



RECORD ONLY SUBMITTAL PACKAGE

TURNKEY INDUSTRIES - 200 DIESEL

Prepared For:

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The information presented in this submittal package has been approved and is provided for record purposes only.

Date: 6/2/2026

Opportunity # O-814120

BMS# 43566

Customer PO# Signed Quote



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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.

TABLE OF CONTENTS



Section 1 - Project Information

Project Bill of Material
Fuel Supply Requirements

Section 2 - Generator Specification Sheets

Generator Specification Sheet
Generator Data Sheet
PowerCommand Control (PCC) Specification Sheet
Alternator Data Sheet
Cooling System Data Sheet
Sound Data Sheet
Exhaust Emission Data Sheet
Exhaust Emission Compliance Statement
Prototype Test Summary Report

Section 3 - Generator Accessories

Circuit Breaker Data Sheet
Battery Charger Specification Sheet

Section 4 - Generator Drawings and Interconnects

Generator Outline Drawing
Enclosure Outline Drawing
Foundation Outline Drawing
Generator Options Outline Drawing
Circuit Breaker Outline Drawing
DC Interconnection Wiring Diagram
AC Interconnection Wiring Diagram

Section 5 - Startup & Warranty

Pre Commissioning Inspection Form
Generator Warranty Statement

SECTION 1

Project Information



Bill of Material

Feature Code	Description	Qty
C150N6	C150N6, 150kW, 60Hz, Standby, Natural Gas/Propane Genset	1
C150 N6	C150N6, 150kW, 60Hz, Standby, Natural Gas/Propane Genset	
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
A331-2	Duty Rating - Standby Power (ESP)	
L155-2	Emissions Certification - SI, EPA, Emergency, Stationary, 40CFR60	
L090-2	Listing - UL 2200	
L193-2	NFPA 110 Type 10 Level 1 Capable	
B184-2	Exciter/Regulator - Permanent Magnet Generator, 3 Phase Sensor	
R002-2	Voltage - 277/480, 3 Phase, Wye, 4 Wire	
BB87-2	Alternator - 60Hz, Reconnect, Full Output, 105C, 40C Ambient, Increased Motor Starting (IMS)	
A292-2	Alternator Heater, 120 Volt AC	
F231-2	Aluminum Sound Attenuated Level 1 Enclosure, with Exhaust System	
P176-2	Enclosure Color - Green, Aluminum	
F252-2	Enclosure - Wind Load 180 MPH, ASCE7-10	
F065-2	Battery Rack	
F179-2	Skidbase - Housing Ready	
H609-2	Control Mounting - Left Facing	
H703-2	PowerCommand 2.3 Controller	
H012-2	Gauge - Oil Pressure	
H606-2	Analog Meters - AC Output	
K796-2	Stop Switch - Emergency	
KS52-2	Relays - Auxiliary, Qty 2, 25A - 15V DC/10A - 30V DC	
H536-2	Control Display Language - English	
KV03-2	Load Connection - Single	
KX26-2	Circuit Breaker, Location A, 70A - 250A, 3P, LSI, 600 Volts AC, 100%, UL	
2200	Circuit Breaker or Terminal Box (Position B) - None	

4400	Circuit Breaker or Terminal Box (Position C) - None	
KB72-2	Circuit Breaker or Entrance Box - Bottom Entry,Right Side	
A366-2	Engine Governor - Electronic, Isochronous	
C284-2	Single Gas Fuel - NG or LP Vapor	
A422-2	Engine Starter - 12 Volt DC Motor	
D041-2	Engine Air Cleaner - Normal Duty	
A333-2	Battery Charging Alternator	
BB89-2	Battery Charger - 6 Amp, Regulated	
E125-2	Engine Cooling - Radiator, High Ambient Air Temperature, Ship Fitted	
H389-2	Shutdown - Low Coolant Level	
E089-2	Extension - Coolant Drain	
H669-2	Engine Coolant - 50% Antifreeze, 50% Water Mixture	
E153-2	Coolant Heater,Cold Ambient	
H706-2	Engine Oil	
L028-2	Genset Warranty - 2 Years Base	
L050-2	Literature - English	
A322-2	Packing - Skid, Poly Bag	
H268-2	Extension - Oil Drain	

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.

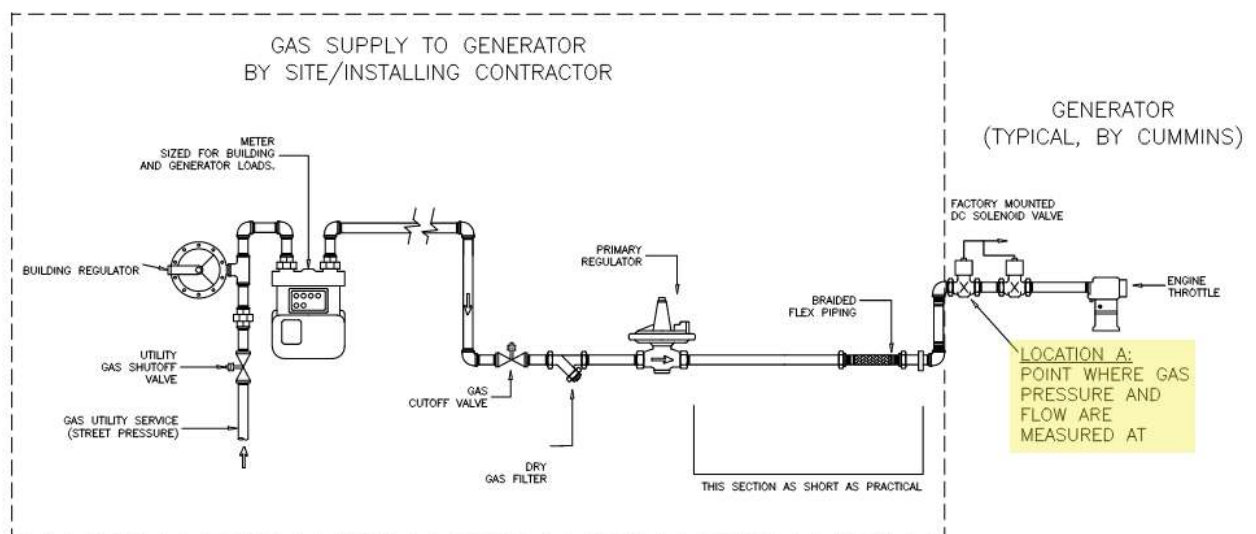


Figure 1. Typical site design

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:

	<u>NG</u>	<u>PV</u>	
Fuel consumption at 100% load:	1915.0	783.0	SCFH
Required <u>Operating</u> fuel pressure:	6.0 - 13.0		in H ₂ O

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**):

	<u>Provided by Cummins</u>	<u>Provided by others</u>
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





Spark-Ignited Generator set

125, 150, 175, & 200 kW
Standby
EPA Emissions



Description

Cummins Power Generation generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary standby applications.

Features

Gas engine - Rugged 6-cylinder Cummins QSJ8.9G spark-ignited engine delivers reliable power. The electronic air/fuel ratio control provides optimum engine performance and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 2.3 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling system - Standard cooling package provides reliable running at up to 50 °C (122 °F) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminum material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7-10. The design has hinged doors to provide easy access for service and maintenance.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor and dealer network.

	Natural Gas		Data sheets
	Standby (60 Hz)		
Model	kW	kVA	60 Hz
C125N6	125	156	NAD-6303
C150N6	150	188	NAD-6304
C175N6B	175	218	NAD-6632
C200N6B	200	250	NAD-6633

Generator Set Specifications

Governor regulation class	ISO 8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.25% @ 60 Hz
Radio frequency emissions compliance	FCC code title 47 part 15 class B

Engine Specifications

Design	Turbocharged and Aftercooled
Bore	114.1 mm (4.49 in)
Stroke	144.5 mm (5.69 in)
Displacement	8.9 liters (543 in ³)
Cylinder block	Cast iron, in-line 6 cylinder
Battery capacity	850 amps standard, dual battery optional
Battery charging alternator	100 amps
Starting voltage	12-volt, negative ground
Lube oil filter type(s)	Spin-on
Standard cooling system	125 kW - 50 °C (122 °F) ambient cooling system 150 kW - 45 °C (113 °F) ambient cooling system 175 kW - 50° C (122° F) ambient cooling system 200 kW - 45° C (113° F) ambient cooling system
Rated speed	1800 rpm

Alternator Specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 °C (248 °F) standby
Exciter type	Torque match (shunt) with PMG as option
Alternator cooling	Direct drive centrifugal blower
AC waveform total harmonic distortion	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3%

Available Voltages

1-phase	3-phase				
• 120/240	• 120/208	• 120/240	• 277/480	• 347/600	• 127/220

Generator Set Options

Fuel system

- ☐ 125 and 150 kW:
 - ☐ Single fuel – natural gas or propane vapor, field selectable
 - ☐ Dual fuel – natural gas or propane vapor, auto changeover
- ☐ 175 and 200 kW:
 - ☐ Single fuel – natural gas
- ☐ Low fuel gas pressure warning

Engine

- ☐ Normal or Heavy-duty engine air cleaner
- ☐ Shut down – low oil pressure
- ☐ Extension – oil drain
- ☐ Engine oil heater

Electrical

- ☐ One, two or three circuit breaker configurations
- ☐ 80% rated circuit breakers
- ☐ 100% rated LSI circuit breakers

Control

- ☐ PC2.3 with AmpSentry
- ☐ PC3.3 with Paralleling option
- ☐ AC output analog meters
- ☐ Stop switch – emergency
- ☐ Auxiliary output relays (2)
- ☐ Auxiliary configurable signal inputs (8) and relay outputs (8)

Alternator

- ☐ 120 °C temperature rise alternator
- ☐ 105 °C temperature rise alternator
- ☐ PMG
- ☐ Alternator heater, 120V
- Reconnectable full 1 phase output alternator

Enclosure

- ☐ Aluminum enclosures with muffler installed – green color
 - ☐ Weather
 - ☐ Sound Level 1
 - ☐ Sound Level 2
 - ☐ Winter

Cooling system

- ☐ Shutdown – low coolant level
- ☐ Warning – low coolant level
- ☐ Extension – coolant drain
- ☐ Coolant heater options:
 - ☐ < 4 °C (40 °F) - Cold weather
 - ☐ < -17 °C (0 °F) - Extreme cold

Exhaust system

- ☐ Exhaust connector NPT
 - ☐ Exhaust muffler mounted
- ### Generator set application
- ☐ Base barrier – elevated genset
 - ☐ Battery rack, single or dual battery
 - ☐ Radiator outlet duct adapter

Warranty

- ☐ Base warranty – 2 year / 1000 hours, standby
- ☐ 3-year standby warranty options
- ☐ 5-year standby warranty options

Generator Set Accessories

- ☐ Coolant heaters – 1500W / 2000W
- ☐ Battery rack, single or dual battery
- ☐ Battery heater kit
- ☐ Engine oil heater
- ☐ Remote control displays
- ☐ Auxiliary output relays (2)
- ☐ Auxiliary configurable signal inputs (8) and relay outputs (8)
- ☐ Annunciator – RS485

- ☐ Remote monitoring device – PowerCommand 500/550
- ☐ Battery charger – stand-alone, 12V
- ☐ Circuit breakers
- ☐ Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- ☐ Base barrier – elevated generator set
- ☐ Mufflers – industrial, residential, or critical
- ☐ Alternator PMG
- ☐ Alternator heater

Control System PowerCommand 2.3



An integrated generator set control system providing voltage regulation, engine protection and operator interface.

Power Management - Provides battery monitoring and testing features and smart-starting control system.

InPower™ – PC-based service tool available for detailed diagnostics.

PCCNet RS485 - Network interface (standard) to devices such as remote annunciator for NFPA 110 applications.

Control boards - Potted for environmental protection.

Ambient operation - Suitable for operation in ambient temperatures from -40 °C to +70 °C and altitudes to 13,000 feet (5,000 meters).

