RECORD ONLY SUBMITTAL PACKAGE



DEPCO - C750N6

Prepared for:

DEPCO Power Systems
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Date 4/15/24 Rev _

Salesforce O# Opp # 463387
BMS # BMS 33899
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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

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SECTION 1
PROJECT INFORMATION

April 2, 2024

Bill of Material

Feature Code	Description	Qty
C750N6	**GENEST, SPARK-IGNITED - 60 HZ, 750 KW-937 KVA**	6

Item	Description	Qty
C750N6	Genset - Spark Ign, Natural Gas, 60Hz, 750kW	1
ENG	GTA50E, 1135 HP, 8.5:1, Factory Certified for Emissions	1
CAT	Catalyst, 10" Flange, NSPS 2/4/1	1
A331-2	Duty Rating - Standby Power	1
L090-2	Listing - UL 2200	1
C002-2	Natural Gas	1
F267-2	Enclosure - Sound Att, LEVEL 2, Galvaneal, Base Mtd, with Exhaust System	1
P187-2	Onan Green Enclosure Color	1
B267-2	Generator - S6L1D-C41 (ADS #630), 60Hz, Winding 311 - 12 Wire, 120C, 0.8pf	1
R002-2	Voltage - 277/480, 3ph	1
B184-2	Exciter / Regulator - PMG, 3 Phase Sensor	1
A292-2	Heater - Alternator, 120VAC	1
KX21-2	Set Control - Power Command 3.3 MLD	1
H609-2	Controls Facing Left	1
E082-2	Radiator Cooled	1
H389-2	Shutdown - Low Coolant Level	1
H557-2	Coolant Heater_40°F MinAmbientTemp	2
E098-2	Sightglass on Radiator	1
A366-2	Engine Governor - Electronic, Isochronous Only	1
A334-2	Engine Starter - 24 VDC Motor	1
A333-2	Battery Charging Alternator - Normal Output	1
D041-2	Engine Air Cleaner - Normal Duty	1
H706-2	Lube Oil, Engine Filled Prior to Shipment	1
H669-2	Anti-Freeze - 50/50 Mix, System Filled Prior to Shipment	1
A466-2	Critical Grade Silencer, Carbon Steel	1
H268-2	Extension - Oil Drain	1
E089-2	Extension - Engine Coolant Drain	1
H606-2	Bargraph - AC Analog Meters	1
KA08-2	Alarm - Audible, Engine Shutdown	1
L050-2	Manuals in English	1
F065-2	Battery Rack	1
A465-2	Battery Charger, 120/208 VAC Input, 10A / 24V Output	1
A067G633	Fuel Strainer - Gaseous, 4in NPT	1
MM-3-24	Flexible Fuel Connection - Gaseous, 4in NPT	1

K631-2	Relays - Genset Status (User Configured)	1
H550-2	Ground Fault Indicator w/ Alarm Output Contact	1
M132-2	Circuit Breaker - LSi_1200A_100%_LEFT, 600/525V	1
L280-2	Genset Warranty - Standby Power 2 year / 1000 hours	1
F997-02	Std CB Mounting Option	1
P997-2	Drip Rails	1

IMPORTANT!

FUEL SUPPLY REQUIREMENTS

Fuel Source: Natural Gas

Fuel Consumption at Full Load: 11,401 SCFH

Required Operating Fuel Pressure: 14 -20 in H_2O

Fuel pressure required at the engine mounted regulator while the generator set is in operation, no load to full load. ***Please Note: The pressure listed is not a static pressure. If the above pressure is not maintained while the generator set is operating up to full load, the system will not function as required and the fuel delivery system will need to be reworked to provide operating pressure as listed.***

Required Fuel Pressure **AND** Volume **MUST** be available under **ALL** operating conditions at the generator set location.

All generator sets must be installed with a flexible fuel line and fuel strainer prior to the engine connection:

Flexible Fuel Line: [ ] included loose accessory
[ ] included engine mounted

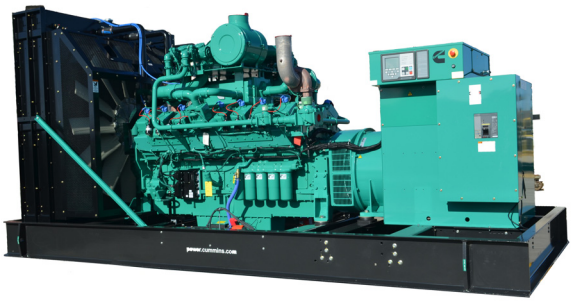
Fuel Strainer: [ ] included loose accessory

SECTION 2
GENERATOR SPECIFICATIONS

Specification sheet

Gaseous fuel generator set

600 kW - 750 kW 60 Hz



Description

You can count on the 600-750 kW natural gas generator set (GenSet) for the reliability, quality, and dependability that is genuine Cummins performance. EPA-certified, this fully-integrated power generation system provides optimum performance and versatility for demand response and stationary standby power applications.

Features

- Over 100 years of Cummins power generation technology and innovation
- Listed to UL 2200 and CSA standards for all low voltage models
- Stamford rugged and reliable alternator with state-of-the-art technology
- One-year (demand response) and two-year (standby) base warranty supported by a worldwide Cummins twenty-four hour, seven days-a-week, distributor network
- Accepts 100% rated load in a single step
- Capable of meeting NFPA 110 Type 10 for Level 1 emergency or standby power supply systems (EPSSs) when installed and operated per Cummins and NFPA guidelines
- Standard Power Command Control (PCC) 3300 technology provides digital (precise) frequency and voltage regulation
- Efficient and convenient operation monitoring and control options:
  - Modbus over the Internet (monitor and control)
  - Remote HMI (monitor and control)

Model	Power rating 60 Hz kW (kVa)		Emissions	Data sheet
	Standby	Demand Response		
C600N6	600 (750)		EPA-certified for stationary emergency and non-emergency applications	NAD-C600N6
C650N6	650 (813)			NAD-C650N6
		600 (750)		NAD-C650N6DR
C750N6	750 (937)			NAD-C750N6
		700 (875)		NAD-C750N6DR

Engine specifications

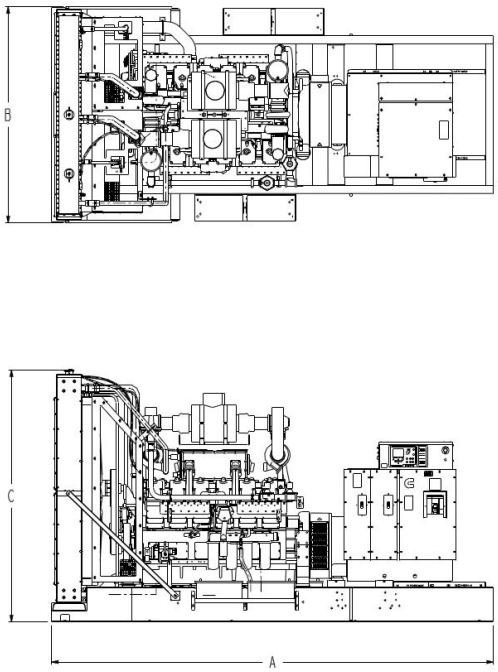
Base engine	Cummins GTA50E
Displacement	3069 in^3 (50.3 L)
Minimum battery capacity	1800 amps at minimum ambient temperature of 0 °F (-18 °C)
Battery charging alternator	70 amps
Starting voltage	24-volt, negative ground
Standard cooling system	104 °F (40 °C)

Alternator specifications

Design	Brushless, 4-pole, drip-proof revolving field
Stator	2/3 pitch
Rotor	Direct-coupled by flexible disc
Insulation system	Class H per NEMA MG1-1.65 or better
Standard temperature rise*	125 °C
Exciter type	Permanent Magnet Generator (PMG)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct-drive centrifugal blower

* For UL ratings, refer to temperature rise at 120 °C or below, and ambient temperature up to 40 °C

Outline drawing



This outline drawing is for reference only.
Do not use for installation design.

All models	Dim "A" in. (cm)	Dim "B" in. (cm)	Dim "C" in. (cm)
Open set	203 (516)	92 (234)	128 (325)
Weather protec enclos			25)
Sound-attenuated Level I & II enclosure	365 (927)	102 (259)	128 (325)

Refer to drawings for specific weights and dimensions

NOTE: Consult drawings for applicable weights. Contact the factory for additional information.

GenSet options and accessories

Engine

- 240/480 V, 4000 W coolant heaters (480 field-wired)
- 240 V, 300 W lube oil heater

480V 1P/5000W x 2 coolant heater

Alternator

- 80 °C rise
- 105 °C rise
- ~~125~~ °C rise

Refer to alternator datasheet for project specific temperature ratings

120C

- 120/240 V, 200 W anti-condensation heater

Fuel system - flexible fuel connector and fuel strainer

Exhaust system

- GenSet mounted muffler (enclosure models, only)
- Critical grade silencer
- Hospital grade silencer

Generator set

- Batteries
- Battery charger - 120/208/240 V, 10A
- Main line circuit breaker
- Electronically-operated (E.O.) generator breaker
- PowerCommand Network I/O module
- PowerCommand Network Aux 101, 102 module
- Remote control HMI with extension harness
- Remote annunciator panel
- Spring isolators
- Audible alarm
- Oil maintainer
- Weather-protective enclosure with silencer
- Sound-attenuated enclosure Level I and Level II with silencer
- Warranty - five-year standby including parts, labor, and travel

Standby power 2 year warranty

Applicable codes and standards

The Underwriters Laboratory (UL) 2200 Listing is a comprehensive safety standard encompassing the design, construction, and performance of stationary GenSets.

CSA Group tests products under a formal process to ensure that they meet the safety and/or performance requirements of applicable standards. This GenSet is certified to: CSA 22.2 No. 100 Motors and Generators; CSA 22.2 No. 0.4-044 Bonding of Electrical Equipment; CSA 22.2 No. 14 Industrial Control Equipment; and CSA 22.2 No. 0 General Requirements - Canadian Electrical Code, Part II.

Engine is certified to Stationary Emergency and Non-Emergency U.S. EPA New Source Performance Standards (NSPS), 40 CFR 60 subpart JJJJ.
U.S. applications must be applied per EPA regulations.

This product has been manufactured under the controls established by a Bureau Veritas Certification approved management system that conforms with ISO 9001:2015.

PowerCommand 3.3 control system



An integrated microprocessor-based GenSet control system providing voltage regulation, engine protection, AmpSentry alternator protection, operator interface and isochronous governing.

Advanced control methodology

- Designed for reliable operation in harsh environment.
- Provides battery monitoring and testing features and smart starting control system.
- Includes three-phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.
- Digitally governed with temperature dynamic governing and integrated digital electronic isochronous governing.
- **Prototype tested** - UL, CSA, and CE compliant.
- **Supports multiple languages**- English, Spanish, and French (standard); other languages, optional.
- **Protects the engine**- cranking lockout, overspeed shutdown, and battleshort; sensor failure indication; low fuel level warning or shutdown; low oil pressure warning and shutdown; high/low coolant temperature warning and shutdown; fail to start (overcrank) and fail to crank shutdown; and battery voltage monitoring, protection, and testing.
- **Enables paralleling control** - direct control of the paralleling breaker and displays breaker status; First Start Sensor System selects first GenSet 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 (baseload/peak shave) Mode; and digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions.
- **Includes AmpSentry alternator protection** - over current and short circuit shutdown; over current warning; single and three-phase fault regulation; over and under voltage/frequency shutdown; overload warning with alarm contact; reverse power and reverse var shutdown; and field overload shutdown.
- Cummins InPower PC-based service tool connects to the PowerCommand 3.3 control system for detailed diagnostics, setup, data logging, and fault simulation.
- Comes standard with PCCNet and Modbus interface.
- Allows for up to twenty configurable data inputs and outputs.

State-of-the-art operator panel

- Includes LED lamps indicating GenSet running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop.
- **Displays engine data** - DC voltage and engine speed; lube oil pressure and temperature; coolant temperature; and comprehensive full authority electronic (FAE) data.
- **Provides GenSet data** - start attempts, starts, running hours, kW hours; load profile (operating hours at percent load in 5% increments); fault history – up to 32 events; data logging and fault simulation (requires InPower); air cleaner restriction indication; exhaust temperature in each cylinder.
- **Includes alternator data** - Line-to-neutral and line-to-line AC volts; three-phase AC current; frequency; kW, kVar, and power factor kVa (three-phase and total); and winding temperature and/or bearing temperature (optional).

Refer to document S-1570 for more detailed information.

100 YEARS OF
POWER
GENERATION

Ratings definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power is in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271, and BS 5514.

Demand Response Power Rating - Spark Ignited Gas (DRP):
Applicable for supplying electrical power in parallel with commercially available power in variable and non-variable load applications. This fuel rating is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engine operation is limited to a total of 500 hours per year. Engines may be operated in parallel to the public utility for up to 500 hours per year, with an average load factor no greater than 80% of rated Demand Response Power. Engines with Standby Power ratings available can be run in Emergency Standby applications up to the Standby Power rating for up to 50 hours per year. The customer should be aware, however, that the life of any engine will be reduced by constant high load operation.

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect GenSets to any building electrical system except through an approved device or after the building main disconnect is open. Neutral connection must be bonded in accordance with National Electrical Code.

Specifications are subject to change without notice.

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NAS-C600N6-C650N6-C750N6
November 2021

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Generator set data sheet

Model	**C750N6**
Frequency	**60 Hz**
Fuel type	**Natural gas**
kW (kVa) rating	**750 (937) standby**
	Demand response ready - see data sheet NAD-C750N6 DR
Emissions	**EPA-certified for stationary emergency and non-emergency applications**

Exhaust emission data sheet	EDS-3075
Sound performance data sheet	MSP-4067
Cooling performance data sheet	MCP-2115
Prototype test summary data sheet	PTS-698
Standard set-mounted radiator cooling outline	C750N6-01

Fuel consumption Fuel consumption for cfh and m^3/hr is based on 905 Btu/ft^3.	**1/4 load**	**1/2 load**	**3/4 load**	**full load**
cfh	3872	6081	8724	11,401
m^3/hr	110	172	247	323
MMBtu/hr	3.50	5.50	7.90	10.32

Fuel supply

Fuel supply pressure is measured at the factory-supplied fuel shut-off (FSO) valve.
Fuel inlet pressure must not exceed 25 in. WC under any operating condition.

Minimum operating pressure, in. H_20 (kPa)	14 (3.5)
Maximum operating pressure, in. H_20 (kPa)	20 (5)

Engine	**Standby**	**Prime**	**Continuous**
Engine manufacturer	Cummins		
Engine model	GTA 50E		
Configuration	V16		
Aspiration	Turbocharged and coolant-air aftercooled		
Gross engine power output, bhp (kWm)	1135 (847)		
BMEP at set rated load, psi (kPa)	162 (1117)		
Bore, in. (mm)	6.25 (159)		

Engine (cont'd.)	Standby	Prime	Continuous
Stroke, in. (mm)	6.25 (159)		
Rated speed, rpm	1800		
Piston speed, ft./min (m/s)	1875 (9.5)		
Compression ratio	8.5:1		
Lube oil capacity, qt. (L)	237 (224)		
Overspeed limit, rpm	2150		
Regenerative power, kW	165		

Air			
Combustion air, cfm (m^3/min)	1886 (53)		
Max air cleaner restriction (dirty filter), in. H_2O (kPa)	15 (3.7)		
Alternator cooling air, cfm (m^3/min)	3420 (96.84)		

Exhaust			
Exhaust flow at set rated load, cfm (m^3/min)	7432 (223)		
Exhaust temp, °F (°C)	1261 (683)		
Max allowable system back pressure, in. H_2O (kPa)	47.7 (11.9)		
Catalyst back pressure, in. H_2O (kPa)	20.4 (5.08)		

Cooling			
Ambient design, °F (°C)	104 (40)		
Fan load, HP (kWm)	100 (74.6)		
Coolant capacity (with radiator), gal (L)	119 (450)		
Cooling system air flow, acfm (m^3/min)	64,806 (1944)		
Heat rejected, jacket water circuit, Btu/min (MJ/min)	57,886 (61)		
Heat rejected, after-cooler circuit, Btu/min (MJ/min)	5509 (5.81)		
Total heat radiated to room, Btu/min (MJ/min)	63,395 (67)		
Max cooling air flow static restriction, in. H_2O (kPa)	0.5 (0.12)		

Weight

Weight represents a set with standard features. See outline drawing for weights of other configurations.

Unit wet weight lbs. (kgs)	22,578 to 24,650 (10,241 to 11,181)

Full-load amperage (FLA) at rated voltage

Three-phase FLA is based on 0.8 power factor (PF).

120/240 (1 Ph)	120/208	127/220	139/240	220/380	240/416	254/440	277/480	347/600
N/A	2602	2460	2255	1424	1301	1230	1128	902

Derates

Engine power available up to 3750 ft. (1143 m) and ambient temperatures up to 104 ˚F (40 ˚C). Above these conditions, derate at 4% per 1000 ft. (305 m) and 1% per 18 ˚F (10 ˚C) to a maximum of 10,000 ft.

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ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect GenSets to any building electrical system except through an approved device or after the building main disconnect is open. Neutral connection must be bonded in accordance with National Electrical Code.

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Specification Sheet

PowerCommand® 3.3 Generator Set Digital Integrated Control System



Bargraph Optional

Introduction

The PowerCommand® 3.3 control system is a microprocessor-based generator set monitoring, metering, and control system, which is comprised of PowerCommand® Control 3300 and the Human Machine Interface 320. PCC3300 supports multiple operation modes including:

- Standalone,
- Synchronization only,
- Isolated bus paralleling,
- Utility single generator set paralleling,
- Utility multiple generator set paralleling,
- Utility single generator set paralleling with power transfer control (automatic mains failure),
- Isolated bus paralleling with Masterless Load Demand

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

Offering enhanced reliability and performance over more conventional generator set controls via the integration of all generator control functions into a single system, PCC3300 is your Power of One generator set control solution.

Benefits and Features

- 320 x 240 pixels graphical LED backlit LCD
- Multiple languages supported
- AmpSentry™ protection provides industry-leading generator overcurrent protection
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr control
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing is provided on applicable platforms
- Generator set monitoring (including metering) and protection with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- 12 V (DC) and 24 V (DC) battery operation
- RS-485 Modbus® interface for interconnecting to customer equipment
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA, and CE standards

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PowerCommand® Generator Set Digital Control System PCC 3300



Introduction

PCC3300 is an industry-leading digital generator set control suitable for usage on a wide range of diesel and lean burn natural gas generator sets in both standalone as well as paralleling applications.

PowerCommand® is compatible with either shunt or PMG excitation, and is suitable for usage with reconnectable or non-reconnectable generators. Configuration for any frequency, voltage and power connection from 120 V (AC) to 600 V (AC) line-to-line or 601 V (AC) to 45k V (AC) with an external PT is supported. The PCC3300 derives its own power from the generator set starting batteries and functions over a voltage range of 8 V (DC) to 30 V (DC).

Features

- PCC3300 supports configurable control features via software download using InPower PC-compatible software
- 12 V (DC) and 24 V (DC) battery operation
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing on applicable platform is provided, which is capable of providing isochronous frequency regulation
- Full authority J1939 CANBus® prime mover communications and control is provided for platforms with an Engine Control Module (ECM)
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
  - Reduces the risk of Arc Flash due to thermal overload or electrical faults by inverse time protection
- Generator set monitoring offers status information for all critical prime mover and generator functions
- AC and DC digital generator set metering is provided. AC measurements are configurable for single or three phase sensing with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Battery monitoring system continually monitors the battery output and warns of the potential occurrence of a weak battery condition
- Relay drivers for prime mover starter, fuel shutoff (FSO), glow plug/spark ignition power and switched B+ applications are provided
- Integrated generator set protection is offered to protect the prime mover and generator
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr Control
- The synchronization check function provides adjustments for phase angle window, voltage window, frequency window and time delay
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Advanced serviceability is offered via InPower™, a PC-based software service tool
- PCC3300 is designed for reliable operation in harsh environments with the unit itself being a fully encapsulated module
- RS-485 ModBus interface for interconnecting to customer equipment
- Native on PCC3300: Four discrete inputs, two dry contact relay outputs and two low-side driver outputs are provided and are all configurable.
  - Optional extra PCC3300 input and output capability available via AUX101
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards

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Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

Operator adjustments: The HMI320 includes provisions for many set up and adjustment functions.

Genset hardware data: Access to the control and software part number, genset rating in kVA and genset model number is provided from the HMI320 or InPower.

Data logs: Information concerning all of the following parameters is periodically logged and available for viewing; engine run time, controller on time, number of start attempts, total kilowatt hours, and load profile. (Control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history: Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kW, kVAr, Power Factor, kVA (three phase and total)
- Frequency

For Lean Burn Natural Gas Engine applications:

- Alternator heater status
- Alternator winding temperature (per phase) as well as alternator drive end and non-drive end bearing

Utility/AC bus data

- Voltage (three phase line-to-line and line-to-neutral)
- Current (three phase and total)
- kW, kVAR, Power Factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1-Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Coolant temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Lean Burn Natural Gas (LBNG) application parameters include:

- Safety shutoff valve status
- Valve proving status
- Downstream gas pressure
- Gas inlet pressure
- Gas mass flow rate
- Control valve position
- Gas outlet pressure
- Manifold pressure and temperature
- Throttle position
- Compressor outlet pressure
- Turbo speed
- Compressor bypass position
- Cylinder configuration (e.g., drive end and non-drive end configurations)
- Coolant pressure 1 and 2 as well as coolant temperature 1 and 2 for both HT/LT respectively
- Exhaust port temperature (up to 18 cylinders)
- Pre-filter oil pressure
- Exhaust back pressure
- Parent ECM internal temperature and isolated battery voltage
- Speed bias
- Child ECM internal temperature and isolated battery voltage
- Knock level, spark advance, and knock count (for up to 18 cylinders)
- Auxiliary supply disconnector status
- Engine heater status
- Coolant circulating pump status
- Lube oil priming pump status
- Lube oil status
- Oil heater status
- Derate authorization status
- Start system status
- Ventilator fan status
- Ventilation louvre status
- Radiator fan status
- DC PSU status
- Start inhibit/enable status and setup

Service adjustments – The HMI320 includes provisions for adjustment and calibration of genset control functions. Adjustments are protected by a password. Functions include:

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable input and output set up
- Meter calibration
- Paralleling setup
- Display language and units of measurement

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Prime Mover Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data transfer between genset and engine controller for control, metering and diagnostics.

12 V (DC) or 24 V (DC) nominal battery voltage is supported by PCC3300 for normal operation.

Temperature dependant prime mover governing dynamics: This function is supported enabling the engine to be responsive when warm and more stable when operating at lower temperature via providing control and modification over electronic governing parameters as a function of engine temperature.

Isochronous governing is provided in order to control prime mover speed within ±0.25% of nominal rated speed for any steady state load from no load to full load. During operation frequency drift should not exceed ±0.5% of nominal frequency given a 33ºC (or 60ºF) chance in ambient temperature within an eight-hour period.

Droop electronic speed is governing capability is natively offered by PCC3300 to permit droop from 0% to 10% between no load to full load.

Remote start capability is built into the PCC3300 as the unit accepts a ground signal from remote devices to automatically command the starting of the generator set as well as the reaching of rated speed, voltage and frequency or otherwise run at idle speed until prime mover temperature is adequate. The presence of a remote start signal shall cause the PCC3300 to leave sleep mode and return to normal power mode. PCC3300 supports an option for delayed start or stop.

Remote Start Integrity: In compliance with NEC2017 Start Signal Integrity standard – NFPA70 Article 700.10(D)(3), the remote start circuit from ATS to PCC3300 is continuously monitored for signal disturbance due to broken, disconnected or shorted wires via a configurable input. Loss of signal integrity results in activation of a remote start signal.

Remote and local emergency stopping capability: PCC3300 accepts ground signal from a locally or remoted mounted emergency stop switch to cause the generator set to immediately shutdown. The generator set is prevented from either running or cranking with the emergency stop switch engaged. If PCC3300 is in sleep mode, then the activation of any emergency stop switch shall return PCC3300 is normal powered state along with the activation of the corresponding shutdown and run-prevention states.

Sleep mode: PowerCommand 3.3 supports a configurable low current draw state, which is design with consideration to the needs of prime applications or others application without a battery charger (in order to minimize battery current drain).

Automatic prime mover starting: Any generator set controlled by PCC3300 is capable of automatic starting achieved via either magnetic pickup or main alternator output frequency. PCC3300 additionally supports configurable glow plug control where applicable.

Prime mover cycle cranking: PCC3300 supports configurable starting cycles and rest periods. Built in starter protection are incorporated to prevent the operator from specifying a starting sequence that may be damaging.

Configurable time delay functionality: PCC3300 supports time delayed generator set starting and stopping (for cooldown). Permissible time delays are as follows (noting a default setting is 0 seconds):

1. Start delay: 0 seconds to 300 seconds prior to starting after receiving a remote start signal.
2. Stop delay: 0 seconds to 600 seconds prior to shut down after receiving a signal to stop in normal operation modes.

Lean Burn Natural Gas application specific parameters

PCC3300 supports prime mover inhibiting in order to permit application-specific processes (i.e. Auxiliaries) to be started first.

Generator Control

PCC3300 performs both Genset voltage sensing and Genset voltage regulation as follows:

- Voltage sensing is integrated into PCC3300 via three phase line-to-line sensing that is compatible with shunt or PMG excitation systems
- Automatic voltage regulation is accomplished by using a three phase fully rectified input and has a FET output for good motor starting capability.

Major features of generator control include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/-1.5% for a 40 ºC (104 ºF) change in temperature in an eight-hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level.

The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand® will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Cylinder Cut-off System (CCS): PCC 3300 supports Cylinder Cut-off System which is used to operate the engines on half bank at no load and light load conditions. CCS has below benefits on engine

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performance- improved emission standards, improved fuel efficiency, reduced hydrocarbons, reduced white smoke, reduced wet stacking and higher exhaust temperature at light loads to improve turbocharger operations and catalyst performance.

Step Timing Control (STC): PCC 3300 supports STC functionality which is used to advance the engine timing of a hydro-mechanical engine during start up and light load conditions. During ADVANCED injection timing, it:

- Improves cold weather idling characteristics
- Reduces cold weather white smoke
- Improves light load fuel economy
- Reduces injector carboning

Paralleling Functions

First Start Sensor™ system – PowerCommand® provides a unique control function that positively prevents multiple gensets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between the gensets that allows the gensets to work together to determine which genset is a system should be the first to close to the bus. The system includes an independent backup function, so that if the primary system is disabled the required functions are still performed.

Synchronizing – Control incorporates a digital synchronizing function to force the genset to match the frequency, phase and voltage of another source such as a utility grid. The synchronizer includes provisions to provide proper operation even with highly distorted bus voltage waveforms. The synchronizer can match other sources over a range of 60-110% of nominal voltage and -24 to +6 hertz. The synchronizer function is configurable for slip frequency synchronizing for applications requiring a known direction of power flow at instant of breaker closure or for applications where phase synchronization performance is otherwise inadequate.

Load sharing control – The genset control includes an integrated load sharing control system for both real (kW) and reactive (kVar) loads when the genset(s) are operating on an isolated bus. The control system determines kW load on the engine and kVar load on the alternator as a percent of genset capacity, and then regulates fuel and excitation systems to maintain system and genset at the same percent of load without impacting voltage or frequency regulation. The control can also be configured for operation in droop mode for kW or Kvar load sharing.

Load govern control– When PowerCommand® receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW values from 0-100% of standby rating, and 0.7-1.0 power factor (lagging). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAR load govern droop.

Load demand control – The control system includes the ability to respond to an external signal to initiate load demand operation. On command, the genset will ramp to no load, open its paralleling breaker, cool down, and shut down. On removal of the command, the genset will immediately start, synchronize, connect, and ramp to its share of the total load on the system.

Sync check – The sync check function decides when permissive conditions have been met to allow breaker closure. Adjustable criteria are: phase difference from 0.1-20 deg, frequency difference from 0.001-1.0 Hz, voltage difference from 0.5-10%, and a dwell time from 0.5-5.0 sec. Internally the sync check is used to perform closed transition operations. An external sync check output is also available.

Genset and utility/AC bus source AC metering – The control provides comprehensive three phase AC metering functions for both monitored sources, including: 3-phase voltage (L-L and L-N) and current, frequency, phase rotation, individual phase and totalized values of kW, kVAR, kVA and Power Factor; totalized positive and negative kW-hours, kVAR-hours, and kVA-hours. Three wire or four wire voltage connection with direct sensing of voltages to 600V, and up to 45kV with external transformers. Current sensing is accomplished with either 5 amp or 1 CT secondaries and with up to 10,000 amp primary. Maximum power readings are 32,000kW/kVAR/kVA.

