGE ORDER DEFINED. "Change Order" shall mean a written order to the Contractor executed by the Parties after execution of this Contract, directing a change in the Work. A Change Order may include a change in the Contract Price (other than a change attributable to damages caused by the Contractor for delay) or the time for the Contractor's performance, or any combination thereof. Where there is a lack of total agreement on the terms of a Change Order or insufficient time to execute a bilateral change, Rockland Green may also direct a change in the Work in the form of a "Construction Change Directive", which will set forth the change in the Work and the change, if any, in the Contract Price or time for performance, for subsequent inclusion in a Change Order. Construction Change Directives shall include a not-to-exceed preliminary price, against which the Contractor may begin billing (subject to the requirements for pay applications elsewhere herein) as the work is performed.

SECTION 8.3 SUBSTANTIATING THE CHANGE ORDERS. The cost of any change in the Work shall be determined in accordance with the requirements of this Article and consistent with the Contract Documents.

SECTION 8.4 ITEMIZATION FOR CHANGE ORDERS. The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Engineer, with any proposal for a Change Order.

A. The price breakdown:

(i) Must include sufficient detail to permit an analysis of all costs for material, labor, equipment, and Subcontracts; and

(ii) Must cover all work involved in the modification, whether the work was deleted, added or changed.

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B. Subcontract price breakdowns. The Contractor shall provide similar price breakdowns to support any amounts claimed for Subcontracts.

C. Justification. The Contractor's proposal shall include a complete justification for any time extension proposed in conjunction with the Change Order request.

SECTION 8.5 CALCULATION OF CHANGE ORDER AMOUNTS. Any change in the Contract Price resulting from a Change Order shall be determined as follows:

A. Mutual agreement. By mutual agreement between Rockland Green and the Contractor as evidenced by a written Change Order executed by the Parties of the Change Order.

B. No mutual agreement. If no mutual agreement occurs between Rockland Green and the Contractor, the change in the Contract Price, if any, shall be derived by determining the reasonable actual costs incurred or savings achieved, resulting from revisions in the Work. Such reasonable actual costs or savings shall include a component for direct job site overhead and profit but shall not include home-office overhead or other indirect costs or components. The calculation of actual costs shall conform to the markup schedule otherwise provided in Section 8.8, below. Any such costs or savings shall be documented in the format and with such content and detail as Rockland Green requires.

C. Documentation. The Contractor shall promptly submit such documentation and other backup as Rockland Green may require in evaluating the actual costs incurred.

SECTION 8.6 EXECUTION OF CHANGE ORDER AS WAIVER OF CLAIM. The execution of a Change Order by the Contractor shall constitute conclusive evidence of the Contractor's agreement to the ordered changes in the Work, this Contract as thus amended, the Contract Price and the time for performance by the Contractor. The Contractor, by executing the Change Order, waives and forever releases any claim against Rockland Green for additional time or compensation for matters relating to, arising out of or resulting from the Work included within or affected by the executed Change Order of which the Contractor knew or should have known.

SECTION 8.7 NOTIFICATION TO SURETY AS OTHERWISE REQUIRED. The Contractor shall notify and obtain the consent and approval of the Contractor's surety with reference to all Change Orders and Construction Change Directives if such notice, consent or approval are required by Rockland Green, the Contractor's surety or by law. The Contractor's execution of the Change Order or Construction Change Directive shall constitute the Contractor's warranty to Rockland Green that the surety has been notified of, and consents to, such Change Order or Construction Change Directive and the surety shall be conclusively deemed to have been notified of such Change Order or Construction Change Directive and to have expressly consented thereto.

SECTION 8.8 ADDITIONAL COST FACTORS IN PRICING CHANGE ORDERS OR CONSTRUCTION CHANGE DIRECTIVES. For the purpose of Change Orders or Construction Change Directives, the following additional definitions and requirements apply:

A. Materials. Contractor's or Subcontractor's materials shall include the cost of materials, sales tax (if any) and the cost of all transport. The cost of items listed shall be directly

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related to the Change Order or Construction Change Directive. Indirect costs not specifically related to the Change Order or Construction Change Directive shall not be considered.

B. Direct Labor Cost. Contractor's or Subcontractor's direct labor cost shall be limited to the hourly rate of directly involved workers, employer contributions towards Contractor standard benefits, pensions, unemployment or social security (if any), and employer costs for paid sick and annual leave.

C. Overhead. Contractor's or Subcontractor's overhead shall include license fees, bond premiums, supervision, wages of timekeepers and clerks, incidentals, home and field office expense, and vehicle expense directly related to the Project, and all other direct Project expenses not included in the Contractor's materials, direct labor, and equipment costs.

D. Allowance. The allowance for overhead and profit shall be limited to the following schedule:

(i) For the Contractor, for any work performed by the Contractor's own forces, 15% of the subtotal of costs to the Contractor.

(ii) For the Contractor, for any work performed by his Subcontractor, 6% of the amount due the Subcontractor.

(iii) For each Subcontractor or sub-subcontractor involved, for any work performed by their own forces, 15% of their materials and direct labor costs.

(iv) For each Subcontractor, for work performed by his sub-subcontractor(s), 6% of the amount due the sub-subcontractor.

E. Total Cost or Credit. For Change Orders or Construction Change Directives the total cost or credit to Rockland Green shall be based on the following schedule:

(i) Contractor's materials cost;

(ii) Contractor's direct labor costs;

(iii) Contractor's equipment costs (includes owned/rental equipment);

(iv) Applicable Subcontractor costs;

(v) Subtotal of costs to the Contractor;

(vi) Contractor's overhead and profit; and

(vii) Total cost or credit to Rockland Green.