AC Protection

- AmpSentry protective relay
- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload
- Overload warning
- Reverse kW shutdown
- Reverse VAR shutdown
- Short circuit protection

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Emergency stop
- Fuel-in-rupture-basin warning or shutdown

Operator/display panel

- Manual off switch
- 320 x 240 Pixels graphic LED backlight LCD with push button access for viewing engine and alternator data and providing setup, controls, and adjustments (English, Spanish, or French).
- LED lamps indicating genset running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -20 °C to +70 °C

Alternator data

- Line-to-line and Line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total kVa

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase line-to-line sensing
- Configurable torque matching

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop
- Automatic transfer switch (ATS) control
- Generator set exercise, field adjustable

Options

- ☐ Auxiliary output relays (2)
- ☐ Remote annunciator with (3) configurable inputs and (4) configurable outputs
- ☐ PMG alternator excitation
- ☐ PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- ☐ Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)
- ☐ Digital governing
- ☐ AC output analog meters (bargraph)
 - Color-coded graphical display of:
 - 3-phase AC voltage
 - 3-phase current
 - Frequency
 - kVa
- ☐ Remote operator panel

For further detail on PC 2.3, see document S-1569

For further detail on PC 3.3, see document S-1570

Ratings Definitions

Emergency standby power (ESP):

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

Limited-time running power (LTP):

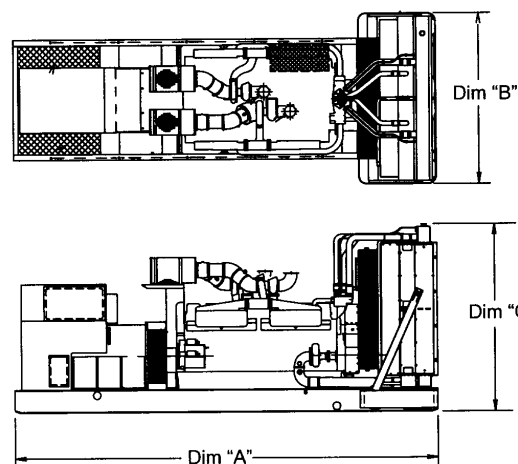
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime power (PRP):

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

Base load (continuous) power (COP):

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



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

Do not use for installation design

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set Weight* wet kg (lbs.)
Open Set				
C125N6	2867 (113)	1016 (40)	1415 (56)	1580 (3483)
C150N6	2867 (113)	1016 (40)	1415 (56)	1580 (3483)
C175N6B	2867 (113)	1016 (40)	1478 (58)	1610 (3543)
C200N6B	2867 (113)	1016 (40)	1478 (58)	1698 (3735)
Weather Protective Enclosure				
C125N6	2867 (113)	1016 (40)	1836 (72)	1661 (3662)
C150N6	2867 (113)	1016 (40)	1836 (72)	1661 (3662)
C175N6B	2867 (113)	1016 (40)	1836 (72)	1691 (3728)
C200N6B	2867 (113)	1016 (40)	1836 (72)	1779 (3922)
Sound Attenuated Enclosure Level 1				
C125N6	3621 (143)	1016 (40)	1836 (72)	1776 (3915)
C150N6	3621 (143)	1016 (40)	1836 (72)	1776 (3915)
C175N6B	3621 (143)	1016 (40)	1836 (72)	1806 (3982)
C200N6B	3621 (143)	1016 (40)	1836 (72)	1894 (4176)
Sound Attenuated Enclosure Level 2				
C125N6	4061 (160)	1016 (40)	1836 (72)	1791 (3940)
C150N6	4061 (160)	1016 (40)	1836 (72)	1791 (3940)
C175N6B	4061 (160)	1016 (40)	1836 (72)	1821 (4015)
C200N6B	4061 (160)	1016 (40)	1836 (72)	1909 (4209)

* Weights above are average. Actual weight varies with product configuration

Codes and Standards

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

 The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins Power Generation products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	 This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.
	 The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
International Building Code The generator set is certified to International Building Code (IBC) 2012.	 All low voltage models are CSA certified to product class 4215-01.
	U.S. EPA Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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NAS-6298-EN (12/22) A057Y417



power.cummins.com

Generator Set Data Sheet



Model: C150N6
Frequency: 60 Hz
Fuel type: Natural gas
kW rating: 150 Natural gas standby

Emissions level: EPA Emissions

Fuel consumption	Natural gas Standby				Propane Standby			
	kW (kVA)				kW (kVA)			
Ratings	150 (188)				150 (188)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
scfh	718.7	1111.3	1487.2	1915.0	288.4	438.5	596.3	783.0
m ³ /hr	20.35	31.47	42.12	54.3	8.17	12.42	16.89	22.2

Engine	Natural gas Standby Rating	Propane Standby Rating
Engine model	QSJ8.9G	
Configuration	Cast Iron, In line, 6 cylinders	
Aspiration	Turbocharged and aftercooled	
Gross engine power output, kWm (bhp)	179 (240)	
Bore, mm (in)	114.1 (4.49)	
Stroke, mm (in)	144.5 (5.69)	
Rated speed, rpm	1800	
Compression ratio	9.7:1	
Lube oil capacity, L (qt)	20.8 (22)	

Fuel supply pressure	
Minimum operating pressure, kPa (in H ₂ O)	1.5 (6)
Maximum operating pressure, kPa (in H ₂ O)	3.5 (13)

Air	Natural gas Standby Rating	Propane Standby Rating
Combustion air, m ³ /min (scfm)	13.7 (483)	13.9 (490)
Maximum normal duty air cleaner restriction, kPa (in H ₂ O)	0.37 (1.5)	
Maximum heavy-duty air cleaner restriction, kPa (in H ₂ O)	3.7 (15.0)	

Exhaust	Natural gas Standby Rating	Propane Standby Rating
Exhaust flow at set rated load, m ³ /min (cfm)	40.8 (1440)	42.7 (1509)
Exhaust temperature at set rated load, °C (°F)	641.1 (1186)	668.9 (1236)
Maximum back pressure, kPa (inH ₂ O)	9 (36.1)	

Standard set-mounted radiator cooling	Natural gas Standby Rating	Propane Standby Rating
Ambient design, °C (°F)	50 (122)	
Fan load, kWm (HP)	10.3 (13.8)	
Coolant capacity (with radiator), L (US gal)	26 (6.9)	
Cooling system air flow, m ³ /min (scfm)	249.2 (8800)	
Maximum cooling air flow static restriction, kPa (inH ₂ O)	0.125 (0.5)	

Weights

Unit wet weight kg (lb)	Refer to drawings for specific weights & dimensions
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Note: Weights represent a set with standard features. See outline drawing for weights of other configurations

Derating factors

Natural gas

Standby	Engine power available up to 775 m (2540 ft.) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 4.25% per 300 m (985 ft.) and 2% per 10° C (18° F).
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Propane

Standby	Engine power available up to 775 m (2540 ft.) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 4.25% per 300 m (985 ft.) and 2% per 10° C (18° F).
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Ratings definitions

Emergency standby power (ESP)	Limited-time running power (LTP)	Prime power (PRP)	Base load (continuous) power (COP)
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

Alternator data

Standard alternators	Single phase table	Three phase table					Full single phase output, reconnectable
Maximum temperature rise above 40° C ambient	120° C	120° C	120° C	120° C	120° C	120° C	120° C
Feature code	BB88-2	B986-2	B946-2	B943-2	B952-2	BB86-2	BB88-2
Alternator data sheet number	ADS-212	ADS-210	ADS-210	ADS-209	ADS-209	ADS-209	ADS-212
Voltage ranges	120/240	120/240	120/208	277/480	347/600	127/220	120 - 480
Voltage feature code	R104-2	R106-2	R098-2	R002-2	R114-2	R020-2	Varies by voltage
Surge kW	152	156	156	156	156	156	Varies by voltage
Full load current amps at standby rating	625	452	521	226	181	493	Varies by voltage

Optional alternators for improved starting capability	Single phase table	Three phase table					Full single phase output, reconnectable
Maximum temperature rise above 40° C ambient	105° C	105° C	105° C	105° C	105° C	105° C	105° C
Feature code	BB87-2	BB94-2	BB93-2	BB95-2	BB92-2	BB85-2	BB87-2
Alternator data sheet number	ADS-212	ADS-210	ADS-210	ADS-209	ADS-209	ADS-210	ADS-212
Voltage ranges	120/240	120/240	120/208	277/480	347/600	127/220	120 – 480
Voltage feature code	R104-2	R106-2	R098-2	R002-2	R114-2	R020-2	Varies by voltage
Surge kW	153	157	156	157	157	156	Varies by voltage
Full load current amps at standby rating	625	452	521	226	181	493	Varies by voltage

Formulas for calculating full load currents:

Three phase output

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

Single phase output

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

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any buildings electrical system except through an approved device or after building main switch is open.

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NAS-6304-EN (01/22) A058H646



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PowerCommand®

2.3 Control System



Control System Description

The PowerCommand control system is a microprocessor-based generator set monitoring, metering and control system designed to meet the demands of today's engine driven generator sets. The integration of all control functions into a single control system provides enhanced reliability and performance, compared to conventional generator set control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied.

Features

- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support.
- AmpSentry™ protective relay - true alternator overcurrent protection.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Digital voltage regulation. Three phase full wave FET type regulator compatible with either shunt or PMG systems.
- Generator set monitoring and protection.
- 12 and 24 VDC battery operation.
- Modbus® interface for interconnecting to customer equipment.
- Warranty and service. Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE, UKCA and CSA standards.

PowerCommand Digital Genset Control PCC 2300



Description

The PowerCommand generator set control is suitable for use on a wide range of generator sets in non-parallel applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC Line-to-Line.

Power for this control system is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 30 VDC.

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation - Three phase full wave FET type regulator compatible with either shunt or PMG systems. Sensing is three phase.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine
- due to thermal Control Module (ECM).
- AmpSentry™ protection provides industry-leading alternator overcurrent protection:
 - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriately acted upon.
- Reduces the risk of Arc Flash overload or electrical faults by inverse time protection
- Common harnessing - with higher feature Cummins controls. Allows for easy field upgrades.
- Generator set monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system to sense and warn against a weak battery condition.
- Configurable for single or three phase AC metering.
- Engine starting - Includes relay drivers for starter, Fuel Shut Off (FSO), glow plug/spark ignition power and switch B+ applications.
- Generator set protection – Protects engine and alternator.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Advanced serviceability - using InPower™, a PC-based software service tool.

- Environmental protection - The control system is designed for reliable operation in harsh environments. The main control board is a fully encapsulated module that is protected from the elements.
- Modbus interface for interconnecting to customer equipment.
- Configurable inputs and outputs - Four discrete inputs and four dry contact relay outputs.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

Base Control Functions

HMI Capability

Operator adjustments - The HMI includes provisions for many set up and adjustment functions.

Generator set hardware data - Access to the control and software part number, generator set rating in kVA and generator set model number is provided from the HMI or InPower.

Data logs - Includes engine run time, controller on time, number of start attempts, total kWh, and load profile (control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

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

Alternator data

- Voltage (single or three phase Line-to-Line and Line-to-Neutral)
- Current (single or three phase)
- kW, kVar, power factor, kVA (three phase and total)
- Frequency

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

Engine data

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

Service adjustments - The HMI includes provisions for adjustment and calibration of generator set control functions. Adjustments are protected by a password. Functions include:

Service adjustments (continued)

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

Engine Control

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

12 VDC/24 VDC battery operations - PowerCommand will operate either on 12 VDC or 24 VDC batteries.

Temperature dependent governing dynamics (with electronic governing) - modifies the engine governing control parameters as a function of engine temperature. This allows the engine to be more responsive when warm and more stable when operating at lower temperature levels.

Isochronous governing - (where applicable) Capable of controlling engine speed within $\pm 0.25\%$ for any steady state load from no load to full load. Frequency drift will not exceed $\pm 0.5\%$ for a $33\text{ }^{\circ}\text{C}$ ($60\text{ }^{\circ}\text{F}$) change in ambient temperature over an 8 hour period.

Droop electronic speed governing - Control can be adjusted to droop from 0 to 10% from no load to full load.

Remote start mode - It accepts a ground signal from remote devices to automatically start the generator set and immediately accelerate to rated speed and voltage. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

Remote and local emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either emergency stop switch will wake up the control.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating. The control can also be configured to go into a low current state while in auto for prime applications or applications without a battery charger.

Engine starting - The control system supports automatic engine starting. Primary and backup start disconnects are achieved by one of two methods: magnetic pickup or main alternator output frequency. The control also supports configurable glow plug control when applicable.

Cycle cranking - Is configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shut down after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Alternator Control

The control includes an integrated three phase Line-to-Line sensing voltage regulation system that is compatible with shunt or PMG excitation systems. The voltage regulation system is a three phase full wave rectified and has an FET output for good motor starting capability.

Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within $\pm 1.0\%$ for any loads between no load and full load. Voltage drift will not exceed $\pm 1.5\%$ for a $40\text{ }^{\circ}\text{C}$ ($104\text{ }^{\circ}\text{F}$) 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.

Protective Functions

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

Protective functions include:

Battle Short Mode

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

Derate

The derate function reduces output power of the genset in response to a fault condition. If a derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or modbus.

Configurable Alarm and Status Inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition. The control is programmable for warning, shutdown or status indication and for labeling the input.

Emergency Stop

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

Full Authority Electronic Engine Protection

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

General Engine Protection

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

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

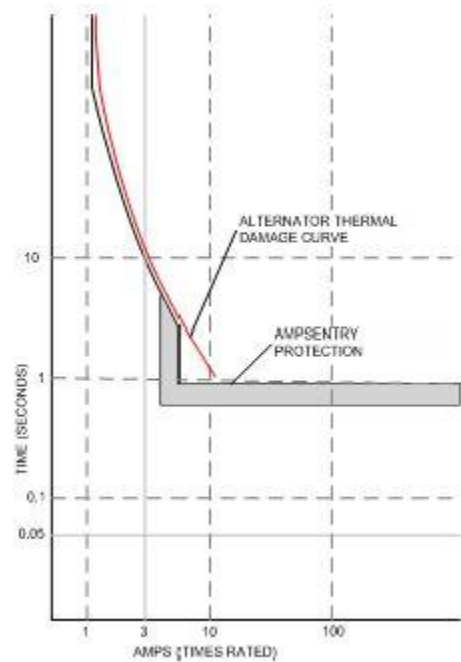
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crank sequence.

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.

Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the generator set or in the load. It also provides single and three phase fault current regulation so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3-Phase short) or fixed timer (2 sec for 1-Phase short, 5 sec for 2-Phase short). See document R1053 for a full-size time over current curve.



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

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

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

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5-20 second time delay. Default: 6 Hz, 10 seconds.

Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

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

Overcurrent warning/shutdown - Thresholds and time delays are configurable. Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

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

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

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point.

Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

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

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

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

Field Control Interface

Input signals to the PowerCommand control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Battleshort
- Rupture basin
- Start type signal
- Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Output signals from the PowerCommand control include:

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

- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30 VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.

- Ready to load (generator set running) signal: Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

Communications Connections Include:

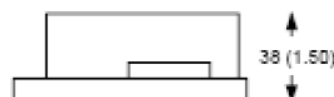
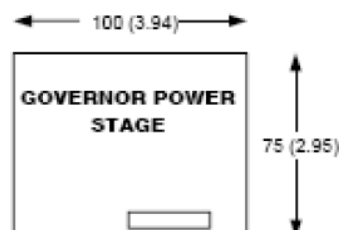
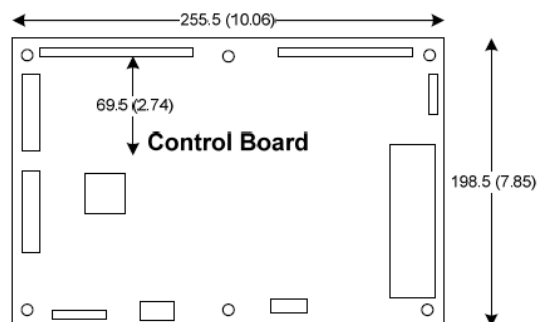
- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.

- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

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

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

Mechanical Drawings



PowerCommand Human Machine Interface HMI320



Description

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

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

Features

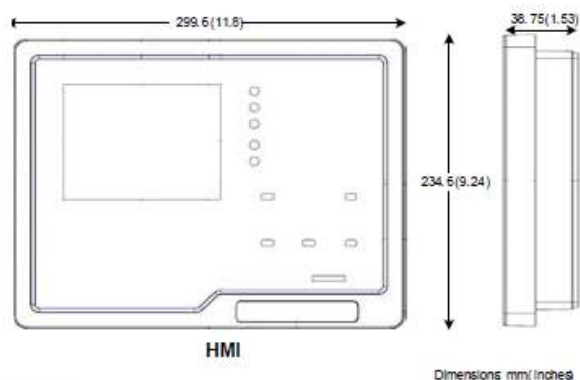
- LED indicating lamps:
 - Genset running
 - Remote start
 - Not in auto
 - Shutdown
 - Warning
 - Auto
 - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.

- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.
- LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian and Chinese Characters.

Communications connections include:

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

Mechanical Drawing



Software

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

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 °C to +70 °C (-40 °F to 158 °F) and for storage from -55 °C to +80 °C (-67 °F to 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 to +70 °C (-4 °F to 158 °F) and for storage from -30 °C to +80 °C (-22 °F to 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 generator set. 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: 1993 compliance, controls and switchgear.
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking: The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN50081-1,2 residential/light industrial emissions or industrial emissions.
- EN50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

Warranty

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



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Alternator data sheet

Frame size: **UCD3J**

Characteristics

Weights:	Wound stator assembly:	670.205 lb	304 kg
	Rotor assembly:	597.45 lb	271.9 kg
	Complete alternator:	1602.76 lb	727 kg
Maximum speed:		2250 rpm	
Excitation current:	Full load:	2.20 Amps	
	No load:	0.50 Amps	
Insulation system:	Class H throughout		

1 ∅ Ratings (1.0 power factor) (Based on specific temperature rise at 40 °C ambient temperature)		60 Hz (winding no)				50 Hz (winding no)				
		Double delta		4 lead		Double delta				
		<u>120/240</u>		<u>120/240</u>		<u>110-120</u> <u>220/240</u>				
125 °C Rise ratings	kW/kVA	161/201		175/219		140/175				
105 °C Rise ratings	kW/kVA	150/188		157/196		126/158				
3 ∅ Ratings (0.8 power factor) (Based on specified temperature rise at 40 °C ambient temperature)		Upper broad range			LBR*	347/600	Broad range			
		<u>120/208</u> <u>240/416</u>	<u>127/220</u> <u>255/440</u>	<u>139/240</u> <u>277/480</u>	<u>190-208</u> <u>380-416</u>	<u>347/600</u>	<u>110/190</u> <u>220/380</u>	<u>115/200</u> <u>230/400</u>	<u>120/208</u> <u>240/415</u>	<u>127/220</u> <u>254/440</u>
150 °C Rise ratings	kW	230	240	255	255	230	200	200	200	172
	kVA	288	300	319	319	288	250	250	250	215
125 °C Rise ratings	kW	215	225	240	240	215	184	184	184	164
	kVA	269	281	300	300	269	230	230	230	205
105 °C Rise ratings	kW	200	211	220	220	200	168	168	168	148
	kVA	250	264	275	275	250	210	210	210	185
80 °C Rise ratings	kW	170	180	190	190	170	154	154	154	128
	kVA	213	225	238	238	213	193	193	193	160
3 ∅ Reactances (per unit, ±10%) (Based on full load at 105 °C rise rating)		<u>416</u>	<u>440</u>	<u>480</u>	<u>380</u>	<u>600</u>	<u>380</u>	<u>400</u>	<u>415</u>	<u>440</u>
Synchronous		2.651	2.457	2.221	2.00	2.00	1.939	1.75	1.626	N/A
Transient		0.164	0.153	0.137	0.13	0.13	0.103	0.093	0.086	N/A
Subtransient		0.096	0.09	0.08	0.07	0.07	0.07	0.064	0.059	N/A
Negative sequence		0.117	0.109	0.098	0.14	0.14	0.117	0.105	0.098	N/A
Zero sequence		0.048	0.045	0.04	0.04	0.04	0.044	0.04	0.037	N/A
3 ∅ Motor starting		Broad range			LBR*	600	Broad range			
Maximum kVA	(Shunt)	770			770	770	535			
(90% sustained voltage)	(PMG)	920			920	920	678			
Time constants (Sec)										
Transient		0.045			0.045	0.045	0.045			
Subtransient		0.015			0.015	0.015	0.015			
Open circuit		1.270			1.270	1.270	1.270			
DC		0.030			0.030	0.030	0.030			
Windings (@ 20° C)										
Stator resistance	(Ohms per phase)	0.0128			0.0128	0.0128	0.0128			
Rotor resistance	(Ohms)	2.0000			2.0000	2.0000	2.0000			
Number of leads		12			12	6	12			

* Lower broad range 110/190 thru 120/208, 220/380 thru 240/416.



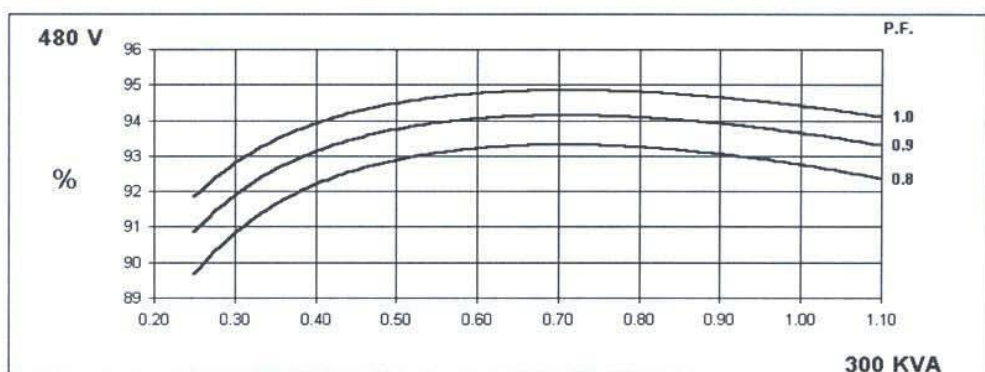
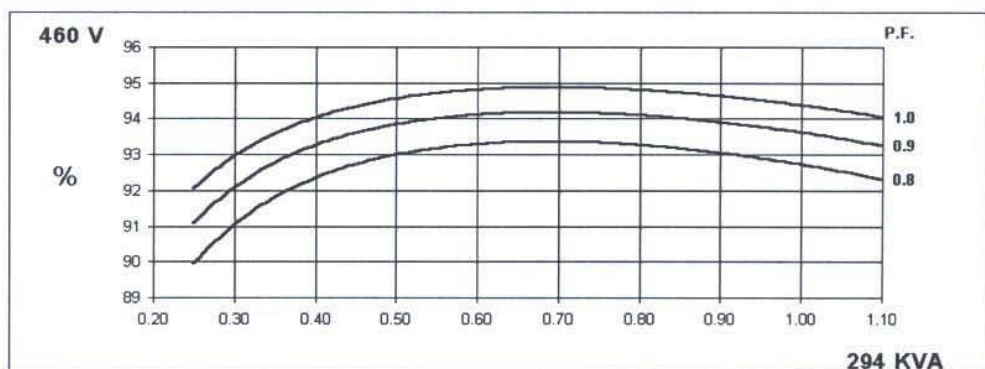
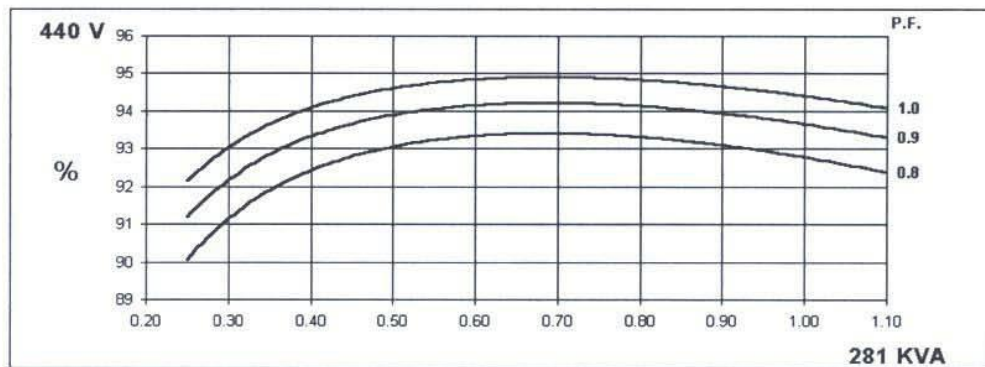
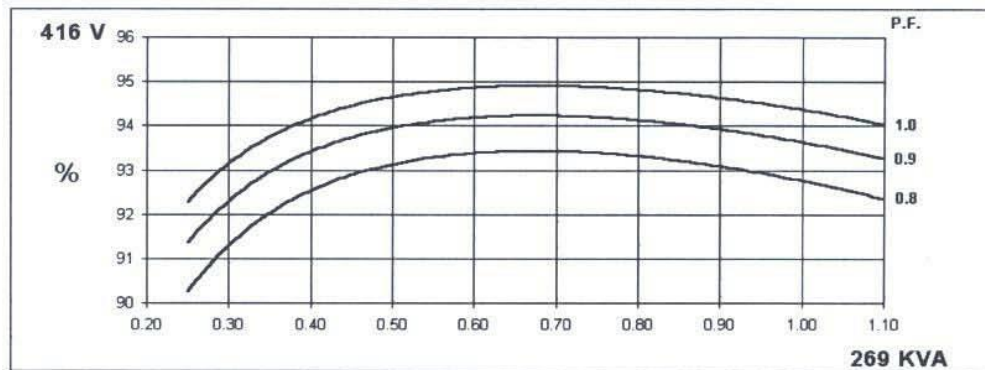
Alternator data sheet

Frame size: UCD3J

60 Hz

Winding 311

THREE PHASE EFFICIENCY CURVES

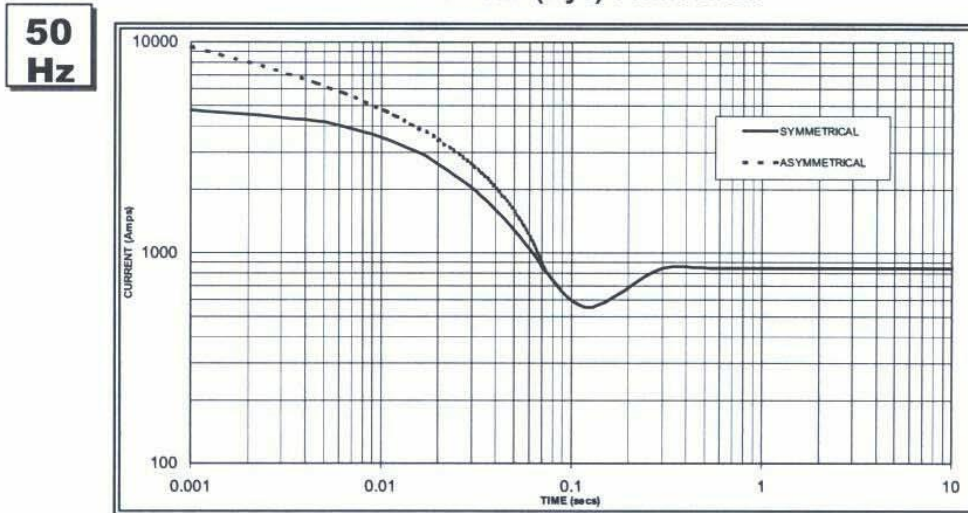




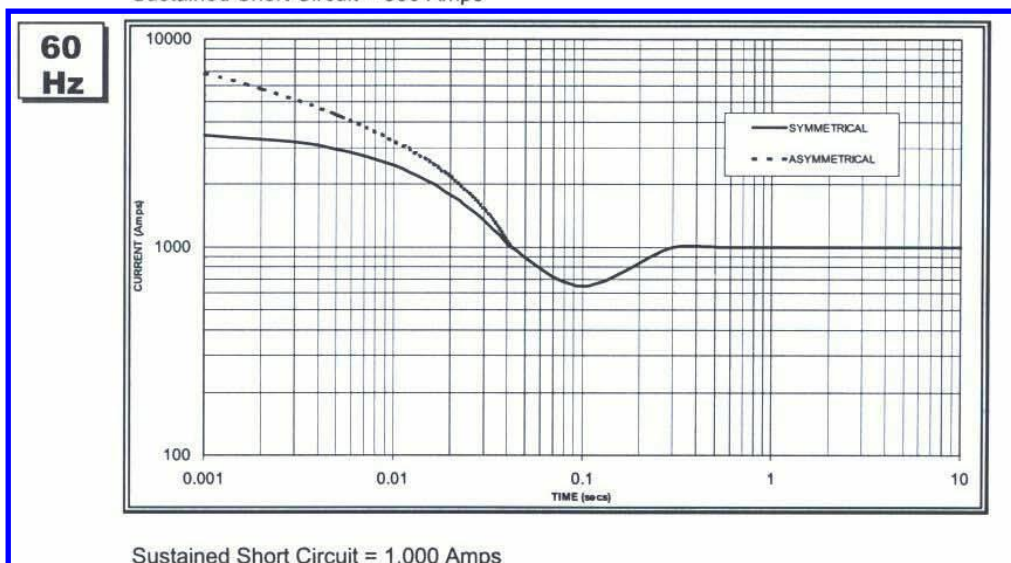
Alternator data sheet

Frame size: UCD3J

Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.