Power transfer control – provides integrated automatic power transfer functions including source availability sensing, genset start/stop and transfer pair monitoring and control. The transfer/retransfer is configurable for open transition, fast closed transition (less than 100msec interconnect time), or soft closed transition (load ramping) sequences of operation. Utility source failure will automatically start genset and transfer load, retransferring when utility source returns. Test will start gensets and transfer load if test with load is enabled. Sensors and timers include:

Under voltage sensor: 3-phase L-N or L-L under voltage sensing adjustable for pickup from 85-100% of nominal. Dropout adjustable from 75-98% of pickup. Dropout delay adjustable from 0.1-30 sec.

Over voltage sensor: 3-phase L-N or L-L over voltage sensing adjustable for pickup from 95-99% of dropout. Dropout adjustable from 105-135% of nominal. Dropout delay adjustable from 0.5-120 sec. Standard configuration is disabled and is configurable to enabled in the field using the HMI or InPower service tools.

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Over/Under frequency sensor: Center frequency adjustable from 45-65 Hz. Dropout bandwidth adjustable from 0.3-5% of center frequency beyond pickup bandwidth. Pickup bandwidth adjustable from 0.3-20% of center frequency. Field configurable to enable.

Loss of phase sensor: Detects out of range voltage phase angle relationship. Field configurable to enable.

Phase rotation sensor: Checks for valid phase rotation of source. Field configurable to enable.

Breaker tripped: If the breaker tripped input is active, the associated source will be considered as unavailable.

Timers: Control provides adjustable start delay from 0 - 300sec, stop delay from 0 - 800sec, transfer delay from 0-120sec, retransfer delay from 0-1800sec, programmed transition delay from 0-60sec, and maximum parallel time from 0-1800sec.

Negative Sequence Current Protection: PCC3300 supports this protection natively in order to determine if the generator is at any point was running subject to negative phase sequencing.

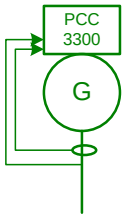
Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped.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

Exerciser clock –The exerciser clock (when enabled) allows the system to be operated at preset times in either test without load, test with load, or extended parallel mode. A Real Time Clock is built in. Up to 12 different programs can be set for day of week, time of day, duration, repeat interval, and mode. For example, a test with load for 1 hour every Tuesday at 2AM can be programmed. Up to 6 different exceptions can also be set up to block a program from running during a specific date and time period.

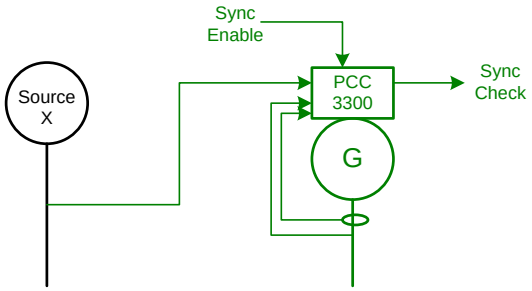
Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for either the genset metering point ("Base Load") or the utility metering point ("Peak Shave"). The control point for the reactive power (kVAR or Power Factor) can also be independently configured for either the genset metering point or the utility metering point. This flexibility would allow base kW load from the genset while maintaining the utility power factor at a reasonable value to avoid penalties due to low power factor. The System always operates within genset ratings. The control point can be changed while the system is in operation. Set points can be adjusted via hardwired analog input or adjusted through an operator panel display or service tool.

Application types – Controller is configured to operating in one of six possible application types. These topologies are often used in combinations in larger systems, with coordination of the controllers in the system either by external device or by interlocks provided in the control. Topologies that may be selected in the control include:

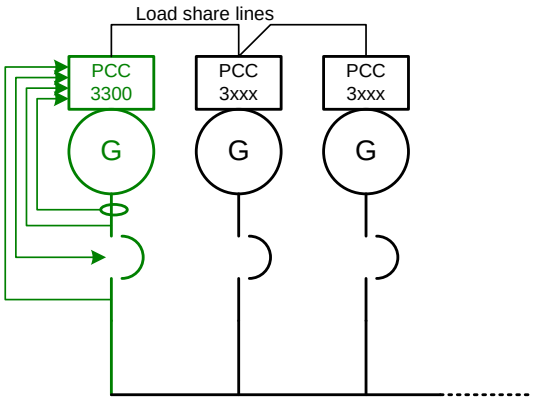
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



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

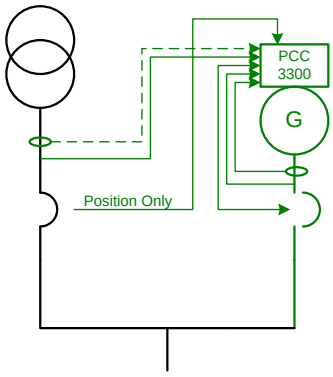


Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.

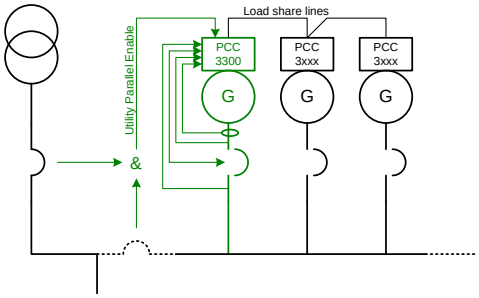


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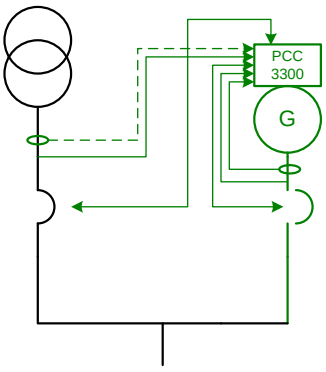
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



Utility Multiple: Supports all functionality of Isolated Bus and provides extended paralleling to the utility. Extended paralleling load set points follow a constant setting; dynamically follow an analog input, Modbus register or HMI.

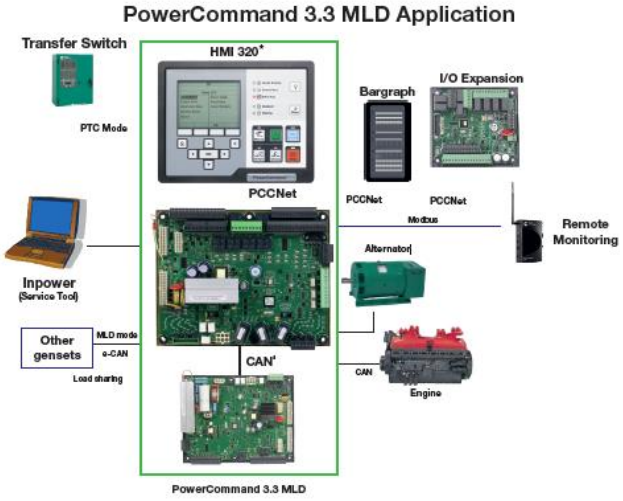


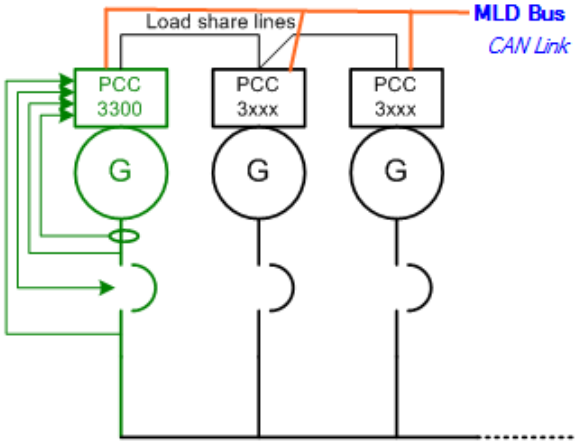
Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

PowerCommand® 3.3 with Masterless Load Demand (MLD) technology enables generator sets to start/stop automatically based on load demand. Masterless Load Demand-capable generators are equipped with an additional s-CAN network connection that allows sharing of information amongst paralleled generator sets. MLD has been designed for hassle-free installation, commissioning and operation. MLD functionality. Integrated on-board system logic provides the MLD topology control without the need for any additional system.





PCC3300 External Voltage and Frequency Biasing Inputs

PCC3300 supports externally driven voltage and frequency biasing capability in order to permit external paralleling (if intending to use this feature please contact your local distributor for further information).

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Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided. Protective functions include:

Battle short mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation (or are handled by the engine ECM) are not bypassed. Please refer to the Control Application Guide or Manual for list of these faults.

Derate

The Derate function reduces output power of the genset in response to a fault condition. If a Derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or Modbus. If a Derate command occurs while in utility parallel mode, the control will actively reduce power by lowering the base load kW to the derated target kW.

Configurable alarm and status inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, derate, shutdown, shutdown with cooldown or status indication and for labeling the input.

Emergency stop

Annunciated whenever either emergency stop signal is received from external switch.

General prime mover protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the genset is signaled to start and indicate a warning if the battery indicates impending failure.

Low coolant level warning – Can be set up to be a warning or shutdown.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

Fail to start (overcrank) shutdown - The control system will indicate a fault if the genset fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Fault simulation –The control in conjunction with InPower software, will accept commands to allow a technician to verify the proper operation of the control and its interface by simulating failure modes or by forcing the control to operate outside of its normal operating ranges. InPower also provides a complete list of faults and settings for the protective functions provided by the controller.

For Lean Burn Natural Gas Engine applications:

Off load running (protection) – This feature protects the engine in the event the genset is being called to go off load for too long.

Hydro Mechanical fuel system engine protection:

Overspeed shutdown – Default setting is 115% of nominal

Low lube oil pressure warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

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

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

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

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

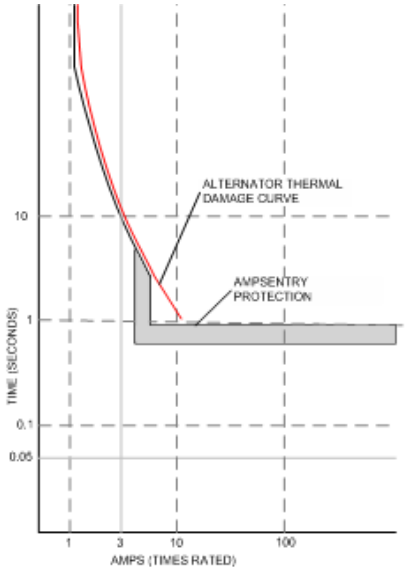
Full authority electronic engine protection:

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

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Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand® Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the genset or in the load. It also provides single and three phase fault current regulation (3x Current) so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3 phase short) or fixed timer (2sec for 1P short, 5sec for 2P short). See document R1053 for a full-size time over current curve. The control does not included protection required for interconnection to a utility (mains) service.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off or synchronizing.

Under frequency shutdown (81 u) - Genset output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5-20 second time delay. Default: 6 Hz, 10 seconds. Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81o) - Genset is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz, 20 seconds, disabled.

Overcurrent warning/shutdown (51) - Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Loss of sensing voltage shutdown - Shutdown of genset will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown genset when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point. Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown (40) - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Negative sequence overcurrent warning (46) – Control protects the generator from damage due to excessive imbalances in the three phase load currents and/or power factors.

Custom overcurrent warning/shutdown (51) – Control provides the ability to have a custom time overcurrent protection curve in addition to the AmpSentry protective relay function.

Ground fault overcurrent (51G) – Control detects a ground fault either by an external ground fault relay via a contact input or the control can measure the ground current from an external current transformer. Associated time delays and thresholds are adjustable via InPower or HMI.

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Paralleling Protection

Breaker fail to close Warning: When the control signals a circuit breaker to close, it will monitor the breaker auxiliary contacts and verify that the breaker has closed. If the control does not sense a breaker closure within an adjustable time period after the close signal, the fail to close warning will be initiated.

Breaker fail to open warning: The control system monitors the operation of breakers that have been signaled to open. If the breaker does not open within and adjustable time delay, a Breaker Fail to Open warning is initiated.

Breaker position contact warning: The controller will monitor both 'a' and 'b' position contacts from the breaker. If the contacts disagree as to the breaker position, the breaker position contact warning will be initiated.

Breaker tripped warning: The control accepts inputs to monitor breaker trip / bell alarm contact and will initiate a breaker tripped warning if it should activate.

Fail to disconnect warning: In the controller is unable to open either breaker, a fail to disconnect warning is initiated. Typically, this would be mapped to a configurable output, allowing an external device to trip a breaker.

Fail to synchronize warning: Indicates that the genset could not be brought to synchronization with the bus. Configurable for adjustable time delay of 10 -900 seconds, 120 default.

Phase sequence sensing warning: Verifies that the genset phase sequence matches the bus prior to allowing the paralleling breaker to close.

Maximum parallel time warning (power transfer control mode only): During closed transition load transfers, control independently monitors paralleled time. If time is exceeded, warning is initiated and genset is disconnected.

Bus or genset PT input calibration warning: The control system monitors the sensed voltage from the bus and genset output voltage potential transformers. When the paralleling breaker is closed, it will indicate a warning condition if the read values are different.

Field Control Interface

Input signals to the PowerCommand® control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Rupture basin
- Start type signal
- Battle short
- Load demand stop
- Synchronize enable
- Genset circuit breaker inhibit
- Utility circuit breaker inhibit
- Single mode verify
- Transfer inhibit – prevent transfer to utility (in power transfer control mode)
- Retransfer inhibit – prevent retransfer to genset (in power transfer control mode)
- kW and kVAR load setpoints

Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Input signals for Lean Burn Natural Gas Engine applications:

- Gearbox oil pressure/temperature protection
- Fire fault
- Earth fault support as a discrete input via an appropriate secondary detection device
- Differential fault
- DC power supply fault
- Genset Interface Box (GIB) isolator open fault
- Start inhibit/enable (x3)
- Radiator fan trip
- Ventilator fan trip
- Ventilation louvers closed
- Start system trip
- Alternator heater trip
- Alternator heater status
- Alternator winding temperature (PT100 RTDx3)
- Alternator drive end bearing temperature (PT100 RTD)
- Alternator non-drive end bearing temperature (PT100 RTD)

Output signals from the PowerCommand® control include:

- Load dump signal: Operates when the genset is in an overload condition.
- Delayed off signal: Time delay-based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 - 120 seconds. Default: 0 seconds.

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- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (genset running) signal: Operates when the genset has reached 90% of rated speed and voltage and latches until genset is switched to off or idle mode.
- Paralleling circuit breaker relays outputs: Control includes (4) relay output contacts (3.5A, 30 VDC) for opening and closing of the genset and utility breakers.

Output Signals for Lean Burn Natural Gas Engine applications:

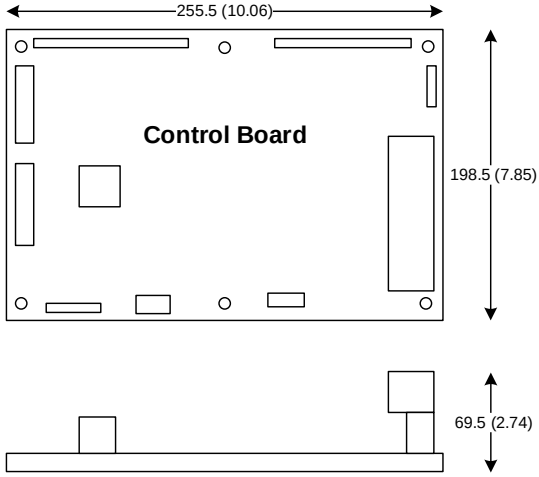
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

Communications connections include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins Power Generation products.

Mechanical Drawing



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PowerCommand® Human Machine Interface HMI320



Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

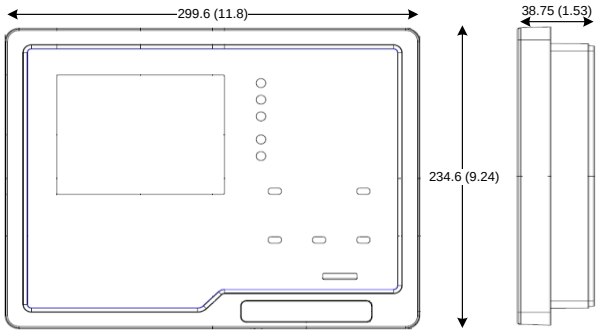
Features:

- LED indicating lamps
  - genset running
  - remote start
  - not in auto
  - shutdown
  - warning
  - auto
  - manual and stop
  - Circuit breaker open (if equipped)
  - Circuit breaker closed (if equipped)
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

Communications connections include:

- PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.
- This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



HMI

Dimensions: mm (inches)

Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand® gensets and transfer switches, to facilitate service and monitoring of these products.

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Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC (-40 ºF) to +70º C (158 ºF), and for storage from -55 ºC (-67 ºF) to +80 ºC (176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC (-4 ºF) to +70 ºC (158 ºF), and for storage from -30 ºC (-22 ºF) to +80 ºC (176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a genset. The control includes transient voltage surge suppression to provide compliance to referenced standards.

Certifications

PowerCommand® meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4:2005 compliance, controls and switchgear (second edition)
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking- The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN 61000-6-3,4 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized, suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand® control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.
- ROHS (Restriction of Hazardous substance) complaint both for HMI 320 & PCC3300v2.

Reference Documents

Please refer to the following reference documents available in the PowerSuite library:

- PowerCommand™ 3.3. Application Guide
- T-037: PowerCommand Control Application Manual (ANSI Protective Functions)
- T-040: PowerCommand 3.3 Paralleling Application Guide

Please refer to the following reference documents available on Cummins Quickserve:

- Service Manuals for PC3.3 (non-MLD) and PC3.3 (MLD)
- Modbus Register Mapping

Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

PCCNet COMPATIBLE

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Alternator Data Sheet
Frame Size: S6L1D-C4

Characteristics

	No of Bearings:	1-bearing		2-bearing	
Weights:	Stator assembly:	1770 lb	803 kg	1770 lb	803 kg
	Rotor assembly:	1590 lb	721 kg	1497 lb	679 kg
	Complete assembly:	4182 lb	1897 kg	4343 lb	1970 kg
Maximum speed:		2250 rpm			
Excitation current:	Full load:	2.9 (Wdg 311/312), 2.6 (Wdg 07)			
	No load:	0.74 (Wdg 311/312), 0.92 (Wdg 07)			
Insulation system:	Class H throughout				

3 Ø Ratings (0.8 power factor)			**60 Hz** (winding no)					
			347/600 (07)	208/416 (311/312)	220/440 (311/312)	230460 (311/312)	240/480 (311/312)	240 Delta (311/312)
150° C rise ratings	@ 40° C	kW	837	730	775	805	835	730
		kVA	1046	913	969	1006	1044	913
125° C rise ratings	@ 40° C	kW	800	700	740	770	800	700
		kVA	1000	875	925	963	1000	875
105° C rise ratings	@ 40° C	kW	730	652	676	712	732	652
		kVA	913	815	845	890	915	815
80° C rise ratings	@ 40° C	kW	632	568	588	612	632	568
		kVA	790	710	735	765	790	710

Reactances (per unit ± 10%)	347/600 (07)	208/416 (311/312)	220/440 (311/312)	230460 (311/312)	240/480 (311/312)	240 Delta (311/312)
(Based on full load at 125° C rise rating)						
Synchronous	1.79	2.86	2.71	2.58	2.46	2.86
Transient	0.17	0.20	0.19	0.18	0.17	0.20
Subtransient	0.14	0.17	0.16	0.15	0.14	0.17
Negative sequence	0.06	0.08	0.08	0.07	0.07	0.08
Zero sequence	0.01	0.02	0.02	0.02	0.01	0.02

Motor starting	347/600 (07)	208/416 (311/312)	220/440 (311/312)	230460 (311/312)	240/480 (311/312)	240 Delta (311/312)
Maximum kVA (90% sustained voltage)	3264	3264	3264	3264	3264	3264

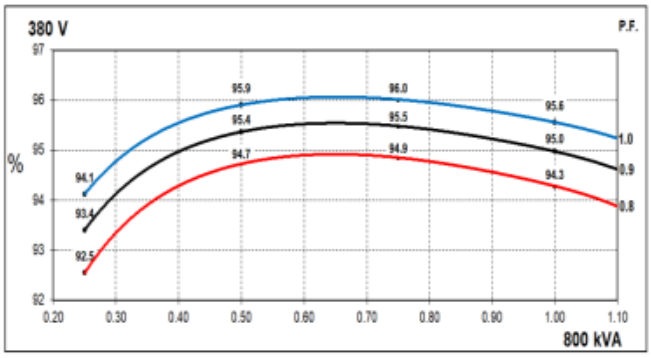
Time constants (sec)	347/600 (07)	208/416 (311/312)	220/440 (311/312)	230460 (311/312)	240/480 (311/312)	240 Delta (311/312)
Transient	0.089	0.092	0.092	0.092	0.092	0.092
Subtransient	0.022	0.016	0.016	0.016	0.016	0.016
Open circuit	3.321	3.34	3.34	3.34	3.34	3.34
DC	0.026	0.02	0.02	0.02	0.02	0.02

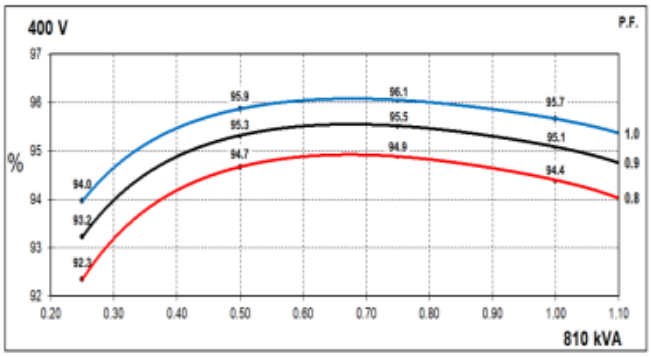
Windings (@22° C)	347/600 (07)	208/416 (311/312)	220/440 (311/312)	230460 (311/312)	240/480 (311/312)	240 Delta (311/312)
Stator resistance (L-L Ohms)	0.0088	0.0066	0.0066	0.0066	0.0066	0.0066
Rotor resistance (Ohms)	1.63	1.63	1.63	1.63	1.63	1.63
Number of leads	6	12/6	12/6	12/6	12/6	12/6

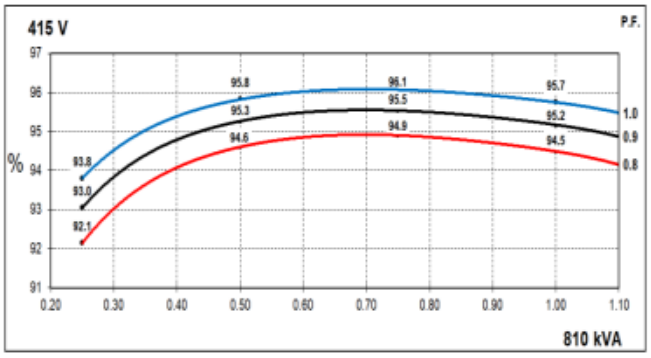
S6L1D-C4 Wdg.311/312

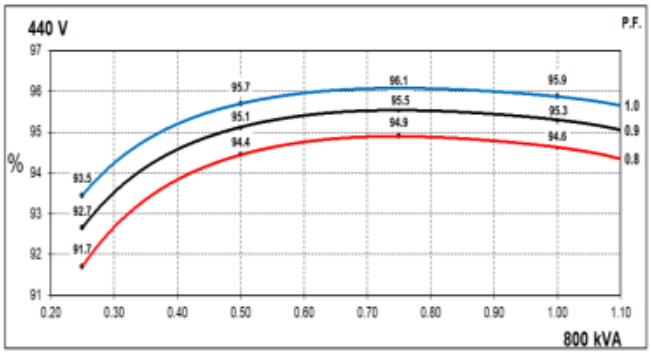
THREE PHASE EFFICIENCY CURVES

50Hz

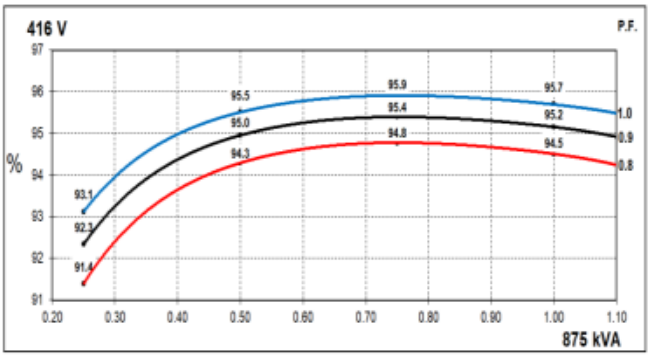


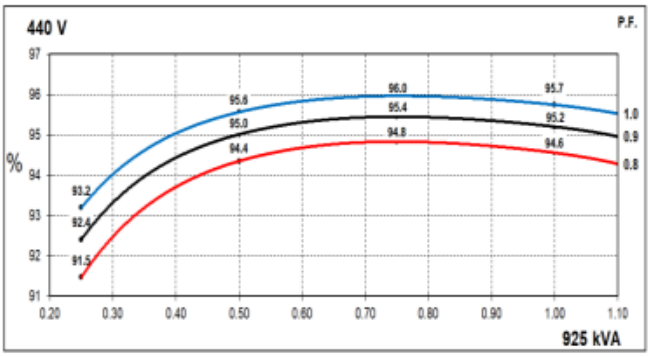


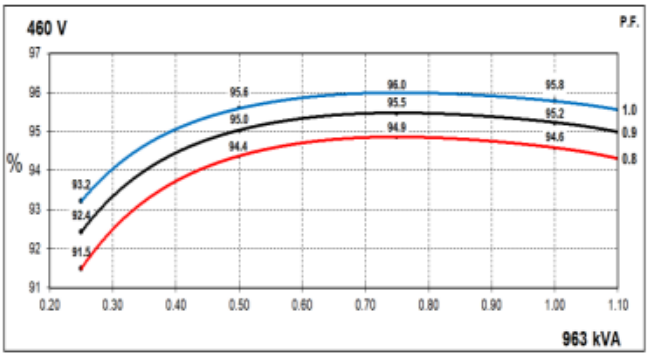


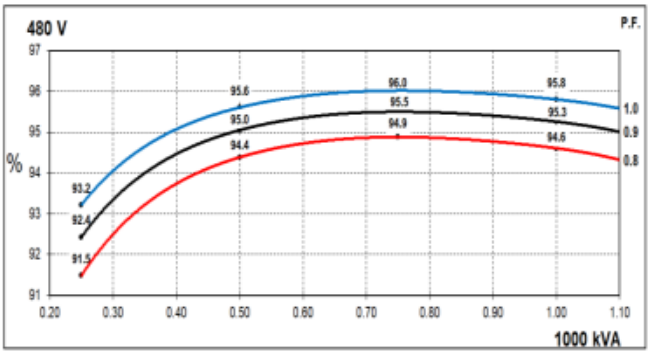


60Hz





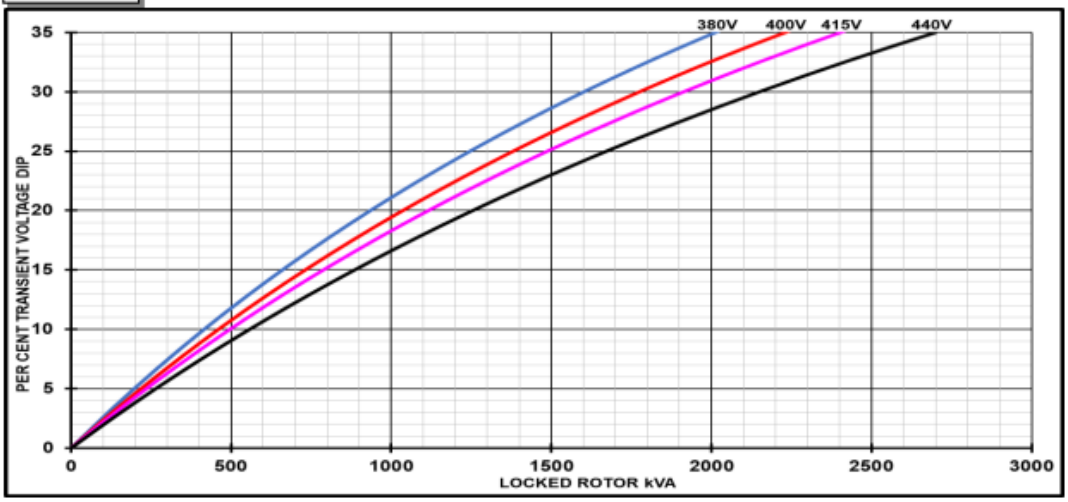




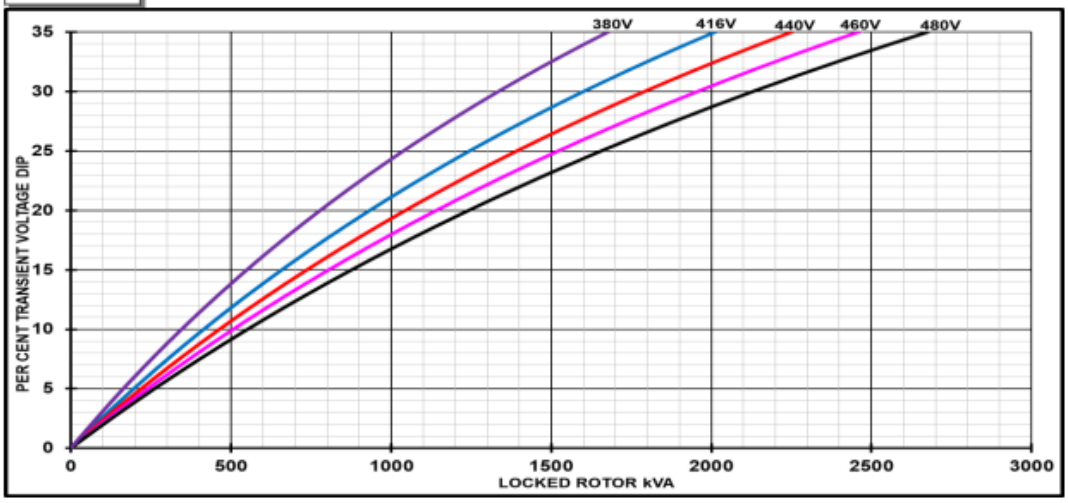
S6L1D-C4 Wdg.311/312

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



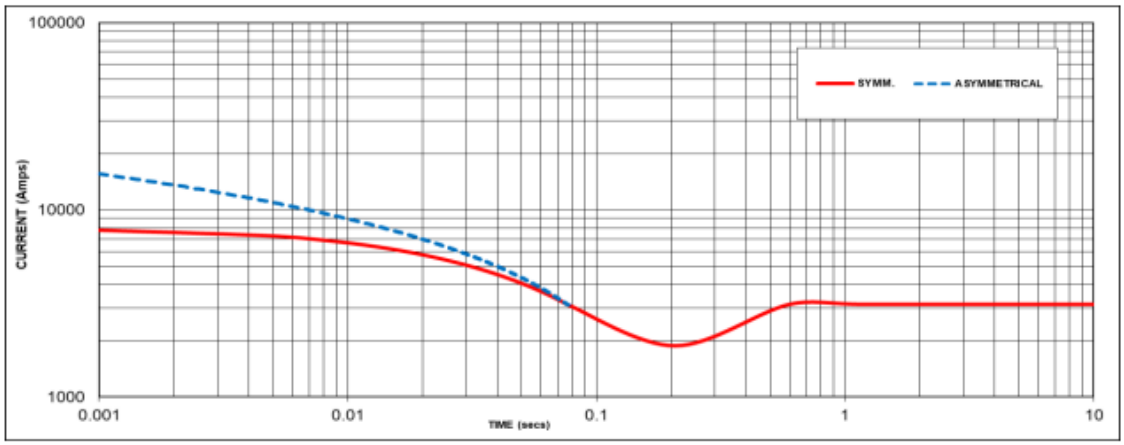
Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor	Lagging PF	Scaling Factor
<= 0.4	1.00	<= 0.4	1.25
0.5	0.95	0.5	1.20
0.6	0.90	0.6	1.15
0.7	0.86	0.7	1.10
0.8	0.83	> 0.7	1.00
0.9	0.75		
0.95	0.70		
1	0.65		

Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

S6L1D-C4 Wdg.311/312

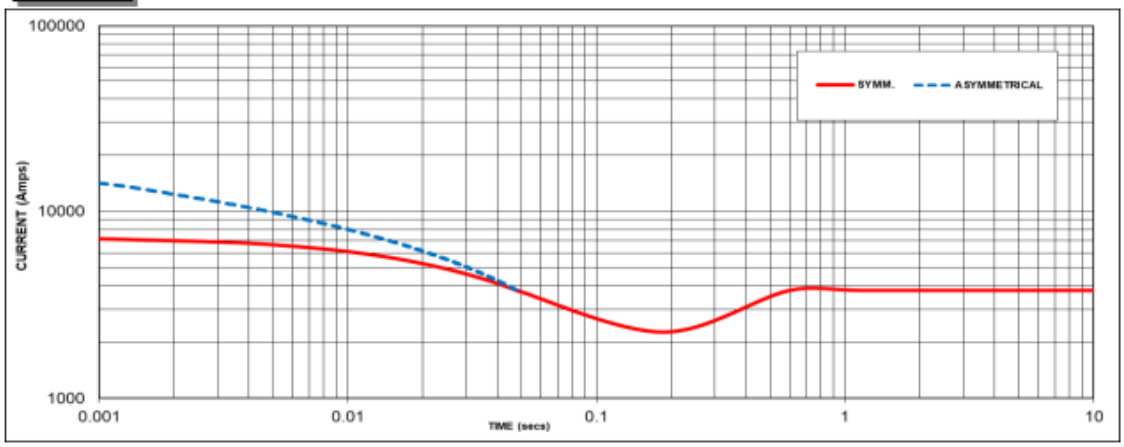
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 3125 Amps

60Hz



Sustained Short Circuit = 3781 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 1.07	440V	X 1.06
415V	X 1.12	460V	X 1.12
440V	X 1.18	480V	X 1.17

The sustained current value is constant irrespective of voltage level

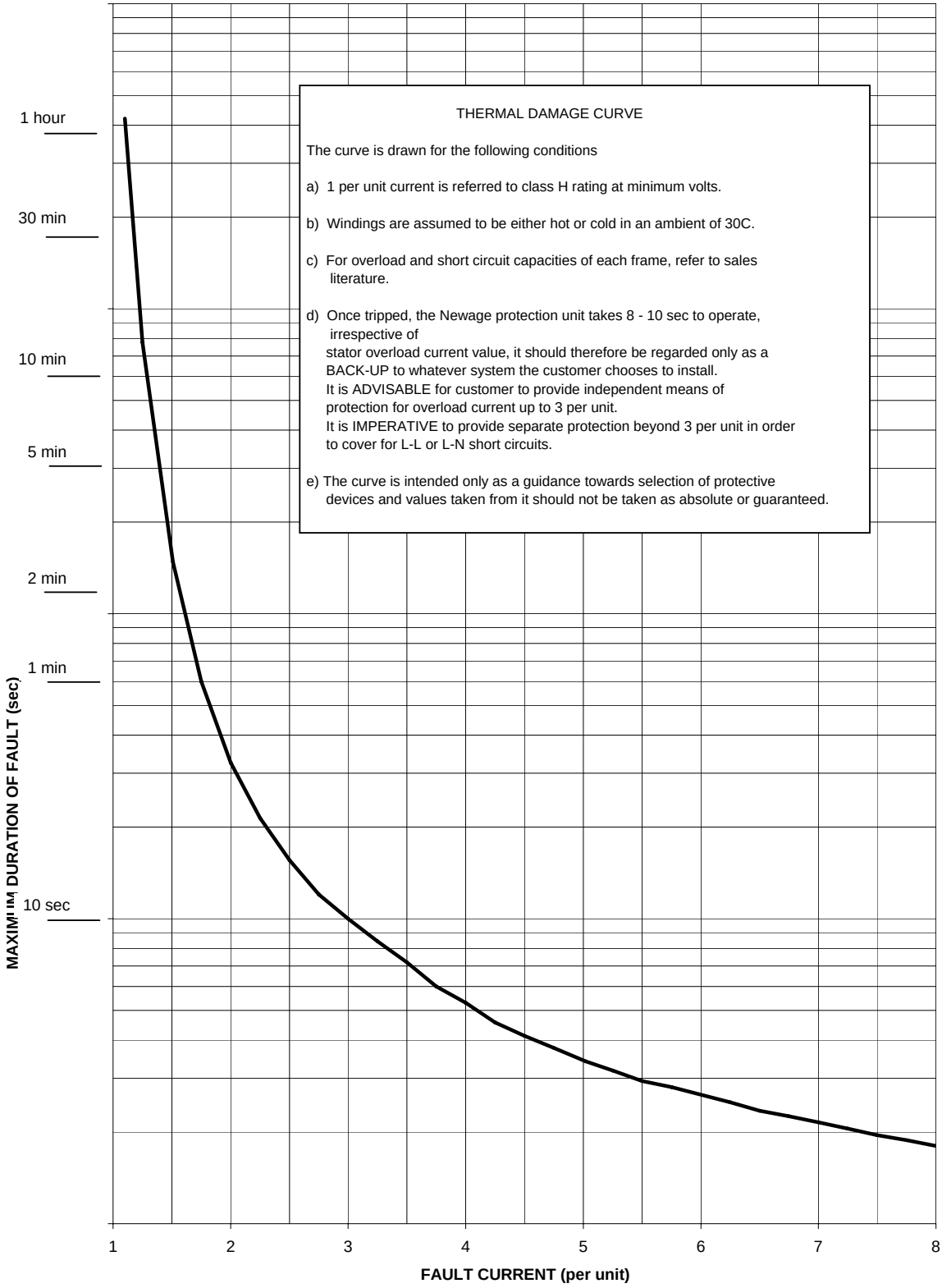
If MX322 or digital AVR is used, the sustained short-circuit current value is to be multiplied by a factor of 1.1.

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.

Note 3 All other times are unchanged
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.

Sound data sheet

C750N6 60 Hz spark-ignited generator set (GenSet)

A-weighted sound pressure levels (SPLs) @ 7 meters in dB(A)

The reference sound pressure is 20 µPa.

Configuration	Position*								8 position average SPL
	1	2	3	4	5	6	7	8	
Standard unhoused with infinite exhaust	84.6	90.8	92.1	92.8	89.9	92.9	90.9	86.7	90.8
Weather-protective enclosure with muffler	84.8	90	90.6	91.7	86.9	88.9	90.1	84.3	88.4
Sound-attenuated enclosure Level I with muffler	80.8	80	77.7	82	82.1	83.7	78.3	82	80.8
Sound-attenuated enclosure Level II with muffler	78.8	77.2	74.7	77.5	79.0	78.7	76.0	80.7	78.2

*Position 1 faces the GenSet front. The positions proceed around the GenSet in a counter-clockwise direction in 45° increments. All positions are approximately 7 m (23 ft.) from the surface of the GenSet and approximately 1.2 m (48 in) from floor level.

A-weighted sound power levels (SPWLs) @ 1 meter in dB(A)

The reference sound power is 1 pW (10^{-12} W).

Configuration	Octave band center frequency (Hz)								Total SPWL
	63	125	250	500	1000	2000	4000	8000	
Standard unhoused with infinite exhaust	92.2	103.0	107.5	114.2	115.6	113.4	108.8	103.4	120.1
Weather-protective enclosure with muffler	92.8	104.6	107.3	112.9	115.3	108.7	107.1	100.2	118.8
Sound-attenuated enclosure Level I with muffler	89.8	103.9	102.7	108.5	109.1	105.8	96.2	92.6	113.8
Sound-attenuated enclosure Level II with muffler	91.4	103.2	101.9	104.2	102.8	101.4	92.8	89.8	110.0

Data is based on a 100% rated load with a standard radiator cooling package.
Sound levels are subject to instrumentation, measurement, installation, and manufacturing variability.
The sound data for a GenSet with infinite exhaust does not include the exhaust noise contribution.
Sound power levels are calculated according to ISO 3744 and ISO 8528-10 requirements.

Cooling system data sheet

C750N6 60 Hz spark-ignited generator set (GenSet)

40 °C ambient radiator cooling system

	Rating (kW)	Maximum allowable ambient temperature, °C							
		Unhoused maximum cooling @ air flow static restriction by in. H_20 (mm H_20)					Housed in free air (no air discharge restriction) by enclosure feature code		
		0.0 (0.0)	0.25 (6.4)	0.5 (12.7)	0.75 (19.1)	1.0 (25.4)	F265	F266	F267
Standby	750	N/A	N/A	41	N/A	N/A	40	40	40
Demand response	700	N/A	N/A	42	N/A	N/A	40	40	40

Data reflects anticipated cooling performance for a typical GenSet.
Cooling data is based on 1000 ft. (305 m) site test location.
GenSet power output may need to be reduced at high ambient conditions. Consult GenSet data sheet for derate schedules.
Cooling performance may be reduced due to several factors including, but not limited to: incorrect installation; improper operation; fouling of the cooling system; and/or other site installation variables.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2024 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Cummins Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: RCEXB38.0AAA-006

Effective Date: 09/10/2023

Expiration Date: 12/31/2024

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 09/10/2023

Revision Date: N/A

Manufacturer: Cummins Inc.
Engine Family: RCEXB38.0AAA
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards :
Mobile Part 1048
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4
NMHC + NOx (g/kW-hr) : 2.7
Stationary Part 1048
NMHC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4
HC + NOx (g/kW-hr) : 2.7
Part 60 Subpart JJJJ Table 1
VOC (g/Hp-hr) : 0.7
CO (g/Hp-hr) : 2.0
NOx (g/Hp-hr) : 1.0
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Exhaust emission data sheet

C750N6 60 Hz spark-ignited generator set (GenSet)

Natural gas exhaust emissions data @ 1800 rpm

Exhaust component		25% load		50% load		75% load		Full load	
		g/hp-hr	ppm	g/hp-hr	ppm	g/hp-hr	ppm	g/hp-hr	ppm
Oxides of nitrogen (Dry)	NOx	0.01	2	0.01	4	0.02	7	0.04	12
Total unburned hydrocarbons (Wet)	THC	0.3	140	0.5	279	0.5	281	0.4	256
Carbon Monoxide (Dry)	CO	0.3	67	0.2	75	0.3	118	0.2	86
Non-methane hydrocarbons (Wet)	NMHC	0.01	8	0.02	17	0.02	18	0.01	16

Engine information:

Model: Cummins GTA50E

Emission certification: EPA-certified for stationary emergency and non-emergency applications

Aspiration: Turbocharged and coolant-air aftercooled

Bore: 6.25 in. (159 mm)

Stroke: 6.25 in. (159 mm)

Displacement: 3069 in^3 (50.3 L)

Cylinders: 16

Combustion: Stoichiometric

Compression ratio: 8.5:1

Test conditions

Steady-state emissions recorded per ISO 8178-1 during operation at rated engine speed (+/- 2%) and stated constant load (+/- 2%) with engine temperatures, pressures, and emission rates stabilized.

Fuel specifications:	Dry processed natural gas fuel with 905 BTU per standard cubic foot lower heating value.
Air inlet temperature:	77 °F (25 °C)
Barometric pressure:	29.39 in. Hg (99.5 kPa) at 500 ft. (152 m) altitude
Relative humidity:	30%
Emissions data tolerance:	NO_x: +/-10%, HC: +/-15%, CO: +/-10%, carbon dioxide (CO_2): +/-10%, oxygen (O_2): +/-10%

NOx, HC, CO and particulate matter (PM) emissions data above were collected using a production-intent engine under the test conditions shown. These results should be are representative but measured emissions in the field may be higher or lower than the values above due to test site ambient conditions, installation, fuel quality, test procedures, and instrumentation. Engine operation with air intake or exhaust restriction greater than published limits or with improper maintenance may increase emissions.

Prototype test report
60 Hz test summary

Applicable generator set models:
C750N6 (700 kW) - demand response
C750N6 (750 kW)

Representative prototype:
Model: C750N6
Engine: GTA 50E
Alternator: S6L1D-E41

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 (GenSet) electrical and mechanical design integrity.

Cooling system 40 °C ambient
0.5 in. H_2O restriction

The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load under static restriction conditions.

Alternator temperature rise
The highest rated temperature rise (120 °C) test results are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for Class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with rated voltages. Only the highest temperatures are reported.

Durability
The GenSet was subject to an endurance test operating at variable load up to the standby rating to verify structural soundness and durability of the design.

Steady state performance
The GenSet was tested to verify steady state operating performance. It was within these specified maximum limits:

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

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

Voltage dip:	25.6%
Recovery time:	3.3 seconds
Frequency dip:	19.1%
Recovery time:	3.7 seconds

Voltage rise:	18.8%
Recovery time:	0.8 seconds
Frequency rise:	9.6%
Recovery time:	1.4 seconds

Harmonic analysis

	Line to line		Line to neutral	
Harmonic	No load	Ful load	No load	Full load
3	0	0.1	0	0
5	0	1.9	0	1.9
7	0.7	0.5	0.7	0.5
9	0	0	0	0
11	0.6	0.3	0.6	0.3
13	0.3	0.3	0.3	0.3
15	0	0	0	0

SECTION 3
GENERATOR ACCESSORIES

Product data sheet
Characteristics

PJL36120U33A
Circuit breaker, PowerPact P, 1200A, 3 pole, 600VAC, 25kA, lugs, Micrologic 5.0,



Main

Range	PowerPact
Product name	PowerPact P
Product or Component Type	Circuit breaker
Device Application	Distribution

Complementary

Line Rated Current	1200 A
Poles description	3P
Control Type	Toggle
Breaking capacity code	J
Breaking capacity	AIR 100 kA 240 V AC 50/60 Hz UL 489 AIR 65 kA 480 V AC 50/60 Hz UL 489 AIR 25 kA 600 V AC 50/60 Hz UL 489 Icu 65 kA 240 V AC 50/60 Hz IEC 60947-2 Icu 50 kA 380/415 V AC 50/60 Hz IEC 60947-2
[Ue] rated operational voltage	600 V AC 50/60 Hz UL 489
Network Frequency	50/60 Hz
[Ics] rated service breaking capacity	35 KA 240 V AC 50/60 Hz IEC 60947-2 25 KA 380/415 V AC 50/60 Hz IEC 60947-2
[Uimp] rated impulse withstand voltage	8 KV IEC 60947-2
Trip unit technology	Electronic, standard, Micrologic 5.0, LSI
[Ui] rated insulation voltage	750 V IEC 60947-2
Trip unit name	Micrologic 5.0
Suitability for isolation	Yes IEC 60947-2
Utilisation category	Category A
AWG gauge	Please see CB outline drawing for lug and termination details
Local signalling	Overload 1 1 LED amber) 1 trip indicator green)
Mounting mode	Unit mount lug)

Mounting Support	Lug
Electrical connection	Lugs line Lugs load
Terminal identifier	Please see CB outline drawing for lug and termination details
Long time pick-up adjustment range	0.4...1 x Ir
Tightening torque	442.54 Lbf.In (50 N.m) 0.15…0.37 in² (95…240 mm²) (4 x AWG 3/0...500 kcmil) 8.85…11.51 Lbf.In (1.0…1.3 N.m)
Number of slots	2 auxiliary switch OF plug-in) 1 alarm switch SD plug-in) 1 overcurrent trip switch SDE plug-in) 1 voltage release MN or MX plug-in)
Wire stripping length	1.18 In (30 mm)
Height	16.16 In (410.46 mm)
Width	8.27 In (210.06 mm)
Depth	8.05 In (204.47 mm)
Net Weight	32 Lb(US) (14.51 kg)
Quantity per Set	1

Environment

Quality labels	CE
Standards	UL CSA NEMA NOM-003-SCFI-2000 IEC 60947-2
Product certifications	UL CSA NOM
IP degree of protection	Front cover IP40
Pollution degree	3 IEC 60947-1
Ambient Air Temperature for Operation	28…158 °F (-2…70 °C)
Ambient Air Temperature for Storage	-58…185 °F (-50…85 °C)
Operating altitude	< 6561.68 ft (2000 m) without derating 13123.36 ft (4000 m) with derating

Ordering and shipping details

Category	01215-PG,H,J,K,L,N UNIT MT BREAKERS
Discount Schedule	DE2
GTIN	785901500100
Nbr. of units in pkg.	1
Package weight(Lbs)	32.00 Lb(US) (14.515 kg)
Returnability	Yes
Country of origin	US

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	11.75 In (29.845 cm)
Package 1 width	11.63 In (29.528 cm)
Package 1 Length	20.25 In (51.435 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: DINP, which is known to the State of California to cause cancer, and DIDP, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACh Regulation	REACh Declaration
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS Declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End Of Life Information
PVC free	Yes

Product data sheet

Specifications



Trip unit, PowerPact P, R, with rating plug, Micrologic 5.0, LSI protection

S133A

Main

Product name	Micrologic
Product or Component Type	Trip unit
Trip unit technology	Electronic
Circuit breaker type	P-frame R-Frame
Provided equipment	rating plug

Complementary

Trip unit name	Micrologic 5.0
Trip unit protection functions	LSI
Type of Installation	Field installable
Tightening torque	7.08 lbf.in (0.8 N.m)
Height	7.85 in (199.39 mm)
Width	2.11 in (53.59 mm)
Depth	2.88 in (73.15 mm)

Environment

Product certifications	UL Listed CSA

Ordering and shipping details

Category	01290-MASTERPACT ACCESSORIES
Discount Schedule	DE2F
GTIN	785901686002
Nbr. of units in pkg.	1
Package weight(Lbs)	16.48 oz (467.2 g)
Returnability	Yes
Country of origin	US

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	3.80 in (9.652 cm)
Package 1 width	5.60 in (14.224 cm)
Package 1 Length	12.80 in (32.512 cm)

Offer Sustainability

California proposition 65	WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov
REACh Regulation	REACh Declaration
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.
PVC free	Yes

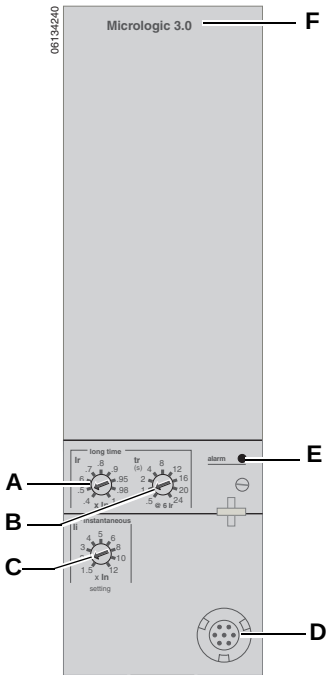
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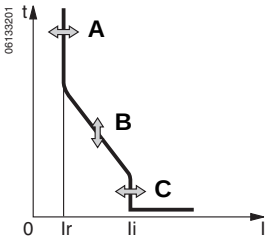
Micrologic 3.0 Trip Unit

The Micrologic 3.0 trip unit provides basic (LI) protection.

A. Long-time pickup (Ir) switch
B. Long-time delay (tr) switch
C. Instantaneous pickup (Ii) switch
D. Test plug receptacle
E. Overload indicator light
F. Trip unit name

Figure 3: Micrologic 3.0 Trip Unit



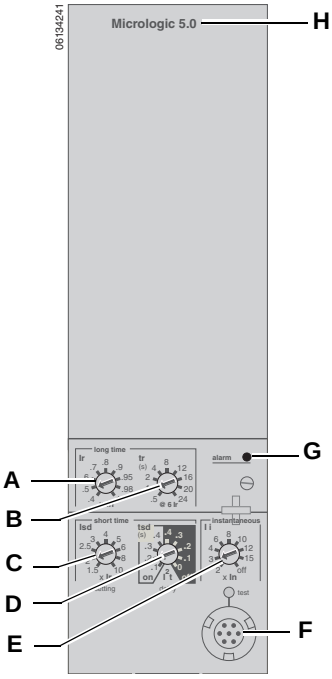


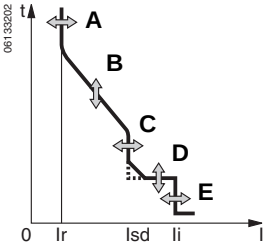
Micrologic 5.0 Trip Unit

The Micrologic 5.0 trip unit provides selective (LSI) protection.

A. Long-time pickup (Ir) switch
B. Long-time delay (tr) switch
C. Short-time pickup (Isd) switch
D. Short-time delay (tsd) switch
E. Instantaneous pickup (Ii) switch
F. Test plug receptacle
G. Overload indicator light
H. Trip unit name

Figure 4: Micrologic 5.0 Trip Unit





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Trip Unit Switches

Long-Time Protection

Long-time protection protects equipment against overloads.

- Long-time protection is standard on all trip units.
- The long-time pickup (Ir) (A) sets maximum current level (based on sensor plug rating In) which circuit breaker will carry continuously. If current exceeds this value, circuit breaker will trip after the preset time delay. The long-time pickup (Ir) is adjustable from 0.4–1.0 times the sensor plug rating (In).
- The long-time delay (tr) (B) sets the length of time that the circuit breaker will carry an overcurrent below the short-time or instantaneous pickup current level before tripping. See Table 1 for long-time delay settings.
- The overload indicator light (C) indicates that the Ir long-time pickup threshold has been exceeded.
- Both long-time pickup and long-time delay are on the field-replaceable adjustable rating plug. To change settings to more precisely match the application, various rating plugs are available. For instructions on replacing the rating plug, see Section 4—Adjustable Rating Plug Replacement.
- The In value can be changed by replacing the sensor plug below the trip unit. For further information, see the instructions packed with the sensor plug replacement kit.
- Long-time protection uses true RMS measurement.

Thermal imaging provides continuous temperature rise status of the wiring, both before and after the device trips. This allows the circuit breaker to respond to a series of overload conditions which could cause conductor overheating, but would go undetected if the long-time circuit was cleared every time the load dropped below the pickup setting or after every tripping event.

NOTE: If checking trip times, wait a minimum of 15 minutes after circuit breaker trips before resetting to allow the thermal imaging to reset completely to zero.

Figure 5: Long-Time Protection Switches

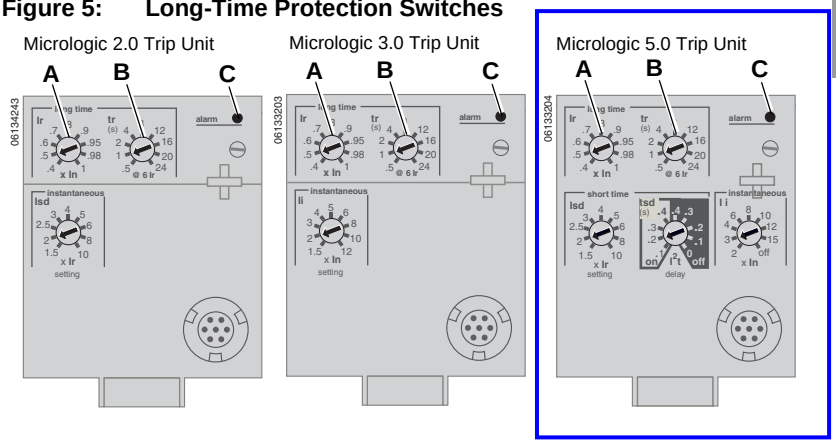


Table 1: Micrologic Trip Unit Long-Time Delay Values

Setting[1]	Long-Time Delay in Seconds[2]								
tr at 1.5 x Ir	12.5	25	50	100	200	300	400	500	600
tr at 6 x Ir	0.5	1	2	4	8	12	16	20	24
tr at 7.2 x Ir	0.34[3]	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6

[1]In = sensor rating. Ir = In x long-time pickup. Trip threshold between 1.05 and 1.20 Ir.
[2]Time-delay accuracy +0/-20%
[3]For Micrologic 5.0 trip units, when tsd is set to 0.4 off or 0.4 on, then tr = 0.5 instead of 0.34.

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Short-Time Protection

Short-time protection protects equipment against short circuits.

- Short-time protection is standard on 2.0 and 5.0 trip units. It is not available on 3.0 trip units.
- Short-time protection is based on the long-time pickup (Ir)
- The short-time pickup (Isd) (A) sets the current level (below instantaneous trip level) where the circuit breaker will trip after the preset time delay.
- The short-time delay (tsd) (B) sets the length of time that the circuit breaker will carry an overcurrent above the short-time pickup current level before tripping. It is adjustable on the 5.0 trip unit and factory set to zero on the 2.0 trip unit.
- The I^2t on/I^2t off option provides improved selectivity with downstream protective devices:
- With I^2t off selected, fixed time delay is provided.
  - — With I^2t on selected, inverse time I^2t protection is provided up to 10 x Ir. Above 10 x Ir, a fixed time delay is provided.
  - — Intermittent currents in the short-time tripping range which do not last sufficiently long to trigger a trip are accumulated and shorten the trip delay appropriately.
- Setting tsd to the 0 setting turns off time-delay features.
- Short-time protection uses true RMS measurement.
- Short-time delay can be adjusted to provide selectivity with a downstream circuit breaker.

Figure 6: Short-Time Protection Switches

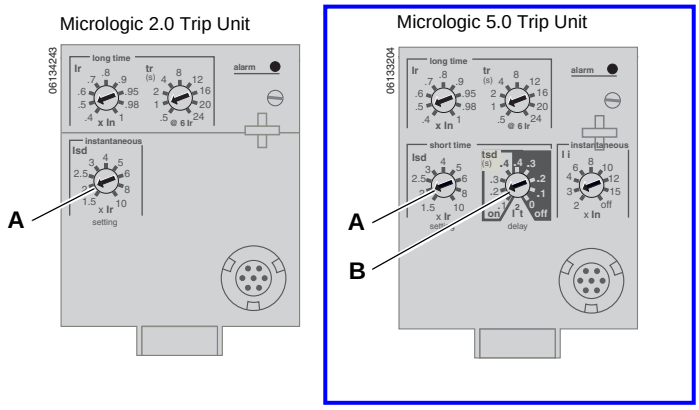


Table 2: Micrologic Trip Unit Short-Time Delay Values

Setting	Short-Time Delay				
I^2t off (Isd at 10 Ir) (seconds)	0	0.1	0.2	0.3	0.4
I^2t on (Isd at 10 Ir) (seconds)	–	0.1	0.2	0.3	0.4
tsd (min. trip) (milliseconds)	20	80	140	230	350
tsd (max. trip) (milliseconds)	80	140	200	320	500

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Instantaneous Protection

Instantaneous protection protects equipment against short circuits with no intentional time delay.

