



RECORD ONLY SUBMITTAL PACKAGE

CSDG - 5211-5212

Prepared For:

Central States Diesel Generators
2001 S Prairie Ave
Waukesha, WI 53189-7307

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The information presented in this submittal package has been approved

and is provided for record purposes only.

Date: 10/12/2026



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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.

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SECTION 1

Project Information



Bill of Material

Feature Code	Description	Qty
C1300N6	Genset - Spark Ign, Natural Gas, 60Hz, 1300kW	2
ENG	QSK60G, 1953 HP, 11.4:1	
A331-2	Duty Rating - Standby Power	
L090-2	Listing - UL 2200	
C002-2	Natural Gas	
F267-2	Enclosure - Sound Att, LEVEL 2, Galvaneal, Base Mtd, with Exhaust System	
P187-2	Onan Green Enclosure Color	
B268-2	Generator - S7L1D-C41 (ADS #642), 60Hz, Winding 312 - 6 Wire, 105C, 0.8pf	
R002-2	Voltage - 277/480, 3ph	
B184-2	Exciter / Regulator - PMG, 3 Phase Sensor	
A292-2	Heater - Alternator, 120VAC	
KX21-2	Set Control - Power Command 3.3 MLD	
H609-2	Controls Facing Left	
E082-2	Radiator Cooled	
H389-2	Shutdown - Low Coolant Level	
H557-2	Coolant Heater - 240V 1ph / 12000W	
A366-2	Engine Governor - Electronic, Isochronous Only	
A334-2	Engine Starter - 24 VDC Motor	
A333-2	Battery Charging Alternator - Normal Output	
D041-2	Engine Air Cleaner - Normal Duty	
H706-2	Lube Oil, Engine Filled Prior to Shipment	
A466-2	Critical Grade Silencer, Carbon Steel	
H759-2	Engine Oil Heater - 240VAC 1PH / 2000W	
H268-2	Extension - Oil Drain	
E089-2	Extension - Engine Coolant Drain	
H606-2	Bargraph - AC Analog Meters	
KA08-2	Alarm - Audible, Engine Shutdown	
L050-2	Manuals in English	
F065-2	Battery Rack	
B183-2	Battery charger, 120 / 208 / 240VAC Input, 30A/24V output	
A059G917	Fuel Strainer - Gaseous, 3in NPT	
22837-07	Flexible Fuel Connection- Gaseous, 3in NPT	
KS53-2	Signals-Aux, Input / Output	
L026-2	Standard Test Report	
L026-2	Certified Test Report	
L015-2	Additional 1 Hour Load Bank Test Time	
M156-2	Circuit Breaker - LSiG_2000A_100%_RIGHT, 600/525V	
H657-2	Distro Panel 150A 120/240V 1P/3W	
L280-2	Genset Warranty - Standby Power 2 year / 1000 hours	
H740-2	Module, Modbus to BacNet	
F997-02	Std CB Mounting Option	
P997-2	Drip Rails	

GAS SUPPLY DESIGN BEST PRACTICES

Required:

1. The required fuel pressure and volume **must** be available under **all** operating conditions at the generator set gas inlet (see Location A on Figure 1 for measurement point).
2. The generator must have a dedicated pipe run from the meter, not teed off from other equipment supply pipes.
3. Braided flex piping and dry gas filters are required elements of the piping design, but if improperly sized can be highly restrictive to flow. These components and other restrictive portions of the piping system (valves, elbows, etc.) can, and often should be sized larger than the genset fuel connection.
4. A 'pilot' style regulator should never be used, as they are slow to respond to changes in demand from the generator set.

Recommended:

1. Long pipe runs increase pressure drop, so shorter is better. Elbows & valves increase restriction to flow, piping should be designed with as few of these as possible.
2. It is important to have the final pressure regulator as close to the generator inlet as practical. This allows for higher pressure in the line, as well as helps keep a steady draw on the line during operation.

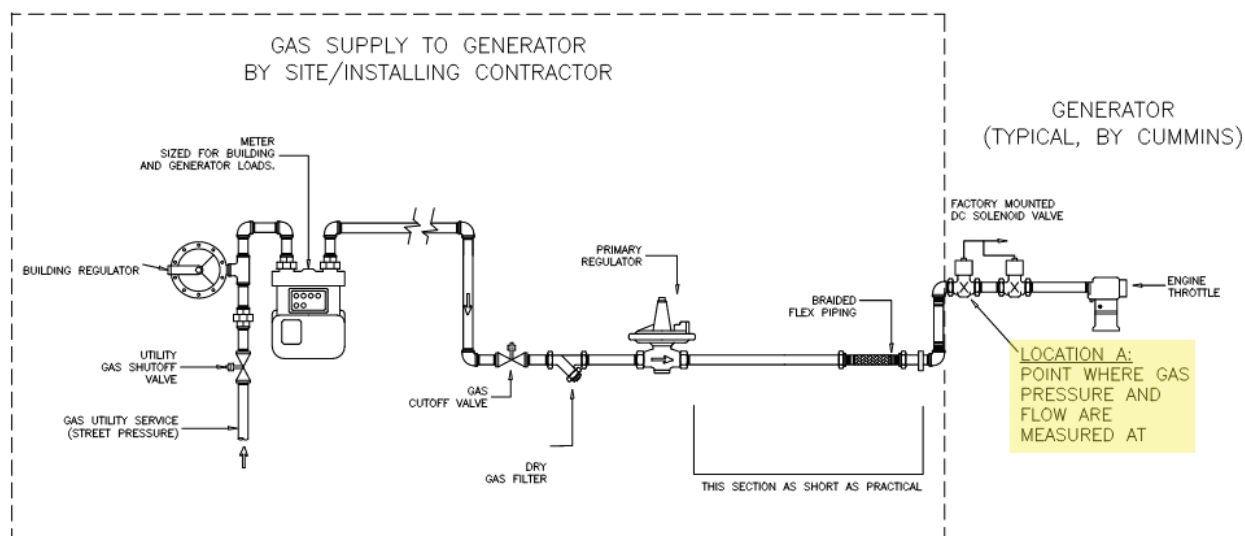


Figure 1. Typical site design

All gas supply piping must be designed by the appropriate engineer and installed by a qualified contractor. Refer to **NFPA 54** for gas pipe sizing information and any related local jurisdiction documents for code compliance on fuel piping installation.

Gas Fuel supply requirements for this generator set:

Fuel source:

NG

PV

Fuel consumption at 100% load: SCFH

Required Operating fuel pressure: in H₂O

Pressure is measured at the engine inlet solenoid, after the final regulator

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 corrected to provide operating pressure as listed.

All generators must be installed with a flexible fuel line and fuel strainer prior to the engine connection (**installation by others**):

Provided by Cummins

Provided by others

Flexible fuel line: ☒ ☐

Fuel strainer: ☒ ☐

Pressure regulator: ☐ ☒

If provided by Cummins, see drawings in submittal for flex line and strainer sizing

Contact your Cummins representative for technical assistance.

SECTION 2

Generator Specifications



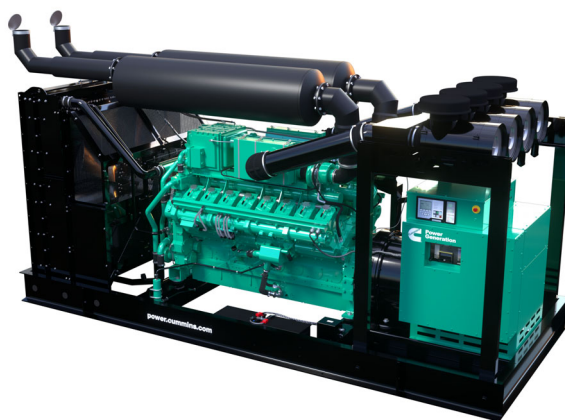


Specification sheet

QTY 2 - C1300N6

Gaseous fuel generator set

1000 kW - 1300 kW
60 Hz



Description

You can count on the 1000-1300 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) Standby and demand response	Emissions	Data sheet
C1000N6B	1000 (1250)	EPA-certified for stationary emergency and non-emergency applications	NAD-C1000N6B
C1300N6	1300 (1625)		NAD-C1300N6

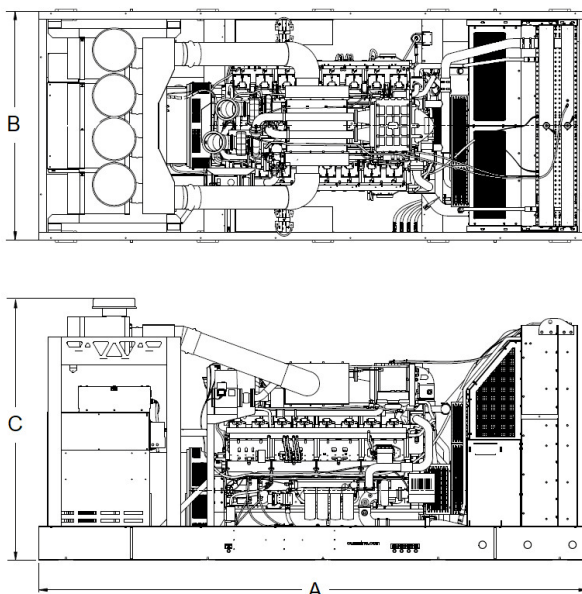
Engine specifications

Base engine	Cummins QSK 60G
Displacement	3671 in ³ (60.1 L)
Minimum battery capacity	1800 amps at minimum ambient temperature of 0 °F (-18 °C)
Battery charging alternator	55 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

Outline drawing



All models	Dim "A" in. (cm)	Dim "B" in. (cm)	Dim "C" in. (cm)
Open	Refer to drawings for specific weights and dimensions		
Sound attenuated Level II enclosure	403 (1024)	102 (259)	128 (325)

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

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

GenSet options and accessories

Alternator

- 80 °C rise
- 105 °C rise
- 125 °C rise
- 120/240 V, 200 W anti-condensation heater

Fuel system - flexible fuel connector and fuel strainer

Exhaust system - critical grade silencer

Generator set

- Batteries
- Battery charger - 120/208/240 V, 30A
- 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
- Sound-attenuated enclosure Level II with silencer
- Warranty - five-year standby including parts, labor, and travel

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.



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.

ISO 9001:2015

This product has been manufactured under the controls established by an 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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Generator set data sheet

Model	C1300N6
Frequency	60 Hz
Fuel type	Natural gas
kW (kVa) rating	1300 (1625) standby and demand response
Emissions	EPA-certified for stationary emergency and non-emergency applications

Exhaust emission data sheet	EDS-3079
Sound performance data sheet	MSP-4071
Cooling performance data sheet	MCP-2121
Prototype test summary data sheet	PTS-702
Standard set-mounted radiator cooling outline	C1300N6-01

Fuel consumption	50% load	75% load	full load
Fuel consumption for cfh and m ³ /hr is based on 905 Btu/ft ³ .			
cfh	8157	11,553	14,926
m ³ /hr	231	327	423
MMBtu/hr	7.38	10.46	13.51

Fuel supply

Fuel supply pressure is measured at the factory-supplied fuel shut-off (FSO) valve.

Minimum operating pressure, in. H ₂ O (kPa)	94 (23.4)
Maximum operating pressure, in. H ₂ O (kPa)	166 (41)

Engine	Standby and demand response	Prime
Engine manufacturer	Cummins	
Engine model	QSK 60G	
Configuration	V16	
Aspiration	Turbocharged	
Gross engine power output, bhp (kWm)	1953 (1456)	
BMEP at set rated load, psi (kPa)	234 (1610)	
Bore, in. (mm)	6.25 (159)	
Stroke, in. (mm)	7.48 (190)	
Rated speed, rpm	1800	
Piston speed, ft./min (m/s)	1875 (9.5)	

Engine (cont'd.)	Standby and demand response	Prime
Compression ratio	11.4:1	
Lube oil capacity, qt. (L)	188 (178)	
Overspeed limit, rpm	2150	
Regenerative power, kW	250	

Air

Combustion air, cfm (m ³ /min)	3890 (110)	
Max air cleaner restriction (dirty filter), in. H ₂ O (kPa)	10 (2.5)	

Exhaust

Exhaust flow at set rated load, cfm (m ³ /min)	11840 (335)	
Exhaust temp, °F (°C)	900 (482)	
Max allowable system back pressure, in. H ₂ O (kPa)	20 (5)	

Cooling

Ambient design, °F (°C)	104 (40)	
Fan load, HP (kWm)	99 (73.8)	
Coolant capacity (with radiator), gal (L)	135 (511)	
Cooling system air flow, acfm (m ³ /min)	95,430 (2702)	
Heat rejected, jacket water circuit, Btu/min (MJ/min)	52,602 (55.5)	
Heat rejected, after-cooler circuit, Btu/min (MJ/min)	5822 (6.1)	
Total heat radiated to room, Btu/min (MJ/min)	58,424 (61.64)	
Max cooling air flow static restriction, in. H ₂ O (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)	Refer to drawings for specific weights and dimensions
----------------------------	---

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	N/A	N/A	N/A	N/A	N/A	N/A	1955	1564

Engine derates

For non-standard remote installations, contact your local Cummins representative.

Barometer in. Hg (mbar)	SAE standard altitude ft. (m)	Derate factor based on 1300 kWe at ambient temperature °F (°C)							
		68 (20)	77 (25)	86 (30)	95 (35)	104 (40)	113 (45)	122 (50)	131(55)
20.7 (701)	9843 (3000)	0.71	0.69	0.68	0.67	0.65	0.62	0.58	0.55
21.4 (723)	9022 (2750)	0.74	0.73	0.71	0.70	0.69	0.65	0.62	0.58
22.1 (747)	8202 (2500)	0.78	0.76	0.75	0.73	0.72	0.68	0.65	0.62
22.8 (771)	7382 (2250)	0.81	0.80	0.78	0.77	0.75	0.72	0.68	0.65
23.5 (795)	6562 (2000)	0.84	0.83	0.81	0.80	0.79	0.75	0.72	0.68
24.3 (820)	5741(1750)	0.88	0.86	0.85	0.83	0.82	0.79	0.75	0.72
25.0 (846)	4921(1500)	0.91	0.90	0.88	0.87	0.85	0.82	0.78	0.75
25.8 (872)	4101 (1250)	0.94	0.93	0.91	0.90	0.89	0.85	0.82	0.78
26.6 (899)	3281 (1000)	0.98	0.96	0.95	0.93	0.92	0.89	0.85	0.82
27.4 (926)	2461 (750)	1.00	1.00	0.98	0.97	0.95	0.92	0.88	0.85
28.3 (954)	1640 (500)	1.00	1.00	1.00	1.00	0.99	0.95	0.92	0.88
29.1 (983)	820(250)	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.92
29.5 (995)	492 (150)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93
30.0 (1012)	0	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95

Ratings definitions

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ISO 9001:2015

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PowerCommand® 3.3 Generator Set Digital Integrated Control System



Bargraph Optional

Introduction

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

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

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

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

Benefits and Features

- 320 x 240 pixels graphical LED backlit LCD
- Multiple languages supported
- AmpSentry™ protection provides industry-leading generator overcurrent protection
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes

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

PowerCommand® Generator Set Digital Control System PCC 3300



Introduction

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

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

Features

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

Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

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

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

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

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

Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kW, kVA, 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 disconnect status
- Engine heater status
- Coolant circulating pump status
- Lube oil priming pump status
- Lube oil status
- Oil heater status
- Derate authorization status
- Start system status
- Ventilator fan status
- Ventilation louvre status
- Radiator fan status
- DC PSU status
- Start inhibit/enable status and setup

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

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

Prime Mover Control

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

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

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

Isochronous governing is provided in order to control prime mover speed within $\pm 0.25\%$ of nominal rated speed for any steady state load from no load to full load. During operation frequency drift should not exceed $\pm 0.5\%$ of nominal frequency given a 33°C (or 60°F) change 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 remotely 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 to 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 designed with consideration to the needs of prime applications or other applications 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 is 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 shutdown 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 $\pm 1.0\%$ for any loads between no load and full load. Voltage drift will not exceed $\pm 1.5\%$ for a 40 °C (104 °F) 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 the following benefits on engine

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

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

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

Paralleling Functions

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

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

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

Load govern control– When PowerCommand® receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW

values from 0-100% of standby rating, and 0.7-1.0 power factor (lagging). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAR load govern droop.

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

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

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

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

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

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

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

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

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

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

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

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

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

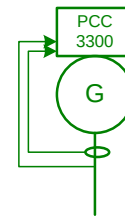
Exerciser clock –The exerciser clock (when enabled) allows the system to be operated at preset times in either test without load, test with load, or extended parallel mode. A Real Time Clock is built in. Up to 12 different programs can be set for day of week, time of day, duration, repeat interval, and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

Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for either the genset metering point ("Base Load") or the utility metering point ("Peak Shave"). The control point for the reactive power (kVAR or Power Factor) can also be independently configured for either the genset metering point or the utility metering point. This flexibility would allow base kW load from the genset while maintaining the utility power factor at a reasonable value to avoid

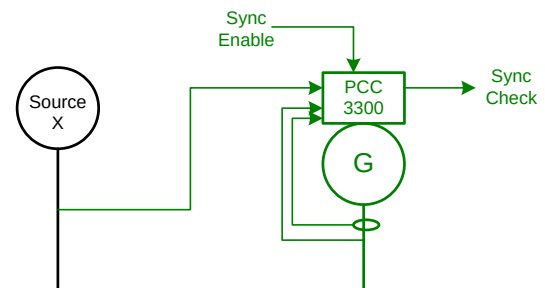
penalties due to low power factor. The System always operates within genset ratings. The control point can be changed while the system is in operation. Set points can be adjusted via hardwired analog input or adjusted through an operator panel display or service tool.

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

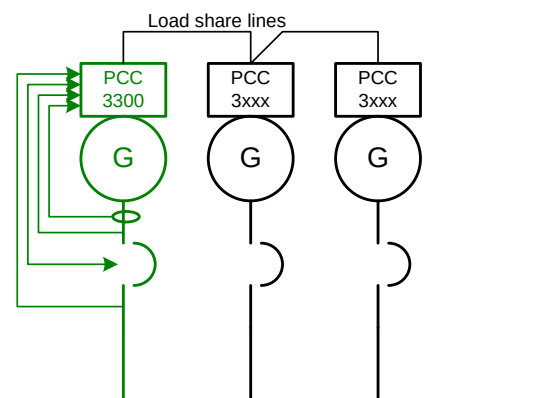
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



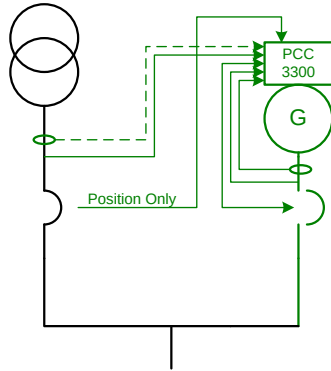
Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.



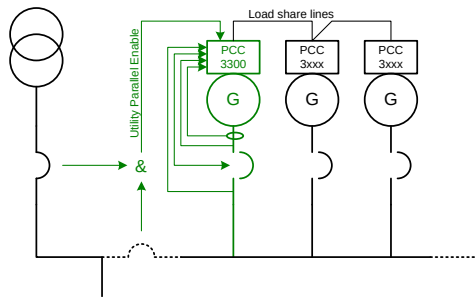
Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



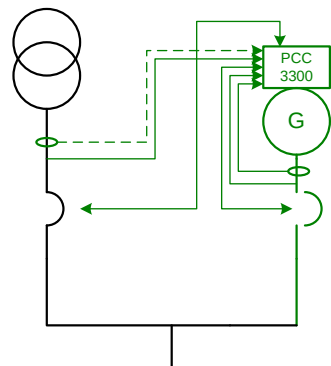
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



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

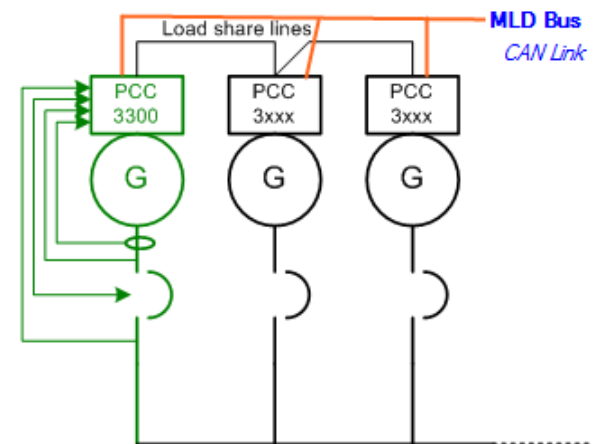
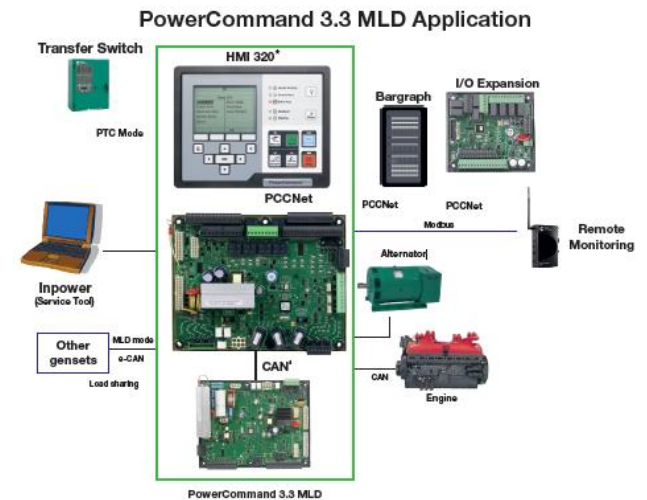


Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

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



PCC3300 External Voltage and Frequency Biasing Inputs

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

Protective Functions

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

Battle short mode

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

Derate

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

Configurable alarm and status inputs

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

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

Emergency stop

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

General prime mover protection

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

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

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

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

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

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

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

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

For Lean Burn Natural Gas Engine applications:

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

Hydro Mechanical fuel system engine protection:

Overspeed shutdown – Default setting is 115% of nominal

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

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

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

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

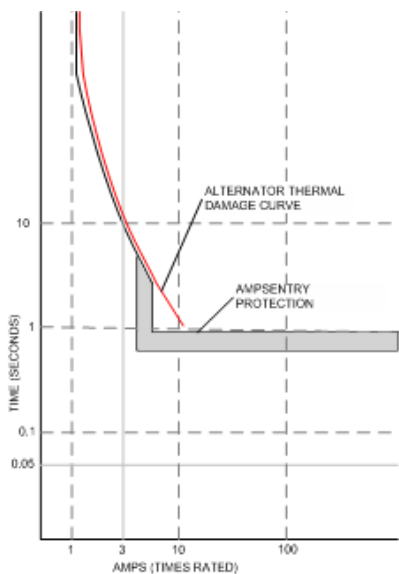
High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Full authority electronic engine protection:

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

Alternator Protection

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Paralleling Protection

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

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

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

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

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

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

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

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

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

Field Control Interface

Input signals to the PowerCommand® control include:

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

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

Input signals for Lean Burn Natural Gas Engine applications:

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

Output signals from the PowerCommand® control include:

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

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

Output Signals for Lean Burn Natural Gas Engine applications:

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

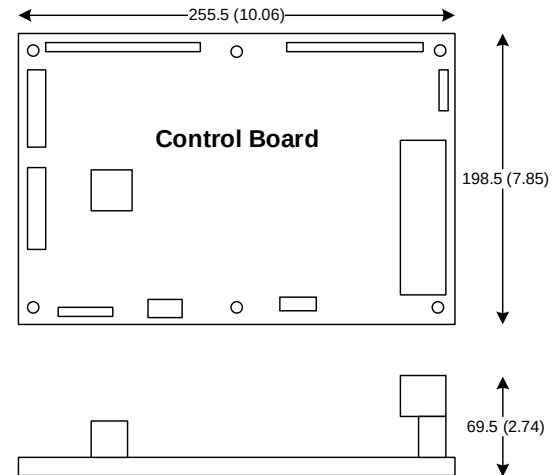
Communications connections include:

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

Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.

- Networking: This RS-485 communication port allows connection from the control to the other Cummins Power Generation products.

Mechanical Drawing



PowerCommand® Human Machine Interface HMI320



Description

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

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

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

Features:

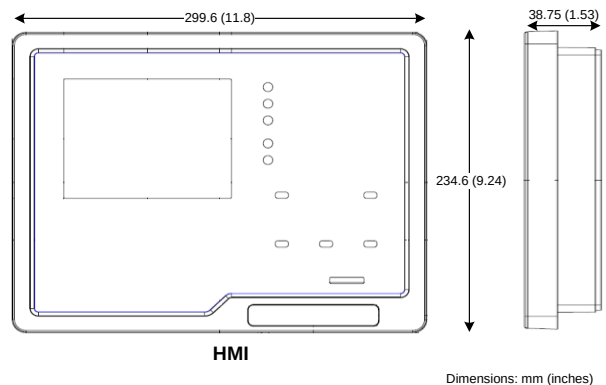
- LED indicating lamps
 - genset running
 - remote start
 - not in auto
 - shutdown
 - warning
 - auto
 - manual and stop
 - Circuit breaker open (if equipped)
 - Circuit breaker closed (if equipped)
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.

- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

Communications connections include:

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

Mechanical Drawing



Software

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

Environment

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

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

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.



