

**CUMMINS / DQCC 800**



**Sales and  
Service**

**Cummins Sales and Service**



**800kw**

# NOTICE

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THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY OF FROM OUR VENDORS. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS IS POSSIBLE. PLEASE REVIEW IT CAREFULLY AND THOROUGHLY.

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## Bill of Materials

Item	Description	Qty
	<b>Diesel Genset: 60Hz-800kW</b>	
	U.S. EPA, Stationary Emergency Application	2
800DQCC	Genset-Diesel,60Hz,800kW	2
A331-2	Duty Rating-Standby Power	2
L090-2	Listing-UL 2200	2
L170-2	Emissions Certification, EPA, Tier 2, NSPS CI Stationary Emergency	2
F202-2	Enclosure-Steel,SndAtt,Level 2,Base Mtd,w/ExhSys	2
C251-2	Fuel Tank-Subbase,1500 Gallon,UL142 Compliant	2
R002-2	Voltage-277/480,3 Phase,Wye,4 Wire	2
B276-2	Alternator-60Hz,3 Phase,Wye,Limited Range125C	2
H703-2	Generator Set Control-PowerCommand 2.3	2
H536-2	Display Language-English	2
H678-2	Display-Control, LCD	2
K020-2	Display, Running Time	2
KS53-2	Signals - Auxiliary, 8 Inputs/8 Outputs	2
KP74-2	Stop Switch-Emergency,Externally Mounted	2
H609-2	Control Mounting-Left Facing	2
KU93-2	CB or EB or TB-Left Only	2
KP89-2	CB-1200A,3P,600/690V,UL/IEC,ServEnt,100%UL,Left	2
KB73-2	CB or EB or TB-Bottom Entry, Left	2
H666-2	Indication-Ground Fault, 3-Pole Xfr Sw, Rmt Mt CT	2
KP99-2	Ckt Brkr Access, 24VDC Trip, Aux&Trip Contacts,LS	2
P175-2	Enclosure Color-Green,Steel Enclosure	2
L116-2	5 Gallon Fill/Spill Box	2
L163-2	Listing, ULC-S601-07	2
F208-2	Cooling Air Outlet-Horizontal ,Sound Attenuated	2
C215-2	Alarm-High Fuel Fill	2
C127-2	Separator-Fuel/Water	2
C256-2	Fuel Tank Connection-Dual Stub Up	2
E074-2	Engine Cooling-Radiator, 50C Ambient	2
H389-2	Shutdown-Low Coolant Level	2
H557-2	Coolant Heater-208/240/480V, Below 40F Ambient Temp	2
D041-2	Engine Air Cleaner-Normal Duty	2
L026-2	Test Record-Certified	2
L028-2	Genset Warranty- Base	2
A048G602	Battery Charger. 10amp-120/208/240Vac (60/50Hz)	2
0300-5929-02	Annunciator - (RS485)	2



# Diesel generator set QSK23 series engine

600 kW - 800 kW 60 Hz Standby



## Description

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

## Features

**Cummins heavy-duty engine** - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

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

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

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

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

**Peer-to-peer paralleling** - For applications where two or more generators with PowerCommand 3.3 control can be combined with an electrically operated circuit breaker and a combination of transfer switch(s).

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

**Enclosures** - Optional weather protective and sound attenuated enclosures are available.

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

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

	Standby rating	Prime rating	Continuous rating	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz
DQCA	600 (750)	545 (681)		D-3352
DQCB	750 (938)	680 (850)		D-3353
DQCC	800 (1000)	725 (906)		D-3354

## Generator set specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 61000-4-2: Level 4 electrostatic discharge IEC 61000-4-3: Level 3 radiated susceptibility

## Engine specifications

Bore	169.9 mm (6.69 in)
Stroke	169.9 mm (6.69 in)
Displacement	23.15 liters (1413 in <sup>3</sup> )
Configuration	Cast iron, in line 6 cylinder
Battery capacity	1400 amps minimum at ambient temperature of 0 °C to 10 °C (32 °F to 50 °F)
Battery charging alternator	35 amps
Starting voltage	24 volt, negative ground
Fuel system	Direct injection: number 2 diesel fuel, fuel filter, automatic electric fuel shutoff
Fuel filter	Spin-on fuel filters with water separator
Air cleaner type	Dry replaceable element with restriction indicator
Lube oil filter type(s)	Fleet guard dual venturi spin-on, combination full flow and bypass filters
Standard cooling system	High ambient radiator

## Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Single bearing flexible disc
Insulation system	Class H
Standard temperature rise	125 °C Standby at 40 °C ambient
Exciter type	Permanent Magnet Generator (PMG)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3%

## Available voltages

### 60 Hz Line-Neutral/Line-Line

- |           |           |           |           |
|-----------|-----------|-----------|-----------|
| • 110/190 | • 127/220 | • 230/380 | • 277/480 |
| • 115/200 | • 139/240 | • 240/416 | • 347/600 |
| • 120/208 | • 220/380 | • 255/440 |           |

Note: Consult factory for other voltages.

## Generator set options and accessories

### Engine

- 208/240/480 V coolant heater for ambient below 4.5 °C (40 °F)
- Fuel/water separator
- Heavy duty air cleaner

### Alternator

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

- 120/240 V anti-condensation heater
- Temperature sensor - alternator bearing RTD

### Control panel

- PC3.3
- PC3.3 with MLD
- 120/240 V 100 W control anti-condensation heater
- Ground fault indication
- Remote fault signal package
- Run relay package

- Run time display

### Cooling system

- 50 °C ambient

## Generator set options and accessories (continued)

### Exhaust system

- Industrial grade exhaust silencer (12 to 18 dBA)
- Residential grade exhaust silencer (18 to 25 dBA)
- Critical grade exhaust silencer (25 to 35 dBA)
- Super critical exhaust silencer (35 to 45 dBA)

### Generator set

- AC entrance box
- Battery
- Battery rack with hold-down
- Circuit breaker - set mounted
- Remote annunciator panel
- Spring isolators

### • 2 year warranty

- 5 year warranty
- 10 year major components warranty

Note: Some options may not be available on all models - consult factory for availability.

## PowerCommand 2.3 – control system



**PowerCommand 2.3 control** - An integrated generator set control system providing voltage regulation, engine protection, generator protection, operator interface, and isochronous governing (optional).

**Control** - 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 (5000 meters).

**Prototype tested** - UL, CSA, and CE compliant.

### 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 (over crank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout

- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown

### Operator/display panel

- Manual off switch
- 128 x 128 alpha-numeric display with push button access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -20 °C to +70 °C

### Alternator data

- Line-to-Neutral AC volts
- Line-to-Line AC volts
- 3-phase AC current
- Frequency
- kVA, kW, power factor

### Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature

### 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)
- Total kilowatt hours
- Load profile

### Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

### Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase Line-to-Line sensing
- Configurable torque matching
- Fault current regulation under single or three phase fault conditions



### Control functions

- Time delay start and cool down
- Glow plug control (some models)
- Cycle cranking
- PCCNet interface
- (4) Configurable inputs
- (4) Configurable outputs
- Remote emergency stop
- Battle short mode
- Load shed
- Real time clock with exerciser
- Derate

### Options

- Auxiliary output relays (2)
- 120/240 V, 100 W anti-condensation heater
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand for Windows® remote monitoring software (direct connect)
- AC output analogue meters
- PowerCommand 2.3 and 3.3 control with AmpSentry protection

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 loads 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):

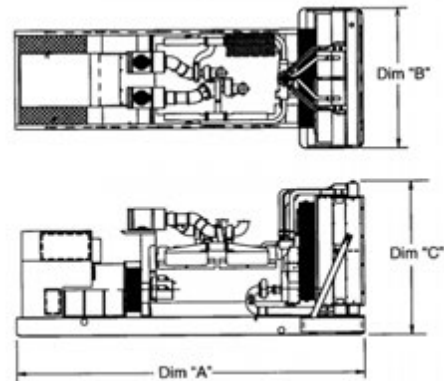
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

#### Prime Power (PRP):

Applicable for supplying power to varying electrical loads 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

### Dimensions and weights with standard cooling system

Model	Dim 'A' (mm) (in.)	Dim 'B' (mm) (in.)	Dim 'C' (mm) (in.)	Set weight* dry (kg) (lbs)	Set weight* wet (kg) (lbs)
DQCA	4395.4 (173)	1855.5 (73)	2065.7 (81)	6075 (13395)	6337 (13973)
DQCB	4395.4 (173)	1855.5 (73)	2065.7 (81)	6075 (13395)	6337 (13973)
DQCC	4395.4 (173)	1855.5 (73)	2065.7 (81)	6075 (13395)	6337 (13973)





### Dimensions and weights with optional cooling system with seismic feature codes L228-2 and/or L225-2

Model	Dim 'A' (mm) (in.)	Dim 'B' (mm) (in.)	Dim 'C' (mm) (in.)	Set weight* dry (kg) (lbs)	Set weight* wet (kg) (lbs)
DQCA	4395.4 (173)	1715 (68)	2060.1 (81.1)	6377 (14061)	6518 (14372)
DQCB	4395.4 (173)	1715 (68)	2060.1 (81.1)	6377 (14061)	6518 (14372)
DQCC	4395.4 (173)	1715 (68)	2060.1 (81.1)	6377 (14061)	6518 (14372)

\* Weights represent a set with standard features. See outline drawings for weights of other configurations.