Nothing contained in this Article shall be deemed to contradict or limit the terms of Section 3.9 herein.

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ARTICLE IX.
CLAIMS BY THE CONTRACTOR

SECTION 9.1 PROCEDURES FOR CONTRACT CLAIMS. All Contractor claims against Rockland Green shall be initiated by a written claim submitted to Rockland Green. Notice of such claim shall be received by Rockland Green no later than either ten (10) days after the event, or ten (10) days after the first appearance of the circumstances causing the claim, whichever is sooner, and same shall set forth in detail all known facts and circumstances supporting the claim; final costs associated with any claim upon which notice has been filed must be submitted in writing to Rockland Green within thirty (30) days after notice has been received. ANY CLAIM NOT FILED WITH ROCKLAND GREEN WITHIN SUCH TIME AND IN COMPLIANCE WITH THE PRECEDING PROVISIONS SHALL BE DEEMED CONCLUSIVELY TO HAVE BEEN WAIVED AND SHALL BE DISMISSED.

SECTION 9.2 CONTRACTOR PROHIBITED FROM WITHHOLDING SERVICES. The Contractor shall continue to perform the Contract Services regardless of the existence of any claims submitted by the Contractor or any Disputed Decision, including claims set forth in Section 11.1 hereof. Contractor shall not withhold services for failure of the parties to agree upon a Change Order, but Contractor shall proceed in accordance with any Construction Change Directive and may at its option file a claim under this Article.

SECTION 9.3 CLAIMS RELATED TO PROJECT SITE CONDITIONS. In the event the Contractor discovers previously concealed, hidden, and/or subsurface Site conditions which materially vary from those typically and ordinarily encountered in the general geographical location of the Project and the Contract Documents, the Contract Price may, with the approval of Rockland Green, be modified, either upward or downward, upon the written notice of claim made by either party within ten (10) days after the first appearance to such party of the circumstances. Final costs must be submitted within thirty (30) days after such notice is received by Rockland Green, unless extended by written agreement of the Parties. As a condition precedent to Rockland Green having any liability to the Contractor due to concealed and unknown conditions, the Contractor must give the Engineer written notice of, and an opportunity to observe, such condition prior to disturbing the condition. The failure by the Contractor to give the written notice and make the claim as provided by this section shall constitute a waiver by the Contractor of any rights arising out of or relating to such concealed and unknown condition.

SECTION 9.4 CONDITION PRECEDENT TO LIABILITY. In the event the Contractor seeks to make a claim for an increase in the Contract Price, as a condition precedent to any liability of Rockland Green therefor, unless emergency conditions exist, the Contractor shall strictly comply with the requirements of Section 9.1 and such claim shall be made by the Contractor before proceeding to execute any work for which a claim is made. Failure to comply with this condition precedent shall constitute a waiver by the Contractor of any claim for additional compensation.

SECTION 9.5 LIMITATION OF ROCKLAND GREEN'S OBLIGATIONS FOR CLAIMS. In a claim by the Contractor against Rockland Green for compensation in excess of the Contract Price, any liability of Rockland Green to the Contractor shall be strictly limited and computed in accordance with the Contract Documents and shall in no event include indirect costs

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(such as a home office overhead) or consequential damages of the Contractor or any estimated costs or damages.

ARTICLE X.
EVENTS OF DEFAULT AND TERMINATION

SECTION 10.1 ROCKLAND GREEN'S RIGHT TO TERMINATE FOR CAUSE. Rockland Green may terminate the Contract for cause for any of the reasons set forth in this Article, or for any other material breach of this Contract, whether or not the act, omission, or conduct resulting in the Contractor's material breach is enumerated in this Article.

SECTION 10.2 GROUNDS FOR TERMINATION. Rockland Green has the right to terminate the Contract for cause if the Contractor:

A. Fails to supply adequate properly skilled workers or proper materials;

B. Fails to make payment to Subcontractors or suppliers for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

C. Fails to comply with Applicable Law, including obtaining any necessary permits and the Prevailing Wage Law;

D. Fails to perform the Work in accordance with the Contract Documents or otherwise breaches any provision of the Contract Documents;

E. Is insolvent as determined under the United States Bankruptcy Code;

F. Pursuant to the issuance of an order of a court of competent jurisdiction, a receiver, liquidator, custodian or trustee of the Contractor is appointed or of a major part of the Contractor's property, respectively, or the filing against the Contractor of a petition to reorganize the Contractor pursuant to the United States Bankruptcy Code, which order shall not have been discharged or which filing shall not have been dismissed within ninety (90) days after such issuance or filing, respectively;

G. Fails to provide adequate assurances after notice of an anticipatory breach or repudiation of this Contract;

H. Fails to make satisfactory progress in the prosecution of this Contract;

I. Endangers the performance of this Contract;

J. Fails, after notice, to implement Construction Change Directive or Change Order;

K. Ceases performance of the Work in violation of the Contract Standards;

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L. Fails to obtain and maintain the Performance Bond, Payment Bond, or Required Insurance as required herein;

M. Intentionally misrepresents information and facts relating to the Contractor's performance of its obligations hereunder;

N. Assigns this Contract or any funds due hereunder without prior written approval by Rockland Green;

O. Experiences a changes in ownership in violation of Section 14.6;

P. Makes a false representation or warranty in any material respect when made, and the legality of this Contract or the ability of the Contractor to carry out its obligations hereunder is adversely affected; or

Q. Fails to supply complete and accurate information, records or accounts as provided herein.

R. Fails to achieve Final Completion within thirty (30) days of the Scheduled Substantial Completion Date, except for excuse by Uncontrollable Circumstances.