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	Carbon steel	Stainless Steel
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

Enclosure paint options

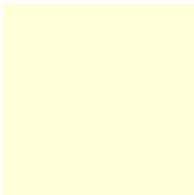
These standard enclosure colors are available as selected in Cummins pricing. All GenSet enclosures will be painted Onan Green Textured, unless otherwise ordered. Underwriters Laboratories (UL) colors noted are included in standard pricing; other colors selected for UL units would have additional charges.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



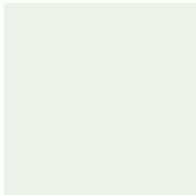
Onan Green Textured (UL)



Moss Green



Cream



Sugar White



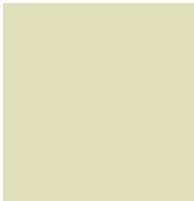
Cummins Red



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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Alternator Data Sheet

Frame Size: S7L1D-C4

Characteristics									
			No of Bearings:		1-bearing		2-bearing		
Weights:			Stator assembly:		2835 lb	1286 kg	2835 lb	1286 kg	
			Rotor assembly:		2542 lb	1153 kg	2440 lb	1107 kg	
			Complete assembly:		6415 lb	2910 kg	6358 lb	2884 kg	
Maximum speed:			2250 rpm						
Excitation current:			Full load:		Wdg 07: 2.6, Wdg 13: 2.5, Wdg 312: 2.8				
			No load:		Wdg 07: 0.93, Wdg 13: 1.1, Wdg 312: 0.61-0.58				
Insulation system:			Class H throughout						
3 Ø Ratings (0.8 power factor)			60 Hz (winding no)						
			<u>600</u> (07)	<u>380</u> (13)	<u>400</u> (13)	<u>416</u> (13)	<u>416</u> (312)	<u>440</u> (312)	<u>480</u> (312)
163° C rise ratings	@ 27° C	kW	1620	1520	1520	1520	1456	1556	1620
		kVA	2025	1900	1900	1900	1820	1945	2025
150° C rise ratings	@ 40° C	kW	1580	1485	1485	1485	1420	1515	1580
		kVA	1975	1856	1856	1856	1775	1894	1975
125° C rise ratings	@ 40° C	kW	1515	1425	1425	1425	1365	1455	1515
		kVA	1894	1781	1781	1781	1706	1819	1894
105° C rise ratings	@ 40° C	kW	1410	1325	1325	1325	1275	1355	1410
		kVA	1762	1656	1656	1656	1594	1694	1762
80° C rise ratings	@ 40° C	kW	1300	1225	1225	1225	1175	1255	1300
		kVA	1625	1531	1531	1531	1469	1569	1625
3 Ø Reactances			<u>600</u> (07)	<u>380</u> (13)	<u>400</u> (13)	<u>416</u> (13)	<u>416</u> (312)	<u>440</u> (312)	<u>480</u> (312)
(Based on full load at 125° C rise rating)									
Synchronous			2.01	1.80	1.62	1.50	3.35	3.19	2.79
Transient			0.19	0.20	0.18	0.16	0.26	0.24	0.21
Subtransient			0.12	0.14	0.13	0.12	0.16	0.16	0.14
Negative sequence			0.16	0.17	0.15	0.14	0.23	0.22	0.19
Zero sequence			0.02	0.02	0.02	0.02	0.03	0.03	0.03
3 Ø Motor starting			<u>600</u> (07)	<u>380</u> (13)	<u>400</u> (13)	<u>416</u> (13)	<u>416</u> (312)	<u>440</u> (312)	<u>480</u> (312)
Maximum kVA (90% sustained voltage)			6075	5700	4700	5100	6075	6075	6075
Time constants (sec)			<u>600</u> (07)	<u>380</u> (13)	<u>400</u> (13)	<u>416</u> (13)	<u>416</u> (312)	<u>440</u> (312)	<u>480</u> (312)
Transient			0.167	0.164	0.164	0.164	0.155	0.155	0.155
Subtransient			0.018	0.019	0.019	0.019	0.0177	0.0177	0.0177
Open circuit			4.17	3.93	3.93	3.93	4.05	4.05	4.05
DC			0.031	0.026	0.026	0.026	0.036	0.036	0.036
Windings (@22° C)			<u>600</u> (07)	<u>380</u> (13)	<u>400</u> (13)	<u>416</u> (13)	<u>416</u> (312)	<u>440</u> (312)	<u>480</u> (312)
Stator resistance (L-L Ohms)			0.0032	0.0014	0.0014	0.0014	0.0024	0.0024	0.0024
Rotor resistance (Ohms)			1.710	1.710	1.710	1.710	1.710	1.710	1.710
Number of leads			6	6	6	6	6	6	6



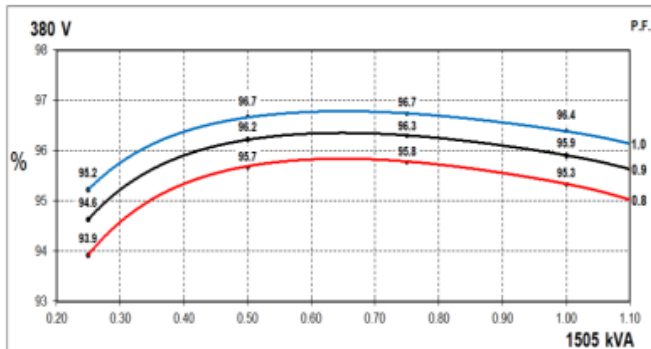
Alternator Data Sheet

Frame Size: S7L1D-C4

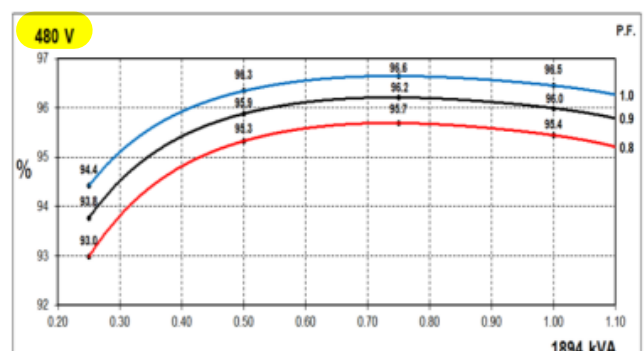
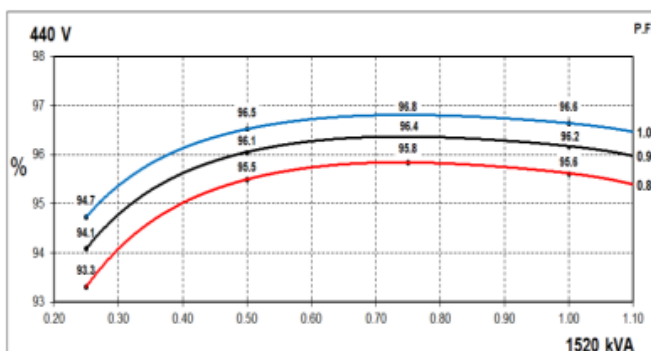
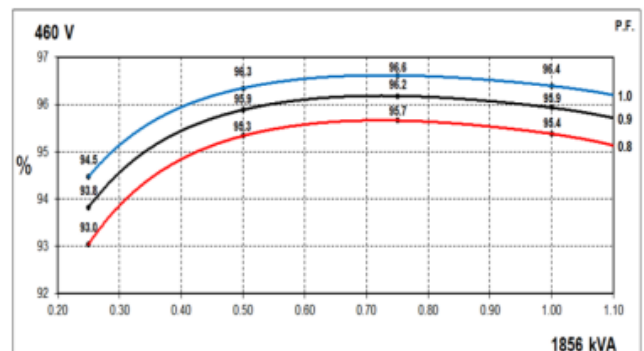
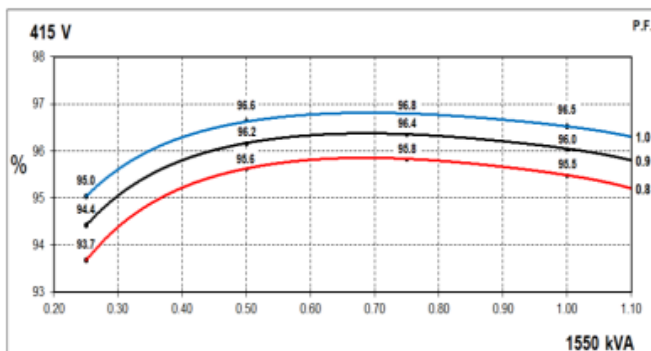
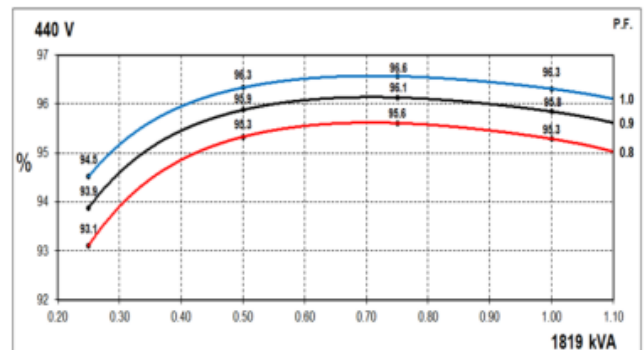
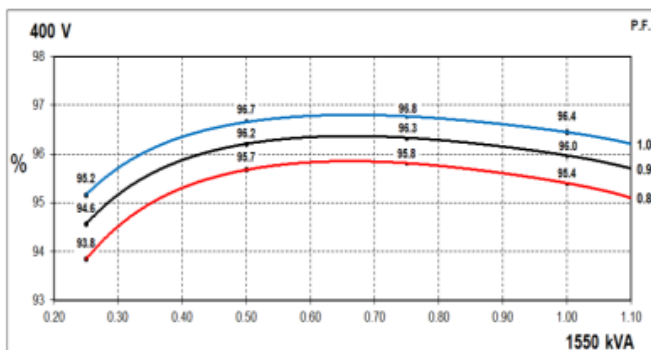
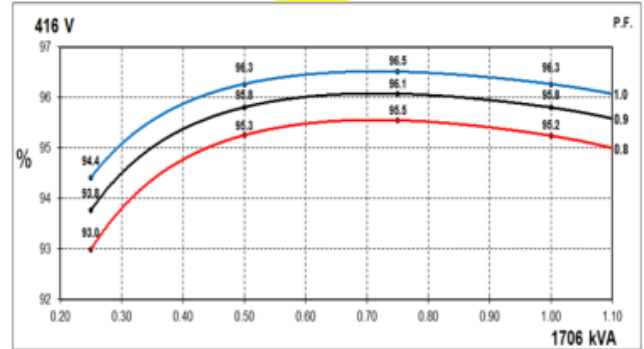
S7L1D-C4 Wdg.312

THREE PHASE EFFICIENCY CURVES

50Hz



60Hz



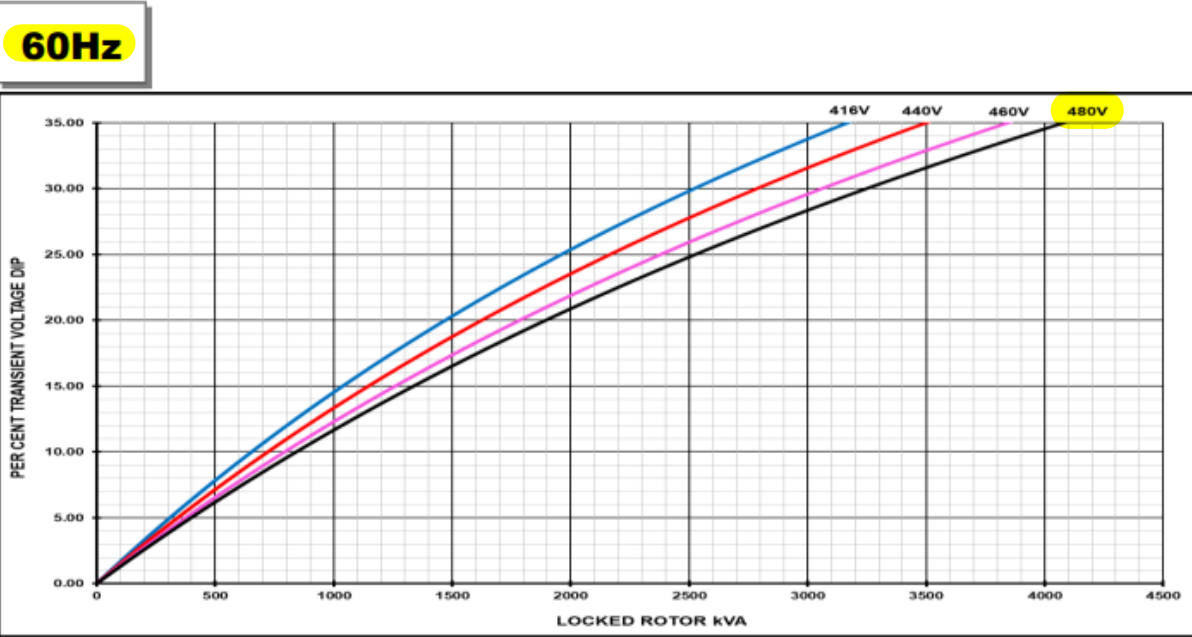
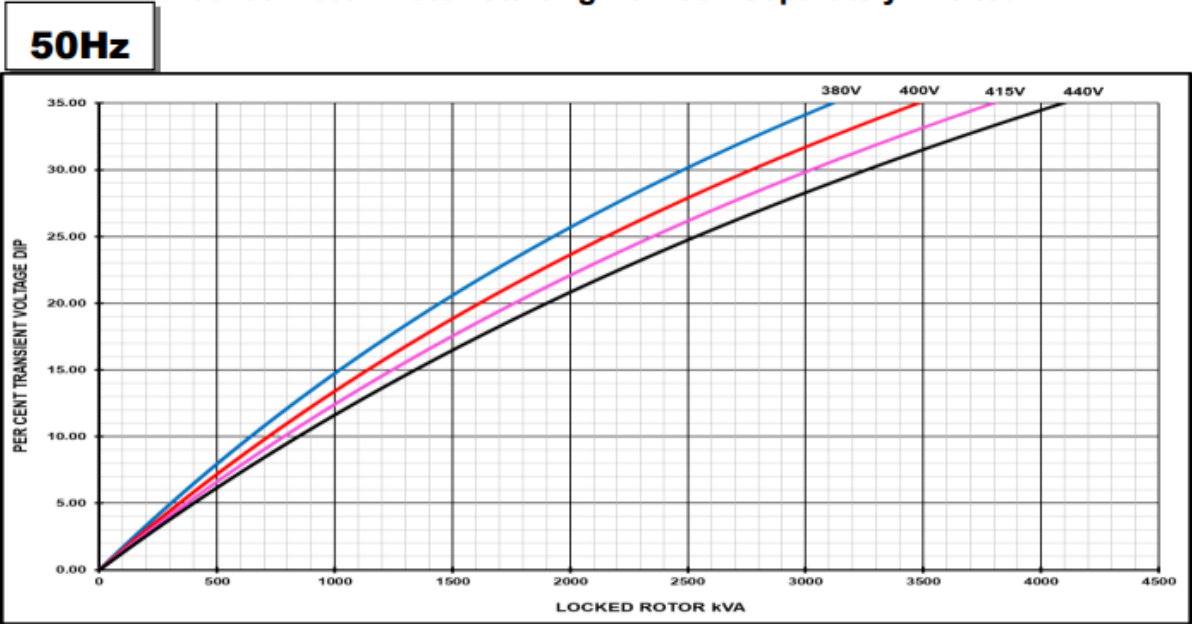


Alternator Data Sheet

Frame Size: S7L1D-C4

S7L1D-C4 Wdg.312

Locked Rotor Motor Starting Curves - Separately Excited



Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

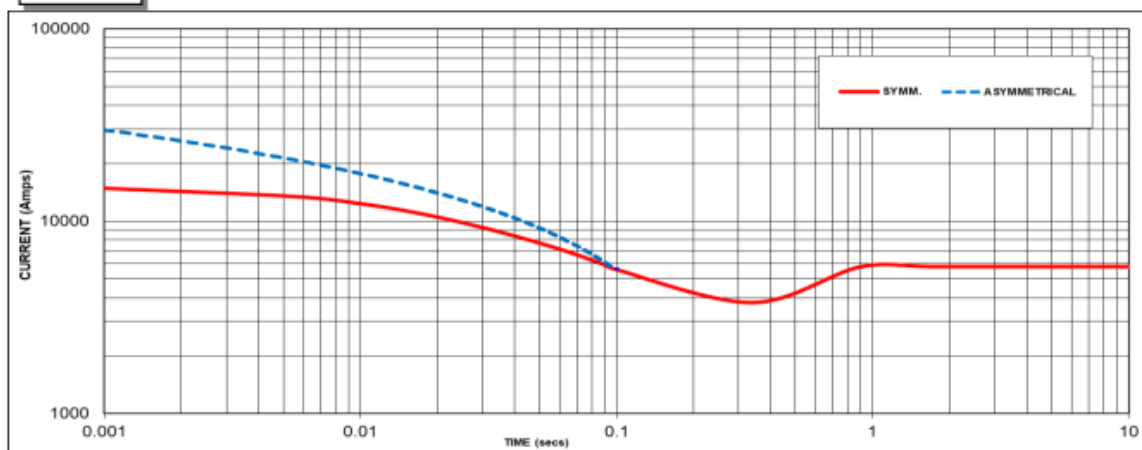


Alternator Data Sheet

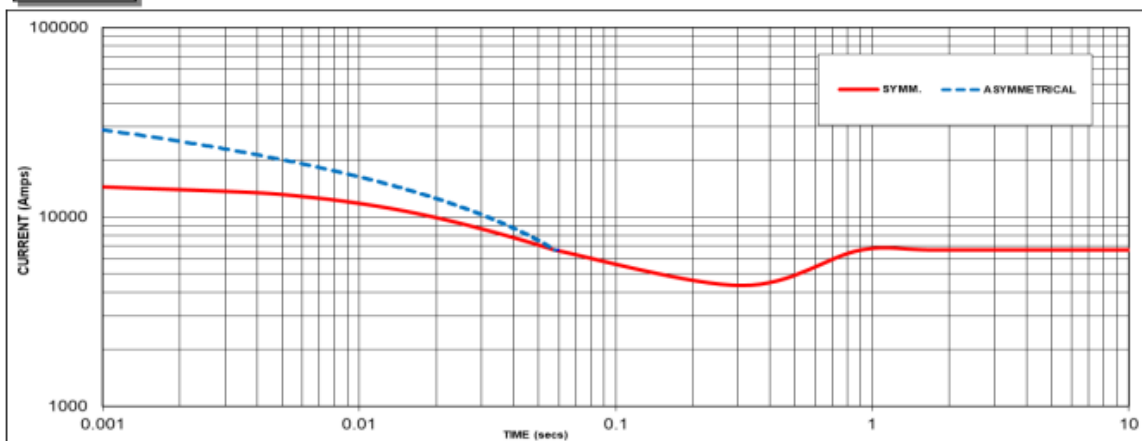
Frame Size: S7L1D-C4

S7L1D-C4 Wdg.312

Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz

Sustained Short Circuit = 5820 Amps

60Hz

Sustained Short Circuit = 6704 Amps

Note 1

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

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

The sustained current value is constant irrespective of voltage level

Note 2

The sustained current values are for MX341 AVR. For MX322 and Digital AVR 1.2 factor to be applied to the sustained short circuit

Note 3

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 4

All other times are unchanged

Curves are drawn for Star connected machines 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



Sound data sheet

C1300N6 60 Hz spark-ignited generator set (GenSet)

Sound pressure levels (SPLs) with radiator cooling package

A-weighted SPLs in dB(A) @ 7 meters

GenSet configuration	Applied standby load	Microphone position*								8 position average SPL	*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.
		1	2	3	4	5	6	7	8		
Unhoused with infinite exhaust	No load	87.8	93.1	92.6	95.8	93.1	93.8	94.3	93.3	93.4	
	50% load	88.2	93.4	93.0	95.9	93.0	93.9	94.5	93.5	93.6	
	75% load	88.8	93.9	93.5	96.1	92.9	94.1	94.9	93.9	93.9	
	Full load	89.9	94.8	94.4	96.4	92.7	94.6	95.4	94.2	94.4	
Housed with level II sound-attenuated enclosure and muffler	No load	84.4	85.9	81.9	83.3	82.6	81.6	78.4	85.0	83.4	
	50% load	84.1	85.8	82.1	83.1	82.2	80.9	78.5	84.4	83.1	
	75% load	84.0	85.7	82.4	83.2	82.3	80.9	78.8	84.3	83.1	
	Full load	84.5	86.1	83.2	83.8	82.8	81.5	79.8	84.7	83.7	

Average A-weighted SPLs in dB(A)@ 1 meter

measured from a reference parallelepiped creating a hemisphere around the GenSet

GenSet configuration	Applied standby load	Octave band center frequency, Hz											Total SPL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Unhoused with infinite exhaust	No load	N/A	51.3	71.1	91.5	93.5	95.2	94.6	92.2	88.1	81.7	68.6	100.9
	50% load	N/A	51.6	71.2	91.6	93.6	95.3	94.7	92.7	88.5	83.4	69.8	101.1
	75% load	N/A	51.6	71.3	91.6	93.6	95.3	94.9	93.5	89.0	86.4	71.7	101.4
	Full load	N/A	51.8	71.4	91.8	93.7	95.4	95.5	94.6	89.9	89.4	73.3	101.9
Housed with level II sound-attenuated enclosure and muffler	No load	N/A	49.3	65.2	88.2	86.2	84.3	79.9	79.1	73.2	67.0	53.0	91.9
	50% load	N/A	49.4	65.5	87.8	86.4	84.5	80.3	80.0	74.4	68.1	56.5	92.0
	75% load	N/A	51.6	65.5	87.5	86.4	85.0	81.3	81.0	76.1	70.9	63.0	92.2
	Full load	N/A	53.9	66.8	87.5	86.9	86.8	84.1	82.9	78.2	73.4	65.0	93.2

A-weighted SPLs in dB(A)@ the operator location

measured at 1 meter from the GenSet control panel at 1.5 meter height

GenSet configuration	Applied standby load	Octave band center frequency, Hz											Total SPL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Unhoused with infinite exhaust	75% load	N/A	52.0	72.6	86.4	91.8	96.6	97.4	96.4	89.5	86.8	73.4	102.5
	Full load	N/A	52.1	72.5	86.6	92.1	96.9	97.9	97.7	90.6	89.9	75.9	103.2
Housed with level II encl and muffler	75% load	N/A	46.9	66.7	87.4	81.4	80.0	74.0	76.7	67.7	69.3	62.3	89.4
	Full load	N/A	47.0	67.2	87.1	81.7	80.2	75.0	78.9	69.2	72.4	64.3	89.6

Sound power levels (SPWLs) with radiator cooling package

A-weighted SPWLs in dB(A) @ 1 meter

measured from a reference parallelepiped creating a hemisphere around the GenSet

GenSet configuration	Applied standby load	Octave band center frequency, Hz											Total SPWL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Unhoused with infinite exhaust	No load	N/A	72.5	92.3	112.7	114.7	116.4	115.8	113.4	109.3	102.9	89.8	122.1
	50% load	N/A	72.8	92.4	112.8	114.8	116.5	115.9	113.9	109.7	104.6	91.0	122.3
	75% load	N/A	72.8	92.5	112.8	114.8	116.5	116.1	114.7	110.2	107.6	92.9	122.6
	Full load	N/A	73.0	92.6	113.0	114.9	116.6	116.7	115.8	111.1	110.6	94.5	123.1
Housed with level II sound-attenuated enclosure and muffler	No load	N/A	72.3	88.2	111.2	109.2	107.3	102.9	102.1	96.2	90.0	76.0	114.9
	50% load	N/A	72.4	88.5	110.8	109.4	107.5	103.3	103.0	97.4	91.1	79.5	115.0
	75% load	N/A	74.6	88.5	110.5	109.4	108.0	104.3	104.0	99.1	93.9	86.0	115.2
	Full load	N/A	76.9	89.8	110.5	109.9	109.8	107.1	105.9	101.2	96.4	88.0	116.2

A-weighted exhaust SPWLs in dB(A) @ 1 meter

measured 1 meter from the exhaust termination

GenSet configuration	Applied standby load	Octave band center frequency, Hz											Total SPWL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Unhoused open exhaust with tail pipe	No load	N/A	65.3	88.0	106.9	111.4	108.1	96.4	93.5	83.1	76.2	59.6	114.1
	50% load	N/A	60.0	90.5	110.0	112.0	113.8	108.6	106.5	104.5	102.1	87.4	118.2
	75% load	N/A	62.9	93.0	111.7	115.3	118.2	114.8	114.0	113.3	108.5	101.7	123.0
	Full load	N/A	62.6	92.6	114.1	115.0	117.8	116.0	115.0	114.6	110.2	103.7	123.6

Published sound levels are measured at a CE certified test site and are subject to instrumentation measurement, installation, and manufacturing variability. The reference SPL is 20 μ Pa. The reference SPWL is 1 pW (10^{-12} W). SPLs and SPWLs at 1 meter from a reference parallelepiped creating a hemisphere around the GenSet are measured per the requirements of ISO 3744 and ISO 8528-10. Exhaust SPWLs at 1 meter are calculated per ISO 6798, Annex A.

An unhoused (open set) configuration GenSet refers to a GenSet with no sound enclosure of any kind. A housed (closed set) configuration GenSet refers to a GenSet that has a Level II (noise reduction) sound enclosure installed over the GenSet. The Level II enclosure is integrally attached to the skid base of the GenSet.

The sound data for a GenSet with infinite exhaust does not include the exhaust noise contribution. The exhaust sound data for a GenSet is solely exhaust noise and does not include noise from any other noise sources.



Cooling system data sheet

C1300N6 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 ₂ O (mm H ₂ O)					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 and demand response	1300	N/A	N/A	43	N/A	N/A	N/A	N/A	42

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.

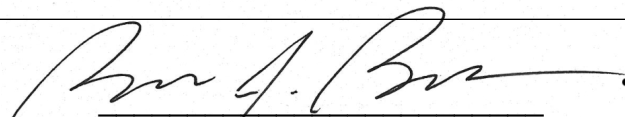


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2026 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Cummins Inc.
(U.S. Manufacturer or Importer)
Certificate Number: TCEXB60.0AAB-011

Effective Date:
11/08/2025
Expiration Date:
12/31/2026


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
11/08/2025
Revision Date:
N/A

Manufacturer: Cummins Inc.
Engine Family: TCEXB60.0AAB
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : Natural Gas (CNG/LNG)
Emission Standards :
Mobile Part 1048
CO (g/kW-hr) : 4.4
NMHC + NO_x (g/kW-hr) : 2.7
Part 60 Subpart JJJJ Table 1
CO (g/Hp-hr) : 2.0
NO_x (g/Hp-hr) : 1.0
VOC (g/Hp-hr) : 0.7
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 1048, 40 CFR Part 60, 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 1048, 40 CFR Part 60 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 1048, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1048, 40 CFR Part 60. 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 1048, 40 CFR Part 60. 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 1048, 40 CFR Part 60.

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

C1300N6 60 Hz spark-ignited generator set (GenSet)

Natural gas exhaust emissions data @ 1800 rpm

Exhaust component		50% load		75% load		Full load	
		g/hp-hr	ppm	g/hp-hr	ppm	g/hp-hr	ppm
Oxides of nitrogen (as NO _x , DRY)	NO _x	1.0	150	1.0	155	1.0	158
Total hydrocarbons (WET)	THC	1.0	3.7	3.8	1484	3.4	1357
Carbon Monoxide (DRY)	CO	N/A	N/A	1.7	405	1.6	406

Engine information:

Model:	Cummins QSK60G	Bore:	6.25 in. (159 mm)
Emission certification:	EPA-certified for stationary emergency and non-emergency applications	Stroke:	7.48 in. (190 mm)
Aspiration:	Turbocharged and coolant-air aftercooled	Displacement:	3672 in ³ (60 L)
		Cylinders:	16
		Combustion:	Advanced lean burn
		Compression ratio:	11.4:1

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. The percentage of NMHCs found in exhaust emissions are typically 2-3 times the percentage of NMHCs found in fuel. If there is no NMHC in the fuel, NMHC and VOC emissions in exhaust will be insignificant.
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%

The NO_x, HC, CO and particulate matter (PM) emissions data tabulated here are representative of test data taken from a single engine under the test conditions shown above. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to engine tuning, test site conditions, installation, fuel specification, test procedures, and instrumentation. Engine operation with excessive air intake or exhaust restrictions beyond published maximum limits, or with improper maintenance, may result in elevated emissions levels.



Prototype test report 60 Hz test summary

Applicable generator set models:

C1300N6 (1300 kW)

Representative prototype:

Model: C1300N6 (1300 kW)

Engine: QSK 60G

Alternator: PI734C

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. H₂O 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.

Electrical and mechanical strength

The GenSet was tested to several single-phase and three-phase faults to verify that the generator can safely withstand the forces associated with short circuit conditions. The GenSet was capable of producing full rated output at the conclusion of the testing.

Torsional analysis and testing

The GenSet was tested to verify that the design is not subjected to harmful torsional stresses in excess of 5000 psi. A spectrum analysis of the transducer output was conducted over the speed range of 1650 to 1890 RPM.