## Codes and standards

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

	<p>This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.</p>		<p>The generator set is available listed to UL 2200 for all 60 Hz low voltage models, Stationary Engine Generator Assemblies. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.</p>
	<p>The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.</p>	<p><b>U.S. EPA</b></p>	<p>Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.</p>
	<p>All low voltage models are CSA certified to product class 4215-01.</p>	<p><b>International Building Code</b></p>	<p>The generator set package is available certified for seismic application in accordance with the following International Building Code: IBC2000, IBC2003, IBC2006, IBC2009, and IBC2012.</p>

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

For more information contact your local Cummins distributor or visit [power.cummins.com](http://power.cummins.com)

**Our energy working for you.™**



## Generator Set Data Sheet



<b>Model:</b>	<b>DQCC</b>
<b>Frequency:</b>	<b>60 Hz</b>
<b>Fuel Type:</b>	<b>Diesel</b>
<b>kW Rating:</b>	<b>800 Standby</b> <b>725 Prime</b>
<b>Emissions level:</b>	<b>EPA NSPS Stationary Emergency Tier 2</b>

Exhaust emission data sheet:	EDS-1088
Exhaust emission compliance sheet:	EPA-1122
Sound data sheet:	MSP-1160
Sound data sheet – with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD):	MSP-1014
Cooling system data in various ambient conditions:	MCP-249
Cooling system data in various ambient conditions – with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD):	MCP-175
Prototype test summary data sheet:	PTS-160

Fuel Consumption	Standby				Prime				Continuous
	kW (kVA)				kW (kVA)				kW (kVA)
Ratings	800 (1000)				725 (906)				
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full	Full
US gph	17.0	29.0	41.0	53.0	15.5	27.5	38.0	48.0	
L/hr	64.4	109.8	155.2	200.6	58.7	104.1	143.8	181.7	

Engine	Standby rating	Prime rating	Continuous rating
Engine manufacturer	Cummins Inc.		
Engine model	QSK23-G7 NR2		
Configuration	Cast iron, in line 6 cylinder		
Aspiration	Turbocharged and air-to-air after-cooled		
Gross engine power output, kWm (bhp)	910 (1220)	809 (1085)	
BMEP at set rated load, kPa (psi)	2510 (364)	2282 (331)	
Bore, mm (in.)	170 (6.69)		
Stroke, mm (in.)	170 (6.69)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	10.21 (2010)		
Compression ratio	16:1		
Lube oil capacity, L (qt)	102 (108)		
Overspeed limit, rpm	2100		
Regenerative power, kW	93		

Fuel Flow		
Maximum fuel flow, L/hr (US gph)	685 (181)	
Maximum fuel inlet restriction, kPa (in Hg)	13.44 (4)	
Maximum fuel inlet temperature, °C (°F)	71 (160)	

<b>Air</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Combustion air, m <sup>3</sup> /min (scfm)	64 (2265)	62 (2201)	
Maximum air cleaner restriction, kPa (in H <sub>2</sub> O)	6.2 (25)		
Alternator cooling air, m <sup>3</sup> /min (cfm)	117 (4156)		

### Exhaust

Exhaust flow at set rated load, m <sup>3</sup> /min (cfm)	155 (5455)	147 (5191)	
Exhaust temperature, °C (°F)	483 (902)	461 (862)	
Maximum back pressure, kPa (in H <sub>2</sub> O)	10.1 (40.8)		

### Standard Set-mounted Radiator Cooling (non-seismic)

Ambient design, °C (°F)	50 (122)		
Fan load, kW <sub>m</sub> (HP)	24 (32)		
Coolant capacity (with radiator), L (US gal)	109.5 (29)		
Cooling system air flow, m <sup>3</sup> /min (scfm)	1069.8 (37779.6)		
Total heat rejection, MJ/min (Btu/min)	33.52 (31793)	30.22 (28672)	
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	30.47 (9)		

### Optional Set-mounted Radiator Cooling (with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD))

Ambient design, °C (°F)	45 (113)		
Fan load, kW <sub>m</sub> (HP)	27 (36)		
Coolant capacity (with radiator), L (US gal)	89 (23.5)		
Cooling system air flow, m <sup>3</sup> /min (scfm)	1252 (44183)		
Total heat rejection, MJ/min (Btu/min)	33.52 (31793)	30.22 (28672)	
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	30.47 (9)		

### Optional Heat Exchanger Cooling

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

	Standby rating	Prime rating	Continuous rating
Raw water delta P at min flow, aftercooler circuit, kPa (psi)			
Raw water delta P at min flow, fuel circuit, kPa (psi)			
Maximum jacket water outlet temp, °C (°F)			
Maximum aftercooler inlet temp, °C (°F)			
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)			
Maximum fuel return line restriction, kPa (in Hg)			

### Optional Remote Radiator Cooling<sup>1</sup>

Set coolant capacity, L (US gal)			
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)			
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)			
Heat rejected, jacket water circuit, MJ/min (Btu/min)			
Heat rejected, aftercooler circuit, MJ/min (Btu/min)			
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)			
Maximum friction head, jacket water circuit, kPa (psi)			
Maximum friction head, aftercooler circuit, kPa (psi)			
Maximum static head, jacket water circuit, m (ft)			
Maximum static head, aftercooler circuit, m (ft)			
Maximum jacket water outlet temp, °C (°F)			
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)			
Maximum aftercooler inlet temp, °C (°F)			
Maximum fuel flow, L/hr (US gph)			
Maximum fuel return line restriction, kPa (in Hg)			

### Weights<sup>2</sup>

Unit dry weight kgs (lbs)	6075 (13395)
Unit wet weight kgs (lbs)	6337 (13973)

see below drawings for overall shipping weight and dimensions

#### Notes:

<sup>1</sup> For non-standard remote installations contact your local Cummins representative.

<sup>2</sup> Weights represent a set with standard features. See outline drawing for weights of other configurations.

### Derating Factors

<b>Standby</b>	Engine power available up to 1137 m (3730 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 4.4% per 305 m (1000 ft). Above 40 °C (104 °F), derate 10% per 10 °C (18 °F).
<b>Prime</b>	Engine power available up to 754 m (2475 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 4.5% per 305 m (1000 ft). Above 40 °C (104 °F), derate 20.9% per 10 °C (18 °F).
<b>Continuous</b>	

## Ratings Definitions

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

## Alternator Data

Voltage	Connection <sup>1</sup>	Temp rise degrees C	Duty <sup>2</sup>	Single phase factor <sup>3</sup>	Max surge kVA <sup>4</sup>	Winding No.	Alternator data sheet	Feature code
277/480	Wye	125/105	S/P		2944	312	ADS-309	B276-2
277/480	Wye	105	S		3313	312	ADS-310	B280-2
347/600	Wye	125/105	S/P		2944	7	ADS-309	B550-2
220/380	Wye	105/80	S/P		4234	312	ADS-312	B599-2
277/480	Wye	80	S		3866	312	ADS-311	B601-2
347/600	Wye	105/80	S/P		3866	7	ADS-311	B603-2
347/600	Wye	80	S		3866	7	ADS-311	B604-2
220/380	Wye	80	P		3866	312	ADS-311	B687-2
277/480	Wye	80	P		3866	312	ADS-311	B694-2
208/416	Wye	125/105	S/P		3313	311	ADS-310	B732-2
208/416	Wye	105/80	S/P		3866	311	ADS-311	B733-2
208/416	Wye	80	S		4234	311	ADS-312	B734-2
220/380	Wye	125	P		3313	312	ADS-310	B736-2
220/380	Wye	125/105	S/P		3866	312	ADS-311	B737-2
255/440	Wye	125/105	S/P		3313	312	ADS-310	B741-2

### Notes:

- <sup>1</sup> Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multiply the three phase kW rating by the Single Phase Factor<sup>3</sup>. All single phase ratings are at unity power factor.
- <sup>2</sup> Standby (S), Prime (P) and Continuous ratings (C).
- <sup>3</sup> Factor for the *Single phase output from Three phase alternator* formula listed below.
- <sup>4</sup> Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

## Formulas for Calculating Full Load Currents:

### Three phase output

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

### Single phase output

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

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

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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 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 Control Module (ECM).
- AmpSentry protection - for true alternator overcurrent 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

### 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 +/-0.25% for any steady state load from no load to full load. Frequency drift will not exceed +/-0.5% for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

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

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

Remote and local emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either emergency stop switch will 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 +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/- 1.5% for a 40 °C (104 °F) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level. The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

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

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

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

### **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

Announced 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.

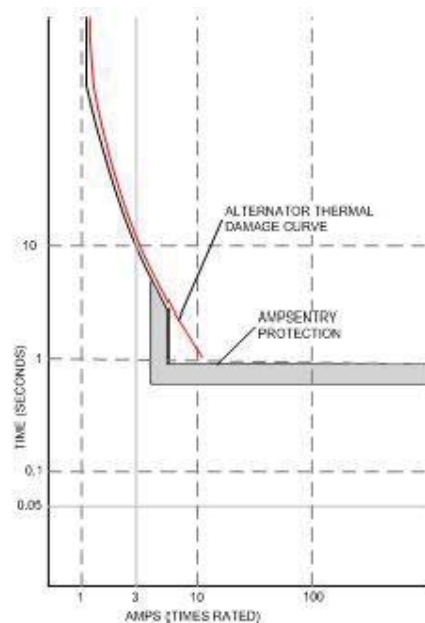
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crank sequence.

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. See document R1053 for a full size time over current curve.



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:

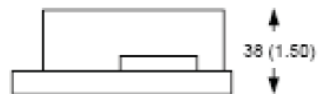
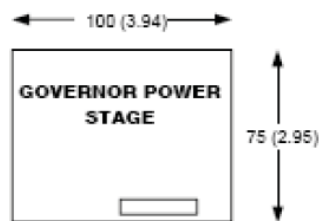
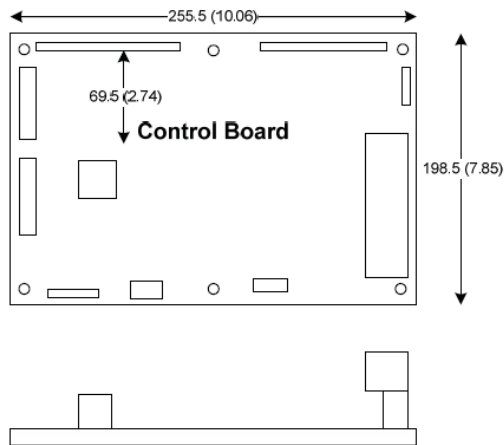
- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.

