SUBMITTAL PACKAGE

SCF ITB24-1135-Faclities-New Generator

Prepared for:

Southcentral Foundation

Cummins Project Manager:

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PLEASE COMPLETE THIS SECTION OR PROVIDE SIGNOFF TO PROCEED

☐ **Revise with corrections provided** **Date:**

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By (name and company):

Requested delivery date:

Requested delivery address:

Contact person and phone # for deliveries:

Salesforce O# 657920

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Customer PO # 102623

5/14/2025

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IMPORTANT: *The critical power solution information and specifications included in this pdf can be used by the site contractor(s) and/or engineer(s) to assist with planning for and accomplishing the overall power solution installation. Please forward this document to the appropriate personnel, as necessary.*

It is the obligation of the electrical contractor and reviewing engineer to determine that the item quantities and accuracy of this submittal is correct as required for the job. Any inaccuracies or deviations must be addressed with Cummins Inc. before release to manufacturing. Any releases of material to manufacturing by the above parties constitute an acceptance of the accuracy of the submittal. Any changes after release will be viewed as a change order, subject to pricing changes. Please take the time to review this package for accuracy to prevent any after-shipment problems that could cause delay in energization.

Cummins certifies that these drawings, material lists, specification and datasheets have been checked prior to submittal and they:

- *accurately depict the proposed equipment*
- *provide current information to the date of the submittal and*
- *present true and accurate equipment information.*

This Approval Drawing Package is submitted as our interpretation of the project requirements and/or the specifications for this job. Please note that issuance of these submittals shall not be deemed or interpreted as performance nor acceptance of your purchase order terms and conditions.

For questions or comments regarding this submittal, please contact the Cummins Project Manager listed on the title page.

Sales and Service

TABLE OF CONTENTS

SECTION 1
PROJECT INFORMATION

Bill of Material

Feature Code	Description	Qty
DQFAC	**DQFAC, Commercial Diesel Generator Set, 900kW Standby 60Hz**	**1**
DQFAC_900DQFAC	900DQFAC, Diesel Genset, 60Hz, 900kW	
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
DQFAC_A331-2	Duty Rating - Standby Power (ESP)	
DQFAC_L170-2	Emission Certification, EPA, Tier 2, NSPS CI Stationary Emergency	
DQFAC_L090-2	Listing - UL 2200	
DQFAC_L228-2	Cert - Seismic, IBC2000, IBC2003, IBC2006, IBC2009, IBC2011	
DQFAC_R002-2	Voltage - 277/480, 3 Phase, Wye, 4 Wire	
DQFAC_BC34-2	Alternator - 60Hz, Wye, BR, 125/105C - Standby/Prime	
DQFAC_A292-2	Alternator Heater, 120 Volt AC	
DQFAC_C127-2	Fuel Water Separator	
DQFAC_H679-2	Control Mounting - Front Facing	
DQFAC_H704-2	PowerCommand 3.3 Controller, Paralleling Capable	
DQFAC_A460-2	Control Cabinet Heater, 120/240 Volt AC Compatible	
DQFAC_H678-2	LCD Control Display	
DQFAC_K631-2	Relays - Genset Status, User Configured	
DQFAC_KA08-2	Alarm - Audible, Engine Shutdown	
DQFAC_KS53-2	Signals - Auxiliary, 8 Inputs/8 Outputs	
DQFAC_KU32-2	Relay - Alarm Shutdown	
DQFAC_KU67-2	Relays - Paralleling Circuit Breaker Control	
DQFAC_H536-2	Control Display Language - English	
DQFAC_KU95-2	Circuit Breaker or Entrance Box or Terminal Box - Right And Left	
DQFAC_KP87-2	Circuit Breaker - 1600, Left, 3P, UL 600, IEC 415, UL Serv Ent 100%	
DQFAC_KP88-2	Circuit Breaker - 1200A, Right, 3P, UL 600, IEC 415, UL Serv Ent, 100%	
DQFAC_KB73-2	Bottom Entry, Left	
DQFAC_KB72-2	Bottom Entry, Right	
DQFAC_H723-2	Indication - Ground Fault, Terminal Box (or) Circuit Breaker Box - Left	
DQFAC_KR01-2	Circuit Breaker Lugs - Mechanical, Left Side	
DQFAC_D041-2	Engine Air Cleaner - Normal Duty	
DQFAC_E126-2	Engine Cooling - Radiator, Enhanced High Ambient Air Temperature, Ship Fitted	
DQFAC_H527-2	Warning AND Shutdown - Low Coolant Level	
DQFAC_E098-2	Sight Glass - Coolant Level	
DQFAC_H557-2	Coolant Heater - 208/240/480 Volts AC, Below 40F Ambient Temperature	
DQFAC_L189-2	Standby 5 Year 2500 Hour Parts+Labor+Travel	
DQFAC_L050-2	Literature - English	
A051H785	**Battery Charger-20Amp, 120/208/240VAC, 12/24V, 50/60Hz**	**1**
Miscellaneous	**Engine Starting Battieries**	**2**
Miscellaneous	**Seismic Spring Type Isolators**	**10**
Miscellaneous	**Walk-In Generator Set Enclosure Pkg.**	**1**

Miscellaneous	**Simplex 900kW Freestanding Outdoor Load Bank, UL listed (Shipped Loose)**	**1**
A045J201	**Remote Annunciator-panel mount with enclosure (Shipped Loose)**	**1**
Miscellaneous	**O&M's**	**1**
Miscellaneous	**Clean engine & generator surfaces. Replace oil & fuel filters**	**1**
Miscellaneous	**Maintenance Service PM Contract: 3 Year, 2 Semi Annual Inspection/Test Run & PM Service**	**1**
Miscellaneous	**Extra Materials: 1 Set of tools with metal box. 2 Sets of Fuel, Oil and Air Filters**	**1**
Miscellaneous	**Field Quality Control - Start-up / Commissioning / Owner Training**	**1**
Miscellaneous	**Standard freight allowed to Wasilla, Alaska (Off-loading by others)**	**1**

SECTION 2
GENERATOR SPECIFICATIONS

Specification sheet

Diesel generator set QST30 series engine

680 kW - 1000 kW 60 Hz

Description

Cummins® commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby and Prime power applications.

Features

Cummins heavy-duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions 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.

Permanent Magnet Generator (PMG) - Offers enhanced motor starting and fault clearing short circuit capability.

Circuit breakers - Option for manually-and/or electrically-operated circuit breakers.

Control system - The PowerCommand® 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, AmpSentry™ protection, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Masterless Paralleling - An optional electrically operated circuit breaker can be added for a simple masterless paralleling solution.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

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 rating	Prime rating	Continuous rating	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz
DQFAA	750 (938)	680 (850)		D-3329
DQFAB	800 (1000)	725 (907)		D-3330
DQFAC	900 (1125)	818 (1023)		D-3331
DQFAD	1000 (1250)	900 (1125)		D-3332

Generator set specifications

Performance Class	Genset models have been tested in accordance with ISO 8528-5. Consult factory for transient performance information.
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Electromagnetic Compatibility Performance	Emissions to EN 61000-6-2:2005 Immunity to EN 61000-6-4:2007+A1:2011

Engine specifications

Bore	140 mm (5.51 in.)
Stroke	165.0 mm (6.5 in.)
Displacement	30.5 L (1860 in^3)
Cylinder block	Cast iron, V 12 cylinder
Battery capacity	1600 amps minimum at ambient temperature of -18 °C to 0 °C (0 °F to 32 °F)
Battery charging alternator	35 amps
Starting voltage	24 volt, negative ground
Fuel system	Direct injection: number 2 diesel fuel, fuel filter, automatic electric fuel shutoff
Fuel filter	Triple element, 10 micron filtration, spin-on fuel filters with water separator
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip-proof, revolving field
Stator	2/3 pitch
Rotor	Single bearing flexible discs
Insulation system	Class H on low and medium voltage, Class F on high voltage
Standard temperature rise	125 °C Standby at 40 °C ambient
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 (THDV)	< 5% no load to full linear load, < 3% for any single harmonic

Available voltages

60 Hz Line – Neutral/Line - Line

• 120/208	• 220/380	• 240/416	• 347/600
• 139/240	• 230/400	• 277/480	

Note: Consult factory for other voltages.

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.

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

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.

Communications interface – Control comes standard with PCCNet and Modbus® interface.

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.

Multi-language support

Operator panel features

Operator/display functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 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 generator set running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- First Start Sensor System selects first generator set to close to bus
- Phase Lock Loop Synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Load govern control for utility paralleling
- Extended Paralleling (Base Load/Peak Shave) Mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions,
- 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
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)
- Other data
- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)

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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
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

Options

- Auxiliary output relays (2)

Ratings definitions

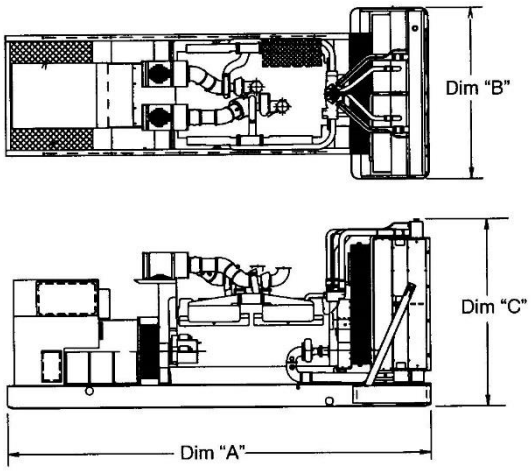
Emergency Standby Power (ESP):
Applicable for supplying power continuously to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528 and ISO 3046-1, obtained and corrected in accordance with ISO 15550).

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 3046-1. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO 8528 and ISO 3046-1, obtained and corrected in accordance with ISO 15550).

This rating is not applicable to all generator set models.



- This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

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Codes and standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

ISO 9001 **ISO 14001** **ISO 45001**	This product was manufactured in a facility whose quality management system is certified to ISO 9001 and its Health Safety Environmental Management Systems certified to ISO 14001 and ISO 45001.	UL LISTED	This product is listed to UL 2200, Stationary Engine Generator Assemblies.
PTS	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 Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
CSA®	All genset models are available as CSA certified to CSA C22.2 No.100	**International Building Code**	The generator set package is available certified for seismic application in accordance with International Building Code.

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Generator Set Data Sheet

Model: DQFAC
Frequency: 60 Hz
Fuel Type: Diesel
kW Rating: 900 Standby
818 Prime
Emissions level: EPA NSPS Stationary Emergency Tier 2

Exhaust emission data sheet:	**EDS-1062**
Exhaust emission compliance sheet:	**EPA-1096**
Sound performance data sheet:	**MSP-1037**
Cooling performance data sheet:	**MCP-155**
Prototype test summary data sheet:	**PTS-266**
Standard set-mounted radiator cooling outline:	**A049K674**
Optional remote radiator cooling outline:	**A053G787**

Fuel Consumption

	Standby				Prime				Continuous
	kW (kVA)				kW (kVA)				kW (kVA)
Ratings	900 (1125)				818 (1023)				
Load	**1/4**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**	**Full**
US gph	16.9	32.4	48.0	63.5	16.3	30.0	43.6	57.3	
L/hr	64.0	122.8	181.5	240.3	61.7	113.4	165.1	216.8	

Engine

	Standby rating	Prime rating	Continuous rating
Engine manufacturer	Cummins Inc.		
Engine model	QST30-G5 NR2		
Configuration	Cast iron, V 12 cylinder		
Aspiration	Turbocharged and low temperature after-cooled		
Gross engine power output, kWm (bhp)	1112 (1490)	1007 (1350)	
BMEP at set rated load, kPa (psi)	2155 (313)	1960 (284)	
Bore, mm (in.)	140 (5.51)		
Stroke, mm (in.)	165 (6.5)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	9.91 (1950)		
Compression ratio	14.7:1		
Lube oil capacity, L (qt)	154 (162.8)		
Overspeed limit, rpm	2100 ±50		
Regenerative power, kW	82		

Fuel Flow

Maximum fuel flow, L/hr (US gph)	570 (150)	
Maximum fuel inlet restriction, kPa (in Hg)	27 (8.0)	
Maximum fuel inlet temperature, °C (°F)	66 (150)	

Air	Standby rating	Prime rating	Continuous rating
Combustion air, m^3/min (scfm)	81 (2880)	74 (2657)	
Maximum air cleaner restriction, kPa (in H_2O)	6.2 (25)		
Alternator cooling air, m^3/min (cfm)	204 (7300)		

Exhaust

Exhaust flow at set rated load, m^3/min (cfm)	195 (6950)	185 (6600)	
Exhaust temperature, °C (°F)	463 (866)	447 (836)	
Maximum back pressure, kPa (in H_2O)	6.8 (27)		

Standard Set-Mounted Radiator Cooling

Ambient design, °C (°F)	50 (122)		
Fan load, kW_m (HP)	33.1 (44.4)		
Coolant capacity (with radiator), L (US gal)	167 (44)		
Cooling system air flow, m^3/min (scfm)	1097.5 (38753)		
Total heat rejection, MJ/min (Btu/min)	43.9 (41660)	39.8 (37728)	
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	67.5 (20)		

Optional Heat Exchanger Cooling

Set coolant capacity, L (US gal)	
Heat rejected, jacket water circuit, MJ/min (Btu/min)	
Heat rejected, aftercooler circuit, MJ/min (Btu/min)	
Heat rejected, fuel circuit, MJ/min (Btu/min)	
Total heat radiated to room, MJ/min (Btu/min)	
Maximum raw water pressure, jacket water circuit, kPa (psi)	
Maximum raw water pressure, aftercooler circuit, kPa (psi)	
Maximum raw water pressure, fuel circuit, kPa (psi)	
Maximum raw water flow, jacket water circuit, L/min (US gal/min)	
Maximum raw water flow, aftercooler circuit, L/min (US gal/min)	
Maximum raw water flow, fuel circuit, L/min (US gal/min)	
Minimum raw water flow at 27 °C (80 °F) inlet temp, jacket water circuit, L/min (US gal/min)	
Minimum raw water flow at 27 °C (80 °F) inlet temp, aftercooler circuit, L/min (US gal/min)	
Minimum raw water flow at 27 °C (80 °F) inlet temp, fuel circuit, L/min (US gal/min)	
Raw water delta P at min flow, jacket water circuit, kPa (psi)	
Raw water delta P at min flow, aftercooler circuit, kPa (psi)	
Raw water delta P at min flow, fuel circuit, kPa (psi)	
Maximum jacket water outlet temp, °C (°F)	
Maximum aftercooler inlet temp, °C (°F)	
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)	
Maximum fuel return line restriction, kPa (in Hg)	

Optional Remote Radiator Cooling[1]	Standby rating	Prime rating	Continuous rating
Set coolant capacity, L (US gal)			
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)	992 (262)		
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)	303 (80)		
Heat rejected, jacket water circuit, MJ/min (Btu/min)	21 (19925)	19.65 (18634)	
Heat rejected, aftercooler circuit, MJ/min (Btu/min)	15.7 (14885)	13.5 (12823)	
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)	6.1 (5753)	5.6 (5301)	
Maximum friction head, jacket water circuit, kPa (psi)	69 (10)		
Maximum friction head, aftercooler circuit, kPa (psi)	48 (7)		
Maximum static head, jacket water circuit, m (ft)	14 (46)		
Maximum static head, aftercooler circuit, m (ft)	14 (46)		
Maximum jacket water outlet temp, °C (°F)	104 (220)	100 (212)	
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)	41 (105)		
Maximum aftercooler inlet temp, °C (°F)	62 (143)	56 (133)	
Maximum fuel flow, L/hr (US gph)			
Maximum fuel return line restriction, kPa (in Hg)	67.5 (20)		

Weights[2]

Refer to drawings for specific weights and dimensions

Notes:

[1] For non-standard remote installations contact your local Cummins representative.

[2] Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating Factors

Standby	Engine power available up to 1720 m (5643 ft) at ambient temperatures up to 40 °C (104 °F) and 595 m (1952 ft) at ambient temperatures up to 50 °C (122 °F). Above these elevations, derate at 3.5% per 305 m (1000 ft) and 7% per 10 °C (18 °F).
Prime	Engine power available up to 1650 m (5413 ft) at ambient temperatures up to 40 °C (104 °F) and 975 m (3198 ft) at ambient temperatures up to 50 °C (122 °F). Above these elevations, derate at 3.5% per 305 m (1000 ft) and 7% per 10 °C (18 °F).
Continuous	

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.

Alternator Data

Voltage	Connection[1]	Temp rise degrees C	Duty[2]	Single phase factor[3]	Max surge kVA[4]	Winding No.	Alternator data sheet	Feature code
208-240/416-480	Wye	125/105	S/P		4725	311	ADS-633	BC34-2
380	Wye	125/105	S/P		4725	311	ADS-633	B872-2
400	Wye	125/105	S/P		4234	311	ADS-312	BC40-2
400	Wye	125/105	S/P		4234	312	ADS-312	BC36-2
600	Wye	125/105	S/P		3866	7	ADS-311	B300-2
380-480	Wye	105/80	S/P		4602	312	ADS-330	B283-2
600	Wye	105/80	S/P		3866	7	ADS-311	B301-2
380-480	Wye	80	S		4602	312	ADS-330	B284-2
600	Wye	80	S		4234	7	ADS-312	B302-2

Notes:

[1] Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multiply the three phase kW rating by the Single Phase Factor[3]. All single phase ratings are at unity power factor.

[2] Standby (S), Prime (P) and Continuous ratings (C).

[3] Factor for the *Single phase output from Three phase alternator* formula listed below.

[4] Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

Formulas for Calculating Full Load Currents:

Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

Single phase output

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

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.

For more information contact your local Cummins distributor or visit power.cummins.com

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D-3331 (01/20)

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

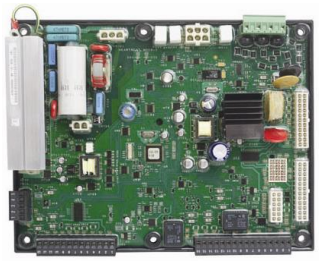
PowerCommand® Control 3300 is designed to meet the exacting demands of the harsh and diverse environments of today's typical power generation applications for Full Authority Electronic or Hydromechanical engine power generator sets.

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

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

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

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

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.

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.

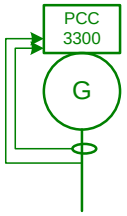
Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped. 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.

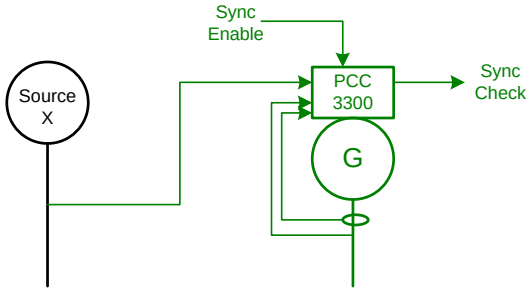
Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for 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:

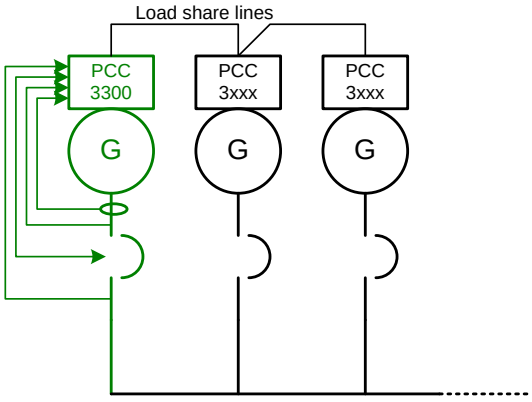
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



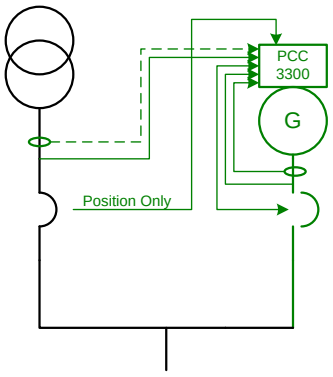
Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.



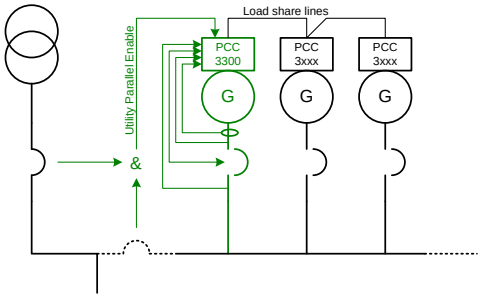
Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



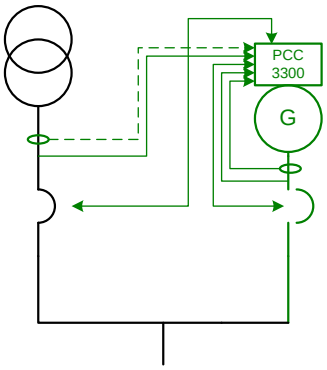
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



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.

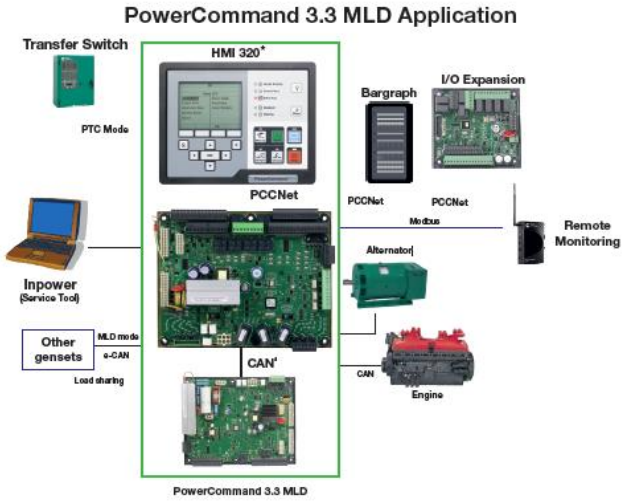


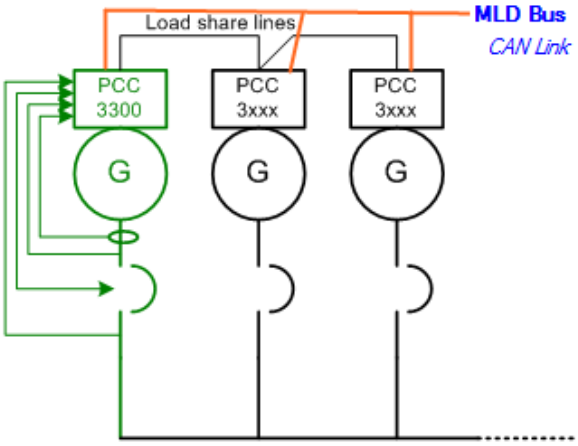
Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



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).

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.

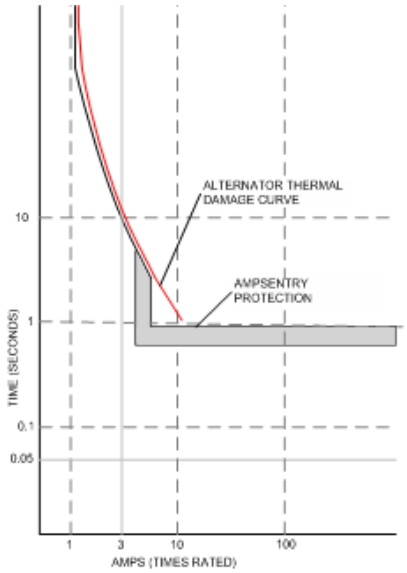
High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

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.

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.

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.

- 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:

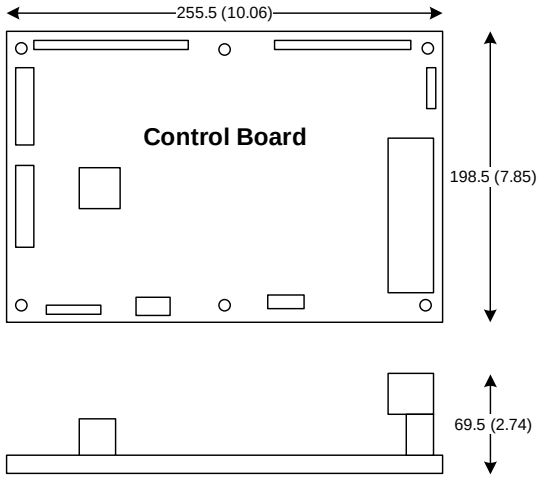
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

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



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.

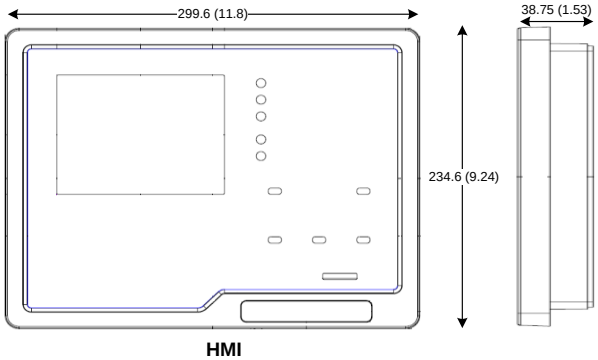
Features:

- 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.

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 50081-1,2 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.

PCCNet COMPATIBLE

2024 EPA Tier 2 Exhaust Emission Compliance Statement 900DQFAC Stationary Emergency,

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 2 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:	RCEXL030.AAD-013
Effective Date:	05/01/2023
Date Issued:	05/01/2023
EPA Engine Family (Cummins Emissions Family):	RCEXL030.AAD

Engine Information:

Model:	QSK30/QST30-G/QST30-G5 NR2	Bore:	5.51 in. (140 mm)
Engine Nameplate HP:	1490	Stroke:	6.50 in. (165 mm)
Type:	4 Cycle, 50°V, 12 Cylinder Diesel	Displacement:	1860 cu. in. (30.5 liters)
Aspiration:	Turbocharged & Low Temperature After-Cooled	Compression Ratio:	14.7:1
Emission Control Device:	Electronic Control		

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	4.8	2.6	0.15	6.4	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 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 H_2O/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.

Exhaust emission data sheet
900DQFAC
60 Hz Diesel generator set

Engine information:

Model:	Cummins Inc. QST30-G5 NR2	Bore:	5.51 in. (139 mm)
Type:	4 Cycle, 50° V, 12 cylinder diesel	Stroke:	6.5 in. (165 mm)
Aspiration:	Turbocharged and low temperature after-cooled	Displacement:	1860 cu. in. (30.4 liters)
Compression ratio:	14.7:1		
Emission control device:	After-cooled (air-to-air)		

Performance data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime
BHP @ 1800 RPM (60 Hz)	331	661	992	1322	1202
Fuel consumption (gal/Hr)	17.3	32.1	47.5	63.9	57.7
Exhaust gas flow (CFM)	2540	4160	5480	6950	6600
Exhaust gas temperature (°F)	583	728	798	866	836
Exhaust emission data					
HC (Total unburned hydrocarbons)	0.16	0.11	0.09	0.08	0.08
NOx (Oxides of nitrogen as NO2)	5.48	4.15	3.90	4.05	4.00
CO (Carbon monoxide)	0.95	0.41	0.43	0.58	0.53
PM (Particular matter)	0.19	0.16	0.13	0.11	0.12
SO2 (Sulfur dioxide)	0.11	0.10	0.10	0.10	0.10
Smoke (Bosch)	0.77	0.81	0.80	0.76	0.78

All values are Grams/HP-Hour, Smoke is Bosch #

Test conditions

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load (± 2%). Pressures, temperatures, and emission rates were stabilized.

Fuel specification:	46.5 Cetane Number, 0.035 Wt.% Sulfur; Reference ISO8178-5, 40CFR86. 1313-98 Type 2-D and ASTM D975 No. 2-D.
Fuel temperature:	99 ± 9 °F (at fuel pump inlet)
Intake air temperature:	77 ± 9 °F
Barometric pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

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	
Standard – Unhoused	Infinite Exhaust	0% Prime	84.4	87.4	87.3	89.4	86.4	88.7	89.8	87.5	87.9
		75% Prime	86.9	90.4	90.4	91.4	88.4	91.0	91.6	90.4	90.3
		100% Prime	88.8	92.0	91.8	92.5	89.1	92.1	92.9	91.4	91.5
		100% Standby	88.9	92.7	92.4	93.3	89.6	92.7	93.4	92.3	92.2
Standard – Unhoused (Remote Cooling)	Infinite Exhaust	0% Prime	82.6	87.0	86.2	86.9	85.9	88.5	88.4	87.3	86.9
		75% Prime	86.5	89.9	90.3	90.7	89.1	90.0	90.9	90.0	89.8
		100% Prime	88.6	91.5	91.8	92.0	90.3	92.0	92.5	91.5	91.4
		100% Standby	88.7	92.3	92.7	92.7	91.3	92.7	93.1	92.2	92.2
F200 – Weather	Genset Mounted Muffler	0% Prime	87.2	86.7	77.9	85.4	83.4	85.3	76.9	85.9	84.8
		75% Prime	90.3	88.8	80.5	87.8	85.2	87.8	79.1	88.2	87.2
		100% Prime	91.2	90.1	81.7	88.6	86.5	89.0	80.4	88.9	88.2
		100% Standby	91.7	90.6	82.3	89.2	87.2	89.5	81.1	89.7	88.8
F201 – Quiet Site II First Stage	Genset Mounted Muffler	0% Prime	79.5	73.6	69.5	69.2	71.1	68.6	68.4	73.7	73.5
		75% Prime	82.5	76.4	73.4	73.1	74.8	73.6	71.6	75.8	76.7
		100% Prime	84.4	77.8	75.3	75.3	77.4	75.8	73.8	77.3	78.5
		100% Standby	84.5	78.4	76.0	76.2	78.5	76.8	74.6	78.2	79.1
F202 – Quiet Site II Second Stage	Genset Mounted Muffler	0% Prime	71.7	69.8	68.6	72.5	70.7	74.2	68.4	68.3	71.0
		75% Prime	72.0	71.8	73.1	75.7	72.8	74.5	70.8	72.1	73.1
		100% Prime	73.6	72.7	73.9	76.6	74.2	74.8	71.8	72.9	74.0
		100% Standby	73.5	73.4	74.9	77.2	75.1	75.3	72.3	73.3	74.6

Sound Data
DQFAC
QST30 60Hz Diesel

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	
Standard – Unhoused	Infinite Exhaust	0% Prime	N/A	42.1	62.4	80.7	85.4	89.7	93.1	91.0	85.8	79.3	70.9	97.1
		75% Prime	N/A	44.7	62.9	81.1	86.0	91.2	94.7	94.1	91.2	85.5	76.7	99.6
		100% Prime	N/A	45.9	65.1	81.3	86.6	91.5	95.5	95.3	92.3	91.3	78.8	100.8
		100% Standby	N/A	46.5	65.9	81.8	87.1	92.2	95.7	95.9	92.9	92.7	79.6	101.4
Standard – Unhoused (Remote Cooling)	Infinite Exhaust	0% Prime	N/A	41.3	58.2	72.3	80.7	88.2	92.4	89.6	84.5	78.0	69.9	95.8
		75% Prime	N/A	43.8	60.0	76.0	83.2	90.4	93.9	94.0	90.2	84.7	75.6	98.9
		100% Prime	N/A	46.0	63.5	78.8	83.3	91.0	95.2	95.5	91.7	89.4	78.1	100.3
		100% Standby	N/A	46.8	64.4	80.1	84.0	91.6	96.0	96.4	92.6	90.4	79.1	101.2
F200 – Weather	Genset Mounted Muffler	0% Prime	N/A	45.5	67.0	76.2	81.2	84.9	87.2	83.7	78.4	69.9	57.5	91.3
		75% Prime	N/A	52.9	70.7	79.3	83.7	86.5	89.4	86.5	82.4	77.6	66.1	93.7
		100% Prime	N/A	54.0	71.5	80.7	85.1	87.9	90.3	87.2	83.5	82.6	66.3	94.9
		100% Standby	N/A	54.2	72.0	81.1	85.5	88.5	90.9	87.9	83.9	82.4	67.1	95.4
F201 – Quiet Site II First Stage	Genset Mounted Muffler	0% Prime	N/A	44.1	65.4	72.5	71.1	73.1	74.9	73.3	69.2	61.1	49.8	80.7
		75% Prime	N/A	52.9	69.9	76.0	76.6	77.9	78.1	78.6	75.3	71.3	58.2	85.3
		100% Prime	N/A	53.1	70.9	77.5	79.0	80.9	80.5	80.0	76.4	77.8	59.4	87.7
		100% Standby	N/A	53.3	71.4	78.1	79.8	82.0	81.9	80.8	76.9	77.9	60.1	88.5
F202 – Quiet Site II Second Stage	Genset Mounted Muffler	0% Prime	N/A	39.4	59.9	72.3	76.3	68.0	68.5	67.4	62.0	54.0	43.9	79.1
		75% Prime	N/A	40.5	64.0	74.5	73.0	67.9	75.5	77.9	77.2	68.8	53.7	83.3
		100% Prime	N/A	41.9	64.9	74.9	72.1	69.9	76.2	78.9	78.4	74.5	57.0	84.4
		100% Standby	N/A	42.5	65.0	75.1	72.2	70.7	76.6	79.7	79.3	74.9	58.5	85.0

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	
Standard – Unhoused	Infinite Exhaust	100% Prime	N/A	52.7	66.7	78.7	83.5	86.3	89.8	90.2	84.9	89.0	70.1	95.8
		100% Standby	N/A	53.2	67.7	79.0	83.7	86.7	89.6	91.0	85.6	88.1	70.4	96.0
Standard – Unhoused (Remote Cooling)	Infinite Exhaust	100% Prime	N/A	49.6	60.3	74.2	82.8	86.4	89.2	91.5	85.2	86.3	69.7	95.6
		100% Standby	N/A	50.2	61.3	74.5	83.7	88.1	90.3	92.6	86.0	85.4	70.1	96.6
F200 – Weather	Genset Mounted Muffler	100% Prime	N/A	44.2	65.6	72.8	77.3	80.6	82.8	78.8	73.6	73.9	58.5	87.0
		100% Standby	N/A	44.5	66.3	73.2	77.3	80.8	83.3	79.4	74.0	74.9	59.2	87.5
F201 – Quiet Site II First Stage	Genset Mounted Muffler	100% Prime	N/A	47.8	61.2	67.4	70.6	71.7	73.5	74.1	68.6	62.9	47.8	79.6
		100% Standby	N/A	48.2	61.8	68.6	71.6	73.4	74.2	74.5	69.1	65.4	48.6	80.5
F202 – Quiet Site II Second Stage	Genset Mounted Muffler	100% Prime	N/A	39.4	56.9	71.7	70.2	67.1	72.4	75.4	70.3	64.6	50.5	79.9
		100% Standby	N/A	39.9	56.0	71.6	70.3	67.4	72.4	76.3	70.7	68.1	51.3	80.4

Sound Data
DQFAC
QST30 60Hz Diesel

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	
Standard – Unhoused	Infinite Exhaust	0% Prime	N/A	61.7	82.1	100.3	105.0	109.3	112.7	110.6	105.4	98.9	90.6	116.8
		75% Prime	N/A	64.3	82.5	100.7	105.7	110.8	114.4	113.7	110.8	105.1	96.4	119.2
		100% Prime	N/A	65.6	84.8	101.0	106.3	111.2	115.2	114.9	112.0	111.0	98.4	120.5
		100% Standby	N/A	66.2	85.5	101.4	106.7	111.9	115.3	115.5	112.5	112.3	99.2	121.0
Standard – Unhoused (Remote Cooling)	Infinite Exhaust	0% Prime	N/A	61.0	77.8	91.9	100.3	107.9	112.0	109.2	104.2	97.7	89.5	115.4
		75% Prime	N/A	63.5	79.7	95.6	102.8	110.0	113.6	113.6	109.8	104.4	95.2	118.5
		100% Prime	N/A	65.7	83.1	98.4	102.9	110.7	114.8	115.1	111.4	109.0	97.8	120.0
		100% Standby	N/A	66.5	84.1	99.7	103.7	111.2	115.7	116.0	112.2	110.1	98.8	120.8
F200 – Weather	Genset Mounted Muffler	0% Prime	N/A	67.0	88.6	97.8	102.8	106.5	108.8	105.3	100.0	91.5	79.1	112.8
		75% Prime	N/A	74.5	92.3	100.9	105.2	108.1	110.9	108.0	104.0	99.2	87.7	115.2
		100% Prime	N/A	75.5	93.1	102.2	106.6	109.4	111.8	108.8	105.0	104.1	87.8	116.4
		100% Standby	N/A	75.7	93.5	102.7	107.1	110.1	112.4	109.4	105.5	104.0	88.7	117.0
F201 – Quiet Site II First Stage	Genset Mounted Muffler	0% Prime	N/A	66.0	87.4	94.4	93.1	95.1	96.9	95.2	91.2	83.1	71.8	102.6
		75% Prime	N/A	74.8	91.9	97.9	98.5	99.9	100.1	100.6	97.3	93.2	80.2	107.3
		100% Prime	N/A	75.1	92.9	99.5	100.9	102.8	102.5	102.0	98.4	99.8	81.3	109.7
		100% Standby	N/A	75.2	93.3	100.1	101.7	103.9	103.8	102.8	98.9	99.8	82.1	110.5
F202 – Quiet Site II Second Stage	Genset Mounted Muffler	0% Prime	N/A	61.5	82.0	94.3	98.4	90.1	90.5	89.5	84.1	76.0	65.9	101.2
		75% Prime	N/A	62.6	86.1	96.5	95.1	90.0	97.6	100.0	99.3	90.9	75.7	105.4
		100% Prime	N/A	64.0	86.9	97.0	94.2	92.0	98.3	101.0	100.5	96.6	79.1	106.5
		100% Standby	N/A	64.6	87.1	97.1	94.3	92.8	98.7	101.8	101.4	97.0	80.6	107.1

Exhaust Sound Power Level, dB(A)

See notes 4 and 6-14 listed below

Configuration	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
		16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Open Exhaust (No Muffler)	0% Prime	N/A	61.1	92.9	103.8	110.8	109.4	106.6	105.2	103.5	96.1	86.0	115.3
	75% Prime	N/A	66.2	101.1	110.4	114.8	119.8	116.4	118.7	118.2	112.1	103.7	125.3
	100% Prime	N/A	66.1	101.3	111.0	116.1	120.3	117.5	120.5	120.2	114.1	104.9	126.7
	100% Standby	N/A	66.4	102.4	112.3	116.6	120.3	117.9	121.3	120.7	114.9	104.8	127.1

Global Notes:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, 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 counterclockwise 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 load 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 enclosure 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 at 1 meter from any diesel generator set up to a power output rating of 1000kVA shall not exceed 75 dB(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

Prototype Test Support (PTS)
60 Hz test summary

Generator set models		Representative prototype	
750DQFAA	1000DQFAD	Model:	1000DQFAD
800DQFAB		Alternator:	HC6K
900DQFAC		Engine:	QST30-G5 NR2

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: 1055 kW

The generator set was evaluated to determine the stated maximum surge power.