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:	Isocronous
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:	23.0%
Recovery time:	4.2 seconds
Frequency dip:	16.3%
Recovery time:	6.0 seconds
Voltage rise:	11.7%
Recovery time:	0.5 seconds
Frequency rise:	6.5%
Recovery time:	2.6 seconds

Harmonic analysis

Harmonic	Line to line		Line to neutral	
	No load	Ful load	No load	Full load
3	0.18	0.02	0.13	0.08
5	0.2	2.0	0.13	1.99
7	0.52	1.46	0.48	0.74
9	0.08	0.03	0.03	0.07
11	0.65	0.48	0.64	0.46
13	0.21	0.28	0.19	0.31
15	0.05	0.05	0.03	0.1

SECTION 3

Generator Accessories



Product data sheet

Specifications

SQUARE D

Green Premium[®]



Circuit breaker, PowerPacT R,
2000A, 3 pole, 600VAC, 50kA,
busbar, Micrologic 6.0A

RLF36200U44F

Main

Range	PowerPact
Product Name	PowerPact R
Product Or Component Type	Circuit breaker
Device Application	Distribution

Complementary

Line Rated Current	2000 A
Number Of Poles	3P
Control Type	Operating handle
Breaking Capacity Code	L
Breaking Capacity	AIR 125 kA 240 V AC 50/60 Hz UL 489 AIR 100 kA 480 V AC 50/60 Hz UL 489 AIR 50 kA 600 V AC 50/60 Hz UL 489 Icu 125 kA 240 V AC 50/60 Hz IEC 60947-2 Icu 85 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	65 kA 240 V AC 50/60 Hz IEC 60947-2 45 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, ammeter, MicroLogic 6.0 A, LSIG
[Ui] Rated Insulation Voltage	750 V IEC 60947-2
Trip Unit Name	MicroLogic 6.0 A
Suitability For Isolation	Yes IEC 60947-2
Utilisation Category	Category A
Awg Gauge	AWG 3/0...750 kcmil aluminium/copper
Local Signalling	Alarm 1 LED yellow(long-time pick up) 1 LED red(long-time pick up) Trip causes 1 LED red) 1 LED red(digital ammeter) Ground indicator 1 LED red) Phase-loading LED green(load balancing)
Mounting Mode	Unit mount busbar)

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Mounting Support	Busbar
Electrical Connection	Busbar connection, line Busbar connection, load
Terminal Identifier	AL2500RK
Tightening Torque	601.85 lbf.in (68 N.m) 0.08...0.62 in ² (50...400 mm ²) (AWG 1/0...750 kcmil) 601.85 lbf.in (68 N.m) 0.08...0.23 in ² (50...150 mm ²) (2 x AWG 1/0...2 x 300 kcmil)
Number Of Slots	2 auxiliary switch OF plug-in) 1 alarm switch SD plug-in) 1 voltage release MN or MX plug-in)
Power Wire Stripping Length	1.38 in (35 mm)
Height	16.24 in (412.50 mm)
Width	16.54 in (420.12 mm)
Depth	14.49 in (368.05 mm)
Net Weight	52 lb(US) (23.59 kg)
Quantity Per Set	1
Circuit Breaker Application	HACR rated

Environment

Quality Labels	CE
Standards	UL CSA NEMA NMX J-266 IEC 60947-2
Product Certifications	UL CSA NOM
Ip Degree Of Protection	IP40
Pollution Degree	3 IEC 60947-1
Ambient Air Temperature For Operation	-13...158 °F (-25...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	US10DE201245
Discount Schedule	0DE2
Gtin	
Returnability	Yes

Packing Units

Unit Type Of Package 1	PCE
Number Of Units In Package 1	1
Package 1 Height	16.22 in (41.2 cm)
Package 1 Width	16.54 in (42.0 cm)
Package 1 Length	14.49 in (36.8 cm)
Package 1 Weight	74.00 lb(US) (33.566 kg)

Sustainability

Green Premium™ label is Schneider Electric's commitment to delivering products with best-in-class environmental performance. Green Premium promises compliance with the latest regulations, transparency on environmental impacts, as well as circular and low-CO₂ products.

Guide to assessing product sustainability is a white paper that clarifies global eco-label standards and how to interpret environmental declarations.

[Learn more about Green Premium >](#)

[Guide to assess a product's sustainability >](#)



Transparency RoHS/REACH

Well-being performance

✓ Mercury Free

✓ Rohs Exemption Information [Yes](#)

✓ Pvc Free

✓ Halogen Free Plastic Parts Product

Certifications & Standards

Eu Rohs Directive [Compliant](#)
[EU RoHS Declaration](#)

China Rohs Regulation [China RoHS declaration](#)
Product out of China RoHS scope. Substance declaration for your information.

Environmental Disclosure [Product Environmental Profile](#)

Circularity Profile [End of Life Information](#)

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

Micrologic™ 6.0A Electronic Trip Units

ENGLISH

Instruction Bulletin

48049-136-05

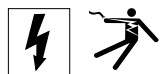
Rev. 02, 06/2015

Retain for future use.



Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



ANSI



IEC



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. This Class A digital apparatus complies with Canadian ICES-003.

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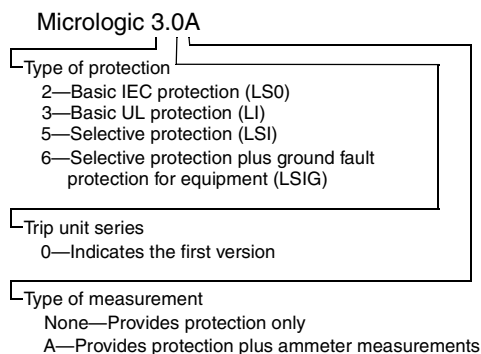
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Section 1— General Information

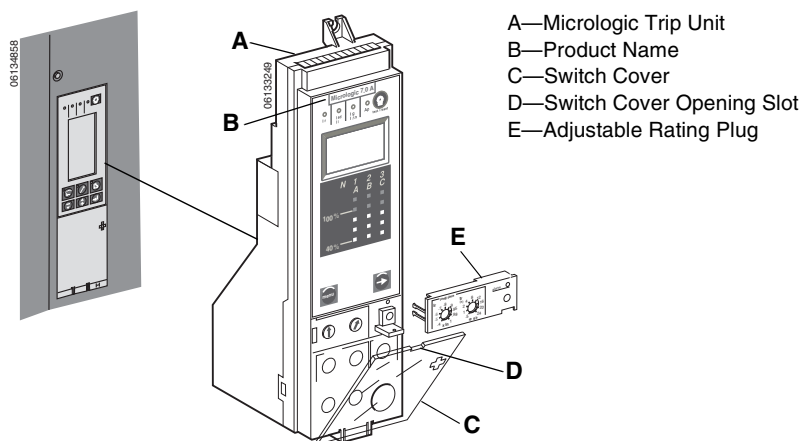
Introduction

Micrologic™ trip units (A) provide adjustable tripping functions on electronic trip circuit breakers. The product name (B) specifies the level of protection provided by the trip unit.



Micrologic trip units are field replaceable to allow for upgrading of the trip unit in the field. For complete information on available circuit breaker models, frame sizes, interrupting ratings, sensor plugs, rating plugs and trip units, see the product catalog.

Figure 1 – Micrologic Trip Unit



Communications

Micrologic trip units can communicate with other devices if the optional Circuit Breaker Communication Module (BCM) is installed. For information on the register lists and other communication devices refer to bulletin 06131B1313: *Modbus Communications System*.

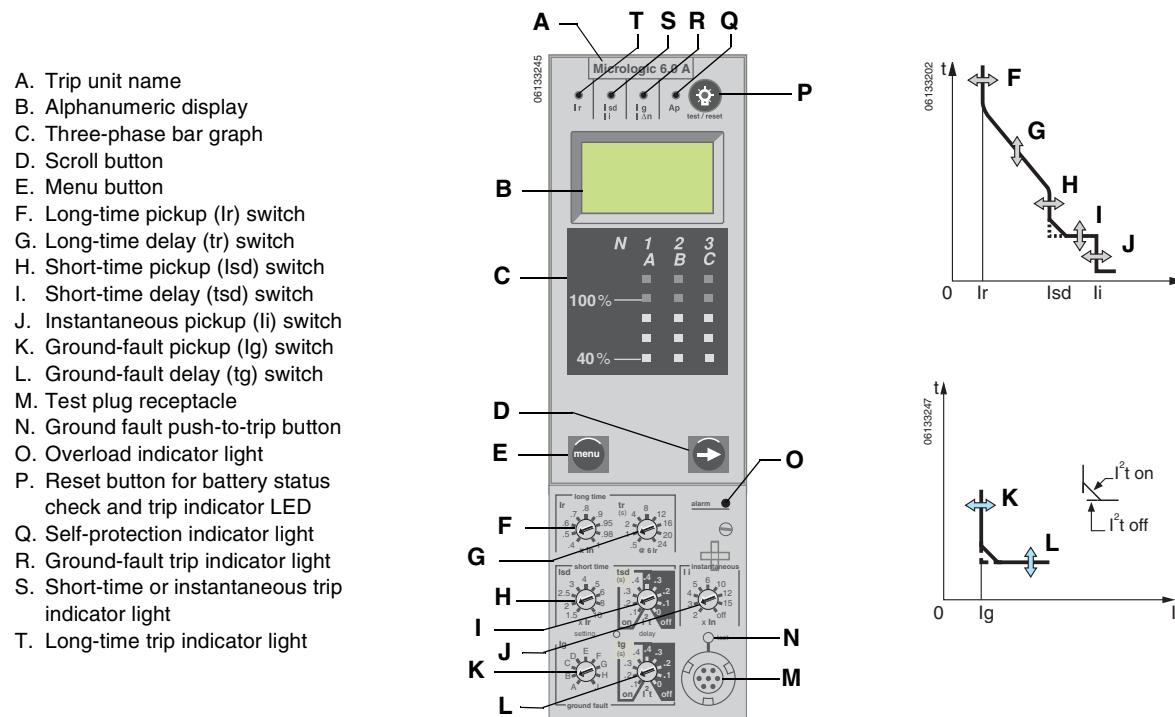
Trip Unit Settings

On the face of the trip unit are adjustable switches to allow changing of trip characteristics. Trip units are shipped with the long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings.

Micrologic 6.0A Trip Unit

The Micrologic 6.0A trip unit provides selective and ground-fault protection for equipment (≤ 1200 A) (LSIG) and a built-in ammeter.

Figure 5 – 6.0A Trip Unit



Zone-Selective Interlocking

Short-time and ground-fault protection can be interlocked to provide zone-selective interlocking.

NOTE: Use I²t off with ZSI for proper coordination. Using I²t on with ZSI is not recommended as the delay in the upstream device receiving a restraint signal could result in the trip unit tripping in a time shorter than the published trip curve.

NOTE: Setting short-time delay (tsd) or ground-fault delay (tg) to the 0 setting will eliminate selectivity for that circuit breaker.

Control wiring links several trip units in the distribution network and in the event of a fault, a trip unit will obey the set delay time only if receiving a signal from a downstream trip unit.

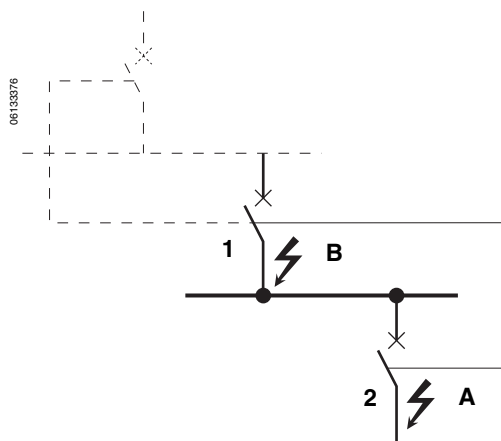
If the trip unit does not receive a signal, tripping will be instantaneous (with no intentional delay).

- The fault is cleared instantaneously by the nearest upstream circuit breaker.
- Thermal stresses (I²t) in the network are minimized without any effect on the correct time delay coordination of the installation.

Figure 6 shows circuit breakers 1 and 2 zone-selective interlocked.

- A fault at A is seen by circuit breakers 1 and 2. Circuit breaker 2 trips instantaneously and also informs circuit breaker 1 to obey set delay times. Thus, circuit breaker 2 trips and clears the fault. Circuit breaker 1 does not trip.
- A fault at B is seen by circuit breaker 1. Circuit breaker 1 trips instantaneously since it did not receive a signal from the downstream circuit breaker 2. Circuit breaker 1 trips and clears the fault. Circuit breaker 2 does not trip.

Figure 6 – Zone-Selective Interlocking



Trip Unit Switches

Long-Time Protection

Long-time protection protects equipment against overloads.

NOTE: Micrologic trip units are powered from the circuit to always provide fault protection. All other functions (display, metering, communications, etc.) require external power. See page 18 for more information.

- Long-time protection is standard on all trip units.
- The long-time pickup (I_r) (A) sets the maximum current level (based on sensor plug rating I_n) which the circuit breaker can continuously carry. If current exceeds this value, circuit breaker will trip after the preset time delay. The long-time pickup (I_r) is adjustable from 0.4–1.0 times the sensor plug rating (I_n).
- The long-time delay (t_r) (B) sets the length of the time that the circuit breaker will carry an overcurrent (below the short-time or instantaneous pickup current level) before tripping. See Table 1 on page 12 for delay settings.
- 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 5 —Adjustable Rating Plug Replacement.
- For Masterpact™ NT and NW circuit breakers, the I_n 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.
- The overload indicator light (C) indicates that the I_r long-time pickup threshold has been exceeded.
- Long-time protection uses true RMS measurement.

Figure 7 – Long-Time Protection Switches

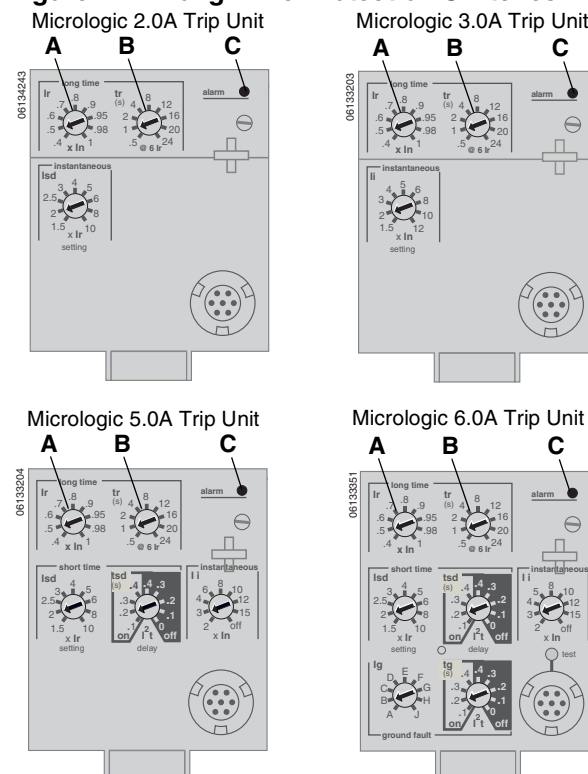


Table 1 – Micrologic Trip Unit Long-Time Delay Values

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

¹Ir = In x long-time pickup. In = sensor rating. Trip threshold between 1.05 and 1.20 Ir.

²Time-delay accuracy +0/-20%

³For Micrologic 5.0A and 6.0A trip units, when tsd is set to 0.4 on or 4.0 off, then tr = 0.5 instead of 0.34.

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 or use a full-function test kit to defeat the thermal imaging.

Short-Time Protection

Short-time protection protects equipment against short circuits.

- Short-time protection is standard on 2.0A, 5.0A and 6.0A trip units. It is not available on 3.0A trip units.
- Short-time protection is based on the long-time pickup (I_r).
- The short-time pickup (I_{sd}) (A) sets current level (below instantaneous trip level) at which circuit breaker will trip after the preset time delay.
- The short-time delay (t_{sd}) (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 5.0A and 6.0A trip unit and factory set to zero on the 2.0A trip unit.

Figure 8 – Short-Time Protection Switches

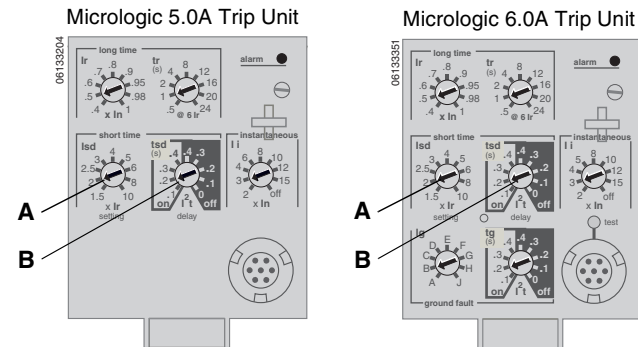


Table 2 – Micrologic Trip Unit Short-Time Delay Values

Setting	Short-Time Delay				
I^2t off (I_{sd} at 10 I_r) (seconds)	0	0.1	0.2	0.3	0.4
I^2t on (I_{sd} at 10 I_r) (seconds)		0.1	0.2	0.3	0.4
t_{sd} (min. trip) (milliseconds)	20	80	140	230	350
t_{sd} (max. trip) (milliseconds)	80	140	200	320	500

- 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 I_r . Above 10 x I_r , 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.
- Short-time protection can be zone-selective interlocked (ZSI) with upstream or downstream circuit breakers.
- Setting t_{sd} to the 0 setting turns off zone-selective interlocking.
- Short-time protection uses true RMS measurement.
- Short-time pickup and delay can be adjusted to provide selectivity with upstream or downstream circuit breakers.

NOTE: Use I^2t off with ZSI for proper coordination. Using I^2t on with ZSI is not recommended as the delay in the upstream device receiving a restraint signal could result in the trip unit tripping in a time shorter than the published trip curve.

Instantaneous Protection

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

- Instantaneous protection (Ii) (A) is standard on the 3.0A, 5.0A and 6.0A trip units.
- Instantaneous protection on 2.0A trip units is achieved by using short-time protection (Isd) with the short-time delay factory set to 0 (zero).
- Instantaneous protection on the 3.0A, 5.0A and 6.0A trip units is based on the circuit breaker sensor rating (In).
- Instantaneous protection on the 2.0A trip unit is based on the long-time pickup setting (Ir).
- Circuit breaker open command is issued as soon as threshold current is exceeded.
- Instantaneous protection uses peak current measurement.
- When instantaneous protection switch is set to off, the instantaneous protection is disabled.

Figure 9 – Instantaneous Protection Switches

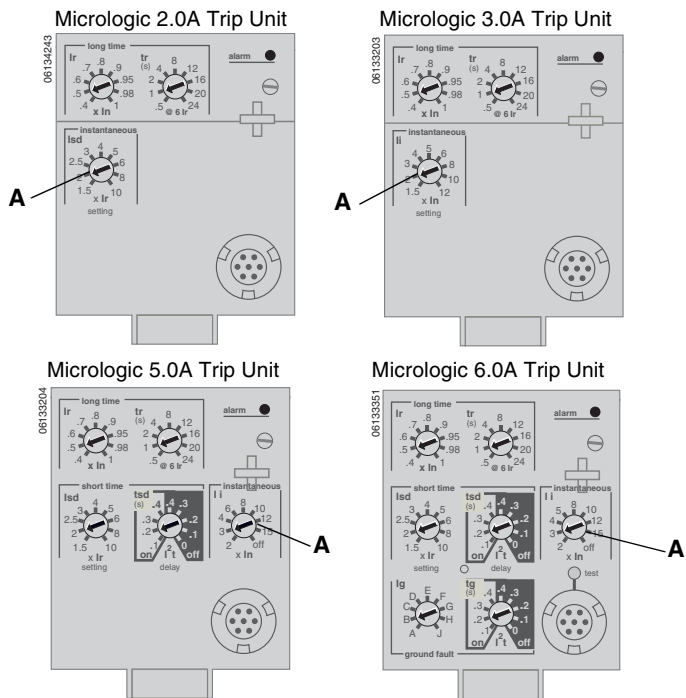


Table 3 – Micrologic Instantaneous Values

Setting	Interruption Current									
2.0A Isd (= Ir x..)	1.5	2	2.5	3	4	5	6	8	10	
3.0A Ii (= In x..)	1.5	2	3	4	5	6	8	10	12	
5.0A Ii (= In x..)	2	3	4	6	8	10	12	15	off	
6.0A 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

Ground-Fault Protection

Equipment ground-fault protection protects conductors against overheating and faults from ground-fault currents (≤ 1200 A).

- Equipment ground-fault protection is standard on 6.0A trip units.
- Ground-fault pickup (I_g) (A) sets ground current level where circuit breaker will trip after the preset time delay.
- Ground-fault delay (t_g) (B) sets the length of time that the circuit breaker will carry a ground-fault current above the ground-fault pickup current level before tripping.
- Equipment ground-fault protection can be zone-selective interlocked (ZSI) with upstream or downstream circuit breakers.
- Setting the ground-fault delay (t_g) to the 0 setting turns off zone-selective interlocking.
- Neutral protection and equipment ground-fault protection are independent and can operate concurrently.

NOTE: Use I^2t off with ZSI for proper coordination. Using I^2t on with ZSI is not recommended as the delay in the upstream device receiving a restraint signal could result in the trip unit tripping in a time shorter than the published trip curve.

Figure 10 – Ground-Fault Protection Switches

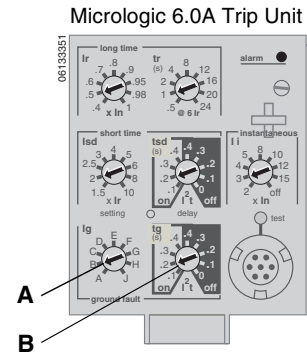


Table 4 – Micrologic Trip Unit Ground-Fault Pickup Values

I_g ($= I_n \times \dots$)	A	B	C	D	E	F	G	H	J
$I_n \leq 400$ A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
400 A $< I_n \leq 1200$ A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
$I_n > 1200$ A	500 A	640 A	720 A	800 A	880 A	960 A	1040 A	1120 A	1200 A

I_n = sensor rating.

I_g = ground-fault pickup.

Table 5 – Micrologic Trip Unit Ground-Fault Delay Values

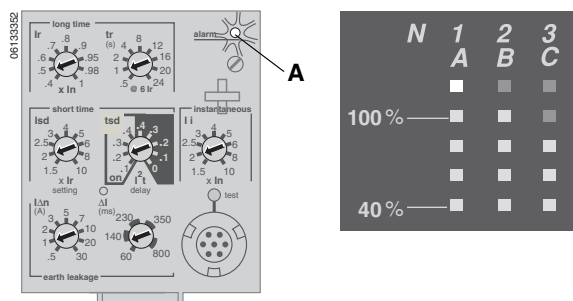
Setting	Ground-Fault Delay				
I^2t off (ms at I_n) (seconds)	0	0.1	0.2	0.3	0.4
I^2t on (ms at I_n) (seconds)	—	0.1	0.2	0.3	0.4
tsd (min. trip) (milliseconds)	20	80	140	230	350
tsd (max. trip) (milliseconds)	80	140	200	320	500

Indicator Lights

Overload Indicator Light

The overload indicator light (A) lights when the I_r long-time pickup level has been exceeded (over 100% on the bar graph).

Figure 11 – Overload Indicator Light



Trip Indicator Lights

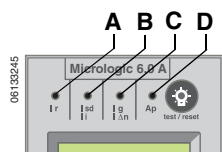
The I_r trip indicator light (A) lights when a trip occurs because the I_r long-time pickup level was exceeded.

The I_{sd}/I_i trip indicator light (B) lights when a trip occurs because the I_{sd} short-time pickup or the I_i instantaneous pickup was exceeded.

The I_g trip indicator light (C) lights when a trip occurs because the I_g ground fault pickup was exceeded.

The A_p self-protection indicator light (D) lights when the trip unit overheats, the instantaneous override level is exceeded, or a trip unit power supply failure occurs.

Figure 12 – Trip Indicator Lights



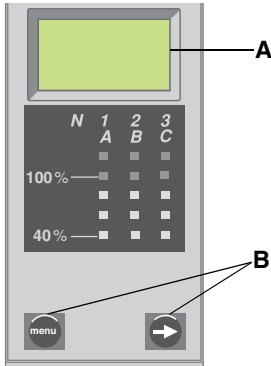
Ammeter

The ammeter monitors and displays the circuit breaker currents. An alphanumeric screen (A) continuously displays the phase at the highest load. Navigation buttons (B) can be pressed to display the various monitored currents.

The process of checking the ammeter values can be stopped at any time. After several seconds, Micrologic trip units automatically return to displaying the phase at the highest load.

See the following section for addition information concerning the ammeter.

Figure 13 – Ammeter



Trip Unit Testing

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

Micrologic Trip Unit Configuration

Control Power

Table 6 – Pickup Values

Sensor Plug Value (In)	Minimum Ground-Fault Pickup
100–250 A	30% of Sensor Rating
400–1200 A	20% of Sensor Rating
1600–6300 A	500 A

The A trip unit was designed to be used with or without an external 24 Vdc power supply.

The following will be powered and functional even if the trip unit is not externally powered:

- Fault protection for LSIG functions. The A trip unit is fully circuit powered for fault protection.
- LED trip indication (powered by an onboard battery). The battery’s only function is to provide LED indication if all other power is off
- All display functions and trip unit features power-up with current flow on one phase greater than or equal to the values in Table 6.
- Ground-fault push-to-trip button works for testing ground fault with current flow on one phase greater than or equal to the values in Table 6.

The ground-fault push-to-trip is also functional if a Hand-Held Test Kit or Full-Function Test Kit is powering the trip unit.

The following will be powered and functional with external power:

- All of the above functions which are functional without external power.
- Ammeter and bar graph displays are functional with or without current flowing through the circuit breaker. With current flow between 0 and 20% of sensor value, the ammeter may not be accurate.
- Trip settings and max. current readings can be accessed on the display by pressing the navigation buttons with or without current flowing through the circuit breaker.
- Ground-fault push-to-trip button works for testing ground fault with or without current flowing through the circuit breaker.
- Optional Modbus communications are functional, using a separate 24 Vdc power supply for the circuit breaker communications module. This separate 24 Vdc power supply is required to maintain the isolation between the trip unit and communications.

The ground-fault push-to-trip is also functional if a Hand-Held Test Kit or Full-Function Test Kit is powering the trip unit.

External Power Supply

⚠ CAUTION

HAZARD OF SHOCK, ARC FLASH OR EQUIPMENT DAMAGE

Trip unit and communication module must use separate power supplies.

Failure to follow this instruction can result in personal injury or equipment damage.

The trip unit display can be powered by a 24 Vdc external power supply.

Table 7 – Power Supply Specifications

Function	Specification
Power for Trip Unit Alone	24 Vdc, 50 mA
Minimum Input-to-Output Isolation	2400 V
Output (Including Max. 1% Ripple)	±5%
Dielectric Withstand (Input/Output)	3 kV rms
Connections	Connections UC3 F1 (-) ———— F2 (+) ———— 24 Vdc

Power supply is used for graphic screen display when the circuit breaker is open or not carrying current.

Section 2—Ammeter

Display

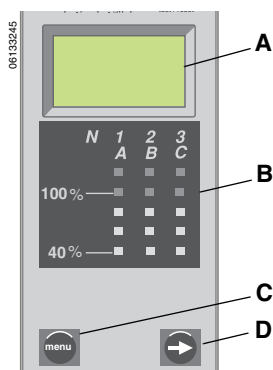
NOTE: The ammeter display will function only if the trip unit is powered. The trip unit is powered by the circuit breaker carrying more than $0.20 \times I_n$ of load current, by being connected to a 24 Vdc external power supply, or by having the Full-Function Test Kit or Hand-Held Test Kit connected and on. Even with external power supplied, current through the circuit breaker must exceed $0.20 \times I_n$ for the ammeter reading to be accurate to within 1.5%.

- A. Alphanumeric screen: Displays ammeter information
- B. Bar graph: Displays currents using an LED bar graph
- C. Menu button: Used to navigate between the various menus
- D. Scroll button: Used to scroll to the next screen in the menus

The default display is the current value of the phase at the highest load.

If no information is displayed, contact the local field office.