- Instantaneous protection (Ii) (A) is standard on 3.0 and 5.0 trip units.*
- Instantaneous protection for 2.0 trip units is based on the circuit breaker sensor rating (Ir).
- Instantaneous protection for 3.0 and 5.0 trip units is based on the long-time delay pickup (In).
- Circuit breaker open command is issued as soon as threshold current is exceeded.
- Instantaneous protection for 3.0 and 5.0 trip units use peak current measurement. Instantaneous protection for 2.0 trip units use RMS current measurement.
- When instantaneous protection switch is set to off, the instantaneous protection is disabled.

*Instantaneous protection on 2.0 trip units is achieved by using short-time protection (Isd) with short-time delay factory set to 0 (zero).

Figure 7: Instantaneous Protection Switches

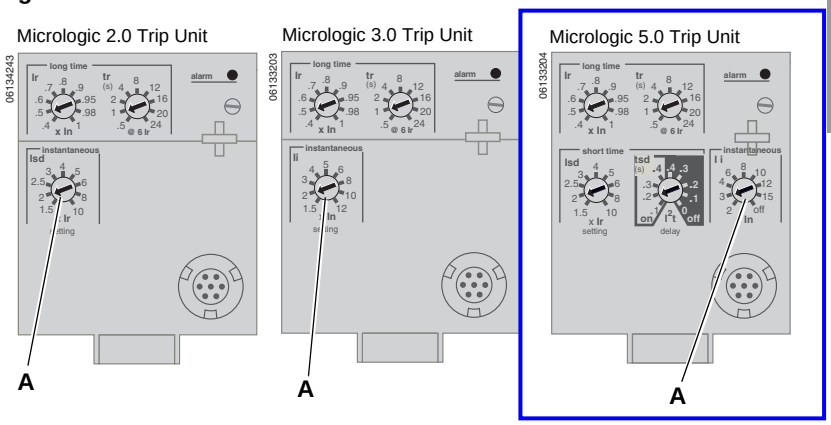


Table 3: Micrologic Instantaneous Values

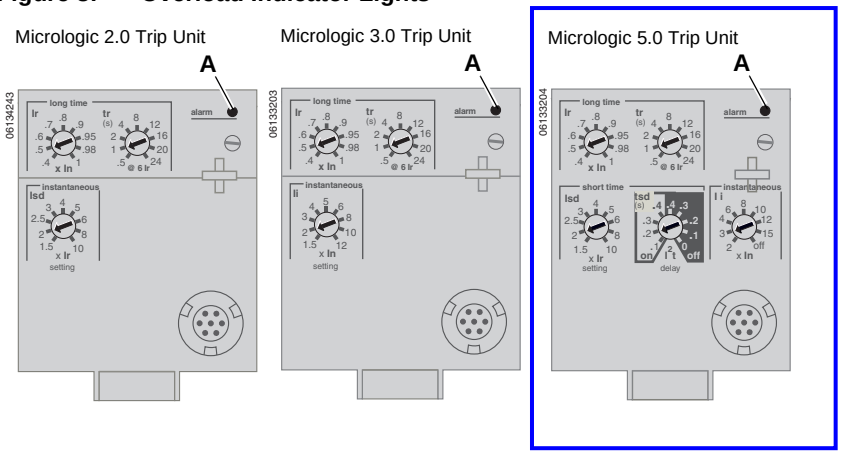
Setting	Interruption Current								
2.0 Isd (= Ir x..)	1.5	2	2.5	3	4	5	6	8	10
3.0 Ii (= In x..)	1.5	2	3	4	5	6	8	10	12
5.0 Ii (= In x..)	2	3	4	6	8	10	12	15	off

Ii = UL and ANSI instantaneous
Isd = IEC instantaneous (short-time with zero delay)
In = sensor rating
Ir = long-time pickup

Overload Indicator Light

The overload indicator light (A) lights when the Ir long-time pickup level has been exceeded.

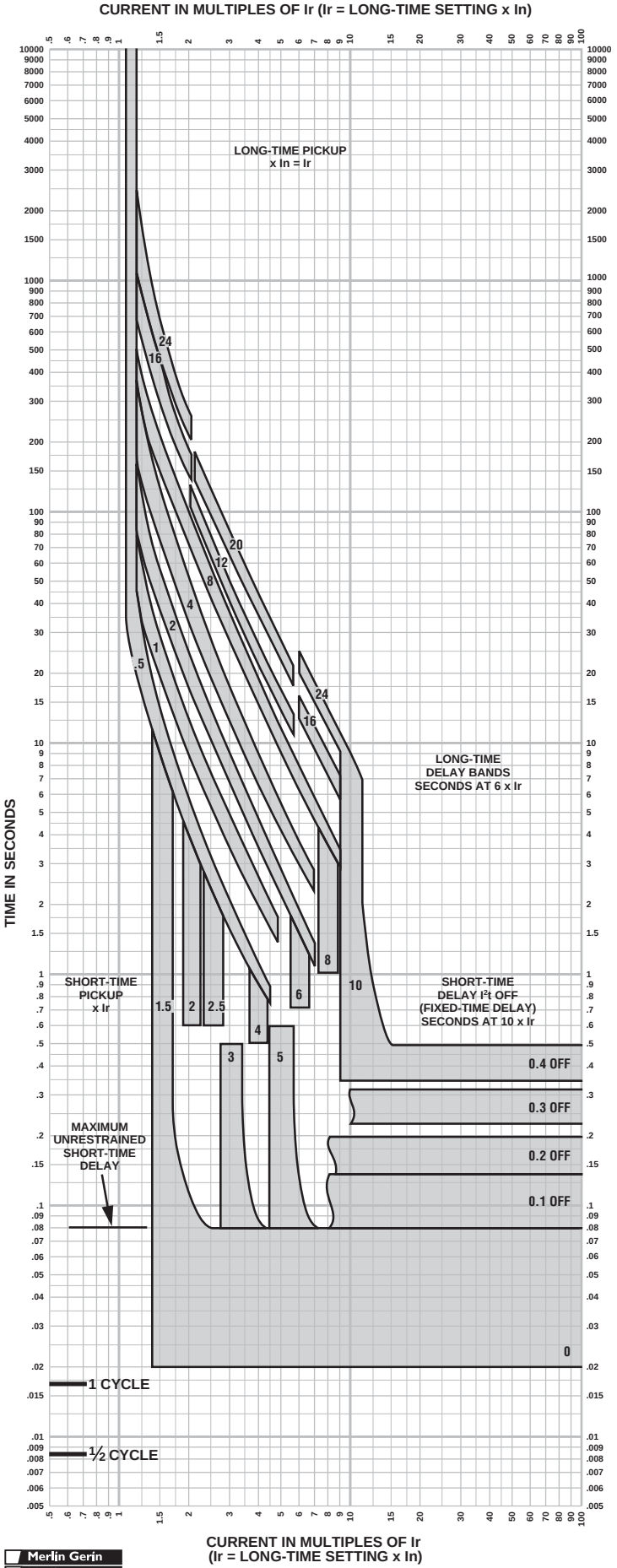
Figure 8: Overload Indicator Lights



Trip Unit Testing

Trip unit functions can be tested using primary injection testing or secondary injection testing.

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MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C ambient temperature.

Notes:

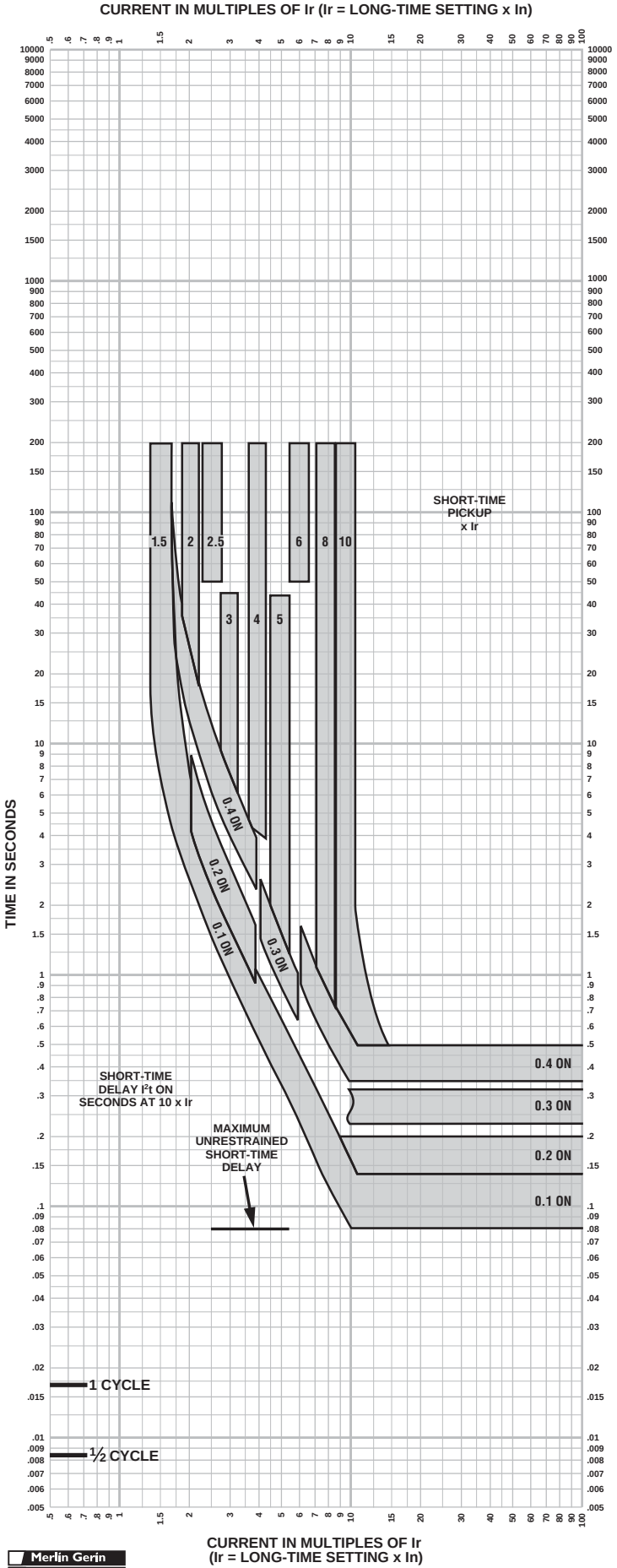
1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

Merlin Gerin
Modicon
Square D
Telemecanique
Federal Pioneer
Federal Pacific
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Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-5

Short-time Pickup and I^2t ON Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C ambient temperature.

Notes:

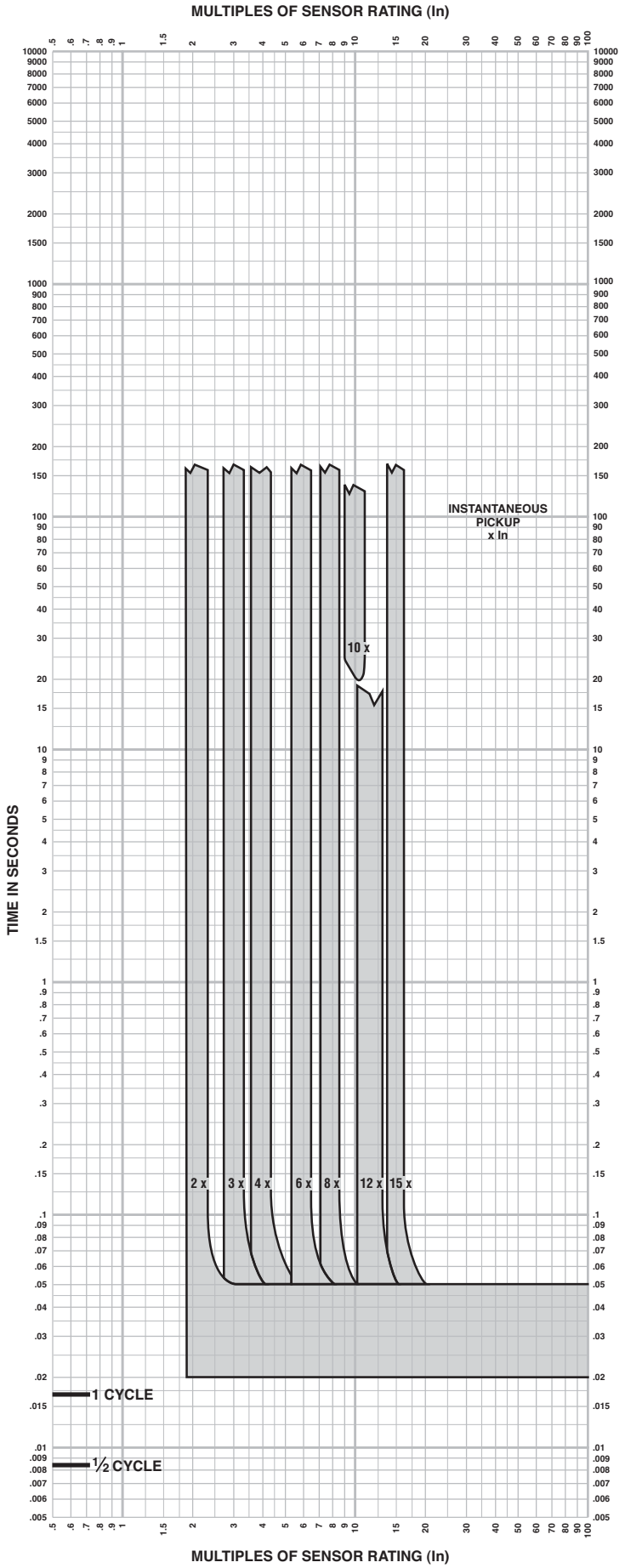
1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. See 613-4 for long-time pickup and delay trip curve.

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Curve No. 0613TC0005
December 2000
Drawing No. B48095-613-05



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup
2x–15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
5. See 613-4 and 613-5 for long-time pickup, long-time delay, short-time pickup, and short-time delay trip curves.

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Curve No. 0613TC0807
January 2008
Drawing No. 48095-0613-07
(Replaces 0613TC0007)

INSTANTANEOUS OVERRIDE VALUES NO. 613-10

MASTERPACT NW/NT

ANSI CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N1 ★	24
NW08N1	None
NW16N1	None
NW08H1 ★	24
NW08H1	None
NW16H1	None
NW20H1	None
NW32H1	None
NW08H2 ★	24
NW08H2	None
NW16H2	None
NW20H2	None
NW32H2	None
NW40H2	None
NW50H2	None
NW08H3 ★	24
NW08H3	85
NW16H3	85
NW20H3	85
NW32H3	85
NW40H3	85
NW50H3	85
NW08L1 ★	24
NW08L1	35
NW08L1F	24
NW16L1	35
NW16L1F	24
NW20L1	35
NW20L1F	24
NW32L1	117
NW40L1	117
NW50L1	117
NW08HA	None
NW16HA	None
NW20HA	None
NW32HA	None
NW40HA	None
NW50HA	None
NW08HF	85
NW16HF	85
NW20HF	85
NW32HF	85
NW40HF	85
NW50HF	85
NW08HC	35
NW16HC	35
NW20HC	35
NW32HC	117
NW40HC	117
NW50HC	117
NT08N1 ★	24
NT08N1	None
NT08H1 ★	24
NT08H1	None
NT08L1F	10
NT08NA	None

MASTERPACT NW/NT

UL CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N ★	24
NW08N	40
NW12N	40
NW16N	40
NW20N	40
NW08H ★	24
NW08H	40
NW12H	40
NW16H	40
NW20H	40
NW25H	65
NW30H	65
NW40H	75
NW50H	75
NW60H	75
NW08L ★	24
NW08L	35
NW08LF	24
NW12L	35
NW12LF	24
NW16L	35
NW16LF	24
NW20L	65
NW20LF	24
NW25L	65
NW30L	65
NW40L	75
NW50L	75
NW60L	75
NW08HF	40
NW12HF	40
NW16HF	40
NW20HF	40
NW25HF	65
NW30HF	65
NW40HF	75
NW50HF	75
NW60HF	75
NW08HB	35
NW12HB	35
NW16HB	35
NW20HB	65
NW25HB	65
NW30HB	65
NW40HB	75
NW50HB	75
NW60HB	75
NT08N ★	24
NT08N	40
NT12N	40
NT16N	40
NT08H ★	24
NT08H	40
NT12H	40
NT16H	40
NT08L1	10
NT12L1	10
NT16L1	10
NT08L	10
NT08LF	10
NT12L	10
NT16L	10
NT12LF	10
NT08HF	40
NT12HF	40

★ Maximum sensor plug 250 A

MASTERPACT NW/NT

IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N1	None
NW10N1	None
NW12N1	None
NW16N1	None
NW08H1	None
NW10H1	None
NW12H1	None
NW16H1	None
NW20H1	None
NW25H1	None
NW32H1	None
NW40H1	None
NW50H1	None
NW63H1	None
NW08H2 ★	24
NW08H2	85
NW10H2	85
NW16H2	85
NW20H2	85
NW25H2	85
NW32H2	85
NW40H2	85
NW50H2	117
NW63H2	117
NW20H3	65
NW25H3	65
NW32H3	65
NW40H3	65
NW08L1 ★	24
NW08L1	35
NW10L1	35
NW12L1	35
NW16L1	35
NW20L1	35
NW08H10	None
NW10H10	None
NW12H10	None
NW16H10	None
NW20H10	None
NW25H10	None
NW32H10	None
NW40H10	None
NW08NA	None
NW10NA	None
NW16NA	None
NW08HA	None
NW10HA	None
NW12HA	None
NW16HA	None
NW20HA	None
NW25HA	None
NW32HA	None
NW40HA	None
NW50HA	None
NW63HA	None
NW08HF	85
NW10HF	85
NW12HF	85
NW16HF	85
NW20HF	85
NW25HF	85
NW32HF	85
NW40HF	85
NW08HA10	None
NW10HA10	None
NW12HA10	None
NW16HA10	None
NW20HA10	None
NW25HA10	None
NW32HA10	None
NW40HA10	None
NT08H1	None
NT10H1	None
NT12H1	None
NT16H1	None
NT08L1	10
NT08H10	None
NT10H10	None
NT12H10	None
NT16H10	None
NT08HA	None
NT10HA	None
NT12HA	None
NT16HA	None
NT08HA10	None
NT10HA10	None
NT12HA10	None
NT16HA10	None

POWERPACT / HORIZON / SELECT / COMPACT

UL/IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
RG 600	57
RG 800	57
RG 1000	57
RG 1200	57
RG 1600	57
RG 2000	57
RG 2500	57
RJ 600	48▲
RJ 800	48▲
RJ 1000	48▲
RJ 1200	48▲
RJ 1600	48▲
RJ 2000	48▲
RJ 2500	48▲
RK 600	57
RK 800	57
RK 1000	57
RK 1200	57
RK 1600	57
RK 2000	57
RK 2500	57
RL 600	48▲
RL 800	48▲
RL 1000	48▲
RL 1200	48▲
RL 1600	48▲
RL 2000	48▲
RL 2500	48▲
PG 250	24
PG 400	24
PG 600	24
PG 800	24
PG 1000	24
PG 1200	24
PJ 250	7
PJ 400	10
PJ 600	10
PJ 800	10
PJ 1000	10
PJ 1200	10
PK 250	24
PK 400	24
PK 600	24
PK 800	24
PK 1000	24
PK 1200	24
PL 250	7
PL 400	10
PL 600	10
PL 800	10
PL 1000	10
PL 1200	10
MG 300	12▲
MG 350	12▲
MG 400	12▲
MG 450	12▲
MG 500	12▲
MG 600	12▲
MG 700	12▲
MG 800	12▲
MJ 300	12▲
MJ 350	12▲
MJ 400	12▲
MJ 450	12▲
MJ 500	12▲
MJ 600	12▲
MJ 700	12▲
MJ 800	12▲

IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
NS 800b N	57
NS 1000b N	57
NS 1250b N	57
NS 1600b N	57
NS 2000 N	57
NS 2500 N	57
NS 3200 N	57
NS 800b H	48▲
NS 1000b H	48▲
NS 1250b H	48▲
NS 1600b H	48▲
NS 2000 H	48▲
NS 2500 H	48▲
NS 3200 H	48▲
NS 630b N	24
NS 800 N	24
NS 1000 N	24
NS 1250 N	24
NS 1600 N	24
NS 630b H	24
NS 800 H	24
NS 1000 H	24
NS 1250 H	24
NS 1600 H	24
NS 630b L	24
NS 800 L	24
NS 1000 L	24
NS 1250 L	24
NS 1600 L	24

▲ Tolerance +/- 15%

Note:

Faults at or above instantaneous override value will be cleared at 25 msec or less.

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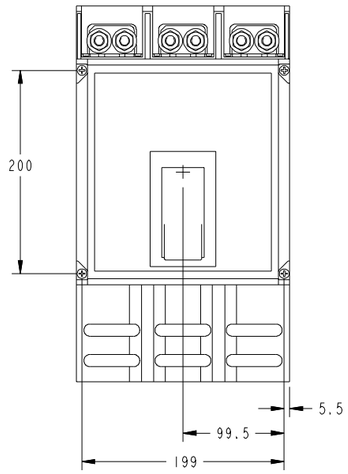
Schneider Electric

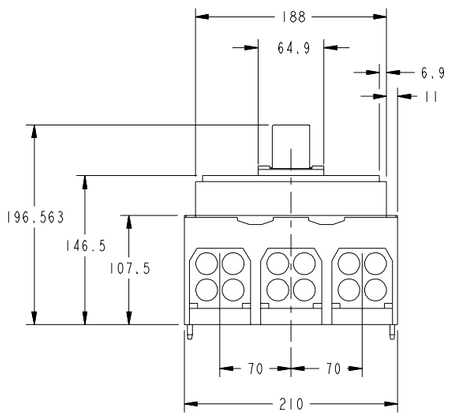
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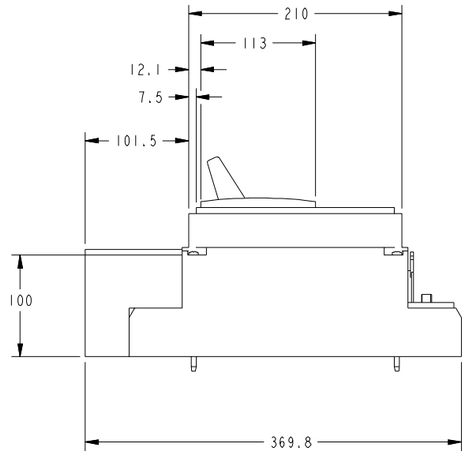
Curve No. 0613TC0610
February 2006
Drawing No. 48095-0613-10
(Replaces 0613TC0410)

0320_2183	D	Pro/ENGINEER	METRIC DWG

REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
FRD16140	A	1	PRODUCTION_RELEASE	-	DC	EC	EC	03-21-03
FRD16280	B	1	3.0 TRIP WAS 5.0 TRIP. ADD (LI).	2D	DC	EC	EC	04-08-03
		2	CHANGE TABLE	2C	DC	EC	EC	04-08-03
		3	PJ WAS PG	2B	DC	EC	EC	04-08-03
FRD19293	C	1	ADD & RELEASE DASH NO -01	-	BMM	PL	LARSON	04-06-04
		2	ADD CURRENT ER TABULATION	2B	BMM	PL	LARSON	04-06-04
		3	ADD NOTE 7	2B	BMM	PL	LARSON	04-06-04
FRD20430	D	1	NOTE 3, RMV -01 AMPERAGE SETTINGS	2-C	SJG	PPL	LARSON	05-28-04
		2	ADD MATERIAL TO -01 CURRENT ER TAB	1-B	SJG	PPL	LARSON	05-28-04
		3	REVISE INTERRUPT RATING TABLE	2-C	SJG	PPL	LARSON	05-28-04
FRD26895	E	1	NOTE 4, STUDS FOR BUSS BAR WAS STABS	-	WP	PPL	LARSON	03-22-06
FRD29478	F	1	ADD NOTE 8	2B	GWH	BG	LARSON	10-10-06







NOTES:

1. THIS PART IS VENDOR SOURCE CONTROLLED.
2. ELECTRONIC TRIP CIRCUIT BREAKER. STANDARD MICROLOGIC ~~3.0 TRIP UNIT. (LI)~~ 5.0LSI
3. BREAKERS TO BE SUPPLIED WITH TYPE E PLUG.

TYPE E PLUG AMPERAGE SETTINGS								
TYPE E	60%	70%	75%	80%	85%	90%	93%	95%	100%
0320_2183	720	840	900	960	1020	1080	1116	1140	1200

4. BREAKERS TO BE SUPPLIED WITH STUDS FOR BUSS BAR ON LINE/TOP SIDE AND WITH LUGS ON LOAD/BOTTOM SIDE.
5. AGENCIES: 3 POLE UL LISTED
   IEC
6. INTERRUPTING RATING

CIRCUIT BREAKER	UL/CSA RATING (60 Hz)			IEC 60947-2 RATING (50/60 Hz)			
				240 Vac		380/415 Vac	
	240 Vac	480 Vac	600 Vac	Icu	Ics	Icu	Ics
PJ	100 kA	65 kA	25 kA	65 kA	35 kA	50 kA	25 kA

7. LEVEL OF OPERATION ABOVE 80% CONTINUOUS LOAD REQUIRES SPECIAL TESTING, INSTALLATION AND APPLICATION REQUIREMENTS PER VENDOR LITERATURE.
8. 3 LUGS ACCEPTING (3) 3/0-600 kcmil CONDUCTORS IS AVAILABLE THRU ACCESSORIES: PGA PART NUMBER 0332-4279.

CURRENT_ER	PRODUCTION P/N	BREAKER	POLES	VOLTS UL/(IEC)	PLUG TYPE
FRD29478	0320_2183	PJ1200	3	600 (690)	E

CURRENT_ER	ACCESSORIES P/N	MATERIAL
FRD29478	0320_2183_01	0320_2183

ITEM	PART NO	DWG SIZE	DESCRIPTION OR MATERIAL	REF DES

DO NOT SCALE PRINT

TOLERANCE UNLESS OTHERWISE SPECIFIED

DIM	mm	inch
	X ± 1	X ±
	.X ± 0.8	.XX ±
	.XX ± 0.38	.XXX ±
ANG TOL ± 1.0		
HOLE	0.89~4.99 +0.15/-0.08	.004~.200 +.006/-.003
	5.00~9.99 +0.20/-0.10	.201~.421 +.008/-.004
	10.00~17.49 +0.25/-0.13	.422~.703 +.010/-.005
	17.50~24.99 +0.38/-0.13	.704~.999 +.012/-.005
DRAWN TO SCALE OF 3/8		

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	NAME	DATE
DR	D CRANE	03-21-03
CHKR ☑ MFG ☐	E CZECHOWSKI	03-21-03
APPROVED	E CZECHOWSKI	03-21-03

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

MODEL FIRST USED ON: HC6/HC7

SITE CODE: PGA

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

TITLE: CIRCUIT_BREAKER (1200A)

DRG NO: 0320_2183

SHEET 1 of 1

DRG SIZE: D

OUTDOOR ENCLOSURE

Accessory specification sheet for 250 - 1300 kW Natural gas generator sets (GenSets)

THE RIGHT CHOICE FOR GENSET PROTECTION.



Cummins provides the option of protecting your Cummins Generator Set (GenSet) with UL 2200 Listed weather-protective and sound-attenuated steel enclosures that not only limit the GenSet from producing high decibels of sound, but also protect the GenSet from harsh weather conditions. These enclosures are designed to enclose the entire GenSet while allowing ample air flow for cooling. Several enclosure configurations are available for each GenSet model to suit most weather protection and sound control requirements:

Weather-protective enclosures provide protection from climate conditions and include an internally-mounted exhaust silencer. The exhaust silencer on a weather-protective enclosure reduces noise, but is primarily intended to protect the GenSet from the outdoor environment.