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 over the speed range of 1200 to 2000 RPM.

Cooling system: 50 °C ambient
0.5 in H2O 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 stated static restriction conditions.

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 steady state operating performance was within the specified maximum limits.

Voltage regulation:	± 0.50%
Random voltage variation:	± 0.50%
Frequency regulation:	± 0.25%
Random frequency variation:	± 0.25%

Transient performance:

The generator set was tested with the standard alternator to verify single step loading capability as required by NFPA 110. Voltage and frequency response on load: addition and rejection were evaluated. The following results were recorded at 0.8 power factor:

Full load acceptance:

Voltage dip:	35.9%
Recovery time:	4.5 seconds
Frequency dip:	11.4%
Recovery time:	5.0 seconds

Full load rejection:

Voltage rise:	25.7%
Recovery time:	1.8 seconds
Frequency rise:	7.8%
Recovery time:	3.3 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	0.052	0.04	0.144	0.092
5	0.128	1.36	0.058	1.32
7	1.0	0.196	1.0	0.19
9	0.012	0.034	0.033	0.066
11	0.985	0.84	1.01	0.83
13	0.158	0.32	0.12	0.29
15	0.0	0.005	0.025	0.022

Enhanced High Ambient Air Temperature Radiator Cooling System

	Fuel Type	Duty	Rating (kW)	Max cooling @ air flow static restriction, unhoused (inches water/mm water)						Housed in free air, no air discharge restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	1.5/38.1	Weather (F200)	Sound level 1 (F201)	Sound level 2 (F202)
				Maximum allowable ambient temperature, degree C								
60 Hz	Diesel	Standby	900	64.0	61.1	58.1	55.4	52.0	43.6	57.0	56.1	56.0
		Prime	818	63.3	60.7	58.2	55.2	52.1	44.9	56.8	55.8	55.8
				Airflow (m^3/s) – Actual @ Fan								
				20.3	19.4	18.6	17.6	16.5	14.9	18.3	18.0	17.9

Notes:

1. Data shown are anticipated cooling performance for typical generator set.
2. Cooling data is based on 1000 ft (305 m) site test location.
3. Generator set power output may need to be reduced at high ambient conditions. Consult generator set data sheet for derate schedules.
4. Cooling performance may be reduced due to several factors including but not limited to: Incorrect installation, improper operation, fouling of the cooling system, and other site installation variables.

Alternator Data Sheet
Frame Size: S6L1D-F4

Characteristics

	No of Bearings:	1-bearing		2-bearing	
Weights:	Stator assembly:	2421 lb	1098 kg	2421 lb	1098 kg
	Rotor assembly:	2130 lb	966 kg	2037 lb	924 kg
	Complete assembly:	5128 lb	2326 kg	5002 lb	2269 kg
Maximum speed:		2250 rpm			
Excitation current:	Full load:	2.6 Amps			
	No load:	0.55 Amps (Wdg 311/312), 0.79 Amps (Wdg 07)			
Insulation system:	Class H throughout				

3 Ø Ratings (0.8 power factor)			**60 Hz** (winding no)					
			120/208 240/416 (311/312)	127/220 254/440 (311/312)	133/230 266/460 (311/312)	139/240 277/480 (311/312)	120/240 Delta (311/312)	347/600 (07)
150° C rise ratings	@ 40° C	kW	1080	1125	1160	1200	1080	1220
		kVA	1350	1406	1450	1500	1350	1525
125° C rise ratings	@ 40° C	kW	1020	1070	1110	1150	1020	1150
		kVA	1275	1338	1388	1438	1275	1438
105° C rise ratings	@ 40° C	kW	950	990	1020	1050	950	1050
		kVA	1188	1238	1275	1313	1188	1313
80° C rise ratings	@ 40° C	kW	824	860	880	900	824	900
		kVA	1030	1075	1100	1125	1030	1125

Reactances (per unit ± 10%)	120/208 240/416 (311/312)	127/220 254/440 (311/312)	133/230 266/460 (311/312)	139/240 277/480 (311/312)	120/240 Delta (311/312)	347/600 (07)
(Based on full load at 125° C rise rating)						
Synchronous	3.0	2.82	2.67	2.54	3.0	1.96
Transient	0.18	0.17	0.16	0.15	0.18	0.14
Subtransient	0.14	0.13	0.13	0.12	0.14	0.11
Negative sequence	0.21	0.20	0.19	0.18	0.21	0.15
Zero sequence	0.06	0.06	0.06	0.05	0.06	0.04

Motor starting	120/208 240/416 (311/312)	127/220 254/440 (311/312)	133/230 266/460 (311/312)	139/240 277/480 (311/312)	120/240 Delta (311/312)	347/600 (07)
Maximum kVA (90% sustained voltage)	4725	4725	4725	4725	4725	4725

Time constants (sec)	120/208 240/416 (311/312)	127/220 254/440 (311/312)	133/230 266/460 (311/312)	139/240 277/480 (311/312)	120/240 Delta (311/312)	347/600 (07)
Transient	0.097	0.097	0.097	0.097	0.097	0.104
Subtransient	0.0162	0.0162	0.0162	0.0162	0.0162	0.012
Open circuit	4.09	4.09	4.09	4.09	4.09	4.066
DC	0.0221	0.0221	0.0221	0.0221	0.0221	0.027

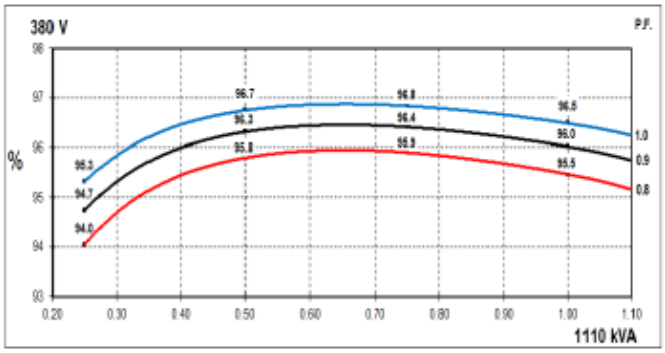
Windings (@22° C)		120/208 240/416 (311/312)	127/220 254/440 (311/312)	133/230 266/460 (311/312)	139/240 277/480 (311/312)	120/240 Delta (311/312)	347/600 (07)
Stator resistance	(L-L Ohms)	0.0018	0.0018	0.0018	0.0018	0.0018	0.0048
Rotor resistance	(Ohms)	2.13	2.13	2.13	2.13	2.13	2.13
Number of leads		12/6	12/6	12/6	12/6	12/6	6

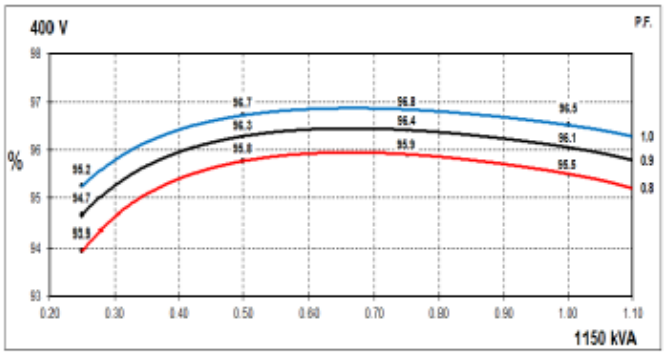
* Parallel Star connection only available with Wdg 311

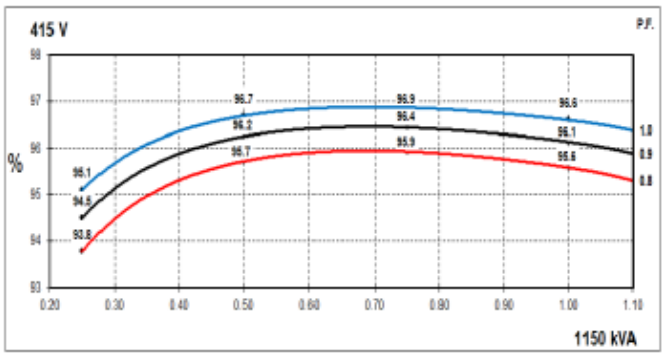
S6L1D-F4 Wdg.311/312

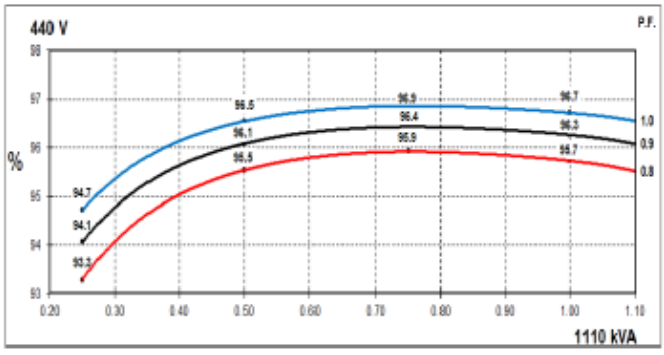
THREE PHASE EFFICIENCY CURVES

50Hz

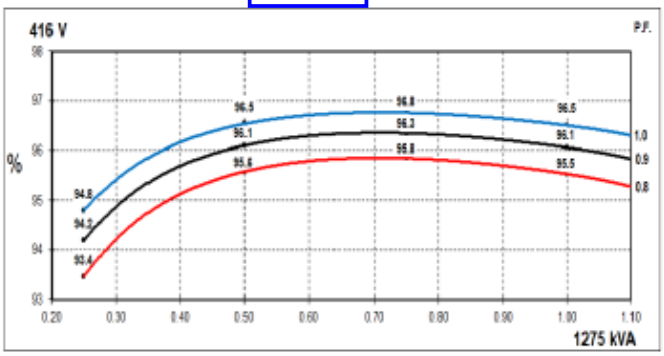


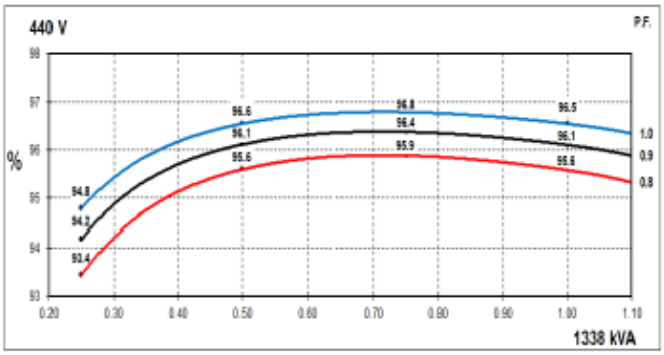


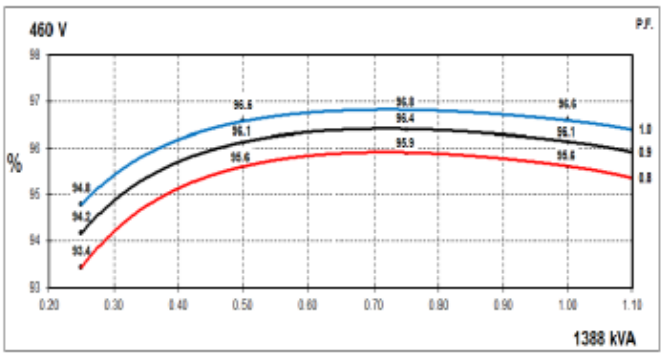


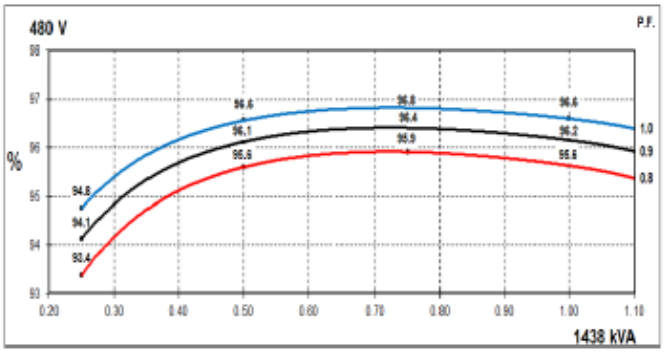


60Hz





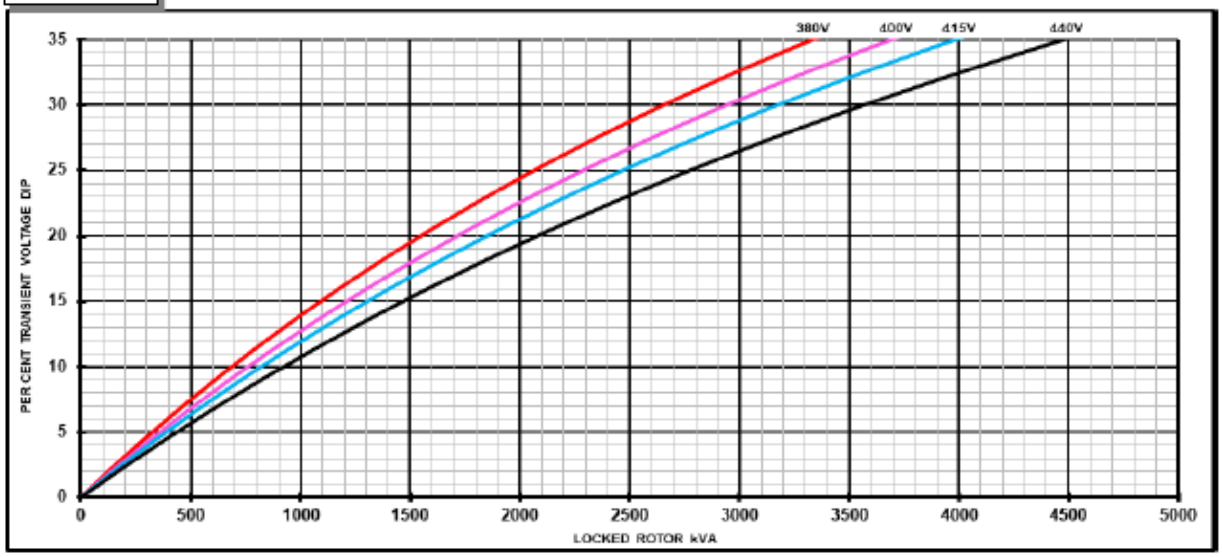




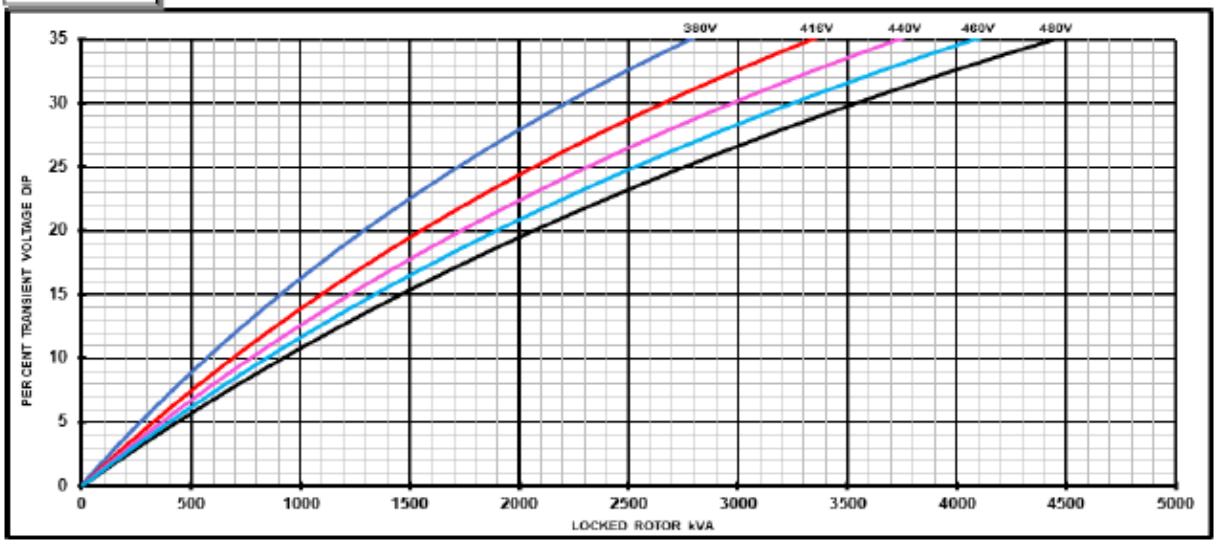
S6L1D-F4 Wdg.311/312

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



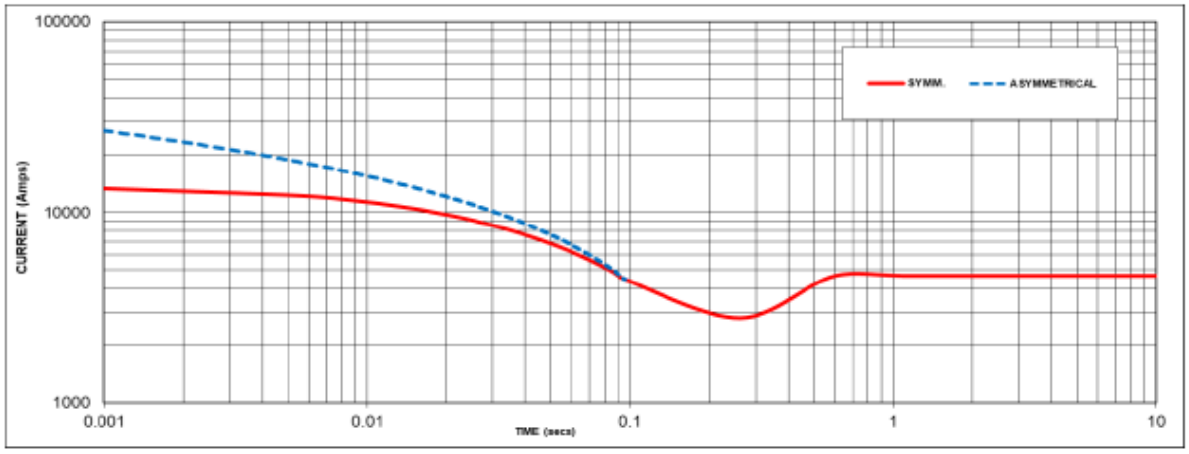
Transient Voltage Dip Scaling Factor	
PF	Factor
< 0.5	1
0.5	0.97
0.6	0.93
0.7	0.9
0.8	0.85
0.9	0.83

Transient Voltage Rise Scaling Factor
For voltage rise multiply voltage dip by 1.25

S6L1D-F4 Wdg.311/312

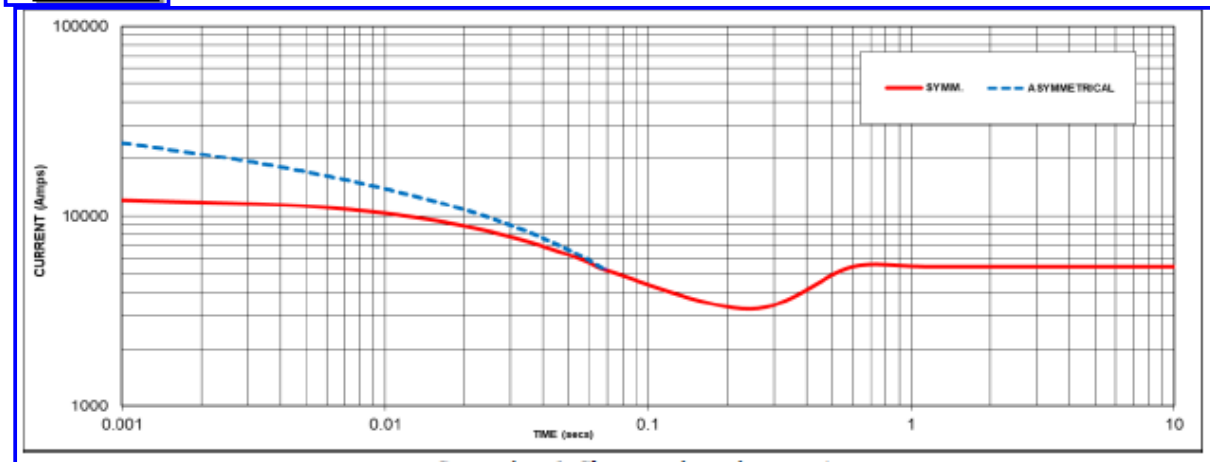
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 4650 Amps

60Hz



Sustained Short Circuit = 5420 Amps

Note 1
The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380V	X 1.00	416V	X 1.00
400V	X 1.05	440V	X 1.06
415V	X 1.09	460V	X 1.10
440V	X 1.16	480V	X 1.15

The sustained current value is constant irrespective of voltage level

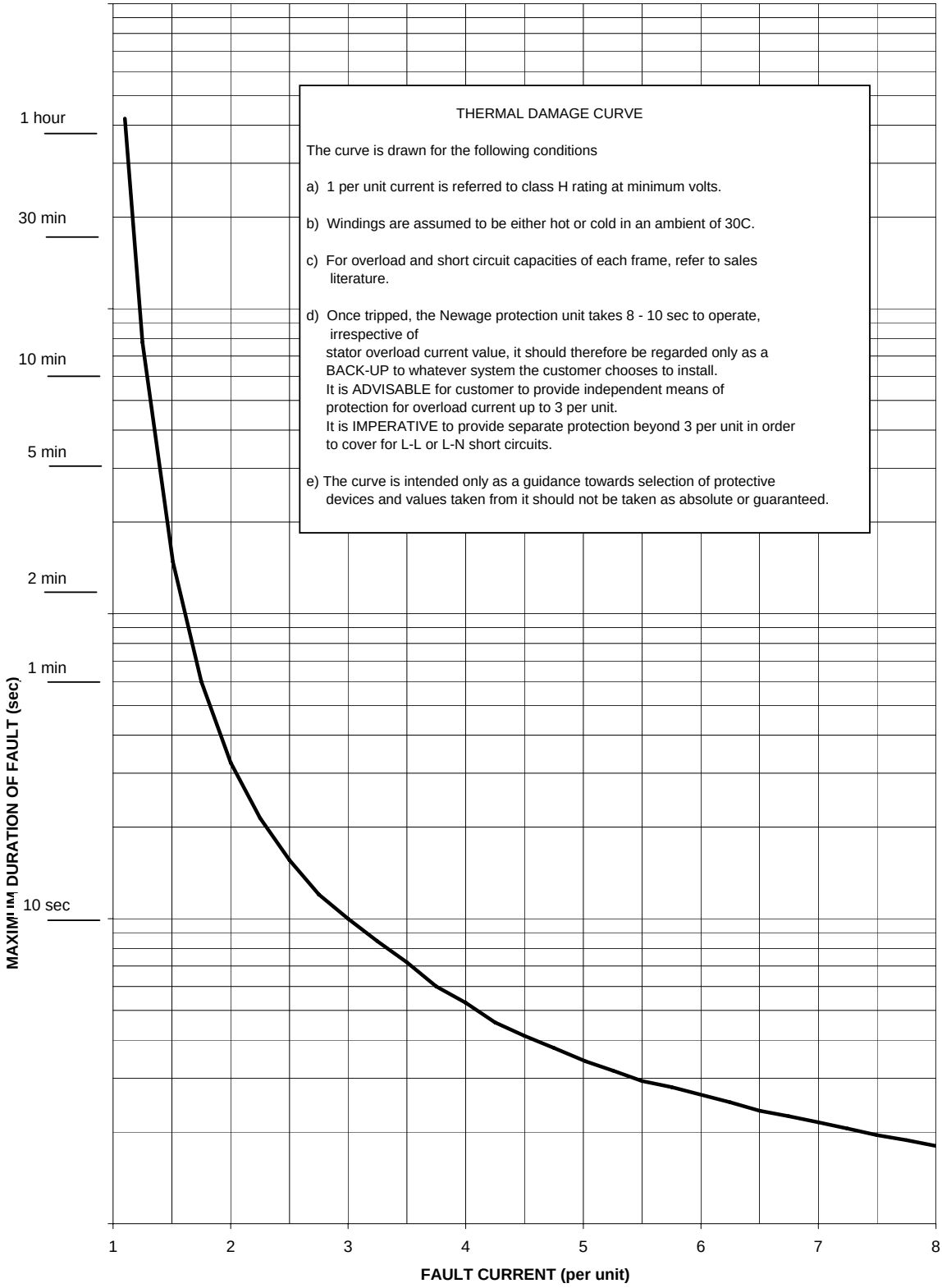
Note 2
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3
Curves are drawn for Star connections under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

THERMAL DAMAGE CURVE



THERMAL DAMAGE CURVE

The curve is drawn for the following conditions

a) 1 per unit current is referred to class H rating at minimum volts.

b) Windings are assumed to be either hot or cold in an ambient of 30C.

c) For overload and short circuit capacities of each frame, refer to sales literature.

d) Once tripped, the Newage protection unit takes 8 - 10 sec to operate, irrespective of stator overload current value, it should therefore be regarded only as a BACK-UP to whatever system the customer chooses to install. It is ADVISABLE for customer to provide independent means of protection for overload current up to 3 per unit. It is IMPERATIVE to provide separate protection beyond 3 per unit in order to cover for L-L or L-N short circuits.

e) The curve is intended only as a guidance towards selection of protective devices and values taken from it should not be taken as absolute or guaranteed.

VMC GROUP
THE POWER OF TOGETHER™

CERTIFICATE OF COMPLIANCE
SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certification No.

VMA-50957-01C (Revision 13)

Expiration Date: 6/30/2026

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are CERTIFIED[1] FOR SEISMIC APPLICATIONS in accordance with the following building code[2] releases.

IBC 2021, 2018, 2015, 2012

The following model designations, options, and accessories are included in this certification. Reference report number VMA-50957-01 as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Cummins Power Generation, Inc.; Diesel Gensets

DSHAD, DQDAA-C, DFEJ-K, DQCA-C, DQFA-H; 230kW - 1000kW

The above referenced equipment is **APPROVED** for seismic application when properly installed[3], used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance[4]. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as I_p=1.5. The equipment is qualified by successful seismic shake table testing at the nationally recognized University of California Berkeley Pacific Earthquake Engineering Research Center under the review of the ISO Accredited Product Certification Agency, the VMC Group.

Certified Seismic Design Levels			
Certified **IBC**	**Importance $I_p \leq 1.5$** Soil Classes A-E Risk Categories I-IV Design Categories A-F	z/h ≤ 1.0	z/h = 0.0
		$S_{DS} \leq 0.650$ g	$S_{DS} \leq 1.940$ g

Certified Seismic Installation Methods[8]	
External Isolation Mounting From Unit Base To Fuel Tank	External Isolation Mounting From Unit Base To Rigid Structure
Rigid Mounting From Unit Base To Fuel Tank	Rigid Mounting From Unit Base To Rigid Structure

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CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Series	Model	Max Rating [kW]	Length [in]	Width [in]	Height [in]	Max Weight [lb]	S_{DS} z/h=0	S_{DS} z/h=1	Configuration
DSHAx (QSL9-G2)	D	230	143	42	78	4,466	2.28	2.00	Off Tank
DQDAx (QSL9-G7)	A, B, C	250, 275, 300	246	90	106	13,039	2.48		
DFEx (QSX15)	J, K	450, 500	233	86	100	16,077	1.94	0.65	
DQCx (QSK23)	A, B, C	600, 750, 800	315	102	119	29,291			
DQFx (QST30)	A, B, C, D, H	750, 800, 900, 1000	338			29,794			
DSHAx (QSL9-G2)	D	230	143	42	110	8,002	2.28	2.00	On Tank
DQDAx (QSL9-G7)	A, B, C	250, 275, 300	232	90	128	29,504	2.48		
DFEx (QSX15)	J, K	450, 500	366	86		39,245	1.94	0.65	
DQCx (QSK23)	A, B, C	600, 750, 800	338	102	142	52,082			
DQFx (QST30)	A, B, C, D, H	750, 800, 900, 1000			138	53,425			

Group	Type	S_{DS} (z/h=0)	S_{DS} (z/h=1)	A_{Flex-H}	A_{Rig-H}	A_{Flex-V}	A_{Rig-V}	Rigid Mounting F_p/W_p	Isolated Mounting F_p/W_p
Seismic	AC156	1.940	0.65	1.94	0.78	1.29	0.52	0.87	1.46

This certification includes the open generator set and the enclosed generator set when installed with or without the sub-base tank. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification excludes After Treatment Units (ATUs), all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices, remote control panels, remote radiators, pumps and other electrical/mechanical components.

IBC CERTIFIED VMC GROUP

VMA-50957-01C (Revision 13)
Issue Date: Thursday, March 2, 2017
Revision Date: Monday, March 4, 2024
Expiration Date: Tuesday, June 30, 2026

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Notes & Comments:

1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The tested units were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.

2. The following building codes are addressed under this certification:
   IBC 2021 referencing ASCE7-16 and ICC-ES AC-156
   IBC 2018 referencing ASCE7-16 and ICC-ES AC-156
   IBC 2015 referencing ASCE7-10 and ICC-ES AC-156
   IBC 2012 referencing ASCE7-10 and ICC-ES AC-156

3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) may be specified on the installation drawings or specified by a 3rd party. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for ensuring the proper installation of all anchors and mounting hardware.

4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, the VMC Group, and meets the seismic design levels claimed by this certificate.

5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification makes no statements of compliance in regards to NEMA, IP, UL, CSA, or other relevant standards after a seismic event. For compliance to other relevant standards, please contact the manufacturer.

6. This certificate applies to units manufactured at:
   Cummins Power Generation, Inc., 1400 73rd Ave NE, Minneapolis, MN 55432

7. This certification follows the VMC Group's ISO-17065 Scheme.

8. The certified seismic installation methods states are a summary for all series this certificate covers, for more detailed information on the certified seismic installation methods, see the certified product tables.

John P. Giuliano, PE
President, VMC Group

VMA-50957-01C (Revision 13)
Issue Date: Thursday, March 2, 2017
Revision Date: Monday, March 4, 2024
Expiration Date: Tuesday, June 30, 2026

SECTION 3
GENERATOR ACCESSORIES

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			
QSK23-G7	DQCA	DQCB	DQCC	
QST30-G5	DQFAA	DQFAB	DQFAC	DQFAD
QST30-G17	DQFAH			
QSK38-G17	C1250D6E			
QSK38-G18	C1250D6E	C1500D6E		
QSK50-G5	DQGAE	DQGAF		
QSK50-G4	DQGAA	DQGAB		
QSK50-G8	DQGAS			
QSK50-G24	C1750D6E	C2000D6E		
QSK50-G25	C2000D6E			
QSK60-G6	DQKAA	DQKAB	DQKAD	DQKAE
QSK60-G14	DQKAF			
QSK60-G17	DQKAM			

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 Pages
P and R	0612CT0101 https://www.se.com/us/en/download/document/0612CT0101/	16-17
L	0611CT1001 https://www.se.com/us/en/download/document/0611CT1001/	8-9
MasterPact NT/NW	https://www.se.com/us/en/faqs/FA231180/	Please refer to PLS007 Rev 25

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above.

https://www.se.com/us/en/work/support/contacts.jsp

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.

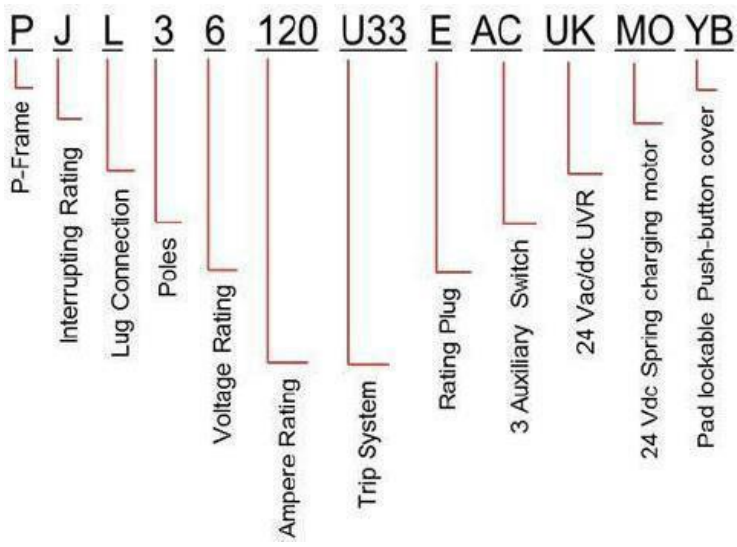
*If the first 3 letters are “PJP,” the search will not work. You will need to start with just “PJ” and use the description pages to obtain the information you are looking for on the “PJP.”

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.”



For decoding the ABB breakers, see the decoder sheet, titled "T8 Catalog number explanation"

Feature Code	Breaker Box Description	Cummins Part #	Engine	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KP82-2	CB-2500, Right,3P, UL600, IEC 415, UL Serv Ent, 100%	0320-2164-01	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36250U31F	MicroLogic 3.0 LI	F
		A054K364	QST30-G5, QST30-G17, 30L, QSK23-G7, QSK38-G17, QSK38-G18, QSK50-G24, QSK50-G25		RLF36250U33F	MicroLogic 5.0 LSI	
		A064G468	QSK50-G24, QSK50-G25				
KP83-2	CB-2500A, Left, 3P, 600, IEC 415, UL Serv Ent, 100%	0320-2164-01	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36250U31F	MicroLogic 3.0 LI	F
		A054K364	QST30-G5, QST30-G17, 30L, QSK23-G7, QSK38-G17, QSK38-G18		RLF36250U33F	MicroLogic 5.0 LSI	
KP84-2	CB-2000, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	0320-2164-02	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36200U31F	MicroLogic 3.0 LI	F
		A054K366	QST30-G5, QST30-G17, 30LQSK23-G7, QSK38-G17, QSK38-G18, QSK50-G24, QSK50-G25		RLF36200U33F	MicroLogic 5.0 LSI	
		A064G467	QSK50-G24, QSK50-G25				
KP85-2	CB-2000, Left,3P, UL 600, IEC 415, UL Serv Ent, 100%	0320-2164-02	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36200U31F	MicroLogic 3.0 LI	F
		A054K366	QST30-G5, QST30-G17, 30L QSK23-G7, QSK38-G17, QSK38-G18		RLF36200U33F	MicroLogic 5.0 LSI	
KP86-2	CB-1600A, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	A065A939	QSK38-G17, QSK38-G18, QSK50-G24, QSK50-G25	Schneider Electric	RJF3616OU33A	MicroLogic 5.0 LSI	A
		0320-2164-03	QSK50-G4, QSK50-G5, QSK50-G7, 50L, 60L, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		RLF36160U31F	MicroLogic 3.0 LI	F
		A054K368	QST30-G5, QST30-G17, 30LQSK23-G7		RLF36160U33F	MicroLogic 5.0 LSI	
		A064G460	QSK50-G24, QSK50-G25				
KP87-2	CB-1600, Left,3P, UL 600, IEC 415, UL Serv Ent 100%	A065A939	QSK38-G17, QSK38-G18	Schneider Electric	RJF36160U33A	MicroLogic 5.0 LSI	A
		0320-2164-03	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		RLF36160U31F	MicroLogic 3.0 LI	F
		A054K368	QST30-G5, QST30-G17, 30L,, QSK23-G7		RLF36160U33F	MicroLogic 5.0 LSI	
KP88-2	CB-1200, Right, 3P, UL 600, IEC 415, UL Serv Ent, 100%	A065A772	QSK38-G17, QSK38-G18, QSK50-G24, QSK50-G25	Schneider Electric	PJF36120U33A	MicroLogic 5.0 LSI	A
		0320-2183	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		PJP36120U31E	MicroLogic 3.0 LI	E
		A054K408	QST30-G5, QST30-G17, 30LQSK23-G7		PJP36120U33E	MicroLogic 5.0 LSI	
		A065A804	QSK50-G24, QSK50-G25				
KP89-2	CB-1200, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	A065A772	QSK38-G17, QSK38-G18	Schneider Electric	PJF36120U33A	MicroLogic 5.0 LSI	A
		0320-2183	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		PJP36120U31E	MicroLogic 3.0 LI	E
		A054K408	QST30-G5, QST30-G17, 30. QSK23-G7		PJP36120U33E	MicroLogic 5.0 LSI	
KP90-2	CB-800A, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	A065A767	QSK38-G17, QSK38-G18, QSK50-G24, QSK50-G25	Schneider Electric	PJF36080U33A	MicroLogic 5.0 LSI	A
		0320-2182	QSK50-G4, QSK50-G5,QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		PJP36080U31F	MicroLogic 3.0 LI	F
		A054K405	QST30-G5, QST30-G17, 30L. QSK23-G7		PJP36080U33F	MicroLogic 5.0 LSI	
		A065A802	QSK50-G24, QSK50-G25				
KP91-2	CB-800A, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	A065A767	QSK38-G17, QSK38-G18	Schneider Electric	PJF36080U33A	MicroLogi5.0 LSI	A

Specification Sheet

Battery Charger

A048G602 10 A 50/60 Hz
A051H785 20 A 50/60 Hz

Description

Cummins® fully automatic battery chargers are constant voltage/constant current chargers incorporating a 4-stage charging algorithm. Designed for use in applications where battery life and reliability are important; these chargers, complete with built-in equalize charge capability, are ideal for stationary or portable starting battery charging service.