- 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

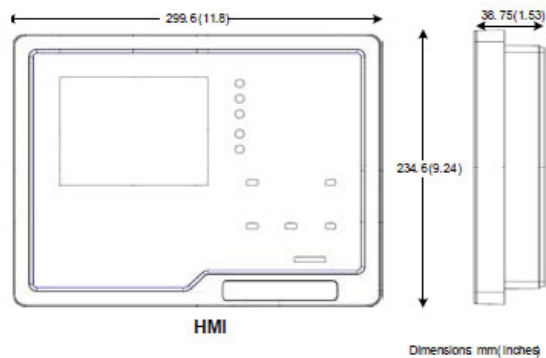
- LED indicating lamps:
  - Genset running
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the 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 control system is suitable for use on generator sets to be CE-marked.
- 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 508 recognized or Listed 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: HC6G

<b>Characteristics</b>								
<b>Weights:</b>	Wound stator assembly:	1998 lb		900 kg				
	Rotor assembly:	1689 lb		761 kg				
	Complete alternator:	4240 lb		1910 kg				
<b>Maximum speed:</b>		2250 rpm						
<b>Excitation current:</b>	Full load:	2.5 Amps						
	No load:	0.5 Amps						
<b>Insulation system:</b>	Class H throughout							
<b>3 <math>\phi</math> Ratings</b>	(0.8 power factor)	<b>60 Hz</b>				<b>50 Hz</b>		
(Based on specific temperature rise at 40° C ambient temperature)		110/190*	120/208*	139/240*		110/190*	120/208*	127/220*
		<u>220/380</u>	<u>240/416</u>	<u>(277/480)</u>	<u>347/600</u>	<u>220/380</u>	<u>240/415</u>	<u>254/440</u>
150° C rise ratings	kW	665	730	837	837	656	656	656
	kVA	831	913	1046	1046	820	820	820
<b>125° C rise ratings</b>	kW	640	700	800	800	640	640	640
	kVA	800	875	1000	1000	800	800	800
105° C rise ratings	kW	580	650	730	730	600	600	600
	kVA	725	813	913	913	750	750	750
80° C rise ratings	kW	520	568	632	632	520	520	520
	kVA	650	710	790	790	650	650	650
<b>Reactances</b>	(per unit $\pm$ 10%)	110/190*	120/208*	139/240*		110/190*	120/208*	127/220*
(Based on full load at 125° C rise rating)		<u>220/380</u>	<u>240/416</u>	<u>277/480</u>	<u>347/600</u>	<u>220/380</u>	<u>240/415</u>	<u>254/440</u>
Synchronous		3.87	3.53	3.03	2.96	3.14	2.63	2.34
Transient		0.31	0.28	0.24	0.22	0.25	0.21	0.19
Subtransient		0.23	0.21	0.18	0.16	0.17	0.15	0.13
Negative sequence		0.27	0.24	0.21	0.20	0.21	0.18	0.16
Zero sequence		0.03	0.03	0.03	0.03	0.03	0.02	0.02
<b>Motor starting</b>		<u>Broad range</u>			<u>600</u>	<u>Broad range</u>		
Maximum kVA	(90% sustained voltage)	2944			2944	2000		
<b>Time constants</b>		<u>Broad range</u>			<u>600</u>	<u>Broad range</u>		
(sec)								
Transient		0.185			0.185	0.185		
Subtransient		0.025			0.025	0.025		
Open circuit		2.350			2.350	2.350		
DC		0.040			0.040	0.040		
<b>Windings</b>	(@ 20° C)	<u>Broad range</u>			<u>600</u>	<u>Broad range</u>		
Stator resistance	(Ohms per phase)	0.0074			0.0110	0.0074		
Rotor resistance	(Ohms)	1.3700			1.3700	1.3700		
Number of leads		6 (12 optional)			6	6 (12 optional)		

\* 12 lead reconnectable option is required to obtain low (parallel wye) voltages.



## Prototype Test Supported Emergency/Standby Generator Sets Certification

Cummins Power Generation certifies that its commercial generator sets bearing the Prototype Test Supported (PTS) seal have been subjected to a design and development process that includes extensive prototype testing and evaluation. A PTS production model is engineered and manufactured according to documentation developed through comprehensive research, design and design verification.

Design verification is based on tests of preproduction prototype models manufactured specifically for prototype test purposes and not sold as new equipment. To be certified as a PTS model, the generator set must satisfy these prerequisites:

**DESIGN** - The PTS certified generator set must be designed specifically for emergency/standby applications that require high reliability and rapid response.

**PROTOTYPE TESTING** - Design suitability of the PTS certified generator set must be proven by tests on preproduction prototype models. The prototype test program is intended to:

1. Confirm the engine and generator have reserve capacity beyond rating to minimize the potential of damage or shutdown during steady state or transient loading conditions, including momentary overloads.
2. Demonstrate generator set, controls and accessories capability to perform reliably and compatibly in service during disturbances common in actual load circuits.
3. Verify the integrity of the generator and excitation system insulation systems and electrical components to withstand heating under rated load and transient overcurrent conditions.
4. Evaluate generator set mechanical and electrical strength to perform without damage during abnormal operating conditions, such as short circuits or out-of-phase paralleling. While operating at rated load, the generator set must be subjected to several 3-phase short circuits of 20 second duration. After the tests, the generator set is inspected to verify that no electrical or mechanical damage was incurred by any components.
5. Determine by endurance testing that no resonance conditions exist in the generator set or accessories that will cause premature failure of components on production units.
6. Investigate and identify failure modes to minimize the risk of any single component failure or human error that could lead to lack of essential electrical supply.
7. Provide a margin of safety, by actual trials, between the generator set component design and protection systems so that the components are not damaged before the protective devices activate a shutdown.

**DOCUMENTATION AND SOFTWARE** - The PTS certified generator set must be documented in a single drawing package with all components identified with Cummins Power Generation part numbers. A PTS test certificate must be created for each PTS generator set certifying the PTS testing performed.

**QUALITY ASSURANCE** - Engineering drawings, specifications and test requirements for a PTS certified generator set must be classified by components and assembly quality characteristics. A component and process inspection and test plan must be developed and maintained to measure product conformance to documentation requirements.

**PRODUCTION MODEL TESTING** - PTS certified generator sets must be subjected to complete production tests that demonstrate conformance to specifications at all rated conditions, including start-up, full load pickup and a performance run at full rated load and power factor.



## Prototype Test Support (PTS) 60 Hz test summary



<u>Generator set models</u>	<u>Representative prototype</u>
600DQCA	Model: 800DQCC
800DQCC	Alternator: HC6H
750DQCB	Engine: QSK23-G7 NR2
	Rated voltage: 480 V

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: 833 kW**  
The generator set was evaluated to determine the stated maximum surge power.

**Torsional analysis and testing:**  
The generator set was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted over the speed range of 1350 to 1950 RPM.

**Cooling system:** 50 °C ambient  
0.50 in H2O restriction  
  
The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load in elevated ambient temperature under stated static restriction conditions.

**Durability:**  
The generator set was subjected to a minimum 500 hour endurance test operating at variable load up to the standby rating based upon MIL-STD-705 to verify structural soundness and durability of the design.

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

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

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

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

Full load acceptance:

Voltage dip: 30.0%  
Recovery time: 2.3 seconds  
Frequency dip: 9.3%  
Recovery time: 3.9 seconds

Full load rejection:

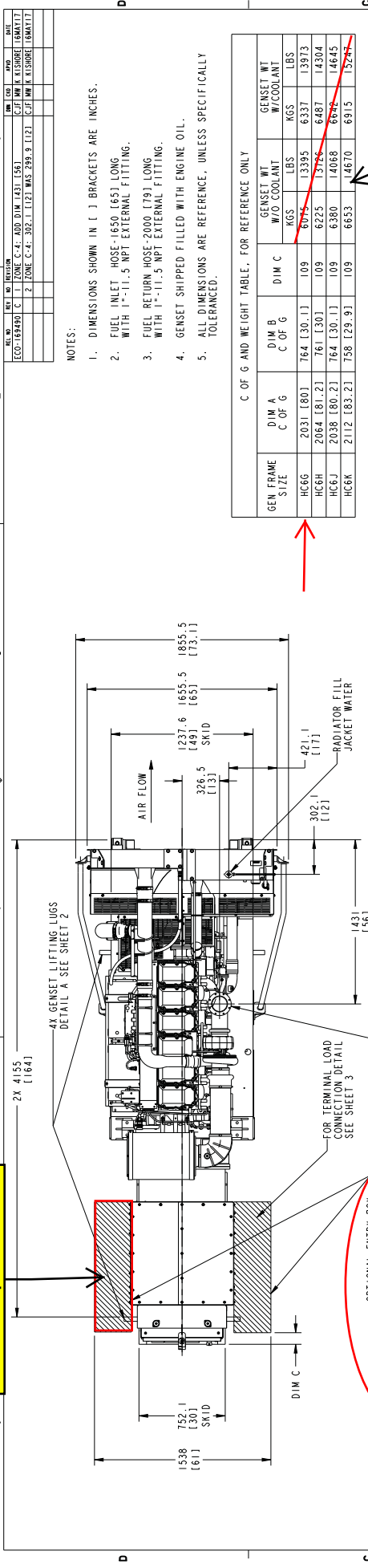
Voltage rise: 23.7%  
Recovery time: 2.6 seconds  
Frequency rise: 4.6%  
Recovery time: 3.4 seconds

**Harmonic analysis:** Distortion percentage per MIL (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	0.036	0.245	0.093	0.169
5	0.083	2.081	0.112	2.171
7	0.824	0.609	0.820	0.597
9	0.023	0.042	0.021	0.074
11	0.600	0.355	0.613	0.397
13	0.307	0.300	0.295	0.308
15	0.009	0.017	0.009	0.094



1200 amp breaker



- NOTES:
1. DIMENSIONS SHOWN IN [ ] BRACKETS ARE INCHES.
  2. FUEL INLET HOSE - 1650 [65] LONG WITH 1"-11.5 NPT EXTERNAL FITTING.
  3. FUEL RETURN HOSE 2000 [79] LONG WITH 1"-11.5 NPT EXTERNAL FITTING.
  4. GENSET SHIPPED FILLED WITH ENGINE OIL.
  5. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.