SECTION 10.3 NOTICE OF TERMINATION. If Rockland Green determines pursuant to Section 10.2 that it has cause to terminate this Contract, Rockland Green will provide the Contractor with a written notice of an opportunity to cure the default. If the default is not cured within seven (7) days of the Contractor's receipt of the notice, the termination for default is effective on the date specified in Rockland Green's written notice. If, however, Rockland Green determines that default contributes to the curtailment of an essential service or poses an immediate threat to life, health, or property, the Executive Director may terminate this Contract immediately upon issuing oral or written notice to the Contractor without any prior notice or opportunity to cure. In addition to any other remedies provided by law or this Contract, the Contractor must compensate Rockland Green for additional costs that foreseeably would be incurred by Rockland Green, whether the costs are actually incurred or not, to obtain substitute performance.

SECTION 10.4 ACTION BY CONTRACTOR AND ROCKLAND GREEN.

A. Action by Contractor upon Notice of Termination. Upon receipt of written notice from Rockland Green of termination pursuant to this Article, the Contractor shall:

(i) Cease operations as directed by Rockland Green in the notice and, if required by Rockland Green, participate in an inspection of the Work with Rockland Green and the Engineer to record the extent of completion thereof, to identify the Work remaining to be completed or corrected, and to determine what temporary facilities, tools, equipment and construction machinery are required and authorized to remain at the Project Site pending completion of the Work.

(ii) Following such initial inspection of the Work with Rockland Green and the Engineer the Contractor shall:

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(a) Complete or correct the items directed by Rockland Green, and take actions necessary, or that Rockland Green may direct, for the protection and preservation of any stored materials and equipment and completed Work;

(b) Unless otherwise directed by Rockland Green pursuant to Section 10.5 (B)(i) below, remove its tools, equipment and construction machinery from the Site, and

(c) Except as directed by Rockland Green in Section 10.5 (B) (ii) below, terminate all existing Subcontracts and purchase orders related to the Work and enter into no further Subcontracts or purchase orders therefor.

B. Action by Rockland Green Following Notice. Following written notice from Rockland Green of termination, Rockland Green may:

(i) Take possession of the Project Site and of all materials and equipment thereon;

(ii) Accept assignment of Subcontracts and purchase orders as provided in this Contract, and

(iii) Complete the Work by whatever reasonable method Rockland Green may deem expedient.

(iv) Exercise any rights under the Contractor's Performance Bond, Payment Bond, and any other applicable security instrument of the Contractor.

C. Cost of Terminating Subcontracts. The Contractor will not be compensated for the cost of terminating Subcontracts which must be terminable at no cost to Rockland Green if the Contract is terminated.

ARTICLE XI.
DISPUTE RESOLUTION AND LITIGATION

SECTION 11.1 DISPUTED DECISIONS OF ROCKLAND GREEN OR THE ENGINEER. If the Contractor disputes or objects to any requirement, direction, instruction, interpretation, determination, or decision of Rockland Green or the Engineer ("Disputed Decision"), the Contractor may, immediately upon receiving any such Disputed Decision, notify the Engineer in writing, with a copy to Rockland Green, of its dispute or objection and of the amount of any equitable adjustment to the Contract Price or Contract Time to which Contractor claims it will be entitled as a result thereof ("Notice of Dispute"); provided, however, that Contractor shall, nevertheless proceed without delay to perform the Work as required, directed, instructed, interpreted, determined, or decided by Rockland Green or the Engineer without regard to such dispute or objection and such Notice of Dispute. To the extent that a Disputed Decision also gives rise to a claim within the meaning of Section 9.1, Contractor shall also comply with the provisions of that Section and Article. Unless the Contractor so notifies the Engineer not later than two business days after receipt of such Disputed Decision, and, whenever feasible, prior to taking

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any action based upon such Disputed Decision, the Contractor shall be conclusively deemed (1) to have agreed to and accepted such Disputed Decision as being fair, reasonable, and finally determinative of the Contractor's obligations and rights under this Contract; (2) to have waived all grounds for dispute of or objection to such Disputed Decision; and (3) to have waived all claims for damages and equitable adjustments to the Contract Price and Contract Time based on such Disputed Decision. To avoid and settle without litigation any Disputed Decision, Rockland Green and Contractor agree to engage in good faith mediation as provided in this Section. Within seven (7) days after Engineer's receipt of any Notice of Dispute, Engineer shall deliver to Contractor, with a copy to Rockland Green, Engineer's preliminary written response either rejecting Contractor's claim, recommending to Rockland Green approval of Contractor's claim, suggesting a compromise of Contractor's claim, or requesting additional information. Within fourteen (14) days after Contractor's receipt of Engineer's preliminary written response, the Contractor shall deliver to the Engineer any additional information requested and notify the Engineer whether the Contractor is withdrawing, modifying or reaffirming its Notice of Dispute. Within three business days after the Engineer's receipt of the Contractor's reply, a conference among Rockland Green, the Engineer, and the Contractor shall be held to resolve the dispute. In the event the parties fail to resolve such dispute, the parties may hereby agree, as an express condition precedent to the commencement of any litigation in accordance with Section 11.2, below, to mediate the Disputed Decision in accordance with the American Arbitration Association's ("AAA") Construction Industry Rules. Each party shall bear its own costs of such mediation.