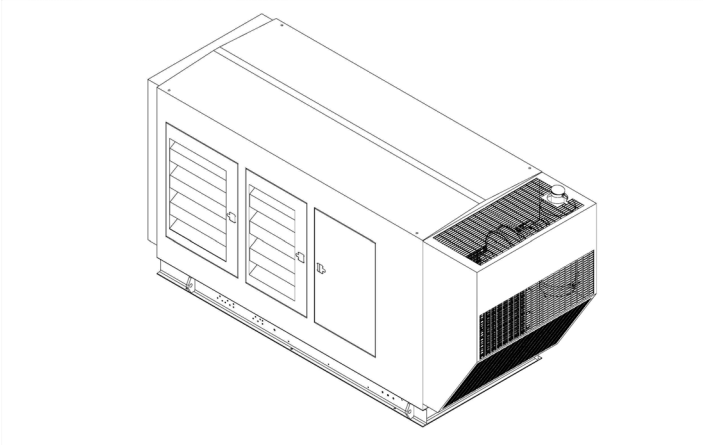
Level I sound-attenuated enclosures provide weather protection and include an internally-mounted exhaust silencer and sound insulating panels. The silencer and the panels reduce the noise level of the GenSet to a level below that achieved with a weather protective enclosure. Level I sound-attenuated enclosures are appropriate for applications where sound reducing enclosures are required.

Level II sound-attenuated enclosures provide weather protection and include an internally-mounted exhaust silencer and sound insulating panels which reduce the noise level of the GenSet to a level below that achieved with a Level I sound-attenuated enclosure. Level II sound-attenuated enclosures are appropriate for applications where sound reducing enclosures are required.

NOTE: Enclosures are designed for outdoor use, only.

Enclosure feature	Standard	Optional
Construction	Galvannealed steel	Aluminum (for corrosive environments)
	Compact footprint	Manufactured floor
	Stainless steel hardware	
	Cambered roof to prevent water accumulation	
	Zinc phosphate pretreatment, e-coat primer, and super durable textured powder topcoat paint to help minimize corrosion and color fade	
	Rain collar and rain cap	
Intake and discharge louvers	Fixed	Motorized intake
		Motorized or gravity discharge
Doors	Two or three (depending on the GenSet dimensions) flush, recessed, and hinged doors per side for service access	
	Doors keyed alike for added security and convenience	
	Weather-protective bulb seals	
Silencer grade	Critical	Hospital
Silencer construction	Stainless steel	Aluminum
Installation	Enclosure directly attached to the GenSet skid base; easy access lifting points	
Wind rating	100 mph	High wind bracing
Electrical	Fuel and electrical stub-up area within enclosure perimeter	
Accessories		DC lights w/timer (2)
		120/240V load center 120/208V load center
		AC lights (2 X AC vapor-proof)
		120V GFI convenience receptacles (2)
		5 kW heater
		External emergency-stop

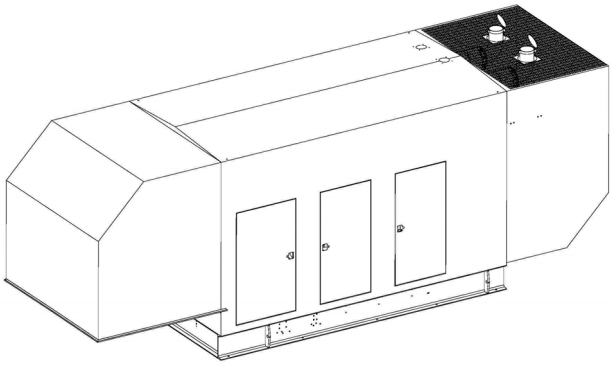
Weather-protective enclosures



	Weather-protective enclosure dimensions and weights				
GenSet model	Length in. (cm)	Width in. (cm)	Height in. (cm)	Steel weight lbs. (kg)	Aluminum weight lbs. (kg)
C250N6	183 (465)	70 (178)	99 (251)	1550 (703)	930 (422)
C300N6	183 (465)	70 (178)	99 (251)	1550 (703)	930 (422)
C350N6	183 (465)	70 (178)	94 (239)	1550 (703)	930 (422)
C400N6	219 (556)	90 (229)	126 (320)	2200 (998)	1320 (599)
C450N6	219 (556)	90 (229)	126 (320)	2200 (998)	1320 (599)
C500N6B	219 (556)	90 (229)	126 (320)	2200 (998)	1320 (599)
C550N6	248 (630)	102 (259)	132 (335)	2600 (1179)	1560 (708)
C600N6	272 (691)	102 (259)	128 (325)	3300 (1497)	1980 (898)
C650N6	272 (691)	102 (259)	128 (325)	3300 (1497)	1980 (898)
C750N6	272 (691)	102 (259)	128 (325)	3300 (1497)	1980 (898)

Level I and Level II sound-attenuated enclosures

For detailed sound data, refer to the GenSet sound data sheet.



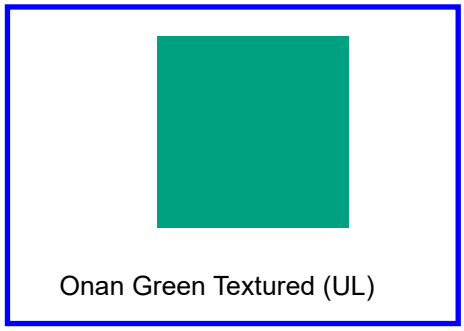
Level I and Level II sound-attenuated enclosure dimensions and weights

GenSet model	GenSet sound data sheet	Length in. (cm)	Width in. (cm)	Height in. (cm)	Steel weight lbs. (kg)	Aluminum weight lbs. (kg)
C250N6	MSP-4054	281 (714)	70 (178)	99 (251)	2550 (1157)	1530 (694)
C300N6	MSP-4056	281 (714)	70 (178)	99 (251)	2550 (1157)	1530 (694)
C350N6	MSP-4057	281 (714)	70 (178)	94 (239)	2550 (1157)	1530 (694)
C400N6	MSP-4059				3600 (1633)	2160 (980)
C450N6	MSP-4060				3600 (1633)	2160 (980)
C500N6B	MSP-4061				3600 (1633)	2160 (980)
C550N6	MSP-4062	340 (864)	102 (259)	132 (335)	4400 (1996)	2640 (1197)
C600N6	MSP-4063	365 (927)	102 (259)	128 (325)	5100 (2313)	3060 (1388)
C650N6	MSP-4065	365 (927)	102 (259)	128 (325)	5100 (2313)	3060 (1388)
C750N6	MSP-4067	365 (927)	102 (259)	128 (325)	5100 (2313)	3060 (1388)
C1000N6B	MSP-4070	403 (1024)	102 (259)	131 (333)	5750 (2608)	3450 (1565)
C1300N6	MSP-4071	403 (1024)	102 (259)	131 (333)	5750 (2608)	3450 (1565)

Refer to drawings for specific weights and dimensions

Enclosure paint options

These standard enclosure colors are available as selected in Cummins pricing. All GenSet enclosures will be painted Onan Green Textured, unless otherwise ordered. Underwriters Laboratories (UL) colors noted are included in standard pricing; other colors selected for UL units would have additional charges. Contact your local sales representative for more information.



Onan Green Textured (UL)



Moss Green

Cream

Sugar White



Cummins Red



Cummins Beige (UL)



Chocolate Brown

Compartment Tan Textured (UL)



Spectrum Gray



ANSI 61 Gray (UL)



Jet Black

Applicable codes and standards

The Underwriters Laboratory (UL) 2200 Listing is a comprehensive safety standard encompassing the design, construction, and performance of stationary GenSets.

CSA Group tests products under a formal process to ensure that they meet the safety and/or performance requirements of applicable standards. This GenSet is certified to: CSA 22.2 No. 100 Motors and Generators; CSA 22.2 No. 0.4-044 Bonding of Electrical Equipment; CSA 22.2 No. 14 Industrial Control Equipment; and CSA 22.2 No. 0 General Requirements - Canadian Electrical Code, Part II. All low voltage models are CSA-certified to product class 4215-01.

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

GenSets with weather-protective or sound-attenuated enclosures may reduce the ambient temperature of the GenSet by 4 to 8 °F (2 to 4.5 °C) depending on the type of enclosure and site conditions. Refer to the GenSet specification sheet and the cooling data sheet for specific capabilities.



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BATTERY CHARGER

Accessory specification sheet for 250 - 750 kW Natural gas generator sets (GenSets)

THE SMART CHOICE FOR MISSION-CRITICAL ENGINE STARTING.

Failure to start due to battery problems is the leading cause of inoperable GenSets. The Cummins battery charger for these GenSets offers:

- **Patented charging algorithms** – recharges faster and more safely to reduce the risk of sudden battery failure
- **Hardened switch mode power train** - delivers first-class abuse resistance and energy efficiency
- **Four-rate, temperature-compensated output** – ensures the longest battery life
- **Industry-first NFPA 110 battery-fault alarm** – troubleshoots five possible battery failures to assist dispatching a Cummins technician quickly
- **Lasting reliability** – guarantees greater than 1.2 million hours of field mean time between failures (MTBF) with the industry's best warranty
- **UL Listed**
- **Small, lightweight package** with non-corroding aluminum housing, superior lightning and voltage transient protection, and extensive temperature rating and over-temperature protection

Installation drawing	Part number
GE100036	A048G602



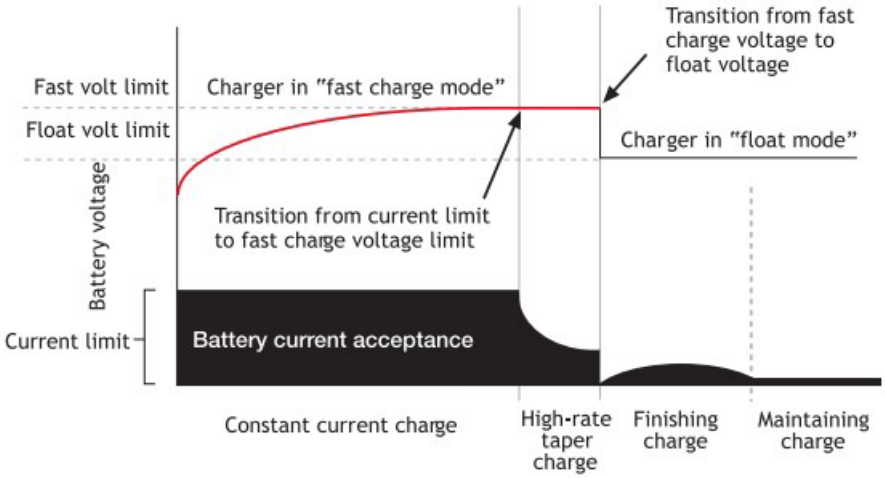
Patented smart technology built into every charger includes:

- Digital metering
- Modbus communications
- All-electronic operation with generous component de-rating
- A disconnected/reversed/incorrect voltage battery alarm and protection
- Protection of connected equipment against load dump transients

Four-rate automatic float/fast charge mode control

The high rate (fast charge) voltage is a fixed level 6.5% +1% over the selected float voltage level. A jumper is available to defeat fast charge mode operation for use with VRLA batteries. Automatic fast charge responds to the battery's current demand, providing the fastest possible recharge and lowest possible water consumption plus longest battery life.

- **Constant current:** The charger operates at the maximum possible output in the fast charge mode.
- **High-rate taper charge:** The charger stays at the fast charge voltage level while battery current acceptance falls to 90% of the charger's rated output.
- **Finishing charge:** The charger operates at the float voltage and completes the battery charge.
- **Maintaining charge:** The charger supplies only the very few milliamp required by the battery to stay at peak capability.



Specifications

AC input

Voltage	110-120/208-240 VAC, ±10%, single phase
Frequency	standard 60 Hz ±5%
Current	6.6/3.3 amps maximum
Protection	1-pole fuse, soft-start, transient suppression

Charger output

Nominal voltage	12VDC (default) or 24VDC, field selectable
Battery settings	Six discrete battery voltage programs:
	- Low or high S.G. flooded
	- Low or high S.G. VRLA
	- Nickel cadmium 9, 10, 18, 19 or 20 cells
Equalize-voltage	6.5% above float voltage sensing
Output voltage regulation	±0.5% (1/2%) line and load regulation
Maximum output current	10 amps nominal
Electronic current limit	105% rated output typical – no crank disconnect required
Charge characteristic	Constant voltage, current limited, 4-rate automatic equalization
Temperature compensation	Enable or disable anytime, remote sensor optional
Equalize charging	Battery interactive auto-boost
Output protection	1-pole fuse, current limit, transient suppression

User interface

Digital meter	Three-position jumper allows user to select from three display settings:			
	alternating volts / amps (standard setting)			
	constant volts			
	constant amps			
Accuracy	±2% volts, ±5% amps			
NFPA 110 alarms	Nine active control panel indicators:	LED		Rated 2A @ 30 VDC resistive Form C contact
	AC good (**ON**)	green		
	Float mode (**ON**)	green		
	Fast charge (Boost mode **ON**)	yellow		
	Temperature compensation active (**ON**)	green		
	AC fail	red		X
	Charger fail	red		X
	Battery fault*	red		X
	Low battery voltage	red		X
	High battery voltage	red		X

*Battery faults include: battery disconnected; battery polarity reversed; mismatched charger battery voltage; open or high resistance charger to battery connection; open battery cell or excessive internal resistance.

Controls

AC input voltage select	Field-selectable switch
Optional 12/24-volt output select	Field-selectable two-position jumper (12V and 24V)
Battery program select	Field-selectable six-position jumper (see footnote under **Alarms** section)
Meter display select	Field-selectable three-position jumper (see **Digital meter** definition)
Fast charger enable/disable	Field-selectable two-position jumper
Temp compensation enable	Standard - can be disabled or re-enabled in the field
Remote temp comp enable	Connect optional remote sensor to temp comp port

Environmental

Operating temperature	- 4 °F to +140 °F (-20 °C to +60 °C) - meets full specification to +113 °F (45 °C)
Over temperature protection	Gradual current reduction to maintain safe power device temperature
Humidity	5% to 95%, non-condensing
Vibration	UL 991 Class B (2G sinusoidal)
Transient immunity	ANSI/IEEE C62.41, Cat. B, EN50082-2 heavy industrial, EN 61000-6-2

Construction

Housing/configuration	Non-corroding aluminum
Printed circuit card	Surface mount technology, conformal coated
Cooling	Natural convection
Protection degree	NEMA-1
Damage prevention	Fully recessed display and controls
Electrical connections	Compression terminal blocks

Optional features:

- 50/60 Hz input frequency
- Remote temperature compensation sensor
- Condensation protection drip shield
- National Electrical Manufacturers Association (NEMA) 3R enclosure to protect the battery charger from rain, sleet, and wind-blown dust. A small drain hole on the bottom allows for ventilation and quick dispersion of any water that may enter the battery charger enclosure.

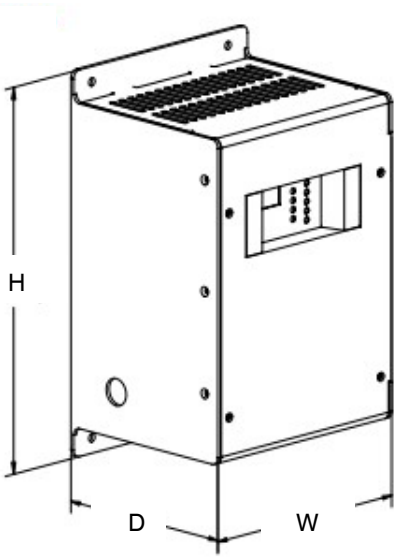
Optional product compliance:

- UL Listing Category BBHH - Battery Chargers for Engine Driven Emergency and Standby Power System Generators. The basic standard for this category is UL 1236 and the applicable requirements of NFPA 110, “Standard for Emergency and Standby Power Systems.”
- Office of Statewide Health Planning and Development (OSHPD) pre-approval for California hospital projects

Height in. (cm)	Width in. (cm)	Depth in. (cm)
12.5 (31.8)	7.7 (19.5)	6.5 (16.5)

NOTE: Refer to the GenSet general arrangement drawing for the battery charger location and the GenSet installation manual for the termination details.

Weight lbs. (kg) 25 (11.3)



Applicable codes and standards

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

The Underwriters Laboratory (UL) 2200 Listing is a comprehensive safety standard encompassing the design, construction, and performance of manufactured products.

Electromagnetic compatibility (EMC) standards ensure that a device does not generate electromagnetic interference (EMI), is not affected by EMI, and that the device's operation does not disturb the communication system around it at locations with industrial, scientific, and medical equipment and installations involving high currents and associated magnetic fields, or in which there is frequent switching of heavy inductive or capacitative loads.

International Building Code (IBC) is a model building code that addresses both health and safety concerns for buildings based upon prescriptive and performance related requirements. The code provisions are intended to protect public health and safety while avoiding both unnecessary costs and preferential treatment of specific materials or methods of construction.

National Fire Protection Agency (NFPA) standard 110 covers performance requirements for emergency and standby power systems providing an alternate source of electrical power in buildings and facilities in the event that the normal electrical power source fails.

National Electrical Manufacturers Association (NEMA) is an American National Standards Institute (ANSI)-accredited standards developing organization made up of business leaders, electrical experts, engineers, scientists, and technicians. NEMA standards promote the safety, efficiency, resilience, and sustainability of products and systems used to power the world.

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Specification Sheet

Ground Fault Indication Relay – H550, H666, H667, H668



Code requirements

NFPA 70, the U.S. National Electrical Code (NEC) requires that services of 1000 amps and larger in capacity which operate at more than 150 volts from Line-to-Neutral must be provided with ground fault equipment. Generator sets rated at 1000 amps and larger which serve as emergency power must be provided with ground fault indication equipment. Health care facilities that utilize ground fault protection equipment must be provided with a coordinated multi-level ground fault system.

Cummins ground fault indication equipment is designed for use in Emergency/Standby power systems, for indication of ground fault conditions during generator set operation.

Features

Suitable for indicating a ground fault condition on a generator set which is either locally or remotely grounded.

Supply voltage - Operates on 24 VDC (nominal) control power - fully functional at voltages from 18-30 VDC.

Direct connection - Suitable for direct connection to generator sets operating at voltages up to 600 VAC (Line to Line).

Ground fault current settings - 100-1200 A, in 10 discrete settings: 100, 150, 200, 250, 300, 450, 600, 750, 800, 1200 A.

Monitoring - Provides continuous monitoring of neutral-to-ground with LED indication for open connection.

Factory mounted controls - Available factory mounted and interconnected to Cummins Detector™ series PowerCommand® controls.

Link reconnection - For use with either 3-pole (solid neutral) or 4-pole (switched neutral) transfer switches.

Indicating lamps - For relay on (green), ground fault current over setting (red), loss of ground connection (red).

Time delay settings – Adjustable 0-10 seconds.

Circuit board - One-piece molded case fully potted.

Contacts - One set of form C output, 8A at 250 VAC, 8A at 30 VDC.

“Test” - Push-button.

“Reset” - Push-button.

Percent full scale metering output - 0-1 mA full scale.

Bonding jumper - Sized per NEC requirements.

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Construction

The relay is provided in a non-conducting phenolic case, with provisions for panel mounting or mounting to a standard DIN rail (panel mounting is recommended for mounting on a generator set). Relay components are fully potted with epoxy resin for vibration resistance and durability.

The relay includes an integral terminal block assembly, which accepts wires up to 12-gauge.

Relay function selection link (auto/hand reset).

Environmental range - Operating -10 °C to +60 °C, storage -20 °C to 70 °C.

DC supply burden - 2.5 W.

Transfer switch type selection link - (3-pole or 4-pole).

System operation

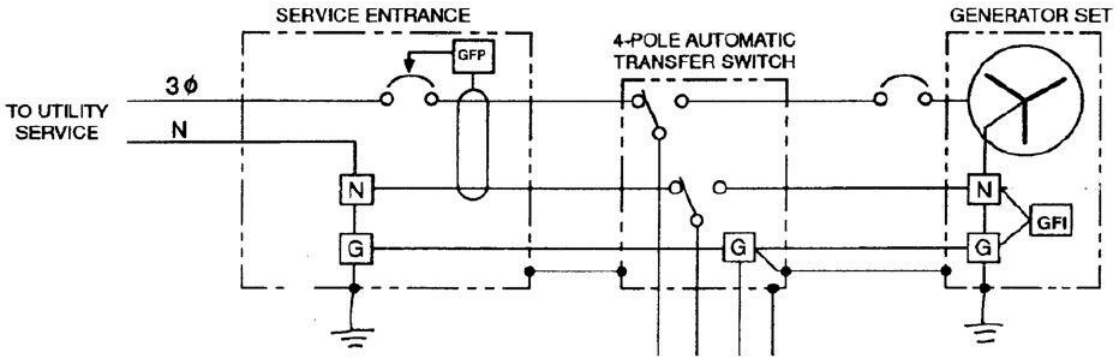
The ground fault relay continuously monitors the voltage across the neutral-to-ground bonding jumper and lights the ground fault alarm lamp on the generator set control when the connection is broken.

When the generator set is running, the relay continuously monitors the neutral-to-ground generator set connection and lights the ground fault alarm lamp on the generator set control when a ground fault condition is sensed.

Alarm condition can be cleared by pushing the reset switch on the generator set control panel. Actual ground fault current level can be monitored with a 0-1 mA meter, directly from the relay. A push button test switch is provided to simulate ground fault conditions and operate the relay and indication circuitry. Addition of the auto-reset link activates automatic reset of the relay after the ground fault condition has cleared.

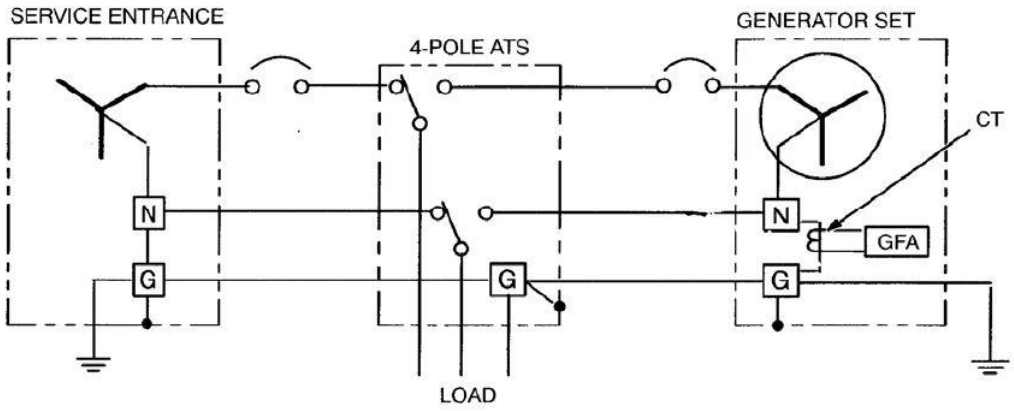
System schematic

Separately derived system connections (local grounding connection).



Neutral-to-ground bonding jumper must be sized per code requirements. For non-separately derived systems (3-phase/4-wire systems with 3-pole transfer switch), the ground connection and the neutral-to ground bonding jumper on the generator set are removed, and the 3-pole ATS link is added to the ground fault relay. For non-separately derived systems a label must be applied to the service entrance switchboard, indicating that removal of the equipment-bonding jumper can cause hazardous operating conditions.

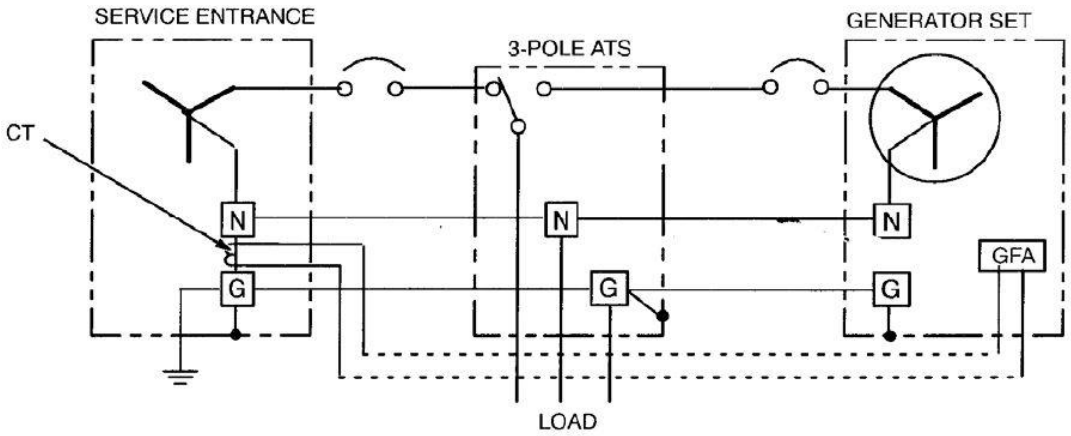
0179-3509 – TYPE A



THREE-PHASE, FOUR-WIRE UTILITY, 4-POLE ATS

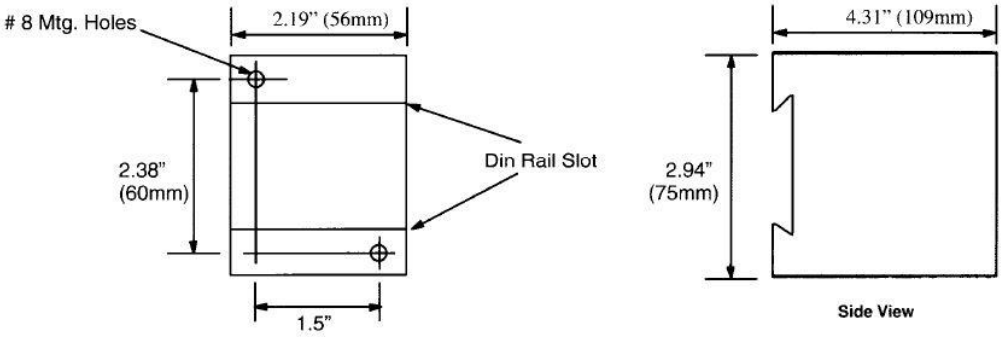
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0179-3509 – TYPE B



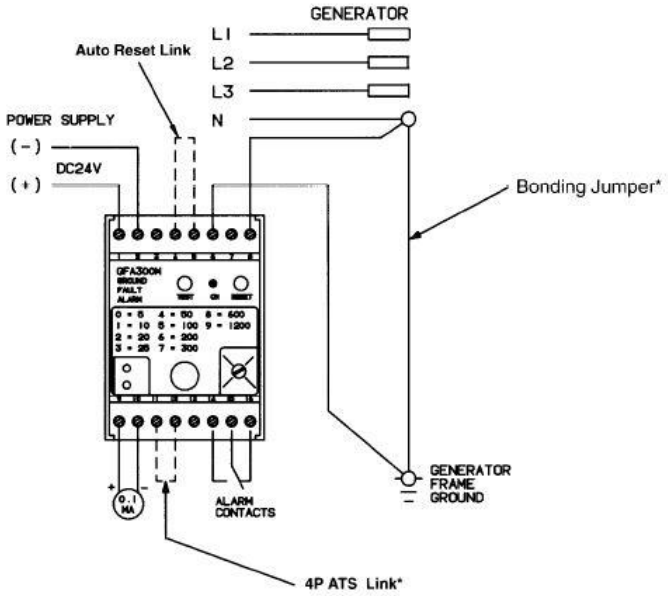
THREE-PHASE, FOUR-WIRE UTILITY, 3-POLE ATS

Outline detail



Weight: 19 oz (540 grams)

Interconnection detail



* Required only with separately derived systems. Bonding jumper is included in kit.

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Field installation kits

Accessory kit #	Corresponding production part #	Critical component	Used with alt frame size 4 or 5	Used with alt frame size 6 or 7	Feature code	Miscellaneous	Instruction sheet
0179-3244-05	0179-3244-03	0307-3003-01	X		H550	For use with PCC2100	C645
0179-3244-06	0179-3244-07	0307-3003-01		X	H550	For use with PCC2100	C645
0179-3244-09	0179-3244-08	0307-3003-01	X			For use with PCC2100	C645
0179-3428-02	0179-3428-01	0307-3003-01	X		H550	For use with PCC3200, PCC3201	C706
0179-3509-03	0179-3509-01	0307-3003-01		X	H667/ H668	Ground Fault Kit – PCC2100/3100, 4 pole. Separately derived transfer switch (SDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-04	0179-3509-02	0307-3003-01		X	H666	Ground Fault Kit – PCC3200, 3-pole NSDTS (H666) NON-separately derived transfer switch (NSDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-07	0179-3509-05	0307-3003-01		X	H667/ H668	Ground Fault Kit – PCC3200, 4-pole. Separately derived transfer switch (SDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-08	0179-3509-06	0307-3003-01		X	H666	Ground Fault Kit – PCC3200, 3-pole. NON-separately derived transfer switch (NSDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0300-4582-05	0300-4582-03	0307-3003-01	X		H550	For use with PCC3100	C646

Feature descriptions

H550-2 = The unit is equipped with an adjustable sensor to detect a ground fault condition on the main alternator output. A fault condition illuminates an indicating lamp on the genset control panel. Sensor features include: -0 to 1.0 second adjustable time delay. Ground fault pickup settings: 100, 150, 200, 250, 300, 450, 600, 750, 800, 1200 Amps – “Test” and “Reset” buttons and functional condition indicating lights. Suitable for operating voltages up to 600 VAC.