C OF G AND WEIGHT TABLE, FOR REFERENCE ONLY

GEN FRAME SIZE	DIM A C OF G	DIM B C OF G	DIM C	GENSET WT W/O COOLANT KGS	GENSET WT W/O COOLANT LBS
HC66	2031 [80]	764 [30.1]	109	6075	13395
HC6H	2064 [81.2]	761 [30]	109	6225	13775
HC6J	2038 [80.2]	764 [30.1]	109	6380	14068
HC6K	2112 [83.2]	758 [29.9]	109	6653	14670

AIR CLEANER REFERENCE TABLE

AIR CLEANER OPTION	DIM D HEIGHT
STANDARD AIR CLEANER	1867 [74]
HEAVY DUTY AIR CLEANER	2479 [97.6]

OPTIONAL ENTRY BOX - ELECTRICAL LOWER STUB-UP 320 X 1133 BOTH SIDES FOR OPTIONAL CIRCUIT BREAKER APPLICATIONS. SEE APPLICABLE CIRCUIT BREAKER OUTLINE DRAWING (DIMENSIONS FROM CONTROL HOUSING)

EXHAUST FLANGE 203 [8.0] O.D. X 139.8 [5.5] I.D. WITH 8 HOLES Ø110 [0.4] EQUI-SPACED ON Ø182.63 [7.2] P.C.D.

4X GENSET LIFTING LUGS DETAIL A SEE SHEET 2

FOR TERMINAL LOAD CONNECTION DETAIL SEE SHEET 3

RADIATOR FILL JACKET WATER

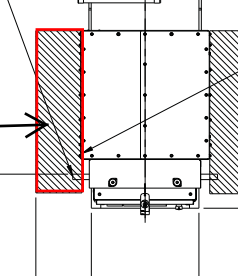
JACKET WATER COOLANT DRAIN TAPS (BOTH SIDES)

CRANK

OUTPUT BOX

6X Ø11 X 21.5 L.C. SLOTS FOR AIR DUCT MOUNTING

SEE BELOW DRAWINGS FOR OVERALL SHIPPING WEIGHT AND DIMENSIONS



CUMMINS POWER GENERATION

OUTLINE, GENSET

GENSET 15

PGF D A054H775

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

SCALE: 1:1

DATE: 1/16

DESIGNED BY: J. BRODIE

CHECKED BY: J. BRODIE

DATE: 1/16

PROJECT: 15

DOC: A054H775

DESIGNED BY: J. BRODIE

CHECKED BY: J. BRODIE

DATE: 1/16

PROJECT: 15

DOC: A054H775

DESIGNED BY: J. BRODIE

CHECKED BY: J. BRODIE

DATE: 1/16

PROJECT: 15

DOC: A054H775

DESIGNED BY: J. BRODIE

CHECKED BY: J. BRODIE

DATE: 1/16

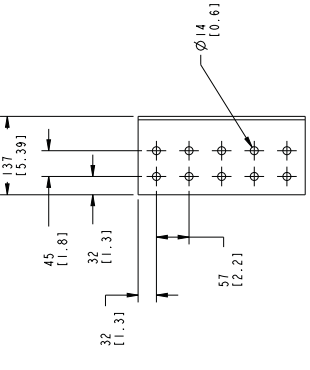
PROJECT: 15

DOC: A054H775

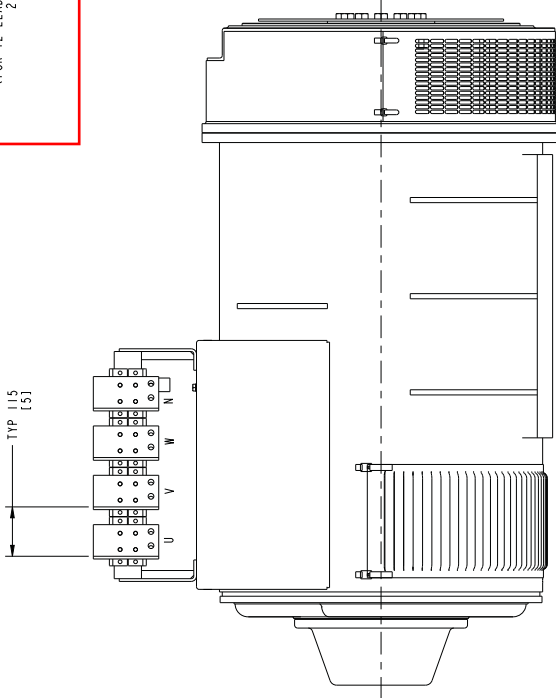


PTC Equip. Paramet LLC

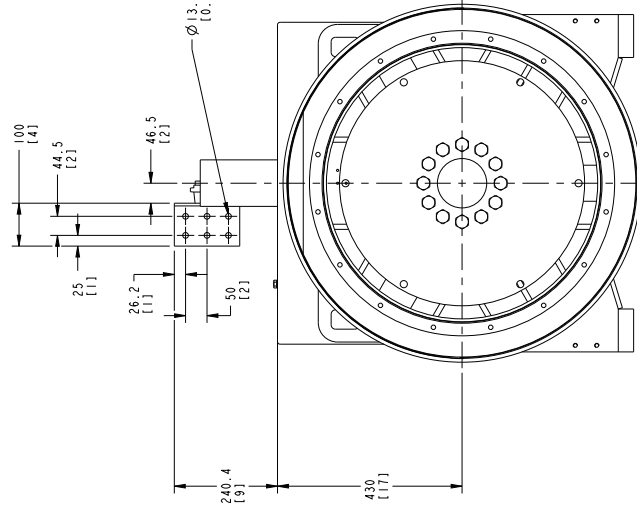
REV.	NO.	DATE	BY	CHK	APP
	01	10/10/11	C.P. HINE	C. ROBERT	
	02				
	03				



**GENERATOR OUTPUT TERMINALS**  
(FOR 12 LEAD ALTERNATORS/WINDING 3111)  
2 HOLE LUG, NEMA  
SCALE 1/4



**HC6 ALTERNATOR**  
ELECTRICAL CONNECTION DETAIL  
(OUTPUT BOX NOT SHOWN)  
SCALE 3/16



**GENERATOR OUTPUT TERMINALS**  
(FOR 6 LEAD ALTERNATORS/WINDINGS 312 & 07)  
2 HOLE LUG, NEMA

UNLESS SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS (INCHES)		DESIGN	AWD5135	DATE	10/10/11
SCALE	AS NOTED	DESIGNER	J. BRODIE	DRAWN	J. BRODIE
TOLERANCES		PROJECT	115	SHEET NO.	
FRACTIONAL	DECIMAL	DRAWING TITLE		PAGE NO.	
±0.0048	±0.025	GEN. ELECTRIC		3 of 3	
±0.0127	±0.076	SITE CODE			
±0.254	±1.27	DRAWING NO.			
±0.508	±2.54	DOC. B.C.			
±1.27	±6.35	PGF			

Revision: C  
Part Name: A054H775  
ECO-169490

# 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			
QSK19-G8	DQPAA	DQPAB		
QSK23-G7	DQCA	DQCB	DQCC	
QST30-G5	DQFAA	DQFAB	DQFAC	DQFAD
QST30-G17	DQFAE	DQFAF	DQFAG	DQFAH
QSK50-G5	DQGAE	DQGAF		
QSK50-G4	DQGAA	DQGAB		
QSK50-G8	DQGAR	DQGAS		
QSK60-G6	DQKAD	DQKAE	DQKAA	DQKAB
QSK60-G14	DQKAF			
QSK60-G16	DQKAK	DQKAL		
QSK60-G17	DQKAM			

## Instructions

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

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

Frame	Catalog Name*	Catalog Number description pages
P and R	<a href="http://www.schneiderelectric.us/en/download/document/0612CT0101/">0612CT0101</a> <a href="http://www.schneiderelectric.us/en/download/document/0612CT0101/">http://www.schneiderelectric.us/en/download/document/0612CT0101/</a>	16-17
L	<a href="http://www.schneiderelectric.us/en/download/document/0611CT1001/">0611CT1001</a> <a href="http://www.schneiderelectric.us/en/download/document/0611CT1001/">http://www.schneiderelectric.us/en/download/document/0611CT1001/</a>	8-9
MasterPact NT/NW	<a href="http://www.schneider-electric.us/en/faqs/FA231180/">http://www.schneider-electric.us/en/faqs/FA231180/</a>	Please refer to PLS007 Rev 25

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

<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.

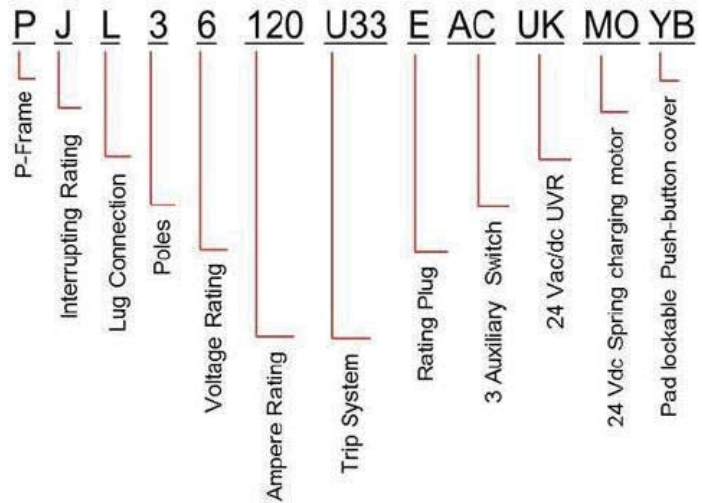
\*If the first 3 letters are "PJP," the search will not work. You will need to start with just "PJ" and use the description pages to obtain the information you are looking for on the "PJP."