Sustained Short Circuit = 850 Amps



Sustained Short Circuit = 1,000 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 1.07
415v	X 1.10	460v	X 1.12
440v	X 1.16	480v	X 1.16

The sustained current value is constant irrespective of voltage level

Note 2

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

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

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection 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



Alternator data sheet

Frame size: UCD3J

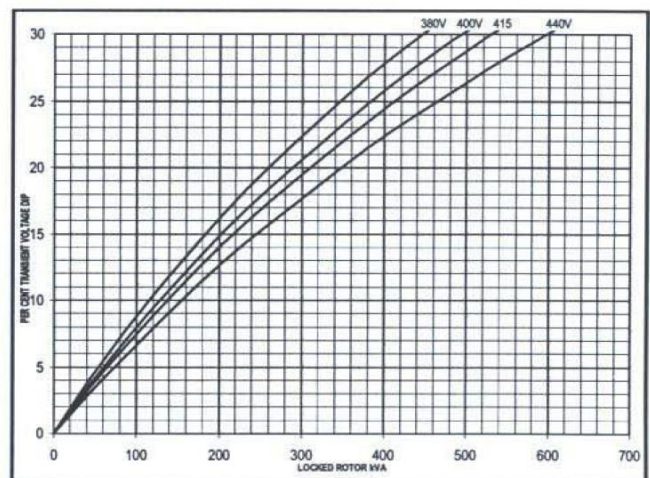
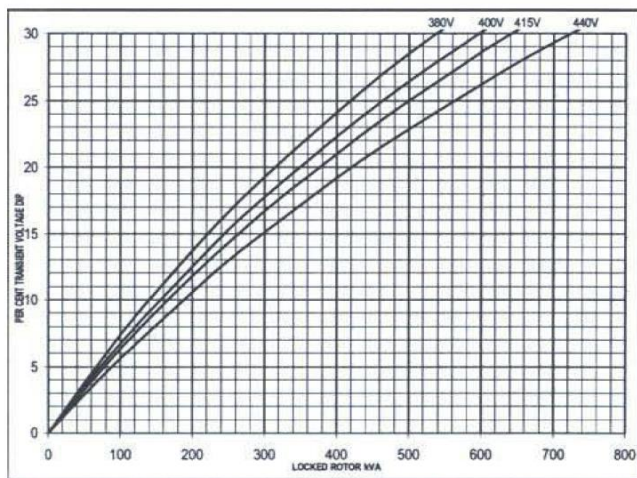
Winding 311

Locked Rotor Motor Starting Curve

50
Hz

MX

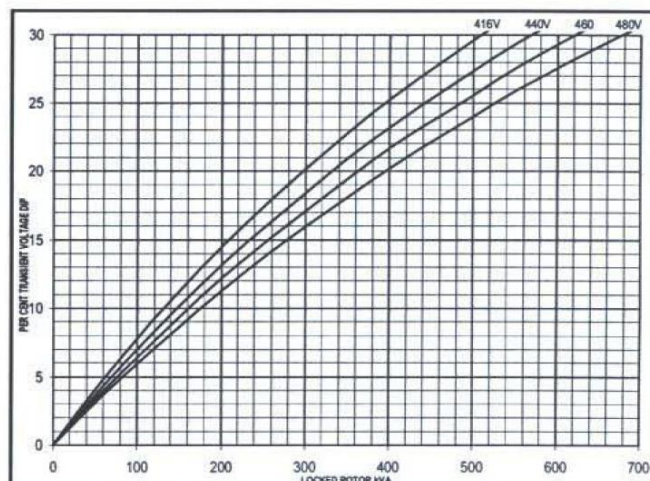
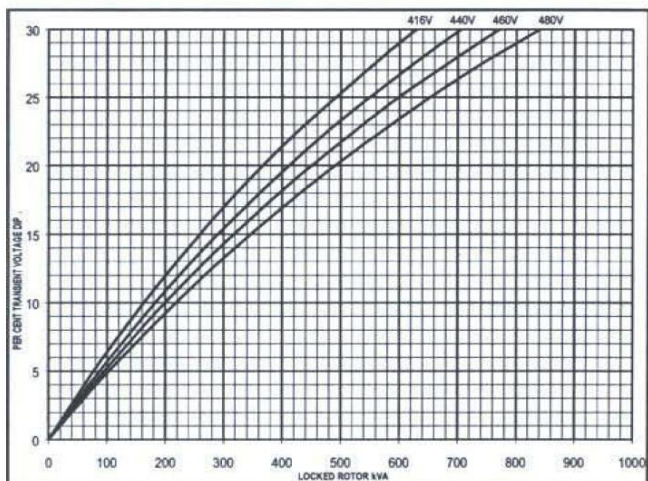
SX



60
Hz

MX

SX





Sound Data

C150N6

QSJ8.9G 60Hz

Sound Pressure Level @ 7 meters, dB(A)

See notes 1-6 listed below

Configuration	Exhaust System	Position (Note 1)								8 Position Average
		1	2	3	4	5	6	7	8	
Standard – Unhoused	Infinite Exhaust	79.5	82.2	82.6	83.9	79.3	82.6	82.5	81.7	82.0
F216-2 Weather Protective Aluminium	Mounted	82.0	80.6	76.2	81.0	79.2	85.4	79.4	82.8	81.6
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	81.1	76.3	71.9	72.8	72.2	73.0	71.5	76.1	75.7
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	72.8	72.5	69.3	71.5	70.9	71.3	69.4	71.8	71.3

Sound Power Level, dB(A)

See notes 2-4, 7 and 8 listed below

Configuration	Exhaust System	Octave Band Center Frequency (Hz)										Overall Sound Power Level
		31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	59.0	73.8	86.0	94.7	103.0	103.9	104.3	103.0	100.1	89.5	110.2
F216-2 Weather Protective Aluminium	Mounted	63.2	83.3	92.1	99.5	103.7	103.7	104.0	103.9	96.5	81.9	110.5
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	62.2	77.2	87.2	92.4	96.2	97.0	96.5	94.3	96.7	80.0	103.7
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	62.6	76.4	86.3	90.2	93.1	92.1	90.6	88.8	89.2	75.3	99.0

Exhaust Sound Power Level, dB(A)

See notes 2 & 9 listed below

Open Exhaust (No Muffler) @ Rated Load	Octave Band Center Frequency (Hz)										Overall Sound Power Level
	31.5	63	125	250	500	1000	2000	4000	8000	16000	
	56.0	89.6	97.4	101.2	108.2	110.5	113.0	115.7	114.4	105.8	120.3

Note:

- Position 1 faces the Generator front per ISO 8528-10. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7m (23 ft) from the surface of the generator set and 1.2 m (48 inches) from floor level.
- Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
- Data based on full rated load.
- Sound data for generator set with infinite exhaust do not include exhaust noise.
- Sound Pressure Levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
- Reference sound pressure is 20 μ Pa.
- Sound Power Levels per ISO 3744 and ISO 8528-10, as applicable.
- Reference power – 1 pW (10^{-12} W)
- Exhaust Sound Power Levels are per ISO 6798, as applicable.



Cooling System Data

C150N6

QSJ8.9G-G2

High Ambient Air Temperature Radiator Cooling System

	Fuel Type	Duty	Rating (kW)	Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)					Housed in Free Air, No Air Discharge Restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	Weather (F216)	Sound Level 1 (F231)	Sound Level 2 (F217)
				Maximum Allowable Ambient Temperature, Degree C							
60 Hz	Natural Gas	Standby	150	55	55	50	N/A	N/A	47	45	45
	Propane	Standby	150	53	51	49	N/A	N/A	47	45	45

Notes:

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



2026 EPA Exhaust Emission Compliance Statement C150N6 Standby 60 Hz Spark Ignited Generator Set

Compliance Information:

The engine used in this generator set complies with U.S. EPA emissions regulations under the provisions of 40 CFR Part 60, Stationary Emergency Spark-Ignited emissions limits when tested per ISO 8178 D1.

Engine Manufacturer: Cummins Inc.
EPA Certificate Number: TCEXB08.9ALB-007
Effective Date: 11/8/2025
Date Issued: 11/8/2025
EPA Engine Family (Cummins Emissions Family): TCEXB08.9ALB

Engine Information:

Model: QSJ8.9G-G2 Bore: 4.49 in. (114 mm)
Engine Nameplate HP: 240 Stroke: 5.69 in. (145 mm)
Type: 4 Cycle, In-Line, 6 Cylinder Displacement: 543.0 cu. in. (8.9 liters)
Aspiration: Turbocharged and Aftercooled Compression Ratio: 8.5:1
Emission Control Device: Electronic Air/Fuel Ratio Control and Closed-Loop Breather System

U.S. Environmental Protection Agency Station Emergency SI Emission Limits

Natural Gas	Grams per BHP-hr			Grams per kW _m -hr		
	<u>NO_x</u>	<u>VOC</u>	<u>CO</u>	<u>NO_x</u>	<u>VOC</u>	<u>CO</u>
EPA Emissions Limit	2.0	1.0	4.0	2.7	1.3	5.4

Propane (LP)	Grams per BHP-hr			Grams per kW _m -hr		
	<u>NO_x</u>	<u>VOC</u>	<u>CO</u>	<u>NO_x</u>	<u>VOC</u>	<u>CO</u>
EPA Emissions Limit	2.0	1.0	4.0	2.7	1.3	5.4

Notes:

Tests conducted using alternate methods, instrumentation, fuel or reference conditions can yield different results.

Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



Exhaust Emission Data Sheet

C150N6

60 Hz Spark Ignited Generator Set
EPA Emissions

Engine Information:

Model:	Cummins QSJ8.9G-G2	Bore:	4.49 in. (114.1 mm)
Type:	4 cycle, in-line, 6 cylinder	Stroke:	5.69 in. (144.5 mm)
Aspiration:	Turbocharged and Aftercooled	Displacement:	543 cu. in. (8.9 liters)
Compression Ratio:	8.5:1		
Emission Control Device:	Electronic Air/Fuel Ratio & Closed-Loop Breather System		

Natural Gas

	<u>1/4</u>	<u>1/2</u>	<u>3/4</u>	<u>Full</u>
<u>Performance Data</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>
BHP @ 1800 RPM (60 Hz)	72.4	125.7	180.2	240.0
Fuel Consumption (SCFH)	718.7	1111.3	1487.2	1915.0
Exhaust Gas Flow (CFM)	535.0	894.0	1160.0	1431.0
Exhaust Gas Temperature (°F)	1191.0	1203.0	1196.0	1186.0
Air to Fuel Ratio	22.2	24.3	24.3	24.3

Exhaust Emission Data

HC (Total Unburned Hydrocarbons)*	0.99	1.31	1.01	0.96
NOx (Oxides of Nitrogen as NO ₂)	1.55	0.61	0.98	1.45
CO (Carbon Monoxide)	1.81	1.41	1.36	1.36
All values above are cited: g/BHP-hr				
HC (Total Unburned Hydrocarbons)*	411	563	469	457
NOx (Oxides of Nitrogen as NO ₂)	222	90	155	236
CO (Carbon Monoxide)	425	340	352	363

All values above are cited: ppmv

*HC includes NMHC, VOC, POC, and ROC constituents (Non-Methane HC, Volatile Organic Compounds, Precursor Organic Compounds and Reactive Organic Compounds).



Exhaust Emission Data Sheet

C150N6

60 Hz Spark Ignited Generator Set
EPA Emissions

<u>Propane (LP)</u>				
	<u>1/4</u>	<u>1/2</u>	<u>3/4</u>	<u>Full</u>
<u>Performance Data</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>
BHP @ 1800 RPM (60 Hz)	72.4	125.7	180.2	240.0
Fuel Consumption (SCFH)	288.4	438.5	596.3	783.0
Exhaust Gas Flow (CFM)	538.0	877.0	1176.0	1494.0
Exhaust Gas Temperature (°F)	1219.0	1298.0	1279.0	1236.0
Air to Fuel Ratio	21.1	22.1	22.7	23.3
<u>Exhaust Emission Data</u>				
HC (Total Unburned Hydrocarbons)*	0.36	0.35	0.33	0.45
NOx (Oxides of Nitrogen as NO ₂)	1.49	1.28	1.38	1.23
CO (Carbon Monoxide)	3.21	2.46	2.10	2.14
All values above are cited: g/BHP-hr				
HC (Total Unburned Hydrocarbons)*	153	163	159	215
NOx (Oxides of Nitrogen as NO ₂)	212	202	223	194
CO (Carbon Monoxide)	749	636	556	557
All values above are cited: ppmv				
*HC includes NMHC, VOC, POC, and ROC constituents (Non-Methane HC, Volatile Organic Compounds, Precursor Organic Compounds and Reactive Organic Compounds.				

Test Conditions

Test Conditions apply to both Natural Gas and Propane

Data is representative of steady-state engine speed (± 25 RPM) with full load ($\pm 2\%$). Pressures, temperatures, and emission rates were stabilized.

Fuel Specification:	Natural Gas: Dry gas received from Supplier (1000 BTU/SCF) Propane: Meets the requirements for Commercial Grade Propane under the ASTM D1835 Standard Specification for Liquefied Gases.
Fuel Inlet Temperature:	60 $\pm$ 9 °F at flow transmitter
Fuel Pressure:	14.73PSIA $\pm$ 0.5 PSIA at Flow Transmitter
Air Inlet Temperature:	77 $\pm$ 9 °F
Barometric Pressure:	22.92 $\pm$ 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H ₂ O/lb (10.7 g/kg) of dry air

The NOx, HC, CO and PM emission 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 test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



Prototype Test Support (PTS) 60 Hz Test Summary



Generator set models

C125N6

C150N6

Representative prototype

Model: C150N6

Engine: QSJ8.9G-G2

Alternator: UC27J

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity. Prototype testing is conducted only on generator sets not sold as new equipment.

Maximum surge power: 156.4 kW

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

Maximum motor starting: 220 kVA

The generator set was tested to simulate motor starting by applying the specified kVA load at low lagging power factor (0.4 or lower). With this load applied, the generator set recovered to a minimum of 90% rated voltage

Alternator temperature rise:

The highest rated temperature rise (120 °C) test result 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.