SECTION 11.2 FORUM SELECTION AND CONSENT TO JURISDICTION, WAIVER OF RIGHT TO REMOVE. The parties hereby agree to litigate in a state court of competent jurisdiction within Rockland County, New York, all Disputed Decisions not settled either through direct negotiation or mediation pursuant to Section 11.1. If either Party elects to bring a claim or file suit or any legal proceeding, the Parties expressly acknowledge and agree that such claim or legal proceeding or cause of action shall be filed, remain, tried and resolved in the State Courts of the State of New York, County of Rockland. The Parties expressly waive any right otherwise provided by any Applicable Law to remove the matter to any other state or federal venue. Each party shall bear its own costs of such litigation, except as otherwise provided herein or by law. Neither party shall be compelled to participate in any form of arbitration, whether commenced by the other party or by a third party such as a Subcontractor, supplier or consultant, and all references to arbitration herein or in any procurement documents are deemed void.

ARTICLE XII.
INSURANCE, SECURITY FOR PERFORMANCE, INDEMNIFICATION, AND UNCONTROLLABLE CIRCUMSTANCES

SECTION 12.1 REQUIRED INSURANCE. At all times during the Term, the Contractor shall obtain and maintain the Required Insurance in accordance with Appendix 4 hereto and shall pay all premiums and deductibles with respect thereto as the same become due and payable. The failure of the Contractor to obtain and maintain any Required Insurance shall not relieve the Contractor of its liability for any losses intended to be insured thereby. Should any failure to provide continuous insurance coverage occur, the Contractor shall indemnify and hold harmless Rockland Green in the manner provided in Section 12.3 hereof, from and against any Loss and Expense arising out of such failure.

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SECTION 12.2 SECURITY FOR PERFORMANCE.

A. Performance and Payment Bonds. The Contractor shall provide financial security for the performance of its obligations and prompt payment of moneys that are due to all persons furnishing labor and materials hereunder through a Performance Bond and a Payment Bond each issued by a surety company: (1) approved by Rockland Green having a rating of "A" in the latest revision of the A.M. Best Company's Insurance Report; (2) listed in the United States Treasury Department's Circular 570, "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsurance Companies"; and (3) properly registered and licensed to conduct business in the State of New York. The Performance Bond and the Payment Bond shall each be issued in the amount of the Contract Price. The Performance Bond and the Payment Bond shall be substantially in the applicable form prescribed by Rockland Green and contained as Transaction Agreement Forms 1 and 2 to this Contract. A copy of the Performance Bond and the Payment Bond shall be kept by Rockland Green and shall be open to public inspection. The Penal sum of each bond required under this Section shall be in the full amount of the Contract Price.

B. Costs of Providing Security for Performance. The cost and expense of obtaining and maintaining the Security Instruments required under this Section as security for the performance of the Contractor's obligations hereunder shall be borne by the Contractor without reimbursement from Rockland Green.

SECTION 12.3 INDEMNIFICATION BY THE CONTRACTOR. The Contractor shall indemnify, defend and hold harmless Rockland Green, and its elected officials, appointed officers, employees, representatives, the Engineer, agents and contractors (each, a "Rockland Green Indemnitee"), from and against (and pay the full amount of) any and all Loss-and-Expense incurred by a Rockland Green Indemnitee to third-parties arising from or in connection with (or alleged to arise from or in connection with): (1) any failure by the Contractor to perform its obligations under this Contract; or (2) the negligent acts, errors or omissions or willful misconduct of the Contractor or any of its Affiliates, officers, directors, employees, agents, representatives or Subcontractors in connection this Contract. The Contractor shall also indemnify Rockland Green as and to the extent provided elsewhere in this Contract. The Contractor's indemnity obligations hereunder shall not be limited by any coverage exclusions or other provisions in any insurance policy maintained by the Contractor which is intended to respond to such events. The Contractor shall not, however, be required to reimburse or indemnify any Rockland Green Indemnitee for any Loss-and-Expense to the extent resulting from (a) the negligence or willful misconduct of any Rockland Green Indemnitee or to the extent attributable to any Uncontrollable Circumstance, and (b) any act or omission of any Rockland Green Indemnitee judicially determined to be proportionally responsible for or contributing to the Loss-and-Expense, and a Rockland Green Indemnitee whose negligence or other wrongful conduct, act or omission is adjudged to have caused such Loss-and-Expense shall be responsible therefor in the proportion that its negligence or wrongful conduct caused or contributed to the Loss-and-Expense. A Rockland Green Indemnitee shall promptly notify the Contractor of the assertion of any claim against it for which it is entitled to be indemnified hereunder, and the Contractor shall have the right to assume the defense of the claim in any Legal Proceeding and to approve any settlement of the claim. These indemnification provisions are for the protection of Rockland Green and any Rockland Green Indemnitee only and shall not establish, of themselves, any liability to third parties. This

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indemnification obligation shall include, but is not limited to, all claims against Rockland Green by an employee or former employee of the Contractor or any Subcontractor, and the Contractor expressly waives all immunity and limitation on liability under any industrial insurance act, other workers' compensation act, disability benefit act, or other employee benefit act of any jurisdiction which would otherwise be applicable in the case of such a claim. The provisions of this Section shall survive termination of this Contract.

The Contractor shall be responsible for all liability associated with the Work. Without limiting the foregoing, the Contractor shall indemnify, defend and hold harmless Rockland Green from all Loss and Expense on account of any tort or other liability resulting from the Work.