### 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."



The following link is another way to decode the Schneider products

[https://www.productinfo.schneider-electric.com/portals/ui/digest/viewer/561d5d65e4b0c5c41a243bf2/561d5f9ae4b0c5c41a24480c/r/17707021\\_83351#\\_17707021\\_83351](https://www.productinfo.schneider-electric.com/portals/ui/digest/viewer/561d5d65e4b0c5c41a243bf2/561d5f9ae4b0c5c41a24480c/r/17707021_83351#_17707021_83351)

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

**Mechanically operated breakers**

Feature Code	Breaker box description	Cummins part #	Engine	Manufacturer	Breaker catalog number	Trip unit	Plug type
KP82-2	CB-2500, Right, 3P, UL600, IEC 415, UL Serv Ent, 100%	0320-2164-01	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36250U31F	MicroLogic 3.0 LI	F
		A054K364	QSK19-G8, QSK23-G7		RLF36250U33F	MicroLogic 5.0 LSI	
KP83-2	CB-2500A, Left, 3P, 600, IEC 415, UL Serv Ent, 100%	0320-2164-01	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36250U31F	MicroLogic 3.0 LI	F
		A054K364	QSK19-G8, QSK23-G7		RLF36250U33F	MicroLogic 5.0 LSI	
KP84-2	CB-2000, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	0320-2164-02	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36200U31F	MicroLogic 3.0 LI	F
		A054K366	QSK19-G8, QSK23-G7		RLF36200U33F	MicroLogic 5.0 LSI	
KP85-2	CB-2000, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	0320-2164-02	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36200U31F	MicroLogic 3.0 LI	F
		A054K366	QSK19-G8, QSK23-G7		RLF36200U33F	MicroLogic 5.0 LSI	
KP86-2	CB-1600A, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	0320-2164-03	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, 50L, 60L, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36160U31F	MicroLogic 3.0 LI	F
		A054K368	QSK19-G8, QSK23-G7		RLF36160U33F	MicroLogic 5.0 LSI	
KP87-2	CB-1600, Left, 3P, UL 600, IEC 415, UL Serv Ent 100%	0320-2164-03	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36160U31F	MicroLogic 3.0 LI	F
		A054K368	QSK19-G8, QSK23-G7		RLF36160U33F	MicroLogic 5.0 LSI	
KP88-2	CB-1200, Right, 3P, UL 600, IEC 415, UL Serv Ent, 100%	0320-2183	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	PJP36120U31E	MicroLogic 3.0 LI	E
		A054K408	QSK19-G8, QSK23-G7		PJP36120U33F	MicroLogic 5.0 LSI	
KP89-2	CB-1200, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	0320-2183	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	PJP36120U31E	MicroLogic 3.0 LI	E
		A054K408	QSK19-G8, QSK23-G7		PJP36120U33F	MicroLogic 5.0 LSI	
KP90-2	CB-800A, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	0320-2182	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	PJP36080U31F	MicroLogic 3.0 LI	F
		A054K405	QSK19-G8, QSK23-G7		PJP36080U33F	MicroLogic 5.0 LSI	
KP91-2	CB-800A, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	0320-2182	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	PJP36080U31F	MicroLogic 3.0 LI	F
		A054K405	QSK19-G8, QSK23-G7		PJP36080U33F	MicroLogic 5.0 LSI	
KP92-2	CB-600A, Right, 3P, UL 600, IEC 690, UL Serv Ent 100%	A044T468	QSK19-G8, QSK23-G7, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S LSI	N/A
KP93-2	CB-600A, Left, 3P, UL 600, IEC 690, UL Serv Ent, 100%	A044T468	QSK19-G8, QSK23-G7, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S LSI	N/A
KU62-2	CB-3000A, 3P, 600/690V, UL/IEC, ServEnt, 100%UL, Right	A029B150	QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36300U31A	MicroLogic 3.0 LI	F
KU68-2	CB-3000A, 3P, 600/690V, UL/IEC, ServEnt, 100%UL, Left	A029B150	QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36300U31A	MicroLogic 3.0 LI	F

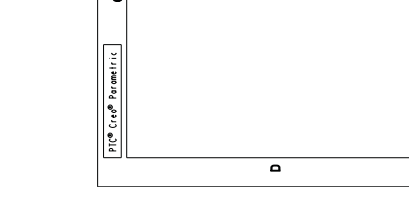
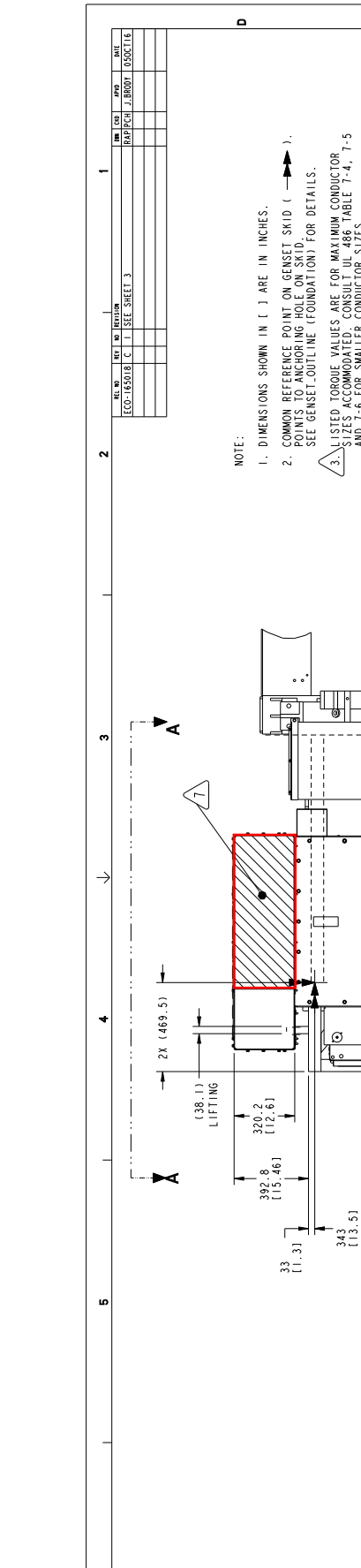
REV	DATE	BY	CHK	APP
1	08/11/2010	J. BRODITZKY	J. BRODITZKY	165018

ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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- NOTE:
1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.
  2. COMMON REFERENCE POINT ON GENSET SKID ( → ) POINTS TO ANCHORING HOLE ON SKID. SEE GENSET-OUTLINE (FOUNDATION) FOR DETAILS.
  3. LISTED TORQUE VALUES ARE FOR MAXIMUM CONDUCTOR SIZES ACCOMMODATED. CONSULT UL 486 TABLE 7-4, 7-5 AND 7-6 FOR SMALLER CONDUCTOR SIZES.
  4. ALL ITEMS SHOWN IN ILLUSTRATION ARE FOR REFERENCE ONLY.
  5. ELECTRICAL CONDUITS MUST:
    - PROVIDE FLEXIBLE CONNECTION (USING FLEXIBLE CONDUIT AND CABLES).
    - BE INSTALLED IN A WAY THAT IT WILL ABSORB OR REDUCE VIBRATION CONDITIONS. FOR EXAMPLE: ADD OFF-SET BENDS BETWEEN THE MOUNTING SURFACE OF THE CIRCUIT BREAKER ENCLOSURE AND THE STUB AREA ORIGINATING IN CONCRETE OR THE TYPE OF BASE FLOORING.
  6. FLEXIBILITY IN CONDUIT AND CABLE INSTALLATION SHOULD BE PROVIDED TO ACCOUNT FOR MOVEMENT BETWEEN GENSET AND GROUND.
  7. AREA SHOWN INDICATES APPROXIMATE OFFSET PLACEMENT OF THE ELECTRICAL FLEXIBLE CONDUIT. STUB-UP AREA ORIGINATING IN CONCRETE OR THE TYPE OF BASE FLOORING WITHIN ENCLOSURE TO PROVIDE VIBRATION PROTECTION.
  8. WIRE-CONDUIT COMBINATIONS MEET NEC AND CEC. TO USE OTHER COMBINATIONS, REFER TO APPLICABLE CODES TO ENSURE THAT WIRE, AMPACITY, BEND SPACE AND GUTTER SPACE MEET THE REQUIREMENTS.
  9. SHUNT TRIP UNITS CAN BE OPERATED AT 75% OF NOMINAL VOLTAGE AND WILL ACCEPT MOMENTARY OR CONTINUOUS APPLIED VOLTAGE.
  10. SHUNT TRIP UNITS CAN BE OPERATED AT 70% TO 75% OF NOMINAL VOLTAGE AND WILL ACCEPT MOMENTARY OR CONTINUOUS APPLIED VOLTAGE.
  11. ALL DIMENSIONS SHOWN FOR RIGHT SIDE ENTRY ALSO APPLY TO LEFT SIDE ENTRY IN MIRROR ORIENTATION.
  12. ALTERNATOR MODEL W636G A, B, R, FRAME CIRCUIT BREAKER ARE BEING SHOWN FOR DRAWING SIMPLICITY.
  13. "NS" SHUNT TRIP HAS NO INTERNAL CONTACTS. IT MUST BE USED IN CONJUNCTION WITH AUXILIARY CONTACTS TO ACCEPT CONTINUOUS APPLIED VOLTAGE. IT CAN OPERATE AT 75% OF NOMINAL VOLTAGE.
  14. 800 AMP BREAKER: A LUG ACCEPTING (2) 3/0-600 kcmil CONDUCTORS IS AVAILABLE THROUGH ACCESSORIES. P6A PART NUMBER 0332-4278.
  15. 1200 AMP BREAKER: A LUG ACCEPTING (3) 3/0-600 kcmil CONDUCTORS IS AVAILABLE THROUGH ACCESSORIES. P6A PART NUMBER 0332-4279.
  16. STANDARD FEATURE ON SCHNEIDER ELECTRIC NW BREAKER.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		
FRONT VIEW	0.00 - 4.99	0.15 - 0.08
RIGHT SIDE VIEW	0.00 - 4.99	0.15 - 0.08
TOP VIEW	0.00 - 4.99	0.15 - 0.08
LEFT SIDE VIEW	0.00 - 4.99	0.15 - 0.08
ISOMETRIC VIEW	0.00 - 4.99	0.15 - 0.08
SECTION A-A	0.00 - 4.99	0.15 - 0.08
SECTION B-B	0.00 - 4.99	0.15 - 0.08
SECTION C-C	0.00 - 4.99	0.15 - 0.08
SECTION D-D	0.00 - 4.99	0.15 - 0.08
SECTION E-E	0.00 - 4.99	0.15 - 0.08
SECTION F-F	0.00 - 4.99	0.15 - 0.08
SECTION G-G	0.00 - 4.99	0.15 - 0.08
SECTION H-H	0.00 - 4.99	0.15 - 0.08
SECTION I-I	0.00 - 4.99	0.15 - 0.08
SECTION J-J	0.00 - 4.99	0.15 - 0.08
SECTION K-K	0.00 - 4.99	0.15 - 0.08
SECTION L-L	0.00 - 4.99	0.15 - 0.08
SECTION M-M	0.00 - 4.99	0.15 - 0.08
SECTION N-N	0.00 - 4.99	0.15 - 0.08
SECTION O-O	0.00 - 4.99	0.15 - 0.08
SECTION P-P	0.00 - 4.99	0.15 - 0.08
SECTION Q-Q	0.00 - 4.99	0.15 - 0.08
SECTION R-R	0.00 - 4.99	0.15 - 0.08
SECTION S-S	0.00 - 4.99	0.15 - 0.08
SECTION T-T	0.00 - 4.99	0.15 - 0.08
SECTION U-U	0.00 - 4.99	0.15 - 0.08
SECTION V-V	0.00 - 4.99	0.15 - 0.08
SECTION W-W	0.00 - 4.99	0.15 - 0.08
SECTION X-X	0.00 - 4.99	0.15 - 0.08
SECTION Y-Y	0.00 - 4.99	0.15 - 0.08
SECTION Z-Z	0.00 - 4.99	0.15 - 0.08

ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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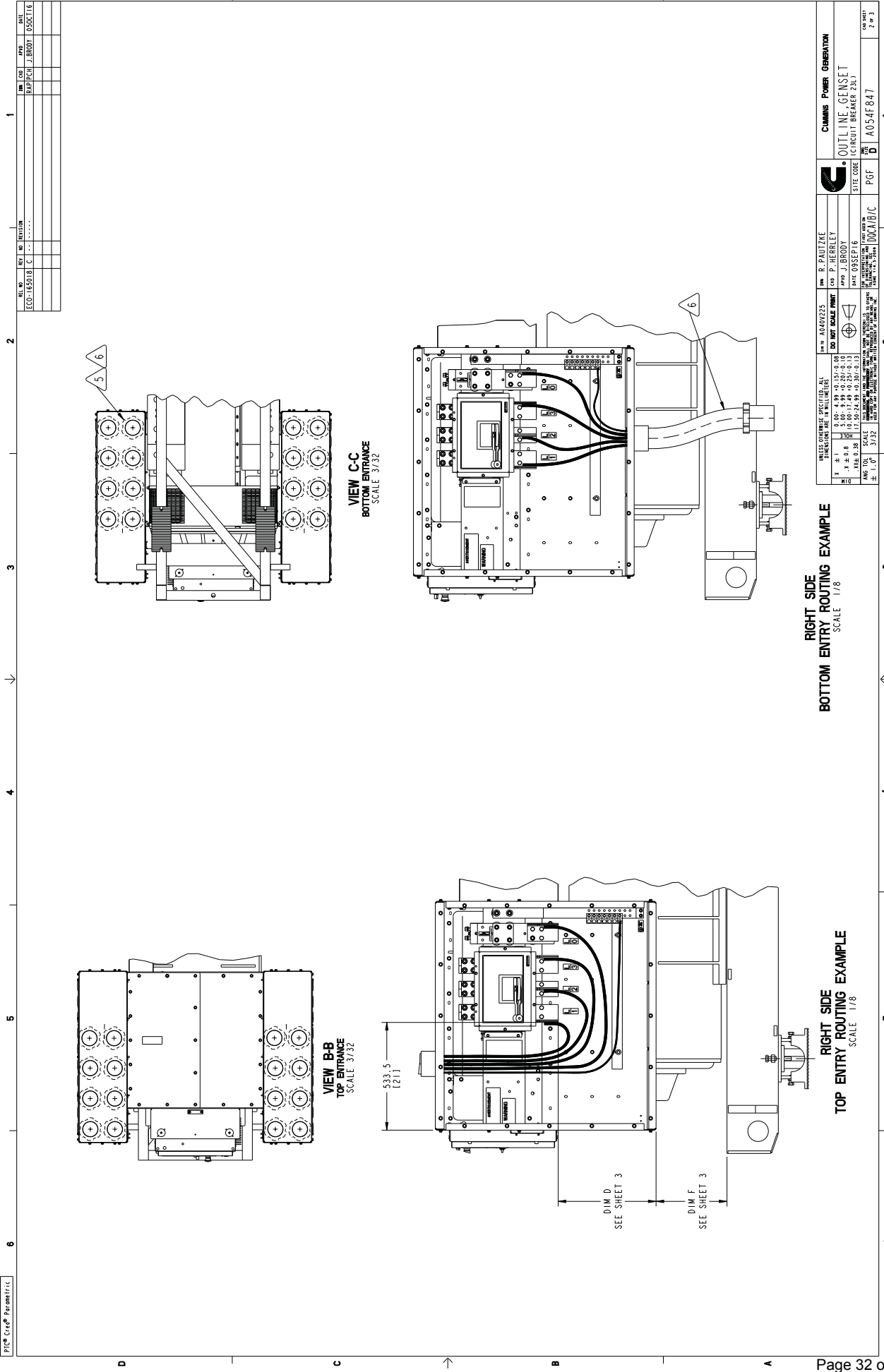
ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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ECO-165018	C. T. BEE	SHEET 3
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PTC Corp. Private/ITL



REV	DATE	BY	CHK	DESCRIPTION
1	08/01/01	JEROME	JEROME	ISSUE FOR PRODUCTION
2				
3				

ECO-166018	C		
ECO-166018	C		

ECO-166018	C		
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ECO-166018	C		
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ECO-166018	C		
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ECO-166018	C		
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<b>UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS</b> <table border="1"> <tr> <td>FR.</td> <td>± .1</td> </tr> <tr> <td>MM.</td> <td>± .004 - .009</td> </tr> <tr> <td>CS.</td> <td>± .003 - .006</td> </tr> <tr> <td>W.</td> <td>± .003 - .006</td> </tr> <tr> <td>DR.</td> <td>± .003 - .006</td> </tr> <tr> <td>HO.</td> <td>± .003 - .006</td> </tr> <tr> <td>GE.</td> <td>± .003 - .006</td> </tr> <tr> <td>FIN.</td> <td>± .003 - .006</td> </tr> </table>				FR.	± .1	MM.	± .004 - .009	CS.	± .003 - .006	W.	± .003 - .006	DR.	± .003 - .006	HO.	± .003 - .006	GE.	± .003 - .006	FIN.	± .003 - .006
FR.	± .1																		
MM.	± .004 - .009																		
CS.	± .003 - .006																		
W.	± .003 - .006																		
DR.	± .003 - .006																		
HO.	± .003 - .006																		
GE.	± .003 - .006																		
FIN.	± .003 - .006																		
ECO-166018	C																		

ECO-166018	C		
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ECO-166018	C		
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ECO-166018	C		
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ECO-166018	C		
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Revision: C  
 Part Name: A054F847  
 ECO-166018  
 Drawing Name: A054F848  
 Revision: C  
 Part Name: A054F847  
 ECO-166018



REV.	BY	CHKD.	DATE	DESCRIPTION
1	...	...	...	...
2	...	...	...	...
3	...	...	...	...
4	...	...	...	...
5	...	...	...	...

REV.	BY	CHKD.	DATE	DESCRIPTION
1	...	...	...	...
2	...	...	...	...
3	...	...	...	...
4	...	...	...	...
5	...	...	...	...

**TABLE 1**  
 ACCESSORY SPECIFICATIONS

LUG	FRAME	MAX. AMPS	WIRE RANGE COPPER	DIM. D ±.25 [1.0]	DIM. E ±.25 [1.0]	DIM. F ±.25 [1.0]	ACCESSORY DESCRIPTION	CONTACT RATING	INTRUSH	CONNECTION TYPE
	SQUARE D N/UGL W/MICROLOGIC 5.0 TRIP UNIT	600A 3-POLE	2/0-350 KCMIL	554 [21.8]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	10A $\Delta$ 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN.
	SQUARE D W/MICROLOGIC 5.0 TRIP UNIT	800A 3-POLE	3/0-500 KCMIL	599 [23.5]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	200VA $\Delta$ 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN.
	SQUARE D W/MICROLOGIC 5.0 TRIP UNIT	1200A 3-POLE	3/0-500 KCMIL	556 [21.8]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	200VA $\Delta$ 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN.
	SCHNEIDER ELECTRIC NW 3000/2500/2000/1600 (ELECTRICALLY OPERATED) 1600-3000 AMP BREAKERS BUS BARS STANDARD W/MICROLOGIC 5.0 TRIP UNIT		NEMA HOLE PATTERN	473.2 [18.63]	1242.6 [48.92]	201.1 [7.92]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	200VA $\Delta$ 10	PUSH-IN TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN.
	SQUARE D R 2500/2000/1600 W/MICROLOGIC 5.0 TRIP UNIT	600A 3-POLE	NEMA HOLE PATTERN	490 [19.1]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	200VA $\Delta$ 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN.
	SCHNEIDER ELECTRIC NW 3000/2500/2000/1600 (ELECTRICALLY OPERATED) W/OPTIONAL LUG W/3000 AMP BREAKERS TORQUE 375 IN LBS (42 Nm)		#2-600 KCMIL	473.2 [18.63]	1242.6 [48.92]	201.1 [7.92]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	200VA $\Delta$ 10	PUSH-IN TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN.
	SQUARE D R 2500/2000/1600 W/OPTIONAL LUG W/2000 AMP BREAKERS TORQUE 375 IN LBS (42 Nm)		#2-600 KCMIL	490 [19.1]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP $\Delta$ 9/13 1 EA. FORM C 1 AUX. CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 250 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	200VA $\Delta$ 10	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN.