Figure 14 – Ammeter



Ammeter Measurements

Micrologic A trip units measure the true RMS value of currents. They provide continuous current measurement from 0.2 to $20 \times I_n$ with an accuracy of 1.5% (including sensors). No auxiliary source is needed where $I > 0.2 \times I_n$. The optional external power supply (24 Vdc) makes it possible to display currents where $I < 0.2 \times I_n$.

A digital LCD screen continuously displays the most heavily loaded phases (I_{max}) or displays the I_a , I_b , I_c , I_g , and (on 4-pole circuit breakers only) I_n stored current and setting values by successively pressing the navigation button.

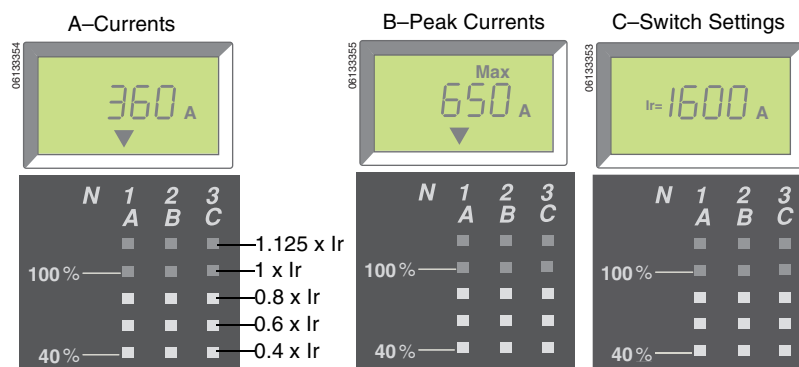
Accessing Information

Three different menus can be accessed:

- A. Current measurements
- B. Stored peak current measurements
- C. Switch settings

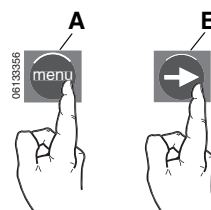
In addition, the ammeter can be used to address the circuit breaker communication module (BCM) in circuit breakers which have the optional circuit breaker communication module installed.

Figure 15 – Menus



To access the next menu, press the menu button (A). To access the next screen in a menu, press the scroll button (B).

Figure 16 – Navigation Buttons



Current Menu

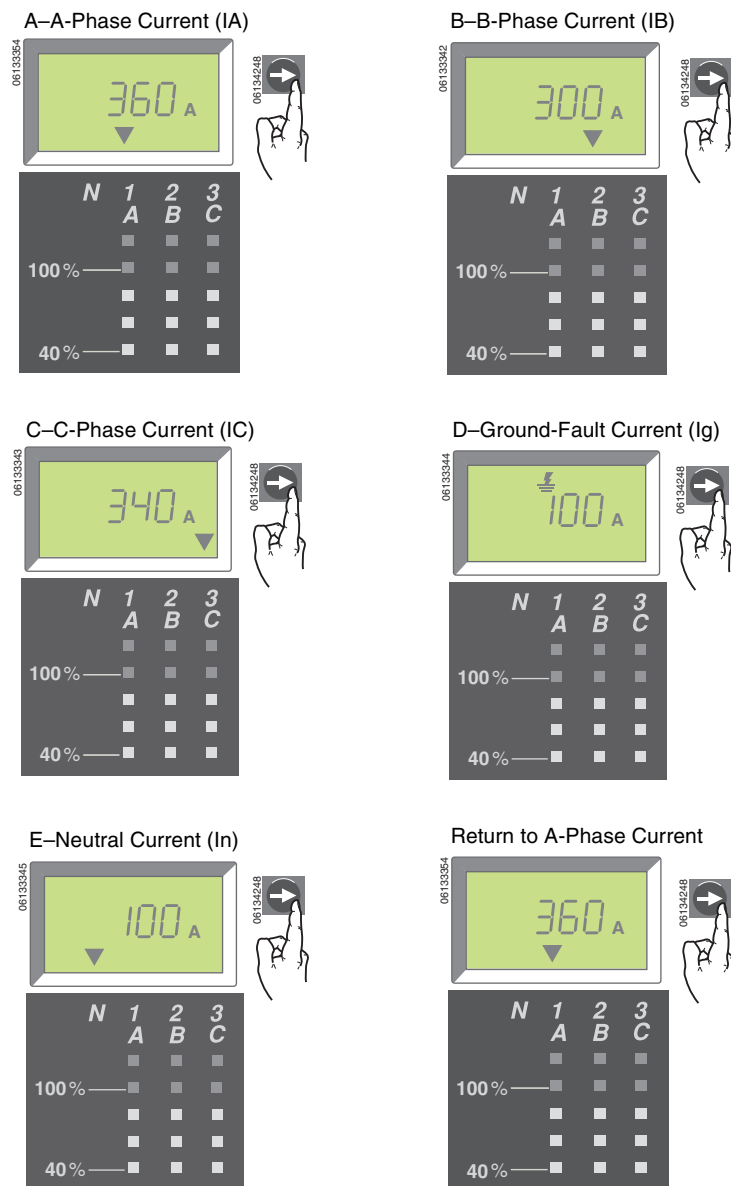
The current (default) menu displays:

- A. Phase current (IA) in A phase
- B. Phase current (IB) in B phase
- C. Phase current (IC) in C phase
- D. Ground-fault current (Ig) (Micrologic 6.0A trip units only)
- E. Neutral current (In)

To display next current, press scroll button.

NOTE: Neutral current is only displayed with a 4-pole circuit breaker with the neutral protection set to half or full. Refer to bulletin 48041-082-03 for NC CT wiring guidelines.

Figure 17 – Current Menus



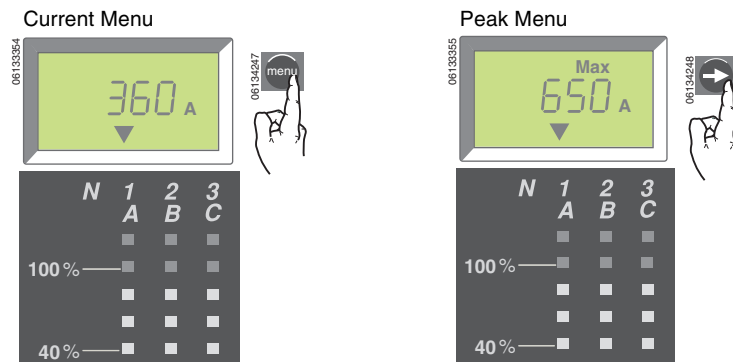
Peak Menu

To access the peak menu:

1. Current menu is displayed.
2. Press menu button.
3. Peak menu appears.

To access menu screens, press scroll button.

Figure 18 – Access the Peak Menu



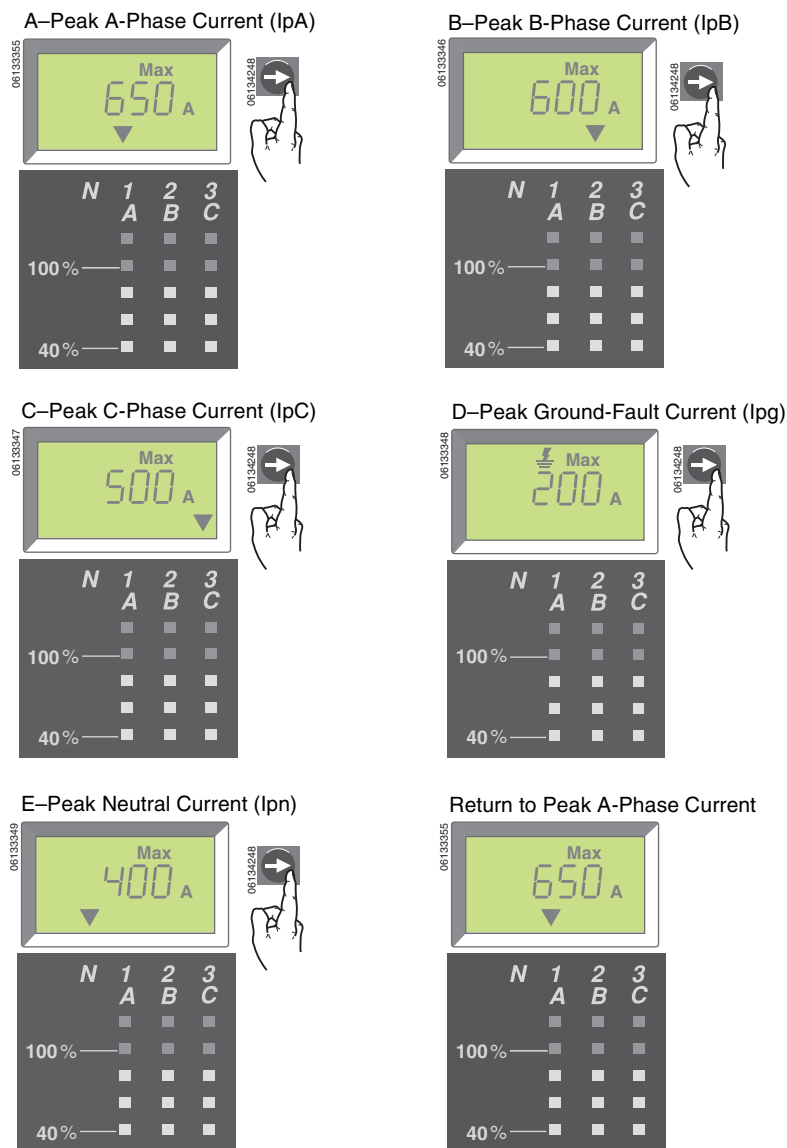
The peak menu displays:

- A. Peak current (IpA) in A phase
- B. Peak current (IpB) in B phase
- C. Peak current (IpC) in C phase
- D. Peak ground-fault current (Ipg) (Micrologic 6.0A trip unit only)
- E. Peak neutral current (Ipn)

To display next peak current, press scroll button.

To reset a max value, scroll to the particular max value screen to be reset and hold the scroll button for three seconds.

Figure 19 – Peak Menus



Switch Settings Menu

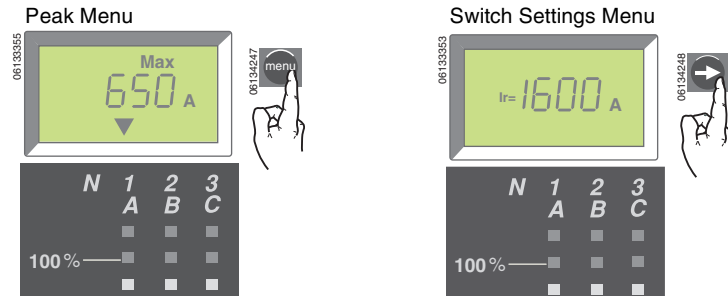
The switch settings menu displays the values at which the switches are set.

To access the switch settings menu:

1. Peak menu is displayed.
2. Press menu button.
3. Switch settings menu will appear.

To access menu screens, press scroll button.

Figure 20 – Access the Switch Settings Menu

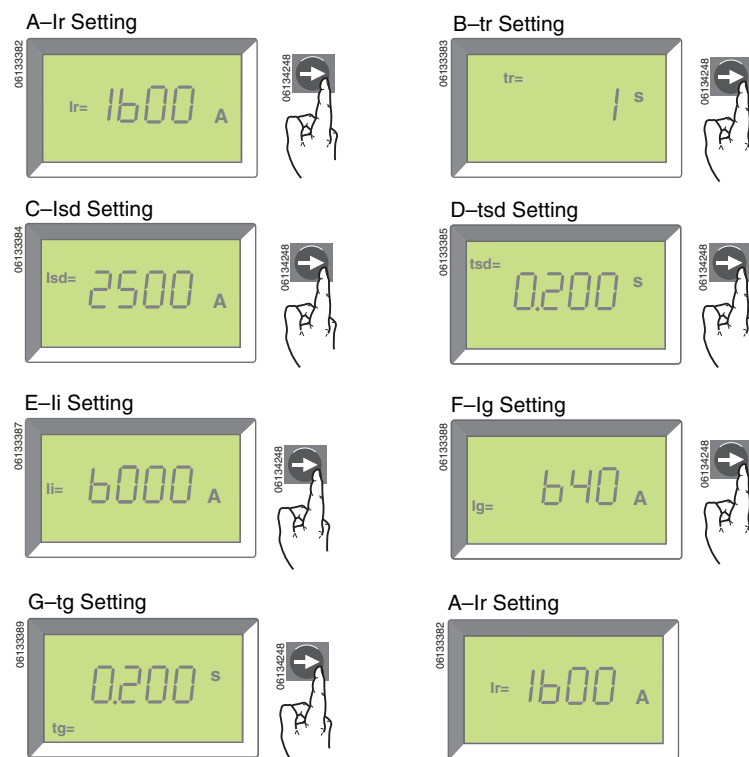


The switch settings menu displays:

- A. Long-time pickup (I_r) setting
- B. Long-time delay (t_r) setting
- C. Short-time pickup (I_{sd}) setting
- D. Short-time delay (t_{sd}) setting
- E. Instantaneous pickup (I_i) setting
- F. Ground-fault pickup (I_g) setting (6.0A trip units only)
- G. Ground-fault delay (t_g) setting (6.0A trip units only)

To display next switch setting, press scroll button.

Figure 21 – Trip Unit Switch Settings

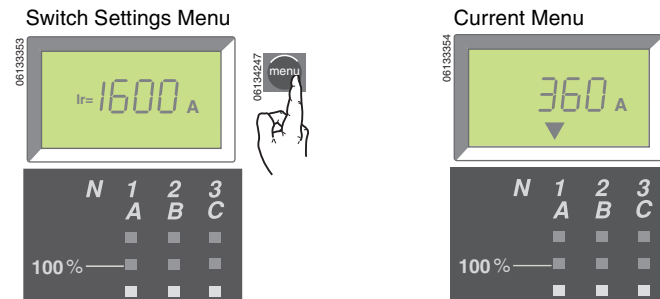


To return to the current menu:

1. Switch settings menu is displayed.
2. Press menu button.
3. Current menu will appear.

Or wait several seconds and ammeter will automatically return to the current (i.e., default) menu.

Figure 22 – Return to Current Menu

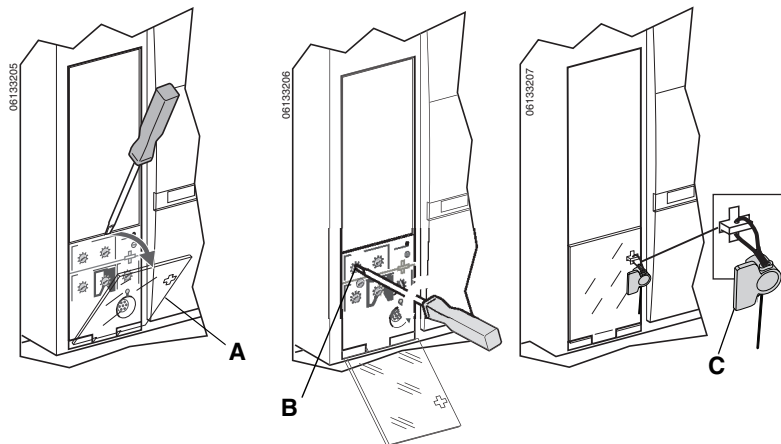


Section 3— Operation

Switch Setting Adjustment

1. Open switch cover (A).
2. Adjust the appropriate switches (B) to desired values.
3. Replace switch cover. Use wire seal MICROTUSEAL (C, not provided), if necessary, to provide tamper evidence.

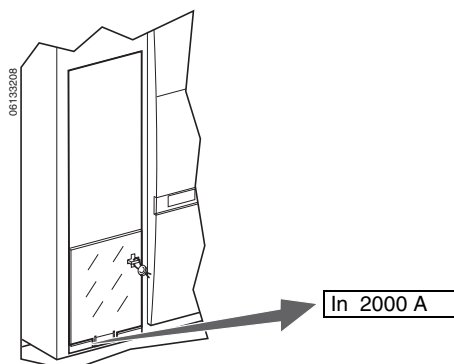
Figure 23 – Adjust Switch Settings



Examples

Circuit breaker is rated 2000 A.

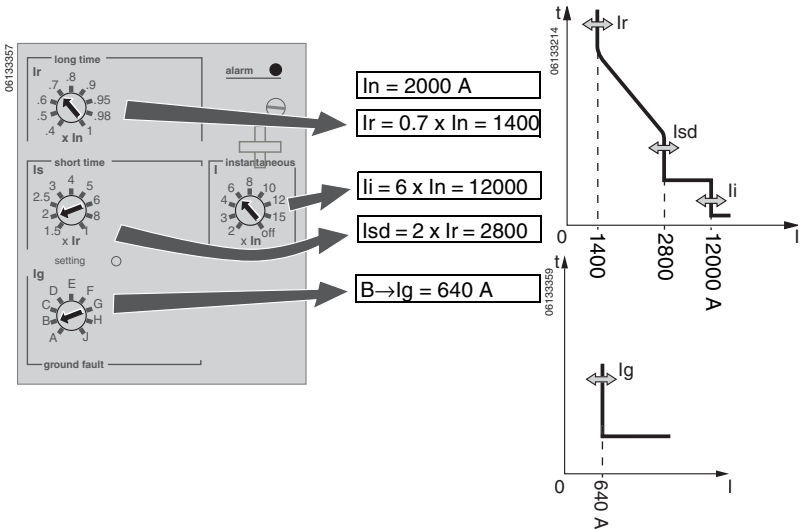
Figure 24 – Circuit Breaker Rating



Micrologic 6.0A Trip Unit

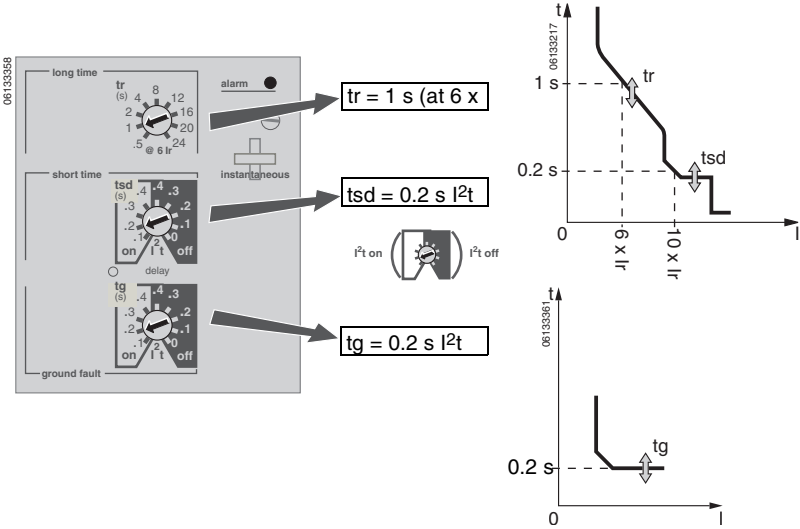
- 1. Set pickup levels.

Figure 31 – Set Pickup Levels



- 2. Set time delays.

Figure 32 – Set Pickup Levels



Zone-Selective Interlocking (ZSI)

The number of devices which can be interlocked are shown in Table 8.

Table 8 – ZSI Combinations

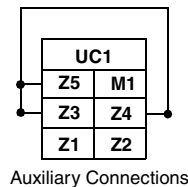
Upstream Device (receives input from RIM) → ↓ Downstream Device (sends output to RIM)	Micrologic #.0x Trip Units	Square D Micrologic Series B Trip Units	Square D GC-100 Ground-Fault Relay for Equipment Protection	Square D GC-200 Ground-Fault Relay for Equipment Protection	Merlin Gerin STR58 Trip Units	Federal Pioneer USRC and USRCM Trip Units
Micrologic #.0x Trip Units	15	R	R	15	15	R
Square D Micrologic Series B Trip Units	R	26	R	R	R	15
Square D GC-100 Ground-Fault Relay for Equipment Protection	R	R	7	R	R	R
Square D GC-200 Ground-Fault Relay for Equipment Protection	15	R	R	15	15	R
Merlin Gerin STR58 Trip Units	15	R	R	15	15	R
Merlin Gerin STR53 Trip Units	15	R	R	15	15	R
Federal Pioneer USRC and USRCM Trip Units	R	15	R	R	R	15
Square D Add-On Ground Fault Module for Equipment Protection	R	5	R	R	R	R

R—RIM module is required to restrain any devices.

Numerical References—Maximum number of upstream circuit breakers which can be restrained without requiring a RIM Module.

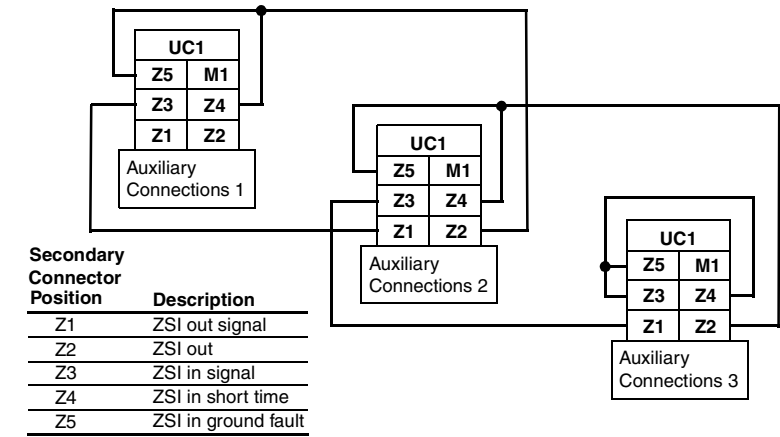
Circuit breaker terminals are shipped with terminals Z3, Z4 and Z5 jumpered to self-restrain the short-time and ground-fault functions. Remove the jumpers when activating zone-selective interlocking.

Figure 33 – Jumpered Terminals



Wire circuit breakers for zone-selective interlocking.

Figure 34 – ZSI Wiring Example



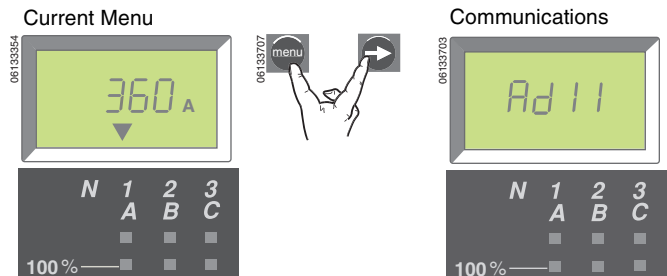
Communication Module Values

If the optional circuit breaker communication module (BCM) is installed, use the ammeter to set communication module values.

To access the communication module menu:

- 1. Current menu is displayed.
- 2. Simultaneously press both menu button and scroll button down for three seconds.
- 3. Communication module addressing menu will appear.

Figure 35 – Access Communication Module Menu

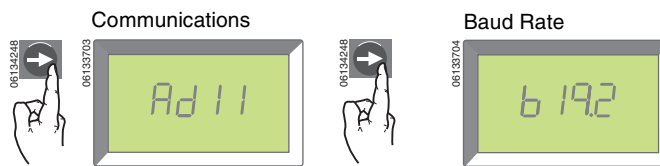


Set communication module values:

1. Press and release scroll button to sequence addresses (1 through 47). When the correct address number is reached, enter the value by pressing and holding scroll button until the display stops flashing.

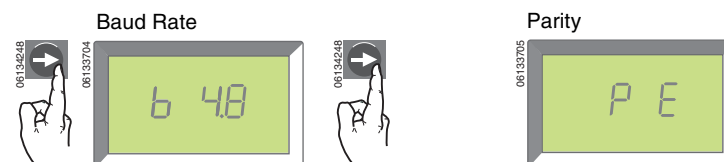
Baud rate screen will appear after address has been entered.

Figure 36 – Set Communication Module Values



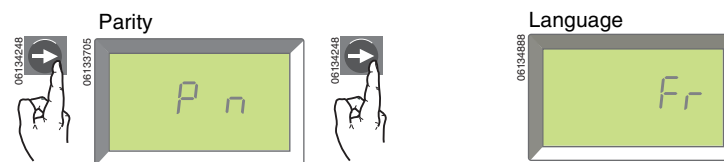
2. Press and release scroll button to sequence baud rates (4.8k, 9.6k or 19.2k). When the desired baud rate appears, enter the value by pressing and holding scroll button until the display stops flashing.

Parity screen will appear after baud rate has been entered.



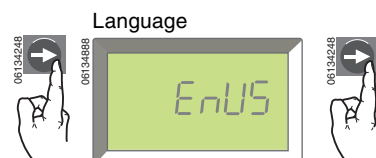
3. Press and release scroll button to sequence parities (E [even] or n [none]). When the desired parity appears, enter the value by pressing and holding scroll button until the display stops flashing.

Languages screen will appear after parity has been entered.



4. Press and release scroll button to scroll through languages (French [Fr], US English [En US], UK English [En], German [d], Spanish [SP] or Italian [It]). When the desired language appears, enter the value by pressing and holding scroll button until the display stops flashing.

Ammeter display will return to the default screen after language is entered.



After the communication module values have been set, ammeter will automatically return to the current (i.e., default) menu.

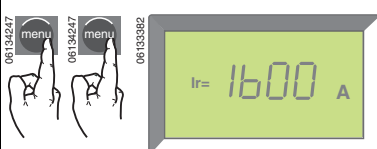
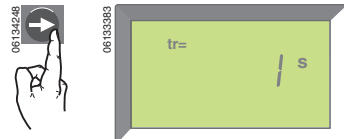
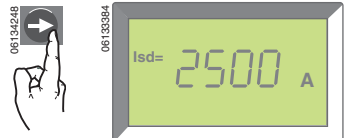
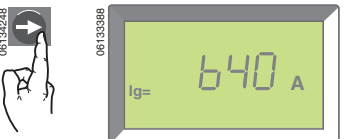
Refer to the *Modbus Communications Guide* 0613IB1313 for other components and setup instructions.

Trip Unit Settings Check

Use the ammeter switch setting menu to check the trip unit settings.

1. Press menu button twice.
2. Switch settings menu will appear.
3. Press scroll button to advance to next screen.
4. After checking trip unit settings, press menu button once to return to main menu.

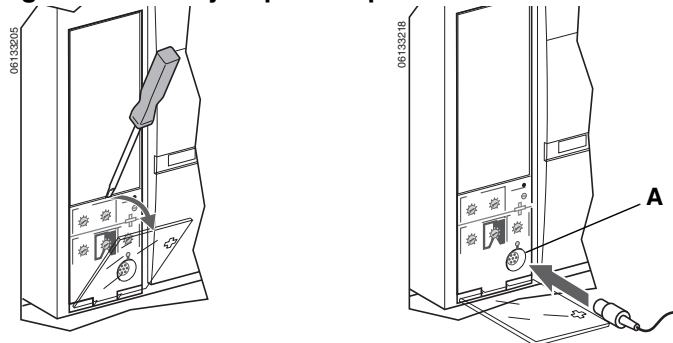
Table 9 – Trip Unit Settings

Setting		Window	2.0A	3.0A	5.0A	6.0A
Ir	Long-Time Pickup		X	X	X	X
tr	Long-Time Delay		X	X	X	X
I _{sd}	Short-Time Pickup		X		X	X
t _{sd}	Short-Time Delay				X	X
I _i	Instantaneous Pickup			X	X	X
I _g	Ground-Fault Pickup					X
t _g	Ground-Fault Delay					X

Trip Unit Operation Verification

Use a test kit connected to the trip unit test plug receptacle (A) to verify trip unit is functioning as desired. See instructions shipped with test kit to perform verification tests.