SECTION 12.4 UNCONTROLLABLE CIRCUMSTANCES. Except as otherwise provided herein, neither party shall be liable to the other for any failure or delay in the performance of any obligation under this Contract to the extent due to the occurrence of an Uncontrollable Circumstance. The party experiencing an Uncontrollable Circumstance shall give prompt written notice to the other, and use all reasonable efforts to eliminate the cause thereof, reduce costs and resume performance hereunder. If the Executive Director of Rockland Green determines that the event which caused the disruption of services has ended, but the Contractor does not resume Contract Services after notification, it will constitute a breach of this Contract. Closure of a Disposal Facility that the Contractor is/was using or intended to use does not constitute an Uncontrollable Circumstance, notwithstanding Rockland Green's approval of such facility.

ARTICLE XIII.
WARRANTY

SECTION 13.1 WARRANTY. The Contractor warrants to Rockland Green that the Work, and all materials, equipment, and structures furnished or fabricated, shall (i) be new, of recent manufacture and of high quality, (ii) conform to the requirements of this Contract, (iii) be free of defects in materials, equipment, and workmanship, and (iv) meet the Specifications during the Warranty Period (the "Warranty").

A. Call-Back Obligations. If, at any time during the Warranty Period, any of the Work is found to be malfunctioning, defective or otherwise not in accordance with the requirements of this Contract, the Contractor shall correct it promptly after receipt of written notice from Rockland Green to do so. Rockland Green shall give such notice promptly after discovery of the condition. The Contractor shall respond to service calls from Rockland Green within three (3) business days. Such response shall require that a competent representative or representatives of the Contractor, inspect the Project Site and, while on Site, either correct the problem or initiate a course of action that will fully correct the problem within a reasonable period of time in accordance with Good Engineering and Construction Practice and the specific requirements of this Article. The time period for correction shall not exceed ten (10) days; provided, however, that if such time periods are not practicable in accordance with Good Engineering and Construction Practice, then the time period for correction shall be the minimum amount of time required in accordance with Good Engineering and Construction Practice. Before any necessary correction, repair or replacement of facilities is initiated by the Contractor, a plan indicating the scope and schedule for such work shall be approved by Rockland Green. In the event of a latent, hidden, or not readily observable defect in the design, materials or workmanship or deviation from this

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Contract, the Warranty shall extend for an additional one (1) year from the date of discovery of such defect, deviation or condition.

B. Right of Rockland Green to Proceed with Corrective Action; Contractor Liability. If the Contractor fails to commence and complete the steps set forth in subsection (A) of this Section within the required time frames, in addition to any other remedies provided under this Contract, the Security Instruments or Applicable Law, Rockland Green may commence and complete the correction of such nonconforming Work with its own forces or with third party contractors. If Rockland Green does perform such corrective Work, the Contractor shall be responsible for all costs incurred in performing such correction.

C. No Period of Limitation on Other Obligations. Nothing contained in this Article shall be construed to establish a period of limitation with respect to other obligations that the Contractor has under this Contract or under Applicable Law with respect to the Work. The Warranty Period relates only to the specific obligations of the Contractor to respond to notices from Rockland Green under this Article, and has no relationship to the time within which the obligation of the Contractor to comply with this Contract may be enforced, nor the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations under this Contract.

D. Extension of Warranty. The "call-back" obligations set forth in this Section shall apply to all Work re-done or corrected pursuant to this Contract. The "call-back" obligations for re-done or corrected elements of the Work shall extend beyond the Warranty Period, if necessary, to provide a one (1) year period following acceptance by Rockland Green of such re-done or corrected Work.

E. Contractor Reliance on Manufacturers' Warranties During Call-Back Period. During the period in which the call-back obligations set forth in this Section are in effect, the Contractor (or Rockland Green) shall be permitted to enforce all warranties provided by manufacturers, suppliers and other third parties, if any. Notwithstanding the applicability or effectiveness of such warranties, the Contractor shall be required to comply with all the requirements set forth in this Section.

F. Compensation. The Contractor acknowledges that the Contract Price contains the entire compensation due the Contractor for any and all warranty work to be performed by the Contractor or its Subcontractors or agents pursuant to this Article including overhead and profit, except as otherwise provided. In the event any amounts are required to be paid to third-parties to perform warranty work pursuant to this Article, payment of such amounts shall be the responsibility of the Contractor.

G. Warranty not Exclusive. The warranty set forth in this Article is in addition to, and not in limitation of, any other warranties, rights and remedies available under this Contract or Applicable Law, and shall not limit the Contractor's liability or responsibility imposed by this Contract or Applicable Law with respect to the Work, including liability for design defects, latent construction defects, strict liability, negligence or fraud. The provisions of this Article shall survive the termination of this Contract.

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H. No Limitation of Third Party Warranties. Nothing in this Contract is intended to limit any third party warranty that provides Rockland Green with greater warranty rights than those provided under this Article.

ARTICLE XIV.
MISCELLANEOUS PROVISIONS

SECTION 14.1 RELATIONSHIP OF THE PARTIES. The Contractor is an independent contractor of Rockland Green and the relationship between the Parties shall be limited to performance of this Contract in accordance with its terms. Neither Party shall have any responsibility with respect to the services to be provided or contractual benefits assumed by the other Party. Nothing in this Contract shall be deemed to constitute either Party a partner, agent or legal representative of the other Party. No liability or benefits, such as workers' compensation, pension rights or liabilities, or other provisions or liabilities arising out of or related to a contract for hire or employer/employee relationship, shall arise or accrue to any Party's agent or employee as a result of this Contract or the performance thereto.

SECTION 14.2 CERTAIN OBLIGATIONS TO SURVIVE TERMINATION. Warranties, representations, indemnification obligations and other continuing obligations explicitly stated herein, survive acceptance of the Work under this Contract and termination of this Contract; and do not relieve the Contractor of the Contractor's obligations hereunder.