**TABLE 2**  
 TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2014 ARTICLE 310.15  
 TABLES 310.15 (B)(16) AND 310.15 (B)(13)(c), FOR 90C TEMPERATURE  
 RATED CONDUCTOR AT 30C AMBIENT, AND ANNEX C WITH 4 CURRENT-CARRYING  
 CONDUCTORS IN EACH CONDUIT

MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY		TOTAL NUMBER OF CONDUITS	
	QTY	SIZE	QTY	SIZE (IN. INCHES)	QTY	SIZE (IN. INCHES)
3000A	8	600 KCMIL	8	3	8	4
2500A	7	600 KCMIL	8	3	7	4
2000A	6	500 KCMIL	6	3	6	4
1600A	6	350 KCMIL	280	6	4	3 1/2
1200A	4	400 KCMIL	304	4	3	3
800A	3	350 KCMIL	280	3	3	3
600A	3	4/0 AWG	208	3	3	3

**TABLE 3**  
 TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2014, ARTICLE 310.15  
 AND TABLE 310-16 FOR 90C TEMPERATURE RATED CONDUCTOR AT 40C  
 AMBIENT AND ANNEX C

MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY		TOTAL NUMBER OF CONDUITS	
	QTY	SIZE	QTY	SIZE (IN. INCHES)	QTY	SIZE (IN. INCHES)
3000A	8	700 KCMIL	379	8	8	4
2500A	8	500 KCMIL	313	8	8	4
2000A	7	300 KCMIL	255	8	7	3
1600A	7	300 KCMIL	233	7	7	3
1200A	4	500 KCMIL	313	4	4	4
800A	4	250 KCMIL	211	4	4	3
600A	3	250 KCMIL	211	3	3	3

**TABLE 3**

GENSET MODEL	ALTERNATOR MODEL	DIM "A"
<input type="checkbox"/> DOCA	<input checked="" type="checkbox"/> HC634G	115.3
<input type="checkbox"/> DOCB	<input type="checkbox"/> HC634H	[4.54]
<input type="checkbox"/> DOCC	<input type="checkbox"/> HC634J	115.3
<input type="checkbox"/> DOCC	<input type="checkbox"/> HC634K	[4.54]
	<input type="checkbox"/> HC634K	14.3
		[.56]

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS (INCHES)

1	±0.13	0.004
2	±0.25	0.008
3	±0.38	0.015
4	±0.63	0.025
5	±1.27	0.050
6	±2.54	0.100
7	±3.81	0.150
8	±5.08	0.200
9	±7.62	0.300
10	±12.7	0.500

PERMITS SHALL BE OBTAINED FROM THE CITY OF CHICAGO, DEPARTMENT OF PUBLIC WORKS, DIVISION OF INSPECTION AND PERMITS, 311 N. LAKE STREET, CHICAGO, IL 60601. (773) 527-3333

DATE: 06/18/2024  
 TIME: 10:00:00 AM  
 PROJECT: A064F848  
 DRAWING: A064F847  
 SHEET: 3 OF 4

DESIGNED BY: R. PAUTZKE  
 CHECKED BY: P. HERRELE  
 APPROVED BY: J. BRODT  
 SCALE: AS SHOWN  
 SITE CODE: CHICAGO (DRAWING 234)

GENSET MODEL: DOCA  
 ALTERNATOR MODEL: HC634G  
 DIM "A": 115.3

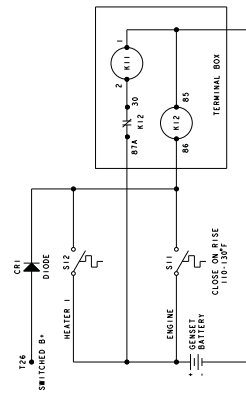
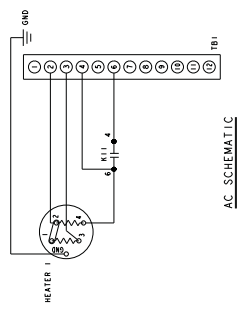
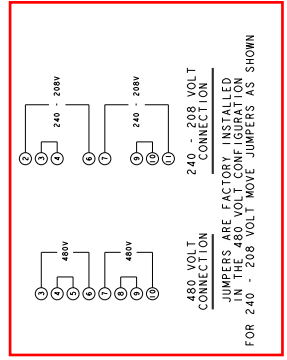
CUMMINS POWER GENERATION  
 OUTLINE, GENSET  
 CURRUIT BREAKER (234)

PGF: A054F847  
 SHEET: 3 OF 4

REV. NO.	DATE	BY	CHKD.	DESCRIPTION
001	10/18/00	W. J. WILSON		ISSUED FOR CONSTRUCTION
002	10/18/00	W. J. WILSON		REVISION: 1.0
003	10/18/00	W. J. WILSON		REVISION: 2.0
004	10/18/00	W. J. WILSON		REVISION: 3.0
005	10/18/00	W. J. WILSON		REVISION: 4.0

REV. NO.	DATE	BY	CHKD.	DESCRIPTION
001	10/18/00	W. J. WILSON		ISSUED FOR CONSTRUCTION
002	10/18/00	W. J. WILSON		REVISION: 1.0
003	10/18/00	W. J. WILSON		REVISION: 2.0
004	10/18/00	W. J. WILSON		REVISION: 3.0
005	10/18/00	W. J. WILSON		REVISION: 4.0

HEATER AMPERAGE TABLE			
SINGLE PHASE HEATER VOLTAGE	HEATER AMPS	HEATER TOTAL WATTS	FEATURE CODE
208	18.0	3744	23.2 - 4825
240	20.8	4990	26.75 - 6420
480	10.4	4990	13.375 - 6420



6 Pro/ENGINEER METRIC DWG

0500\_4022

2x Ø28 (1.121) HOLES FOR CUSTOMER CONNECTIONS

Ø8-32 TERMINAL FASTENING SCREWS Ø11.2 (10.441) LUG MAX

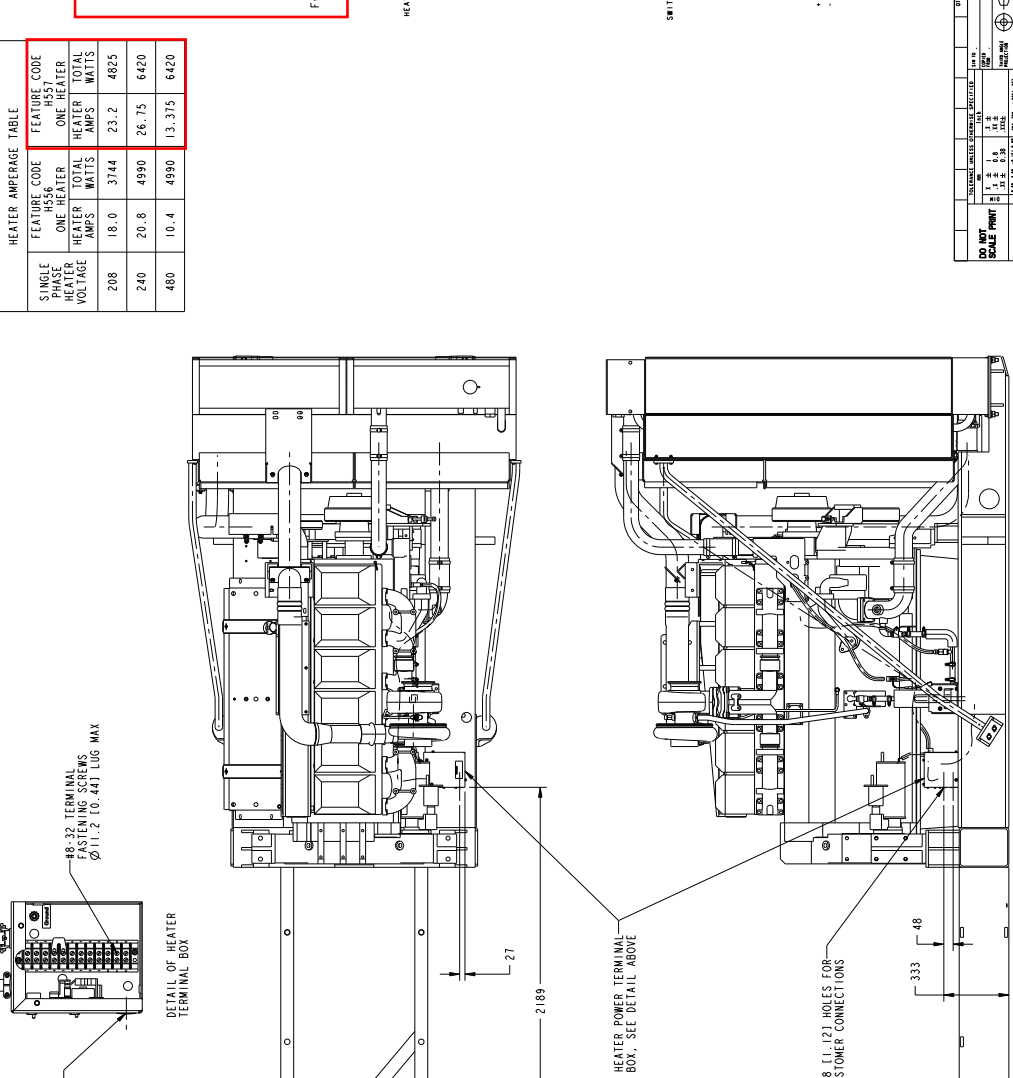
DETAIL OF HEATER TERMINAL BOX

2189

HEATER POWER TERMINAL BOX. SEE DETAIL ABOVE

2x Ø28 (1.121) HOLES FOR CUSTOMER CONNECTIONS

333 48



DO NOT SCALE PRINT	DATE: 10/18/00	SCALE: 2:1	PROJECT: 0500_4022	REV: 05
DESIGNED BY: W. J. WILSON	CHECKED BY: W. J. WILSON	APPROVED BY: W. J. WILSON	DATE: 10/18/00	SCALE: 2:1
CUMMINS POWER GENERATION		INTERFACE OUTLINE (HEATER)		
0500_4022		0500_4022		