H666-2 = The generator set is equipped with a current transformer and a ground fault indication relay for use with or without a set mounted circuit breaker. The CT and the relay supplied with the LV Genset will work only when the system has the single Genset and the CT is placed on the N-G bond. For a separately derived system with multiple Gensets, the current in the N-G bonds of the each Genset must be summed and then wired to the protective relay. For a non-separately derived system the CT should be placed in the N-G bond. In most of the cases this bond will be the part of the switchgear where a service entrance utility breaker is installed. Limitation of this design would be number of CTs which could be placed on the N-G bond and the number of the auxiliary contacts available on the protective relay.

H667-2 = The generator set is equipped with a current transformer and ground fault indication relay for use with a 4-pole, separately derived transfer switch and set mounted circuit breaker. The CT is mounted in the circuit breaker box mounted on the left side of the genset as viewed from the generator end. The genset neutral and ground are bonded.

H668-2 = The generator set is equipped with a current transformer and ground fault indication relay for use with a 4-pole, separately derived transfer switch and set mounted circuit breaker. The CT is mounted in the circuit breaker box mounted on the right side of the genset as viewed from the generator end. The genset neutral and ground are bonded.

Certification

ISO9001 - This product was designed and manufactured in facilities certified to ISO9001.

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SECTION 4
GENERATOR DRAWINGS AND INTERCONNECTS

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
–	2017–617	RELEASED TO PRODUCTION	KL433		NA372	15SEPT17
1	2018–543	REPLACE 6.00" WAS 5.00" TURBO EXHAUST	LQ629		NA372	24SEP18
2	2022–011	NEWAGE S6L1D WAS NEWAGE HC5 & HC6	KL433	NA372	NA372	05JAN22

ENGINE SERVICE CONNECTIONS

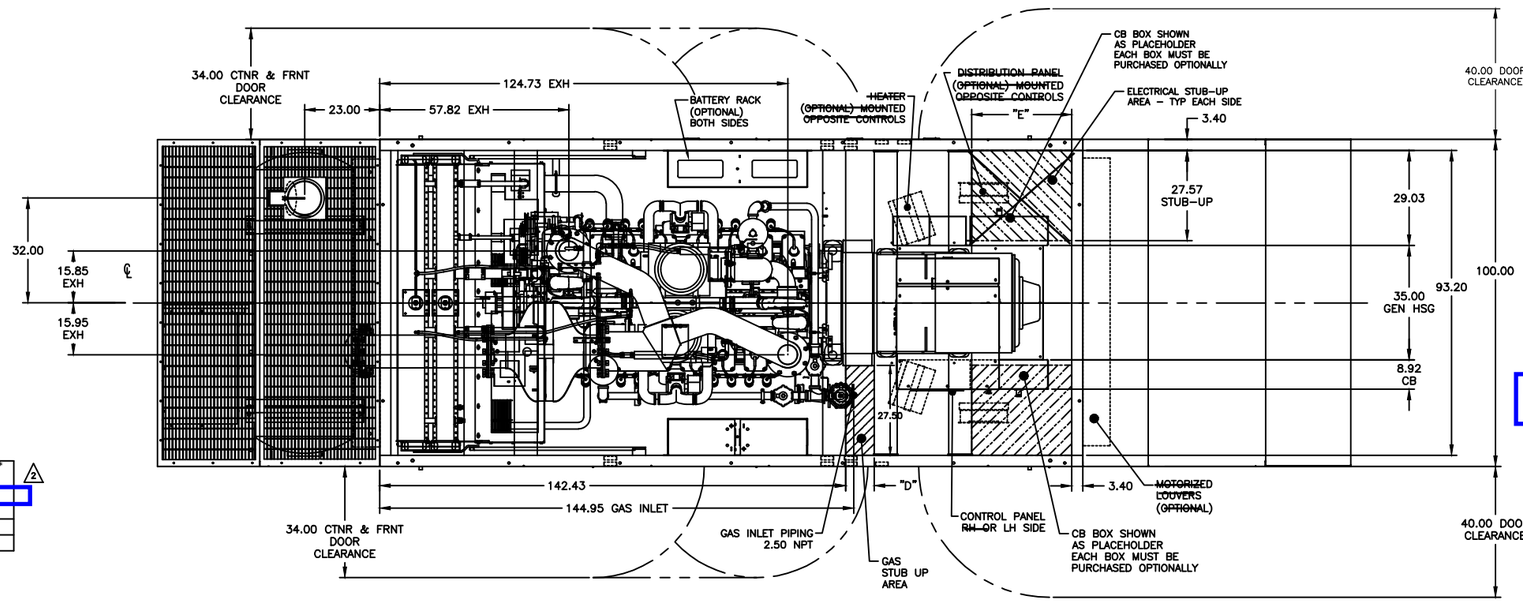
GAS INLET	2.50" NPT
ENGINE WATER IN	5.00" O.D.
ENGINE WATER OUT	2X 3.00" O.D.
MAG PICK–UP	5/8–18 UNF
OIL DRAIN PLUG	1–18 NS
TURBO STACK	2X 6.00" O.D.
EXHAUST STACK	1X 10" O.D.
AFTERCOOLER WATER IN	2.00" NPT
AFTERCOOLER WATER OUT	1.50" NPT
EXH TEMP COUPLING	2X 1/4" NPT

FLUID CAPACITIES

ENGINE OIL	59.2/51.2 GAL
ENGINE COOLANT	40.50 GAL
AFTERCOOLER COOLANT	6.00 GAL
RAD JACKET WATER	45.25 GAL
RAD AFTERCOOLER	42.09 GAL

SERVICE NOTES

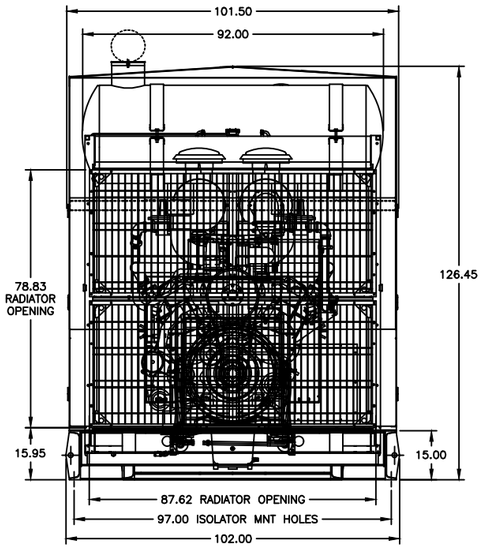
DIPSTICK REMOVAL	21.00"
OIL FILTER REMOVAL	3.00"

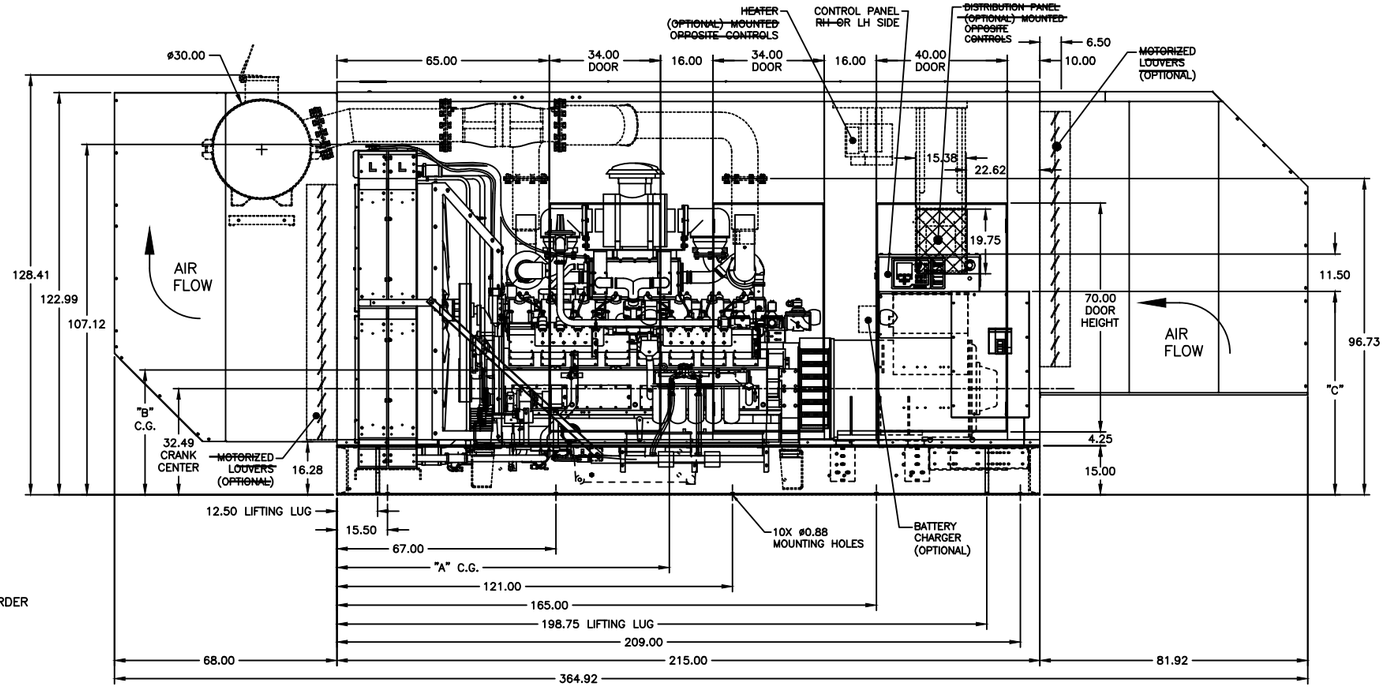


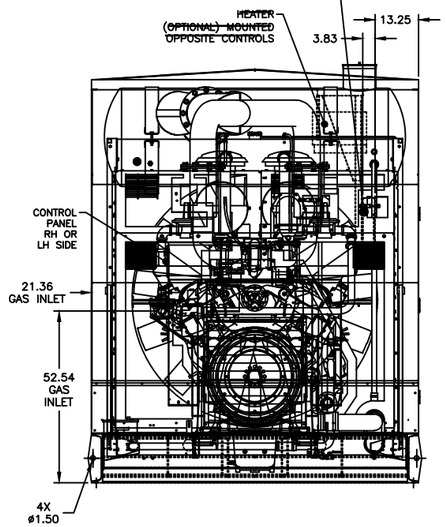
LSI 1200A 3P 100%
left side

GENERATOR FRAME SIZE	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	TOTAL WEIGHT* (WET) LBS/KG
NEWAGE S6L1D-C41	88.62	39.29	62.17	8.77	30.61	29059/13181
NEWAGE S6L1D-D41	89.63	39.19	62.17	8.77	30.61	29390/13331
NEWAGE S6L1D-E41	90.71	39.10	62.17	8.77	30.61	29732/13486
NEWAGE S6L1D-F41	92.60	38.86	62.17	8.77	30.61	30327/13756

*SEE NOTES 1 AND 2





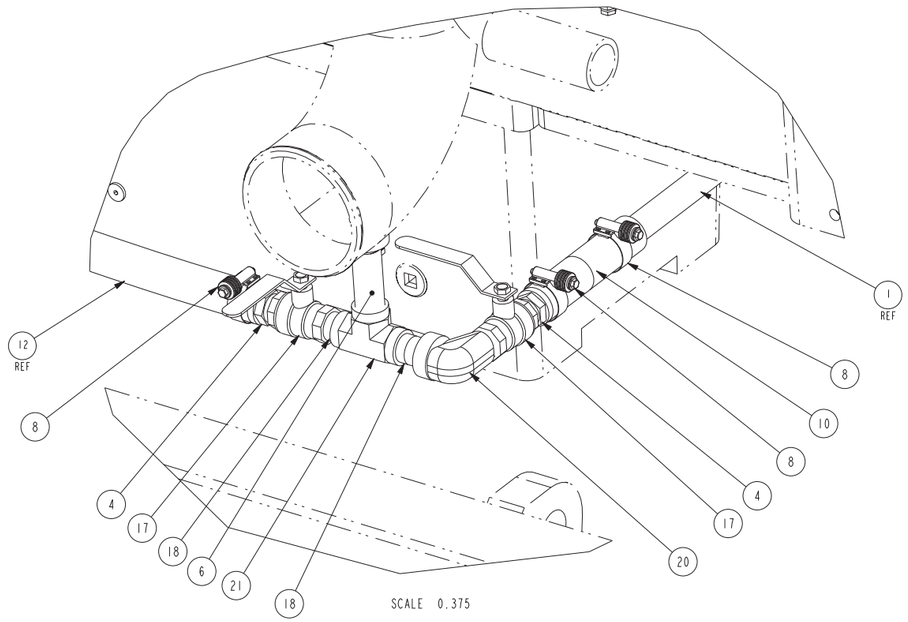


NOTES:
1) ENCLOSURE IS TO BE PAINTED ONAN GREEN UNLESS OTHERWISE NOTED ON ORDER
2) ALL HARDWARE TO BE STAINLESS STEEL
3) ALL DOORS KEYED ALIKE
4) STAINLESS STEEL LIFT–OFF DOOR HINGES
5) FOLDING T–HANDLE COMPOSITE DOOR LATCH
6) ENCLOSURE IS 12 GAUGE
7) ALL WEIGHTS AND DIMENSIONS ARE APPROXIMATE
8) WEIGHTS DO NOT INCLUDE BATTERIES OR OPTIONAL EQUIPMENT
9) WEIGHTS INCLUDE STANDARD CRITICAL GRADE EXHAUST. FOR HOSPITAL GRADE EXHAUST ADD 400 LBS/182 KG
10) CONTROLLER CAN BE MOUNTED ON EITHER SIDE OF CABINET
11) REQUIRES USE OF SPREADER BAR WHEN LIFTING TO PREVENT DAMAGE TO UNIT
12) GENSET DOES NOT INCLUDE FLOOR. CONTACT FACTORY FOR PRICING
13) GENSETS HAVE INTEGRAL ISOLATION

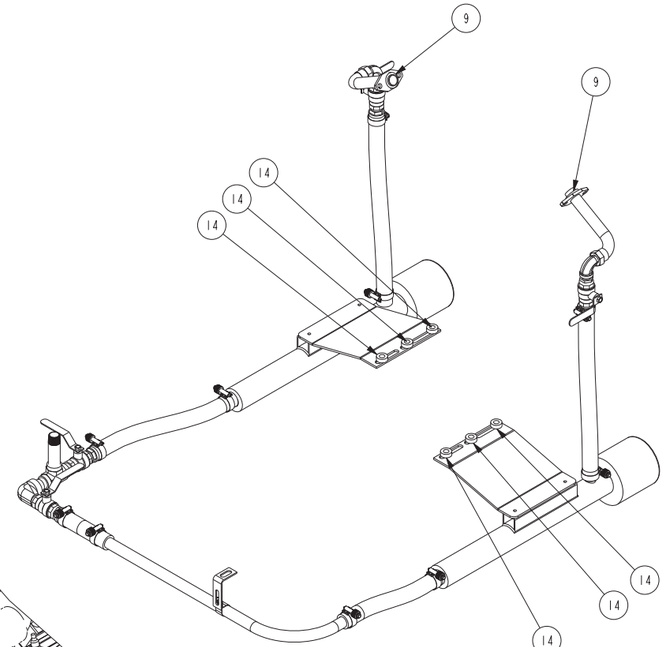
DIMENSIONS ARE IN: INCHES [ ] ARE IN: .	DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential	**Cummins Inc.**
DIMENSION TOLERANCES X.X: ±0.090IN OR 2.3mm X.XX: ±0.030IN OR 0.76mm X.XXX: ±0.015IN OR 0.381mm ANGULAR TOLERANCE: ±1°	SCALE 20.6803	DWN KL433 CKD NA372 APVD NA372 DATE 15SEPT2017	ITEM NAME GENSET, GTA50E RADIATOR, L1/L2 ENCL
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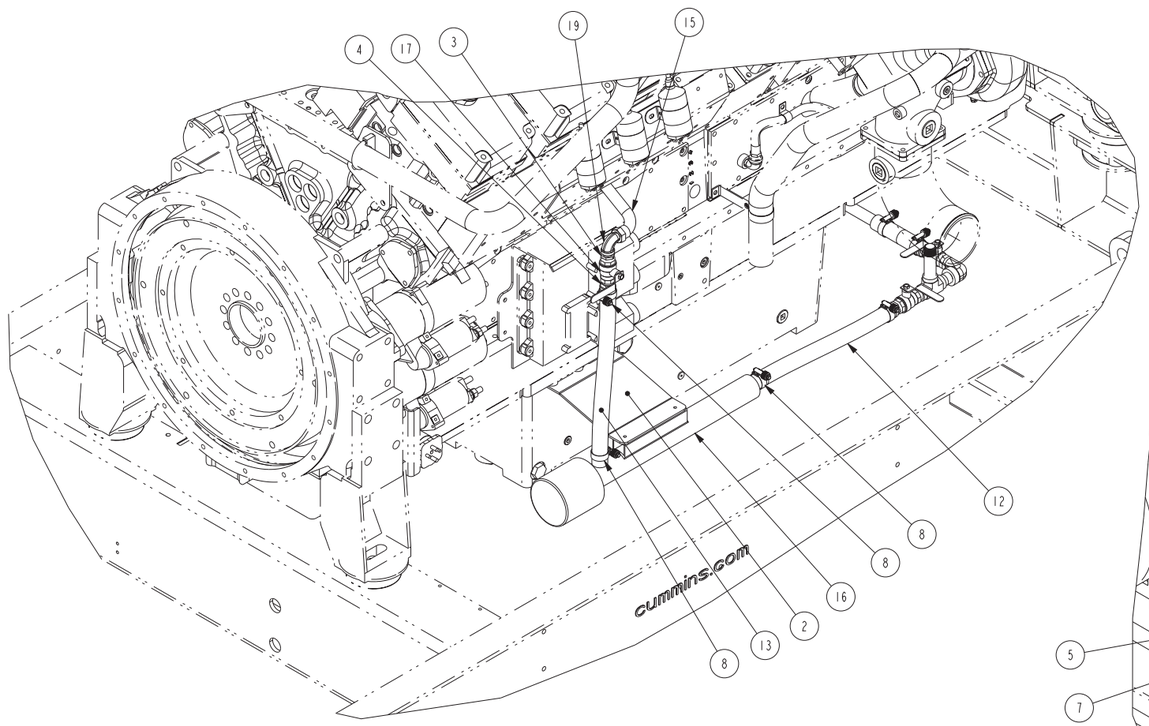
BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	TUBE,CROSSOVER,HEATER; GTA 38/50	7884
2	2	BRACKET, COOLANT HEATER; MULTI-UNIT	8143
3	2	NIPPLE,REDUCING HEXAGON; -12 NPT X -8 NPT,BRASS	12529-12-8
4	4	COUPLING,PLAIN HOSE; -16 BEAD X -12 NPT,BRASS	12545-16-12
5	1	BRACKET, MOUNTING, GUARD; FIREPUMP CFP8.3	13349
6	1	NIPPLE, 3/4" NPT X 4", BLK; FIRST SUPPLY, IBNFP	22924
7	1	CLIP; 1.00 ID, 3/8" HOLE, VINYL	26963-16
8	10	CLAMP, WORM, 9/16" BAND; CONSTANT-TORQUE AS	26977-16
9	2	SEAL, RECTANGULAR RING	3177556
10	1	HOSE, HEATER EPDM; 1.00IN IDx6.00IN LONG	A042F071
11	1	HOSE, HEATER EPDM; 1.00IN IDx12.00IN LONG	A042F071
12	1	HOSE, HEATER EPDM; 1.00IN IDx16.00IN LONG	A042F071
13	2	HOSE, HEATER EPDM; 1.00IN IDx20.00IN LONG	A042F071
14	6	SPACER; 0.5 ID X 1.0 OD X 0.375 LG	A042F273
15	2	WATER TUBE,HEATER ASSEMBLY; GTA 38/50	A058P296
16	2	HEATER,COOLANT; 5000W, 240/480V	CPBPJ7S12
17	4	VALVE, BALL; 3/4" NPT	FA60406
18	2	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
19	2	STREET ELBOW,BLK,1/2" NPT	LTL-SE1290
20	1	ELBOW, STREET, 90 DEG 3/4NPT; PER SAE NO. 130239	LTL-SE3490
21	1	TEE, BLK, 3/4" NPT	LTL-ST34

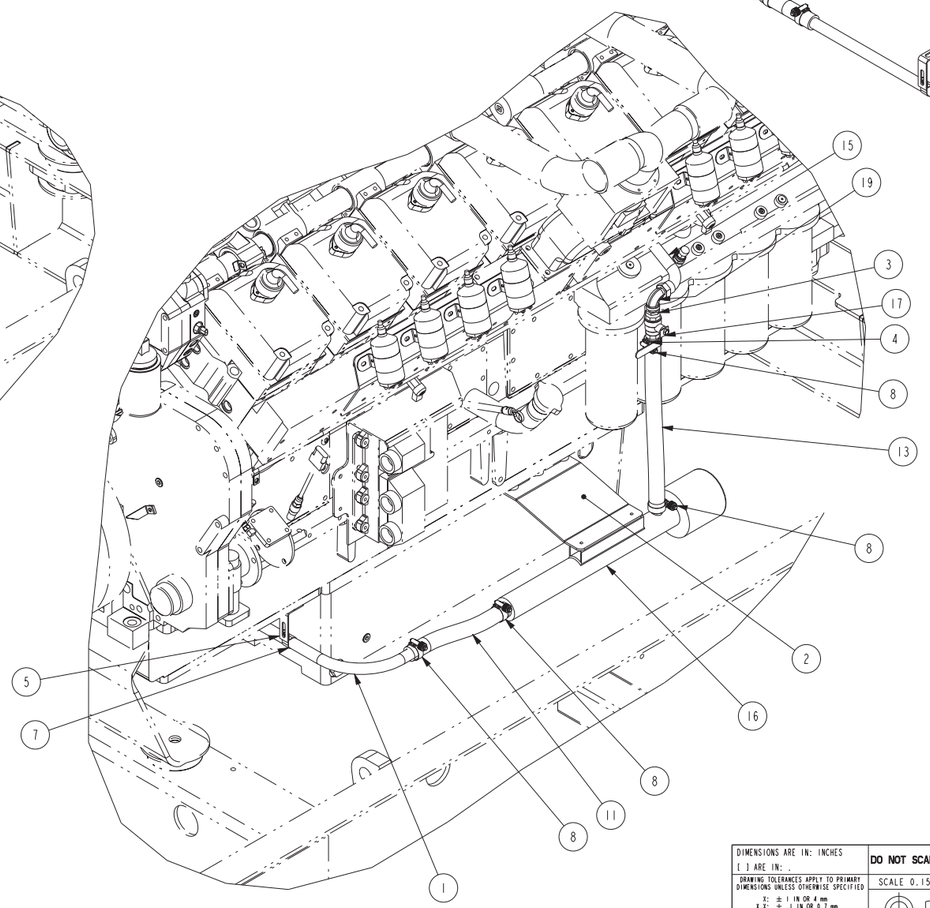
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2022-153	INITIAL RELEASE	JRC	JCB	JCB	15JUL22



SCALE 0.375







DIMENSIONS ARE IN: INCHES [ ] ARE IN: .	DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential	Cummins Inc.
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED. X: ± 1 IN OR 4 mm; X.X: ± .1 IN OR 0.7 mm; X.XX: ± .030 IN OR 0.25 mm; X.XXX: ± .010 IN OR 0.075 mm; ANGULAR TOLERANCE: ± 1°	SCALE 0.150	DWN J.R.CIBULKA; CKD J.C.BREITBACH; APVD J.C.BREITBACH; DATE 15JUL22	ITEM NAME: ASM,COLD WEATHER ACCESS GTA50E, COOLANT
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WATROD and FIREBAR Heaters

Engine Preheaters

Application Hints

- Mount engine preheaters in horizontal position only (as shown in Figures 1, 2 and 3). Contact your Watlow representative if vertical mounting is unavoidable.
- Mount the heater near or below the lowest point on the engine block. Keep outlet nozzle pointed up, as indicated on the tank.
- Estimate kilowatt requirements with the following formula. First determine the engine displacement, then multiply:

English

Cubic inches X 3 = estimated wattage

Metric

Liters X 183 = estimated wattage

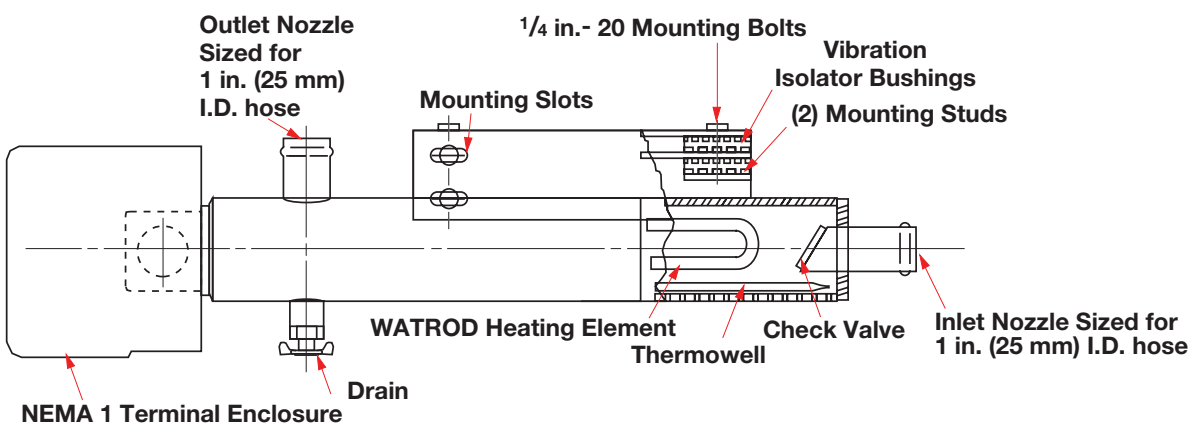
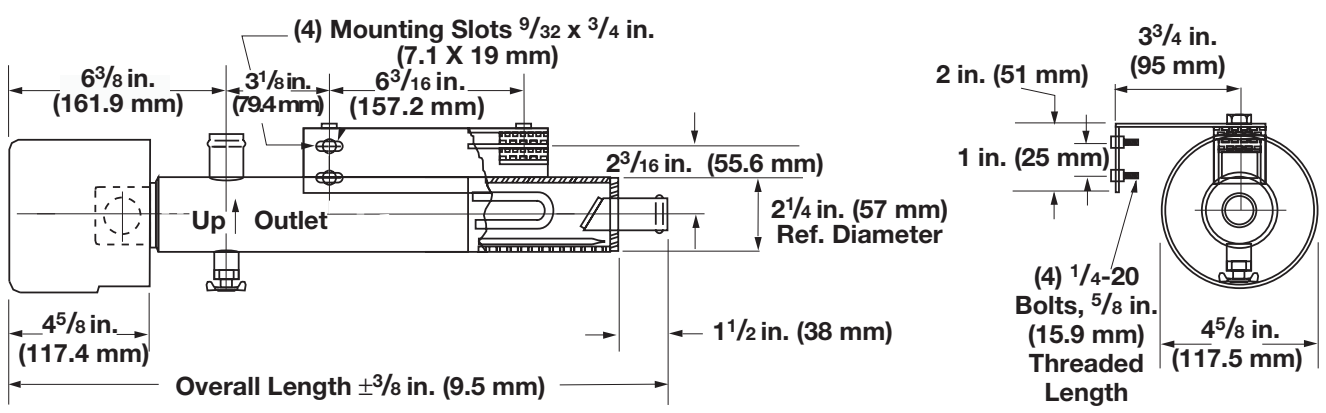


Figure 1



kW	Overall Length in. (mm)	Part Number 120/240VAC 1-Phase	Part Number 208VAC 1-Phase	Part Number 240/480VAC 1-Phase	Est. Ship. Wt. lbs (kg)
Application: Ethylene Glycol/Engine Coolant					
1.13	20 7/8 (530.2)		**CPBPL2S12①**		12 (6)
1.50	20 7/8 (530.2)	**CPBPB6S12**	**CPBPB2S12①**		12 (6)
1.69	20 7/8 (530.2)		**CPBPM2S12①**		12 (6)
1.88	20 7/8 (530.2)		**CPBPN2S12①**		12 (6)
2.00	20 7/8 (530.2)	**CPBPC6S12**			12 (6)
2.25	20 7/8 (530.2)	**CPBPD6S12**			12 (6)
2.25	26 11/16 (677.9)		**CPBPD2S12①**		15 (7)
2.50	20 7/8 (530.2)	**CPBPE6S12**			12 (6)
3.00	26 11/16 (677.9)		**CPBPF2S12①**	**CPBPF7S12**	15 (7)
3.75	26 11/16 (677.9)		**CPBPG2S12①**		15 (7)
4.00	26 11/16 (677.9)			**CPBPH7S12**	15 (7)
5.00	26 11/16 (677.9)			**CPBPJ7S12①**	15 (7)