To achieve optimum battery life, a 4-stage charging cycle is implemented. The four charging stages are constant current, high-rate taper charge, finishing charge, and maintaining charge. During the constant current cycle, the charger operates at maximum possible output in the fast charge mode. During the high-rate taper charge cycle the charger stays at fast charge voltage level until battery current acceptance falls to a portion of the chargers rated output. During the finishing charge cycle the charger operates at the float voltage and completes the battery charge. During the maintaining charge cycle the charger supplies only a few milliamps required by the battery to stay at peak capability.

An optional temperature sensor (A043D534) may be used to adjust charging voltage based on temperature of the battery. Use of a battery temperature sensor helps to increase battery life by preventing over or under charging. The battery temperature sensor also protects the battery from overheating. Temperature compensation sensor is required for all applications when battery charger and battery are located in different temperature or battery heater is being used.

Battery chargers are field-configurable for charging either 12 or 24 VDC battery systems at 50/60 Hz operation. Simple jumper selectors enable selection of output voltage and battery type.

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.

Easy Installation – Clearly marked terminal blocks and panel knockouts provide convenient connections of input and output leads.

User Display – Output voltage and current, fault information and status are indicated on the front panel. Includes precision ammeter and voltmeter.

Monitoring – Status LED indicators are provided to show the condition of the charger. LED's on the right side of the monitor indicate operational functions for Temperature Compensation active (Green), AC on (Green), Float (Green) or Boost (Amber) mode, as well as Battery Fault (Red). LED's on the left side of the monitor illuminate (in Red) when Charger fail, High or Low VDC or AC fail occur.

Adjustable Float Voltage – Float voltage can be set, using easy to understand jumpers, for optimum battery performance and life.

Construction – NEMA-1 (IP20) corrosion resistant aluminium enclosure designed for wall mounting.

Faults – The charger senses and annunciates the following fault conditions: AC power loss, battery overvoltage, battery under voltage, battery fault conditions and charger failure. Includes an individual 30 volt/2-amp isolated contact for each alarm.

Vibration Resistant Design – complies with UL991 class B vibration resistance requirements.

Listed – C-UL listed to UL 1236 CSA standard 22.2 No 107.2-M89. Suited for flooded and AGM lead acid and NiCd batteries in generator set installations.

Warranty – 5 year CPG warranty.

Status and Fault LED

Field Selectable Jumper

Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12VDC* or 24VDC
	Float voltage – 12VDC batteries	12.87, 13.08, 13.31, 13.50*, 13.62, 14.30
	Float voltage – 24VDC batteries	25.74, 26.16, 26.62, 27.00*, 27.24, 28.60
	Equalize-voltage	6.5% above float voltage sensing
	Output voltage regulation	±0.5% (1/2%) line and load regulation
	Maximum output current	10 or 20 amps nominal
	Equalize charging	Battery interactive auto-boost
Input:	Voltage AC	120, 208, 240 ±10%
	Frequency	60/50 Hz +5%
Approximate net weight:		10A: 25 lbs. (11.36 Kg) 20A: 50 lbs. (22.68 Kg)
Approximate dimensions: height x width x depth-in		10A: 12.50" x 7.66" x 6.50"(318 x 195 x 165 mm) 20A: 13.06" x 13.95" x 6.83"(332 x 354 x1 73 mm)
Ambient temperature operation: At full rated output -		- 4 °F to 104 °F (-20 °C to 40 °C)

Note:

1. Battery charger comes with default settings of 12VDC and 13.50/27.00VDC float voltage and can be changed to the battery manufacture recommendations. Replacement printed circuit board and f uses are identified in the Owner's Manual (10A: A050S537 and 20A: A051X126) which resides in Quick Serve On-Line. Service parts can be purchased through the Memphis Distribution Center. The PC board replacement instruction sheet (10A: A052N073, 20A: A053W929) and service manual (A050D829) is also available.
2. Installation and application must comply with "section 4.5.3 batteries and battery charger" of application guide T-030 (Liquid Cooled Generator Set Application Manual A040S369).

Caution:

1. Higher input voltages (i.e. 480VAC or 600VAC) can be applied if a transformer with a 120VAC-240VAC output is installed. Higher input voltages (i.e. 480VAC or 600VAC) can be applied if a transformer with a 120VAC-240VAC output is installed. For voltages higher than 240 VAC, stepdown transformer must be used. Review the respective Owner/Installation manual A050S537 for 10Amp and A051X126 20A chargers for supplier recommended stepdown transformer requirements.
2. 10Amp battery charger is recommended for genset applications with 1 or 2 factory provided batteries. 20Amp battery charger is recommended for Cummins Genset applications with 3 or 4 factory provided batteries. Please consider the auxiliary DC loads connected to the genset batteries and size this charger as per the T-030 application guide to prevent misapplication issues.
3. 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.
4. 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.
5. Use this charger for charging LEAD-ACID or LIQUID ELECTROLYTE NICKEL-CADMIUM batteries only. Do not use this battery charger for charging dry cells, alkaline, lithium, nickel-metal hydride, or sealed nickel-cadmium batteries that are commonly used with home appliances. These batteries may burst and cause injuries to persons and damage to property.
6. Do not parallel these battery chargers with any other charging system.

For more information contact your local Cummins distributor or visit power.cummins.com

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NAAC-5602-EN (06/21) PDA059Y464

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.

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

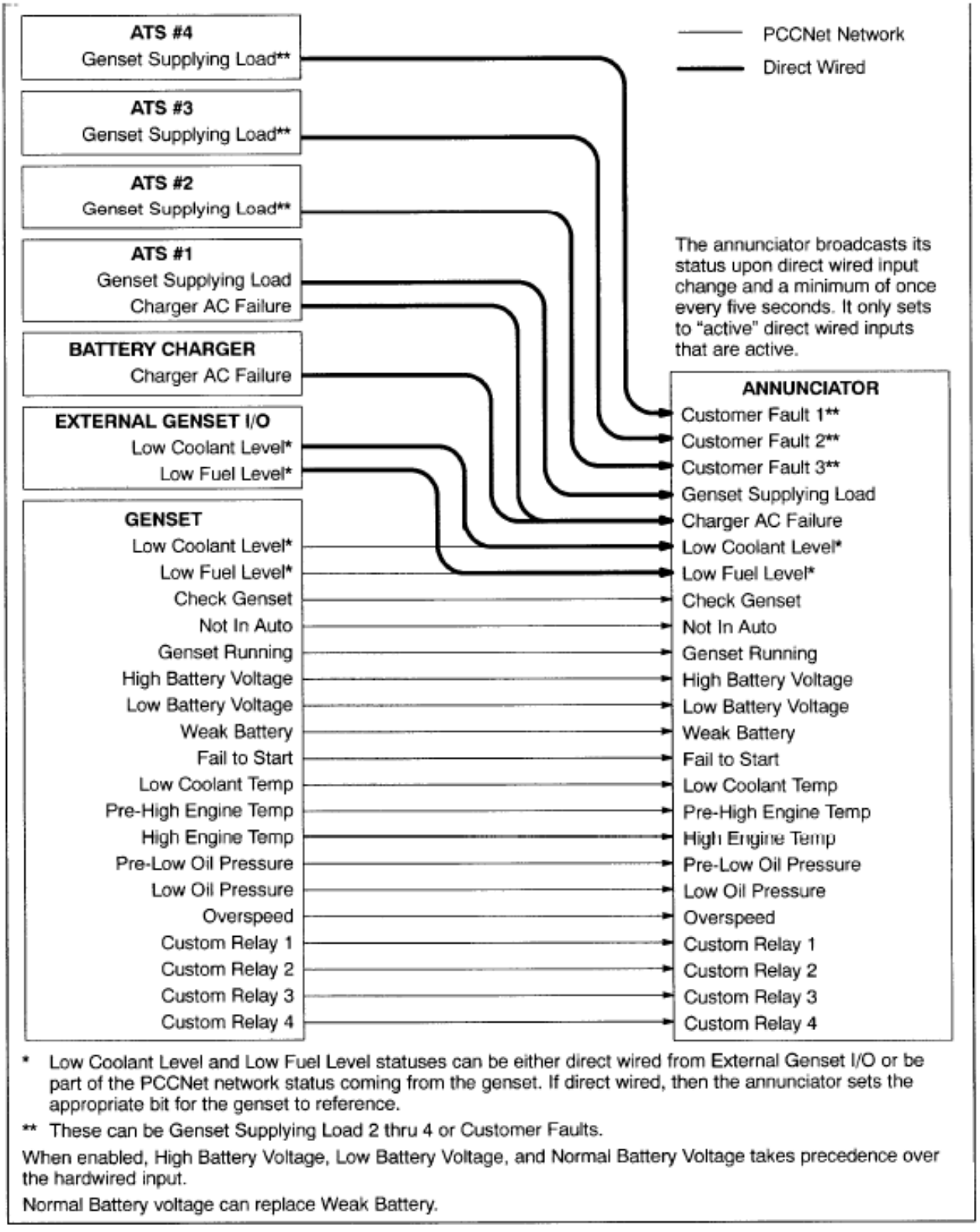
10% to 95% RH (non-condensing)

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

Typical installation



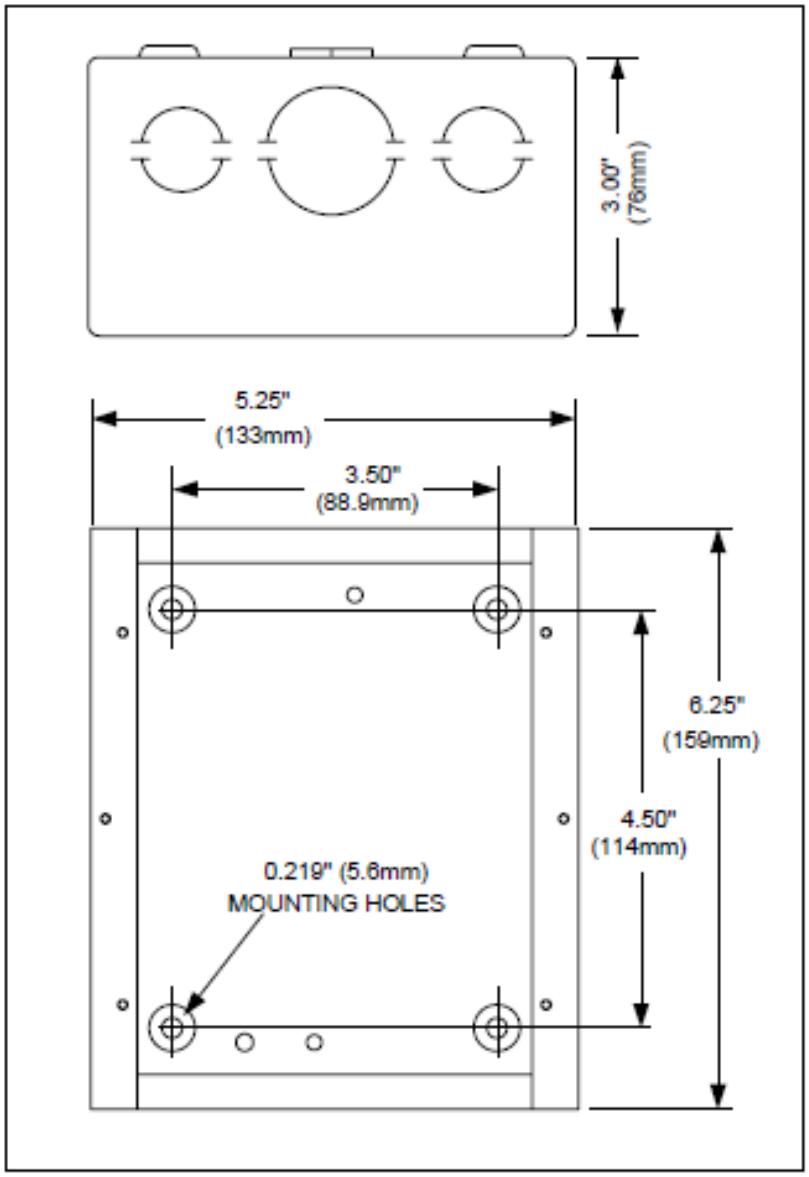
* Low Coolant Level and Low Fuel Level statuses can be either direct wired from External Genset I/O or be part of the PCCNet network status coming from the genset. If direct wired, then the annunciator sets the appropriate bit for the genset to reference.

** 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.

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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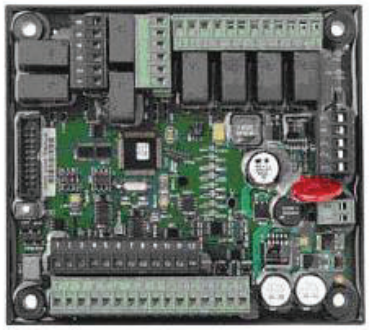
S-1472 (02/22)

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.

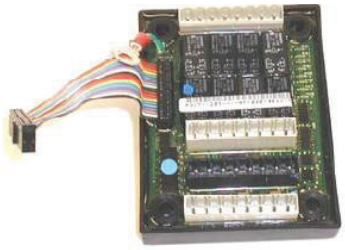
Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

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 compliant.

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:

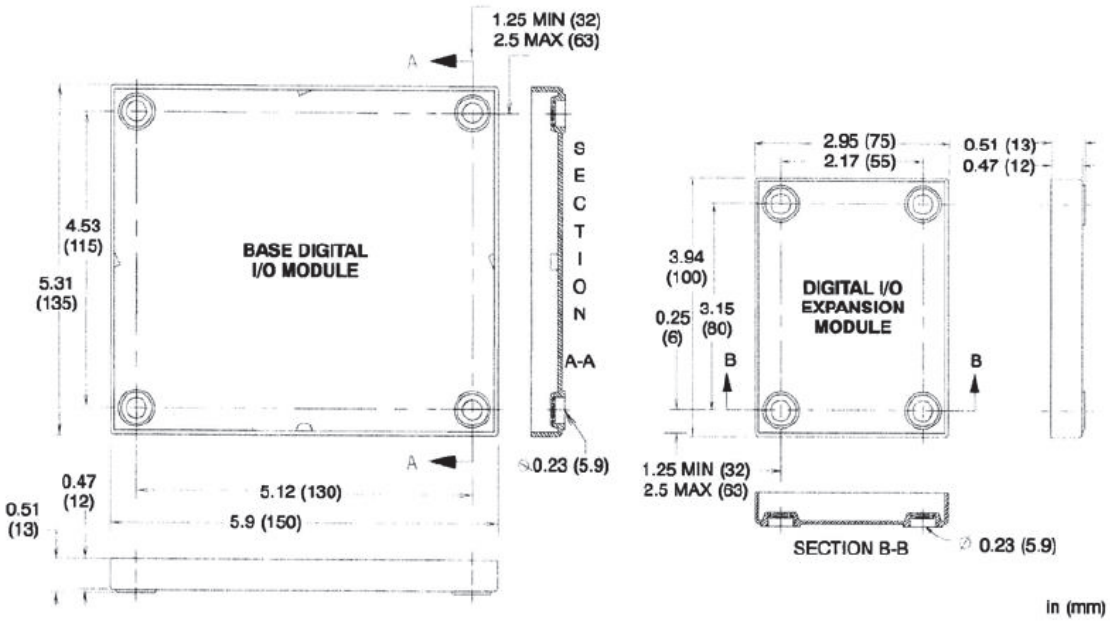
AUX 101

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

Dimensions



Ordering information

Part number	Description
A030K633	AUX101 Control Kit, 8 Discrete/Analog Input/ 8 Form-C Output-PCC 1.x/2.x/3.x
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

Our energy working for you.™

S-1503 (10/17)

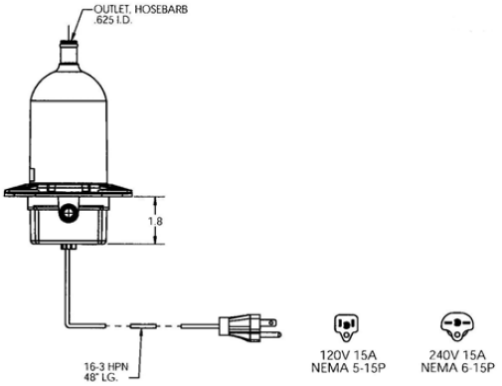
Specification sheet

Coolant heaters

Control thermostat range
ON @ 80º F (27º C)
OFF @ 100º F (38º C)

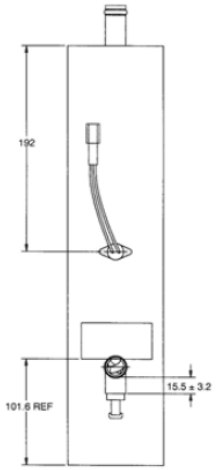
Control thermostat tolerance
± 7.0º F (4º C) on close (ON)
± 5.0º F (3º C) on open (OFF)

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
0333-0630-02	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	
0179-4908-04	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

Heater phase	Single phase heater voltage
Element diameter	.315 IN
Pressure tested by vendor	75 PSIG hydrostatic
Approvals	UL listed CSA compliant

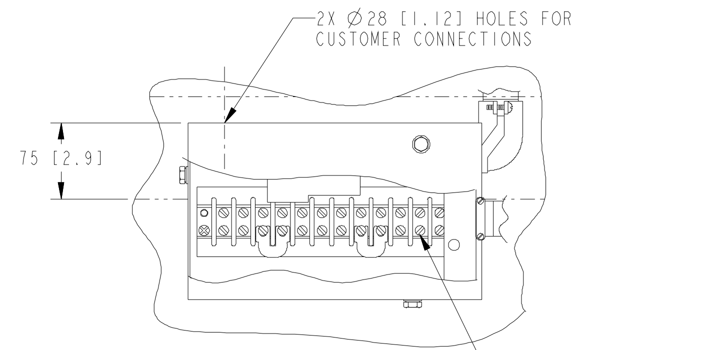


Coolant heater kit	Critical component	Voltage	Wattage	Heater amps	Heater qty	Element wire gauge	Element wire gauge
0179-3087-03	0333-0677-01	208/240/480	3744/4990/4990	23.1/26.8/13.4	2	24	000G-0617
0179-3268-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0618
0179-3325-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0616
0179-3536-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0615
0179-3577-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0639
0179-3578-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0638
0179-3579-05	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0641
0179-3579-07	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0641
0179-3817-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0640
0179-3850-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0637
0179-4299-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0662
0179-4329-03	0333-0677-01	208/240/480	3744/4990/4990	23.1/26.8/13.4	2	24	000G-0657
0179-4606-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0617
0179-4966-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0638
0179-5536-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0640
0179-3087-04	0333-0677-02	208/240/480	4815/6420/6420	23.1/26.8/13.4	2	23	000G-0617
0179-3268-04	0333-0677-02	208/240/480	4325/6420/6420	23.2/26.75/13.375	2	23	000G-0618
0179-3325-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	2	23	000G-0616
0179-3536-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0615
0179-3577-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	2	23	000G-0639
0179-3578-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0638
0179-3579-06	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0641
0179-3579-08	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0641
0179-3817-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0640
0179-3850-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0637
0179-4299-04	0333-0677-02	208/240/480	4325/6420/6420	23.2/26.75/13.375	2	23	000G-0662
0179-4329-04	0333-0677-02	208/240/480	4325/6420/6420	23.2/26.75/13.375	2	23	000G-0657
0179-4606-04	0333-0677-02	208/240/480	4815/6420/6420	23.1/26.8/13.4	2	23	000G-0617
0179-4966-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0638
0179-5536-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0640

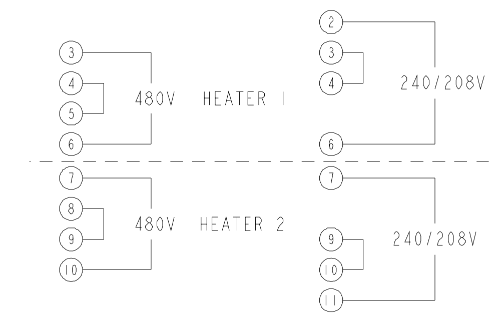
			Coolant heater kit – by feature option					Applicable compatability rule/s		
Model	Spec level	Production part #	H036-2	H074-2	H540-2	H556-2	H557-2	Also required	Not for use with	Coolant heater interface outline
DQDAB	B	0333-0713-01	0333-0713-03							
DQDAB	B	0333-0713-02		0333-0713-04					THOR Enclosure or F215-2 (Housing Ready)	
DQDAC	B	0333-0713-01	0333-0713-03							
DQDAC	B	0333-0713-02		0333-0713-04					THOR Enclosure or F215-2 (Housing Ready)	
DQFAA	A	0179-3577-01				0179-3577-03				0500-3846
DQFAA	A	0179-3577-02					0179-3577-04			0500-3846
DQFAB	A	0179-3577-01				0179-3577-03				0500-3846
DQFAB	A	0179-3577-02					0179-3577-04			0500-3846
DQFAC	A	0179-3577-01				0179-3577-03				0500-3846
DQFAC	A	0179-3577-02					0179-3577-04			0500-3846
DQFAD	A	0179-3577-01				0179-3577-03				0500-3846
DQFAD	A	0179-3577-02					0179-3577-04			0500-3846
DQGAA	A	0179-4606-01				0179-4606-03				0500-3821
DQGAA	A	0179-4606-02					0179-4606-04			0500-3821
DQGAB	A	0179-4606-01				0179-4606-03				0500-3821
DQGAB	A	0179-4606-02					0179-4606-04			0500-3821
DQHAA	A	0179-4966-01				0179-4966-03				0500-3873
DQHAA	A	0179-4966-02					0179-4966-04			0500-3873
DQHAB	A	0179-4966-01				0179-4966-03				0500-3873
DQHAB	A	0179-4966-02					0179-4966-04			0500-3873
DQKAA	A	0179-4299-01				0179-4299-03				0500-4196
DQKAA	A	0179-4299-02					0179-4299-04			0500-4196
DQKAB	A	0179-4299-01				0179-4299-03				0500-4196
DQKAB	A	0179-4299-02					0179-4299-04			0500-4196
DQKB	G	0179-3268-01				0179-3268-03				0500-3822
DQKB	G	0179-3268-02					0179-3268-04			0500-3822
DQKC	G	0179-3268-01				0179-3268-03				0500-3822
DQKC	G	0179-3268-02					0179-3268-04			0500-3822
DQKD	A	0179-3268-01				0179-3268-03				0500-3822
DQKD	A	0179-3268-02					0179-3268-04			0500-3822
DQKH	B	0179-3268-01				0179-3268-03				0500-3822
DQKH	B	0179-3268-02					0179-3268-04			0500-3822

0500_3846	D	Pro/ENGINEER	METRIC DWG

REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
FRD20709	A	1	PRODUCTION_RELEASE	-	WP	HLS	HLS	06-24-04
FRD32924	B	1	CHG TABLE 9984 WAS 9980	1B	GJT	BG	NAVARRETE	08-23-07
		2	CHG TABLE 9650 WAS 8650	1B	GJT	BG	NAVARRETE	08-23-07



DETAIL OF HEATER TERMINAL BOX

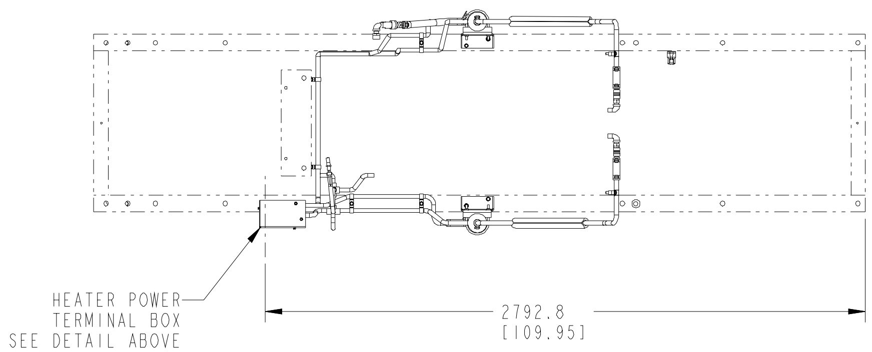


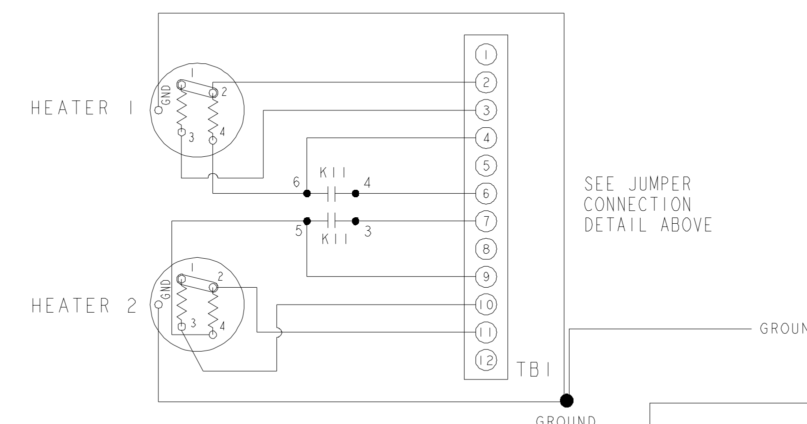
JUMPER CONNECTION DETAIL

NOTES:

1. DIMENSIONS IN [ ] ARE INCHES.
2. THE HEATER CONTROL RELAY DRAWS 83mA OF CURRENT WHEN THE HEATERS ARE UNPOWERED. HEATERS ARE NOT POWERED WHEN:
   1) THE ENGINE HAS REACHED DESIGN TEMPERATURE OR
   2) THE ENGINE IS RUNNING.

⚠ A BATTERY CHARGER IS REQUIRED TO PREVENT BATTERY DISCHARGE.

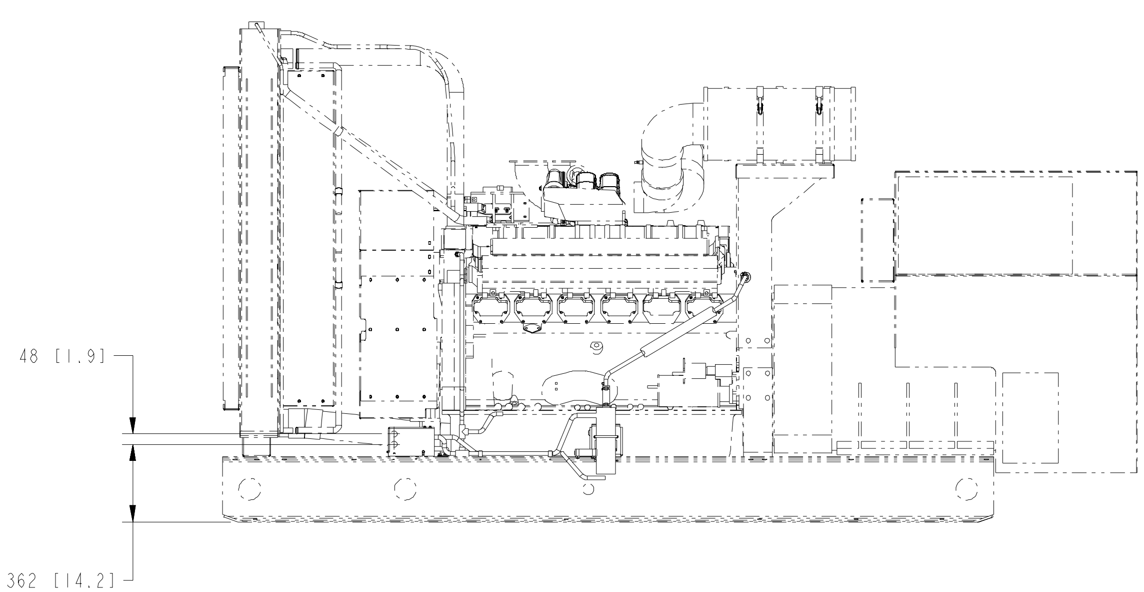


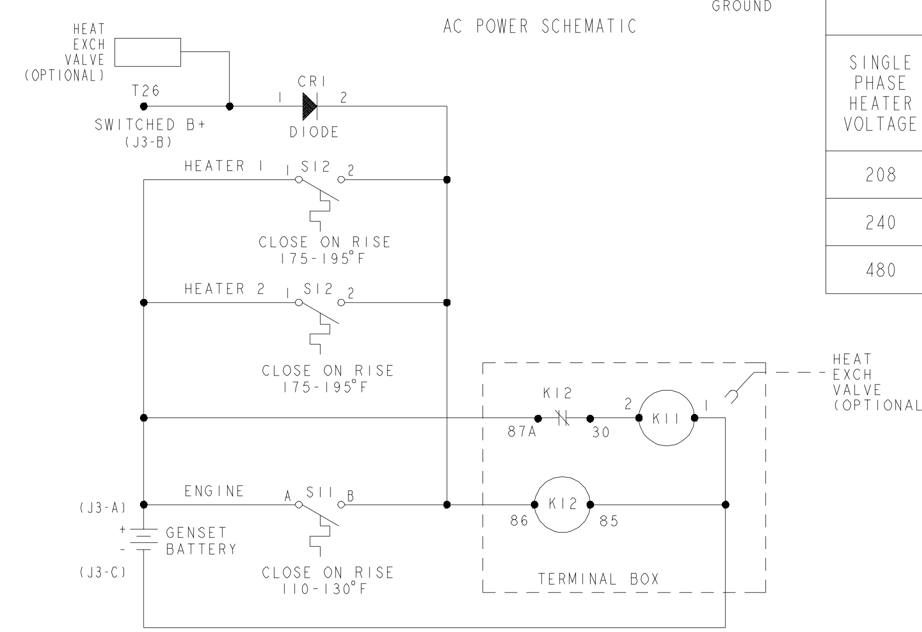


AC POWER SCHEMATIC

B1 B2

HEATER AMPERAGE TABLE						
SINGLE PHASE HEATER VOLTAGE	FEATURE CODE H556 TWO HEATERS			FEATURE CODE H557 TWO HEATERS		
	HEATER AMPS	TOTAL AMPS	TOTAL WATTS	HEATER AMPS	TOTAL AMPS	TOTAL WATTS
208	18.0	36.0	7488	23.2	46.4	9650
240	20.8	41.6	9984	26.75	53.5	12840
480	10.4	20.8	9984	13.375	26.75	12840





DC CONTROL SCHEMATIC

								QTY	ITEM	PART NO	DWG SIZE	DESCRIPTION OR MATERIAL	REF DES

DO NOT SCALE PRINT	TOLERANCE UNLESS OTHERWISE SPECIFIED			
	DIM	mm	Inch	
		X ± 3	.X ±	
		.X ± 0.8	.XX ±	
		.XX ± 0.38	.XXX±	
ANG TOL± 1.0 °	HOLE	0.09-4.99 +0.15/-0.08	.004-.200 +.006/-.003	
		5.00-9.99 +0.20/-0.10	.201-.421 +.008/-.004	
DRAWN TO SCALE OF 1/16		10.00-17.49 +0.25/-0.13	.422-.703 +.010/-.005	
		17.50-24.99 +0.30/-0.13	.704-.999 +.012/-.005	

			NAME	DATE
SIM TO 0500-3154	-	DR	W PELTIER	04-23-04
COPIED FROM 0500-3823	-	CHKR ☐ MFG ☒	H SEPPANEN	06-24-04
THIRD ANGLE PROJECTION		APPROVED	H SEPPANEN	06-24-04

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ANSI Y14.5M-1982

MODEL FIRST USED ON: DFHA, HB, HC, HD

SITE CODE: PGA

CUMMINS POWER GENERATION
1400 73RD AVE NE
MINNEAPOLIS, MINNESOTA 55432

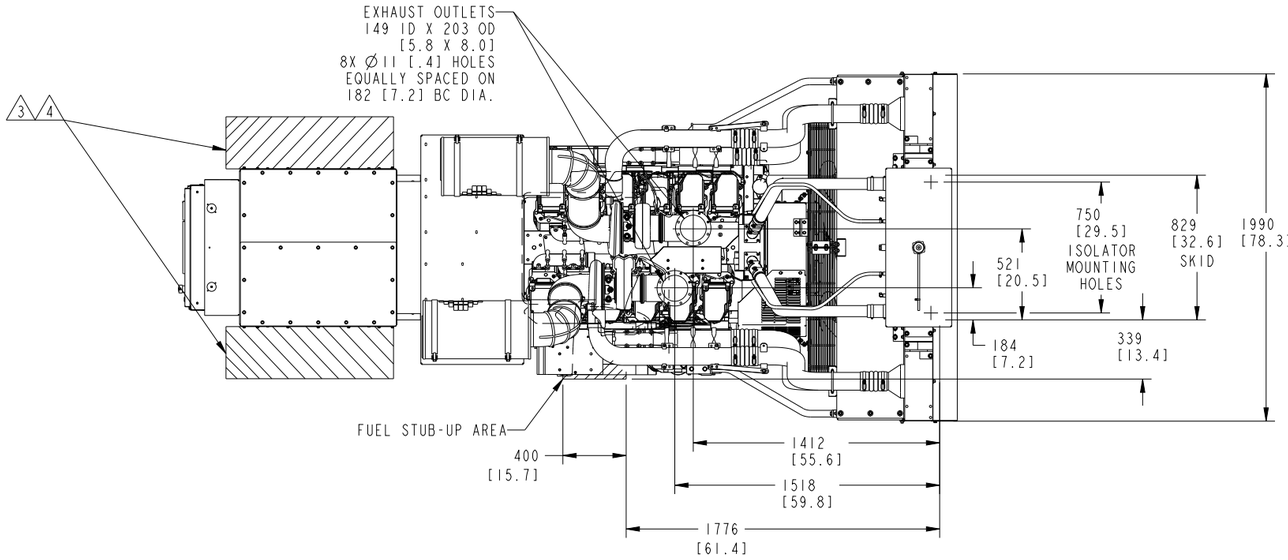
TITLE: INTERFACE_OUTLINE (HEATER)

DWG NO: 0500_3846 — SHEET 1 OF 1 — DWG SIZE D

SECTION 4
GENERATOR DRAWINGS AND INTERCONNECTS

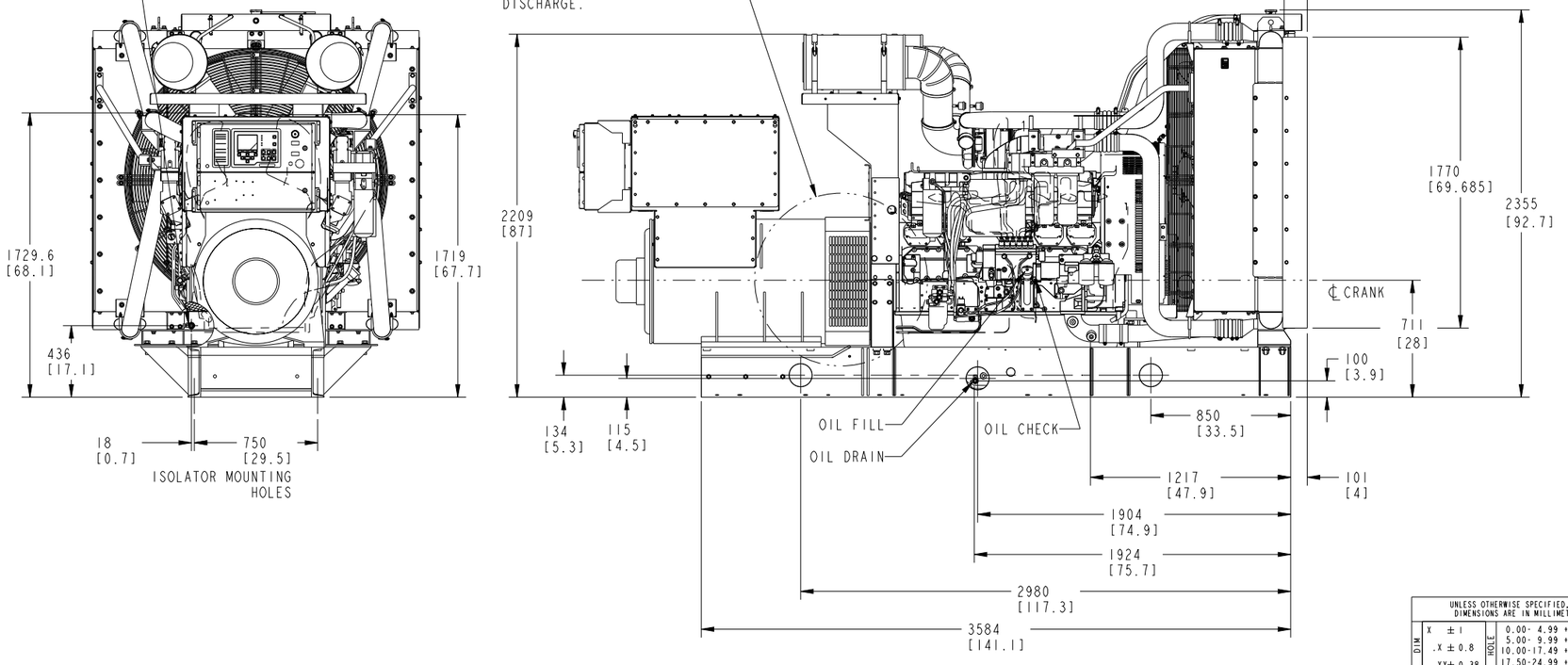
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-179470	D	1	DRAWING HAS BEEN PICTORIALLY UPDATED TO SHOW CORRECT ENGINE	CJF	LC	L CASSENS	13SEP18