Figure 37 – Verify Trip Unit Operation



Equipment Ground-Fault Trip Functions Testing

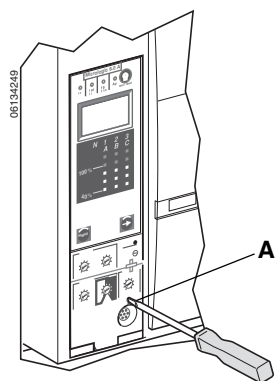
Paragraph 230-95 (c) of the National Electrical Code requires that all equipment ground-fault protection systems be tested when first installed.

With the circuit breaker closed, test the ground-fault (Micrologic 6.0A trip unit only) trip functions. For instructions on how to close circuit breaker, refer to the circuit breaker installation instructions shipped with the circuit breaker.

1. Press the ground-fault test button (A). Circuit breaker should trip.
2. If circuit breaker does not trip, contact the local field office.

NOTE: Trip unit must be powered to test ground-fault trip function. The trip unit is powered if the circuit breaker is carrying more than $0.20 \times I_n$ of load current, if the 24 Vdc external power supply is connected or if the Full-Function Test Kit or Hand-Held Test Kit is connected and on.

Figure 38 – Test Equipment Ground-Fault Trip Function



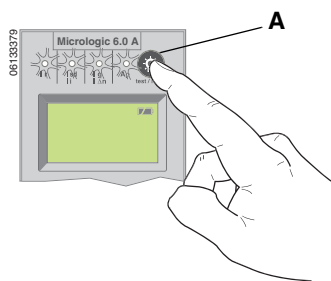
Trip Unit Resetting

When the circuit breaker trips, the fault indicator will remain lit until the trip unit is reset.

Press the reset/test button (A) to reset the trip unit after trip.

Do not return circuit breaker to service until cause of trip is determined. For more information, refer to the circuit breaker installation instructions shipped with the circuit breaker.

Figure 39 – Reset Trip Unit



Trip Unit Status Check

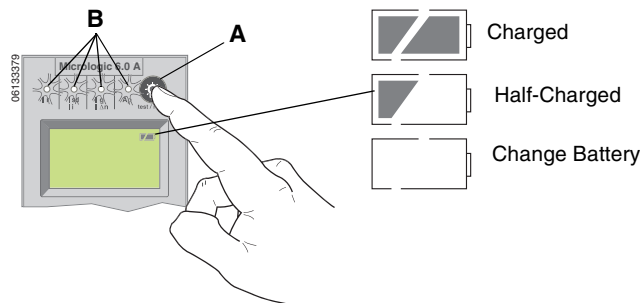
NOTE: Trip unit must be powered to test battery. The trip unit is powered if the circuit breaker is carrying more than $0.20 \times I_n$ of load current, if the 24 Vdc external power supply is connected or if the Full-Function Test Kit or Hand-Held Test Kit is connected and on.

To check trip unit battery and trip indicators, press the test/reset button (A).

- All trip indicators (B) will light up
- Battery status will be displayed
- If no battery status is displayed, there is no battery installed.
- The battery bar graph reading is valid after the reset button has been released.
- If the battery bar graph shows the battery needs to be changed, use Square D battery catalog number S33593:
 - lithium battery
 - 1.2AA, 3.6 V, 800 ma/h

For instructions on replacing battery, see Section 6—Battery Replacement.

Figure 40 – Check Trip Unit Status



Section 4— Trip Unit Replacement

Trip unit replacement must be done by qualified persons, as defined by the National Electric Code, who are familiar with the installation and maintenance of power circuit breakers.

Before replacing trip unit, confirm that the circuit breaker is in good working condition. If the condition of the circuit breaker is unknown, do not proceed. For assistance in evaluating the condition of the circuit breaker, call Technical Support.

Read this entire section before starting the replacement procedure.

NOTE: If trip unit being replaced is a Micrologic 2.0, 3.0 or 5.0 trip unit, order connector block S33101 and circuit breaker or cradle wiring harness if necessary.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Failure to follow these instructions for installation, trip test and primary injection testing may result in the failure of some or all protective function.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Replacement/upgrading of a trip unit in the field must be done by qualified persons, as defined by the National Electric Code, who are familiar with the installation and maintenance of power circuit breakers.
- Before replacing/upgrading trip unit, confirm that the circuit breaker is in good working condition. If the condition of the circuit breaker is unknown, do not proceed. For assistance in evaluating the condition of the circuit breaker, call Technical Support.
- If the circuit breaker fails to function properly in any manner upon completion of the trip unit installation, immediately remove the circuit breaker from service and call Field Services.
- Turn off all power supplying this equipment before working on or inside equipment. Follow instructions shipped with circuit breaker to disconnect and reconnect circuit breaker.
- Replace all devices, doors and covers before returning equipment to service.

Failure to follow this instruction will result in death or serious injury.

Required Tools

- Torque-controlled screwdriver, set at 7 in-lbs (0.8 N•m) $\pm$ 10% (Lindstrom torque driver MAL500-2 or equivalent)
- Micrologic Full-Function Test Kit (part number S33595)

Preparation

Record Switch Settings

Record all trip unit switch settings for later use.

Circuit Breaker Disconnection

Disconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker. The circuit breaker must be completely isolated. (For a drawout circuit breaker, place circuit breaker in the disconnected position.)

For a fixed-mounted circuit breaker, all voltage sources, including auxiliary power, must be disconnected.)

Circuit Breaker Accessory Cover Removal

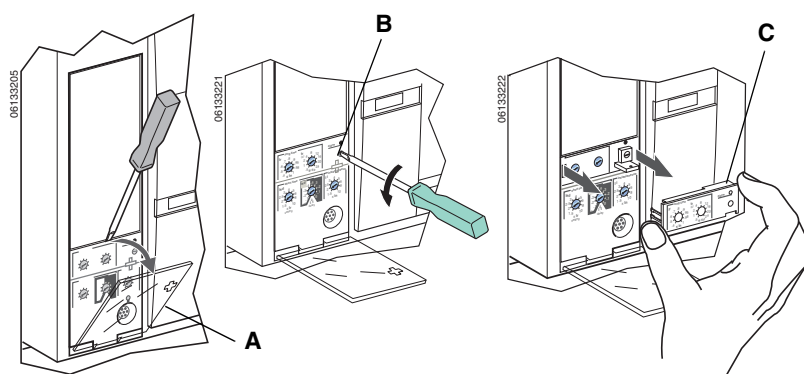
Remove circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

Rating Plug Removal

A small Phillips screwdriver is needed to remove the adjustable rating plug.

1. Open switch cover (A).
2. Unscrew adjustable rating plug mounting screw (B).
3. Remove adjustable rating plug (C). Save for installation in replacement trip unit.

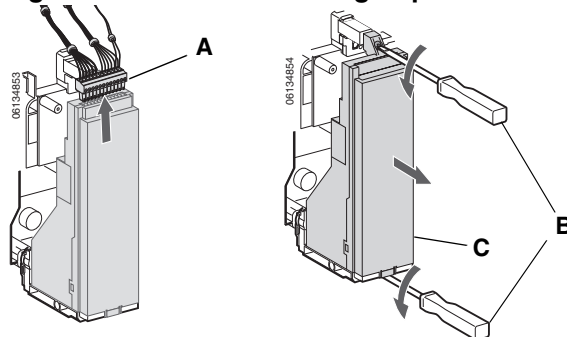
Figure 41 – Remove Adjustable Rating Plug



Trip Unit Removal

1. Remove connector block (A) from top of trip unit, if present.
2. Loosen two trip unit screws (B).
3. Slide out trip unit (C).

Figure 42 – Remove Existing Trip Unit



Trip Unit Replacement

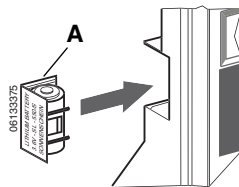
Battery Installation

If a new trip unit is being installed, install the trip unit battery.

Install battery holder with battery (A) in trip unit, observing the correct polarity as indicated on the battery compartment.

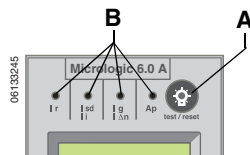
NOTE: Battery holder with battery is located under the side flap in the cardboard box the trip unit is shipped in.

Figure 43 – Install Battery



Press test/reset button (A). All four indicator lights (B) should light. If they do not light, check polarity of battery and retest. If indicator lights still do not light up when test/reset button is pressed, stop installation and contact the local sales office for factory authorized service

Figure 44 – Trip Indicator Lights

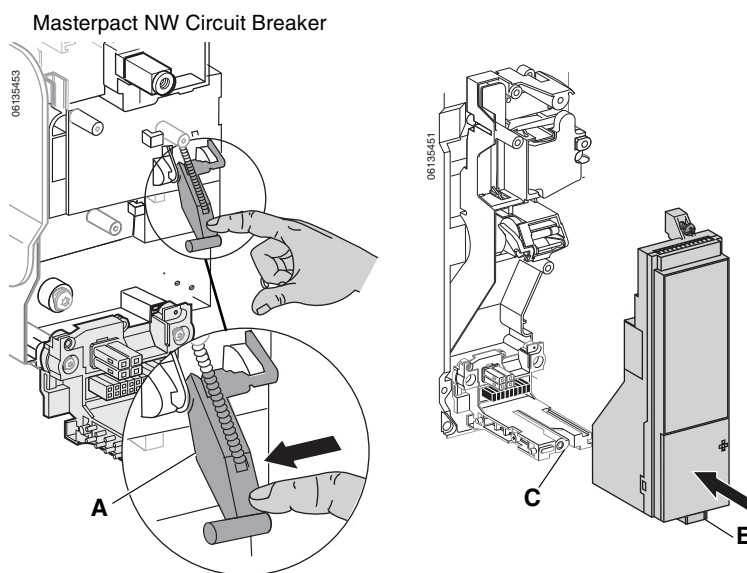


Trip Unit Installation

1. Inspect trip unit connector pins and surfaces. If there is any damage, misaligned pins, or contamination, stop installation and contact the local sales office for factory authorized service.
2. Inspect trip unit mounting base on the circuit breaker. Clear any debris from area and check that all accessory wiring is properly routed for the trip unit being installed. If there is any damage or contamination, stop installation and contact the local sales office for factory authorized service.
3. For Masterpact NW circuit breaker only: Manually depress trip unit interlock (A) and hold it in place during steps 4–6.
4. Align guide rail (B) on bottom of trip unit with guide rail slot (C) on trip unit mounting base in circuit breaker and gently slide the trip unit in until it stops.

NOTE: The Masterpact NT and NW trip unit mounting bases are shock mounted and therefore can flex slightly.

Figure 45 – Install Trip Unit



NOTICE

HAZARD OF EQUIPMENT DAMAGE

Check installation of trip unit to assure proper connections and seating.

Failure to follow this instruction can result in equipment damage or improper circuit breaker tripping.

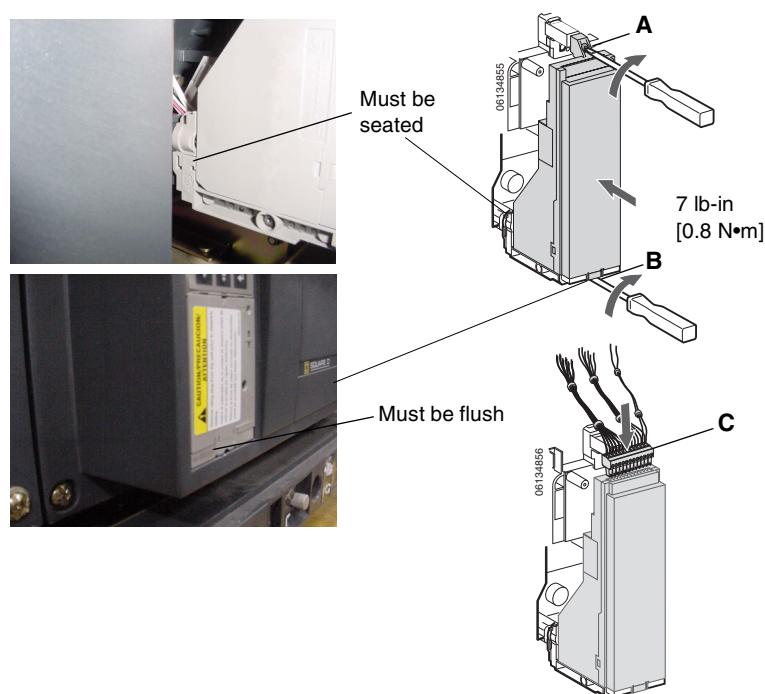
5. Align the trip unit so top mounting screw (A) aligns with the top threaded insert and start the screw by turning the screw two full rotations.
6. Use a torque-controlled screwdriver to drive the bottom screw (B) to 7 in-lbs (0.8 N•m) $\pm$ 10%. The back of the trip unit must be flush with the trip unit mounting base.
7. Use a torque-controlled screwdriver to drive the top screw to 7 in-lbs (0.8 N•m) $\pm$ 10%. Mounting tab must be flush with the mounting standoff and sensor plug.

NOTE: The face of the closed switch cover must be flush with adjoining mounting base surfaces. If these surfaces are not flush, stop installation and contact the local sales office for factory authorized service.

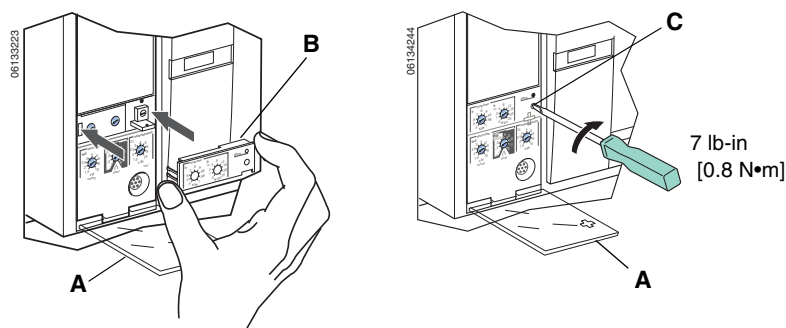
NOTE: If you are upgrading from a Micrologic 2.0, 3.0 or 5.0 trip unit, the connector block must be ordered separately (Part Number S33101). See instructions shipped with the connector block for installation into circuit breaker.

8. Install connector block (C) into top of trip unit.

Figure 46 – Install Trip Unit



9. Install adjustable rating plug into the trip unit.
 - a. Open switch cover (A) on new trip unit.
 - b. Inspect mounting area for debris and contamination.
 - c. Gently push adjustable rating plug (B) into new trip unit.
 - d. Tighten adjustable rating plug mounting screw (C). The plug will be drawn into position flush with front face as screw is tightened.
10. Set trip unit switches to values recorded above or per coordination study results.
11. Close switch cover (A).

Figure 47 – Install Adjustable Rating Plug

Circuit Breaker Accessory Cover Replacement

Replace circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

Trip Unit Installation Check

Secondary Injection Testing

Field installation of a trip unit requires secondary injection testing with the Full-Function Test Kit, to ensure that the newly-installed trip unit is functioning properly. The test will require opening and closing the circuit breaker. Follow the procedures outlined in the instruction bulletins shipped with the circuit breaker and the test kit.

1. Make sure the circuit breaker is isolated from all upstream and downstream devices.
2. Perform secondary injection testing as outlined in the instruction bulletin shipped with the test kit. Verify that all applicable trip unit functions are operating properly.
3. Repeat step 2 with the circuit breaker in the open position.

NOTE: The test kit states that the circuit breaker should be closed when performing the test. Do not close the circuit breaker for this step.

4. If any test fails, do not put the circuit breaker into service and contact the local sales office for factory authorization service.

Primary Injection Testing

Primary injection testing is recommended to ensure that all trip system connections have been correctly made. Perform primary injection testing per the instructions in the Field Testing and Maintenance Guide, bulletin number 0600IB1201.

Check Accessory Operation

1. Installed accessories – Validate the proper operation of all installed accessories. See the corresponding accessory instruction bulletins for operational testing procedures.
2. Zone selective interlocking – If the circuit breaker is part of a ZSI system, follow the zone selective interlocking test procedures as outlined in the Full Function Test Kit instruction bulletin.
3. Communications – If communication modules exist, validate circuit breaker has re-established communications with the supervisor.

Trip Unit Setup

1. If an auxiliary power supply is being used for the Micrologic trip unit, reconnect the auxiliary power supply.
2. Reset the trip unit switches to original values, as recorded at the beginning of this section.

Circuit Breaker Reconnection

Reconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker.

Section 5— Adjustable Rating Plug Replacement

NOTE: To select correct replacement rating plug, see the product catalog.

NOTE: If adjustable rating plug is removed, the circuit breaker will default to a long-time pickup rating of $0.4 \times I_n$ and a long-time delay at whatever setting was selected before the rating plug was removed.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

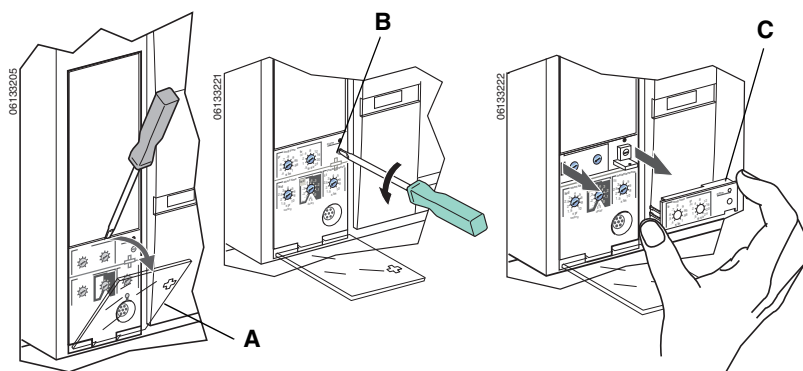
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment. Follow instructions shipped with circuit breaker to disconnect and reconnect circuit breaker.
- Replace all devices, doors and covers before returning equipment to service.

Failure to follow this instruction will result in death or serious injury.

Rating Plug Removal

1. Open circuit breaker contacts:
 - For Masterpact NT and NW circuit breakers, press the “Push to open” button on the circuit breaker.
 - For other circuit breakers, move handle to the off (O) position.
2. Open switch cover (A).
3. Unscrew adjustable rating plug mounting screw (B).
4. Remove adjustable rating plug (C).

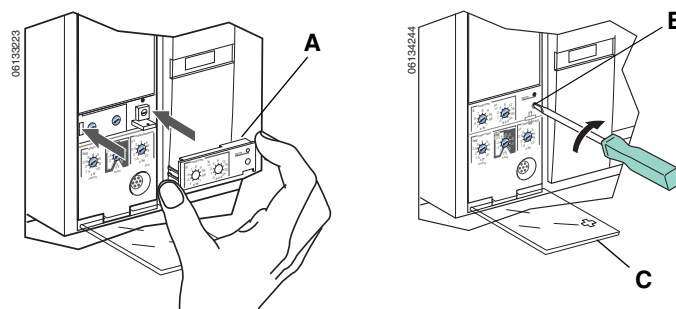
Figure 48 – Remove Adjustable Rating Plug



New Rating Plug Installation

1. Inspect mounting area for debris and contamination.
2. Gently push in new adjustable rating plug (A).
3. Tighten adjustable rating plug mounting screw (B).
4. Set the switches on the trip unit (see Section 3 —Operation).
5. Close switch cover (C).

Figure 49 – Install New Adjustable Rating Plug



Section 6— Battery Replacement

Circuit Breaker Disconnection

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment. Follow instructions shipped with circuit breaker to disconnect and reconnect circuit breaker.
- Replace all devices, doors and covers before returning equipment to service.

Failure to follow this instruction will result in death or serious injury.

Disconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker.

Accessory Cover Removal

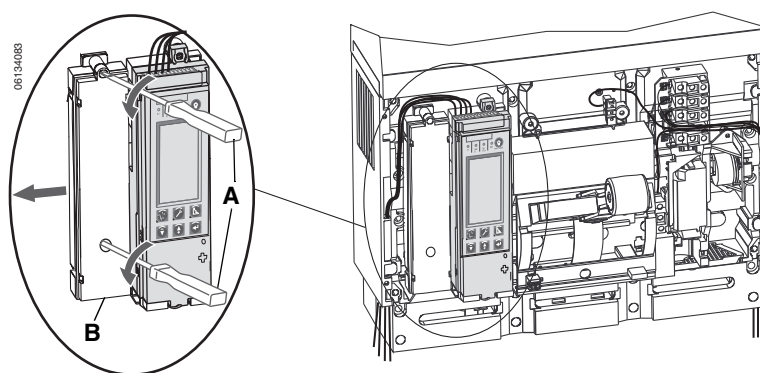
Remove circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

Withstand Module Shifting

NOTE: Some R-frame and NS1600b–NS3200 circuit breakers have a withstand module that needs to be moved to access the battery.

Loosen screws (A) securing withstand module (B). Swing module to side to access trip unit battery cover. Do not remove withstand module connector.

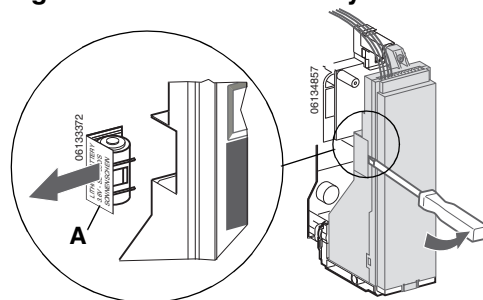
Figure 50 – Shift Withstand Module



Battery Replacement

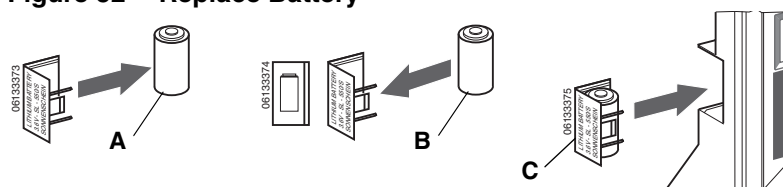
1. Insert small screwdriver blade into battery housing cover notch and rotate to slide battery housing cover (A) out of trip unit.

Figure 51 – Remove Battery Cover



2. Remove battery (A).
3. Insert new battery (B). Make sure that the polarity is correct.
4. Replace battery housing cover (C).

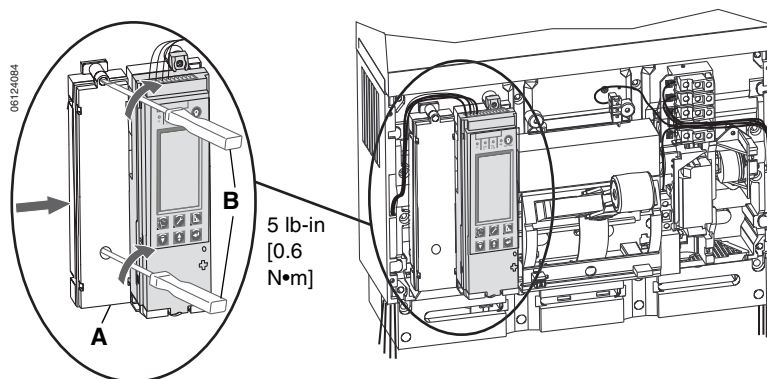
Figure 52 – Replace Battery



Withstand Module Replacement

If the withstand module was moved to access the battery, replace the withstand module (A) and tighten the screws (B).

Figure 53 – Replace Withstand Module

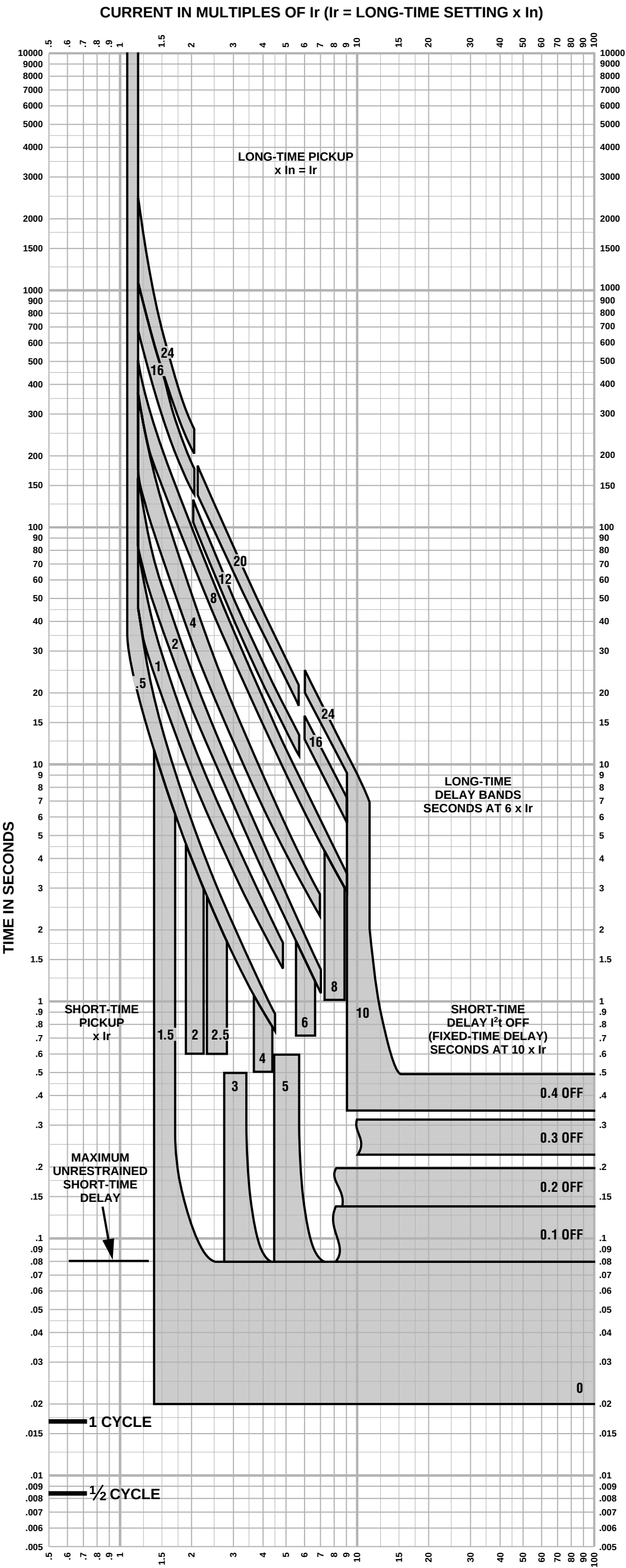


Accessory Cover Replacement

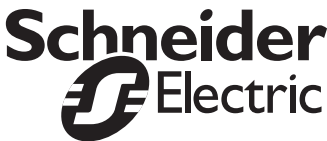
Replace circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

Circuit Breaker Reconnection

Reconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker.