Location	Maximum Rise (°C)
Alternator Stator:	N/A
Alternator Rotor:	N/A
Exciter Stator:	N/A
Exciter Rotor:	N/A

Torsional analysis and testing:

The generator set with UC27J was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted over the speed range of 1650 to 1950 RPM.

Cooling system: 50 °C ambient
0.5 in H₂O restriction

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

Durability:

The generator set was subjected to a 1500 hour endurance test replicating field duty cycles operating at variable load up to the standby rating based upon MIL-STD-705 to verify structural soundness and durability of the design.

Steady state performance:

The generator set was tested to verify steady state operating performance. It was within the specified maximum limits.

Voltage regulation:	± 1%
Random voltage variation:	± 1%
Frequency regulation:	Isochronous
Random frequency variation:	± 0.5%

Transient performance:

The generator set was tested 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:

Full load acceptance:

Voltage dip:	26.9%
Recovery time:	5.3 seconds
Frequency dip:	16.2%
Recovery time:	6.3 seconds

Full load rejection:

Voltage rise:	12.5%
Recovery time:	2.2 seconds
Frequency rise:	15.7%
Recovery time:	4.5 seconds

Harmonic analysis:

(per MIL-STD-705B, Method 601.4)

Harmonic	<u>Line to Line</u>		<u>Line to Neutral</u>	
	<u>No load</u>	<u>Full load</u>	<u>No load</u>	<u>Full load</u>
3	0.0	0.1	0.0	0.1
5	0.8	1.2	0.8	1.2
7	0.7	2.2	0.7	2.1
9	0.0	0.0	0.0	0.0
11	0.2	0.3	0.2	0.3
13	0.2	0.4	0.2	0.4
15	0.0	0.0	0.0	0.1

SECTION 3

Generator Accessories





Data Sheet

Circuit Breakers

Description

This Data sheet provides circuit breaker manufacturer part numbers and specifications. The Circuit breaker box description is the rating of that breaker box installation on a Cummins Generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable Models

Engine	Models					
Kubota	C10D6	C15D6	C20D6			
QSJ2.4	C20N6	C25N6	C30N6	C30N6H	C36N6	C36N6H
	C40N6	C40N6H	C50N6H	C60N6H		
B3.3	C25D6	C30D6	C35D6	C40D6	C50D6	C60D6
QSJ5.9G	C45N6	C50N6	C60N6	C70N6	C80N6	C100N6
QSJ8.9G	C125N6	C150N6	C175N6B	C200N6B		
QSB5	DSFAC	DSFAD	DSFAE	C50D6C	C60D6C	C80D6C
	C100D6C	C125D6C				
QSB7	DSGAA	DSGAB	DSGAC	DSGAD	DSGAE	
		C125D6D	C150D6D	C175D6D	C200D6D	
QSL9	DSHAD	DQDAA	DQDAB	DQDAC		
QSM11	DQHAB					
QSX15	DFEJ	DFEK				

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.
2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an "N", use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Please refer to the catalog numbering systems page, which is given in the chart, to understand the nomenclature of the catalog number.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16-17
H, J, and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8-9
Q	0734CT0201 http://www.schneider-electric.us/en/download/document/0734CT0201/	4

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above. <http://products.schneider-electric.us/technical-library/>

3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

*If the catalog number starts with "N", skip the N and begin your search with the second letter.

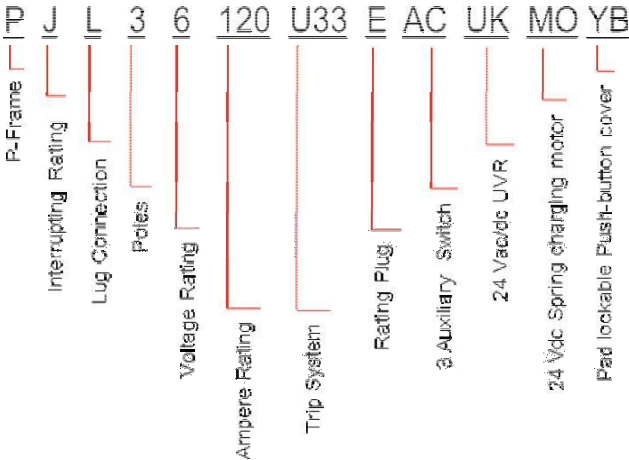
*If the first 3 letters are "PJP," the search will not work. You will need to start with just "PJ" and use the description pages to obtain the information you are looking for on the "PJP."

Example

After finding your circuit breaker catalog number to be "PJL36120U33EACUKMOYB," navigate to the P-frame catalog by using the link provided.

Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PJL36120."



Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KV85-2	CB,Loc B,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KV86-2	CB,Loc B,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KV87-2	CB,Loc B,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KV88-2	CB,Loc B,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A
KV89-2	CB,Loc B,90A,3P,600VAC,80%,UL	A043K997	Schneider Electric	HDL36090	Thermal Magnetic	N/A
KV90-2	CB,Loc B,100A,3P,600VAC,80%,UL	A043L024	Schneider Electric	HDL36100	Thermal Magnetic	N/A
KV91-2	CB,Loc B,125A,3P,600VAC,80%,UL	A043K994	Schneider Electric	HDL36125	Thermal Magnetic	N/A
KV92-2	CB,Loc B,150A,3P,600VAC,80%,UL	A043K991	Schneider Electric	HDL36150	Thermal Magnetic	N/A
KV93-2	CB,Loc B,175A,3P,600VAC,80%,UL	A043L619	Schneider Electric	JDL36175	Thermal Magnetic	N/A
KV94-2	CB,Loc B,200A,3P,600VAC,80%,UL	A043L520	Schneider Electric	JDL36200	Thermal Magnetic	N/A
KV95-2	CB,Loc B,225A,3P,600VAC,80%,UL	A043L517	Schneider Electric	JDL36225	Thermal Magnetic	N/A
KV96-2	CB,Loc B,250A,3P,600VAC,80%,UL	A043L510	Schneider Electric	JDL36250	Thermal Magnetic	N/A
KX09-2	Circuit Breaker-250A,Right CB on Right side,3-Pole,UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX14-2	CirBrkr-250A,Left,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX15-2	CirBrkr-250A,Right,3P,600/690V,SS RMS,80%,UL/IEC	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX22-2	Circuit Breaker-250A,Left CB on Right side,3-Pole, UL 600,IEC 690 100%	A045U091	Schneider Electric	NLGL36250U33X-250A	MicroLogic 3.3S	N/A
KX26-2	CB,Loc A,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A

Product data sheet

Specifications



Circuit breaker, PowerPacT J, unit mount, Micrologic 3.2S, 250A, 3 pole, 14kA, 600VAC

JDL36250CU33X

Main

Range	PowerPact
Product name	PowerPact J
Product or Component Type	Circuit breaker
Device application	Distribution

Complementary

Line Rated Current	250 A
Number of Poles	3P
Control type	Toggle
Breaking capacity code	D
Breaking capacity	25 kA 240 V AC 50/60 Hz UL 489 18 kA 480 V AC 50/60 Hz 14 kA 600 V AC 50/60 Hz 20 kA 250 V DC
[Ue] rated operational voltage	600 V AC 50/60 Hz IEC 60947-3
Network Frequency	50/60 Hz
[Ics] rated service breaking capacity	25 kA 220/240 V AC 50/60 Hz IEC 60947-2 18 kA 380/440/415 V AC 50/60 Hz IEC 60947-2 14 kA 500/525 V AC 50/60 Hz IEC 60947-2 20 kA 250 V DC IEC 60947-2 20 kA 500 V DC IEC 60947-2
[Uimp] rated impulse withstand voltage	8 kV IEC 60947-2
Trip unit technology	Electronic, standard, Micrologic 3.2 S, LSI
[Ui] rated insulation voltage	750 V IEC 60947-2
Trip unit name	Micrologic 3.2 S
Protection Type	Overload protection Short-circuit protection
Suitability for isolation	Yes IEC 60947-2
Utilisation category	Category A
AWG gauge	Please see CB outline drawing for lug and termination details
Local signalling	Ready 1 LED green) Alarm 1 LED 90 % Ir orange)

	Alarm 1 LED 105 % Ir red) Switched off (OFF) 1 trip indicator green)
Mounting mode	Unit mount lug)
Mounting Support	Lug
Electrical connection	Lugs line Lugs load
Terminal identifier	Please see CB outline drawing for lug and termination details
Long time pick-up adjustment range	0.25...1 x In
Tightening torque	221.27 lbf.in (25 N.m) 0.15...0.29 in² (95...185 mm²) (AWG 3/0...350 kcmil)
Number of slots	2 auxiliary switch OF plug-in) 1 alarm switch SD plug-in) 1 overcurrent trip switch SDE plug-in) 1 voltage release MN or MX plug-in)
Power wire stripping length	0.98 in (25 mm)
Height	7.52 in (191 mm)
Width	4.09 in (104 mm)
Depth	3.39 in (86 mm)
Net weight	5.29 lb(US) (2.4 kg)
Communication interface	Modbus Ethernet

Environment

Quality labels	CE
Standards	UL CSA NEMA NOM-003-SCFI-2000 IEC 60947-2
Product certifications	UL CSA NOM
IP degree of protection	Front cover IP40
Pollution degree	3 IEC 60947-1
Ambient Air Temperature for Operation	28...158 °F (-2...70 °C)
Ambient Air Temperature for Storage	-58...185 °F (-50...85 °C)
Operating altitude	< 6561.68 ft (2000 m) without derating 5000 m with derating

Ordering and shipping details

Category	01107-H/J ELEC TRIP UNIT MOUNT BREAKER/SW
Discount Schedule	DE2
GTIN	785901952282
Nbr. of units in pkg.	1
Package weight(Lbs)	5.00 lb(US) (2.268 kg)
Returnability	Yes
Country of origin	US

Packing Units

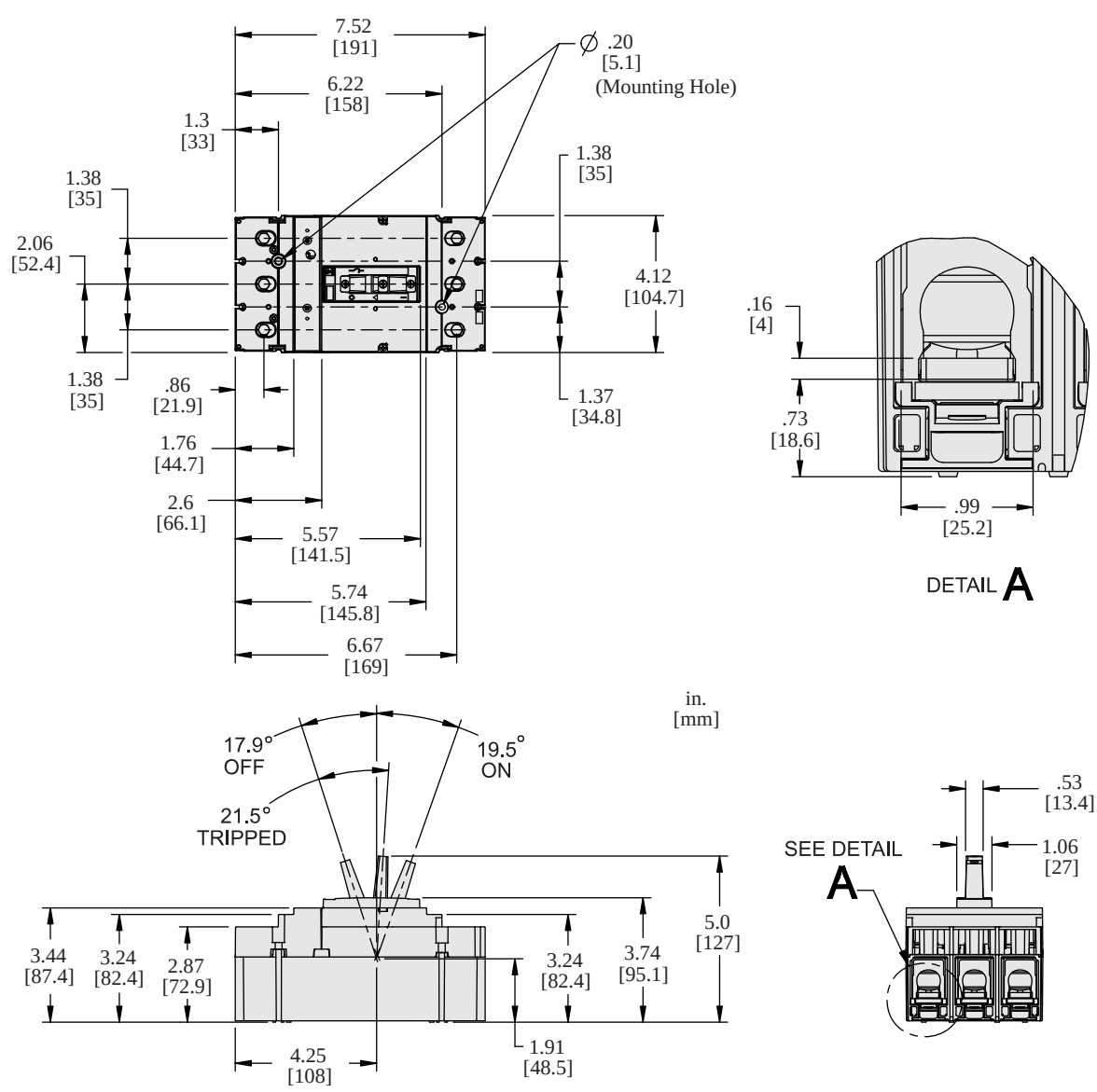
Unit Type of Package 1	PCE
Package 1 Height	5.13 in (13.018 cm)

Package 1 width	7.25 in (18.415 cm)
Package 1 Length	8.44 in (21.433 cm)

Offer Sustainability

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

Dimensions

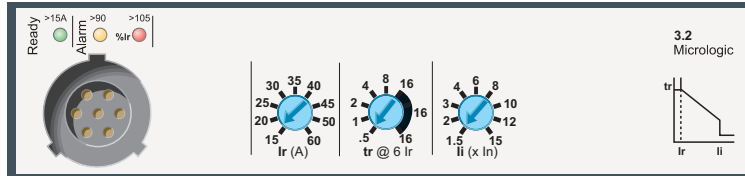


Please see CB outline drawing for lug and termination details

PowerPact™ H-, J-, and L-Frame Circuit Breakers Trip Units

Micrologic™ 3 Trip Units

Micrologic 3 trip units can be used on PowerPact H-, J-, and L-Frame circuit breakers with performance levels D/G/J/L.