NOTES:

1. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.
2. DIMENSIONS SHOWN IN [ ] ARE INCHES.
3. REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
4. FOR ENTRANCE BOX APPLICATIONS, SEE APPLICABLE ENTRANCE BOX OUTLINE DRAWING.
5. 25 [1] DIA HOLES MARKED BY △ FOR 10 POINT ISOLATION MOUNTING.
6. FUEL IN HOSE [Ø.75] X 2009 [79.1] LONG WITH 3/4-14 NPTF EXTERNAL THREAD FITTING. FUEL OUT HOSE [Ø.50] X 1270 [50.0] LONG WITH 3/4-14 NPTF EXTERNAL THREAD FITTING.
7. TERMINALS WILL ACCOMMODATE STANDARD NEMA AND IEC 2-HOLE LUGS.
8. TERMINALS WILL ACCOMMODATE UP TO 10-750 MCM LUGS.
9. TERMINALS WILL ACCOMMODATE UP TO 6-350 CMC LUGS OR 4-500 MCM LUGS.
10. (NOTE REMOVED)

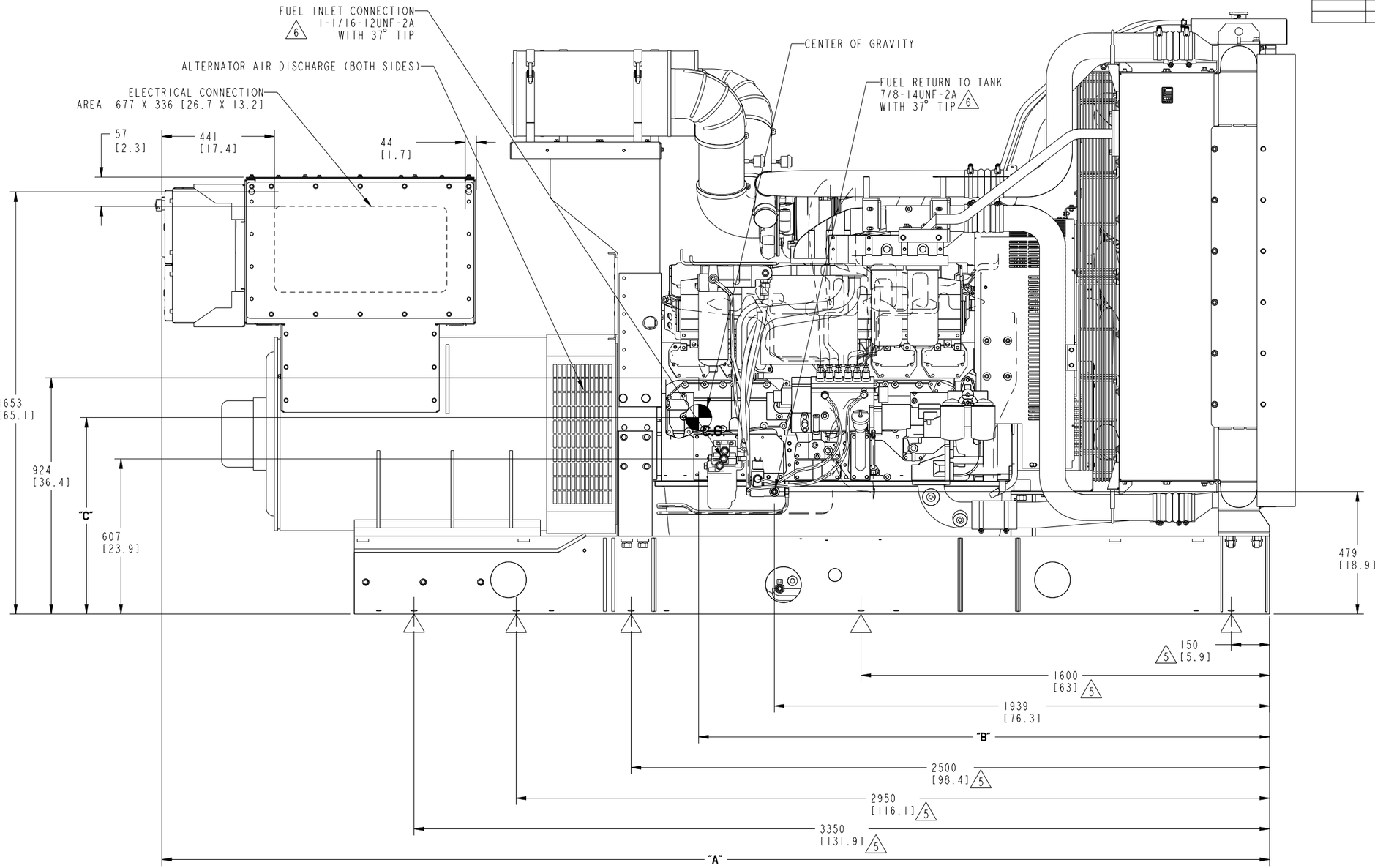


UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO A034N275	DWN A_MARBHAL	CUMMINS POWER GENERATION		
DIM: X ±1, .X ±0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD S_VENKATESAN	SITE CODE	OUTLINE, GENSET	
ANG TOL: ± 1.0° — SCALE: 1/16	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD S_VENKATESAN; DATE 06AUG15	PGF	DWG SIZE D — A049K674	SHEET 1 of 4 — DWG REV D
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 — FIRST USED ON DQFAA/B/C/D			

Drawing Name: A049K675 Revision: D
Part Name: A049K674 Revision: D
ECO-179470 Sheet 1 of 5

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-179470	D	--	-----	CJF	LC	L CASSENS	13SEP18



TABULATION

GEN. FRAME SIZE	DIM "A"	DIM."B" C.G.	DIM."C" C.G.	GEN SET DRY WT KGS	GEN SET DRY WT LBS	GEN SET WET WT KGS	GEN SET WET WT LBS
HC6G	4326 [170.3]	2022 [79.6]	830 [32.7]	6377	14060	6641	14640
HC6H	4326 [170.3]	2060 [81.1]	828 [32.6]	6615	14585	6879	15165
HC6J	4326 [170.3]	2096 [82.5]	824 [32.4]	6838	15076	7102	15656
HC6K	4427 [174.3]	2108 [83.0]	823 [32.4]	6913	15242	7177	15822
P7B	4418 [174]	2192 [86.3]	817 [32.2]	7317	16132	7581	16712
P7C	4418 [174]	2210 [87.0]	813 [32.0]	7575	16701	7839	17281

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X	± 1	0.00- 4.99	+0.15/-0.08
.X	± 0.8	5.00- 9.99	+0.20/-0.10
.XX	± 0.38	10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL: ± 1.0° SCALE: 1/8

SIM TO A034N275

DO NOT SCALE PRINT

- CONFIDENTIAL -
PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN	A_MARBHAL
CKD	S_VENKATESAN
APVD	S_VENKATESAN
DATE	06AUG15

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 — FIRST USED ON DQFAA/B/C/D

SITE CODE: PGF

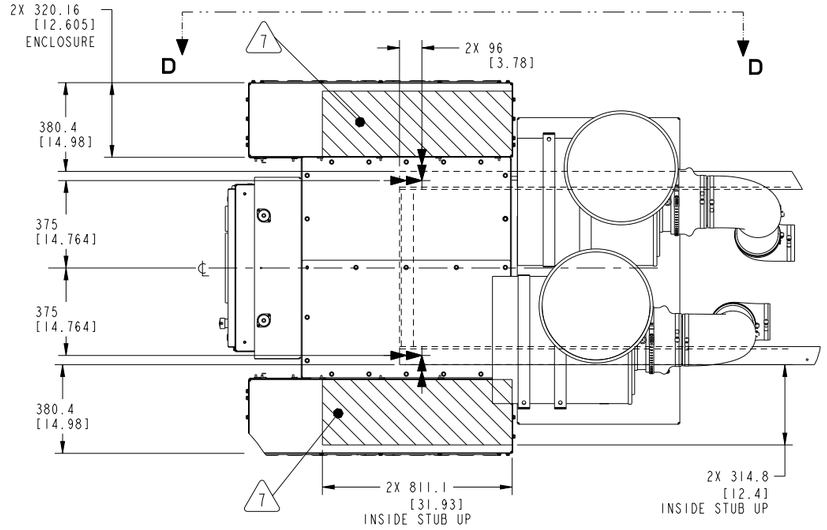
CUMMINS POWER GENERATION

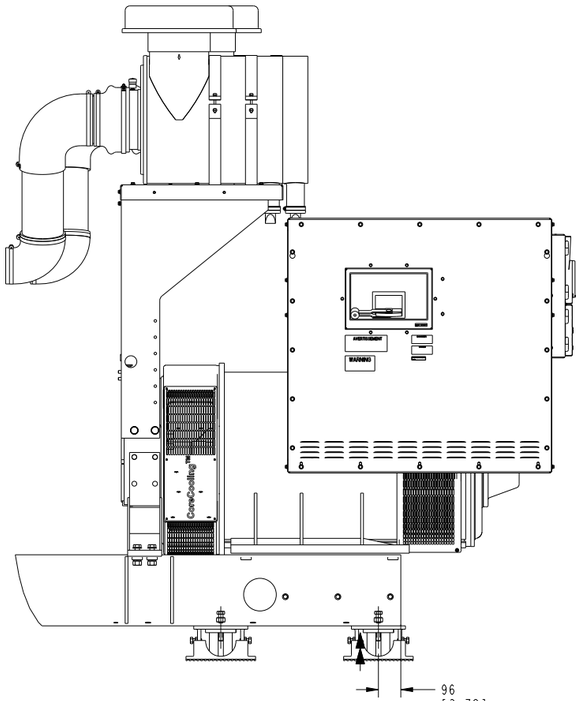
OUTLINE, GENSET

DWG SIZE: D | A049K674 | SHEET 2 of 4 | DWG REV: D

Drawing Name: A049K675 Revision: D
Part Name: A049K674 Revision: D
ECO-179470 Sheet 2 of 5

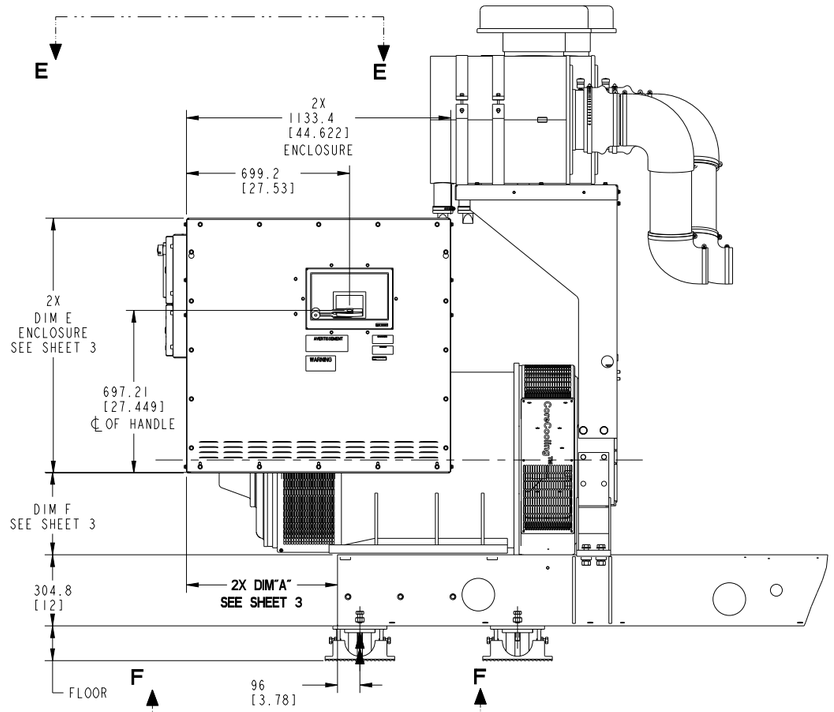
S6





VIEW **A-A**
(ROTATED 180°)

LEFT SIDE ENTRY (11)



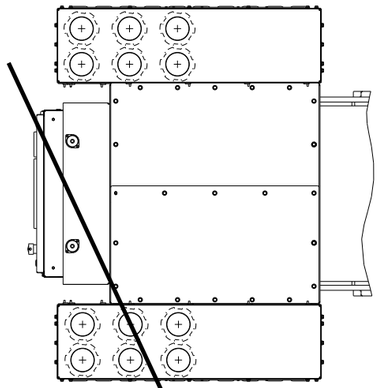
RIGHT SIDE ENTRY

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A1	SCALE:3/32
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

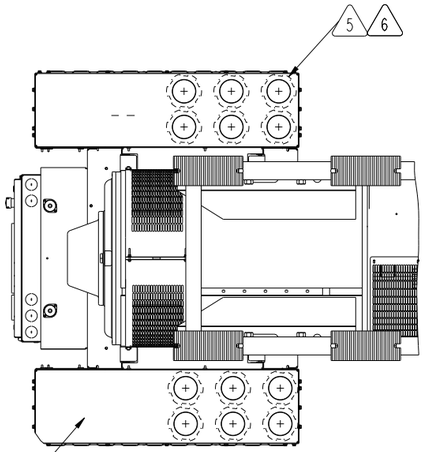
Document Generated: **01JUL2019 15:04 GMT**

Part Number: **A040V836** Part Revision: **F**
Part Name: **OUTLINE,CIRCUIT BREAKER**
Drawing Category: **Detail** State: **Released**

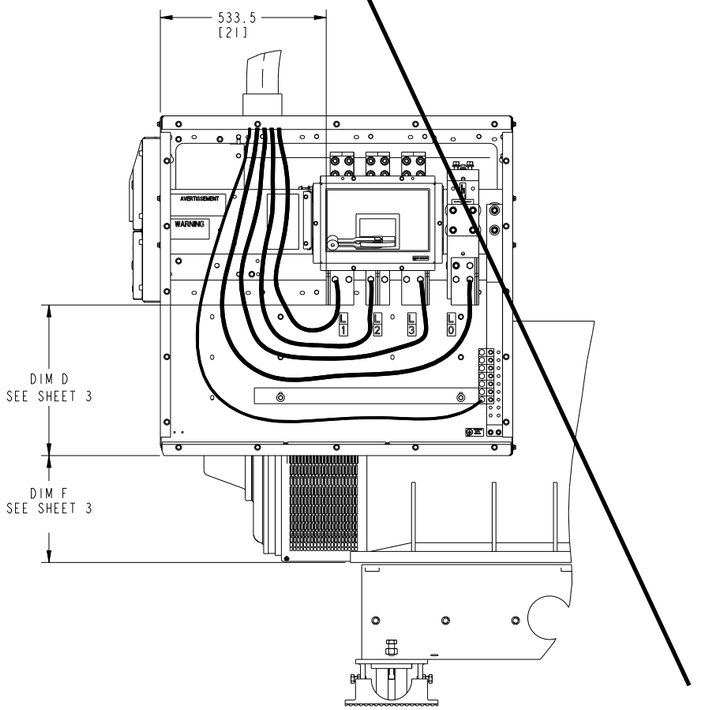
S6



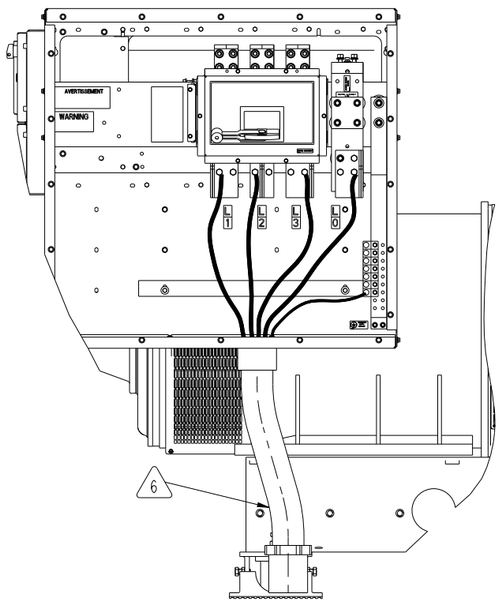
VIEW **E-E**
TOP ENTRY
SCALE 3/32



VIEW **E-E**
BOTTOM ENTRY
SCALE 3/32



RIGHT SIDE
TOP ENTRY ROUTING EXAMPLE
SCALE 1/8



RIGHT SIDE
BOTTOM ENTRY ROUTING EXAMPLE
SCALE 1/8

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A1	SCALE:3/32
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

Document Generated: **01JUL2019 15:04 GMT**

Part Number: **A040V836** Part Revision: **F**
Part Name: **OUTLINE,CIRCUIT BREAKER**
Drawing Category: **Detail** State: **Released**

TABLE 1

UL/IEC LUGS							ACCESSORY SPECIFICATIONS			
LUG	FRAME	MAX AMPS	WIRE RANGE COPPER	DIM D ±25 [1.0]	DIM E ±25 [1.0]	DIM F ±25 [1.0]	ACCESSORY DESCRIPTION	CONTACT RATING	INRUSH	CONNECTION TYPE
	SQUARE D NSJ	400A 3 OR 4 POLE	#2-600 KCMIL	554 [21.8]	1092 [43.02]	440.5 [17.34]	24 VDC SHUNT TRIP	----------	10A 10	COMPRESSION TERMINALS #20-16 AWG OR SMALLER TORQUE: 10 LB-IN
	SQUARE D NLGL W/ MICROLOGIC 5.0 TRIP UNIT	600A 3-POLE	2/0-350 KCMIL	554 [21.8]	1092 [43.02]	440.5 [17.34]	24 VDC SHUNT TRIP 9 13	----------	10A 10	COMPRESSION TERMINALS #20-16 AWG OR SMALLER TORQUE: 10 LB-IN
							1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM 9 13	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	
14	SQUARE D P 800 W/MICROLOGIC 5.0 TRIP UNIT	800A 3-POLE	3/0-500 KCMIL	599 [23.5]	1092 [43.02]	440.5 [17.34]	24 VDC SHUNT TRIP 9 13	----------	200VA 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM 9 13	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
15	SQUARE D P 1200 W/MICROLOGIC 5.0 TRIP UNIT	1200A 3-POLE	3/0-500 KCMIL	556 [21.8]	1092 [43.02]	440.5 [17.34]	24 VDC SHUNT TRIP 9 13	----------	200VA 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM 9 13	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
	SCHNEIDER ELECTRIC NW 2000/1600 (ELECTRICALLY OPERATED) 1600-3000 AMP BREAKERS BUS BARS STANDARD W/MICROLOGIC 5.0 TRIP UNIT	NEMA HOLE PATTERN		490 [19]	1242.6 [48.92]	290.5 [11.44]	24 VDC SHUNT TRIP 9 13 1	----------	200VA 10	PUSH-IN TERMINAL FOR 1 OR 2 #18-14 AWG.
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM 9 13 1	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	PUSH-IN TERMINAL FOR 1 OR 2 #18-16 AWG.
	SQUARE D R 2500/2000/1600 3-POLE 1600-2500 AMP BUS BARS STANDARD W/MICROLOGIC 5.0 TRIP UNIT	NEMA HOLE PATTERN		490 [19]	1092 [43.02]	440.5 [17.34]	24 VDC SHUNT TRIP 9 13	----------	200VA 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM 9 13	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
	SCHNEIDER ELECTRIC NW 2000/1600 (ELECTRICALLY OPERATED) W/OPTIONAL LUG 1600-3000AMP BREAKERS TORQUE 375 IN LBS [42 Nm] 3	#2-600 KCMIL		490 [19]	1242.6 [48.92]	290.5 [11.44]	24 VDC SHUNT TRIP 9 13 1	----------	200VA 10	PUSH-IN TERMINAL FOR 1 OR 2 #18-14 AWG.
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM 9 13 1	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	PUSH-IN TERMINAL FOR 1 OR 2 #18-16 AWG.
	R 2500/2000/1600 W/OPTIONAL LUG 1600-2500 AMP BREAKERS TORQUE 375 IN LBS [42 Nm] 3	#2-600 KCMIL		490 [19]	1092 [43.02]	440.5 [17.34]	24 VDC SHUNT TRIP 9 13	----------	200VA 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM 9 13	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN

TABLE 2

TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2008, ARTICLE 310.15 AT 75C TEMPERATURE RATED CONDUCTOR AT 30C AMBIENT AND ANNEX C 8

MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY	TOTAL NUMBER OF CONDUITS	
	QTY	SIZE		QTY	SIZE (IN INCHES)
2500	6	600 KCMIL	420	6	4
2000	5	600 KCMIL	420	5	4
1600	5	600 KCMIL	420	5	4
1200	3	500 KCMIL	385	3	3
1000	3	400 KCMIL	335	3	3
800	2	300 KCMIL	285	2	3
630	2	350 KCMIL	310	2	3
600	2	350 KCMIL	310	2	3
400	1	600 KCMIL	420	1	4
250	1	250 KCMIL	255	1	2 1/2
100	1	2 KCMIL	115	1	2

TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2008, ARTICLE 310.15 AND TABLE 310-16 AT 75C TEMPERATURE RATED CONDUCTOR AT 40C AMBIENT AND ANNEX C 8

MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY	TOTAL NUMBER OF CONDUITS	
	QTY	SIZE		QTY	SIZE (IN INCHES)
2500	6	750 KCMIL	418	6	4
2000	5	700 KCMIL	405	5	4
1600	4	700 KCMIL	405	4	4
1000	3	500 KCMIL	334	3	3 1/2
800	3	350 KCMIL	273	3	3

TABLE 3

GENSET MODEL	ALTERNATOR MODEL	DIM "A"
☐ DQFAA ☐ DQFAB ☐ DQFAC ☐ DQFAD	☐ HC634G	654 [25.74]
	☐ HC634H	654 [25.74]
	☐ HC634J	654 [25.74]
	☐ HC634K	755 [29.72]
	☐ P734B	746 [29.37]
	☐ P734C	746 [29.37]
	☐ S6D	528 [20.77]
	☐ S6E	648 [24.49]
	☐ S6F	

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A1	SCALE:3/64
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

11/17/2025

PACIFIC ENCLOSURE
-
REVISED DRAWINGS

Pacific Enclosures Ltd.
26221 30A Avenue
Aldergrove, BC
Canada, V4W 2W6
Phone: (604) 856-7544 Fax: (604) 856-7570

Project: #2134 - SCF ITB24-1135-Facilities-New Generator

Pacific Enclosure Design Notes:

Revised drawings per internal review to meet internal clearances.

- Added second door on RHS in front of C/B cabinet
- Added second emergency and exterior lights and second exit sign
- Interior lights switch revised to 3-way (data sheet attached)
- Removed skid frame underneath fuel tank, fuel tank will be sitting and anchored directly to the concrete slab

Talked to tank supplier and here is attached the revised drawing tank supplier confirmed they can build.

- Circuit breakers stub-ups slightly revised in their size (shape strays the same)
- Station service stub-up enlarged a bit to make sure easy access thru for the cable

Let site contractor and/or customer to review and confirm stub-ups are adequate for their cabling on site.

If DWG drawing of tank is required for site contractor to interpose on their site drawings let me know.

Please make sure customer reviews these drawings and provide approval before we to continue in the shop.

ONE INCH 25MM

SCALE

DESCRIPTION
18–0393–1 (DRAWING INDEX)
18–0393–2 (BILL OF MATERIALS)
18–0393–3 (GENERAL ARRANGEMENT)
18–0393–4 (2,330 USEABLE US GALLON UL 142 FUEL TANK)
18–0393–5 (ANCHORAGE)
18–0393–6 (ENCLOSURE LIFT LUG)
18–0393–7 (LIFTING DIAGRAM)
18–0393–8 (SECTION THROUGH ROOF, WALL & DOOR)
18–0393–9 (EXHAUST SILENCER INSTALLATION)
18–0393–10 (EXHAUST SILENCER)
18–0393–11 (BAFFLE INSTALLATION)
18–0393–12 (OPENINGS THRU ROOF & WALLS)
18–0393–13 (STAIR WITH PLATFORM & GUARDRAIL)
18–0393–14 (STRUCTURAL DETAILS – ENCLOSURE)
18–0393–15 (STRUCTURAL DETAILS – WALLS & ROOF)
18–0393–16 (SKID FRAME LAYOUT) OBSOLETE
18–0393–17 (STATION SERVICE PANEL WIRING)
18–0393–18 (DAMPER CONTROL WIRING)
18–0393–19 (P & ID)
18–0393–20 (FUEL TANK INTERCONNECT)

2

SPEC.

2	DWG.18–0393–16 SKID FRAME LAYOUT DESIGNATED AS "OBSOLETE"	OCT.21/2025
1	FUEL TANK USEABLE VOLUME REVISED TO 2,330 USG	FEB.6/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

DRAWING INDEX

CLIENT: CUMMINS NORTHWEST
PROJECT: ITB SCF FACILITIES

SCALE:	DRAWING NO.	SHT.	REV.
–	18–0393–1	1/1	2

ONE INCH
25MM
SCALE

PART	QTY.	DESCRIPTION	PART NUMBER	MANUFACTURER
1	2	208V, 1 PH, 4.5kW FAN FORCED HEATER WITH BUILT-IN THERMOSTAT	LPW2045T-S2-WD-R	KING ELECTRICAL
2	2	24VDC INTAKE DAMPER MOTOR	AFB24	BELIMO
3	1	ø1" INLINE CHECK VALVE ON GENSET FUEL SUPPLY LINE FROM FUEL TANK (NOT SHOWN). FOR DETAILS SEE DWG.18-0393-19	MAS700-1	NEO VALVES
4	1	208/120VAC, 3PH, 225A RATED STATION SERVICE PANEL WITH 100A MAIN, PUSH-IN BREAKERS AND ALUMINUM BUSSING	NQ430L2	SCHNEIDER
5	1	5 US GALLON FUEL FILL SPILL CONTAINER WITH ø2" MALE NPT FITTING & MECHANICAL OFPV VALVE (VALVE INSTALLED IN FUEL TANK) FOR PRESSURIZED FILL SET @ 90% TANK FULL (5PSI PRESSURE MINIMUM REQUIRED TO OPEN)		REGAL TANKS
6	3	15A INTERIOR DUPLEX RECEPTACLE	3232W	LEGRAND
7	2	3-WAY INTERIOR LIGHTS SWITCH	663WG △3	LEGRAND
8 △3	2	PHOTOLUMINESCENT EXIT SIGN	GT1571	GREENTORCH
9	2 △3	48"x80" 14Ga. INSULATED MAN DOOR WITH PANIC HARDWARE EXTERIOR FREEZER HANDLE & INTERIOR PUSH KNOB, WEATHER STRIPPING BULB SEAL (ALL 4 SIDES), DRIP EDGE & SATIN COAT STEEL THRESHOLD	10056CL5020	PACIFIC KASON
10	5	INTERIOR LED LIGHT FIXTURE	CSSL484000LMMVOLT40K80CRI	LITHONIA
11	1	TURNING VANE	22Ga. GALVANIZED	PACIFIC
12	1	AUDIBLE/VISUAL FUEL FILL ALARM INDICATION PANEL	AL201-1-24VDC	K-TECK
13	1	INTAKE MOTORIZED INSULATED ALUMINUM DAMPER (SPRING OPEN-POWER CLOSE) 96"Wx60"Hx4"D	3967 ELT △3	ALUMAVENT
14	1	15A EXTERIOR GFCI DUPLEX RECEPTACLE WITH WEATHERPROOF COVER	1597W WP5100C	LEGRAND INTERMATIC
15	2	RE-CIRCULATION SYSTEM METAL DAMPER 30"Wx52"Hx5-1/2"D	VCD-PB	L.J. CUSTOM
16 △3	1	24VDC, 20A, BATTERY CHARGER SUPPLIED BY CUMMINS, INSTALLED & WIRED BY PACIFIC	A051H785	CUMMINS
17	2	EMERGENCY LED LIGHT WITH BATTERY	APEL	COOPER
18	1	RADIATOR FLEX CONNECTOR	VINYL-FLEX	DINAIR
19	10	GENSET SPRING ISOLATORS SUPPLIED BY CUMMINS, INSTALLED BY PACIFIC	A034C357, M2SSH-1E-3400N (PINK/DK, BLUE)	CUMMINS
20	1	DISCHARGE MOTORIZED INSULATED ALUMINUM DAMPER (POWER OPEN-SPRING CLOSE) 78-1/2"Wx70"Hx4"D	3967 ELT △3	ALUMAVENT
21	1	RE-CIRCULATION SYSTEM MODULATING TEMP. CONTROLLER WITH SENSOR ATTACHED TO GENSET RADIATOR	A350PS-1C A99BB-25C	JOHNSON CONTROL JOHNSON CONTROL
22	1	INTAKE HOOD		PACIFIC
23	1	26" SQUARE EXHAUST OPENING THRU ROOF WITH 10Ga. RAIN SHIELD		PACIFIC
24	1	EXHAUST OUTLET ASSEMBLY: -SHORT RADIUS ELBOW -RAIN CAP -30-1/2" VERTICAL EXTENSION	 TFLEL-12 HD12 ø12" TUBING	 HARCO HARCO HARCO
25	2	3"Wx9"Hx143-1/2"L EXHAUST SILENCER SUPPORT FORMED CHANNEL	10Ga.	PACIFIC
26	4	HIGH TEMPERATURE REMOVABLE BLANKET AT MUFFLER, EXHAUST FLEX, OUTLET ELBOW & MUFFLER OUTLET SPOOL	HIGH TEMPERATURE TEFLON	McKAY MARINE
27	1	ø12" CRITICAL GRADE PANCAKE EXHAUST SILENCER	6017CFH6x6x12 (CUSTOM) CARBON STEEL	HARCO
28 △3	2	ENCLOSURE ACCESS STAIR WITH PLATFORM AND GUARDRAIL	ALUMINUM	PACIFIC
29	1	ø8" SECONDARY EMERGENCY VENT INSTALLED TOP OF FUEL TANK		REGAL TANKS
30	2	ø6" CORRUGATED EXHAUST FLEX SUPPLIED & INSTALLED BY PACIFIC	STAINLESS STEEL	PACIFIC
31	7	FALL RESTRAINT ANCHOR RING	09111	ERICKSON
32	1	ø2" FUEL TANK PRIMARY NORMAL VENT WITH MUSHROOM CAP RUN TO EXTERIOR THRU & 24" ABOVE ROOF (180-11/16" ABOVE GRADE)	SCH 40 PIPE	PACIFIC
33	1	ø8" PRIMARY EMERGENCY VENT INSTALLED TOP OF FUEL TANK		REGAL TANKS
34	2	ø1" FUEL SUPPLY & ø3/4" FUEL RETURN SINGLE BRAID HYDRAULIC HOSES RUN BETWEEN DIESEL FUEL TANK & GENERATOR (NOT SHOWN). FOR DETAILS SEE DWG.18-0393-19	GH681-16 & 12	NEW LINE
35	1	DISCHARGE HOOD		PACIFIC
36	2	3/4" THICK STAINLESS STEEL GROUND PAD EXTERIOR OF TANK AT OPPOSITE CORNERTS		REGAL TANKS
37	4	FUEL TANK/ENTIRE UNIT LIFT LUG		REGAL TANKS
38	1	2,330 USEABLE US GALLON DIESEL SUBBASE FUEL TANK	UL 142	REGAL TANKS

PART	QTY.	DESCRIPTION	PART NUMBER	MANUFACTURER
39	1	900kW, 277/480V, 3PH, 4 WIRE 60Hz GENSET SUPPLIED BY CUMMINS, INSTALLED BY PACIFIC	DQFAC	CUMMINS
40	10	9"Wx15-1/4"Lx1" GENSET SUPPORT PLATE DRILLED & TAPPED FOR (6x) ø3/4" BOLTS		REGAL TANKS
41	1	DISCHARGE/RE-CIRCULATION SYSTEM DUCTING	16Ga. GALVANIZED	PACIFIC
42	4	24VDC DISCHARGE/RE-CIRCULATION VENTILATION SYSTEM MODULATING DAMPER MOTOR	AFB24-SR	BELIMO
43	1	DOCUMENTS BINDER BOX	CP#9000-07	CUSTOM PAK
44	4	1/2"x1/2" GALVANIZED BIRDSCREEN	16Ga.	ACCURATE SCREEN
45 △3	2	RAIN GUTTER ABOVE MAN DOOR	14Ga. STAINLESS STEEL	PACIFIC
46	4	4"Wx15"Lx1/2" THICK LIFT LUG (ENCLOSURE ONLY)		PACIFIC
47	1	1,600A GENSET CIRCUIT BREAKER		CUMMINS
48	1	GENSET CONTROL PANEL		CUMMINS
49	4	GENSET START-UP BATTERY SUPPLIED BY CUMMINS, FLOOR MOUNTED AND WIRED BY PACIFIC	GROUP 34	CUMMINS
50	2	10"Wx144"Lx1/2" THICK GENSET SPRING ISOLATOR SUPPORT FLAT BAR		REGAL TANKS
51	1	1,200A GENSET CIRCUIT BREAKER		CUMMINS
52	1	30"Wx34"Hx16"D FAN INTAKE HOOD (NON-INSULATED, PAINTED ON INTERIOR SAME COLOR AS ENCLOSURE	14Ga. SATIN COAT STEEL	PACIFIC
53	1	22"Wx26"Hx14"D EXHAUST FAN HOOD (NON-INSULATED, PAINTED ON INTERIOR SAME COLOR AS ENCLOSURE	14Ga. SATIN COAT STEEL	PACIFIC
54	1	EXTERIOR LED LIGHT ON/OFF 2-WAY SWITCH	660WG	PASS & SEYMOUR
55	1	EXTERIOR LED LIGHT FIXTURE WITH PHOTOCELL	WPX1LEDP240K	LITHONIA
56	1	2,000 CFM, 120VAC, 1625 RPM, 1/4HP VENTILATION (EXHAUST) FAN	S14-E1	CANARM
57	1	FAN INTAKE MOTORIZED ALUMINUM DAMPER (POWER OPEN-SPRING CLOSE) 24"Wx24"Hx4"D	3967 BF FFM	ALUMAVENT
58	1	120VAC FAN INTAKE DAMPER MOTOR	AFBUP	BELIMO
59	1	EXHAUST FAN & FAN INTAKE DAMPER MOTOR WALL MOUNT THERMOSTAT	ETD9STS	COLUMBUS
60	2 4 2	HSS DUCTILE BRACE IN LEFT SIDE WALL BETWEEN SDOOR HSS POST AND CORNER HSS POST. COMES WITH BRACE GUSSET IN ALL (4x) ENDS & BRIDGE PLATE AT MIDDLE OF HSS X-CROSS BOTH SIDES. FOR DETAILS SEE DWG.18-0393-14	HSS 1-1/2"x1-1/2"x1/8"x117-1/4"L 5/16" PLATE 3"Wx12"Lx1/4"	PACIFIC PACIFIC PACIFIC
61	2 4 2	HSS DUCTILE BRACE IN RIGHT SIDE WALL BETWEEN INTAKE CORNER HSS POST & DOUBLE DOOR HSS POST. COMES WITH BRACE GUSSET IN ALL (4x) ENDS & BRIDGE PLATE AT MIDDLE OF HSS X-CROSS BOTH SIDES. FOR DETAILS SEE DWG.18-0393-14	HSS 1-1/2"x1-1/2"x1/8"x117-1/4"L 5/16" PLATE 3"Wx12"Lx1/4"	PACIFIC PACIFIC PACIFIC
62	4 8 4	HSS DUCTILE BRACE IN INTAKE AND DISCHARGE END WALLS. COMES WITH BRACE GUSSET IN ALL (4x) ENDS & BRIDGE PLATE AT MIDDLE OF HSS X-CROSS BOTH SIDES. FOR DETAILS SEE DWG.18-0393-14	HSS 1-1/2"x1-1/2"x1/8"x167-1/2"L 5/16" PLATE 3"Wx12"Lx1/4"	PACIFIC PACIFIC PACIFIC
63	2	HSS HEADER FULL WIDTH AT END DISCHARGE & INTAKE WALLS (TOP HORIZONTAL MEMBER BETWEEN POSTS LOCATED ON TOP OF END Z-CHANNEL). FOR HSS WELDING DETAILS SEE DWG.18-0393-14	HSS 6"x5"x3/16"x134"L	PACIFIC
64	4	HSS POST FULL HEIGHT FLOOR TO ROOF SKIN AT ENCLOSURE CORNERS	HSS 5"x5"x3/16"x125-1/4"L	PACIFIC
65	2	HSS POST LOCAL TO DOOR & AT OPPOSITE WALL FROM FLOOR UP TO SIDE WALL Z-CHANNEL	HSS 5"x5"x3/16"x119-1/2"L	PACIFIC
66	1	480-208/120V, 30kVA, 3PH STATION SERVICE TRANSFORMER WITH ALUMINUM WINDINGS	9T10K3872	GE