- Merlin Gerin
 - Modicon
 - Square D
 - Telemecanique
 - Federal Pioneer
 - Federal Pacific
- Schneider Electric Brands



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

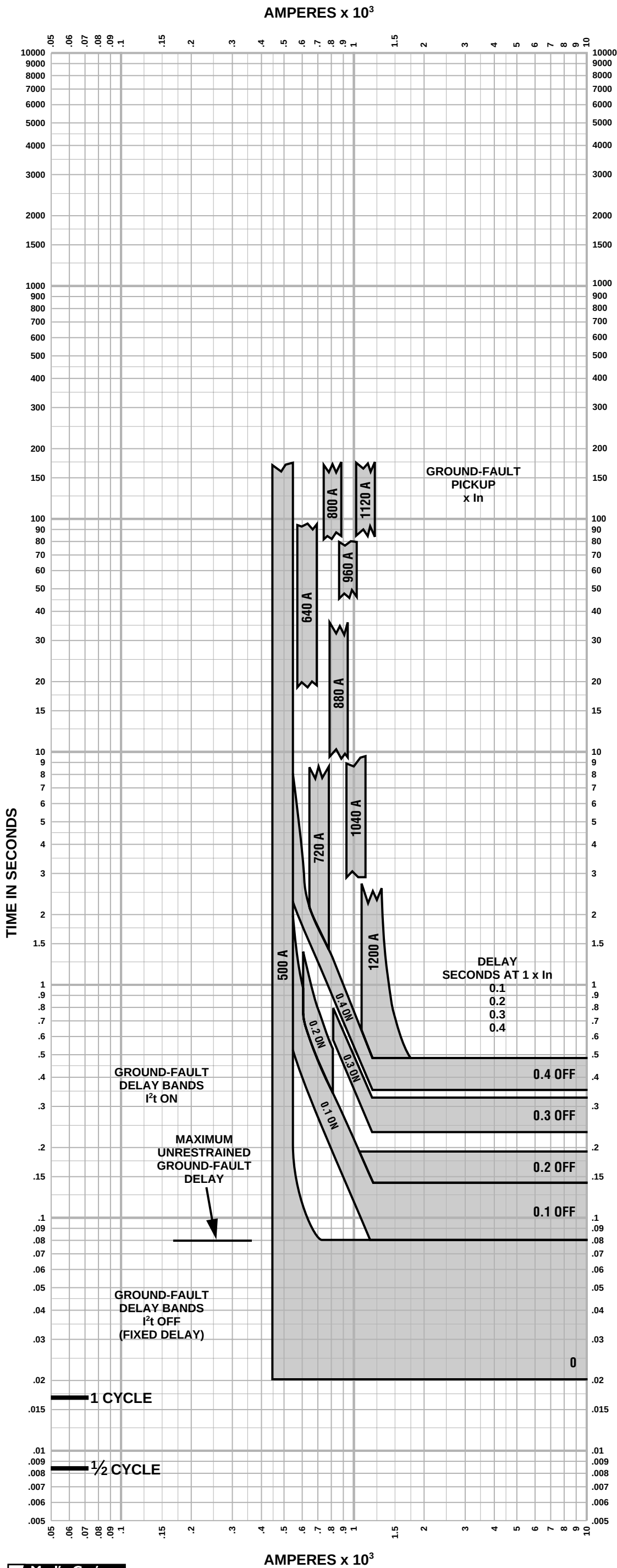
Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

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

Curves apply from -30°C to $+60^{\circ}\text{C}$ 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%.



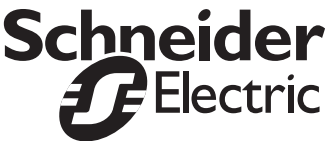
**MICROLOGIC® 6.0 A/P/H TRIP UNIT
WITH ADJUSTABLE GROUND-FAULT
PICKUP AND DELAY
CHARACTERISTIC TRIP CURVE NO. 613-3**

Ground-fault I²t OFF and ON
I_n > 1200 A

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

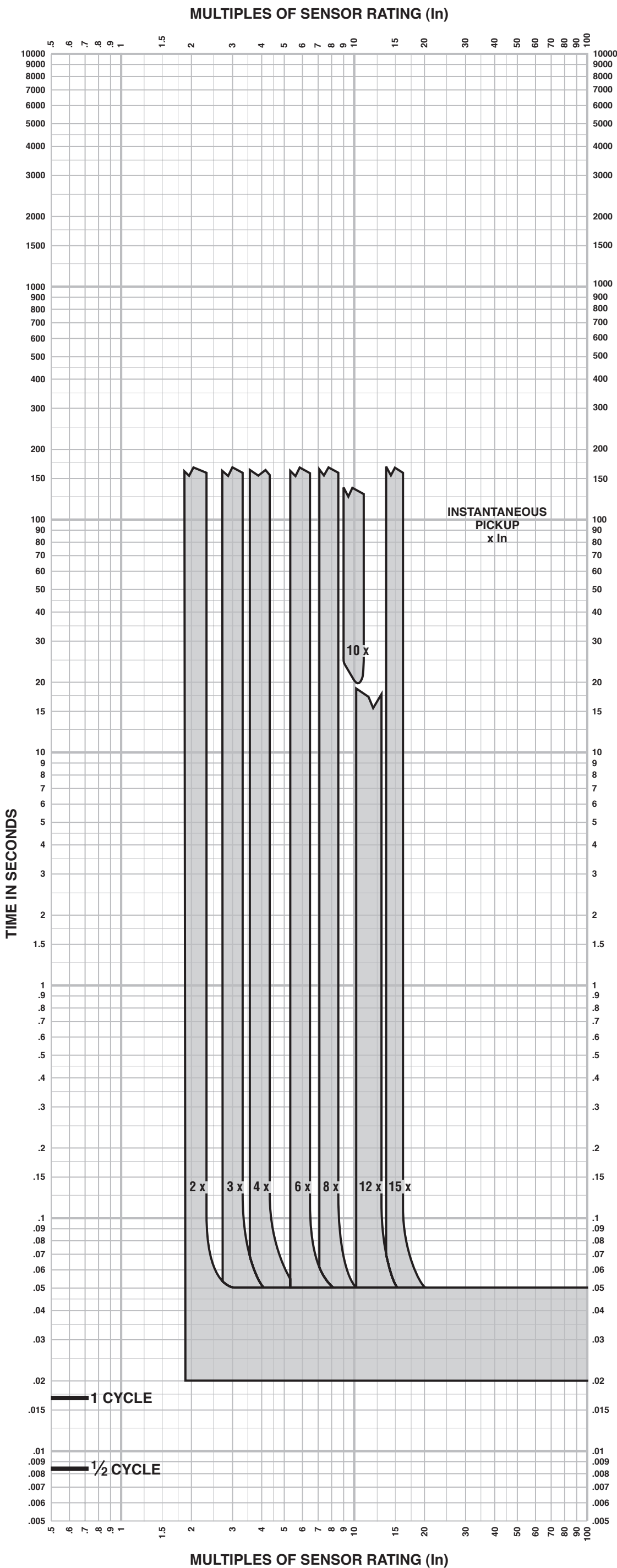
Curves apply from -30°C to +60°C ambient
temperature.

- Merlin Gerin
 - Modicon
 - Square D
 - Telemecanique
 - Federal Pioneer
 - Federal Pacific
- Schneider Electric Brands



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Curve No. 0613TC0003
December 2000
Drawing No. B48095-613-03



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

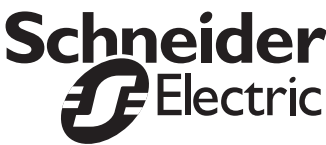
Instantaneous Pickup
2x–15x and OFF

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.



INSTANTANEOUS OVERRIDE VALUES NO. 613-10

MASTERPACT NW/NT		MASTERPACT NW/NT		MASTERPACT NW/NT		POWERPACT / HORIZON / SELECT / COMPACT	
ANSI CB Model No.	Inst. Override (kA RMS) +/- 10%	UL CB Model No.	Inst. Override (kA RMS) +/- 10%	IEC CB Model No.	Inst. Override (kA RMS) +/- 10%	UL/IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N1 ★	24	NW08N ★	24	NW08N1	None	RG 600	57
NW08N1	None	NW08N	40	NW10N1	None	RG 800	57
NW16N1	None	NW12N	40	NW12N1	None	RG 1000	57
NW08H1 ★	24	NW16N	40	NW16N1	None	RG 1200	57
NW08H1	None	NW20N	40	NW08H1	None	RG 1600	57
NW16H1	None	NW08H ★	24	NW10H1	None	RG 2000	57
NW20H1	None	NW08H	40	NW12H1	None	RG 2500	57
NW32H1	None	NW12H	40	NW16H1	None	RJ 600	48▲
NW08H2 ★	24	NW16H	40	NW20H1	None	RJ 800	48▲
NW08H2	None	NW20H	40	NW25H1	None	RJ 1000	48▲
NW16H2	None	NW25H	65	NW32H1	None	RJ 1200	48▲
NW20H2	None	NW30H	65	NW40H1	None	RJ 1600	48▲
NW32H2	None	NW40H	75	NW50H1	None	RJ 2000	48▲
NW40H2	None	NW50H	75	NW63H1	None	RJ 2500	48▲
NW50H2	None	NW60H	75	NW08H2 ★	24	RK 600	57
NW08H3 ★	24	NW08L ★	24	NW08H2	85	RK 800	57
NW08H3	85	NW08L	35	NW10H2	85	RK 1000	57
NW16H3	85	NW08LF	24	NW16H2	85	RK 1200	57
NW20H3	85	NW12L	35	NW20H2	85	RK 1600	57
NW32H3	85	NW12LF	24	NW25H2	85	RK 2000	57
NW40H3	85	NW16L	35	NW32H2	85	RK 2500	57
NW50H3	85	NW16LF	24	NW40H2	85	RL 600	48▲
NW08L1 ★	24	NW20L	65	NW50H2	117	RL 800	48▲
NW08L1	35	NW20LF	24	NW63H2	117	RL 1000	48▲
NW08L1F	24	NW25L	65	NW20H3	65	RL 1200	48▲
NW16L1	35	NW30L	65	NW25H3	65	RL 1600	48▲
NW16L1F	24	NW40L	75	NW32H3	65	RL 2000	48▲
NW20L1	35	NW50L	75	NW40H3	65	RL 2500	48▲
NW20L1F	24	NW60L	75	NW08L1 ★	24	PG 250	24
NW32L1	117	NW08HF	40	NW08L1	35	PG 400	24
NW40L1	117	NW12HF	40	NW10L1	35	PG 600	24
NW50L1	117	NW16HF	40	NW12L1	35	PG 800	24
NW08HA	None	NW20HF	40	NW16L1	35	PG 1000	24
NW16HA	None	NW25HF	65	NW20L1	35	PG 1200	24
NW20HA	None	NW30HF	65	NW08H10	None	PJ 250	7
NW32HA	None	NW40HF	75	NW10H10	None	PJ 400	10
NW40HA	None	NW50HF	75	NW12H10	None	PJ 600	10
NW50HA	None	NW60HF	75	NW16H10	None	PJ 800	10
NW08HF	85	NW08HB	35	NW20H10	None	PJ 1000	10
NW16HF	85	NW12HB	35	NW25H10	None	PJ 1200	10
NW20HF	85	NW16HB	35	NW32H10	None	PK 250	24
NW32HF	85	NW20HB	65	NW40H10	None	PK 400	24
NW40HF	85	NW25HB	65	NW08NA	None	PK 600	24
NW50HF	85	NW30HB	65	NW10NA	None	PK 800	24
NW08HC	35	NW40HB	75	NW16NA	None	PK 1000	24
NW16HC	35	NW50HB	75	NW08HA	None	PK 1200	24
NW20HC	35	NW60HB	75	NW10HA	None	PL 250	7
NW32HC	117	NT08N ★	24	NW12HA	None	PL 400	10
NW40HC	117	NT08N	40	NW16HA	None	PL 600	10
NW50HC	117	NT12N	40	NW20HA	None	PL 800	10
NT08N1 ★	24	NT16N	40	NW25HA	None	PL 1000	10
NT08N1	None	NT08H ★	24	NW32HA	None	PL 1200	10
NT08H1 ★	24	NT08H	40	NW40HA	None	MG 300	12▲
NT08H1	None	NT12H	40	NW50HA	None	MG 350	12▲
NT08L1F	10	NT16H	40	NW63HA	None	MG 400	12▲
NT08NA	None					MG 450	12▲
		NT08L1	10			MG 500	12▲
		NT12L1	10			MG 600	12▲
		NT16L1	10			MG 700	12▲
						MG 800	12▲
		NT08L	10	NW08HF	85	MJ 300	12▲
		NT08LF	10	NW10HF	85	MJ 350	12▲
		NT12L	10	NW12HF	85	MJ 400	12▲
		NT16L	10	NW16HF	85	MJ 450	12▲
		NT12LF	10	NW20HF	85	MJ 500	12▲
				NW25HF	85	MJ 600	12▲
		NT08HF	40	NW32HF	85	MJ 700	12▲
		NT12HF	40	NW40HF	85	MJ 800	12▲
★ Maximum sensor plug 250 A				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		

Note:

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

▲ Tolerance +/- 15%



COOLANT HEATER

Accessory specification sheet for 1000-1300 kW Natural gas generator sets (GenSets)

THE SMART CHOICE FOR GENSET ENGINE PERFORMANCE.

Regulating the coolant temperature reduces engine wear caused by cold engine starting. Optimize the performance of your GenSet with a coolant heater that uses pump-driven forced circulation to provide superior heat distribution. This natural gas GenSet coolant heater includes a thermostat, pump, and all required controls.

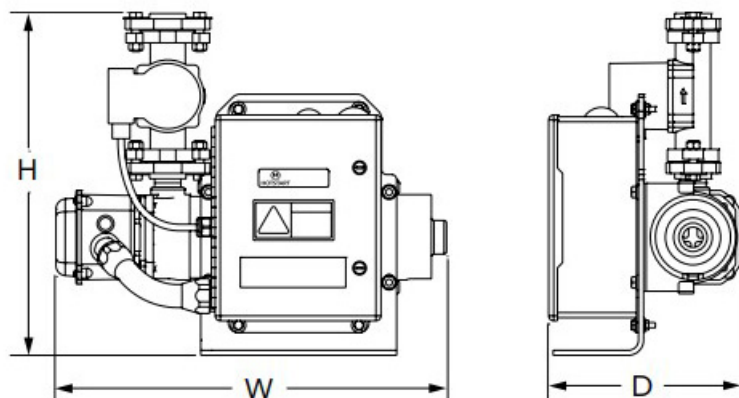


A Cummins 1000-1300 kW natural gas GenSet only requires one 12,000 watt coolant heater.

GenSet model	Coolant heater specifications			
	Required power supply		Heating system	
	Voltage*	Phase	Critical component	Reference drawing
C1000N6B	240	1	CSM11202-000	A067X926
	208	3	CSM31208-000	A067G754
	480	3	CSM31204-000	A066E112
C1300N6	240	1	CSM11202-000	A067X926
	208	3	CSM31208-000	A067G754
	480	3	CSM31204-000	A066E112

*Coolant heater input voltages are NOT field configurable.

Outline drawing



Height in. (cm)	Width in. (cm)	Depth in. (cm)
17 (43.2)	19.4 (49.3)	9.5 (24)

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

Weight: 54 lbs. (24.5 kg)

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.



Conformité Européene (CE) compliant to the health and safety requirements of relevant European directives: LVD 2006/95/EC, EMC 2004/108/EC and PED 97/23/EC.



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BATTERY CHARGER

Component specification sheet for 1000 - 1300 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. To achieve constant, optimal battery charge, this Cummins battery charger automatically adjusts the charge profile based on current conditions: battery depth of discharge, DC loads, battery capacity, and other real-world variables. In contrast, most competitors use simple boost timers to keep the charger output at an elevated voltage for a fixed period that is inevitably either too short or too long to achieve a correct charge. The Cummins battery charger for this GenSets offers:

- **Patented charging algorithms** – ability to recognize and automatically recharge a dead battery
- **Hardened switch mode power train** - designed to withstand vibration, electrical transients, and general exposure, 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, CE marked** - Optional OSHPD pre-approval – already approved for California hospital projects



Patented smart technology built into every charger includes:

- Digital metering
- All-electronic operation with generous component de-rating
- A disconnected/reversed/incorrect voltage battery alarm and protection

Critical component	Reference drawing
A066U082	GE100177

Specifications

AC input

Voltage	170-265 VAC, single phase
Frequency	47-63 Hz
Current	12 amps maximum
Protection	1-pole fuse, soft-start, transient suppression

Charger output

Nominal voltage	24VDC
Battery settings	Charging modes - multistage, including float, boost and commissioning Compatible battery types - Flooded lead-acid, AGM, Ni-Cd, VRLA and ultracapacitor
Equalize-voltage	24-28.6VDC, dependent on configuration and battery type
Output voltage regulation	±0.5% (1/2%) line and load regulation
Maximum output current	30A
Electronic current limit	100% rated output, field adjustable
Charge characteristic	Constant voltage, current limited; Dynamic Boost control
Temperature compensation	Enable or disable anytime, remote sensor optional
Output protection	1-pole fuse, current limit

User interface

Digital meter	20-character display of status and alarm messages DC voltmeter DC ammeter
Accuracy	±2% volts, ±5% amps
Alarms	24 alarms (5 hardwired outputs, J1939 or Modbus TCP/IP) 2 LEDs (AC and DC status)

Environmental

Operating temperature	- 40 °F to +158 °F (-40 °C to +70 °C) - meets full specification to +113 °F (45 °C)
Humidity	5% to 95%, non-condensing
Vibration	Vib: Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 axes. Random: 20-500Hz, .01G2/Hz. Shock: EN 60068-2-27 (15G)
Transient immunity	ANSI/IEEE C62.41 & EN 61000-4-12 on power terminals

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.



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PowerCommand[®] input/output expansion module **AUX 101** and **AUX 102**



Description

The PowerCommand AUX 101 input/output module and the AUX 102 input/output expansion module provide up to sixteen (16) relay output and up to twelve (12) discrete/analog inputs for auxiliary control and monitoring of the power system.

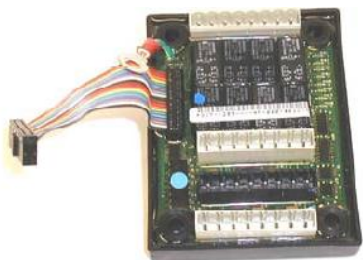
Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

Relay outputs can be used for controlling equipment such as motors, louvers, lamps, fans and pumps. The relays may be configured individually from the genset control operator interface or using InPower™ software.

The AUX 101 and AUX 102 modules are compatible with genset controls supporting a PCCNet network and require a twisted pair connection. This includes the PCC 1301 control.

AUX 101 - Contains eight (8) Form-C relay output sets and eight (8) discrete/analog inputs.

AUX 102 - Easily connects to the AUX 101 to provide an additional eight (8) Form-C relay outputs and (4) additional discrete inputs.



AUX 102 - Expansion

Features

- Up to sixteen (16) configurable Form-C relays provide easy control of system equipment such as lamps, louvers, motors and pumps. LED status of each relay.
- Up to twelve (12) configurable discrete inputs for monitoring equipment status and faults. Equipment status and faults will be annunciated.
- Up to eight (8) analog inputs. Analog inputs can be assigned one of seven preprogrammed functions:
 - Oil temperature
 - Exhaust temperature
 - Fuel level
 - Ambient temperature
 - Alternator RTD
 - Speed bias (for manual paralleling only)
 - Voltage bias (for manual paralleling only)
- Two 5 VDC voltage sources for use with active senders.
- Four programmable current sources for use with resistive senders.
- Two status LEDs:
 - DS1 (green) indicates the AUX 101 is connected to the network and operating normally
 - DS2 (red) indicates the AUX 101 has lost its connection or is not connected to the network
- Device number indicator. Seven segment LED used to uniquely define more than one AUX 101 on the same network.
- May be connected at any point in the PCCNet network.
- Plug-and-play networking - No binding required.
- Pluggable terminal blocks allow easy one-time wiring.
- Less wiring makes installation and system upgrades quick and easy
- PowerCommand controls are supported by a worldwide network of independent distributors who provide parts, service and warranty support.
- UL Listed and labeled; CSA certified; CE and UKCA compliant.

Specifications

Signal requirements

Network connections: RS485, twisted-pair 78 kbps

Control power: 5-40 VDC

Current

- 200 mA typical at 12 V, no active relay
- 100 mA typical at 24 V, no active relay
- 800 mA at 12 V, all relays active

Terminations for control power accept wire up to 16 ga.

Environment

The AUX 101 and AUX 102 are designed for proper operation in ambient temperatures from -40 °C to +60 °C (-40 °F to +140 °F) and for storage from -40 °C to +80 °C (-40 °F to +176 °F). Modules will operate with humidity up to 95%, non-condensing

Relay ratings (AUX 101)

- Normally closed: 3 A at 250 VAC or 30 VDC
- Normally open: 5 A at 250 VAC or 30 VDC

Relay ratings (AUX 102)

- 2 A at 125 VAC, 2 A at 30 VDC

Input ratings (AUX 101)

- Active low inputs
- Maximum voltage 24 VDC (inputs 1 - 6)
- Maximum voltage 40 VDC (inputs 7 - 8)

Network length

Maximum 1219 m (4000 ft)

Approved wiring

Cat 4 or Cat 5 (stranded)

Configurations

All configurations are stored in the main genset control and are modified from the generator set control HMI or using InPower PC software.

Discrete/analog inputs:

Each AUX 101 input can be configured as discrete or analog. AUX 102 inputs are discrete only. Discrete inputs have the following configuration options:

- Active high or active low
- Event, warning or shutdown
- Programmable text (displayed on genset HMI and InPower software)

Analog inputs have a set of predefined functions and can only be configured on certain module inputs. Below is a list of functions and possible module inputs:

- Input 1 - Voltage bias (-3 to +3 VDC)*
- Input 2 - Speed bias (0 to +5 VDC)*
- Inputs 3 – 6
 - Oil temperature
 - Exhaust temperature
 - Ambient air temperature
 - Fuel level
 - Alternator temperature

Inputs are defaulted to disabled

* Please note that speed and voltage bias interfaces are for manual paralleling only and must not be used with automatic paralleling controls.

Relay outputs

Outputs can be configured to energize on occurrence of any event or fault code supported by the genset control. The relay outputs default to the following:

AUX 101

- 1 - Low oil pressure
- 2 - High engine temperature
- 3 - Charger AC failure
- 4 - Battery (low, weak, high)
- 5 - Engine overspeed
- 6 - Fail-to-start
- 7 - Not-in-auto
- 8 - Generator set running

AUX 102

- 9 - Pre-low oil pressure
- 10 - Pre-high engine temperature
- 11 - Low coolant level*
- 12 - Low fuel level*
- 13 - Low coolant temperature
- 14 - Common alarm
- 15 - Not defined
- 16 - Not defined



PROTOCOL GATEWAY

Accessory specification sheet for Generator sets (GenSets) with Power Command Control (PCC) panels

THE SMART CHOICE FOR BUILDING MANAGEMENT SYSTEMS.

Designed for use with Cummins GenSets, the ProtoAir wireless gateway is an external, high-performance, low-cost building automation and industrial control IIoT gateway that enables new or legacy devices to easily interface with each other. Cummins technicians can use the ProtoAir to assist with GenSet maintenance and repair resulting in reduced support costs and improved customer service.

The ProtoAir for these GenSets offers:

- A **cost-effective, simple, and efficient** solution
- **Alarm** and event notifications
- **Minimal hardware** requirements
- **Standard connections** for Ethernet, RS-485, and RS-485/RS-232
- **Low-cost diagnostics** and troubleshooting support
- Fully **certified and approved** (see p. 2)
- A two-year comprehensive **warranty**

One ProtoAir connects multiple Serial and Ethernet devices to these field protocol networks (and more):

- BACnet MS/TP
- BACnet/IP
- Metasys N2
- SNMP
- XML over HTTP
- EtherNet/IP
- DNP 3.0



Critical component	Reference drawing
A059J208	A042H101

Specifications

Serial (Galvanic Isolation)	1 x RS-485/RS-232 & 1 x RS-485
Baud	9600, 19200, 38400, 57600, 76800, 115000
Ethernet	10/100BaseT, MDIX, DHCP
Operating temperature	-20 to 70°C (-4 to 158°F)
Relative humidity	10-95% RH non-condensing
Frequency	2.4 GHz
Channels	1 to 11 (inclusive)
Antenna type	SMA
Encryption	TKIP, WPA2 & AES
Dimensions	4 x 1.1 x 2.7 in. (10.16 x 2.8 x 6.8 cm)
Weight	0.4 lbs. (0.2 kg)
Input	24VAC 0.125A, 12-24VDC 0.25A
Maximum power	3W @12 VDC

Applicable codes and standards



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



The FCC mark is a voluntary mark employed on electronic products manufactured or sold in the United States which indicates that the electromagnetic radiation from the device is below the limits specified by the Federal Communications Commission and the manufacturer has followed the requirements of the Supplier's Declaration of Conformity authorization procedures.



The BTL Mark provides users with assurance that a product has passed the industry standard BACnet conformance tests conducted by a Recognized BACnet Testing Organization (RBTO).



Restriction of Hazardous Substances (RoHS) compliance restricts the use of six hazardous materials found in electrical and electronic products.



The DNP3 Conformance Logo indicates that an outstation has successfully passed the DNP3 Conformance Test Procedures and is listed on the DNP3 Users Group website.



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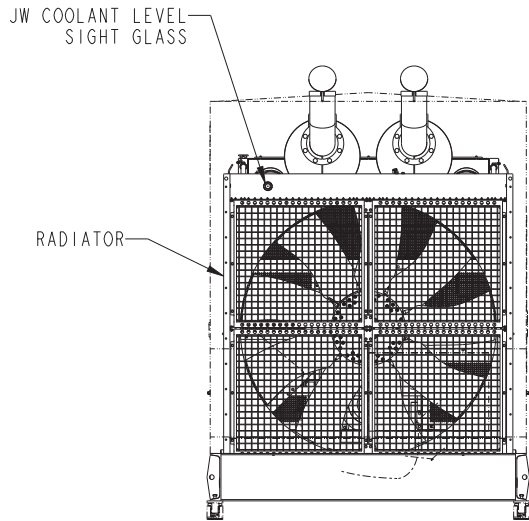
SECTION 4

Generator Drawings and Interconnects



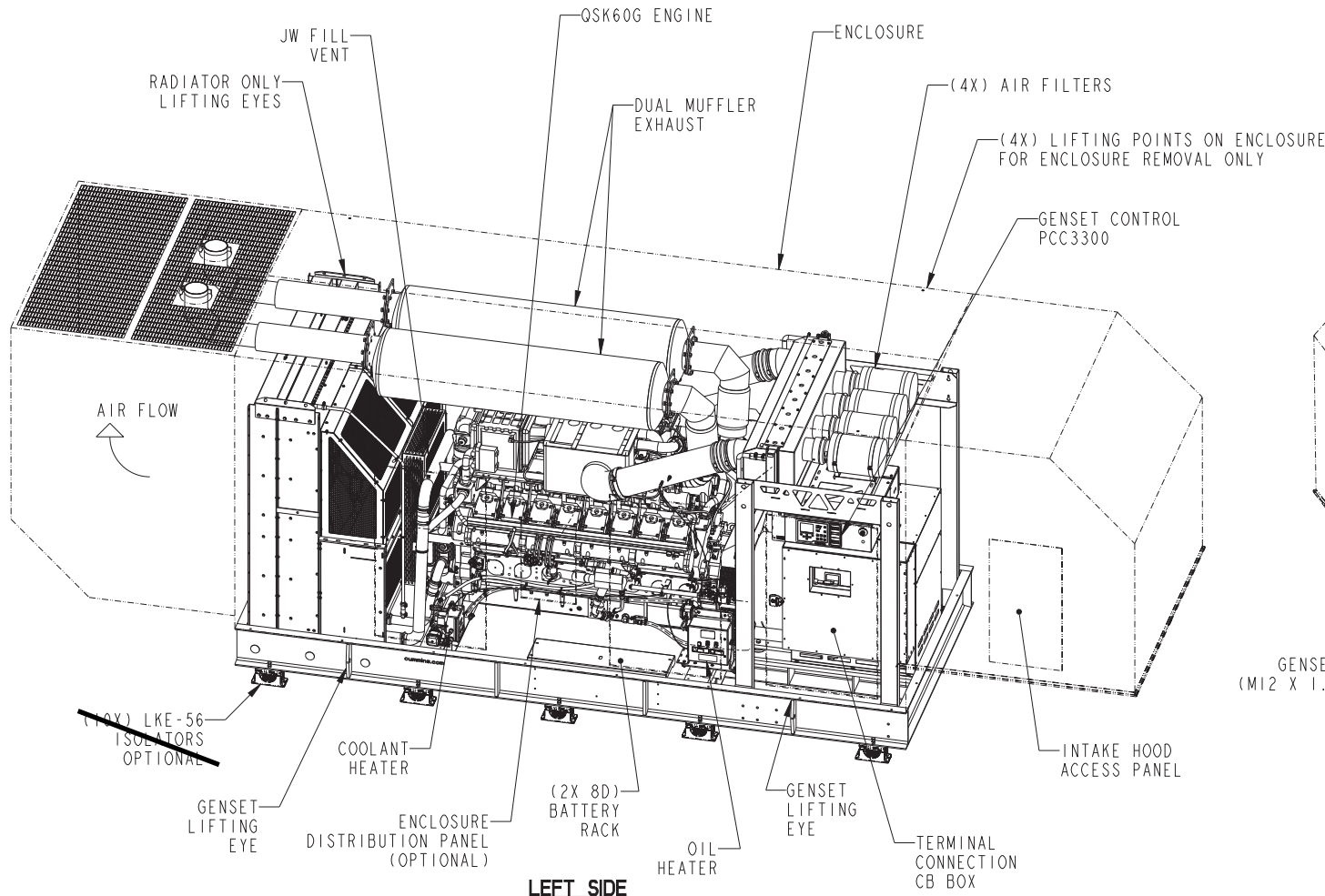
LEGEND	
SHEET #	DESCRIPTION
1	ISOMETRIC VIEWS, GENSET FEATURE IDENTIFICATION
2	GENSET/ALTERNATOR MODELS
	WEIGHTS, CENTER OF GRAVITY
	GENERAL DIMENSIONS
3	FOUNDATION DRAWING
4	GAS/FUEL CONNECTION
	EXHAUST CONNECTION
5	ELECTRICAL INTERFACE
6	LIFTING DIAGRAM

NOTE
Gas supply pressure and volume must meet requirements to allow operation of the generator at 100% load. Please see generator data sheet.