They provide:

- standard protection of distribution cables
- indication of:
 - overloads (using LEDs)
 - overload tripping (using the SDx relay module).

Circuit breakers equipped with Micrologic 3 trip units can be used to protect distribution systems supplied by transformers.

Protection

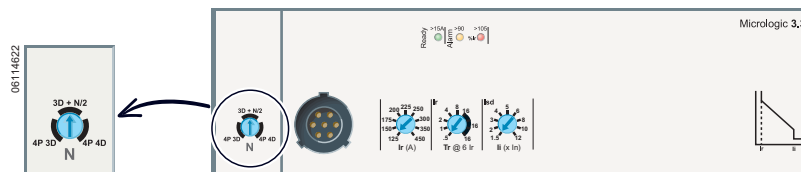
Settings are made using the adjustment rotary switches.

Overloads: Long time protection (I_r)

Inverse time protection against overloads with an adjustable current pick-up I_r set using a rotary switch and an adjustable time delay t_r .

Neutral protection

- On 3-pole L-frame circuit breakers, neutral protection is not possible.
- On four-pole L-frame circuit breakers, neutral protection may be set using a three-position switch:
 - switch position 4P 3D: neutral unprotected
 - switch position 4P 3D + N/2: neutral protection at half the value of the phase pick-up, ($0.5 \times I_r$)
 - switch position 4P 4D: neutral fully protected at I_r



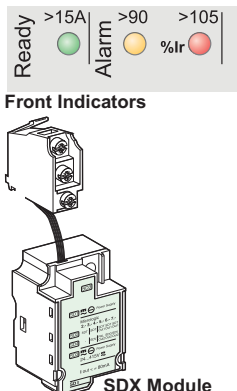
Indicators

Front indicators

- The green “Ready” LED blinks slowly when the electronic trip unit is ready to provide protection. It indicates the trip unit is operating correctly.
- Orange overload pre-alarm LED: steady on when $I > 90\% I_r$
- Red overload LED: steady on when $I > 105\% I_r$

Remote indicators

An overload trip signal can be remotely checked by installing an SDx relay module inside the circuit breaker. This module receives the signal from the Micrologic electronic trip unit through an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. See page 94.



PowerPact™ H-, J-, and L-Frame Circuit Breakers Trip Units

Table 50: Micrologic™ 3 Trip Unit

Ratings	I _n at 104°F (40°C) ¹		60 A	100 A	150 A	250 A	400 A	600 A
Circuit Breaker	H-frame		X	X	X			
	J-frame					X		
	L-frame					X	X	X

Micrologic 3.2 / 3.3 trip units

L Long-time protection

Pick-Up (A) Tripping between 1.05 and 1.20 I _r	I _r		Value depending on sensor rating (I _n) and setting on rotary switch								
	I _n =60 A	I _r =	15	20	25	30	35	40	45	50	60
	I _n = 100 A	I _r =	35	40	45	50	60	70	80	90	100
	I _n = 150 A	I _r =	50	60	70	80	90	100	110	125	150
	I _n = 250 A	I _r =	70	80	100	125	150	175	200	225	250
	I _n = 400 A	I _r =	125	150	175	200	225	250	300	350	400
	I _n = 600 A	I _r =	200	225	250	300	350	400	450	500	600

Time Delay (s) Accuracy 0 to -20%	t _r		0.5	1	2	4	8	16
		1.5 x I _r	15	25	50	100	200	400
		6 x I _r	0.5	1	2	4	8	16
		7.2 x I _r	0.35	0.7	1.4	2.8	5.5	11

Thermal memory 20 minutes before and after tripping

I Instantaneous

Pick-up (A) accuracy ± 15%	I _i x	60 A	1.5	2	3	4	6	8	10	12	15	
		100 A	1.5	2	3	4	6	8	10	12	15	
		150 A	1.5	2	3	4	6	8	10	12	15	
		250 A	1.5	2	3	4	5	6	8	10	12	
		400 A	1.5	2	3	4	5	6	8	10	12	
		600 A	1.5	2	3	4	5	6	8	10	11	
	Non-tripping time		10 ms									
	Maximum break time		50 ms for I > 1.5 I _i									

Micrologic 3.2S / 3.3S trip units

L Long-time protection

Pick-Up (A) Tripping between 1.05 and 1.20 I _r	I _r		Value depending on sensor rating (I _n) and setting on rotary switch								
	I _n =60 A	I _r =	15	20	25	30	35	40	45	50	60
	I _n = 100 A	I _r =	35	40	45	50	60	70	80	90	100
	I _n = 150 A	I _r =	50	60	70	80	90	100	110	125	150
	I _n = 250 A	I _r =	70	80	100	125	150	175	200	225	250
	I _n = 400 A	I _r =	125	150	175	200	225	250	300	350	400
	I _n = 600 A	I _r =	200	225	250	300	350	400	450	500	600

Time Delay (s) Accuracy 0 to -20%	t _r		non-adjustable
		1.5 x I _r	400
		6 x I _r	16
		7.2 x I _r	11

Thermal memory 20 minutes before and after tripping

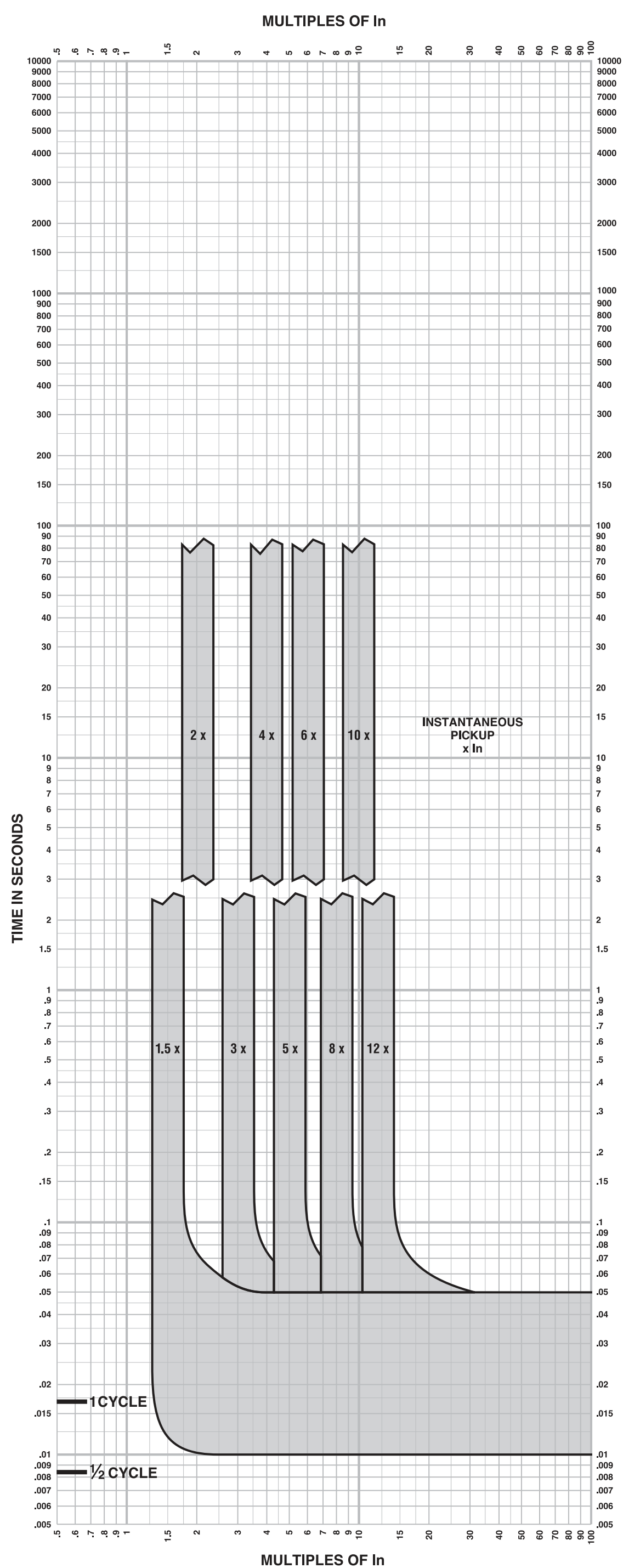
S Short-time protection

Pick-up (A) accuracy ± 10%	I _{sd} - I _r x...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	t _{sd}	non-adjustable									
	Non-tripping time	20									
	Maximum break time	80									

I Instantaneous

Pick-up (A) accuracy ± 15%	I _i x I _n		1.5	2	3	4	6	8	10	12	15
Non-tripping time		10 ms									
Maximum break time		50 ms for I > 1.5 I _i									

¹ If the trip units are used in high-temperature environments, the Micrologic trip unit setting must take into account the thermal limitations of the circuit breaker. See the temperature derating information on page 126.



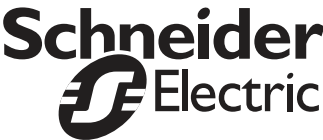
MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.2/3.2S/5.2A or E/6.2A or E
Instantaneous Trip Curve
250A J-Frame

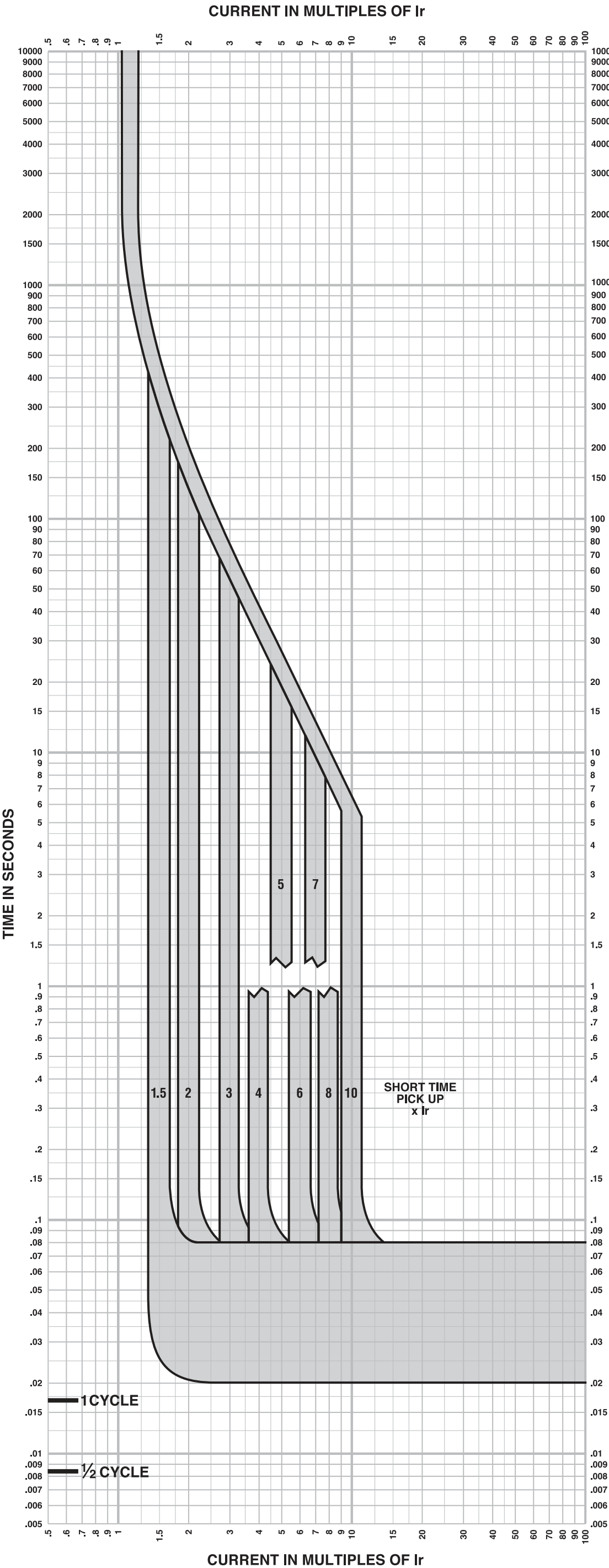
The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. I_n = Maximum dial setting of I_r .
250A J-Frame: I_n = 250A = Max I_r setting

Curves apply from -35°C to +70°C (-31°F to +158°F) ambient temperature.





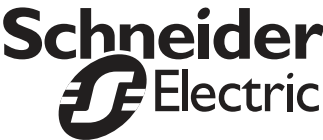
MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.2S Long Time/
Short Time Trip Curve
250A J-Frame

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

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.

Curves apply from -35°C to +70°C (-31°F to +158°F) ambient temperature.





Battery Charger-6 Amp

A045D925 60Hz/50Hz



Description

Cummins® fully automatic battery chargers are designed to both recharge your batteries, and extend your battery's life in applications where it is stored for long periods of time. This charger can handle poor power quality, exposure to extreme weather and rough handling.

To maximize battery life, a 3-stage charging cycle is implemented. The three charging stages are bulk stage, absorption stage and maintenance stage. During the bulk stage, the charger uses its full amp output to do the heaviest charging, quickly bringing your battery to about 75% of capacity. In the absorption stage, the current slows, adjusting for maximum charging efficiency while it gently tops off the battery to about 98% of capacity.

During the maintenance stage, a lower, closely-regulated, constant voltage is applied to maintain full charge and prevent discharge.

Unlike some "trickle chargers," the float charger won't apply more current than necessary to maintain full charge. Batteries can be connected indefinitely, without harm; in fact, the float charge extends battery life.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Lightweight and Silent – Lighter than transformer types, completely silent but still provides full output when overloaded outlets drop AC voltage below the normal 115V.