GENERAL NOTES:

PREP AND PAINT
-ENCLOSURE CLEAN TO SPEC SSPC-SP1
-PRIMED WITH HEMPADUR FAST DRY 47140 PRIMER TO 4 mils DFT
-TOP COATED WITH HEMPAXANE LIGHT 55030 TO 3 mils DFT
-ENCLOSURE EXTERIOR: TO BE CONFIRMED BY THE CUSTOMER
-SUBBASE FUEL TANK: BLACK

EXTERIOR WALLS & ROOF
-14Ga. WALLS & 12Ga. ROOF, ASTM A653 GALVANNEAL Gr33 A40 STEEL
-5" THICK WALL PANELS APPROX. EVERY 16"
-6" SEAM WELDED ROOF WITH 12Ga. ROOF CROSS MEMBERS APPROX. EVERY 12"
-ROOF HAS 1" PEAK TO MINIMIZE PONDING OF WATER

MAIN BODY INTERIOR
-14Ga. WALLS INSULATED WITH 5" MINERAL WOOL INSULATION (R VALUE=20) AND COVERED WITH 22Ga. GALVANIZED PERFORATED STEEL SCREWED IN PLACE
-12Ga. ROOF INSULATED WITH 6" MINERAL WOOL INSULATION (R VALUE=24) AND COVERED WITH 22Ga. GALVANIZED PERFORATED STEEL SCREWED IN PLACE

INTAKE HOOD
-14Ga. ASTM A653 GALVANNEAL Gr33 A40 STEEL
-5" WALL PANELS & 6" DEEP ROOF INSULATED WITH 5" & 6" MINERAL WOOL INSULATION AND COVERED WITH 22Ga. GALVANIZED PERFORATED STEEL SCREWED IN PLACE
-BOTTOM OF HOOD COVERED WITH 16Ga. GALVANIZED BIRD SCREEN SCREWED IN PLACE

DISCHARGE HOOD
-14Ga. ASTM A653 GALVANNEAL Gr33 A40 STEEL
-5" WALL PANELS & 5" DEEP ROOF INSULATED WITH 5" MINERAL WOOL INSULATION AND COVERED WITH 22Ga. GALVANIZED PERFORATED STEEL SCREWED IN PLACE
-BOTTOM OF HOOD COVERED WITH 16Ga. GALVANIZED BIRD SCREEN SCREWED IN PLACE

EXHAUST FAN & FAN INTAKE HOODS
-14Ga. ASTM A653 GALVANNEAL Gr33 A40 STEEL
-2" WALL PANELS & ROOF NON INSULATED, INTERIOR PAINTED SAME COLOR AS EXTERIOR
-BOTTOM OF HOOD COVERED WITH 16Ga. GALVANIZED BIRD SCREEN SCREWED IN PLACE

WEIGHT
△3 -APPROX. 45,170 LBS (ENCLOSURE, GENSET & DRY FUEL TANK)

ELECTRICAL
-ALL WIRING IS IN SURFACE-MOUNT EMT CONDUIT WITH COMPRESSION FITTINGS
-POWER & LIGHTING: #14 AWG MINIMUM
-24VDC & CONTROLS: #16 AWG MINIMUM

EQUIPMENT INSTALL
-CLIENT SUPPLIED GENSET, BATTERY CHARGER, (4x) BATTERIES & VIBRATION SPRING ISOLATORS

ATTENUATION
-THE SOUND PRESSURE LEVEL SHALL AVERAGE 85dBA AT 23 FEET IN A FREE FIELD CONDITION

SHIP LOOSE ITEMS
-FUEL TANK PRIMARY NORMAL VENT PIPE, EXHAUST FAN & FAN INTAKE HOODS, ALUMINUM STAIR WITH PLATFORM & GUARDRAIL/HANDRAIL, EXHAUST OUTLET ELBOW WITH SPOOL, RAIN CAL & RAIN SHIELD FOR SITE RE-INSTALL BY OTHERS

BASE
-2,330 USEABLE US GALLON UL 142 DOUBLE WALL SUBBASE DIESEL FUEL TANK WITH ELECTRICAL STUB-UP AREAS, TWO STAINLESS STEEL GROUND PAD INSTALLED AT OPPOSITE CORNERS EXTERIOR OF TANK & LIFT LUGS.
CONCRETE SLAB FOUNDATION DESIGN IS BY OTHERS

STRUCTURAL STEEL MATERIALS
-W FLANGE BEAM: ASTM A992
-HSS SECTIONS: ASTM A500 GRADE C
-HSS ROUND: ASTM A500 GRADE C
-ANGLES, CHANNELS & PLATE: ASTM A36
-PIPES: ASTM A53-B

STRUCTURAL FASTENERS
-BOLTS: ASTM F3125 GRADE A325, GALVANIZED
-NUTS: ASTM A563, GALVANIZED
-WASHERS: ASTM F436, GALVANIZED

REGULAR STRENGTH FASTENERS
-BOLTS, WASHERS, LOCK WASHERS: Grade 5, ZINC PLATED
-NUTS: Grade 2, ZINC PLATED

MISC
-ALL ELECTRICAL AS PER NEC CODE
-STATE OF ALASKA STAMPED STRUCTURAL DRAWINGS
-ENCLOSURE IS UL CERTIFIED

△3

SPEC.

3	ADDED SECOND DOOR & STAIR WITH PLATFORM, REMOVED W-BEAM SUPPORT FRAME PER CUSTOMER, DAMPERS REVISED TO LOW TEMP RATED	OCT.21/2025	
2	ADDED STATION SERVICE TRANSFORMER PER CUSTOMER	JULY 22/2025	
1	SUPPORT BEAMS REVISED TO W12x26 PER STRUCTURAL ENGINEER, TANK USEABLE VOLUME REVISED TO 2,330 USG	FEB.6/2025	

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

BILL OF MATERIALS & GENERAL NOTES

CLIENT: CUMMINS NORTHWEST

PROJECT: ITB SCF FACILITIES

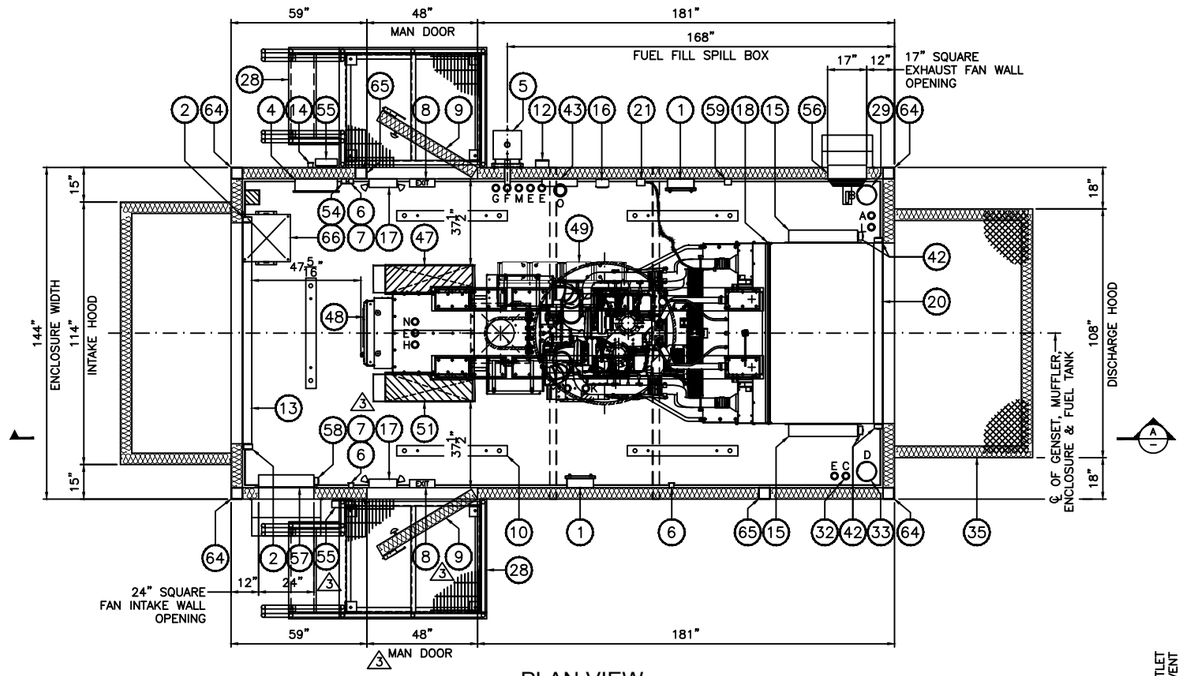
SCALE:	DRAWING NO.	SHT.	REV.
-	18-0393-2	1/1	3

ONE INCH 25MM

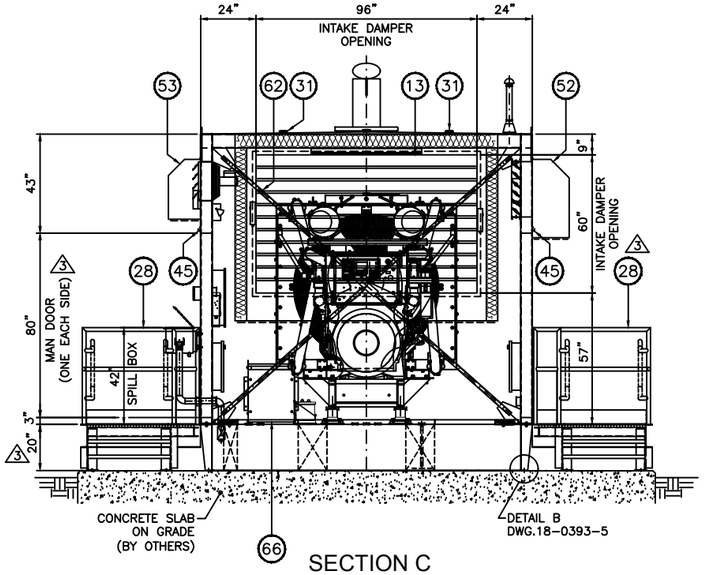
SCALE

NOTE: ENCLOSURE IS REMOVABLE FROM SUBBASE FUEL TANK

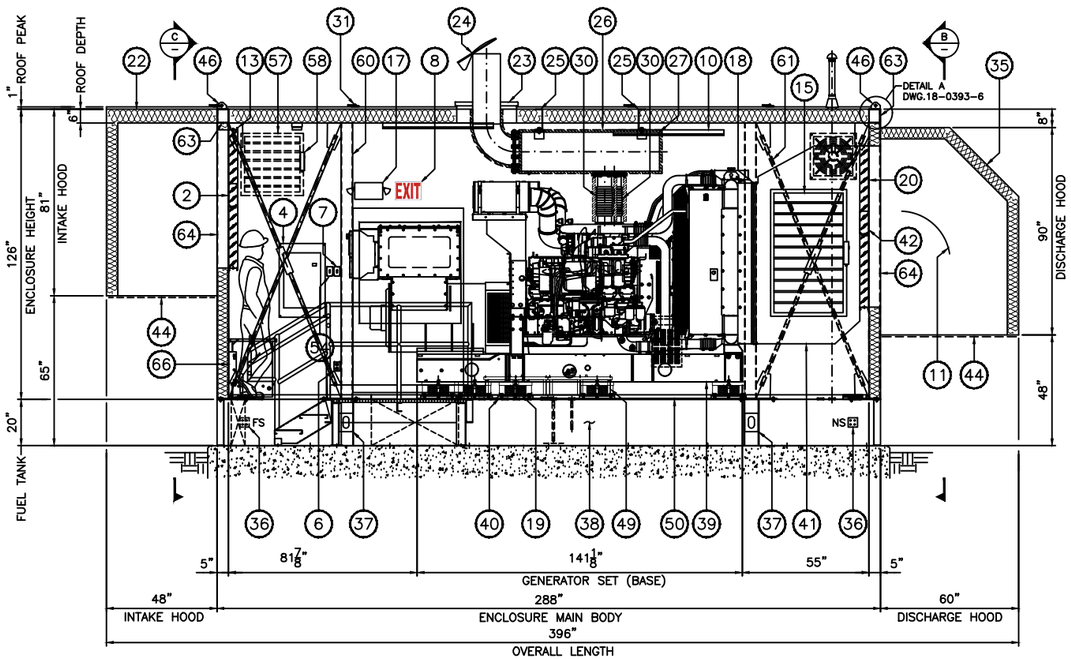
*USE LIFT LUGS ON SUBBASE TANK TO MOVE ENTIRE UNIT



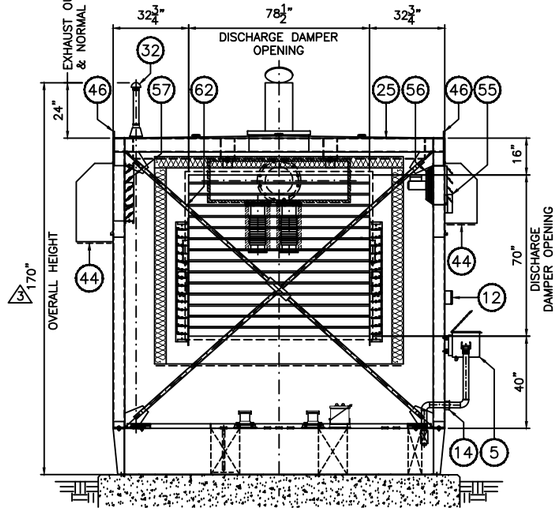
PLAN VIEW



SECTION C



SECTION A



SECTION B
STAIR NOT SHOWN

3	ADDED SECOND DOOR & STAIR WITH PLATFORM, REMOVED W-BEAM SUPPORT FRAME PER CUSTOMER	OCT.21/2025	
2	ADDED STATION SERVICE TRANSFORMER PER CUSTOMER	JULY 22/2025	
1	SUPPORT BEAMS REVISED TO W12x26 PER STRUCTURAL ENGINEER, REVISED OVERALL HEIGHT	FEB.6/2025	

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

WALK-IN MACHINERY CABINET
FOR 900kW CUMMINS DIESEL GENSET
GENERAL ARRANGEMENT & NOTES

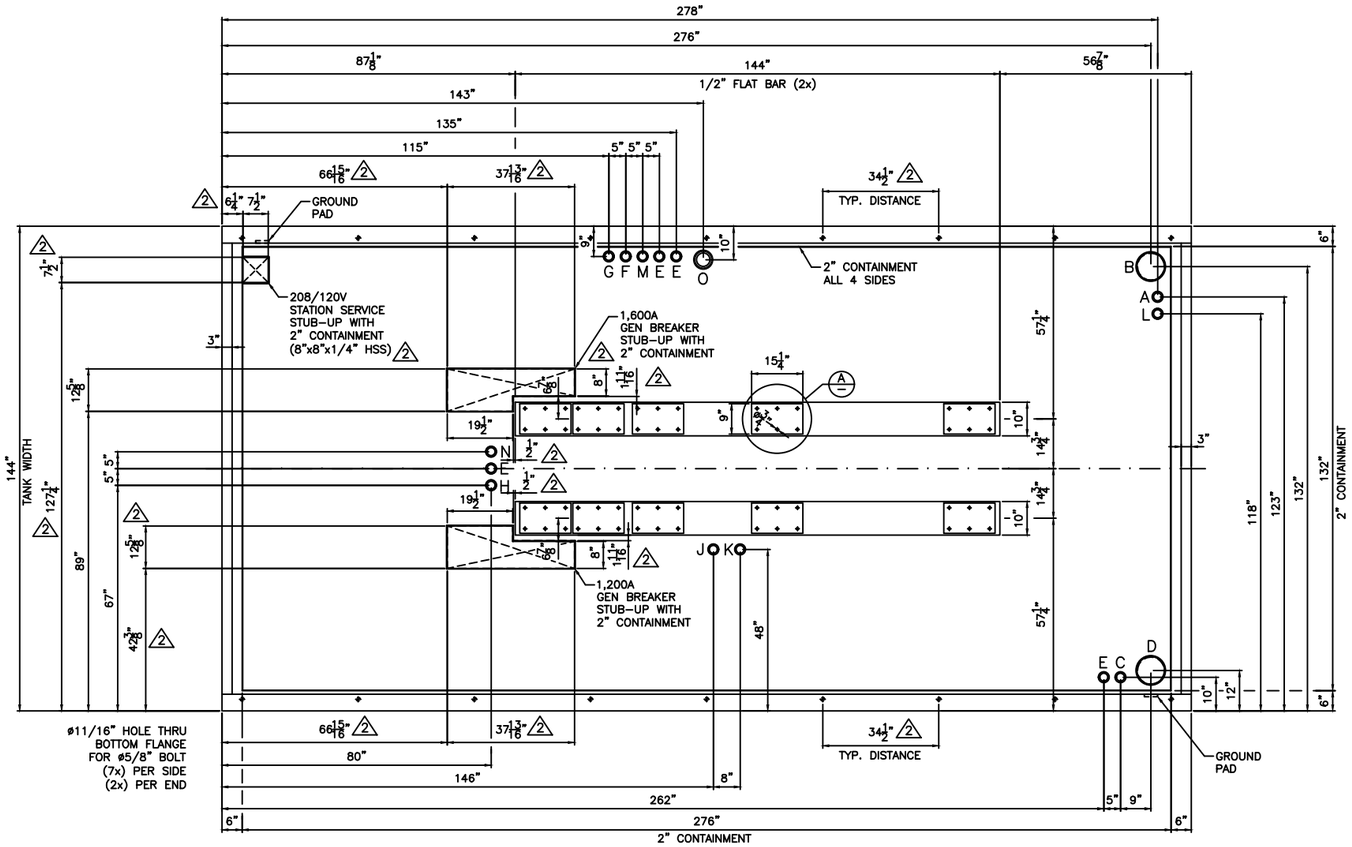
CLIENT: CUMMINS NORTHWEST

PROJECT: ITB SCF FACILITIES

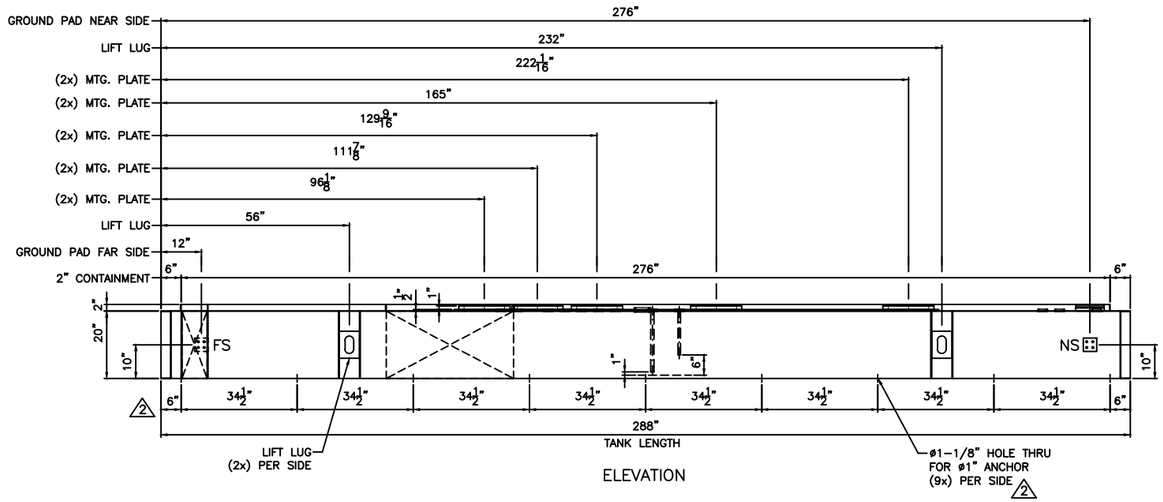
SCALE:	DRAWING NO.	SHT.	REV.
-	18-0393-3	1/1	3

SPEC.

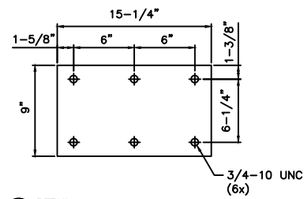
SCALE ONE INCH 25MM



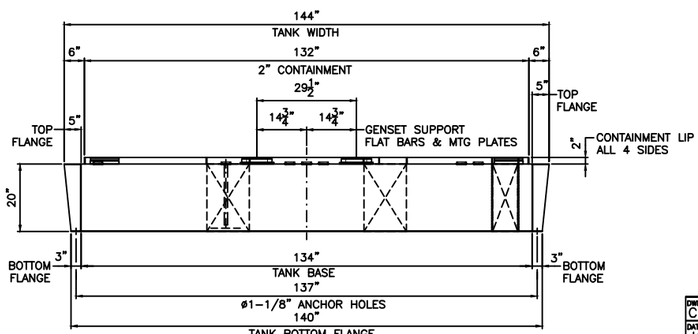
PLAN VIEW



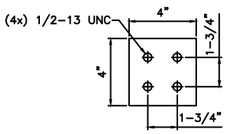
ELEVATION



A DETAIL
1:3 1" THICK STEEL MOUNTING PLATE
10 REQ'D
(SHIPPED LOOSE BY TANK SUPPLIER)



END VIEW



B DETAIL
1:5 3/4" THICK STAINLESS STEEL
GROUND PAD: (2x) REQ'D
(WELDED TO TANK EXTERIOR AT OPPOSITE CORNERS)

Fitting List

A	2" Leak Detector (secondary containment)
B	8" Secondary Emergency Vent
C	2" Primary Normal Vent (Exterior, Extended to above roof by Pacific)
D	8" Primary Emergency Vent
E	2" Extra (4x)
F	2" Fuel Fill port piped to mechanical OFPV (interior of tank, set at 90% full) & exterior 5 US gallon spill container with 2" NPT camlock fitting for pressurized fill (5psi minimum pressure required to open)
G	2" Mechanical Fuel Level Gauge
H	2" High 90% NOFD / Low 30% NCFD
J	2"x 1" Fuel Supply To Genset with 1" removable drop tube to 1" from bottom
K	2"x 3/4" Fuel Return from Genset with 3/4" removable drop tube to 6" from bottom
L	2" Extra in Containment
M	2" 95% NOFD Audible/Visual Fuel Fill Alarm
N	2" Critical Low 10% NCFD
O	4" Extra in primary tank

2 Tank Dry Weight: 16,500 LBS

2,330 USG DOUBLE WALL UL 142 TANK
USEABLE GALLON @ 90% FULL
FUEL TANK USEABLE VOLUME MEASURED FROM BOTTOM OF FUEL SUPPLY SUCTION TUBE TOP 90% HIGH FUEL LEVEL

FUEL LEVEL ALARMS PERCENTAGES BASED ON TANK USEABLE VOLUME

NOTES:
- PRIMARY TANK IS CONSTRUCTED TO SPECIFICATION UL 142
- CONTAINMENT CAPACITY IS 110% OF THE PRIMARY TANK
- ALL TANK FITTINGS TO BE THREADED, NO FLANGES
- ALL FUEL LINES TO AND FROM GENERATOR SET TO THE FUEL TANK ARE SINGLE BRAID HYDRAULIC HOSE TO SAE 100R
- ENTIRE ENCLOSURE DRY WEIGHT: 46,000 LBS
- GENERATOR SET WET WEIGHT: 16,752 LBS

EXTERIOR FINISHING:
- SANDBLAST EXTERIOR & APPLY ONE COAT BLACK POLYURETHANE PAINT

2	ADDED ANCHOR HOLES, REVISED PER TANK SUPPLIER	OCT.21/2025
1	REVISED MOUNTING DIMENSIONS PER NEW SUPPORT BEAM SIZE PER STRUCTURAL ENGINEER, STATION SERVICE STUB-UP MOVED 2" TOWARDS CENTER OF TANK, USEABLE VOLUME REVISED TO 2,330 USG, ADDED ONE 2" AND ONE 4" EXTRA FITTINGS	FEB.6/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

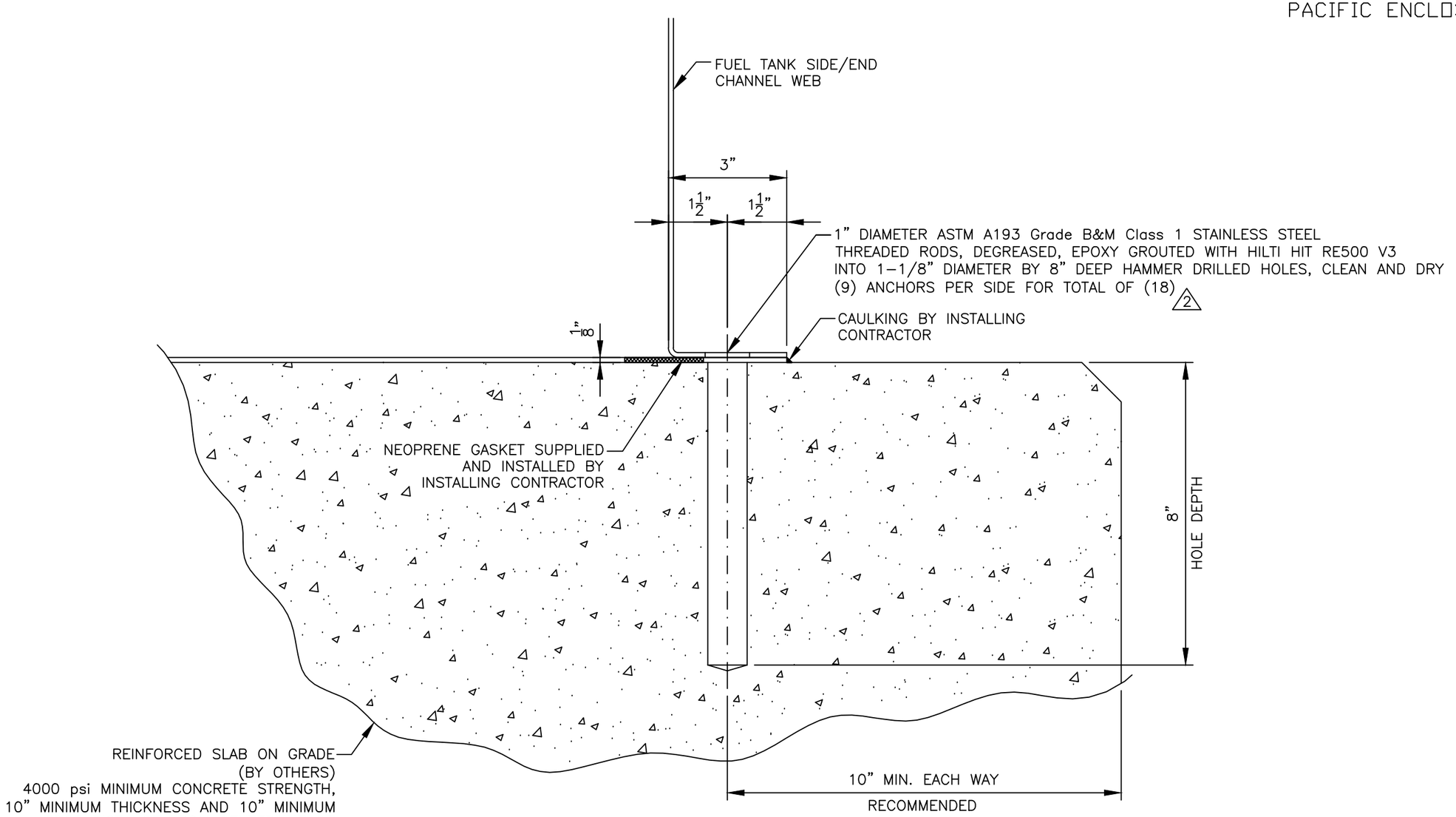
2,330 USEABLE US GALLON
UL 142
SUBBASE DIESEL FUEL TANK

CLIENT: CUMMINS NORTHWEST
PROJECT: ITB SCF FACILITIES

SCALE:	DRAWING NO.	SHT.	REV.
-	18-0393-4	1/1	2

SPEC.

SCALE — ONE INCH | 25MM



DETAIL B
SEE DWG.18–0393–3

SPEC.

NOTE:
1.ANCHORS SUPPLIED & INSTALLED BY OTHERS.

2	REVISED ANCHOPRAGE DUE TO REMOVING W–BEAM SUPPORT FRAME PER CUSTOMER	OCT.21/2025
1	SUPPORT BEAMS REVISED TO W12x26 PER STRUCTURAL ENGINEER, ADDED ADDITIONAL TWO ANCHOR HOLES TO BEAMS BOTTOM FLANGE	FEB.6/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

ANCHORAGE

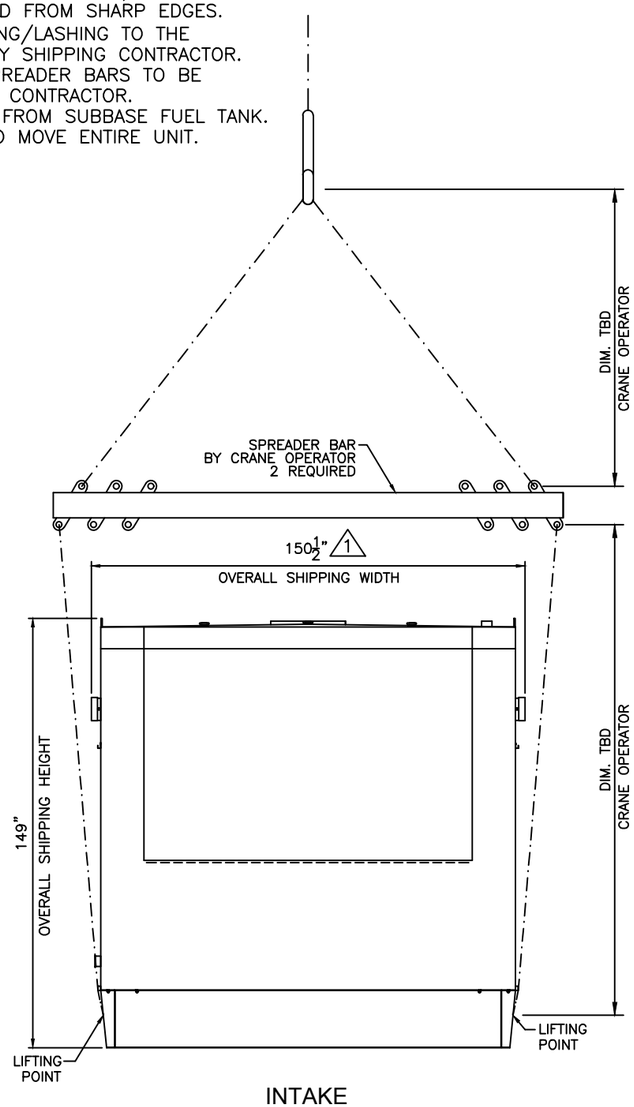
CLIENT: CUMMINS NORTHWEST

PROJECT: ITB SCF FACILITIES

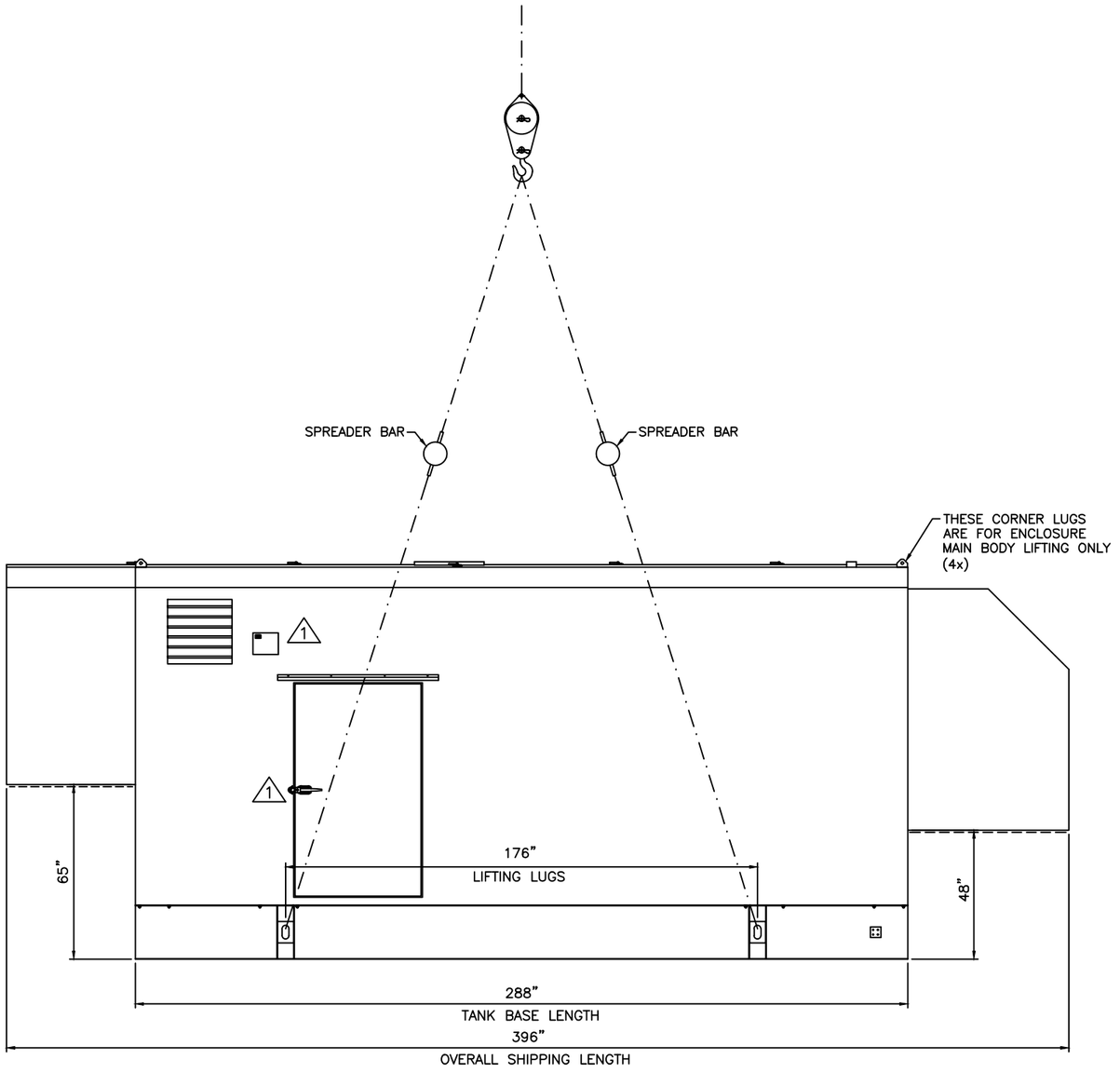
SCALE:	DRAWING NO.	SHT.	REV.
–	18-0393-5	1/1	2

SCALE — ONE INCH | 25MM

NOTES:
1. USE NYLON SLINGS FOR LIFTING – NO CHAINS.
2. USE BASE LIFT LUGS FOR TIE DOWN TO TRAILER.
3. NO TIE DOWN STRAPS OVER THE ENCLOSURE (LOOP LASHING).
4. NO TARPS TO BE USED. UNIT TO BE CLEANED AND ROCK CHIPS TO BE TOUCHED UP w/TOUCH UP PAINT SUPPLIED. SEE DATA FOR MIXING DETAILS.
5. MSDS DOCUMENT FOR PAINT SHIPPED w/UNIT.
6. SLINGS MUST BE PROTECTED FROM SHARP EDGES.
7. METHOD OF CARGO SECURING/LASHING TO THE DECK OF THE TRAILER IS BY SHIPPING CONTRACTOR.
8. LENGTH OF SLINGS AND SPREADER BARS TO BE DETERMINED BY THE CRANE CONTRACTOR.
9. ENCLOSURE IS REMOVABLE FROM SUBBASE FUEL TANK. USE LIFT LUGS ON TANK TO MOVE ENTIRE UNIT.



INTAKE
END ELEVATION



SIDE ELEVATION

WEIGHTS:
1. LIFTING (DRY): 43,375 LBS (ENCLOSURE, GENSET & SUBBASE FUEL TANK) 1

SHIP LOOSE ITEMS:
- PRIMARY NORMAL VENT PIPE: 50 LBS
- EXHAUST OUTLET ELBOW WITH SPOOL, RAIN SHIELD & RAIN CAP: 170 LBS
- VENTILATION FAN & FAN INTAKE HOODS: 35 LBS (EACH)
- ALUMINUM STAIR WITH PLATFORM & GUARDRAIL/HANDRAIL: 320 LBS (EACH) 1
- FUEL FILL SPILL CONTAINER: 35 LBS

SPEC.