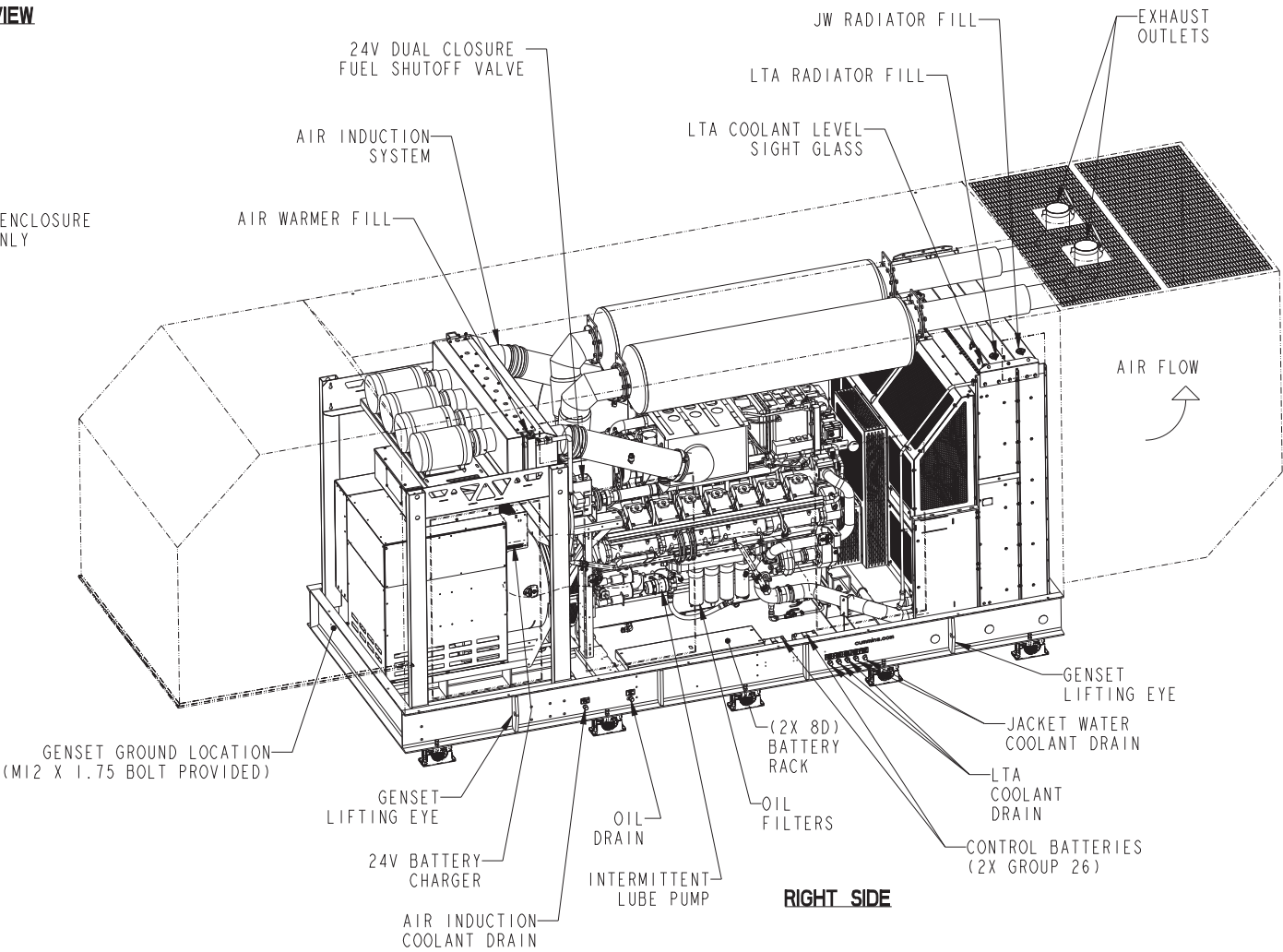


FRONT VIEW

- NOTES:
1. DIMENSIONS:
1.1 ALL DIMENSIONS ARE IN INCHES
1.2 ALL DIMENSIONS ARE REFERENCE UNLESS SPECIFICALLY TOLERANCED
2. WEIGHT: REFER TO TABLE(S) ON SHEET 2 FOR STANDARD BASE GENSET WET AND DRY WEIGHT(S)
3. LARGEST NOMINAL DIMENSIONS:
3.1 LENGTH: 402.7 INCHES
3.2 WIDTH: 102.0 INCHES
3.3 HEIGHT: 130.5 INCHES
3.4 DOES NOT INCLUDE THE HEIGHT OF THE ISOLATORS
4. LIFTING INSTRUCTIONS: REFER TO GENSET INSTALLATION MANUAL AND LIFTING LABEL
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE ENCLOSURE
ENCLOSURE LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING ENCLOSURE
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE RADIATOR
RADIATOR LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING RADIATOR
5. ALLOW 6.5 FEET AROUND THE GENSET FOR SERVICE
6. ELECTRICAL SPECIFIC NOTES ON SHEET 5



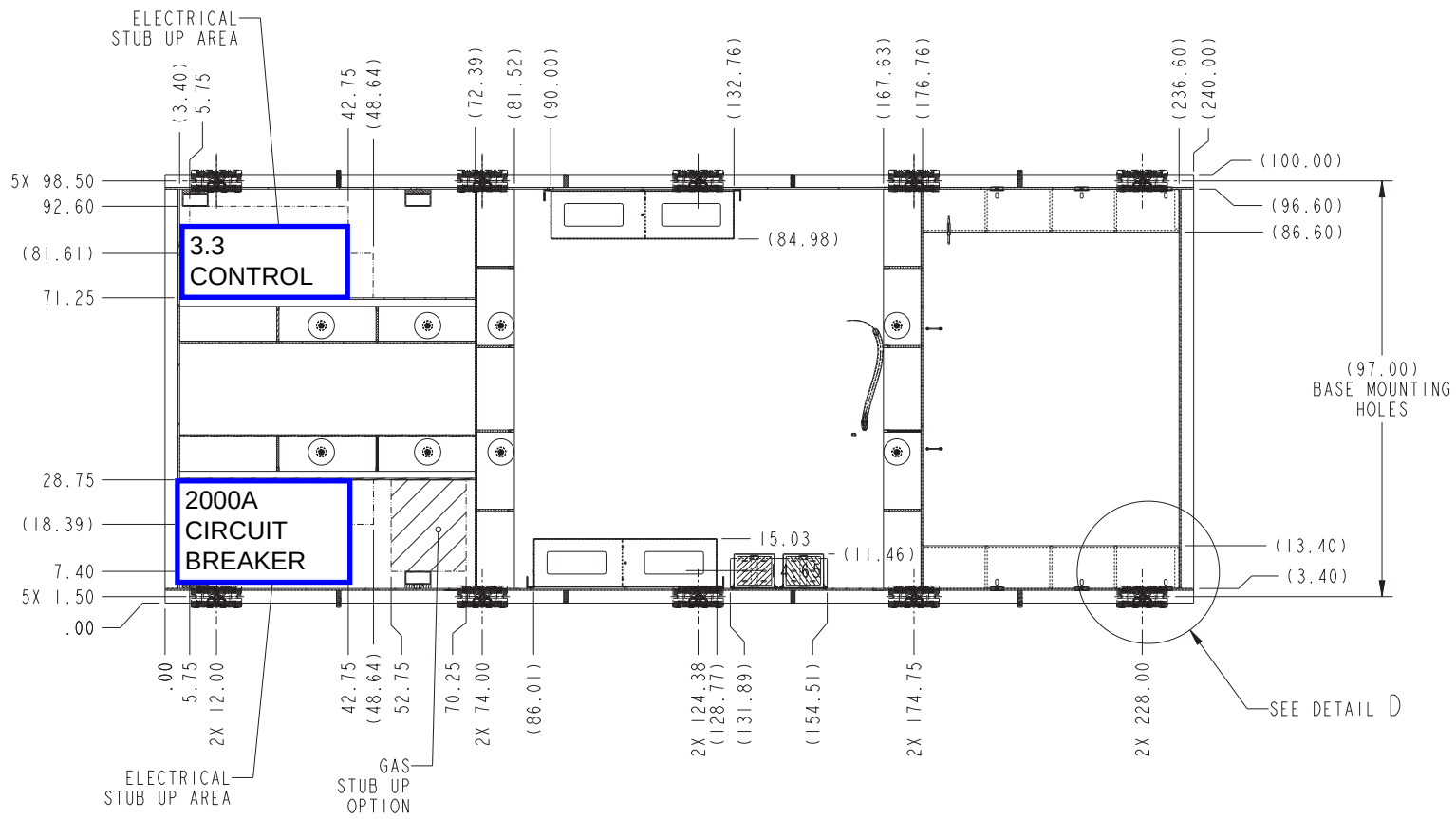
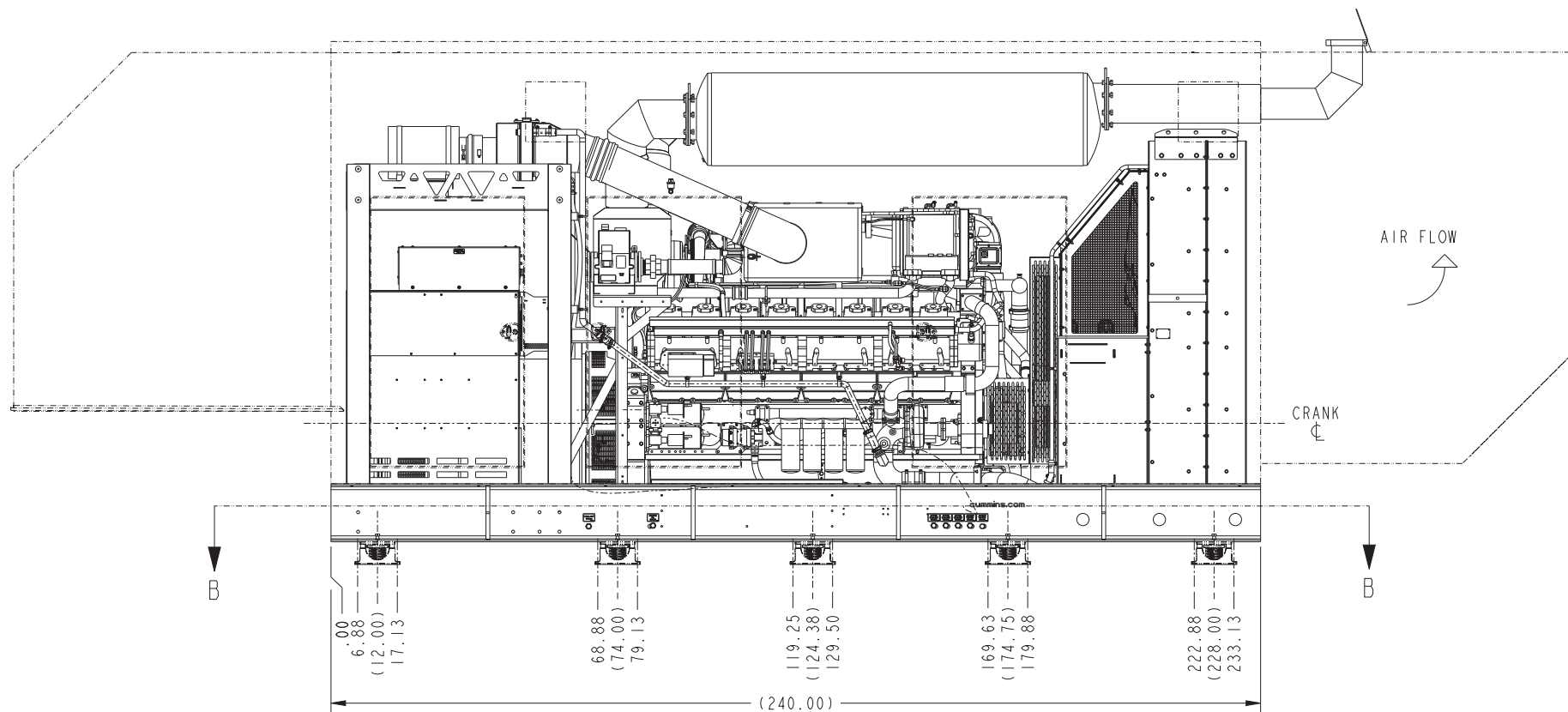
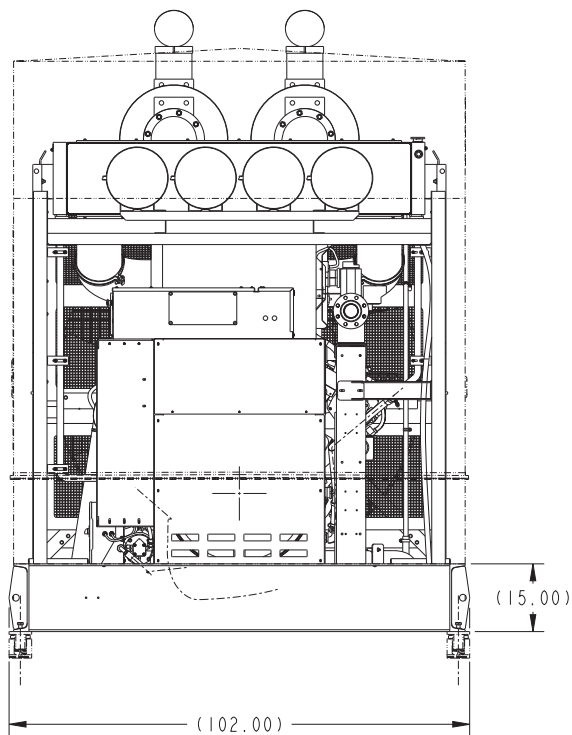
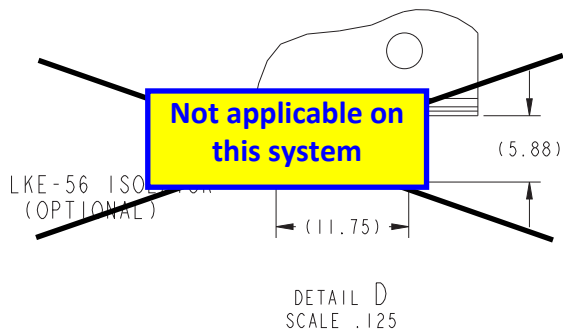
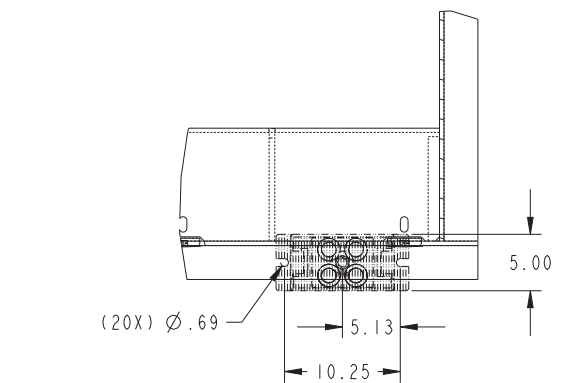
LEFT SIDE



RIGHT SIDE

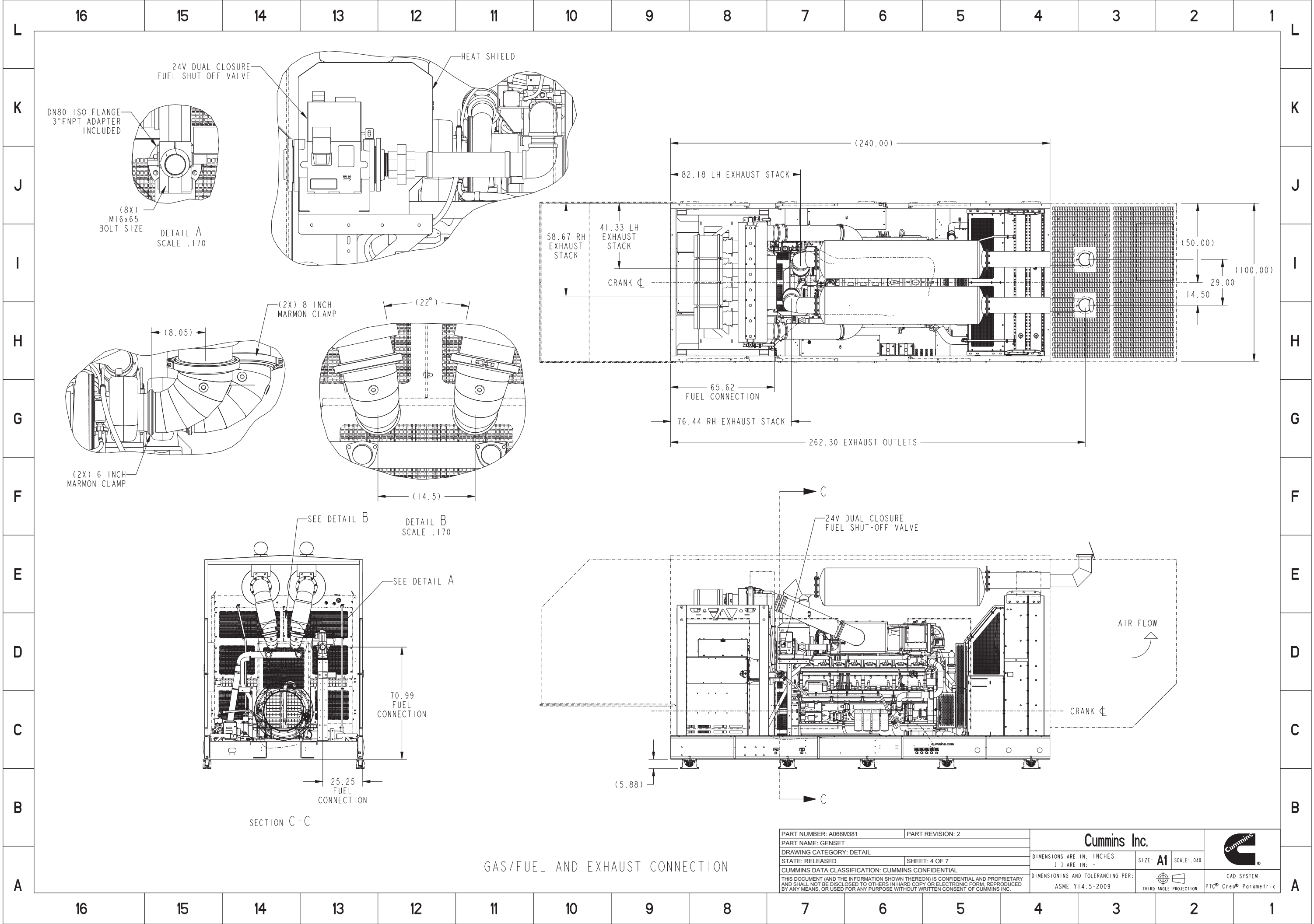
PART NUMBER: A066M381	PART REVISION: 2
PART NAME: GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 1 OF 7
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	

UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY			
DIMENSIONAL TOLERANCES:	ANG. TOL.: ± 1°	X ± 1	X.X ± .1
THIS PART IS SIMILAR TO:		X.XX ± .03	X.XXX ± .010
ADDITIONAL DESCRIPTION: C1300N6B-03			
Cummins Inc.			
DIMENSIONS ARE IN: INCHES	SIZE: A1	SCALE: .035	
() ARE IN: -			
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009			CAD SYSTEM PTC® Creo® Parametric



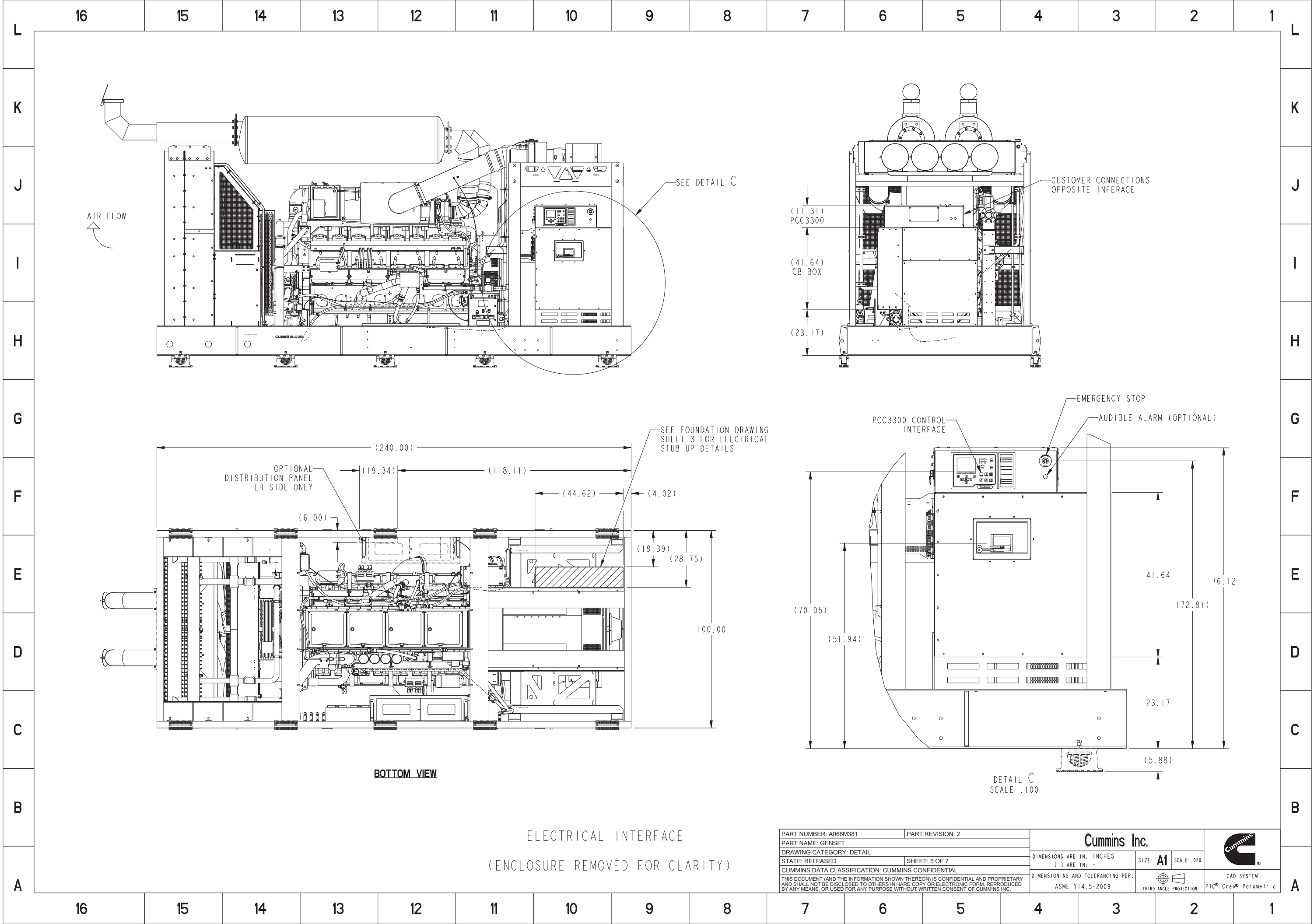
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PART NAME: GENSET							
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CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL				DIMENSIONING AND TOLERANCING PER:			CAD SYSTEM
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							PTC® Creo® Parametric