SECTION 14.3 NO WAIVERS. No action of Rockland Green or Contractor pursuant to this Contract (including, but not limited to, any investigation or payment), and no failure to act, shall constitute a waiver by either party of the other party's compliance with any term or provision of this Contract. No course of dealing or delay by Rockland Green or Contractor in exercising any right, power or remedy under this Contract shall operate as a waiver thereto or otherwise prejudice such party's rights, powers and remedies. No single or partial exercise of (or failure to exercise) any right, power or remedy of Rockland Green or the Contractor under this Contract shall preclude any other or further exercise thereto or the exercise of any other right, power or remedy. The above notwithstanding, any of the terms, covenants, and conditions of this Contract may be waived at any time by the party entitled to the benefit of such term, covenant or condition if such waiver is in writing and executed by the party against whom such waiver is asserted.

SECTION 14.4 ACTIONS OF ROCKLAND GREEN IN ITS GOVERNMENTAL CAPACITY. Nothing in this Contract shall be interpreted as limiting the rights and obligations of Rockland Green in its governmental or regulatory capacity.

SECTION 14.5 ASSIGNMENT. The Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract, or of the Contractor's right, title, or interest herein, (including without limitation through a sale of assets or ownership interest, merger, consolidation or other change of control) to any third party, or assign all or any of the portion of compensation that may be due or become due under the terms hereof to any other person or corporation, without the previous consent in writing of Rockland Green. If the Contractor violates this Section, Rockland Green shall have the right, in its sole discretion, to terminate this Contract without prior notice and without a cure period, and in the event of such termination, the Contractor shall forfeit all monies earned hereunder. Rockland Green may, without the consent of the Contractor, make

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assignments, create such security interests in its rights hereunder and pledge such monies receivable hereunder as may be required in connection with the issuance of bonds.

SECTION 14.6 CHANGE IN OWNERSHIP OF CONTRACTOR OR A PARENT COMPANY. The Contractor shall provide Rockland Green with five (5) days' prior written notice of any change of any nature in the ownership (which includes the ownership structure) of the Contractor or any parent, subsidiary or Affiliate thereof, including without limitation any transfers of shares of stock, membership or other ownership units of the Contractor, parent subsidiary or Affiliate. In addition, if the Contractor is a privately held company, the Contractor shall provide Rockland Green with five (5) days' prior written notice of any changes in the officers, principals or directors of the Contractor. Subsequent to any such notices, the Contractor shall provide upon request of Rockland Green any reasonable information requested by Rockland Green related to such change in ownership (which includes the ownership structure), officers, principals or directors. At any time within five (5) days following Rockland Green's receipt of such supporting information, Rockland Green shall have the right to terminate this Contract upon thirty (30) days' notice to the Contractor. In the event of a violation of this Section by the Contractor, Rockland Green shall have the right in its sole discretion to terminate this Contract without prior notice or cure period, and in the event of such termination, the Contractor shall forfeit all monies earned hereunder.

SECTION 14.7 BINDING EFFECT. This Contract shall inure to the benefit of and shall be binding upon Rockland Green and the Contractor and any assignee acquiring an interest hereunder consistent with Section 14.5 hereof.

SECTION 14.8 AMENDMENT AND WAIVER. This Contract may not be amended except by a written agreement signed by the Parties. Any of the terms, covenants, and conditions of this Contract may be waived at any time by the Party entitled to the benefit of such term, covenant or condition if such waiver is in writing and executed by the Party against whom such waiver is asserted.

SECTION 14.9 NON-DISCRIMINATION. The Contractor, a Subcontractor or a supplier, shall not discriminate nor permit discrimination by any of their respective officers, employees, agents and representatives against any person because of age, race, color, religion, gender, national origin, sexual orientation, or, with respect to otherwise qualified individuals, handicap. The Contractor will take all actions reasonably necessary to ensure that qualified applicants are employed, and that employees are treated during employment, without regard to their age, race, color, gender, religion, sexual orientation, national origin or, with respect to otherwise qualified individuals, handicap. Such action shall include, without limitation, recruitment and recruitment advertising; layoff or termination; upgrading, demotion, transfer, rates of pay or other form of compensation; and selection for training, including apprenticeship. The Contractor shall impose the non-discrimination provisions of this Section by contract on all Subcontractors hired to perform work related to the Contract Services and shall take all reasonable actions necessary to enforce such provisions. The Contractor will post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

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SECTION 14.10 SEVERABILITY OF PROVISIONS. If any one or more of the provisions contained in the Contract Documents should be deemed invalid, illegal or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein are not to be affected or impaired thereby; provided the same does not materially alter the rights or obligations of the parties.

SECTION 14.11 NO THIRD PARTY RIGHTS CREATED. The Contract Documents are not to be construed to create a contractual relationship of any kind other than between Rockland Green and the Contractor. No third-party rights are intended, created, or provided, either expressly or by implication by the terms and conditions of this Contract. The terms and conditions of this Contract are expressly limited to benefit the parties hereto.

SECTION 14.12 DRUG FREE WORKPLACE. The Contractor shall comply with New York Drug-free Workplace Act, P.S. 287.087.22.

SECTION 14.13 NOTICES.

A. Procedure. All notices, consents, approvals or written communications given pursuant to the terms of this Contract shall be: (1) in writing and delivered in person; (2) transmitted by certified mail, return, receipt requested, postage prepaid or by overnight courier utilizing the services of a nationally-recognized overnight courier service with signed verification of delivery; or (3) given by email transmission, if a signed original is deposited in the United States Mail within two (2) days after transmission. Notices shall be deemed given only when actually received at the address first given below with respect to each Party. Either Party may, by like notice, designate further or different addresses to which subsequent notices shall be sent.