1	ADDED SECOND DOOR & STAIR WITH PLATFORM, REMOVED W-BEAM SUPPORT FRAME PER CUSTOMER, REVISED WEIGHTS	OCT.21/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:

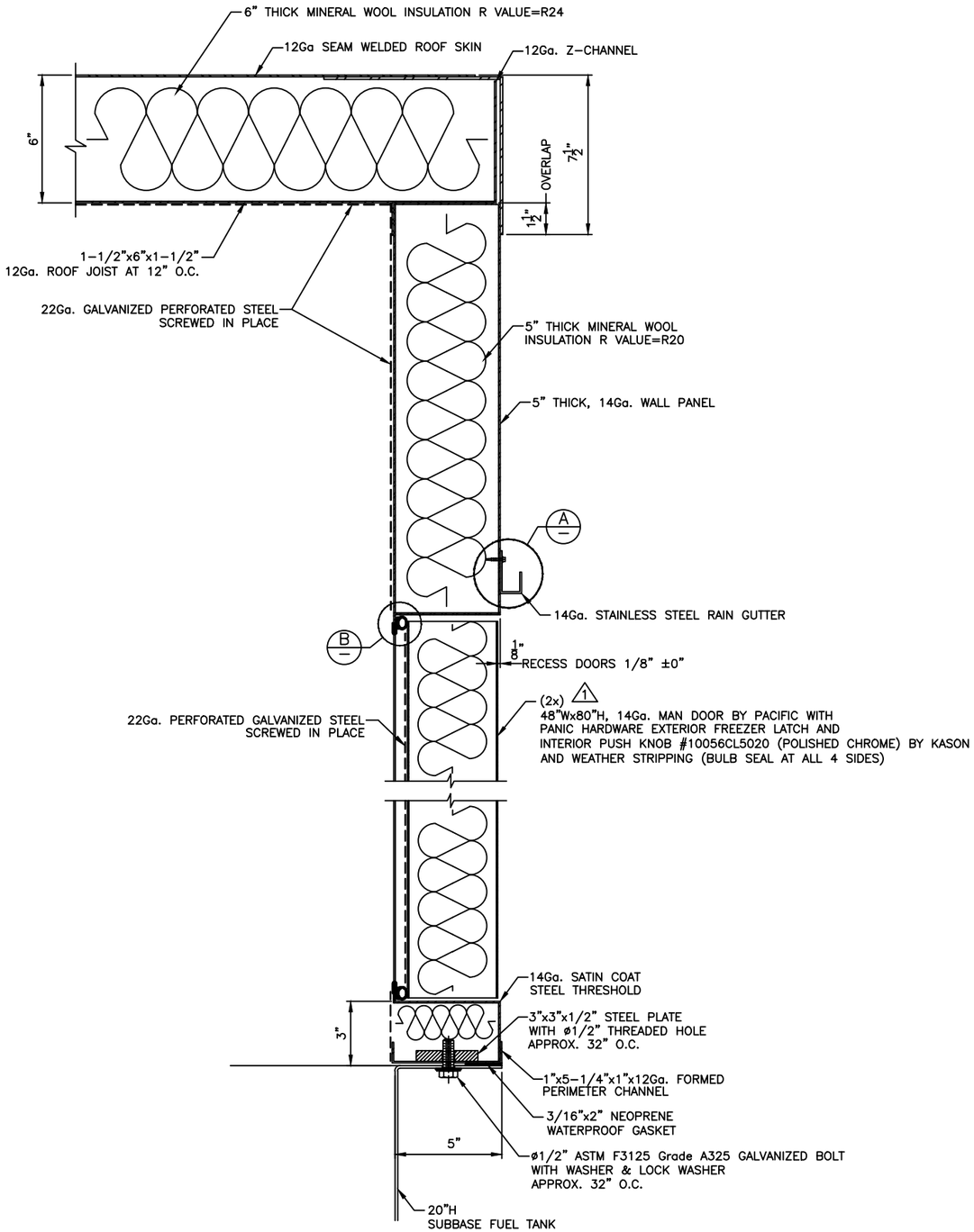
PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

LIFTING DIAGRAM

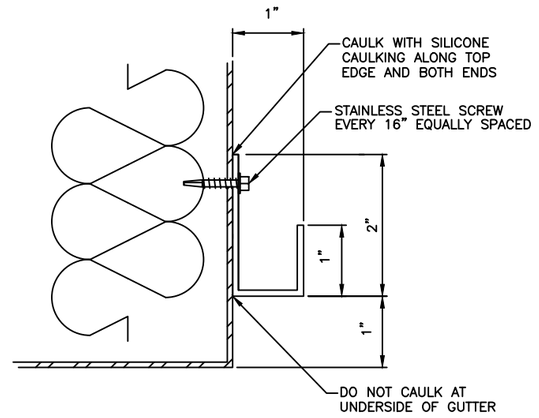
CLIENT: CUMMINS NORTHWEST
PROJECT: ITB SCF FACILITIES

PROJECT. NO.	SCALE:	DRAWING NO.	SHT.	REV.
2134	–	18-0393-7	1/1	1

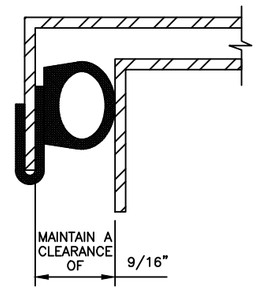
SCALE ONE INCH 25MM



MAN DOOR



A DETAIL
1:3 MAN DOOR
14Ga. STAINLESS STEEL RAIN GUTTER



B DETAIL
1:6 BULB SEAL

1	ADDED SECOND DOOR PER CUSTOMER	OCT.21/2025

DWN. BY	CD
DATE:	JAN.21/2025
CHK. BY	
DATE:	
APP. BY	
DATE:	
PROJECT. NO.	2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

SECTION THROUGH ROOF, WALL & DOOR

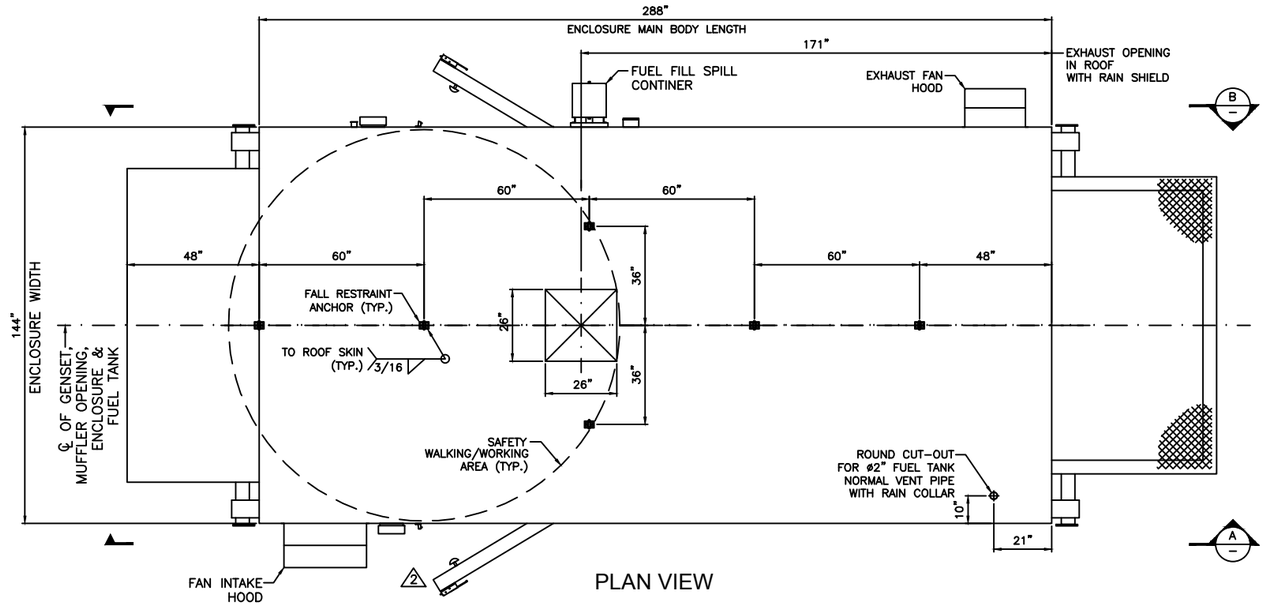
CLIENT: CUMMINS NORTHWEST

PROJECT: ITB SCF FACILITIES

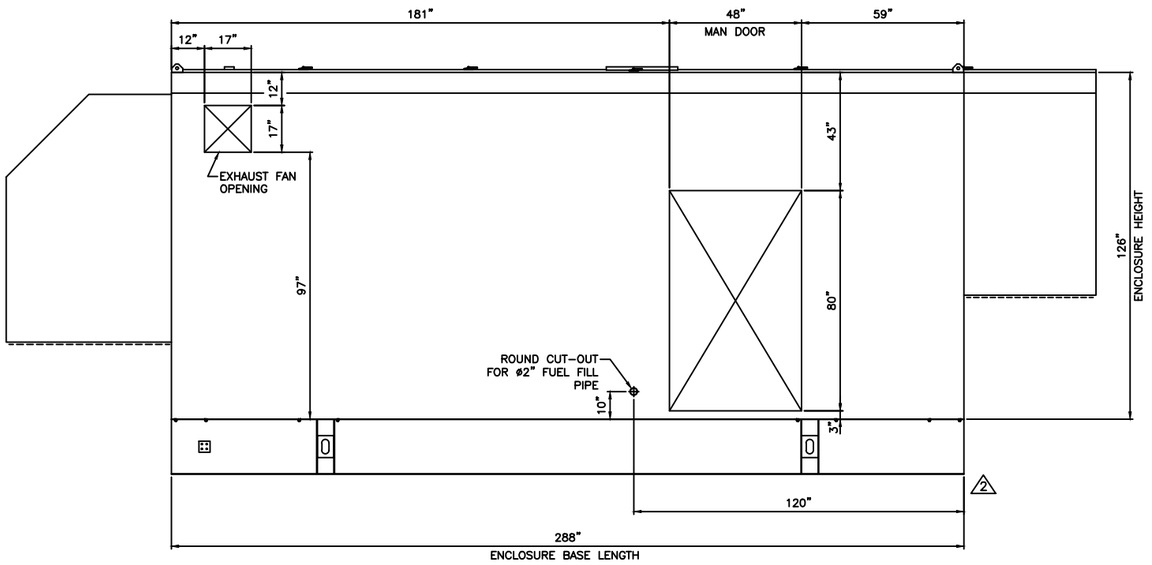
SCALE	DRAWING NO.	SHT.	REV.
-	18-0393-8	1/1	1

SPEC.

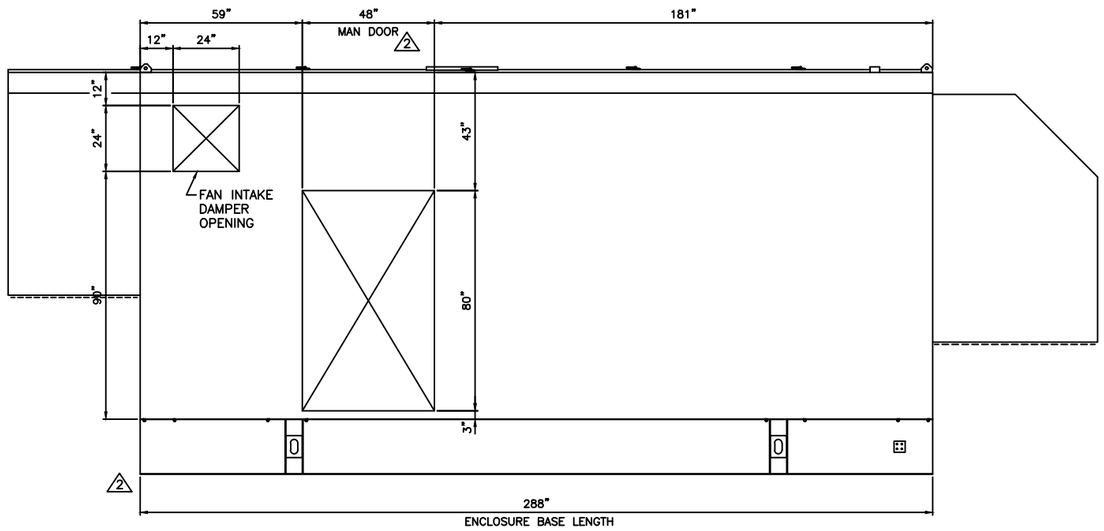
SCALE — ONE INCH | 25MM



PLAN VIEW



SECTION B



SECTION A

SPEC.

NOTES:
1.FOR DISCHARGE & INTAKE OPENINGS SEE DWG.18-0393-3.

2	ADDED SECOND DOOR, REMOVED W-BEAM SUPPORT FRAME PER CUSTOMER	OCT.21/2025
1	SUPPORT BEAMS REVISED TO W12x26 PER STRUCTURAL ENGINEER	FEB.6/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

OPENINGS THRU ROOF & WALLS

CLIENT: CUMMINS NORTHWEST
PROJECT: ITB SCF FACILITIES

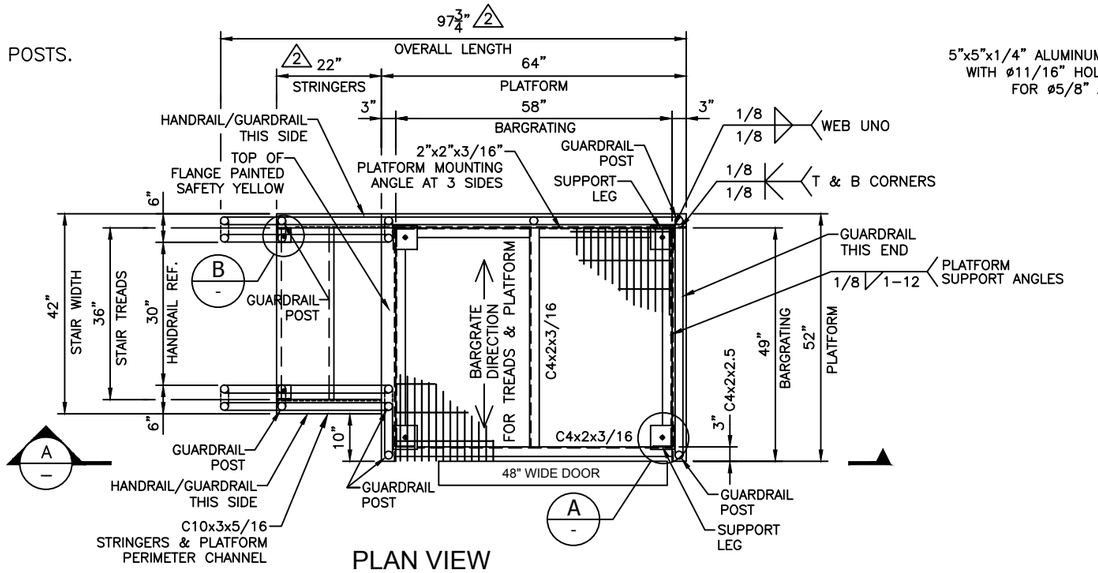
SCALE:	DRAWING NO.	SHT.	REV.
-	18-0393-12	1/1	2

SCALE — ONE INCH | 25MM

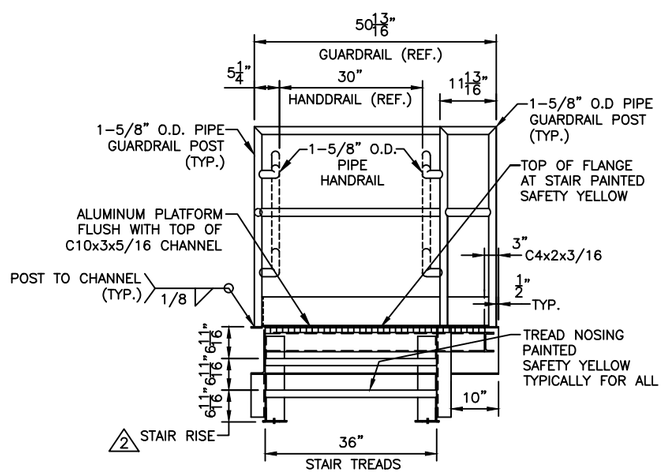
NOTES:
1. BARGRATING PLATFORM SHALL BE WELDED ALUMINUM, SERRATED, CONTAINING 1–1/2" DEEP x 3/16" THICK BEARING BARS & COMPLETED WITH GRATING CLIPS.
2. BARGRATING PLATFORM SHALL BE INSTALLED FLUSH WITH PERIMETER CHANNELS.
3. STAIR TREADS SHALL BE WELDED ALUMINUM, 36" WIDE x 12" DEEP, SERRATED, BOLTED TO STAIR STRINGERS & COMPLETE WITH CHECKER PLATE NOSING.
4. STAIR STRINGERS SHALL BE WELDED TO STAIR LANDING ALUMINUM WORK. STAIR LANDING SHALL BE CONNECTED TO FOUNDATION USING ANCHORS.
5. HANDRAIL/GUARDRAIL & VERTICAL POSTS SHALL BE FABRICATED FROM 1–5/8" O.D. DIA. SCH 40 ALUMINUM PIPE & SHALL BE WELDED TO VERTICAL POSTS.
6. ALUMINUM WORK SHALL BE PREPARED TO SSPS–SP1.
7. FINISH COLORS:
   - PLATFORM CHANNELS, STRINGERS & SUPPORTING LEGS: BLACK
   - PLATFORM & TREADS: UNPAINTED
   - STAIR TREADS NOSING: SAFETY YELLOW
   - HANDRAIL/GURDRAIL, VERTICAL POSTS & KICK PLATES: SAFETY YELLOW
8. ANCHORS FOR FIELD INSTALL ARE BY OTHERS.

STRUCTURAL ALUMINUM MATERIALS
- –ANGLES & CHANNELS: GRADE 6061–T6 ROUND FILLET
- –PLATE: GRADE 6061–T6
- –PIPES: SCH 40 6061–T6
- –GRATING & TREADS: 1–1/2"x3/16"

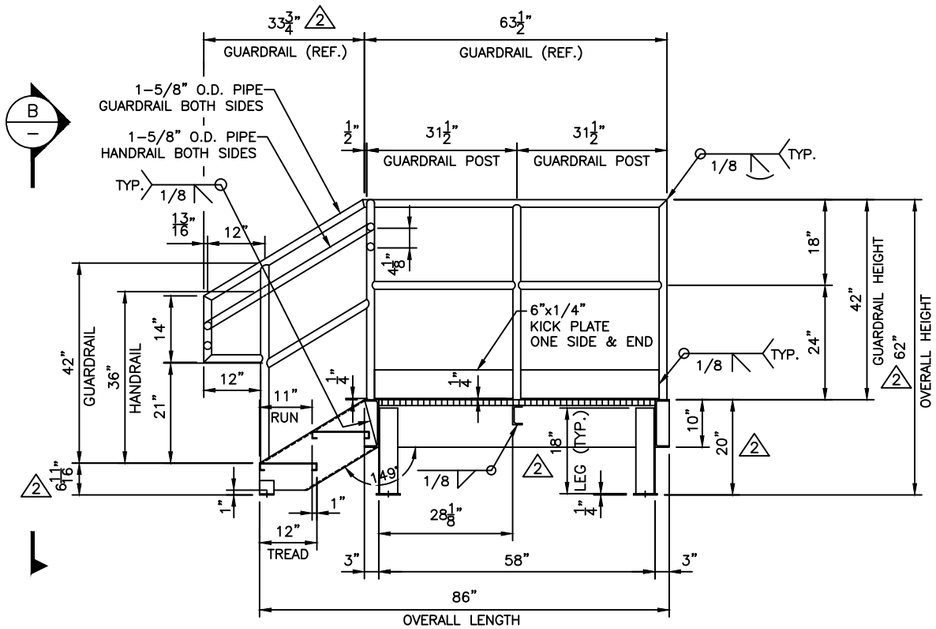
MATERIAL SIZES:
1. CHANNEL (PLATFORM 3 SIDES) & STRINGERS: C10x3x5/16
2. CHANNEL (PLATFORM SUPPORT): C4x2x3/16
3. ANGLE (PLATFORM SUPPORT ONE SIDE & END): 2x2x3/16
4. ANGLE (SUPPORT LEG): 4x4x3/16
5. HANDRAIL/GUALDRAIL POSTS & HORIZONTAL): 1–5/8" O.D SCH 40 PIPE



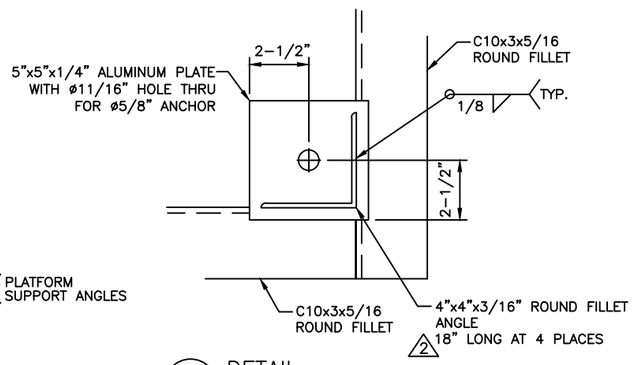
PLAN VIEW



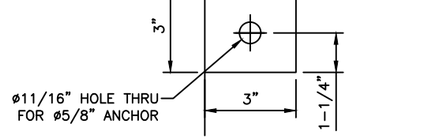
SECTION B



SECTION A



A – DETAIL
1:5 LEG ANCHORAGE TO CONCRETE FOUNDATION



B – DETAIL
1:5 STRINGER ANCHORAGE TO CONCRETE FOUNDATION

SPEC.

NOTES:
1. TWO SETS OF MIRRORED STAIRS WITH PLATFORM & GUARDRAIL/HANDRAIL REQUIRED. 2

2	ADDED NOTE 2 FOR SECOND MIRRORED STAIR WITH PLATFORM & GUARDRAIL DUE TO A SECOND DOOR, REVISED STAIR RISE AND HEIGHT DUE TO REMOVING SUPPORT W–BEAM FRAME	OCT.22/2025	
1	STAIR RISE & HEIGHT REVISED PER NEW SUPPORT BEAM SIZE PER STRUCTURAL ENGINEER	FEB.6/2025	

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

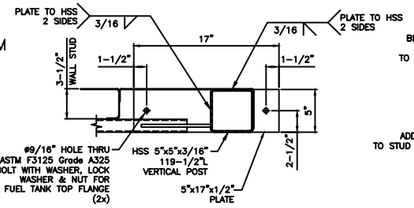
STAIR WITH PLATFORM & GUARDRAIL

CLIENT: CUMMINS NORTHWEST

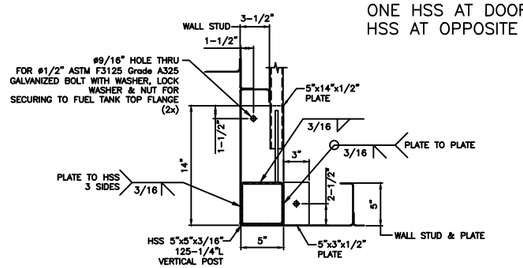
PROJECT: ITB SCF FACILITIES

SCALE:	DRAWING NO.	SHT.	REV.
–	18–0393–13	1/1	2

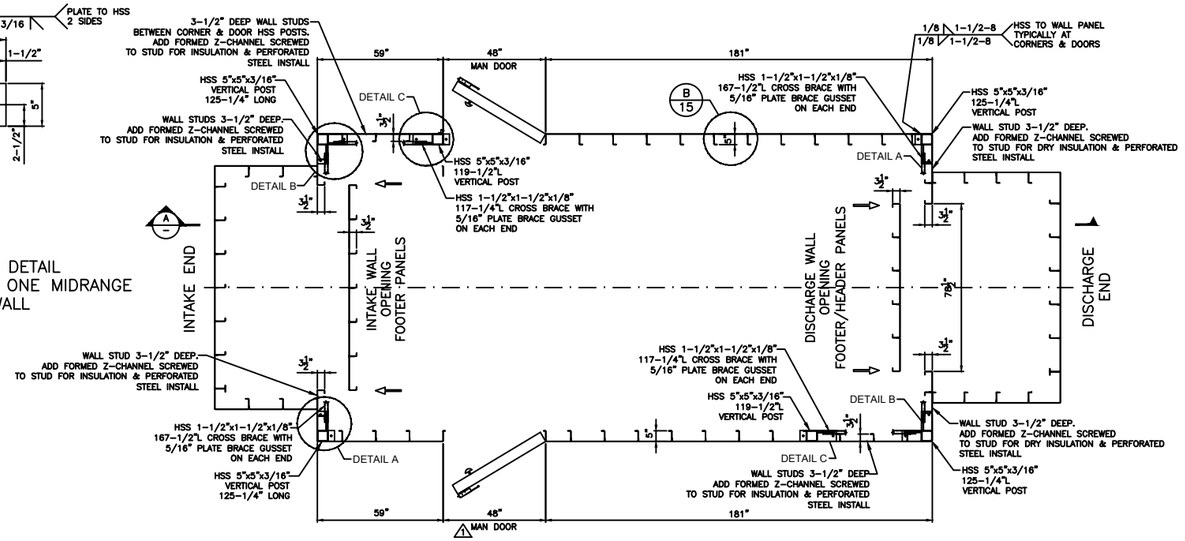
SCALE | ONE INCH | 25MM



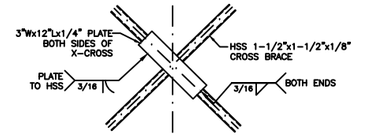
C — DETAIL
1:4 HSS TO PLATE
TYPICAL WELDING & DETAIL
ONE HSS AT DOOR, ONE MIDRANGE
HSS AT OPPOSITE WALL



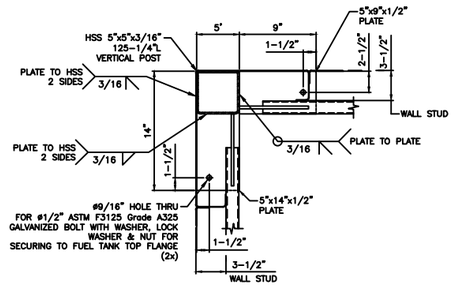
A — DETAIL
1:4 CORNER HSS TO PLATES
TYPICAL WELDING & DETAIL
2 OPPOSITE CORNERS



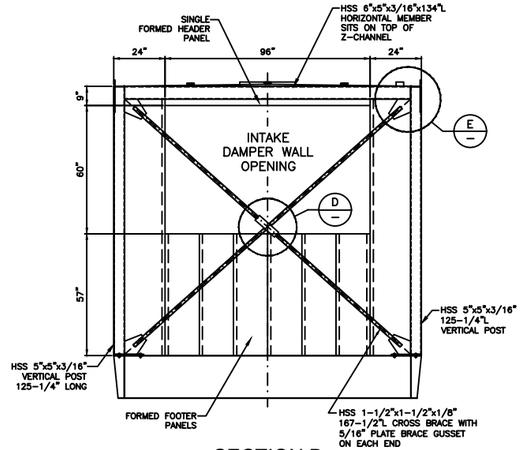
PLAN VIEW
ROOF SKIN & CROSS MEMBERS REMOVED



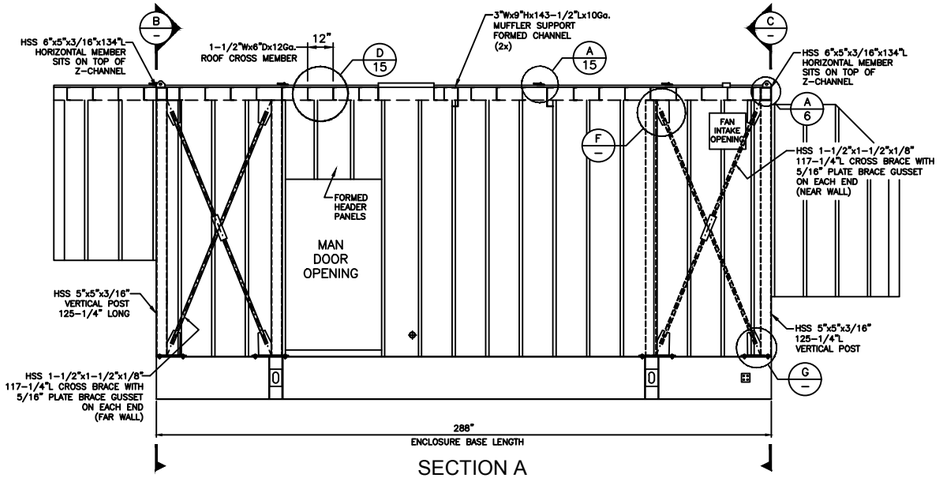
D — DETAIL
1:3 HSS X-CROSS
TYPICAL WELDING



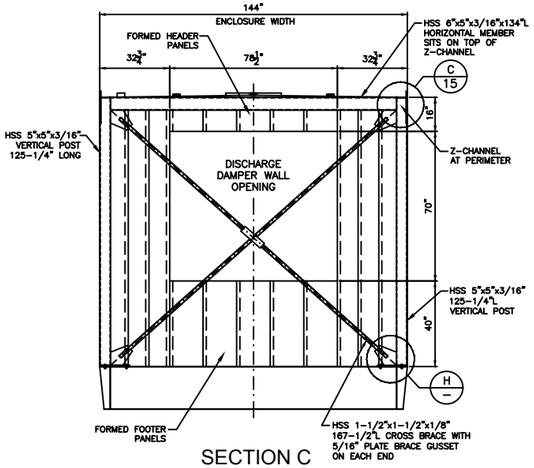
B — DETAIL
1:4 CORNER HSS TO PLATES
TYPICAL WELDING & DETAIL
2 OPPOSITE CORNERS



SECTION B



SECTION A



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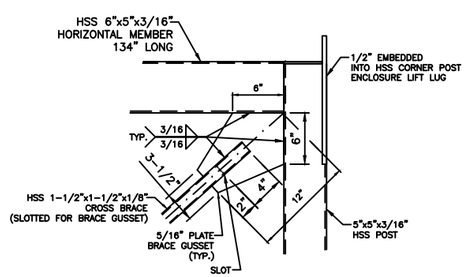
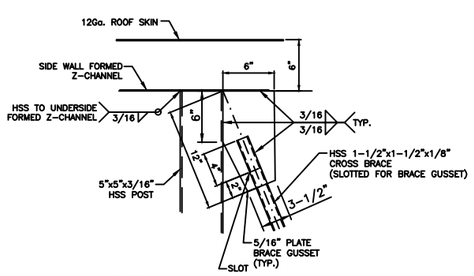
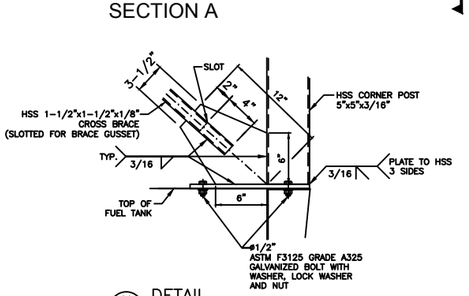


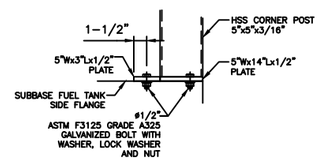
E — DETAIL
1:4 HSS CROSS BRACE TOP GUSSET
AND HSS WELDING
TYPICAL DETAIL



F — DETAIL
1:4 HSS CROSS BRACE TOP GUSSET
AT DOOR & Z-CHANNEL WELDING
TYPICAL DETAIL



H — DETAIL
1:4 HSS CROSS BRACE
BOTTOM GUSSET
TYPICAL WELDING & DETAIL



G — DETAIL
1:4 PLATE TO HSS CORNER POST
TYPICAL DETAIL

1	ADDED SECOND DOOR PER CUSTOMER	OCT.21/2025

DWN. BY	CD
DATE:	JAN.21/2025
CHK. BY	
DATE:	
APP. BY	
DATE:	
PROJECT. NO.	2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

STRUCTURAL DETAILS – ENCLOSURE

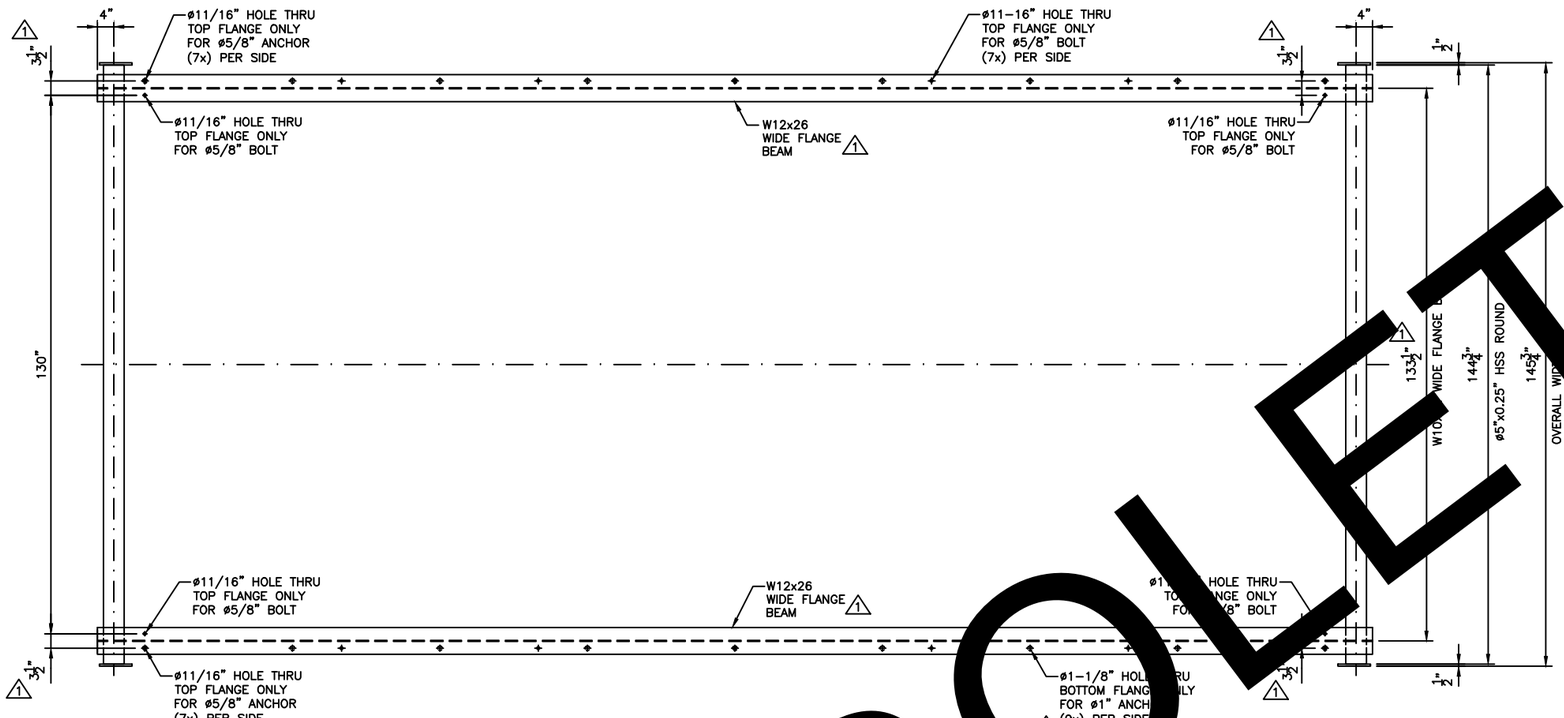
CLIENT: CUMMINS NORTHWEST

PROJECT: ITB SCF FACILITIES

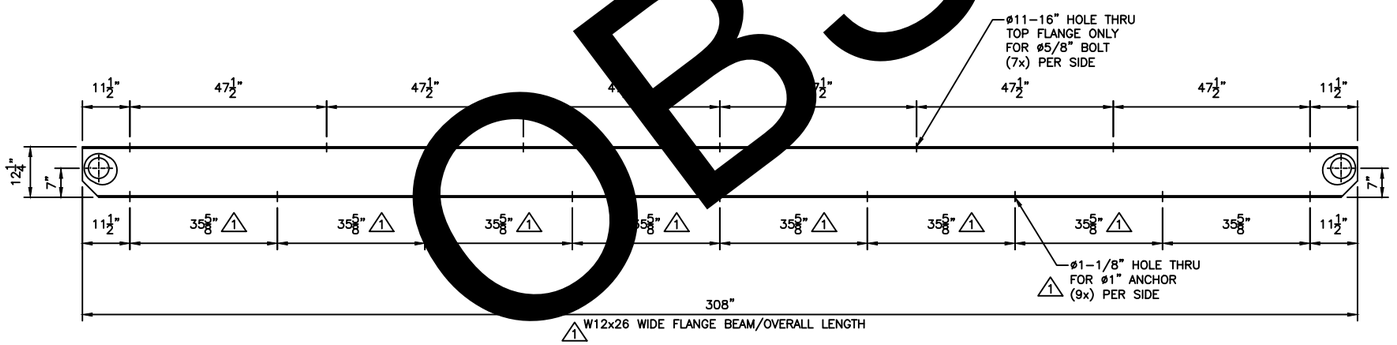
SCALE:	DRAWING NO.	SHT.	REV.
–	18–0393–14	1/1	1

SPEC.