Monitoring – Status LED indicators are provided to show the condition or charging status of the battery. When the red LED is on, it indicates that the battery is discharged and is recharging at the 'BULK' rate. When both the red and green LEDs are on, the battery is charging at the 'midrange' rate. When the green LED is on, the battery is 90% charged and ready for use.

Construction – Made using epoxy-potted cases making it the ultimate in durability, completely waterproof and able to withstand numerous caustic chemicals and gases, as well as being shockproof.

Fault Indication – The charger senses and indicates the following fault conditions: Defective or damaged cells, under-voltage at the battery, battery drawing more current than charger can replace, loss of power or extremely low AC voltage at the charger, other battery fault conditions and charger failure.

Compatibility – Works with Sealed Lead Acid (SLA), Absorbed Glass Mat (AGM) and Gel type batteries.

Low Electromagnetic and Radio

Frequency Interference – This product meets FCC class B for conducted and radiated emissions.

Listed – This product is UL listed according to the UL 1236 Standard.

Warranty – This product has a two year warranty

Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12 VDC
	Float voltage – 12 V batteries	13.0-13.6 VDC at 0-2 amps
	Maximum output current	6 A @ 12 VDC nom
Input:	Voltage AC	115, 208, 240 $\pm 10\%$, 90-135
	Frequency	60 Hz $\pm 5\%$
Battery:	Maximum battery size	150 Amp Hours
	Maximum recharge time	20 hours
Approximate net weight		4 lbs. (1.81 Kg)
Approximate dimensions: height x width x depth-in(mm)		2.25 x 6.4 x 3.5 (57 x 162 x 89)
Ambient temperature operation: At full rated output		40 °F to 158 °F (-40 °C to 70 °C)



Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

Warning: For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.

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

Our energy working for you.™

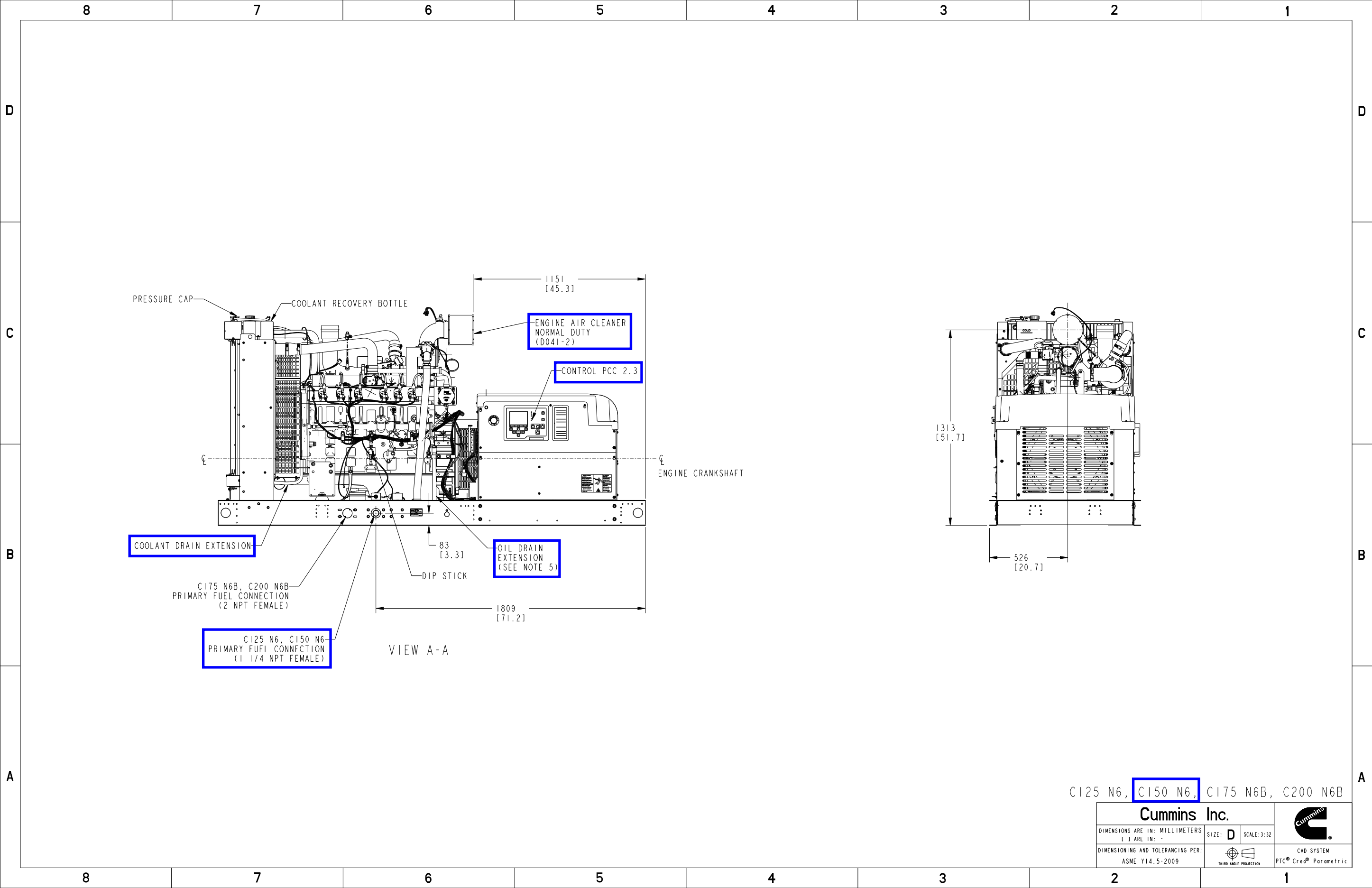


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NAAC-5943-EN / A059R693 (03/19)

SECTION 4

Generator Drawings



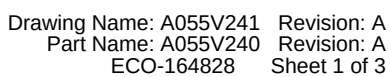


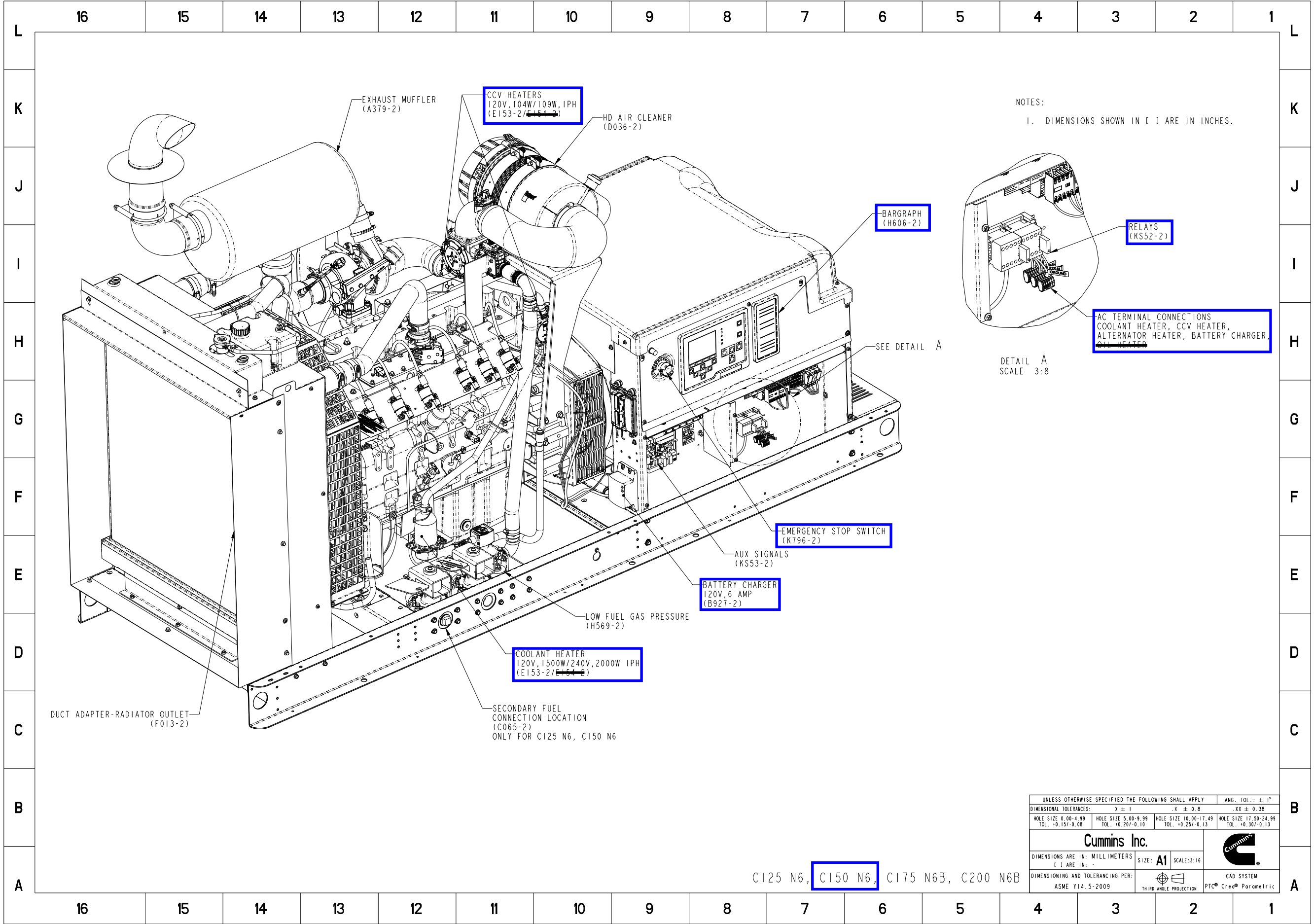
Cummins Data Classification:
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Part Number: **A055J588** Part Revision: **D**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Detail** State: **Released** Sheet 2 of 3

A





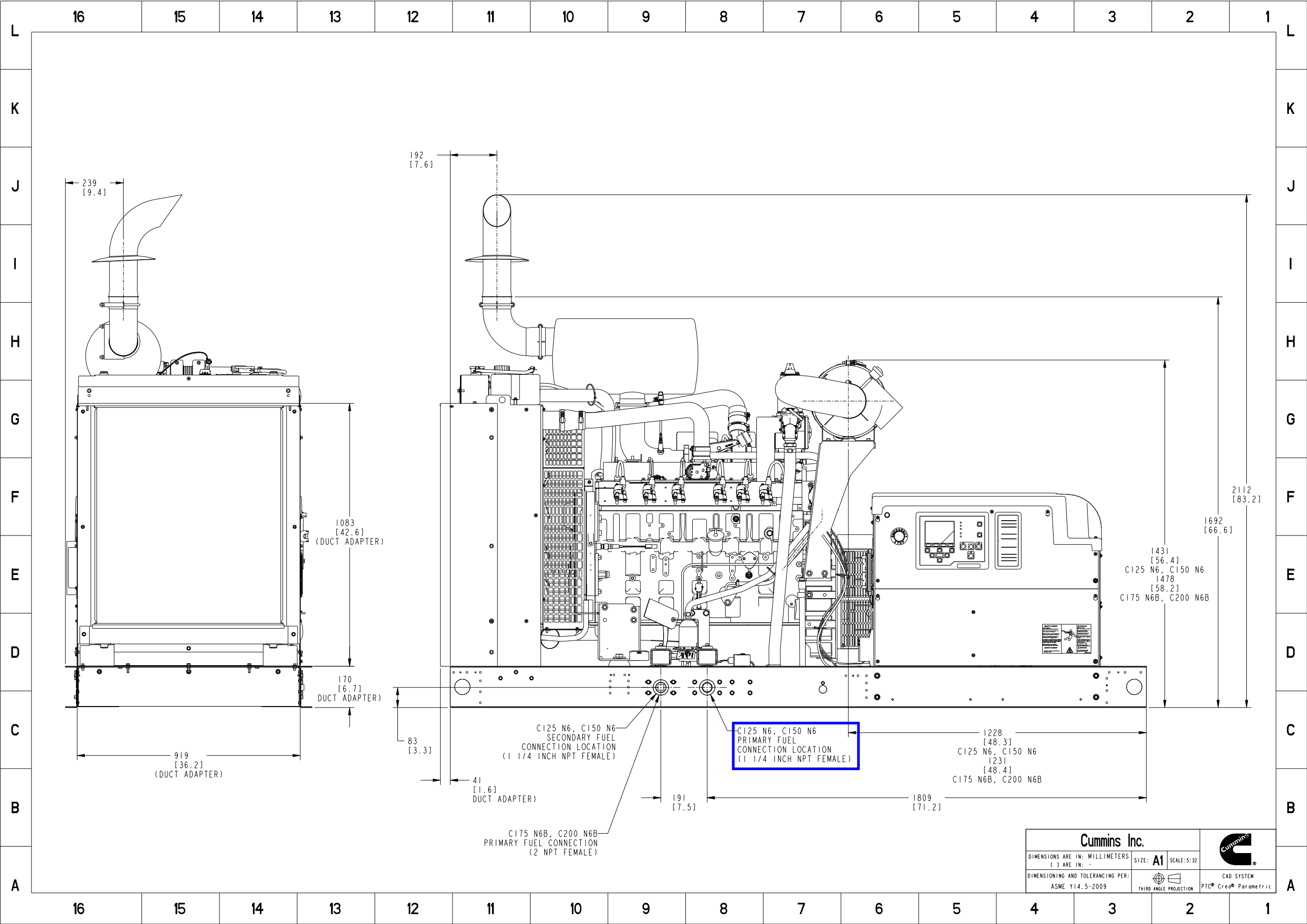
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Part Number: **A055J592** Part Revision: **C**