B. Contractor Notice Address. Notices required to be given to the Contractor shall be addressed as follows:

With a copy to:

C. Rockland Green Notice Address. Notices required to be given to Rockland Green shall be addressed as follows:

Gerard M. Damiani Jr., Executive Director
Rockland Green
172 Main Street
Nanuet, New York 10954
gdamiani@rocklandgreen.com

With a copy to: Dee Louis, Engineer II

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Rockland Green
172 Main Street
Nanuet, New York 10954
dlouis@rocklandgreen.com

SECTION 14.14 NOTICE OF LITIGATION. In the event the Contractor or Rockland Green receives notice of or undertakes the defense or the prosecution of any Legal Proceedings, claims, or investigations in connection with the Project, the Party receiving such notice or undertaking such prosecution shall give the other Party timely notice of such proceedings and shall inform the other Party in advance of all hearings regarding such proceedings.

SECTION 14.15 COUNTERPARTS. This Contract may be executed in any number of original counterparts. All such counterparts shall constitute but one and the same agreement.

SECTION 14.16 FURTHER ASSURANCES. Rockland Green and Contractor each agree to execute and deliver such further instruments and to perform any acts that may be necessary or reasonably requested in order to give full effect to this Contract. Rockland Green and the Contractor, in order to carry out this Contract, each shall use all commercially reasonable efforts to provide such information, execute such further instruments and documents and take such actions as may be reasonably requested by the other and not inconsistent with the provisions of this Contract and not involving the assumption of obligations or liabilities different from or in excess of or in addition to those expressly provided for this Contract. Specifically, upon reasonable request of Rockland Green, the Contractor shall supply an affidavit that the Project and/or Site is free of all liens and encumbrances, including liens for any taxes which are due and required to be paid by the Contractor (other than liens required or contemplated by this Contract).

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IN WITNESS WHERETO, the Parties have caused this Contract to be executed by their duly authorized representatives as of the day and year first above written.

ROCKLAND COUNTY SOLID
WASTE MANAGEMENT AUTHORITY d/b/a
ROCKLAND GREEN

By: _____
Gerard M. Damiani, Jr.
Executive Director

By: _____

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APPENDIX 1

CONTRACT DRAWINGS

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APPENDIX 2

SPECIFICATIONS

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APPENDIX 3

CONTRACT PRICE

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APPENDIX 4

REQUIRED INSURANCE

Prior to the Contract commencement and throughout the term of the Contract, the Contractor shall maintain insurance issued by an insurance carrier satisfactory to Rockland Green to protect the parties hereto from and against any and all claims, demands, actions, judgments, costs, expenses and liabilities of every kind and nature which may arise or result, directly or indirectly, from or by reason of such loss, injury, including injury to the applicable Contractor's employees or employees of such Contractor's Subcontractors, or damage. Such insurance shall be maintained at the Contractor's sole expense.

The Contractor shall obtain and maintain throughout the term of the Contract the following types and minimum amounts, not including deductible, of insurance:

- Commercial general liability and property damage insurance with broad form blanket contractual liability and products and completed operations coverage, shall be not less than $1,000,000 per occurrence and $2,000,000 in the aggregate on a per project basis;
- Commercial comprehensive automobile liability endorsed for any automobile shall be not less than $1,000,000 per person and $1,000,000 per occurrence;
- Worker's compensation coverage in the statutory amounts required by New York State Law;
- Employer's liability insurance required by New York State law covering all of the employees of the Contractor at Rockland Green's facility;
- Excess liability above the commercial general liability and automobile liability shall not be less than $1,000,000; and
- Pollution liability shall not be less than $1,000,000.

1. The commercial general liability, excess liability and pollution liability shall be kept in force for a period of one (1) year following the end of the contract period.

2. Additional Insureds. The Contractor will name Rockland Green, the County, and their officers, agents, employees, and consultants as additional named insureds on a primary, non-contributory basis (the "Additional Insureds") on all insurance policies required herein, other than

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workers' compensation and employer liability coverage. The Contractor will waive the subrogation rights of its various insurance carriers in favor of Rockland Green.

3. Insurance Certificates and Policies. Insurance and any renewals thereof will be evidenced by certificates of insurance (the "Certificates") and copies of all insurance policies issued or countersigned by a duly authorized representative of the issuer and delivered to Rockland Green for its approval thirty (30) days prior to the Contract commencement. The Certificates will require thirty (30) days written notice to Rockland Green, of cancellation, intent not to renew, or reduction in its coverage by the insurance company.

4. Non-Recourse Provision. All insurance policies will provide that the insurers will have no recourse against the Additional Insureds for payment of any premium or assessment and will contain a severability of interest provision in regard to mutual coverage liability policies. The coverages will be the primary source of any restitution or other recovery for any injuries to, or death of persons, or loss or damage to property incurred as a result of an action or inaction of the Contractor or its Subcontractors, of their respective suppliers, employees, agents, representatives, or invitees, that fall within these coverages and also within the coverages of any liability insurance or self-insurance program maintained by Rockland Green.

5. Deductibles. Deductibles shall not exceed $10,000.

6. Subcontractors. The Contractor will be responsible for ensuring that all Subcontractors which are working at the Site secure and maintain all insurance coverages hereunder and other financial sureties required by Applicable Law in connection with their presence and the performance of their duties at or concerning the Contract Services.