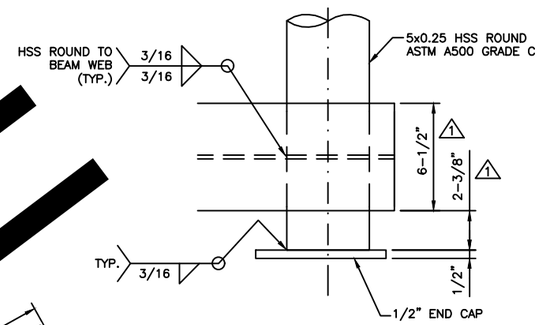
SCALE — ONE INCH | 25MM

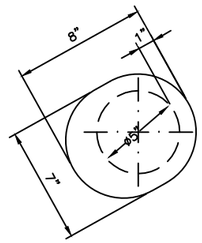


PLAN VIEW

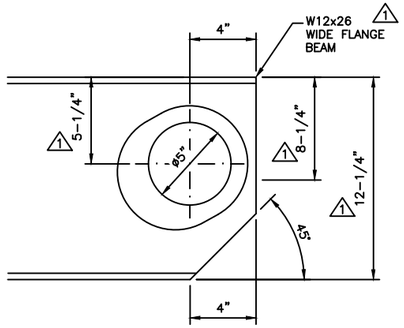


ELEVATION

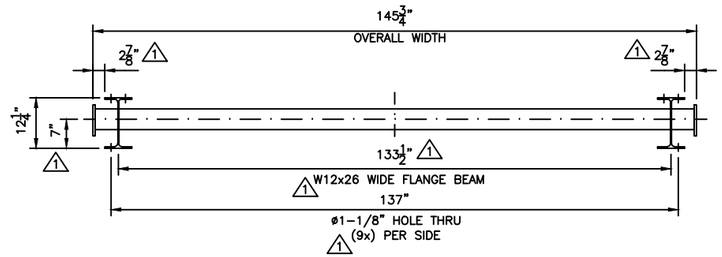




1/2" END CAP
2 REQ'D
SCALE 1:4



TOWING BEAM, HSS ROUND & PLATE
SCALE 1:4



END VIEW

STRUCTURAL MATERIALS
–W FLANGE BEAM: ASTM A992
–HSS ROUND: ASTM A500 GRADE C
–PLATE: ASTM A36

NOTES:
1.FINISH COLOR: BLACK
2.BOLTS WITH WASHERS SUPPLIED & SHIPPED LOOSE BY PACIFIC.
3.ANCHORS FOR FIELD SUPPLIED & INSTALLED ON SITE BY OTHERS.

SPEC.

REV.	DESCRIPTION	DATE
2	SKID FRAME REMOVED PER CUSTOMER, DRAWING DESIGNATED AS "OBSOLETE"	OCT.21/2025
1	SUPPORT BEAMS REVISED TO W12x26 PER STRUCTURAL ENGINEER, ADDED ADDITIONAL TWO ANCHOR HOLES TO BEAMS BOTTOM FLANGE	FEB.6/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

SKID FRAME LAYOUT

CLIENT: CUMMINS NORTHWEST
PROJECT: ITB SCF FACILITIES

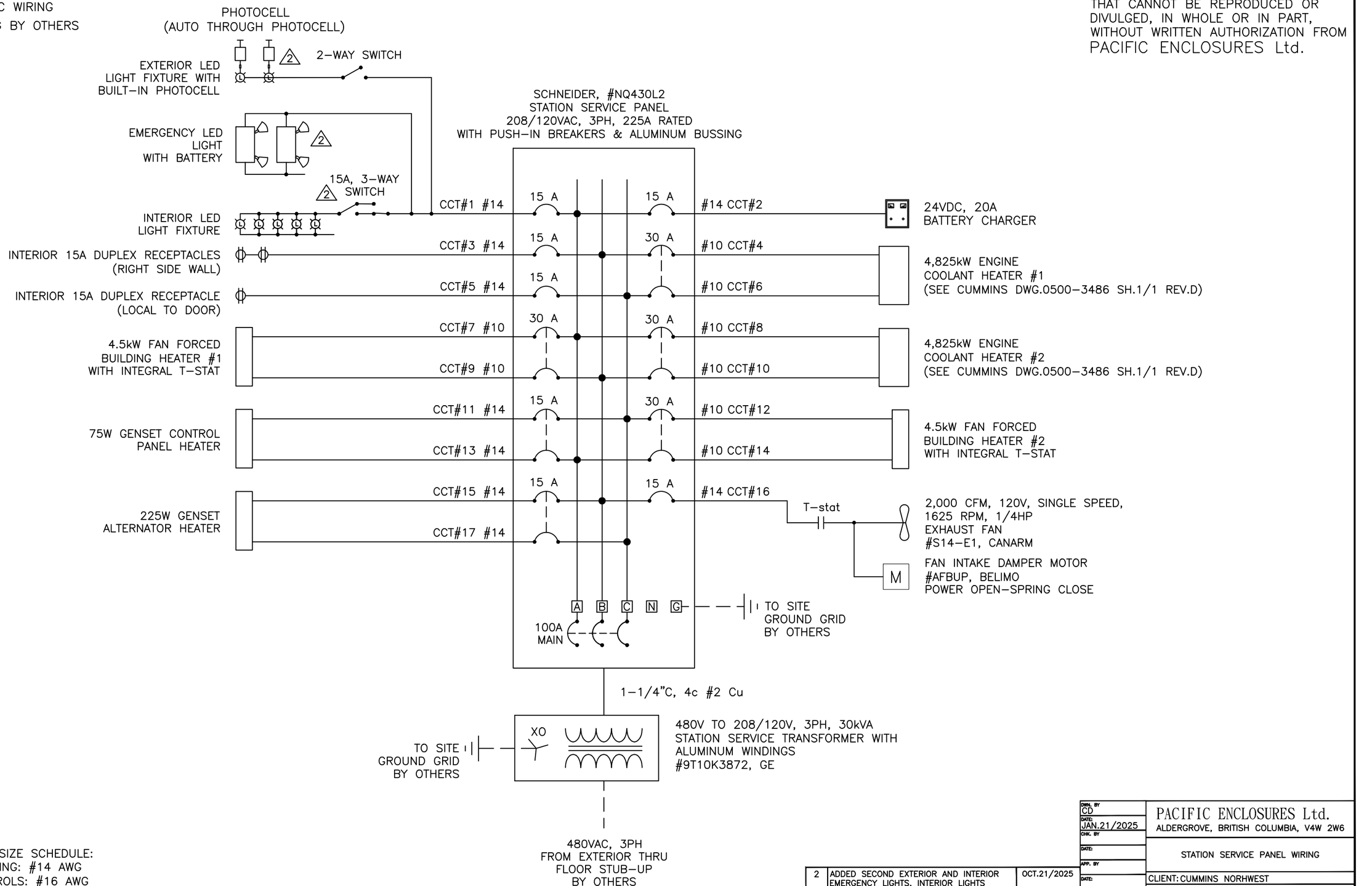
SCALE:	DRAWING NO.	SHT.	REV.
–	18–0393–16	1/1	2

SCALE — ONE INCH | 25MM

LEGEND

PACIFIC WIRING

WIRING BY OTHERS



NOTES:
1. MINIMUM WIRING SIZE SCHEDULE:
   – POWER & LIGHTING: #14 AWG
   – 24VDC & CONTROLS: #16 AWG
2. ALL WIRING IS IN SURFACE–MOUNT EMT CONDUIT WITH COMPRESSION FITTINGS.
3. ALL MATERIAL UL APPROVED, WIRING PER NEC CODE.

REV.	DESCRIPTION	DATE
2	ADDED SECOND EXTERIOR AND INTERIOR EMERGENCY LIGHTS, INTERIOR LIGHTS SWITCH REVISED TO 3–WAY PER CUSTOMER	OCT.21/2025
1	ADDED STATION SERVICE TRANSFORMER PER CUSTOMER	JULY 22/2025

DWN. BY: CD
DATE: JAN.21/2025
CHK. BY:
DATE:
APP. BY:
DATE:
PROJECT. NO. 2134

PACIFIC ENCLOSURES Ltd.
ALDERGROVE, BRITISH COLUMBIA, V4W 2W6

STATION SERVICE PANEL WIRING

CLIENT: CUMMINS NORHWEST
PROJECT: ITB SCF FACILITIES

SCALE:	DRAWING NO.	SHT.	REV.
–	18–0393–17	1/1	2

SPEC.

TradeMaster Grounding Toggle Switch

663WG

Triple Pole Switch in white, with grounded terminals, is made with a thermoplastic toggle and frame. It has a smooth, quiet toggle action and is made with high-impact resistant construction. 15 amps, 120 volts.

**Available in bulk packs of 90. Add "U" to end of Catalog Number. Example: 663WGU

features & benefits

- Extra-long strap. Side wire #12 and #14 AWG. Push wire #14 AWG.
- Tri-drive ground, terminal, and mounting screws.
- Easy-access green hex head ground screw.

specifications

General Info

Color: White
Product Series: TradeMaster
Type: Toggle
Number Of Poles: 3-way
Special Features: NAFTA Compliant, Self-Grounding

Listing Agencies/Third Party Information

cU Lus: Yes
U N SPS C: 39121406

Dimensions

Depth U S: 1.090"
Height U S: 3.281"
Width U S: 1.25"

Technical Information

Amps: 15 Amp
Volts: 120VAC
Volts A C: 120

Buy American Act Compliance

Country of Origin: MEXICO
Buy American Act Status: Trade Agreement Act Compliant

WALK-IN ENCLOSURE
–
BILL OF MATERIAL

Genset model:	Enclosure is designed for a Cummins 900kW, 480-volt genset with two-unit mount circuit breakers, battery charger and batteries. Load bank and control panel are remote.
Type of enclosure:	Insulated, self-framing, Nema 3R weather protective walk-in enclosure with an integral sub-base tank.
Attenuation:	The sound pressure level shall average 85 dBA at 23' in a free field condition.
Size:	Approximately 30' – 0" long x 12' – 0" wide x 10' –8" high. Length at the base is 24' – 0". Sub-base and skid base add 30" to the overall height. Final dimensions to be confirmed with approved drawings.
Weight:	Approximately 41,500lbs (enclosure and genset only).
Construction:	14 and 12 gauge galvannealed steel to ASTM A-653, all welded construction.
Walls:	5" thick 14 gauge with wall studs and thermal breaks approximately every 16”. Designed to withstand wind loads as per IBC code.
Roof:	6" deep 12 gauge with cross members and thermal breaks approximately every 12". Designed to withstand snow loads as per IBC code. Roof has a 1" peak to minimize ponding of water.
Insulation:	5" (R=20) and 6” (R=24) thick mineral wool.
Interior Liner:	22 gauge perforated galvanized steel.
Base:	10" deep wide flange base rails under the tank.
Sub-base Tank:	2,230 US usable gallon UL142, 20" deep double wall fuel tank with a 2” containment lip and complete with the following options: - 2" exterior fill with spill bucket and OPV. - 2" vent (piped to exterior) - 1- ½" level gauge - 2" low and low/low fuel alarm floats - 2" high and high/high fuel alarm floats - Emergency vent - 1/2" return - 2" leak detection float - 1/2" supply - Secondary emergency vent Foundation design is by others.
Doors:	1 of 18 gauge galvannealed steel door (3'-0" x 6'-8") c/w freezer style panic hardware, weather stripping, drip edge and platform with steps.
Penetrations:	Exhaust opening in the roof complete with rain shield. Muffler mounting support channels in the ceiling are included.
Ventilation:	Intake – 24 volt DC motorized intake insulated damper (spring to open power to close) with intake silencer, hood and galvanized bird screen. Discharge – Supply and install motorized insulated discharge and recirculation dampers with discharge duct, silencer, hood and galvanized bird screen. A 1640 cfm vent fan with an independent air intake hood.

Electrical:	225 amp 120/208 three phase combination panel with main circuit breaker, wired to the following: - Four LED lights. - Two interior duplex receptacles. - One exterior duplex receptacle with in-use cover. - Block heater wiring. - Generator heater, control panel heater and lube oil heater wiring. - Battery charger wiring. - Two 4.5 KW fan forced heater with thermostats. - One emergency light with battery pack. - One exterior LED with photocell and HOA. - One exit sign. All wiring is in surface mount EMT conduit with compression fittings.
Paint:	All surfaces inside and outside are cleaned to sspc-sp1, all seams sealed, primed with epoxy primer. The exterior is top coated with semi-gloss polysiloxane paint.
Exhaust System:	Supply and install a super critical muffler inside the enclosure c/w mounting bands, discharge pipe with a rain-cap. Muffler is insulated with high temperature removable blankets. Exhaust flex provided.
Equipment Install:	Install of client supplied genset, isolators and battery charger.
Ship loose items:	Stairs are shipped inside the enclosure.
Certification:	Alaska P.E. stamped drawings.

Exception to the specification:

- 2.04.I.6 PLC ventilation panel not included.
- 2.04.K.1 Heaters have built-in thermostats, discharge dampers have a temperature controller.
- 2.05.A Paint system is as above.

PACIFIC ENCLOSURES
QUALITY. INNOVATIVE. EXCELLENCE.

Pacific Enclosures Ltd.
26221 30A Avenue
Aldergrove, BC
V4W 2W6
Telephone:(604)856-7544
Fax:(604)8567570

EXTENDED 5 YEAR PRODUCT WARRANTY

Pacific Enclosures Ltd. warrants its products to be of the kind and quality described in its specification and to be free from defects in material or workmanship under normal use and service for a period of 66 months from the date of shipment from its factory or 60 months after start-up, whichever comes first.

All obligations and liabilities under this warranty are limited to repairing or replacing at our option F.O.B. Aldergrove, B.C. of such allegedly defective units or parts returned, carrier charges prepaid.

Warranty on accessories furnished by other manufacturers shall be limited by that manufacturer's warranty.

Warranty does not cover failure resulting from improper installation or use.

Changes or repairs made in the field without authorization from Pacific Enclosures Ltd. will void this warranty.

1", 2", & 3" DEFLECTION SEISMIC RESTRAINED CERTIFIED SPRING MOUNT/SNUBBER

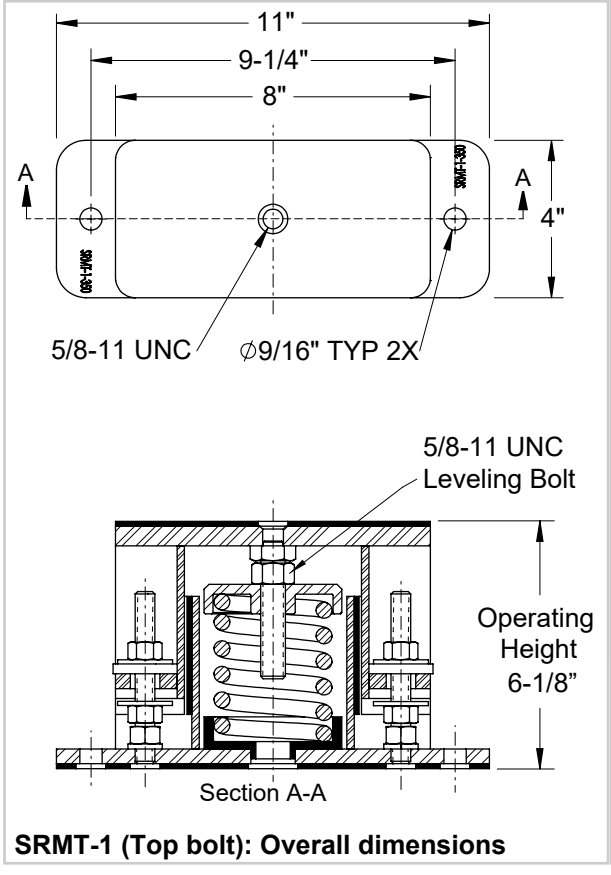
The models **SRMT-1** (top levelling bolt) and **SRMF-1** (flat top with built-in levelling feature) are heavy-duty Seismic Restrained Certified Spring Mounts - Snubbers Combination. The uniquely innovative design incorporates interlocking top and bottom steel channels, which restrict the movement (snubbers effect) in all horizontal directions under lateral forces. Rubber lining inside bottom metal channels prevents metal-to-metal contact. **Vibrasystems Inc. isolators are tested and certified to ASHRAE 171-2017 for wind and seismic load resistance.**

SRMF-1

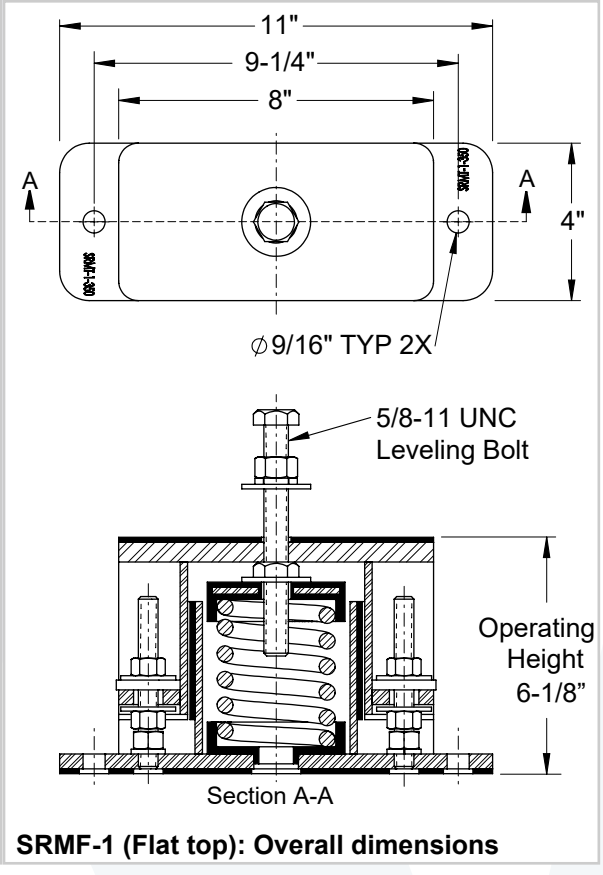
SRMT-1

Recommended for:

HVAC equipment, engine-generators (gensets), fan air circulation systems, compressors, pumps, chillers, AC units, cooling towers, inertia bases, etc.



SRMT-1 (Top bolt): Overall dimensions



SRMF-1 (Flat top): Overall dimensions

Tested & Certified to:
ASHRAE 171-2017
Wind & Seismic Load Resistance
TRU COMPLIANCE
LISTED
1701502-CR-001
Manufactured by:
VibraSystems Inc.

Features:

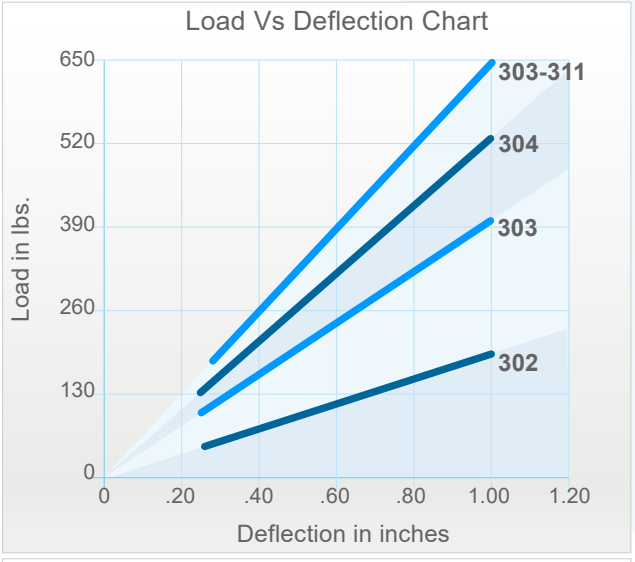
- ✓ Safety Factor: Springs will accommodate an aditional 50% load from the rated load to the solid load.
- ✓ All spring mounts' elements are safe at solid load.
- ✓ Interlocking steel channels restrict the movements (snubbers) in all horizontal directions.
- ✓ Rubber lining inside metal channels prevents metal-to-metal contact.
- ✓ Zinc-plating housing and powder-coating springs provide excellent corrosion resistance.
- ✓ Acoustic elastomer spring cups provide superior vibration isolation and noise reduction.
- ✓ Springs are color-coded and easily replaceable.
- ✓ Now tested and certified to: **ASHRAE 171-2017 for wind and seismic load resistance.**

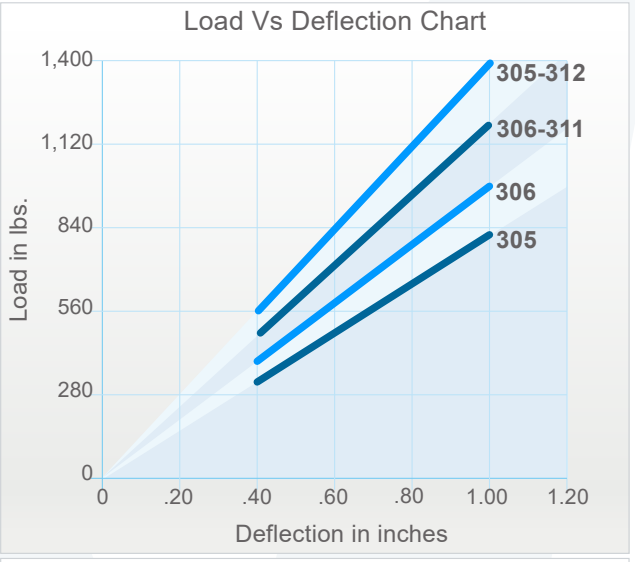
Tested & Certified to: ANSI/ASHRAE 171-2017	Wind & Seismic Maximum Vertical Load Resistance: 16,640 lbs
	Wind & Seismic Maximum Horizontal Load Resistance: 4,100 lbs

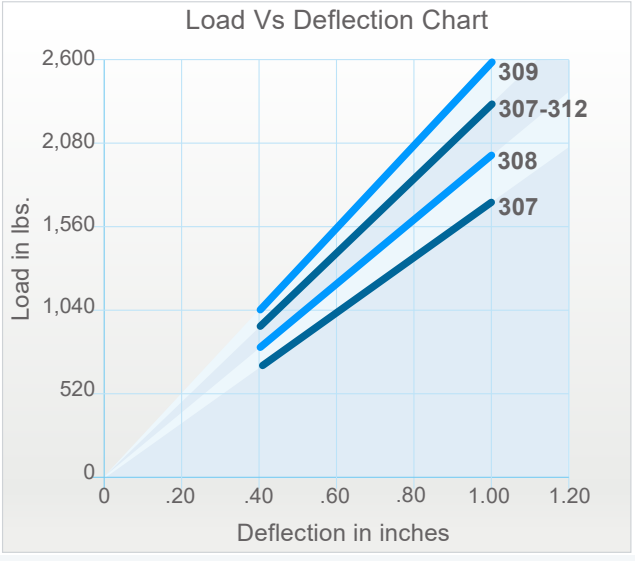
1" DEFLECTION SEISMIC RESTRAINED CERTIFIED SPRING MOUNT/SNUBBER

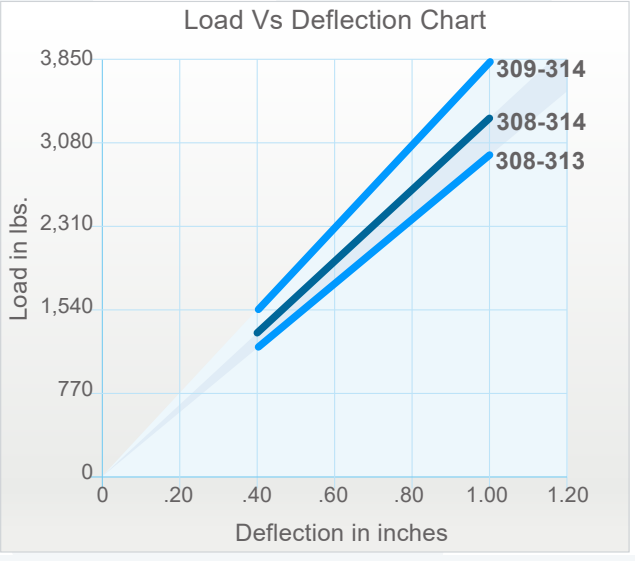
Model	Rated Load (lbs)	Deflection at Rated Load (lin)	Spring Rate (lbs/in)	Spring Color	Ship. Weight (lbs)
SRM-1-302	195	1	195	Yellow	21
SRM-1-303	400	1	400	Orange	21
SRM-1-304	530	1	530	Red	21
SRM-1-303-311	650	1	650	Orange/Green	22
SRM-1-305	825	1	825	White	21
SRM-1-306	1,000	1	1,000	Brown	21
SRM-1-306-311	1,200	1	1,200	Brown/Green	22
SRM-1-305-312	1,400	1	1,400	White/Yellow	22
SRM-1-307	1,700	1	1,700	Green	22
SRM-1-308	2,000	1	2,000	Black	22
SRM-1-307-312	2,330	1	2,330	Green/Yellow	23
SRM-1-309	2,600	1	2,600	Blue	22
SRM-1-308-313	2,990	1	2,990	Black/Orange	23
SRM-1-308-314	3,250	1	3,250	Black/Grey	23
SRM-1-309-314	3,850	1	3,850	Blue/Grey	23

Models are available in two configurations: SRMF-1 (flat top), and SRMT-1 (top bolt).





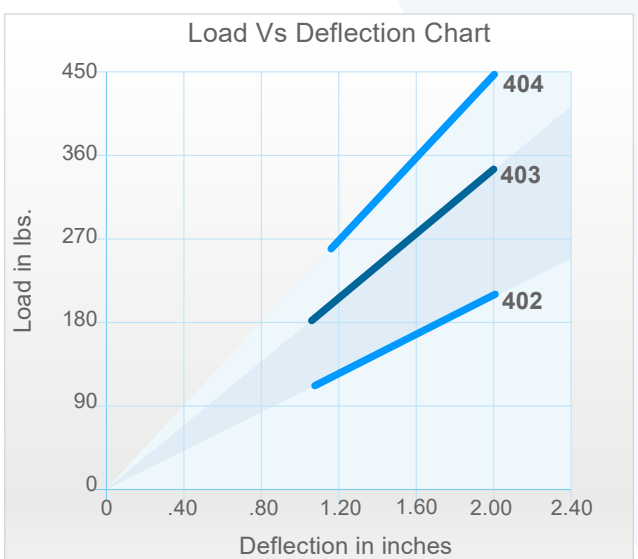


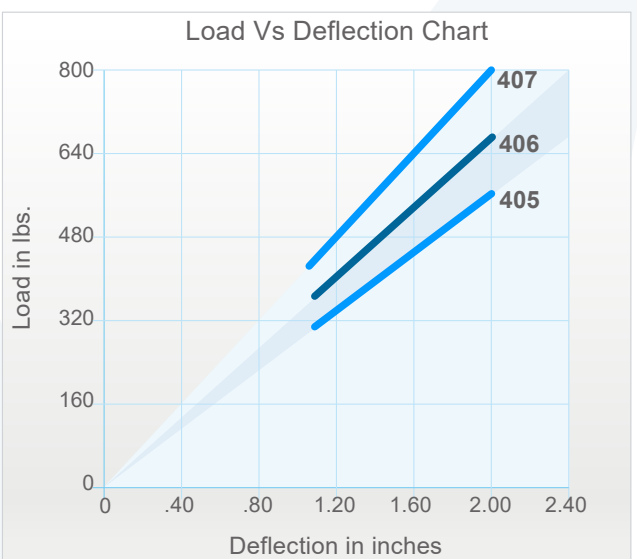


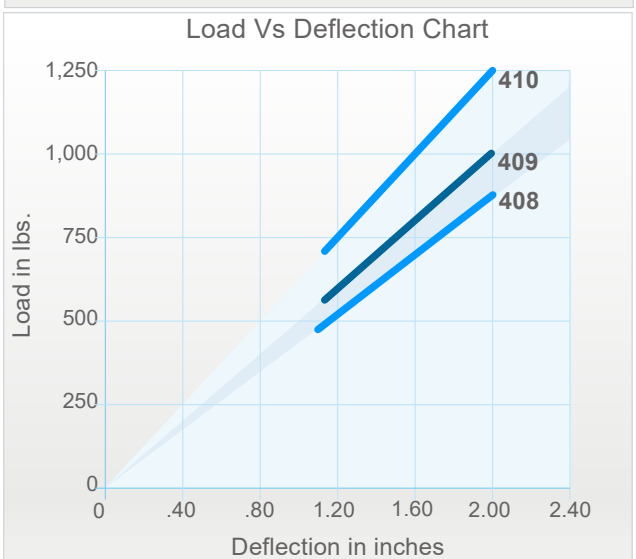
2" DEFLECTION SEISMIC RESTRAINED CERTIFIED SPRING MOUNT/SNUBBER

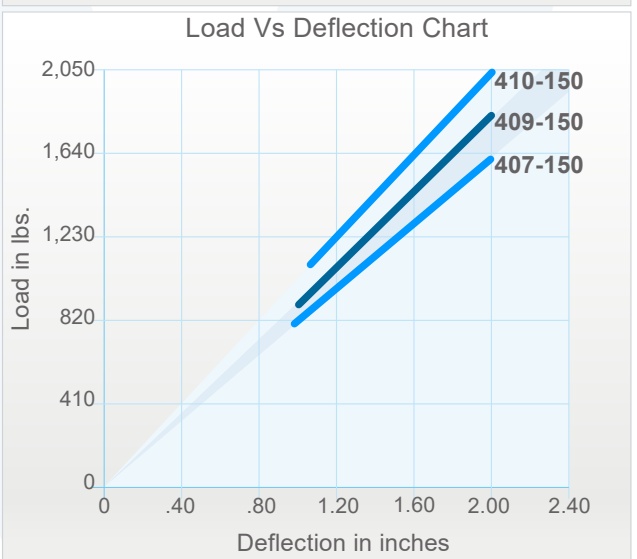
Model	Rated Load (lbs)	Deflection at Rated Load (lin)	Spring Rate (lbs/in)	Spring Color	Ship. Weight (lbs)
SRM-1-402	200	2	100	Grey	22
SRM-1-403	348	2	174	Black	22
SRM-1-404	453	2	226	Blue	22
SRM-1-405	590	2	295	Red	22
SRM-1-406	676	2	338	Orange	22
SRM-1-407	787	2	393	Green	22
SRM-1-408	918	2	459	White	22
SRM-1-409	1,000	2	500	Brown	23
SRM-1-410	1,250	2	625	Yellow	23
SRM-1-407-150	1,587	2	793	Green/Grey	24
SRM-1-409-150	1,800	2	900	Brown/Grey	24
SRM-1-410-150	2,050	2	1,025	Yellow/Grey	24

Models are available in two configurations: SRMF-1 (flat top), and SRMT-1 (top bolt).





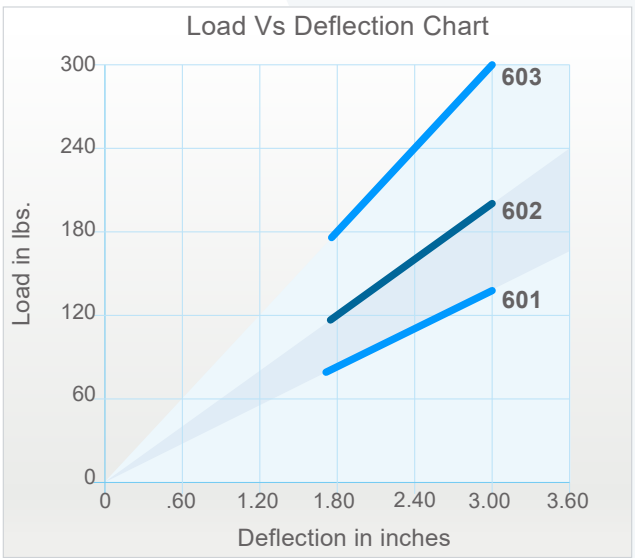


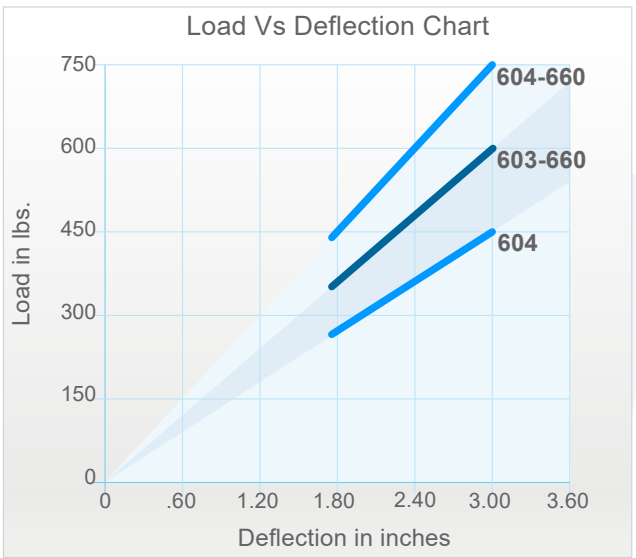


3" DEFLECTION SEISMIC RESTRAINED CERTIFIED SPRING MOUNT/SNUBBER

Model	Rated Load (lbs)	Deflection at Rated Load (lin)	Spring Rate (lbs/in)	Spring Color	Ship. Weight (lbs)
SRM-1-601	140	3	46.6	Blue	25
SRM-1-602	200	3	66.6	Yellow	25
SRM-1-603	300	3	100	Orange	25
SRM-1-604	450	3	150	Red	25
SRM-1-603-660	600	3	200	Orange/Grey	25
SRM-1-604-660	750	3	250	Red/Grey	25

Models are available in two configurations: SRMF-1 (flat top), and SRMT-1 (top bolt).





Model nomenclature:

SRMT-1-410

- 410 — Spring's Name
- 1 — Single spring
- F = Flat top
- T = Top with bolt

Notes:

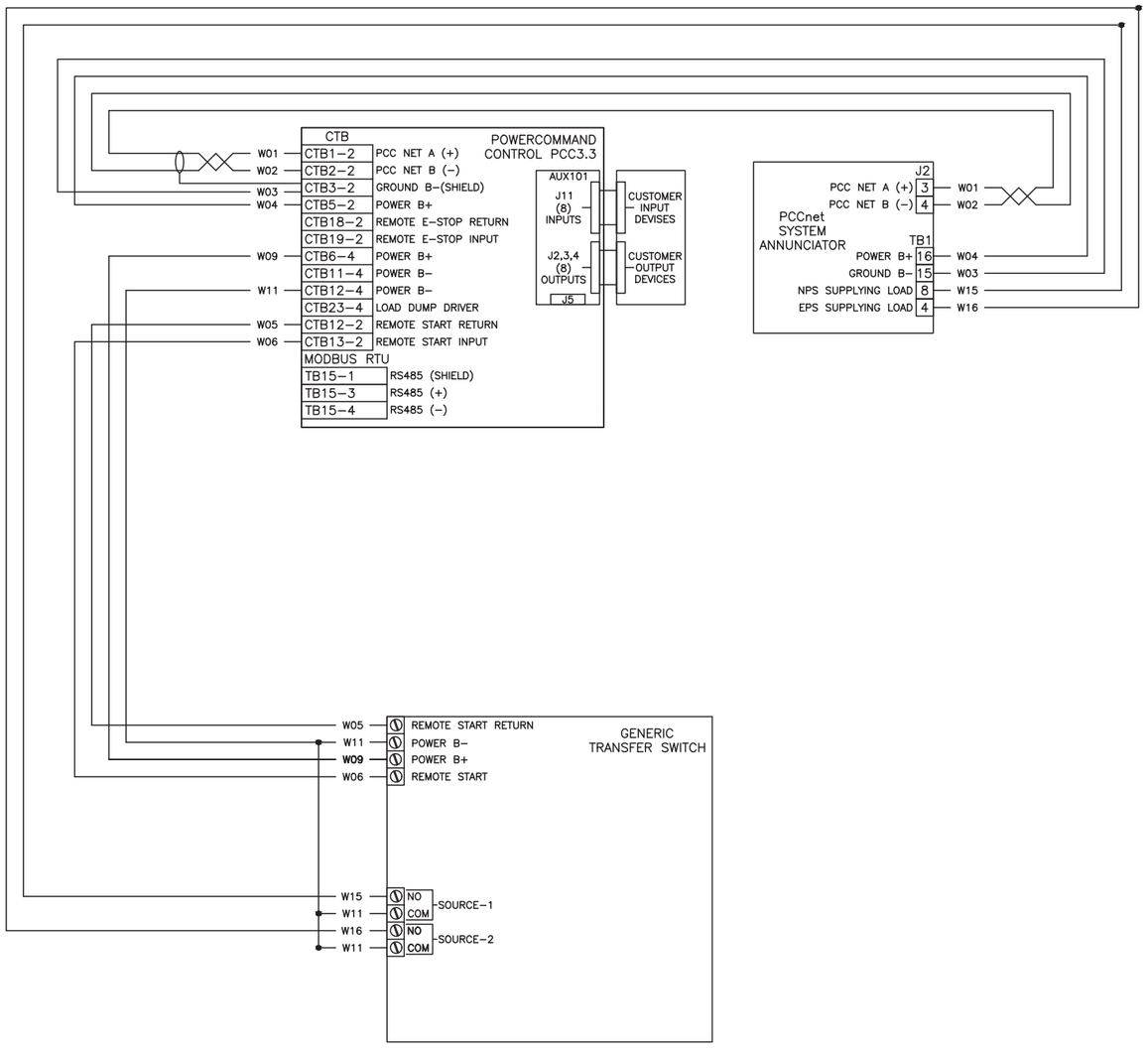
a) Vibrasystems isolators are tested and certified to ASHRAE 171-2017 for wind and seismic load resistance. Wind and Seismic Certification Compliance Report 1701502-CR-001-R1 is available upon request.
b) 300 Spring: 3" Outside diameter x 4.75" Free Length.
c) 310 Spring: 1.75" Outside diameter x 4.75" Free Length.
d) 400 Spring: 3" Outside diameter x 5.75" Free Length.
e) 150 Spring: 2" Outside diameter x 5.75" Free Length.
f) 600 Spring: 3" Outside diameter x 6.75" Free Length
g) 660 Spring: 2" Outside diameter x 6.75" Free Length
h) Rated load is the maximum load recommended.