RAPID SHIP

- Next day shipment up to 2 pieces
- ① - Manufacturing lead times

SHEET #	DESCRIPTION
2	LAYOUT, CONTROL PANEL & OPTIONS
3	SCHEMATIC, OVERALL
4	SCHEMATIC, CUSTOMER CONNECTIONS
5	SCHEMATIC, PARALLELING, ISOLATED BUS, GEN TO GEN
6	SCHEMATIC, PARALLELING, UTILITY SINGLE
7	SCHEMATIC, PARALLELING, UTILITY MULTIPLE
8	SCHEMATIC, OPTIONAL ACCESSORIES
9	SCHEMATIC, OPTIONAL AUX101 & AUX102
10	SCHEMATIC, ALTERNATOR, MCB, CT'S
11	SCHEMATIC, HARNESS, POWER AND SENSOR
12	SCHEMATIC, HARNESS, ENGINE INTERFACE

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REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	CHANGED TITLE TO REFLECT PRODUCTS COVERED BY SCHEMATIC	OZ710	26JAN18
B	2017-409	REMOVED CAN3.0 FROM THE CHILD ECM. CHANGED B+ SUPPLY FOR EMISSION KEY.	KAK	30 JUNE 2017
A	2016-785	ADDED S-CAN NETWORK FOR MLD.	KAK	17 NOV 2016

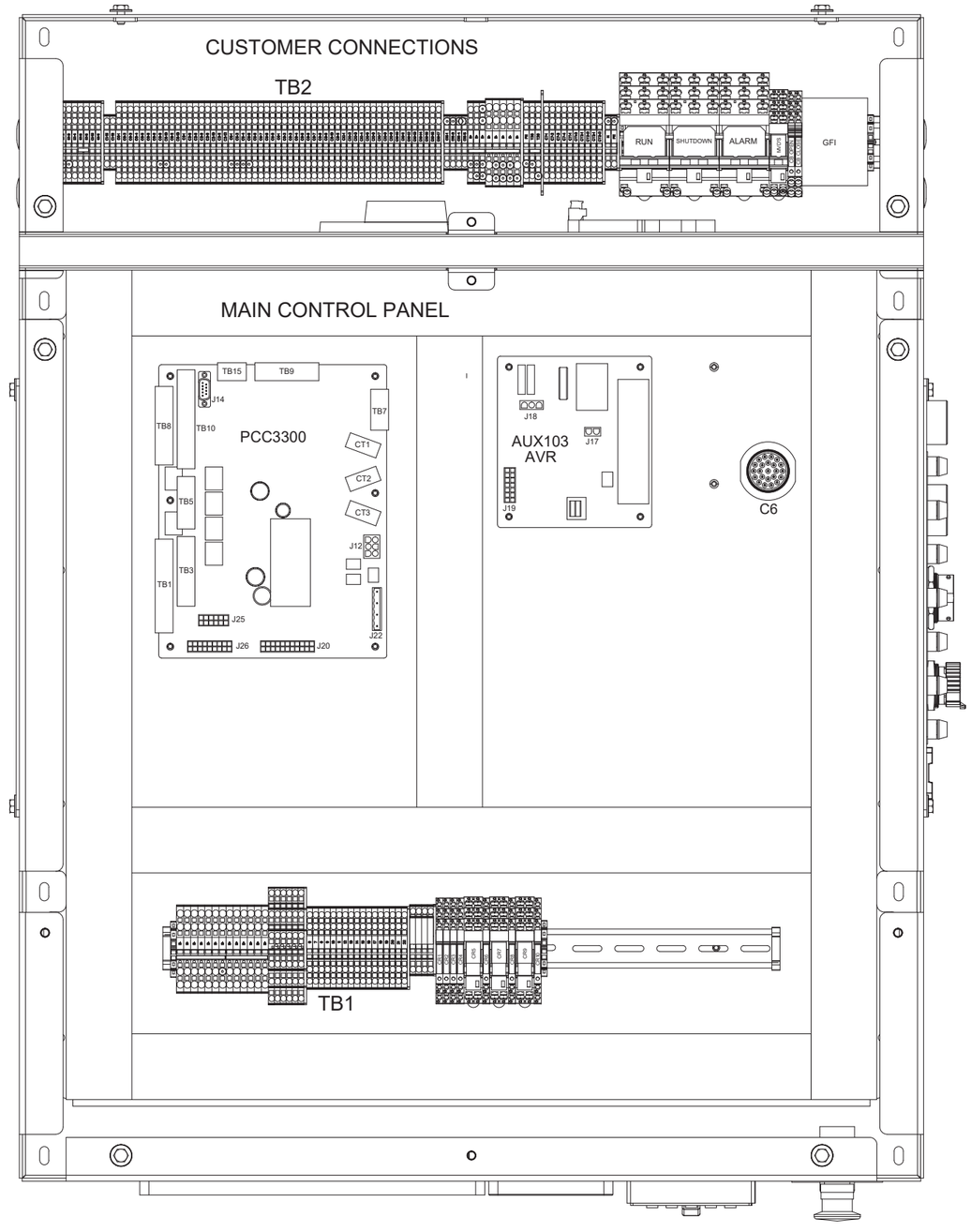
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION
IMPERIAL UNITS: MORE THAN 0 IN THRU 24 IN ± 0.030 IN; OVER 24 IN THRU 36 IN ± 0.060 IN; OVER 36 IN THRU 48 IN ± 0.090 IN
METRIC UNITS: MORE THAN 0 MM THRU 600 MM ± 0.75 MM; OVER 600 MM THRU 900 MM ± 1.5 MM; OVER 900 MM THRU 1200 MM ± 2.25 MM

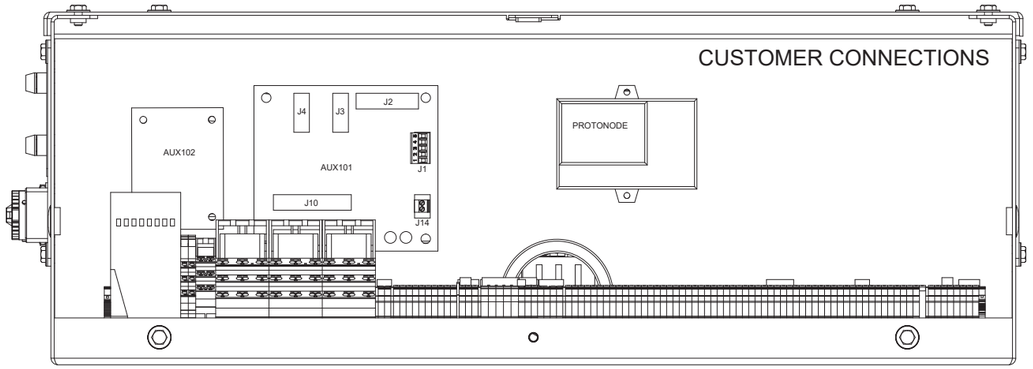
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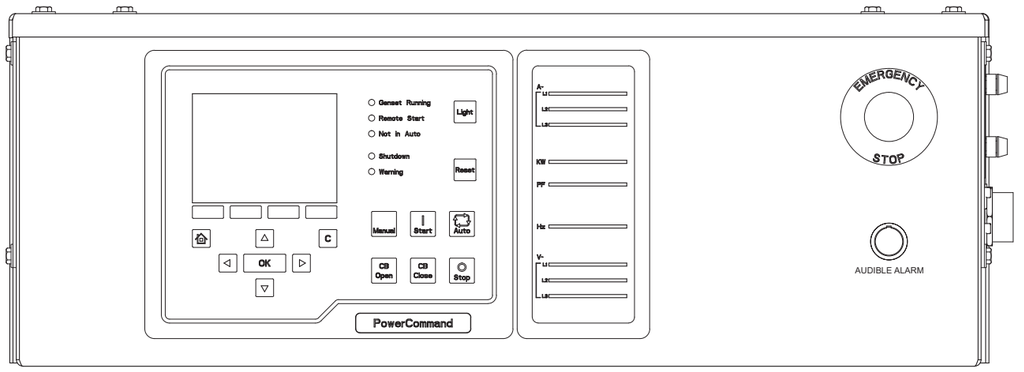
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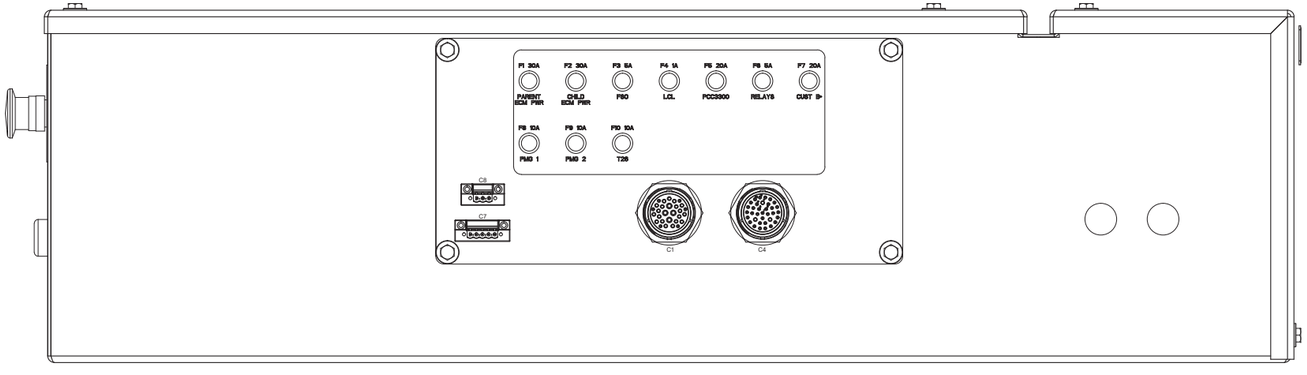
SCHEMATICS, ELECTRICAL
GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S
SCALE:
EST WEIGHT:
DRAWN BY: KAK
DATE: 29 AUG 2016
AUTO CAD
INIT ECO: 2016-617
SHEET 1 OF 12
DRAWING NO: A042F753









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ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION

IMPERIAL UNITS
METRIC UNITS

NPower

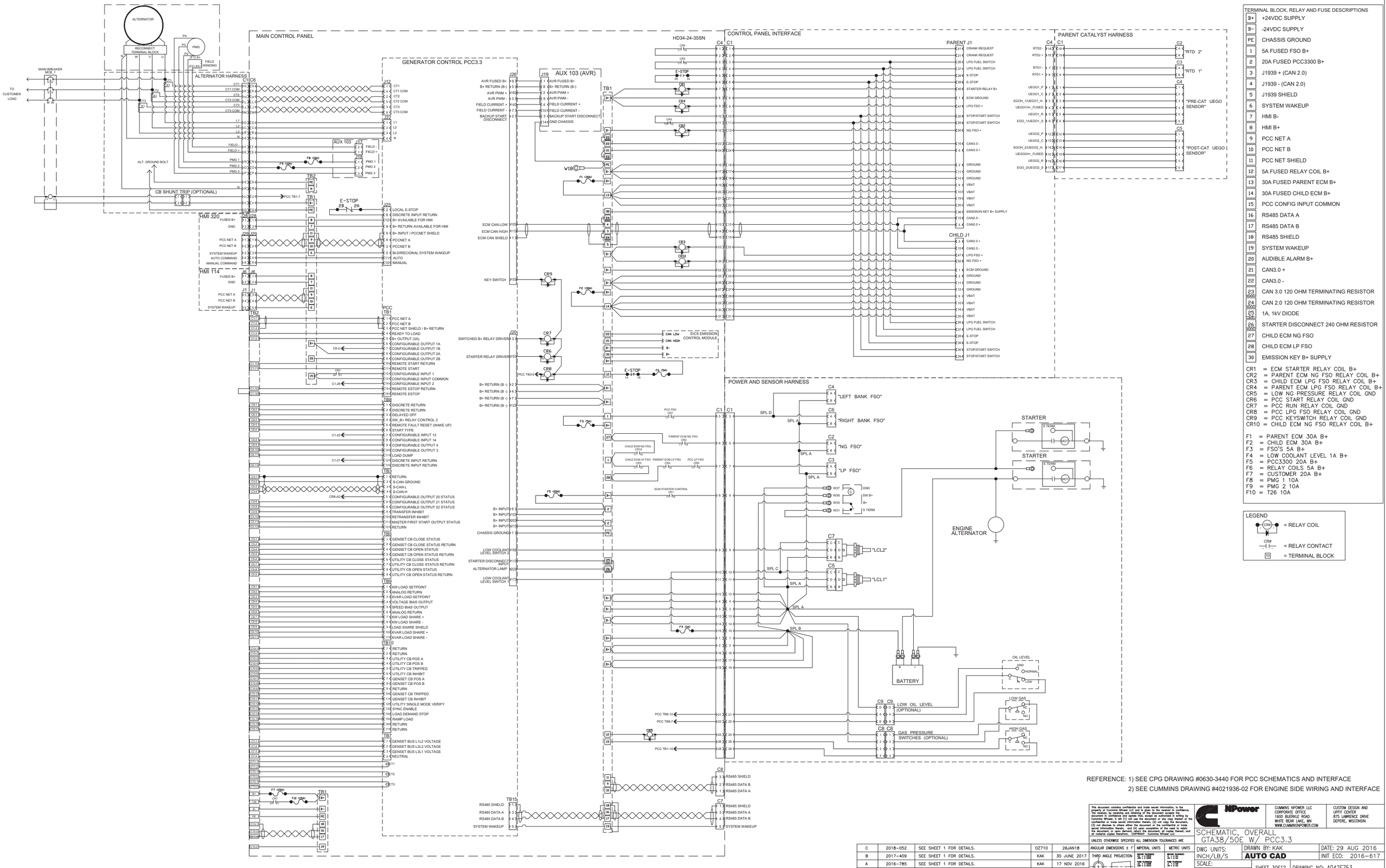
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CUSTOM DESIGN AND UPFIT CENTER
875 LAWRENCE DRIVE
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LAYOUT, CONTROL PANEL AND OPTIONS
GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S
DRAWN BY: KAK
DATE: 29 AUG 2016
AUTO CAD
INIT ECO: 2016-617
SCALE:
EST WEIGHT:
SHEET 20F12
DRAWING NO: A042F753

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	SEE SHEET 1 FOR DETAILS.	OZ710	26JAN18
B	2017-409	SEE SHEET 1 FOR DETAILS.	KAK	30 JUNE 2017
A	2016-785	SEE SHEET 1 FOR DETAILS.	KAK	17 NOV 2016



TERMINAL BLOCK, RELAY AND FUSE DESCRIPTIONS

B+	+24VDC SUPPLY
B-	-24VDC SUPPLY
PE	CHASSIS GROUND
1	5A FUSED FSO B+
2	20A FUSED PCC3300 B+
3	J1939 + (CAN 2.0)
4	J1939 - (CAN 2.0)
5	J1939 SHIELD
6	SYSTEM WAKEUP
7	HMI B-
8	HMI B+
9	PCC NET A
10	PCC NET B
11	PCC NET SHIELD
12	5A FUSED RELAY COIL B+
13	30A FUSED PARENT ECM B+
14	30A FUSED CHILD ECM B+
15	PCC CONFIG INPUT COMMON
16	RS485 DATA A
17	RS485 DATA B
18	RS485 SHIELD
19	SYSTEM WAKEUP
20	AUDIBLE ALARM B+
21	CAN3.0 +
22	CAN3.0 -
23	CAN 3.0 120 OHM TERMINATING RESISTOR
24	CAN 2.0 120 OHM TERMINATING RESISTOR
25	1A, 1kV DIODE
26	STARTER DISCONNECT 240 OHM RESISTOR
27	CHILD ECM NG FSO
28	CHILD ECM LP FSO
30	EMISSION KEY B+ SUPPLY

CR1 = ECM STARTER RELAY COIL B+
CR2 = PARENT ECM NG FSO RELAY COIL B+
CR3 = CHILD ECM LPG FSO RELAY COIL B+
CR4 = PARENT ECM LPG FSO RELAY COIL B+
CR5 = LOW NG PRESSURE RELAY COIL GND
CR6 = PCC START RELAY COIL GND
CR7 = PCC RUN RELAY COIL GND
CR8 = PCC LPG FSO RELAY COIL GND
CR9 = PCC KEYSWITCH RELAY COIL GND
CR10 = CHILD ECM NG FSO RELAY COIL B+

F1 = PARENT ECM 30A B+
F2 = CHILD ECM 30A B+
F3 = FSO'S 5A B+
F4 = LOW COOLANT LEVEL 1A B+
F5 = PCC3300 20A B+
F6 = RELAY COILS 5A B+
F7 = CUSTOMER 20A B+
F8 = PMG 1 10A
F9 = PMG 2 10A
F10 = T26 10A

LEGEND
= RELAY COIL
= RELAY CONTACT
= TERMINAL BLOCK

REFERENCE: 1) SEE CPG DRAWING #0630-3440 FOR PCC SCHEMATICS AND INTERFACE
2) SEE CUMMINS DRAWING #4021936-02 FOR ENGINE SIDE WIRING AND INTERFACE

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ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS
THIRD ANGLE PROJECTION

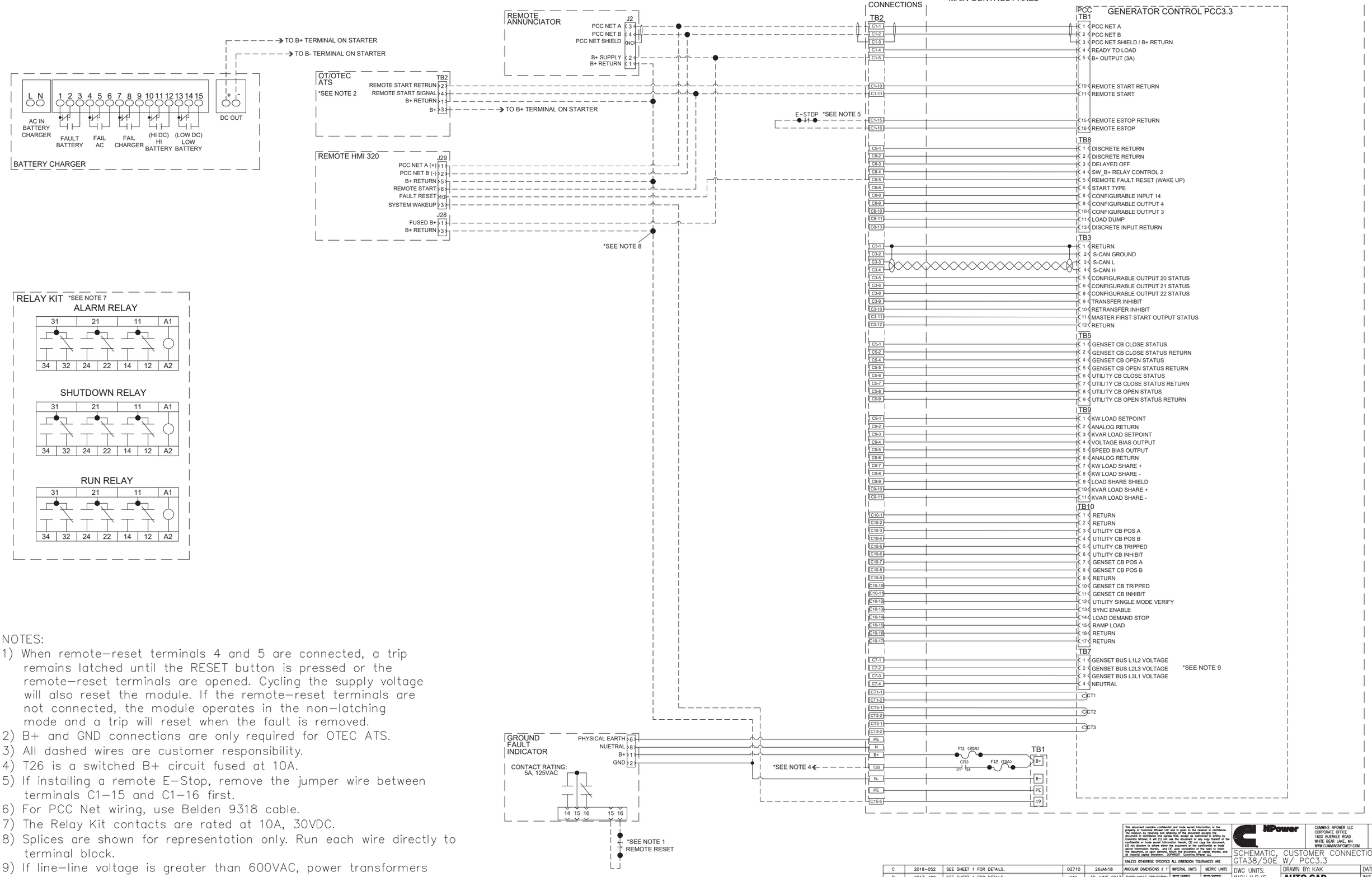
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SCHEMATIC, OVERALL
GTA38/50E W/ PCC3.3

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
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DWG UNITS: INCH/LB/S
SCALE:
EST WEIGHT:
DRAWN BY: KAK
DATE: 29 AUG 2016
AUTO CAD
INIT ECO: 2016-617
SHEET 30F12
DRAWING NO: A042F753



NOTES:

1) When remote–reset terminals 4 and 5 are connected, a trip remains latched until the RESET button is pressed or the remote–reset terminals are opened. Cycling the supply voltage will also reset the module. If the remote–reset terminals are not connected, the module operates in the non–latching mode and a trip will reset when the fault is removed.
2) B+ and GND connections are only required for OTEC ATS.
3) All dashed wires are customer responsibility.
4) T26 is a switched B+ circuit fused at 10A.
5) If installing a remote E–Stop, remove the jumper wire between terminals C1–15 and C1–16 first.
6) For PCC Net wiring, use Belden 9318 cable.
7) The Relay Kit contacts are rated at 10A, 30VDC.
8) Splices are shown for representation only. Run each wire directly to terminal block.
9) If line–line voltage is greater than 600VAC, power transformers must be used.

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ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS	DWG UNITS:	DRAWN BY: KAK	DATE: 23 JUNE 2016
THIRD ANGLE PROJECTION	.X ± 0.12	X ± 3.0	INCH/LB/S	AUTO CAD	INIT ECO: 2016–022
	.XX ± 0.030	X.X ± 0.8	SCALE:	SHEET 40F12	DRAWING NO: A042F753
	.XXX ± 0.005	X.XX ± 0.13	EST WEIGHT:		

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
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SCHEMATIC, CUSTOMER CONNECTIONS
GTA38/50E W/ PCC3.3

THIS DRAWING IS FOR REFERNCE ONLY.
REFER TO CPG DRAWING 0630-3440 FOR ALL DOCUMENTATION.

GEN 1 MAIN CONTROL PANEL

GENERATOR CONTROL PCC3.3

CUSTOMER CONNECTIONS

ATS OR DMC

RS RET
RS SIG
TB2

PCC TB1
- 10 REMOTE START RETURN
- 11 REMOTE START

TB3
- 1 RETURN
- 2 S-CAN GROUND
- 3 S-CAN L
- 4 S-CAN H
- 11 MASTER FIRST START OUTPUT STATUS
- 12 RETURN

*SEE NOTE 6

*SEE NOTE 2

TB5
- 1 GENSET CB CLOSE STATUS
- 2 GENSET CB CLOSE STATUS RETURN
- 4 GENSET CB OPEN STATUS
- 5 GENSET CB OPEN STATUS RETURN

GCB1 CLOSE
GCB1 OPEN

TB9
- 7 KW LOAD SHARE +
- 8 KW LOAD SHARE -
- 9 LOAD SHARE SHIELD
- 10 KVAR LOAD SHARE +
- 11 KVAR LOAD SHARE -

*SEE NOTE 1

EMAX *SEE NOTE 3

AUX 'A' STYLE
BELL ALARM
UVR
MOTOR SPRINGS

TB10
- 1 RETURN
- 2 RETURN
- 7 GENSET CB POS A
- 8 GENSET CB POS B
- 9 RETURN
- 10 GENSET CB TRIPPED
- 11 GENSET CB INHIBIT
- 13 SYNC ENABLE
- 14 LOAD DEMAND STOP
- 15 RAMP LOAD
- 16 RETURN
- 17 RETURN

TB7
- 1 GENSET BUS L1L2 VOLTAGE
- 2 GENSET BUS L2L3 VOLTAGE
- 3 GENSET BUS L3L1 VOLTAGE
- 4 NEUTRAL

CT1
CT2
CT3

TB1
- B+
- T26
- B-

F11 (20A)
F12 (10A)
CR3

GCB1 CLOSE 11 14
GCB1 OPEN 11 14
CLOSING
OPENING

*SEE NOTE 5

FUSE
FUSE
FUSE

IF LINE-LINE VOLTAGE IS GREATER THAN 600VAC, POWER TRANSFORMERS MUST BE USED.

GEN 1

RECONNECT TERMINAL BLOCK
N W V U

EMAX GCB1 *SEE NOTE 3

X1 CT1
X1 CT2
X1 CT3

GENSET BUS

GCB2 CLOSE
GCB2 OPEN

GEN 2

RECONNECT TERMINAL BLOCK
U V W N

EMAX GCB2

GEN 2 MAIN CONTROL PANEL

GENERATOR CONTROL PCC3.3

NOTES:
1) ONLY CONNECT SHIELD AT ONE GENSET TO PREVENT GROUND LOOPS. SHIELD MUST MAINTAIN CONTINUITY OVER ENTIRE LENGTH OF CABLE. CABLE SHALL BE 18AWG, TWISTED, W/ SHIELD. MAXIMUM LENGTH OF 1000 METERS.
2) FOR SINGLE GENSET, USE A 10K PULLUP RESISTOR FROM FUSED B+ TO TB2 C3-11. THIS IS TO PREVENT FIRST START BACKUP FAULT.
3) ABB EMAX AUTOMATED CIRCUIT BREAKER SHOWN FOR REFERENCE.
4) ALL DASHED WIRES ARE CUSTOMER RESPONSIBILITY.
5) FUSING REQUIRED UNLESS ALL THREE OF THE FOLLOWING ARE TRUE:
   A) LL VOLTAGE <= 240 VAC ON SENSING LEADS
   B) NOT PARALLELED OR USING A SIGNAL TRANSFORMER
   C) SIZE <= 125kVA
   FUSE SHALL BE FERRAZ SHAWMUT ½A OR EQUIVALENT.
6) THE ENTIRE S-CAN NETWORK MUST BE SHIELDED TO PREVENT GROUND LOOPS. THE DRAIN WIRE MUST BE CONNECTED TO TB3-1 AT ONLY ONE END OF EACH S-CAN NETWORK BUS.
   THE CABLE SHALL MEET SAE J1939-11 STANDARDS AND HAVE A MAX LENGTH OF 200M.
   EACH END OF THE NETWORK BUS MUST BE TERMINATED WITH A 120 OHM RESISTOR.
   REFER TO INSTALLATION MANUAL FOR DETAILS.

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
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THIRD ANGLE PROJECTION
IMPERIAL UNITS: .X ± 0.030; .XX ± 0.010; .XXX ± 0.005; FRACTIONS ± 1/32; ANGLES ± 1°
METRIC UNITS: .X ± 0.8; .XX ± 0.25; .XXX ± 0.13

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SCHEMATIC, PARALLELING, ISO BUS, GEN-GEN
GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S
SCALE:
EST WEIGHT:
DRAWN BY: KAK
AUTO CAD
DATE: 23 JUNE 2016
INIT ECO: 2016-022
SHEET 50F12
DRAWING NO: A042F753

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GEN 1 MAIN CONTROL PANEL

GENERATOR CONTROL PCC3.3

CUSTOMER CONNECTIONS

ATS OR DMC

RS RET
RS SIG
TB2

PCC TB1

TB2

REMOTE START RETURN 10 — C1-10
REMOTE START 11 — C1-11

TB5

GENSET CB CLOSE STATUS 1 — C5-1
GENSET CB CLOSE STATUS RETURN 2 — C5-2
GENSET CB OPEN STATUS 4 — C5-4
GENSET CB OPEN STATUS RETURN 5 — C5-5

GCB1 CLOSE
GCB1 OPEN
A1 A2

EMAX MCB1 *SEE NOTE 1
AUX
X STYLE

UTILITY BREAKER

TB10

RETURN 1 — C10-1
RETURN 2 — C10-2
UTILITY CB POS A 3 — C10-3
UTILITY CB POS B 4 — C10-4
UTILITY CB TRIPPED 5 — C10-5
GENSET CB POS A 7 — C10-7
GENSET CB POS B 8 — C10-8
RETURN 9 — C10-9
GENSET CB TRIPPED 10 — C10-10
GENSET CB INHIBIT 11 — C10-11
UTILITY SINGLE MODE VERIFY 12 — C10-12
SYNC ENABLE 13 — C10-13
RETURN 16 — C10-16
RETURN 17 — C10-17

RETURN
UTILITY CB POS A
UTILITY CB POS B
UTILITY CB TRIPPED

BELL ALARM
UVR
MOTOR SPRINGS

*SEE NOTE 3
*SEE NOTE 4

TB7

GENSET BUS L1L2 VOLTAGE 1 — C7-1
GENSET BUS L2L3 VOLTAGE 2 — C7-2
GENSET BUS L3L1 VOLTAGE 3 — C7-3
NEUTRAL 4 — C7-4

CT1 — CT1-1 — CT1-2
CT2 — CT2-1 — CT2-2
CT3 — CT3-1 — CT3-2

TB1

B+ — F7 (20A) — B+
F10 (15A) — CR7 — T26
B- — B-

GCB1 CLOSE 11 14 — CLOSING
GCB1 OPEN 11 14 — OPENING

*SEE NOTE 5

FUSE
FUSE
FUSE

IF LINE-LINE VOLTAGE IS GREATER THAN 600VAC, POWER TRANSFORMERS MUST BE USED.