7. Specific Provisions for Comprehensive General Liability Insurance. Comprehensive General Liability insurance, as required hereunder, will include premises-operations, blanket contractual, products and completed operations, personal injury, host liquor liability, explosion, collapse, underground hazards, and broad form property damage, including completed operations and independent contractor's coverages.

8. Specific Provisions for Worker's Compensation Coverage. Worker's Compensation insurance must be in accordance with the requirements of New York law, as amended from time to time. The required worker's compensation insurance will include other State's coverage, voluntary compensation coverage, and federal longshoreman and harbor worker's coverage.

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9. Changes in Insurance Coverage. The insurance listed herein are the minimum coverages permitted, except that Rockland Green may decrease or omit the coverages specified at any time in its sole discretion. If Rockland Green decreases such coverage, any cost savings will be credited to the benefit of Rockland Green.

10. Qualifications of Insurers. The Contractor is required to obtain the insurance set forth in this Appendix with insurance companies that carry a Best's "A" or equivalent rating. In addition, insurance must be obtained and maintained with insurers authorized to do business in the State of New York.

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APPENDIX 5

PREVAILING WAGE SCHEDULE

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TRANSACTION AGREEMENT FORMS

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TRANSACTION AGREEMENT FORM 1
FORM OF
PERFORMANCE BOND

Bond No. _____

KNOW ALL MEN BY THESE PRESENT, that we, [ ] with a place of business at as principal (the "Principal"), and[ ], a [ ] qualified to do business in the State of New York, with a place of business at [ ] as Surety (the "Surety"), are held and firmly bound unto the Rockland County Solid Waste Management Authority d/b/a Rockland Green as Obligee (the "Obligee"), in the sum of [dollars ($)] lawful money of the United States of America, to be paid to the Obligee, for which payment, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, the Principal has assumed and made a contract with the Obligee, bearing the date of [ ], and entitled the [ ](the "Contract").

NOW THE CONDITIONS of this obligation are such that if the Principal and all Subcontractors or suppliers under said Contract shall well and truly keep and perform all the undertakings, covenants, agreement, terms, and conditions of said Contract on their part to be kept and performed during the original term of said Contract and any extensions thereof that may be granted by the Obligee, with or without notice to the Surety, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of any and all duly authorized modifications, alterations, changes or additions to said Contract, (notice to the Surety of such modifications, alterations, changes or additions being hereby waived), the obligations of the Surety set forth herein shall become null and void only if such completion of the Contract is expressly acknowledged in writing by the Obligee; otherwise such obligations shall remain in full force and virtue.

WHENEVER the Principal shall be declared by the Obligee to be in default under the Contract, the Obligee having performed the Obligee's material obligations thereunder, the Surety may promptly remedy the default whatever it may be or shall promptly perform the Contraact in accordance with all of its terms and conditions. To the extent that the Surety elects to not remedy the default nor promptly perform the Contract, the Surety shall make payment to the Obligee up to the Penal Sum of this instrument.

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IN THE EVENT the Contract is abandoned by the Principal, or is terminated by the Obligee under the applicable provisions of the Contract, the Surety hereby further agrees that the Surety shall, if requested in writing by the Obligee promptly take all such actions as is necessary to complete said Contract in accordance with its terms and conditions or make payment as required hereunder.

IN WITNESS WHEREOF, the Principal and Surety have hereto set their hands and seals this _____ day of _____, 2021.

PRINCIPAL	SURETY
_____	_____
_____	_____
[Name and Seal]	[Name and Seal]
_____	_____
[Title]	[Title]
_____	_____
[Address]	[Address]
_____	_____
[Phone]	[Phone]
Attest:_____	Attest:_____

The rate of the Bond is _____% of the first $_____ and _____% for the next $_____. The total premium for this Bond is $_____.

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TRANSACTION AGREEMENT FORM 2
FORM OF
LABOR AND MATERIALS PAYMENT BOND

Bond No. _____

KNOW ALL MEN BY THESE PRESENT, that we [ ] with a place of business at as principal (the "Principal"), and [ ], a [ ] qualified to do business in the State of New York, with a place of business at [ ] as Surety (the "Surety"), are held and firmly bound unto Rockland County Solid Waste Management Authority d/b/a Rockland Green as Obligee (the "Obligee"), in the sum of [Dollars ($)] lawful money of the United States of America, to be paid to the Obligee, for which payment, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, the Principal has assumed and made a contract with the Obligee, bearing the date of [ ], and entitled the [ ] (the "Contract").

NOW, THE CONDITIONS of this obligation are such that if the Principal and all Subcontractors under said Contract shall promptly pay for all labor performed or furnished and for all materials used or employed in said Contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said Contract that may hereafter be made, notice to the Surety of such modifications, alterations, extensions of time, changes or additions being hereby waived, then this obligation shall become null and void; otherwise, it shall remain in full force and virtue.

The Surety's obligation to the Obligee under this Bond shall arise after the Obligee provides notice to the Principal and Surety of claims, demands, liens or suits against the Obligee or the Obligee's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Contract.

The Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Obligee against any duly tendered claim, demand, lien or suit against the Obligee or the Obligee's property.

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IN WITNESS WHEREFORE, the Principal and Surety have hereto set their hands and seals this _____ day of _____, 2021.

PRINCIPAL	SURETY
_____	_____
_____	_____
[Name and Seal]	[Name and Seal]
_____	_____
[Title]	[Title]
_____	_____
[Address]	[Address]
_____	_____
[Phone]	[Phone]
Attest:_____	Attest:_____

The rate of the Bond is _____% of the first $_____ and _____% for the next $_____. The total premium for this Bond is $_____.

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