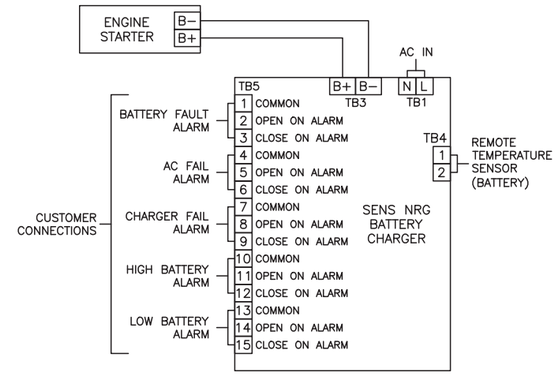
UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL:
.X: .06
.XX: .03
.XXX: .01
ANGLES: .5°

REFERENCES	PREP. BY:	CHKD BY:	MODIFIED BY:	
A065N783	KDU	–	–	09/09/24
A052P338				
A053C830				
A054A427				

GENERIC ATS | FINISH: N/A | ENGINE FAMILY: PCC3300 | GENERIC ATS





- 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)
- MODBUS RS485 CABLE: BELDEN 3106A. (22 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- TOTAL NETWORK LENGTH NOT TO EXCEED 4000 FT.
- ATS LOAD SHED WIRING IS SHOWN FOR REF.–––––

CSSNA POWER GEN

SITE NAME: – –	CONTACT NAME: –	CUSTOMER PROJECT NO: –	TITLE: PCC3.3 CONTROL / GENERIC ATS QSL9..QSX15..QSK23..QST30
CONTRACTOR NAME: –	CONTACT NO: –	CSSNA PROJECT NO: –	SIZE: B DWG NO: PCC3.3 INTERCONNECT REV –
			SCALE: NONE DO NOT SCALE PRINT SHEET 1 OF 1

SECTION 5

LOAD BANK (FORTHCOMING)

MARS

700KW - 1250KW Load Bank

Description

High capacity load testing of generators, UPS, and other AC power sources; periodic reliability exercise of standby generators; automatic load leveling and minimum load regulation; regenerative/ reverse power protection and other load bank applications is possible with the Simplex Mars Version 2.0 Load Bank Series.

The Simplex Mars Version 2.0 is a highly standardized, advanced design, digitally controlled Load Bank Series spanning the 700-1250kw range at common 60 Hertz and 50 Hertz low voltages. Mars V2.0 Is a standard inventory item with versatile control and application possibilities.

Mars V2.0 is intended for outdoor or indoor installation. As with all Simplex Planet Series Load Banks, the Neptune is UL/CUL Listed.

Mars V2.0 is digitally controlled via an on-board PLC, which accepts standard programs for manual, automatic and multi-station control, as well as data monitoring and data acquisition. V2.0 is designed for local or remote control, including multi-station control, using a standard digital, color touchscreen HMI. Remote control connection is simplified through use of RS-485 over shielded/twisted pair network cable (1000m). Local/remote HMI is housed in a weather/tamper resistant, lockable enclosure.

Basic V2.0 is setup for manual control via direct numeric keypad entry.

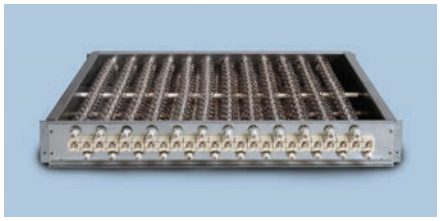
A comprehensive automation option is available which allows automatic load regulation via KW sensing such that the load bank automatically maintains a constant load on the generator. Load level, bandwidth, and timing are user programmable from the touchscreen. This function can be used for minimum loading to prevent wet-stacking and other low load issues, engine optimum loading for emissions control and for regenerative power protection. This function can also be used to stabilize voltage and frequency transients. With the automation option, full display of load bank electrical values (V-A-Hz-KW) is also provided on the touchscreen, with MODBUS registers provided for remote indication and data acquisition.

Options are available for Load Bank integration with Building Automation Systems via Modbus RTU RS-485 or Modbus TCP.

Features

- Utilizes the proven Simplex “Powr-Web” load element (see page 2)
- Branch circuit fuse protection of load elements
- Digital control (see page 4)
- Comprehensive malfunction detection system
- UL/CUL Listed
- Modular enclosure design with separate and isolated control and power sections
- Type 3R, oversize control section with generous cable connection space
- Vertical airflow, exhausts hot air above level of personnel and away from buildings, pavement etc.
- Slide-out, tray mounted load elements
- Comprehensive overload, short circuit and malfunction protection
- Highly standardized for quick turn-around inventory item
- Supported by nationwide service centers
- Anti-condensation heaters with thermostatic control

c UL US LISTED



Powr-Web Resistive Load Element

Description

Simplex Load Banks utilize “Powr-Web” load elements. The “Powr-Web” is an advanced design, air-cooled power resistor specifically designed for application to Load Bank systems. The “Powr-Web” is conservatively operated at half the maximum temperature rating of the alloy and features a short-circuit-safe design based on continuous mechanical support of the element by high temperature, ceramic clad stainless steel rods. The “Power Webs” are assembled into discrete trays which are assembled in a vertical “stack.” Each tray in the “stack” is independently serviceable without disturbing adjacent trays.

Specifications

- Alloy: FeCrAl
- Maximum continuous temperature rating: 1920°F
- Maximum operating temperature as applied in Load Bank: 1080° F
- Cool down time from operating to ambient temperature: 10 seconds

Construction

- Ceramic clad, stainless steel through-rods
- UL Recognized

Version 2.0 Specifications

Capacity:	700-1250KW, Resistive, 1.0 power factor
Voltage:	All common 3-phase 60, 50 Hz voltages: 60 Hertz: 208V, 220V, 240V, 416V, 440V, 450V, 460V, 480V, 575V, 600V 50 Hertz: 190V, 200V, 208V, 380V, 400V, 416V
Frequency:	50, 60 Hz
Load Steps:	25 KW resolution standard. (25-25-50-100-100-250... KW)
Duty Cycle:	Continuous
Temperature:	120°F maximum ambient temperature. Exhaust rise: 150°F–200°F. Hot spots 575°F.
Airflow:	27,400 CFM, 10 HP
Fan/Control:	External or internal from load bus. Control circuits at 120V via transformer. The cooling fan operates at 3-phase line voltage. Load control circuits and fan motor control operate at 120V. Control circuits are fused. Control circuit fuses are 100,000 A.I.C., 600V rated. External, 120V, supply for humidity controller, when ordered.

Options

Option No.	Description
A	Automation option. Allows AUTOMATIC LOAD REGULATION, REGENERATIVE POWER PROTECTION, via KW sensing. Requires installation of remote current transformer (supplied). User programmable: set point, step up/step down bandwidth, initiate delay, step-up delay, step-down delay, shutdown delay. Includes voltage and frequency sensing with adjustable set point and delay. Includes display of volts-amps-hertz-kw and MODBUS registers for same.
020	BMS control. Allows load bank to be controlled/monitored by BMS
030	MODBUS TCP. Replaces MODBUS RTU-485 with TCP capability
040	Multiple remote control stations

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Design subject to change without notice.

Model Number Generation

Example: MR-2.0-750-4803-60-R-M-020
750KW, 480V, 3-phase, 60Hz, Remote Manual Control with BMS Control

MR	2.0	750	4803	60	R	M	020
Mars	**Version**	**KW**	**Voltage**	**Frequency**	**Control**	**Function**	**Options**
Mars	1.0 Legacy 2.0 2013	700kw, 750kw, 800kw, 900kw, 1000kw, 1100kw 1200kw, 1250kw	2083 2403 4803 6003 (Volts x Ph)	60Hz 50Hz	L – Local R – Remote	M – Manual A – Automation	020: BMS Control 030: MODBUS TCP 040: Multiple control stations

Principle Systems and Components

The load bank is a completely self-contained, freestanding unit which includes all resistive load elements, load control devices, load element branch circuit fuse protection, main load bus and terminals, cooling system, control power supply, unit controller and malfunction detection system and NEMA type enclosure.

Load Elements

Simplex “Powr-Web” open wire, helically wound, chromium alloy, thermally derated to 60%. 5% tolerance, 2% balance, .995 p.f.

UL Recognized.

Load Control

Branch circuit contactors each step, overall 50KW circuit maximum. Contactors have enclosed silver surfaced contacts, 120V coils; electrically operated and electrically held.

Element Circuit Protection

Branch circuit fuses, each 50KW branch circuit, 200kAIC, current limiting type.

Power Wiring

150°C insulated, color coded, numbered.

Control Wiring

105°C, color coded, numbered.

Power connection

Plated bus bar within an oversize terminal junction box.

Cooling

Forced air, vertical airflow, top exhaust. 10 HP, 230/460V, 3-phase, TEFC motor driving cast aluminum fan blade. Circuit breaker combination motor starter.

System Protection

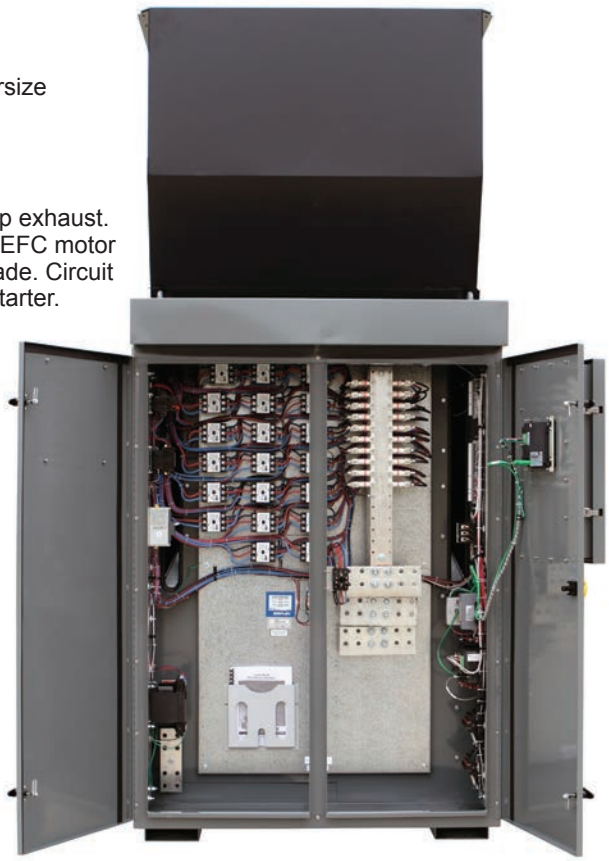
Fan failure, high exhaust temperature, high intake temperature; lockout and alarm. Exhaust temperature indicated on screen.

Enclosure

Modular enclosure consists of three parts:

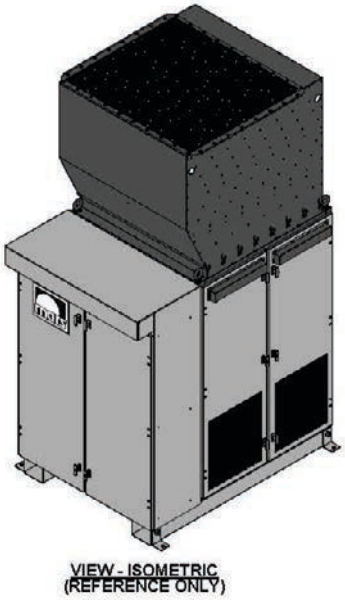
1. Type 3R rainproof power section including load elements and cooling fan
2. Type 3R control section, thermally and electrically isolated from power section
3. Exhaust hood. Mounts atop power section. Vertical flow with rain separators. Hood may be deleted and a duct flange provided for indoor applications where air is exhausted through a duct to the outdoors.

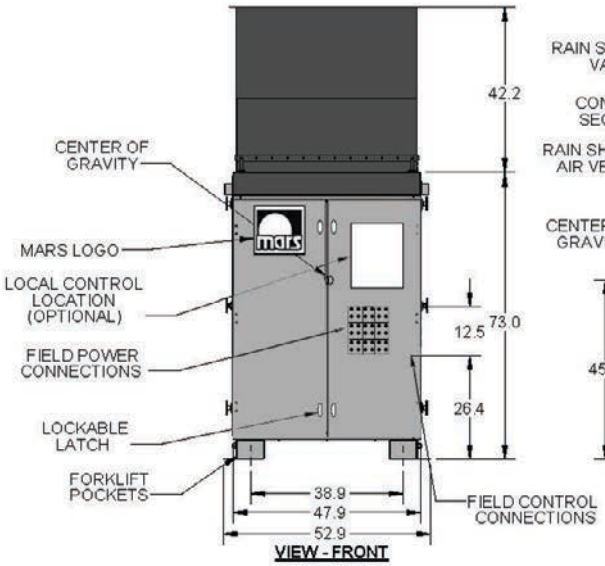
All access via hinged doors with stainless steel hinges and lockable latches. All exterior fasteners are stainless steel.

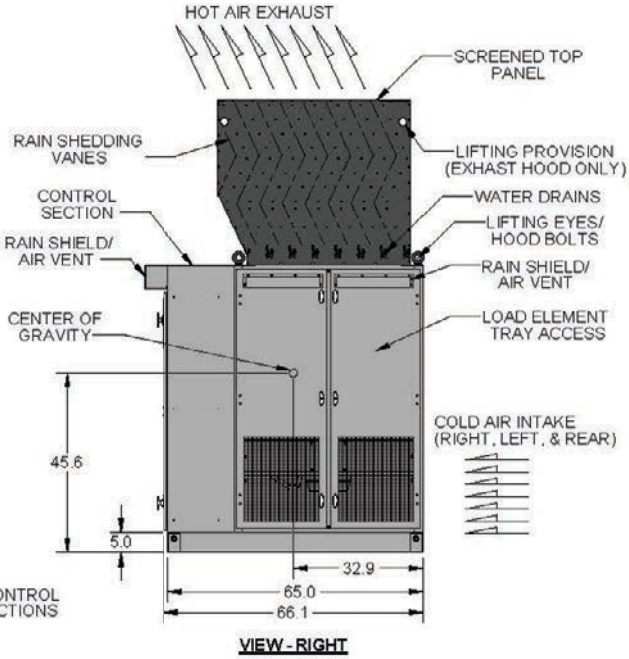


The load bank enclosure is of double wall construction for cool exterior and thermal isolation of the load elements. Cooling airflow through the enclosure is vertical with cold air intake at the bottom and hot air exhaust out the top. Intake and exhaust openings are screened. Enclosure is powder-coated dark gray. Hood powder-coated high temperature black.

Dimensions and Key Features







Controller

PLC based control with local or remote 6-inch TFT color HMI.

1. 6” Color Touch HMI – Provides all functionality previously accomplished by physical lights/ switches
   a. Control Power On/Off Switch
   b. Numeric Load Application Mode: direct entry to keypad, apply and remove function. Allows successive block loading
   c. Master Load Switch function
   d. Load Step Switches function
   e. Fan Failure Indication
   f. High Exhaust Temperature Indication
   g. Load Dump Active Indication
   h. Load Dump Bypassed Indication
   i. Setup Functions
   j. Various other functions depending on chosen options

2. Cooling Failure Load Lockout – Disables all load in the event of an exhaust over-temperature or fan failure
3. Remote Load Dump input – Allows user to connect normally closed contacts to permit remote load dump (close to run, open to dump)
4. Load Dump Bypass– Provides means to defeat load dump function above
5. Discrete Power Available Lamp – Indicates control power available to load bank. LED indicator on load bank.
6. Summary Alarm Lamp – Indicates that there has been a cooling failure, load dump activation or other failure. LED indicator on load bank.
7. BMS Monitoring (Dry Contacts) – Relay dry contacts for BMS monitoring of “normal operation”, “summary alarm”.
8. BMS Monitoring (Modbus RTU RS-485) – Allows all load bank conditions to be monitored via Modbus RTU RS-485

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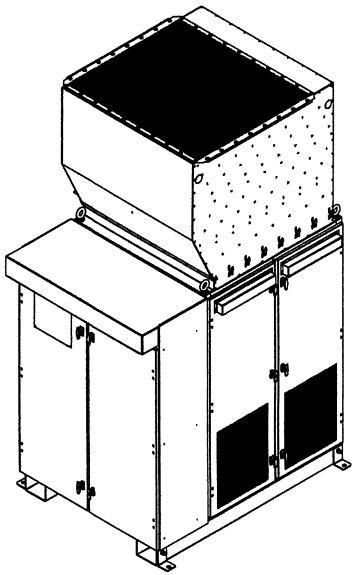
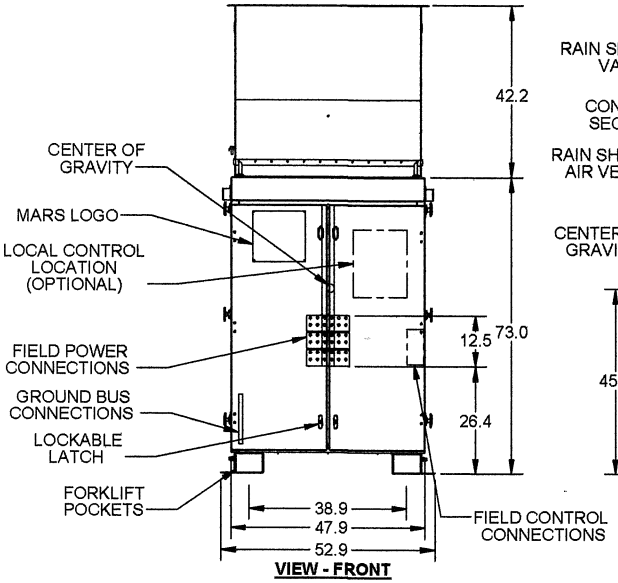
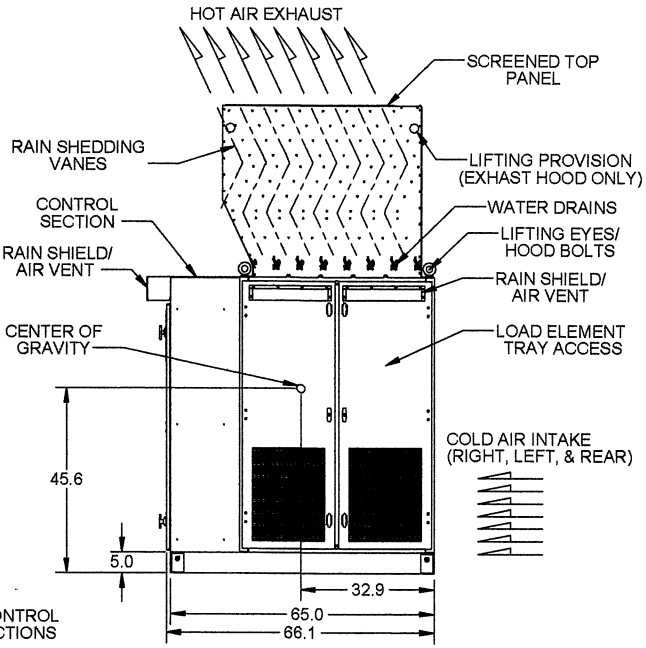
Design subject to change without notice.



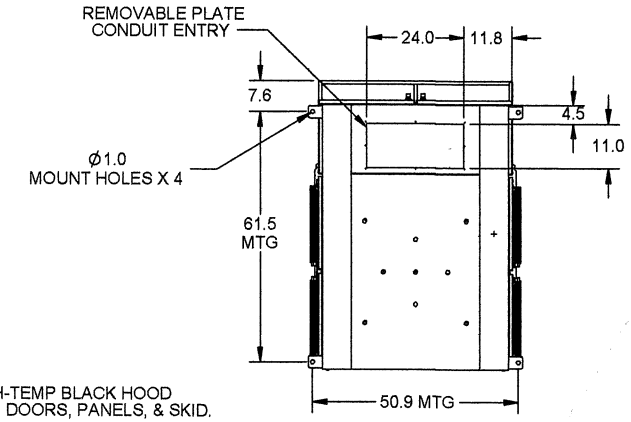
VIEW - ISOMETRIC
(REFERENCE ONLY)



VIEW - FRONT



VIEW - RIGHT



VIEW - BOTTOM

NOTES:
(UNLESS OTHERWISE SPECIFIED)
1. ENVIROMENTAL TYPE - 3R UL APPROVED
2. FINISH - UL POWDER COAT DAR GRAY CABINETS & HIGH-TEMP BLACK HOOD
3. CONSTRUCTION: ALL WELDED, FORMED, STEEL FRAME, DOORS, PANELS, & SKID.
4. AIR FLOW - 21600 CFM
5. MAX INLET TEMP: 125°F
6. MAX △T: 150°F
7. MAX EXHAUST TEMP: 600°F
8. APPROXIMATE WEIGHT - 2700 LBS, 2200 LBS CABINET & 500 LBS EXHAUST HOOD

SIMPLEX

SIMPLEX, INC.
6300 RISING MOON ROAD
SPRINGFIELD, ILLINOIS 62711-6228

THIRD ANGLE PROJECTION

REVISIONS & UPDATES

REV	DESCRIPTION	DATE	APPR
A	Issued for submittal	PWC	MT

TOLERANCES
X.XXX ± 0.005"
X.XX ± 0.010"
X.X ± 0.020"
FRACTIONAL ± 1/32"
ANGLES ± 1°
SURFACES 125

APPROVED BY:	JLW
DRAWN BY:	PWC
SCALE:	1:30
SHEET SIZE:	B-SIZE
SHEET TITLE:	Submittal
W.O. #:	NA
WEIGHT:	2700 lbs

PROJECT
Mars

PART DESCRIPTION
Mars Cabinet Assembly

PART NUMBER
ASM-00016871

PART REVISION: **C**

DRAWING NUMBER
DWG-00008870

SHEET NUMBER	REVISION
1 / 2	A

PRODUCT WARRANTY

SIMPLEX, Inc., warrants the industrial electrical control, test and accessory equipment and parts and accessories thereof to be the kind and quality described in SIMPLEX's specifications and to be free from defects in material or workmanship under normal service, its obligations under this warranty being limited to repairing or replacing, at its option, any part or parts which shall, within twelve (12) months from date of shipment from its factory, as indicated by serial date code on the nameplate or sales records, be returned to SIMPLEX or an authorized SIMPLEX repair station, with transportation costs prepaid, and which its examination shall disclose to its satisfaction to have been thus defective.

The provisions of this warranty shall not apply to any equipment, part or accessory which

(a) has been improperly specified by buyer;

(b) has been improperly stored or handled prior to placing in service;

(c) has been improperly mounted or connected;

(d) has not been operated within specifications stated on its nameplate, label or placard;

(e) has not been properly maintained;

(f) parts supplied by buyer for inclusion in finished equipment are not covered by this warranty;

(g) components or assemblies specified by buyer with no substitution permissible that are not normally used by SIMPLEX.

SIMPLEX reserves the right to reject warranty claims of any kind against assembled equipment, parts or material for which SIMPLEX has not received payment in full.

Should buyer, at his own risk, elect to replace defective equipment or parts in the field rather than return equipment to SIMPLEX's factory or authorized repair station, SIMPLEX will supply and invoice parts at normal prices upon receipt of buyer's bona-fide purchase order. Defective equipment or parts returned for in-warranty crediting in exchange for replacement parts must be returned within 45 days from date of shipment of replacement in order to qualify for warranty consideration. Defective equipment or parts returned after 45 days may be subject to a restocking charge of 20% or a minimum charge of $50.00, whichever is greater.

This warranty is in lieu of all other warranties, express or implied, and all other obligations or liabilities on the part of SIMPLEX, and SIMPLEX neither assumes nor authorizes any other person to assume for it any other liability in connection with any such electrical control, test or accessory equipment or accessories or parts.

SIMPLEX®

CONDITIONS OF SALE

The following conditions apply without exception unless such exception is made in writing and signed by an officer of Simplex. Simplex will, at its option, sell or rent technical industrial equipment or parts thereof or material only on condition that buyer assumes responsibility for correct specification, storage, installation, field adjustments when normally required, testing and appropriate training of users technically competent personnel before release to user and that any malfunction or failure of Simplex supplied material will be reported to Simplex immediately and that no back charges of any nature will accrue to Simplex, without the express written consent of Simplex.

Quotations: Unless specifically stated otherwise, price quotations are based on standard pricing, handling, delivery and warranty. Substantial alterations in details or intent of Simplex's quotations on buyer's purchase order will subject buyer to additional charges based on increased cost incurred by Simplex. Written quotations are firm for 60 days unless otherwise noted. Acceptance of orders based on oral quotes, published literature or written quotations older than 60 days are subject to approval by an officer of Simplex. Delivery dates are the best estimated as of date of issue. We reserve the right to correct and/or reject quotations made on our behalf by our Sales Representatives or Agents. Unless otherwise advised in writing by seller a minimum 10% down payment on non-standard, special equipment, quoted to customer specification will be required prior to approval drawings being supplied. In event of order cancellation this down payment is non-refundable. Progress payments maybe required on high value special equipment. Such payments would require 10% down payment to cover engineering costs, 25% payment upon receipt of customer release to production to cover material costs and balance as determined by Simplex's Finance Department. These payments are non-refundable in event of order cancellation or customer default.

Delays in Manufacturing or Delivery: Seller shall not be held liable for delay in manufacturing or delivery occasioned by causes beyond our control. In no event shall we be liable for any consequential damages or claims for labor resulting from failure or delay in delivery.

Prices: All prices are f.o.b. Springfield, Illinois, with buyer paying all freight costs, unless allowed in written quotation. Prices and other published data are for reference purposes only and do not imply availability of product. Prices are subject to change without notice and prices in effect at the time of shipment will apply to new orders and unreleased existing orders unless otherwise quoted in writing.

Minimum Billing: A minimum billing of not less than $75 will apply to all orders. Minimal fees to offset in part extra costs incurred during order entry process, special services as ordered by customer, shipping processes and collection efforts will be charged where applicable.

Taxes: Published or quoted pricing does not include any federal, state or local taxes. Buyer should report any federal, state, or local taxes as may be required by local law.

Penalty Clauses: Unless specifically accepted in writing by Simplex, Price quotations do not include participation by Simplex in any penalties or damages incurred by buyer.

Acceptance of Orders and Contracts: All orders must be bona-fide contracts detailing complete description of material ordered, included technical specifications as quoted by Simplex, price, terms, delivery, shipping instructions, etc. Simplex's failure to object to any provisions contained in buyer's order or any other communications shall not constitute a waiver of Simplex's terms and conditions not acceptance of such provisions. No order shall be considered accepted unless acknowledged in writing by Simplex.

Disputes, Judicial Forum: Actionable disputes shall be under the laws of the State of Illinois. Judicial forum shall be the circuit court of Sangamon County, Illinois or the Federal Court, Central Region, Illinois.

Terms of Payment - Purchase Material: Net cash U.S. funds 30 days from date of invoice, which shall be the same as date of shipment from our factory, to approved open account customer. All other orders are cash in advance or COD. Material ordered to ship on a given date and later ordered by buyer to be held for later shipment will be invoiced on date shipment originally scheduled or on date material becomes available for shipment, whichever occurs later, and terms of payment will apply from that invoice date. No cash discounts are allowed. Storage and handling charges will accrue to purchaser.

Terms of Payment - Rental Equipment or Field Service: Payable upon receipt of invoice in U.S. funds to approved open account customers. In other cases, payment by cash in advance, COD or security deposit.

ACH: When you provide a check as payment, you authorize us either to use information from your check to make a onetime electronic fund transfer from your account or to process the payment as a check transaction. When we use information from your check to make an electronic fund transfer, funds may be withdrawn from your account as soon as the same day we receive your payments, and you will not receive your check back from your financial institution.

Credit Cards: A processing fee may be added for credit card transactions.

Service Charges: Service charges of 1.5% per month on the unpaid balance apply from 31st day after invoice date. Failure to pay such charges as billed may result in suspension of open account terms.

Cancellation: Upon acceptance by Simplex your order will be entered for production and will not thereafter be subject to cancellation or deferment of delivery schedule without written consent from Simplex. Any expenses already accumulated by Simplex due to cancellation of an order or the extra expense of deferment of a delivery schedule will be borne by customer.

Packing and Marking: Prices include our standard packing and marking for domestic shipment within the continental U.S. Additional expenses incurred for special packing and marking as specified by buyer will be paid by the buyer. No allowance in lieu of packing will be made if buyer accepts material unpacked at our factory or authorized service station.

Shipping Weights: Published shipping weights are approximate and are provided only for estimating freight costs.

Shipments: Shipments will be made best way surface unless otherwise specified by buyer. Responsibility for lowest cost and fastest means shipping method is the buyer's and details are to be specified in the buyer's purchase order. Simplex's responsibility ceases when the carrier signs for and accepts shipment and claims for non-delivery of material or damage, should be filed with carrier by buyer.

Returning Material: Written authorization to return material for credit or repair or replacement must be obtained from Simplex. Such returns are subject to restocking, exchange or repair charges with all transportation charges paid by buyer and are subject to acceptance by Simplex. Simplex, at its option, will apply credited amounts to buyers account, current or future balances, or issue cash refund.

Drawings: One copy of standard drawings, wiring diagrams and instruction manual conforming to Simplex's standard practices will be furnished per unit purchased at no charge. Prices quoted upon request for special drawings or additional copies of standard drawings and instruction manuals.

Warranty: Simplex warrants new industrial equipment or parts or material to be the kind and quality described in Simplex's specifications and to be free from defects in material or workmanship under proper conditions of application and use for period of 12 months. SEE WARRANTY FORM.

SIMPLEX®

SECTION 6
START-UP AND WARRANTY

Cummins Sales and Service

Customer / Contractor Pre Commissioning Inspection Form

The intent of this form is for the contractor to prepare for equipment to be commissioned by a certified Cummins Field Service Power Generation Technician. Filling out this form is required and will minimize delays due to equipment failing to meet requirements. Completing this checklist in its entirety should minimize the need for additional billing beyond the previously provided commissioning quote.

The items listed are the responsibility of the contractor and not Cummins Sales and Service.

Project Name/End User: _____

Contractor: _____

Address: _____ **Contact:** _____

Business Phone: _____ **Cell Phone:**_____

Email: _____

ON SITE INFORMATION

On-Site Contact Information: _____

Address: _____

Time Requested Onsite: _____

Sub location of Generator (ie. Roof, basement, floor): _____

Does the facility have the following: Loading Dock ☐ Elevator ☐

Access (from truck and load bank parking to generator in feet): _____

Parking: Is parking available on-site for service truck: Yes ☐ No ☐

Permits: Have all necessary air quality and local permits been secured: Yes ☐ No ☐ N/A ☐

Fuel Tank Testing: Is fuel tank testing required: Yes ☐ No ☐

If yes when is the inspector scheduled for: _____

Sales and Service

ON SITE INFORMATION CONTINUED

YES	NA	NO
☐	☐	☐
☐	☐	☐
☐	☐	☐

Is the facility occupied and is customer aware there will be power outages after generator is started?

Will there be any site safety training needed for technician prior to beginning? On site contact for training: _____

Will customer representative be on site for operator training?

On site contact for operator training: _____

MECHANICAL LOCATION AND PLACEMENT OF THE GENERATOR SET

YES	NA	NO
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Generator is properly secured to pad or vibration isolators

Generator Enclosure and/or Room is free of all debris

No airflow obstructions to the engine or generator are present for cooling combustion (See Cummins T-030 or Installation manual of generator set)

Room is designed for adequate inlet and outlet airflow

GASEOUS FUEL Natural Gas/LP Vapor/LP Liquid

YES	NA	NO
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Natural gas and/or LPG fuel supply is connected.

Fuel piping is the appropriate size based on full-load CFH/BTU requirement. Pipe size after service regulator: _____

Service regulator(s), (if supplied), fuel strainer(s), flexible fuel line(s) and manual shut off are installed

Fuel pressure after service regulator is:_____inches of H2O

I have read and fully understand the fuel requirements for this equipment, I am verifying that the piping and fuel supply meets or exceeds those requirements. I also understand failure to meet the requirements will result in additional charges.

_____ _____

Contractor "requestor" Signature ***Date***

Sales and Service

DIESEL FUELED GENERATORS

YES	NA	NO	
☐	☐	☐	Flexible fuel connections, (supply and return) are connected to generator and piping.
☐	☐	☐	Day tank installed, wired and plumbed (lines free of obstruction) to genset and main fuel tank if applicable. Only black iron pipe for fuel lines, never use copper or galvanized pipe.
☐	☐	☐	All tanks filled with enough fuel to perform startup and testing.
☐	☐	☐	A return line from engine to day tank and day tank to main tank should be in place

EXHAUST SYSTEM

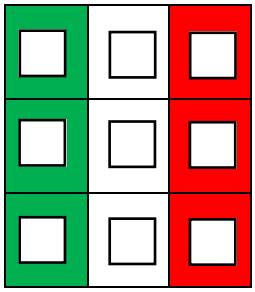
YES	NA	NO	
☐	☐	☐	Exhaust wrapped or isolated to prevent accidental activation of fire protection devices and sprinklers.
☐	☐	☐	Exhaust flex-pipe is installed at engine exhaust outlet (The silencer and flex-pipe are supplied with the generator set).
☐	☐	☐	Silencer is installed with appropriate supports (no weight should be placed on the exhaust outlet of the genset).
☐	☐	☐	Exhaust system has proper expansion joints and wall thimbles (Thimbles are required for wall or roof penetration).

GENERATOR ELECTRICAL CONNECTIONS

YES	NA	NO	
☐	☐	☐	Load conductors connected to breakers
☐	☐	☐	Flexible connections used on all conduit connections to the generator set output box
☐	☐	☐	Remote start interconnection **stranded** wiring is installed between the generator set and the automatic transfer switch(s) and annunciator.
☐	☐	☐	AC Power conductors in dedicated conduit separate from any DC control or network wiring
☐	☐	☐	Ground fault connected/functioning on generator, if supplied
☐	☐	☐	AC power wired to the coolant heaters (Do NOT energize)
☐	☐	☐	Check for AC oil pan heater, control heater or generator winding heater (Needing AC wiring)
☐	☐	☐	Generator is grounded in compliance with local codes
☐	☐	☐	If applicable, louver motors are operational and connected to generator controls

GENERATOR ELECTRICAL CONNECTIONS CONTINUED

YES NA NO



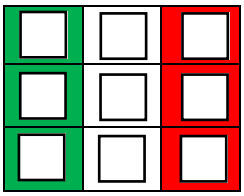
Annunciator mounted in a location where someone can observe a fault of the remote generator system
Where is annunciator located? _____

Are there additional ancillary devices/equipment that need to be integrated into the system? If yes, please define_____

Battery charger mounted (free of vibration, weather, accessible for an operator to observe easily) and connected to the appropriate AC and DC wiring to operate the charger.

TRANSFER SWITCH ELECTRICAL CONNECTIONS

YES NA NO



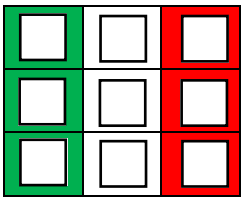
Conductors connected for Utility, Load and Emergency

Remote start interconnection **stranded** wiring is installed between the generator set and the automatic transfer switch(s).

Four Pole Transfer Switch: Is generator neutral grounded? ☐

DAY OF STARTUP

YES NA NO



Training of facility personnel will be done on the same day as start up. Additional trips for operational training will be an additional charge.

Can transfer switch be tested at time of generator startup? (There will be a power interruption) ***Note: After hours testing could result in additional charges.***

If the associated switchgear and/or ATS(s) are not provided by Cummins, will the manufacturer's representative be on site?

Exercise with or without load? ☐

If known, Transfer Time delay set recommendations Generator Set to exercise Day:_____ Time:_____

_____ _____

Contractor "requestor" Signature ***Printed Name***

Date: _____

Please complete this form and return to schedule start up, if not returned within 5 business days prior to scheduled startup it may be delayed. I understand that the start-up date may have to be rescheduled at my expense if the above items have not been completed properly.

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL
Generator

PROJECT:

Training will be conducted by a factory-trained maintenance specialist in engine / generator maintenance and service. Training duration will be approximately 1 hour with a question and answer session to last as long as needed to satisfy owner.

LESSON PLAN

I. Safety
   a. General safety precautions
   b. Equipment safety code
   c. Electrical shock and arc flash
II. Equipment Operation
   a. Engine/generator operation process
   b. Fundamental operating principals of the engine/generator
   c. Identify all components of equipment – mechanical, electrical, and electronic
      i. Standard operating procedures – start-up, monitoring, and shut-down
III. Component Description
   a. Identify each component's function – Engine/generator and Automatic Transfer Switch and their relationship to one another (if applicable)
IV. Preventive Maintenance
   a. Inspection Procedures
      i. Inspection with equipment in operation
      ii. Potential trouble symptoms
      iii. Planned maintenance requirements and intervals
   b. Procedures for testing equipment after maintenance has been performed
V. Service Events
   a. Alarms / Display Messages
   b. Procedures
      i. E-stop reset
   c. Symptom list
   d. Equipment Troubleshooting
   e. Probable Cause & Recommended Correction

"HANDS-ON" DEMONSTRATION

The instructor will demonstrate the engine/generator functionality in auto and manual modes.

Disclaimer
Training is for informational purposes only. If you have any specific safety or operational questions refer to the Operators Manual and/or Sequence of Operations documentation.

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

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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