FOUNDATION DRAWING

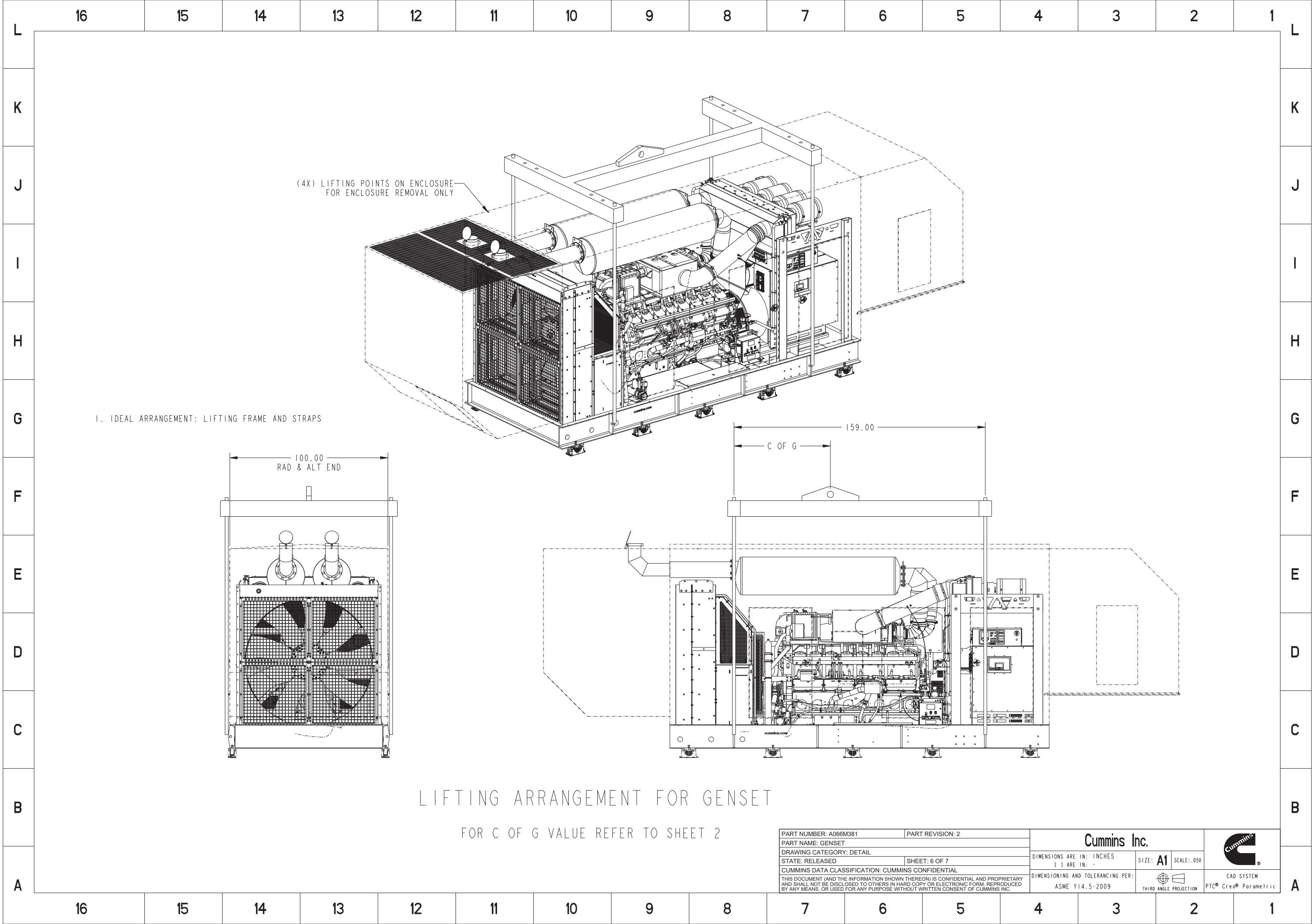


GAS/FUEL AND EXHAUST CONNECTION

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PART NAME: GENSET							
DRAWING CATEGORY: DETAIL				DIMENSIONS ARE IN: INCHES		SIZE: A1	SCALE: .040
STATE: RELEASED		SHEET: 4 OF 7		[] ARE IN: -			
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL				DIMENSIONING AND TOLERANCING PER:			CAD SYSTEM PTC® Creo® Parametric
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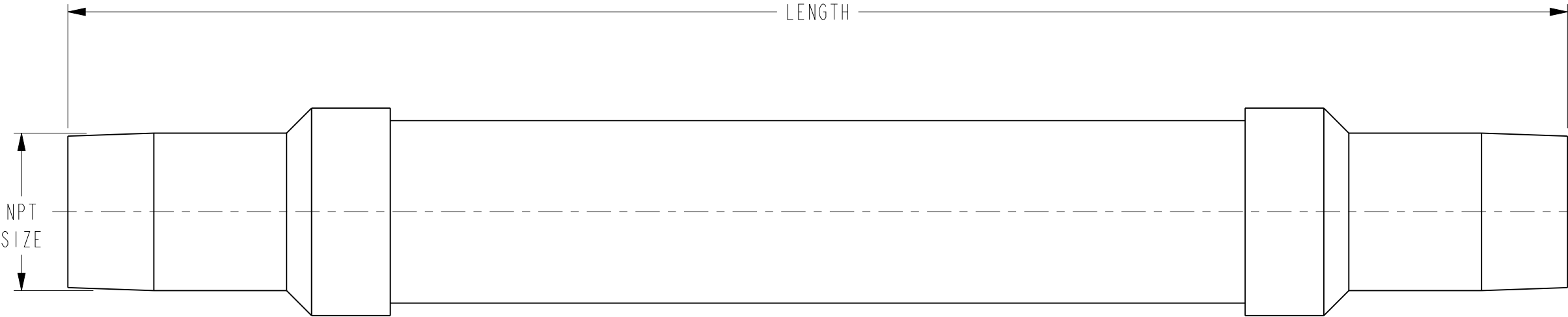
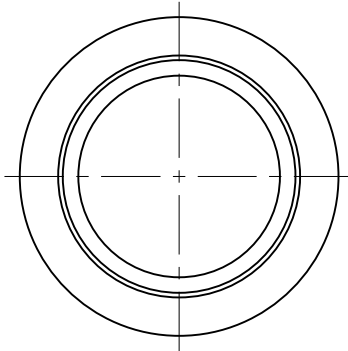


PART NUMBER: A066M381		PART REVISION: 2		Cummins Inc.			
PART NAME: GENSET							
DRAWING CATEGORY: DETAIL				DIMENSIONS ARE IN: INCHES [] ARE IN: -		SIZE: A1	SCALE: .050
STATE: RELEASED		SHEET: 5 OF 7					
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL				DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009			CAD SYSTEM PTC® Creo® Parametric
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PART NUMBER		NPT SIZE	LENGTH	FLEXTech IND INC
22837-01		.75 (3/4)	12 INCHES	FTG-12-A-CS-12
22837-02		1.00	12 INCHES	FTG-16-A-CS-12
22837-03		1.25 (1 1/4)	13 INCHES	FTG-20-A-CS-13
22837-04		1.50 (1 1/2)	14 INCHES	FTG-24-A-CS-14
22837-05		2.00	15 INCHES	FTG-32-A-CS-15
22837-06		3.00	15 INCHES	FTG-48-A-CS-15
22837-07		3.00	24 INCHES	FTG-48-A-CS-24
22837-08		3.00	18 INCHES	FTG-48-A-CS-18
22837-09		2.50 (2 1/2)	15 INCHES	FTG-40-A-CS-15
22837-10		2.00	12 INCHES	FTG-32-A-CS-12

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
-	2012-437	RELEASED TO PRODUCTION	HGP		-	08OCT12
B	2018-226	ADDED 22837-09	OY256		NA372	18APR18
C	2019-091	ADDED 22837-10	LQ629		NA372	27FEB19



- NOTES:
1. STAINLESS STEEL COMPONENTS ARE THE FLEX HOSE (TYPE 321) AND BRAID (TYPE 304).
 2. CONNECTIONS ARE CARBON STEEL SCHEDULE 80 MNPT.
 3. CONNECTION FINISH TO BE GREY OXIDE OR RED OXIDE.
 4. HOST TO CONNECTOR WELDS ARE A312 OR 308L WELDING WIRE.
 5. HOSES TESTED AND LABELED TO THE FOLLOWING:
0.5" TO 2" 350 PSI
2.5" TO 3" 250 PSI
4.0" TO 6" 200 PSI
 6. THESE ASSEMBLIES ARE TO BE LABELED WITH CSA APPROVAL TAG.

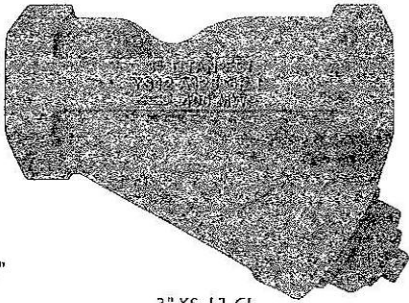
DIMENSIONS ARE IN: INCHES [] ARE IN: INCHES		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential				Cummins Inc.							
DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED X: ± 1 IN OR 4 mm X.X: ± .1 IN OR 0.7 mm X.XX: ± .030 IN OR 0.25 mm X.XXX: ± .010 IN OR 0.075 mm ANGULAR TOLERANCE: ± 1°		SCALE 1.000		DWN HGP				ITEM NAME HOSE, BRAIDED, CSA FLEX NPT X LENGTH							
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				APVD -								22837		1 OF 1	
				DATE 08OCT2012											
				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009											

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
-	2018-077	RELEASED TO PRODUCTION	KL433	NA372	NA372	08FEB18



"Y" (WYE) STRAINER ♦ ANSI CLASS 250
CAST IRON ♦ THREADED ENDS

MODEL: YS 12-CI
(CAST IRON)



3" YS 12-CI

FEATURES

- ♦ **LARGE STRAINING CAPACITY**
WITH ITS LARGE BODY AND SIZABLE STRAINING ELEMENT, THE YS12 PROVIDES EXCELLENT OPEN AREA RATIOS THAT ARE TYPICALLY TWO-AND-A-HALF TIMES LARGER THAN THE CORRESPONDING PIPELINE.
- ♦ **PRECISION MACHINED SEATS**
PRECISION MACHINED SCREEN SEATS IN BOTH THE BODY AND CAP HELP TO ENSURE ACCURATE POSITIONING OF THE SCREEN DURING REASSEMBLY AFTER CLEANING. ALSO, THE MACHINED BODY SEATS ENABLE FINER FILTRATION BY PREVENTING DEBRIS BYPASS.
- ♦ **SELF-CLEANING CAPABILITY**
WITH A TAPPED NPT BLOW-OFF CONNECTION, THIS UNIT CAN BE FITTED WITH A BLOW-DOWN VALVE WHICH FACILITATES CLEANING OF THE STRAINING ELEMENT. PLEASE CONTACT FACTORY FOR MORE INFORMATION.
- ♦ **EPOXY PAINTED**
ALL UNITS ARE EPOXY PAINTED TO HELP RESIST RUST AND CORROSION. TITAN FCI ALSO OFFERS EPOXY COATING AS AN OPTION FOR THE YS12.
- ♦ **THREADED CAP**
TITAN'S YS12 HAS STRAIGHT THREADS TO PERMIT EASY CAP REMOVAL FOR CLEANING AND PROPER ALIGNMENT WHEN REASSEMBLING STRAINER.
- ♦ **TYPE I MILITARY SPECIFICATION**
WHEN FURNISHED WITH A BRONZE BLOW OFF PLUG, THE YS12 MEETS MILITARY SPECIFICATION WW-S-2739 FOR SIZES 3/8" THROUGH 3". PLEASE SPECIFY IF NECESSARY.
- ♦ **NATURAL GAS AND OTHER SPECIAL APPLICATIONS**
TITAN HAS EXTENSIVELY TESTED THE YS12 IN GAS APPLICATIONS AND DETERMINED THAT BUNA-N GASKETS PROVIDE SUPERB SEALING CAPABILITIES FOR THE SERVICE. ALWAYS SPECIFY IF A SPECIAL GASKET OR SCREEN IS REQUIRED FOR A SPECIFIC APPLICATION.

SIZE RANGE : 1/4" ~ 3"

TECHNICAL

PRESSURE/TEMPERATURE RATING
CI-ASTMA126 GR.B - CLASS 250
YS 12-CI (THREADED)

WOG (Non-shock): 400 PSI @ 150 °F
Saturated Steam: 250 PSI @ 406 °F
Maximum Liquid: 250 PSI @ 406 °F

* The above listed temperatures are theoretical and may vary during actual operating conditions.

APPLICATIONS

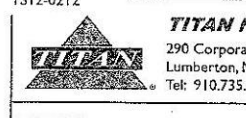
GENERAL APPLICATION: Y-STRAINERS ARE INSTALLED IN A PIPING SYSTEM TO REMOVE UNWANTED DEBRIS FROM THE PIPELINE, PROTECTING EXPENSIVE EQUIPMENT DOWNSTREAM SUCH AS PUMPS, METERS, SPRAY NOZZLES, COMPRESSORS, AND TURBINES. THEY CAN BE PLACED IN A HORIZONTAL OR VERTICAL PIPELINE AS LONG AS THE SCREEN IS IN A DOWNWARD POSITION. STRAINING IS ACCOMPLISHED VIA AN INTERNAL PERFORATED OR MESH LINED STRAINING ELEMENT, THE SIZE OF WHICH SHOULD BE DETERMINED BASED ON THE SIZE OF THE SMALLEST PARTICLE TO BE REMOVED.

SERVICING: THE STRAINING ELEMENT NEEDS REGULAR CLEANING TO PREVENT DEBRIS BUILD UP. IT IS NOT ADVISABLE TO ALLOW THE DIFFERENTIAL PRESSURE TO INCREASE BY 20 PSI. ALTHOUGH CLEANING NORMALLY REQUIRES THE REMOVAL OF THE STRAINING ELEMENT, INSTALLING AND USING A TITAN BLOW-OFF DRAIN VALVE CAN INCREASE THE TIME BETWEEN CLEANINGS.

The above data represents common market and service applications. No representation or guarantee, expressed or implied, is given due to the numerous variations of concentrations, temperatures and flow conditions that may occur during actual service.

TITAN FLOW CONTROL, INC.
YOUR PIPELINE TO THE FUTURE!

Tel: 910-735-0000 ♦ Fax: 910-738-3848 ♦ titan@titanfci.com ♦ www.titanfci.com
290 Corporate Drive ♦ PO Box 7408 ♦ Lumberton, NC 28358



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Web: www.titanfci.com
Fax: 910.738.3848

"Y" (WYE) STRAINER
YS 12-CI - (Cast Iron)

Threaded Ends • Cast Iron • ANSI Class 250

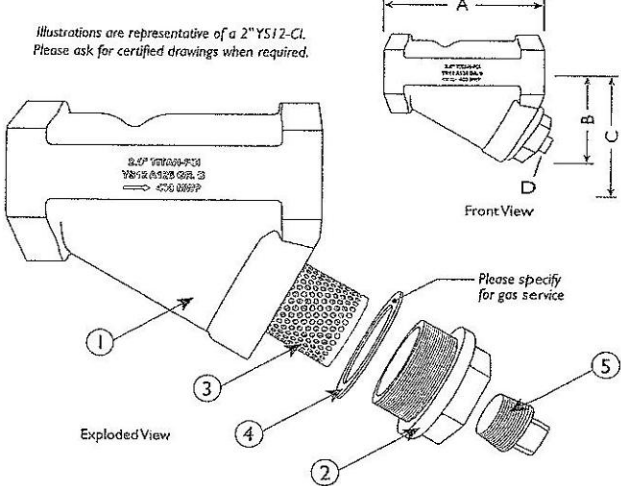
ANSI Class 250

BILL OF MATERIALS

No.	PART	YS 12-CI
1	Body (1)	Cast Iron A126 Gr. B
2	Cap	Cast Iron A126 Gr. B
3	Straining Element (1)	Stainless Steel (1)
4	Gasket (1) (4)	Grafoil
5	NPT Plug (Blow-off) (1)	Steel

1. Bill of Materials represents standard materials. Equivalent or better materials may be substituted at the manufacturer's discretion.
2. All units are epoxy painted.
3. Denotes recommended spare parts.
4. Contact Titan for special gaskets materials, including Buna-N or Viton, for natural gas, hot air, or other applications.
5. The YS12 can be furnished with bronze blow-off plug to meet Military Specification WW-S-2739. Contact factory.
6. Stainless Steel Straining Element is available in Type 304 and Type 316 Stainless Steel. A wide range of wire mesh and perforated screens are available. See "Standard Screen Selections" chart below for standard perforations and meshes. Please specify if a non-standard screen is required.

Illustrations are representative of a 2" YS12-CI. Please ask for certified drawings when required.



Front View

Exploded View

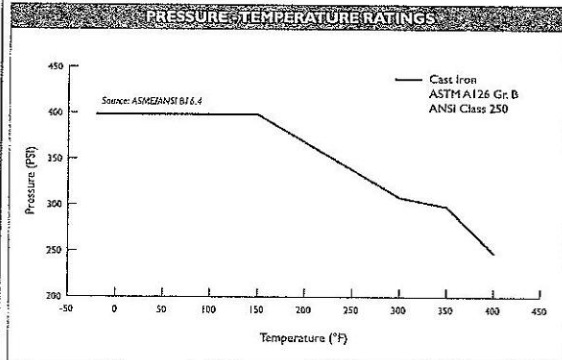
Please specify for gas service

DIMENSIONS AND PERFORMANCE DATA

SIZE	in	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A DIMENSION FACE TO FACE (1)	in	3.188	3.188	3.188	3.75	4.0	5.0	5.75	7.0	9.25	10.0
B DIMENSION CENTER LINE TO BOTTOM	in	2.063	2.063	2.063	2.438	2.625	3.375	3.875	4.75	5.875	6.0
C DIMENSION SCREEN REMOVAL	in	2.375	2.375	2.375	3.0	3.25	4.25	5.0	6.125	7.875	8.0
D NPT Plug BLOW-OFF	in	1/4	1/4	1/4	3/8	3/8	3/4	3/4	1	1 1/2	1 1/2
APPROXIMATE ASSEMBLED WEIGHT	lb	1.5	1.5	1.5	2.5	3.5	6.0	9.0	14.0	25.5	32.0
Flow Coefficient	Cv	0.7	2	8	15	22	38	42	70	110	160

1. Dimensions and weights are for reference only. When required, request certified drawings.
2. Face to face values have a tolerance of ±0.06 in (±2.0 mm).

PRESSURE-TEMPERATURE RATINGS



Source: ASME/ANSI B16.4

Cast Iron
ASTM A126 Gr. B
ANSI Class 250

PRESSURE-TEMPERATURE RATING

ANSI Class 250	A126 Gr. B
WOG (Non-shock):	400 PSI @ 150 °F
Saturated Steam:	250 PSI @ 406 °F
Max Liquid:	250 PSI @ 406 °F

STANDARD SCREEN SELECTIONS

Size	Liquid	Open Area	Steam	Open Area
1/4" - 2"	20 Mesh	51.8%	30 Mesh	44.8%
2 1/2" - 3"	1/16 (.0625)	41%	3/64 (.045)	36%

REFERENCED STANDARDS & CODES

CODE	DESCRIPTION
ASME/ANSI B16.4	Cast Iron Threaded Fittings

Titan FCI makes every effort to ensure the information presented on our literature accurately reflects exact product specifications. However, as product changes occur, there may be short-term differences between actual product specifications and the information contained within our literature. Titan FCI reserves the right to make design and specification changes to improve our products without prior notification. When required, request certified drawings.

NOTES:
1) PART DESCRIPTION: "Y" (WYE) STRAINER
ANSI CLASS 250, CAST IRON, THREADED ENDS
MODEL: YS 12-CI
MANUFACTURER: TITAN FLOW CONTROL, INC.

2) SUPPLIER:
FIRST SUPPLY LLC
3014 HOLMGREN WAY
GREEN BAY, WI 54304-5718
SUPPLIER PRODUCT & DESCRIPTION:
TFCYS12CIM
YS12-CI 3 THD 250# CI WYE STRAINER 1/16 PERF

DIMENSIONS ARE IN: INCHES
[] ARE IN: .

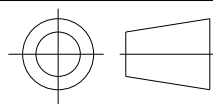
DIMENSION TOLERANCES

X.X: ±0.0901IN OR 2.3mm
X.XX: ±0.0301IN OR 0.76mm
X.XXX: ±0.0151IN OR 0.381mm
ANGULAR TOLERANCE: ±1°

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DO NOT SCALE PRINT

SCALE .500



CMI DATA CLASSIFICATION
Cummins Confidential

DWN KL433
CKD NA372
APVD NA372
DATE 08FEB2018

FOR INTERPRETATION OF
DIMENSIONING AND TOLERANCING,
SEE ASME Y14.5-2009



Cummins Inc.

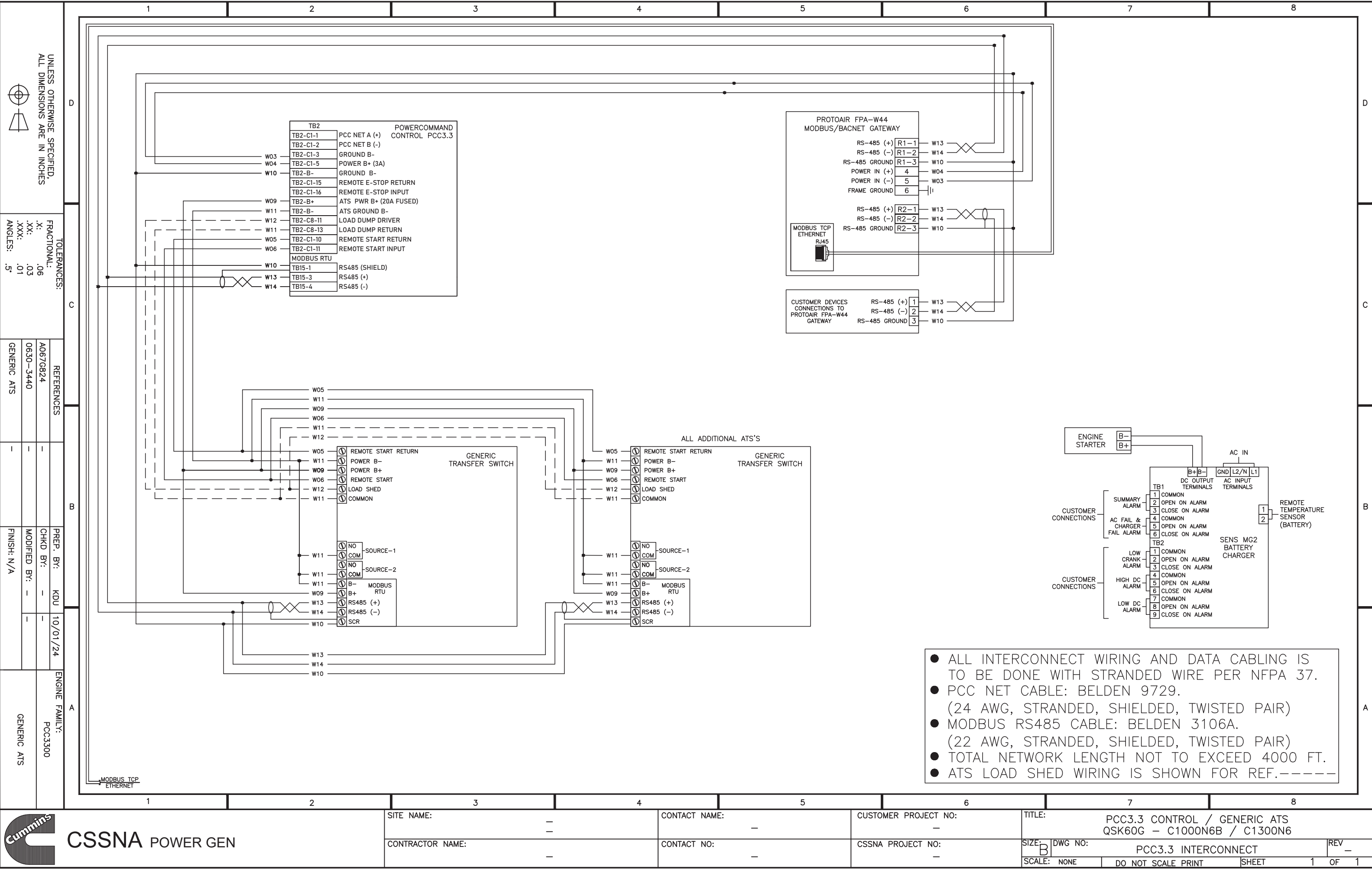
ITEM NAME
STRAINER, WYE, 3 INCH
YS 12-CI, THREADED

ITEM NUMBER
A059G917

CAD SHEET
1 OF 1

MUST CONFORM
TO CES 10903

DWG
SIZE
B



UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES.

TOLERANCES:

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

REFERENCES

A067G824	PREP. BY: KDU	10/01/24
0630-3440	CHKD BY: -	-
GENERIC ATS	MODIFIED BY: -	-
	FINISH: N/A	-

ENGINE FAMILY: PCC3300

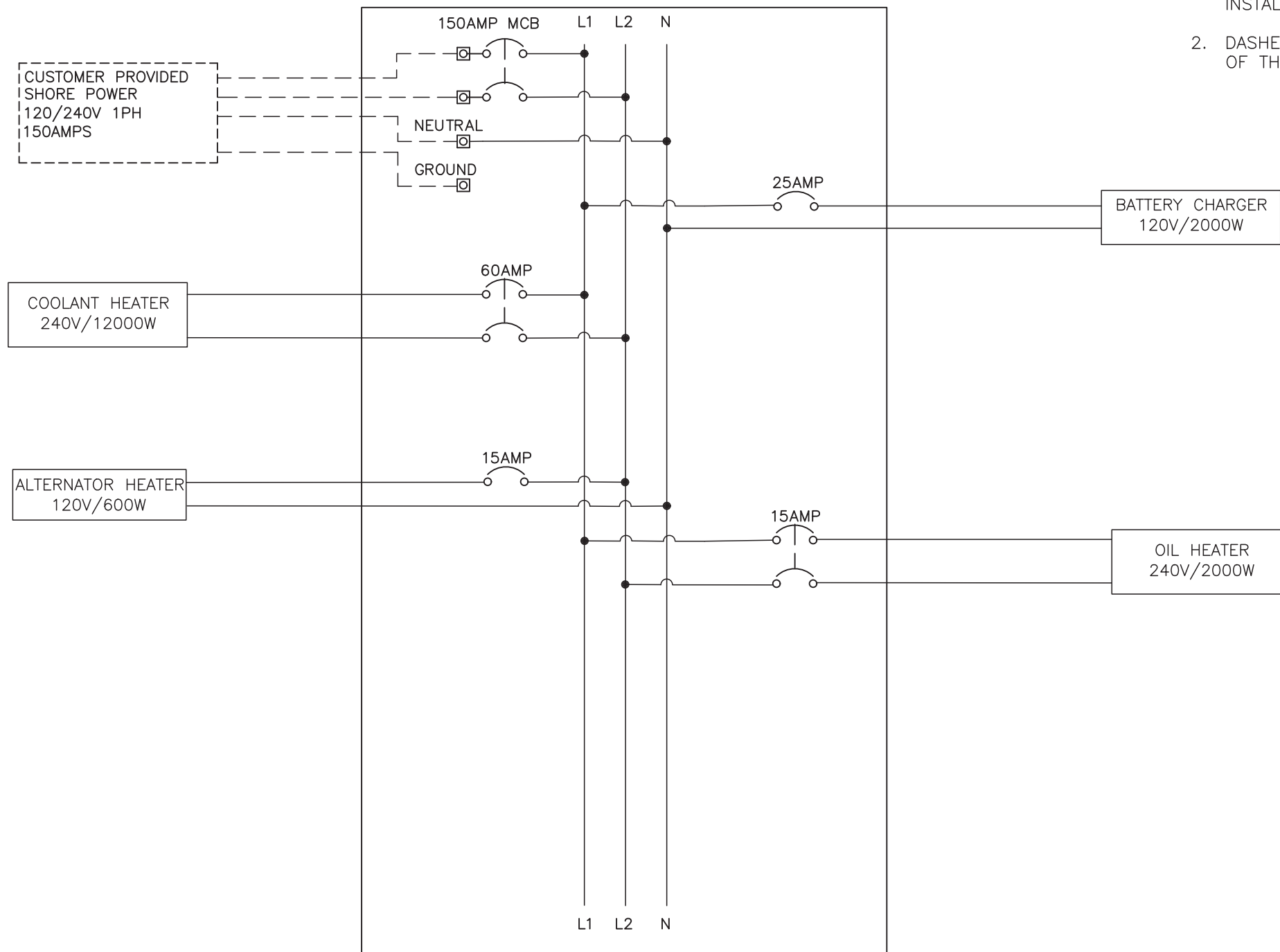
GENERIC ATS

- ALL INTERCONNECT WIRING AND DATA CABLING IS TO BE DONE WITH STRANDED WIRE PER NFPA 37.
- PCC NET CABLE: BELDEN 9729.
(24 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- MODBUS RS485 CABLE: BELDEN 3106A.
(22 AWG, STRANDED, SHIELDED, TWISTED PAIR)
- TOTAL NETWORK LENGTH NOT TO EXCEED 4000 FT.
- ATS LOAD SHED WIRING IS SHOWN FOR REF.-----



UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

AC DISTRIBUTION PANEL



NOTES:

1. FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRICAL CODES FOR INSTALLATION.
2. DASHED LINES ARE THE RESPONSIBILITY OF THE INSTALLER.



CSSNA POWER GEN

TITLE: CSSNA 1-PHASE PANEL

SIZE: B DWG NO: - REV 0
SCALE: DO NOT SCALE PRINT SHEET 1 OF 1

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

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	

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 limited warranty statement may be directed to CSSNAPGWarranty@cummins.com.



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