Part Name: **OUTLINE,GENSET**

Drawing Category: **Detail** State: **Released** Sheet 1 of 3



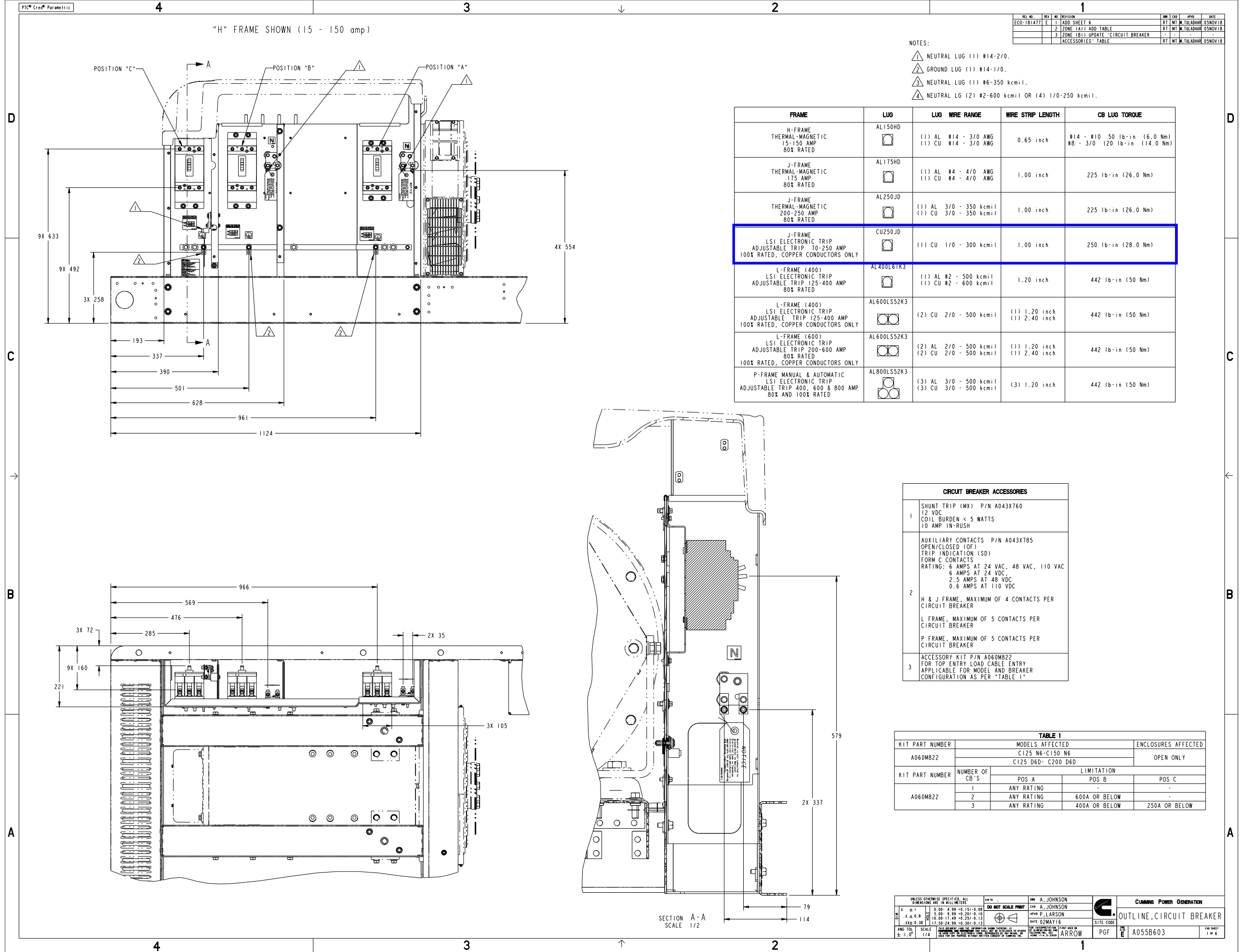
Cummins Data Classification:
Cummins Confidential

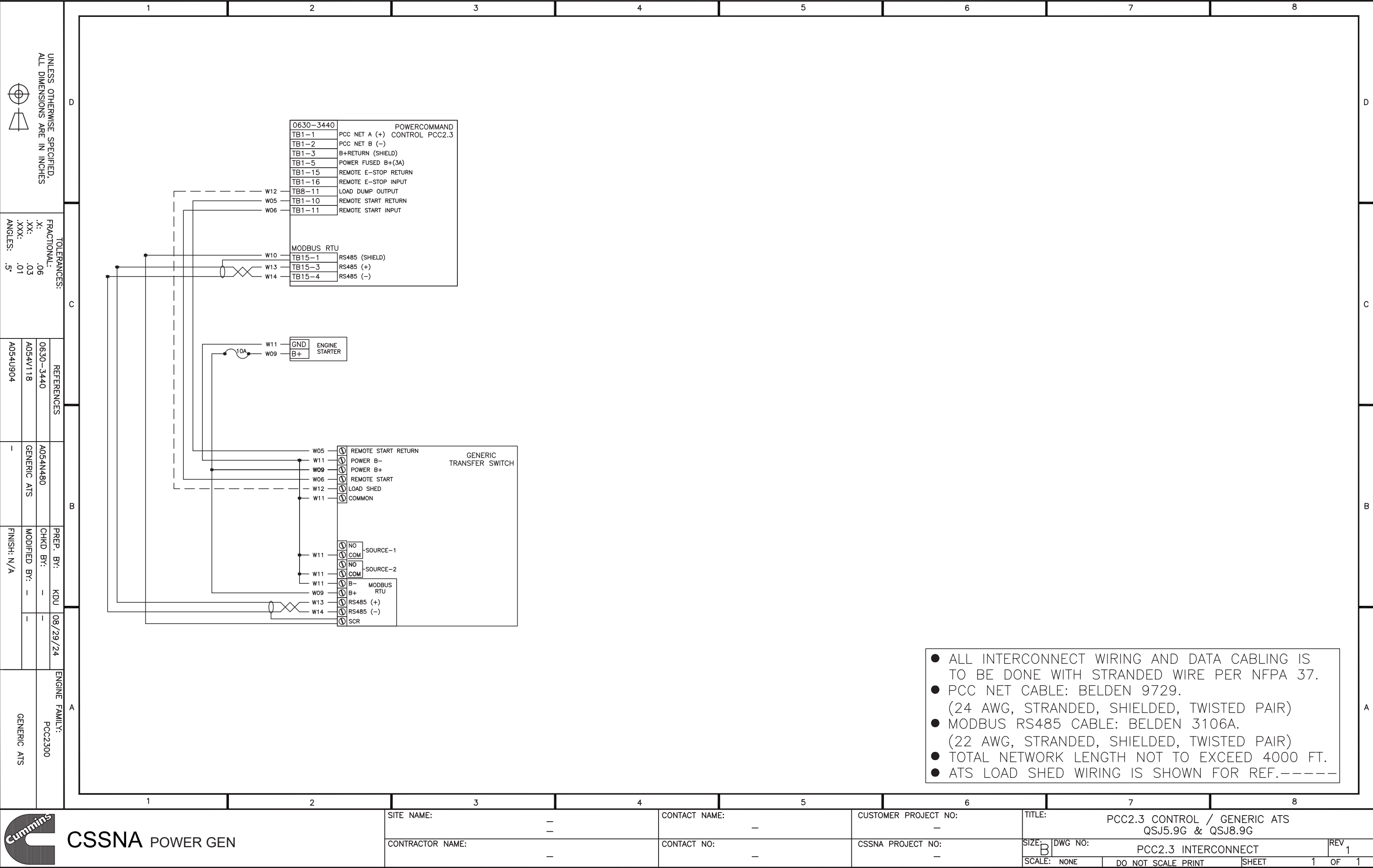
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Part Number: **A055J592** Part Revision: **C**

Part Name: **OUTLINE,GENSET**

Drawing Category: **Detail** State: **Released** Sheet 2 of 3





<

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES							
AC ACCESSORY LOAD TABLE							
CUSTOMER AC CONNECTION TERMINALS							
CLOSED CRANKCASE VENTILATION HEATERS COOLANT HEATER ALTERNATOR HEATER BATTERY CHARGER 12 Vdc LINE NEUTRAL GROUND LINE NEUTRAL GROUND							
COOLANT HEATER 1500 WATTS, 120 VAC, 12.5 AMPS CCV HEATERS 120 WATTS, 120VAC, 1.0 AMP BATTERY CHARGER 192 WATTS, 120 VAC, 1.67 AMPS ALTERNATOR HEATER 100 WATTS, 120 VAC, 0.83 AMPS							
NOTES: 1. INSTALLER TO PROVIDE BRANCH CIRCUITS TO POWER ALL ACCESSORIES 2. ALL ACCESSORIES ARE SINGLE PHASE 120/240 Vac 60 Hz 3. FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRIC CODES FOR INSTALLATION 4. CCV HEATERS MUST BE CONNECTED TO A CONTINUOUSLY ENERGIZED CIRCUIT FROM BOTH UTILITY AND GENERATOR							
AC TERMINAL CONNECTIONS (COOLANT HEATER,CCV HEATER) AC TERMINAL CONNECTIONS (ALTERNATOR HEATER,BATTERY CHARGER,OIL HEATER)							
TITLE: C-SERIES AC LOAD TABLE							
SIZE: B DWG NO: SCALE: DO NOT SCALE PRINT SHEET 1 OF 1							
REV 3							

SECTION 5

Startup & Warranty





Cummins Sales and Service

Customer / Contractor Pre Commissioning Inspection Form

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

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

Project Name/End User: _____

Contractor: _____

Address: _____ Contact: _____

Business Phone: _____ Cell Phone: _____

Email: _____

ON SITE INFORMATION

On-Site Contact Information: _____

Address: _____

Time Requested Onsite: _____

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

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

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

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

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

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

If yes when is the inspector scheduled for: _____

ON SITE INFORMATION CONTINUED

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐

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

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

Will customer representative be on site for operator training?

On site contact for operator training: _____

MECHANICAL LOCATION AND PLACEMENT OF THE GENERATOR SET

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Generator is properly secured to pad or vibration isolators

Generator Enclosure and/or Room is free of all debris

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

Room is designed for adequate inlet and outlet airflow

GASEOUS FUEL Natural Gas/LP Vapor/LP Liquid

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Natural gas and/or LPG fuel supply is connected.

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

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

Fuel pressure after service regulator is: _____ inches of H2O

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

Contractor "requestor" Signature

Date

DIESEL FUELED GENERATORS

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Flexible fuel connections, (supply and return) are connected to generator and piping.

Day tank installed, wired and plumbed (lines free of obstruction) to genset and main fuel tank if applicable. Only black iron pipe for fuel lines, never use copper or galvanized pipe.

All tanks filled with enough fuel to perform startup and testing.

A return line from engine to day tank and day tank to main tank should be in place

EXHAUST SYSTEM

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Exhaust wrapped or isolated to prevent accidental activation of fire protection devices and sprinklers.

Exhaust flex-pipe is installed at engine exhaust outlet (The silencer and flex-pipe are supplied with the generator set).

Silencer is installed with appropriate supports (no weight should be placed on the exhaust outlet of the genset).

Exhaust system has proper expansion joints and wall thimbles (Thimbles are required for wall or roof penetration).

GENERATOR ELECTRICAL CONNECTIONS

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Load conductors connected to breakers

Flexible connections used on all conduit connections to the generator set output box

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

AC Power conductors in dedicated conduit separate from any DC control or network wiring

Ground fault connected/functioning on generator, if supplied

AC power wired to the coolant heaters (Do NOT energize)

Check for AC oil pan heater, control heater or generator winding heater (Needing AC wiring)

Generator is grounded in compliance with local codes

If applicable, louver motors are operational and connected to generator controls

GENERATOR ELECTRICAL CONNECTIONS CONTINUED

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐

Annunciator mounted in a location where someone can observe a fault of the remote generator system

Where is annunciator located? _____

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

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

TRANSFER SWITCH ELECTRICAL CONNECTIONS

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐

Conductors connected for Utility, Load and Emergency

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

Four Pole Transfer Switch: Is generator neutral grounded?

DAY OF STARTUP

YES NA NO

☐	☐	☐
☐	☐	☐
☐	☐	☐

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

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

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

Exercise with or without load?

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

Contractor "requestor" Signature

Printed Name

Date: _____

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

Limited Warranty

Commercial Generating Set

This limited warranty applies to all Cummins Power Generation® branded commercial generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date[†] is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. See table for details.

Continuous Power (COP) is defined as being the maximum power which the generating set is capable of delivering continuously whilst supplying a constant electrical load when operated for an unlimited number of hours per year. No overload capability is available for this rating.

Prime Power (PRP) is defined as being the maximum power which a generating set is capable of delivering continuously whilst supplying a variable electrical load when operated for an unlimited number of hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. For applications requiring permissible average output higher than stated, a COP rating should be used.

Limited-Time Running Power (LTP) is defined as the maximum power available, under the agreed operating conditions, for which the generating set is capable of delivering for up to 500 hours of operation per year.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage 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.

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.

Data Center Continuous (DCC) is defined as the maximum power which the generator is capable of delivering continuously to a constant or varying electrical load for unlimited hours in a data center application.

**Base Warranty Coverage Duration
(Whichever occurs first)**

Rating	Months	Max. Hours
COP	12	Unlimited
PRP	12	Unlimited
LTP	12	500 hrs
ESP	24	1000 hrs
EPA-SE	24	Unlimited
DCC	24	Unlimited

[†] Warranty start date for designated rental and oil and gas model Products is determined to be date of receipt of Product by the end customer.

Cummins Power Generation® Responsibilities:

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

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Inappropriate use of an EPA-SE application generator set relative to EPA's standards.
- Normal wear and tear.
- Improper and/or unauthorized installation.
- Negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.

- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.

A "Data center" is defined as a dedicated facility that house computers and associated equipment for data storage and data handling.

Reliable utility is defined as utility power without routine or regularly scheduled black-outs.

Please contact your local Cummins Power Generation® Distributor for clarification concerning these limitations.

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

Extended Warranty:

Cummins Power Generation® offers several levels of Extended Warranty Coverage. Please contact your local Cummins Power Generation® Distributor for details.

www.power.cummins.com

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IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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

Product Model Number: _____
 Product Serial Number: _____
 Date in Service: _____