UTILITY POWER

U
V
W
N

CT1 X1
CT2 X1
CT3 X1

GEN 1

RECONNECT TERMINAL BLOCK

N W V U

EMAX GCB1 *SEE NOTE 1

UTILITY BREAKER

U V W N

LOAD BUS

NOTES:
1) ABB EMAX AUTOMATED CIRCUIT BREAKER SHOWN FOR REFERENCE.
2) ALL DASHED WIRES ARE CUSTOMER RESPONSIBILITY.
3) SYNCHRONIZER ENABLE IS USED FOR SYNCHRONIZING ACROSS UTILITY BREAKER. THIS INPUT IS ALSO AVAILABLE VIA MODBUS.
4) IN THIS APPLICATION TYPE, THE SINGLE MODE VERIFY INPUT MUST BE ACTIVE TO ENABLE A DEAD BUS CLOSE. THERE IS NO DIRECT SENSING OF LOAD BUS VOLTAGE, SO DEAD BUS IS DETERMINED BY BREAKER POSITIONS ONLY. THIS INPUT IS NOT AVAILABLE VIA MODBUS.
5) FUSES REQUIRED UNLESS ALL THREE OF THE FOLLOWING ARE TRUE:
   A) LL VOLTAGE <= 240VAC ON SENSING LEADS.
   B) NOT PARALLELED OR USING SIGNAL TRANSFORMER.
   C) SIZE <= 125kVA.

FUSES SHALL BE FERRAZ SHAWMUT ½A OR EQUIVALENT.

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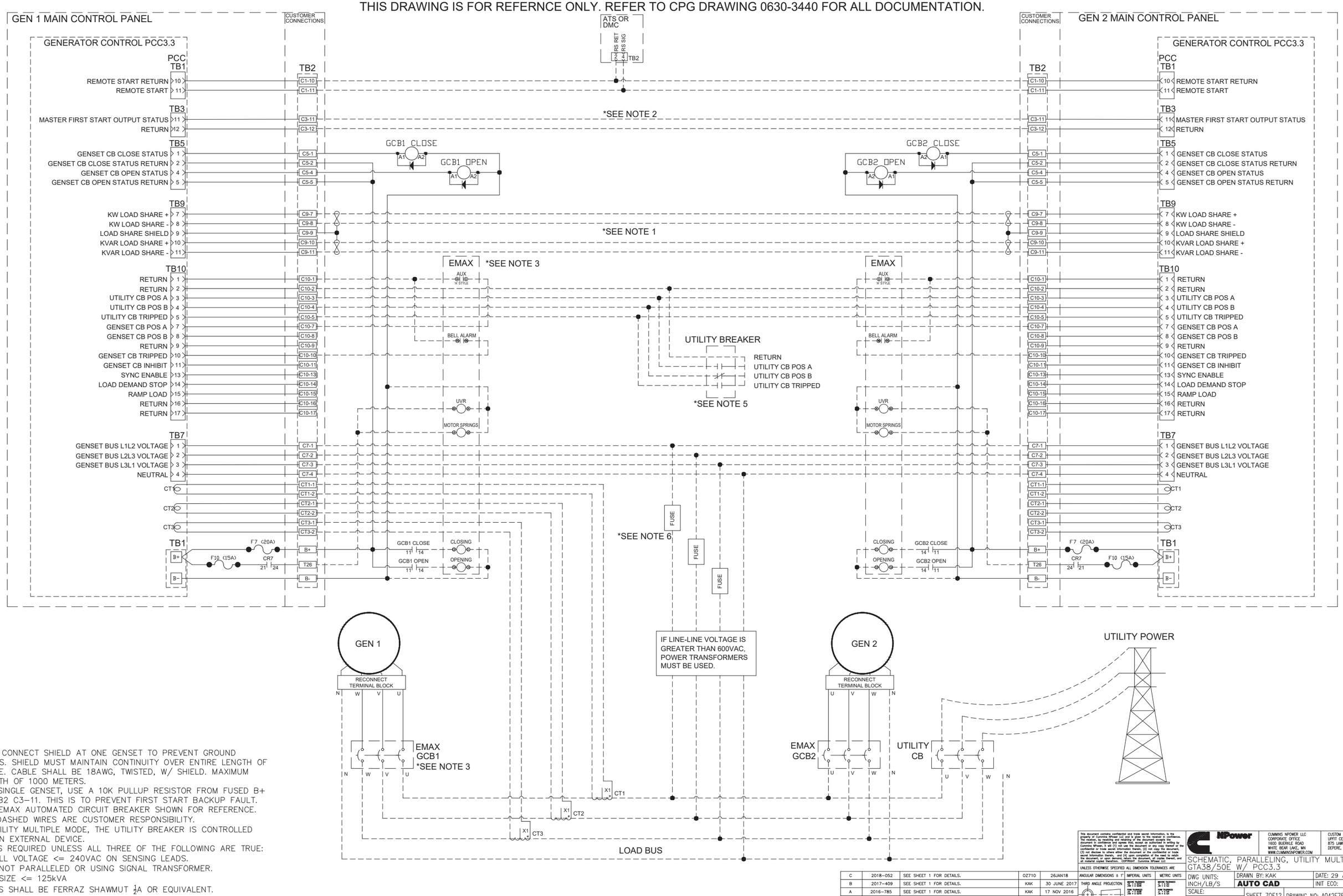
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IMPERIAL UNITS
METRIC UNITS
THIRD ANGLE PROJECTION

DWG UNITS: INCH/LB/S
SCALE:
EST WEIGHT:

DRAWN BY: KAK
DATE: 29 AUG 2016
AUTO CAD
INIT ECO: 2016-617
SHEET 60F12
DRAWING NO: A042F753

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	SEE SHEET 1 FOR DETAILS.	OZ710	26JAN18
B	2017-409	SEE SHEET 1 FOR DETAILS.	KAK	30 JUNE 2017
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1) ONLY CONNECT SHIELD AT ONE GENSET TO PREVENT GROUND LOOPS. SHIELD MUST MAINTAIN CONTINUITY OVER ENTIRE LENGTH OF CABLE. CABLE SHALL BE 18AWG, TWISTED, W/ SHIELD. MAXIMUM LENGTH OF 1000 METERS.
2) FOR SINGLE GENSET, USE A 10K PULLUP RESISTOR FROM FUSED B+ TO TB2 C3-11. THIS IS TO PREVENT FIRST START BACKUP FAULT.
3) ABB EMAX AUTOMATED CIRCUIT BREAKER SHOWN FOR REFERENCE.
4) ALL DASHED WIRES ARE CUSTOMER RESPONSIBILITY.
5) IN UTILITY MULTIPLE MODE, THE UTILITY BREAKER IS CONTROLLED BY AN EXTERNAL DEVICE.
6) FUSES REQUIRED UNLESS ALL THREE OF THE FOLLOWING ARE TRUE:
   A) LL VOLTAGE <= 240VAC ON SENSING LEADS.
   B) NOT PARALLELED OR USING SIGNAL TRANSFORMER.
   C) SIZE <= 125kVA
   FUSES SHALL BE FERRAZ SHAWMUT $\frac{1}{2}$A OR EQUIVALENT.

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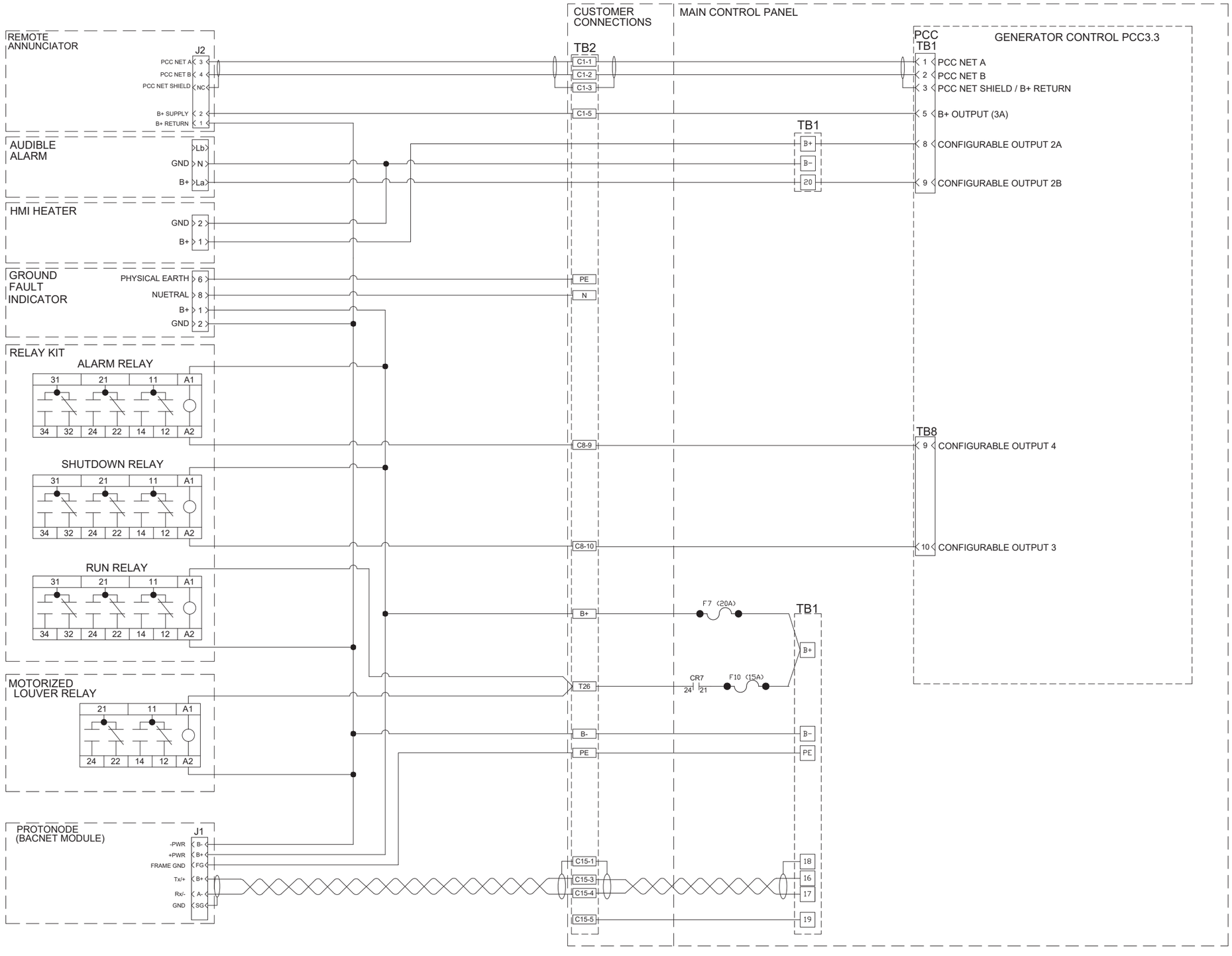
ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION		

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
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SCHEMATIC, PARALLELING, UTILITY MULTIPLE GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S
DRAWN BY: KAK
DATE: 29 AUG 2016
AUTO CAD
INIT ECO: 2016-617
SCALE:
EST WEIGHT:
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THIRD ANGLE PROJECTION

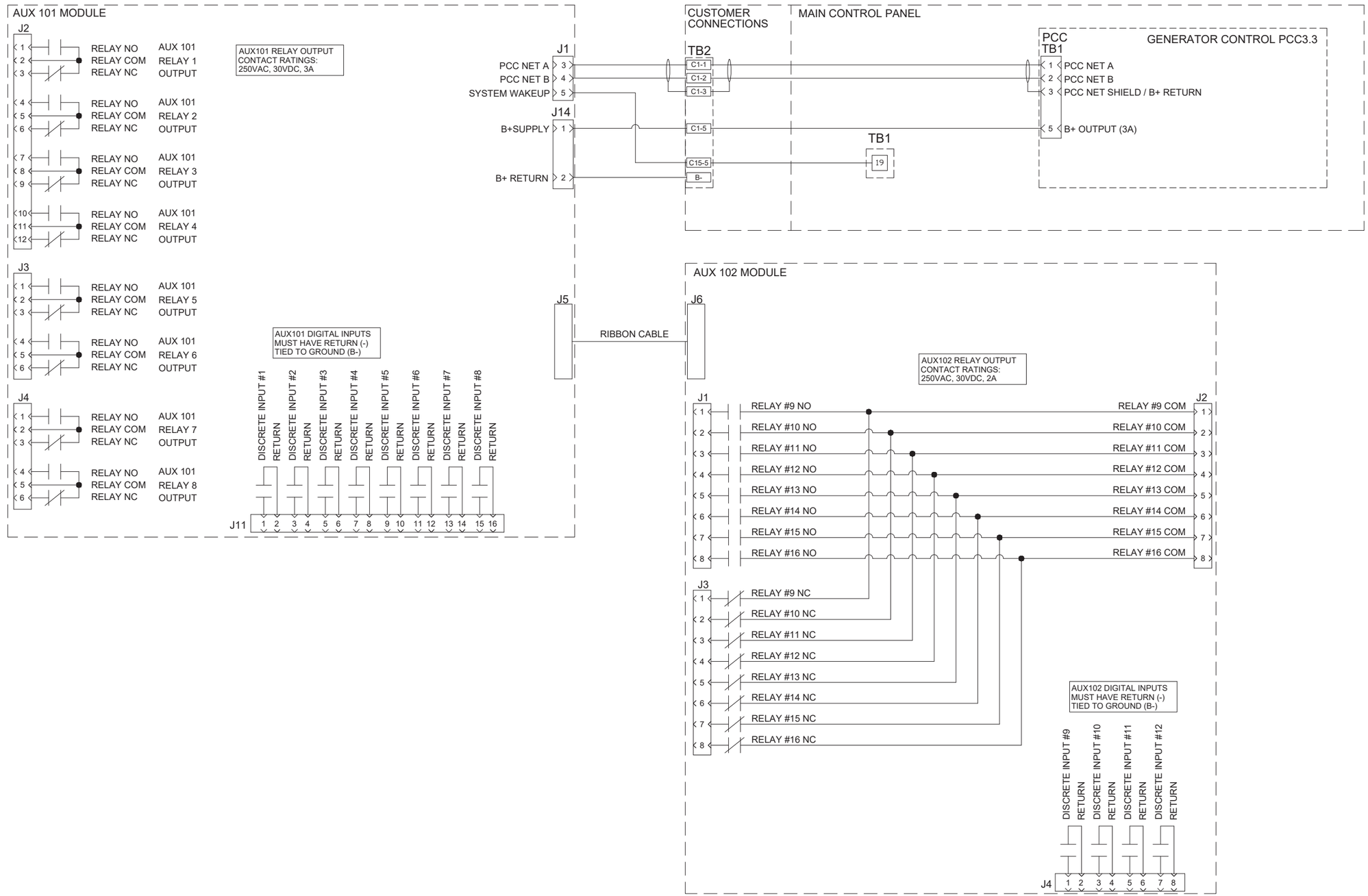
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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

SCHEMATIC, OPTIONAL ACCESSORIES
GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S
DRAWN BY: KAK
DATE: 29 AUG 2016
AUTO CAD
INIT ECO: 2016-617
SCALE:
EST WEIGHT:
SHEET 8OF12
DRAWING NO: A042F753



NOTES:
1) The Aux 101 and Aux 102 modules are located in the Customer Connection side of the main control panel.
2) All connections to the I/O on the Aux 101 and Aux 102 modules are the customers responsibility.

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UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS
THIRD ANGLE PROJECTION

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DEPERE, WISCONSIN

SCHEMATIC, AUX101 & AUX102
GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S
AUTO CAD
DRAWN BY: KAK
DATE: 29 AUG 2016
INIT ECO: 2016-617
SCALE:
EST WEIGHT:
SHEET 9OF12
DRAWING NO: A042F753

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	SEE SHEET 1 FOR DETAILS.	OZ710	26JAN18
B	2017-409	SEE SHEET 1 FOR DETAILS.	KAK	30 JUNE 2017
A	2016-785	SEE SHEET 1 FOR DETAILS.	KAK	17 NOV 2016

MAIN CONTROL PANEL

ALTERNATOR

RECONNECT TERMINAL BLOCK

N W V U

P4

P3 PMG

P2

(F1) X+

(F2) XX-

FIELD WINDING

ALTERNATOR HARNESS

C1 C6

FIELD - F F

FIELD + E E

PMG 1 N N

PMG 2 O O

PMG 3 P P

F8 (10A)

F9 (10A)

AUX 103 (AVR)

J17

2 FIELD -

1 FIELD +

J18

1 PMG 1

2 PMG 2

3 PMG 3

J19

AVR FUSED B+ 1

B+ RETURN (B-) 8

AVR PWM + 2

AVR PWM - 9

FIELD CURRENT + 4

FIELD CURRENT - 10

BACKUP START DISCONNECT 3

GND CHASSIS 14

GENERATOR CONTROL PCC3.3

J26

9 AVR FUSED B+

5 B+ RETURN (B-)

16 AVR PWM +

3 AVR PWM -

14 FIELD CURRENT +

7 FIELD CURRENT -

2 BACKUP START DISCONNECT

MAIN BREAKER MCB_1

U U

V V

W W

TO CUSTOMER LOAD

C1 C2

CB SHUNT TRIPS (OPTIONAL)

2 2

1 1

Q Q

V V

U U

TB1

PE

B-

TB1

7 CB'S SHUNT TRIP B+ (OPTIONAL)

ALT. GROUND BOLT

S S

N

R R

TB2

PE

N

GFI CONNECTIONS (OPTIONAL)

CT1

X1

CT2

X1

CT3

X1

CT1 G G

CT1 COM K K

CT2 H H

CT2 COM L L

CT3 J J

CT3 COM M M

J12

1 CT1

4 CT1 COM

2 CT2

5 CT2 COM

3 CT3

6 CT3 COM

L1 D D

L2 C C

L3 B B

N A A

J22

1 L1

2 L2

3 L3

4 N

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ANGULAR DIMENSIONS ± 1°

IMPERIAL UNITS

METRIC UNITS

THIRD ANGLE PROJECTION

SCHEMATIC, ALTERNATOR, MCB, CT'S GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S

AUTO CAD

DRAWN BY: KAK

DATE: 29 AUG 2016

INIT ECO: 2016-617

SCALE:

EST WEIGHT:

SHEET 100F12

DRAWING NO: A042F753

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	SEE SHEET 1 FOR DETAILS.	OZ710	26JAN18
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A	2016-785	SEE SHEET 1 FOR DETAILS.	KAK	17 NOV 2016

MAIN CONTROL PANEL

POWER AND SENSOR HARNESS

GENERATOR CONTROL PCC3.3

TB1

CR7 11 14 PCC FSO RELAY

CR10 11 14 CHILD ECM NG FSO

CR2 11 14 PARENT ECM NG FSO

CR3 11 14 CHILD ECM LP FSO

CR4 11 14 PARENT ECM LP FSO

CR8 11 14 PCC LP FSO

F3 (5A)

CR1 11 14 START RELAY

C1 C1

C4 "LEFT BANK FSO"

C6 "RIGHT BANK FSO"

C2 "NG FSO"

C3 "LP FSO"

SPL D

SPL A

GND

SW B+

B+

S TERM

STARTER

S TERM

MOT

J20

LOW COOLANT LEVEL SWITCH 1 — 17

LOW COOLANT LEVEL SWITCH 2 — 19

F4 (1A)

B−

B+

SPL B

C5 "LCL1"

C7 "LCL2"

SPL C

ENGINE ALTERNATOR

+ -

BATTERY

TB8

INPUT RETURN — 12

LOW OIL LEVEL SIGNAL — 7

TB1

LOW GAS PRESSURE SIGNAL — 12

INPUT COMMON — 13

HIGH GAS PRESSURE SIGNAL — 14

C9 C9 LOW OIL LEVEL (OPTIONAL)

C8 C8 GAS PRESSURE SWITCHES (OPTIONAL)

OIL LEVEL

GND

NORMAL

LOW

LOW GAS

HIGH GAS

NC

NO

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ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

IMPERIAL UNITS

METRIC UNITS

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SCHEMATIC, POWER & SENSOR HARNESS
GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S

DRAWN BY: KAK

DATE: 29 AUG 2016

AUTO CAD

INIT ECO: 2016-617

SCALE:

EST WEIGHT:

SHEET 110F12 DRAWING NO: A042F753

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	SEE SHEET 1 FOR DETAILS.	OZ710	26JAN18
B	2017-409	SEE SHEET 1 FOR DETAILS.	KAK	30 JUNE 2017
A	2016-785	SEE SHEET 1 FOR DETAILS.	KAK	17 NOV 2016

MAIN CONTROL PANEL

GENERATOR CONTROL PCC3.3

ENGINE INTERFACE HARNESS

HD34-24-35SN

PARENT ECM

CHILD ECM

TB1

J26

ECM CAN LOW

ECM CAN HIGH

ECM CAN SHIELD

KEY SWITCH

CR1 CR2 CR3 CR4 CR5 CR6 CR9 CR10

E-STOP

F1 (30A) F2 (30A) F3 (5A) F4 (5A) F5 (5A) F6 (5A)

R1 R2 R3

U LEAD

CRANK SENSOR

CAM SENSOR

PARENT / CHILD CRANK INTERCONNECT

PARENT / CHILD CAM INTERCONNECT

A/T

"RTD 1"

"RTD 2"

"PRE-CAT UEGO SENSOR"

"POST-CAT UEGO SENSOR"

THROTTLE

COIL INTERFACE

DEPR 1

DEPR 2

DIAGNOSTIC

KNOCK 1

KNOCK 2

OIL PRESSURE

TMAP

ECT

TIP

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
C	2018-052	SEE SHEET 1 FOR DETAILS.	QZ710	26JAN18
B	2017-409	SEE SHEET 1 FOR DETAILS.	KAK	30 JUNE 2017
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ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

IMPERIAL UNITS: .XX ± 0.030 in; .XXX ± 0.010 in; .XXXX ± 0.0050 in; ANGLES ± 0.5°

METRIC UNITS: .X ± 0.8 mm; .XX ± 0.25 mm; .XXX ± 0.13 mm; ANGLES ± 0.5°

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SCHEMATIC, ENGINE INTERFACE GTA38/50E W/ PCC3.3

DWG UNITS: INCH/LB/S

SCALE:

EST WEIGHT:

DRAWN BY: KAK — DATE: 29 AUG 2016

AUTO CAD — INIT ECO: 2016-617

SHEET 120F12 — DRAWING NO: A042F753

SECTION 5
WARRANTY

Commercial generator set
base limited warranty statement

Models manufactured by the
Cummins Custom Design and Upfit Center
(CDUC) in De Pere, Wisconsin

A042E778 Rev. 8
August 2021

PLEASE KEEP FOR YOUR RECORDS

Generator Set model:_____

Generator Set serial number or product identifier:_____

Generator Set data in-service: _____

NOTES:

This base limited warranty statement applies to the following commercial generator set (GenSet) models:

Table 1-1. Natural gas GenSets							
C55N6C	C55N6CB	C70N6C	C95N5C				
C115N6C	C150N5C	C175N6	C185N6C				
C200N6	C225N6	C225N6B	C230N6	C250N6	C250N6C	C250N6CB	C275N6C
C300N6	C350N6						
C400N5C	C400N6	C450N6	C485N6				
C500N6	C500N6B	C550N6	C550N5C	C580N6			
C600N6	C635N6	C650N6	C690N6				
C750N6	C760N6						
C815N6							
C1000N6B	C1300N6						

Table 1-2. Diesel GenSets	
C80D6B	
C110D6B	C130D6B
C275D6D	
C400D6B	

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Cummins commercial generator set (GenSet) base limited warranty

This base limited warranty applies to all Cummins Inc. branded commercial GenSets identified herein and associated accessories ("Product"). This base limited warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Product rating definitions:

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 GenSet is capable of delivering in the event of a reliable utility power outage or under test conditions for up to 500 hours of operation per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP rating. For applications supporting an unreliable utility service, the Prime Power (PRP) rating should be used.

Prime Power (PRP) is defined as the maximum power which a GenSet is capable of delivering continuously while supplying a variable electrical load when operated for an unlimited number of hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. For applications requiring permissible average output higher than stated, a Continuous Power (COP) rating should be used. Total operating time at 100% PRP rating shall not exceed 500 hours/year.

Continuous Power (COP) is defined as the maximum power which the GenSet is capable of delivering continuously while supplying a constant electrical load (supplying utility power at a constant 100 percent load) when operated for an unlimited number of hours per year. No overload capability is available for this rating.

Demand Response Power (DRP) - is defined as the maximum power which a spark-ignited GenSet is capable of delivering electrical power *in parallel* with commercially-available power in variable and non-variable load applications. DRP is intended for use in situations where there are contracted power outages, such as utility power curtailment. A DRP GenSet may be operated in parallel to the public utility **up to 500 hours per year**, with an average load factor no greater than 80% of the DRP rating. DRP GenSets with ESP ratings can be run in emergency standby applications up to their ESP rating for up to 50 hours per year. The customer should be aware, however, that the life of any DRP GenSet will be reduced by constant high load operation (running at ESP).

Environmental Protection Agency - Stationary Emergency (EPA-SE) is defined as being the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generator set is capable of delivering in the event of a utility power outage or under test conditions and used in strict accordance with the EPA NSPS for stationary engines, 40 CFR part 60, subparts IIII and JJJJ, where a reliable utility must be present. The permissible average power output over 24 hours of operation shall not exceed 70% of the EPA-SE.

Base limited warranty period

The base limited warranty start date is the date of initial startup, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The warranty period is as follows:

Base limited warranty period (whichever occurs first)

Rating	Months	Maximum hours
Continuous Power (COP)	12	Unlimited
Demand Response Power (DRP)	12	500
Emergency Standby Power (ESP)	24	1000
Environmental Protection Agency - Stationary emergency (EPA-SE)	24	Unlimited
Prime Power (PRP)	12	Unlimited

Cummins responsibilities

In the event of a failure of the Product during the base limited warranty period due to defects in material or workmanship, Cummins will be responsible for only the following:

- 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 the Cummins distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins' published policies and guidelines.
- Providing evidence for the date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and re-installation resulting from difficult or non-standard installations.
- Costs associated with rental of a GenSet used to replace the Product being repaired.

- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, applicable taxes, damages, and other losses resulting from a warrantable failure.

Base limited warranty limitations

This base limited warranty does **not cover** Product failures resulting from:

- Inappropriate use relative to designated power rating or application guidelines.
- Inappropriate use of an EPA-SE application GenSet relative to EPA's standards
- Normal wear and tear or corrosion.
- Negligence, accidents or misuse.
- Improper and/or unauthorized installation.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins manual, published guideline, or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before or after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; over-fueling; over-speeding; lack of maintenance to lubricating, cooling or air intake systems; delayed/late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices; or 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 GenSet.
- Unusual or special operating environments.

This base limited warranty does **not cover**:

- Costs of maintenance, adjustments, installation, commissioning or start-up.
- Starting batteries, battery chargers, cooling packages, heating elements, exhaust system or after-treatment components, or trailers. (These components shall be covered by the respective manufacturer's warranty, if applicable.)
- Components added to the Product after shipment from Cummins.
- Costs associated with gaining access to the Product.

- Damage to customer property.
- Repair of cosmetic damage to an enclosure after shipment from Cummins.

Cummins right to failed components

Failed components claimed under this base limited warranty remain the property of Cummins. Cummins has the right to reclaim any failed component that has been replaced under this base limited warranty.

Limitation on warranties

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THE PRODUCT. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Limitation on liabilities

IN NO EVENT SHALL CUMMINS BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This base limited warranty shall be enforced to the maximum extent permitted by applicable law. This base limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.



This product has been manufactured under the controls established by a Bureau Veritas Certification approved management system that conforms with ISO 9001:2015.

Cummins contact information

Any questions regarding this base imited warranty statement may be directed to CSSNAPGWarranty@cummins.com.

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