# Enclosures and Tanks

250-1000 kW Gensets



## Enclosure Standard Features

- 14-gauge steel construction (panels)
- Stainless steel hardware
- Zinc phosphate pretreatment, e-coat primer and super durable powder topcoat paint minimize corrosion and color fade
- Package listed to UL 2200
- Designed to satisfy national electrical code installation requirements
- Fuel and electrical stub-up area within enclosure perimeter
- Fixed louvers
- Cambered roof prevents water accumulation
- Recessed, lockable doors in two sides
- Retainers hold doors open for easy access
- Enclosed exhaust silencer ensures safety and protects against rust
- Rain cap
- Exterior oil and coolant drains with interior valves for ease of service
- Rodent barriers on inlet
- Non-hygroscopic sound attenuating material
- Side mounted controls and circuit breakers
- Easy access lifting points for spreader bars
- Dual vibration isolation system (250-500 kW)
- Spring vibration isolation system (600-1000 kW)
- Enclosure mounts to lifting base or fuel tank (250-500 kW)
- Enclosure mounts to lifting base (600-1000 kW)
- Factory pre-assembled package
- Designed for outdoor use only
- Externally mounted emergency stop button for operator safety (optional on 250-500 kW)
- Horizontal air discharge to prevent leaf and snow accumulation (600-1000 kW)

## Options

- Three levels of sound attenuation
- Motorized louvers to protect from ice and snow accumulation (available on air inlet for all models and on air outlet on level II, 250-500 kW enclosures only)
- Horizontal air discharge, sound level 2 only (250-500 kW)
- Aluminium construction with roll-coated polymer paint
- Wind rated to 150 mph
- Neutral sandstone paint color
- Factory mounted battery charger
- External 120 VAC service outlet
- Rain hoods for air inlet (250-500 kW)
- Lifting base in lieu of a sub-base tank (250-500 kW)
  - Pre-wired AC distribution package
  - 100 amp (250-500 kW) or 150 amp (600-1000 kW) main circuit breaker; connected to 120 VAC Line-Neutral and 208 or 240 VAC Line-Line, spare breaker positions and capacity for future upgrades (600-1000 kW)
  - GFCI protected internal 120 VAC service receptacle
  - GFCI protected weather proof external 120 volt service receptacle
  - All factory installed AC powered features pre-wired into load center
- Interior lights – 120 volt (600-1000 kW)
- Rain hoods for air inlet (250-500 kW)
- Seismic isolators available (600-1000 kW)

## Fuel Tanks

### Standard sub-base tank features

- UL 142 Listed
- ULC-S601-07 Listed
- NFPA37 compliant
- Dual walled, steel construction
- Emergency tank and rupture basin vents
- Tank mounted mechanical fuel gauge
- Fuel supply and return tubes
- Top mounted leak detection float switch
- Low and high level fuel switches
- Mounting brackets for optional pump and control (250-500 kW)
- Integral lifting points

### Sub-base tank options

- Pre-wired fuel pump and control
- **Fuel overfill alarm** – internal or external
- Overflow and tank fill plugs
- **Five gallon spill fill box** – internal or external
- Fill pipe extender
- Local code approvals available

### 200-500 kW Dual Wall Sub-base Fuel Tanks – usable operating hours

Genset model (60 Hz)	Gallons /hour at full load	270 gallon tank	300 gallon tank	400 gallon tank	500 gallon tank	600 gallon tank	660 gallon tank	720 gallon tank	850 gallon tank	1420 gallon tank	1470 gallon tank	1700 gallon tank	2050 gallon tank	2525 gallon tank
250 DQDAA	20	14	15	20	25	30	33	36		72	74		104	
275 DQDAB	21	13	14	19	24	29	31	34		66	70		96	
300 DQDAC	23	12	13	17	22	26	29	31		61	64		88	
300 DQHAB	23	12	13	17	22	26	29		37			74		
450 DFEJ	30	9	10	13	17	20	22		28			57		84
500 DFEK	34	8	9	11	15	18	19		25			50		74

Operating hours are measured at 60 Hz, standby rating.

### 600-1000 kW Dual Wall Sub-base Fuel Tanks – usable operating hours

Genset model	Gallons /hour at full load	200 gallon tank	660 gallon tank	1000 gallon tank	1500 gallon tank	2000 gallon tank	2400 gallon tank
600 DQCA	42	5	16	24	36	48	57
600 DQPAA	45	4	15	22	33	44	53
650 DQPAB	50	4	13	20	30	40	48
750 DQCB	51	4	13	20	29	39	47
750 DQFAA	53	4	12	19	28	38	45
<b>800 DQCC</b>	<b>53</b>	4	12	19	<b>28</b>	38	45
800 DQFAB	56	4	12	18	27	36	43
900 DQFAC	64	3	10	16	23	31	38
1000 DQFAD	72	3	9	14	21	28	33

\*3000 gallon tank offered as an accessory kit – refer to NAAC-5853 spec sheet.

- Operating hours are measured at 60 Hz, standby rating.
- Up to 90% fill alarm to comply with NFPA30, operating capacity is reduced by 10%.

## Enclosure Package Sound Pressure Levels @ 7 meters dB(A)

Genset model	Weather protective enclosure (F200, F203)	QuietSite level 1 sound attenuated enclosure (F201, F204)	QuietSite level 2 sound attenuated enclosure (F202, F205)
250 DQDAA	90	88	72
275 DQDAB	90	88	73
300 DQDAC	90	88	73
300 DQHAB	89	88	76
450 DFEJ	88	85	74
500 DFEK	89	87	73
600 DQCA	90.6/86*	79.3/78*	74.1/73*
600 DQPAA	89	81	75
650 DQPAB	90	81	75
750 DQCB	91.1/87*	79.9/79*	75.3/74*
750 DQFAA	89	79	75
800 DQCC	91.3/87*	80.2/79*	75.7/74*
800 DQFAB	89	79	75
900 DQFAC	89	80	76
1000 DQFAD	90	80	76

- All data is 60 Hz, full load standby rating, steel enclosures only.
- Data is a measured average of 8 positions.
- Sound levels for aluminium enclosures are approximately 2 dB(A) higher than listed sound levels for steel enclosures.
- \* Sound data with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD)

## Package Dimensions of Enclosure, Exhaust System, and UL Tank

### 250-500 kW

Tank size (gal)	Weather protective package length (in)	QuietSite level 1 package length (in)	QuietSite level 2 package length (in)	Width (in)	Height (in)	Weather protective package weight (lbs)	QuietSite level 1 package weight (lbs)	QuietSite level 2 package weight (lbs)
270	188	188	222	82	106	4991	5471	6711
300	188	188	222	82	104	5648	6073	6991
400	188	188	222	82	106	5833	6258	7176
500	188	188	222	82	108	5956	6381	7299
600	188	188	222	82	111	6116	6541	7459
660	188	188	222	82	113	6235	6660	7578
720	188	188	222	82	114	6174	6599	7517
850	188	188	222	82	118	6529	6954	7872
1420	200	200	222	82	128	6863	7343	8583
1470	192	192	222	82	128	7253	7733	8973
1700	234	234	234	82	128	7982	8407	9325
2050	284	284	284	82	128	8383	8863	10103
2525	346	346	346	82	128	9391	9871	11111
Lifting base	188	188	222	82	100	4335	4760	5678

### 600-1000 kW

Tank size (gal)	Weather protective package length (in)	QuietSite level 1 package length (in)	QuietSite level 2 package length (in)	Width (in)	Height (in)	Weather protective package weight (lbs)	QuietSite level 1 package weight (lbs)	QuietSite level 2 package weight (lbs)
200	260	303	315	98	137	10194	13074	14954
660	260	303	315	98	137	9586	12466	14346
1000	260	303	315	98	141	10117	12997	14877
1500	260	303	315	98	146	10677	13557	15437
2000	292	327	327	98	143	11959	14839	16719
2400	338	338	338	98	143	12961	15841	17721

- This weight does not include the generator set. Consult your local Cummins distributor or the appropriate generator specification sheet.
- Width is 86" lifting eye to lifting eye (250-500 kW), 102" lifting eye to lifting eye (600-1000 kW).
- Height - Florida, Michigan, and Suffolk add 6.4" (250-500 kW) or 2" (600-1000 kW) for bottom space.
- Maximum length emergency vent removed.

see below drawings for overall shipping weight and dimensions



CSA - The generator set is CSA certified to product class 4215-01.



UL - The generator set is available listed to UL 2200, stationary engine generator assemblies. The PowerCommand® control is listed to UL 508 - Category NITW7 for U.S. and Canadian usage.

For more information contact your local Cummins distributor or visit [power.cummins.com](http://power.cummins.com)

Our energy working for you.™



**\*\*\*Reference Only\*\*\***  
 see below drawings for overall shipping weight and dimensions

Pro/ENGINEER  
 A034L228

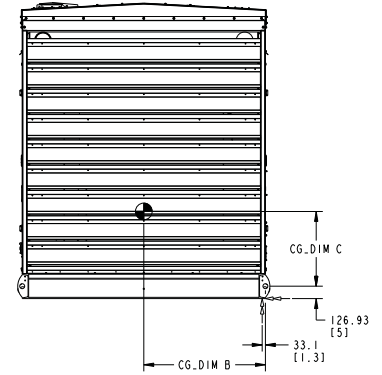
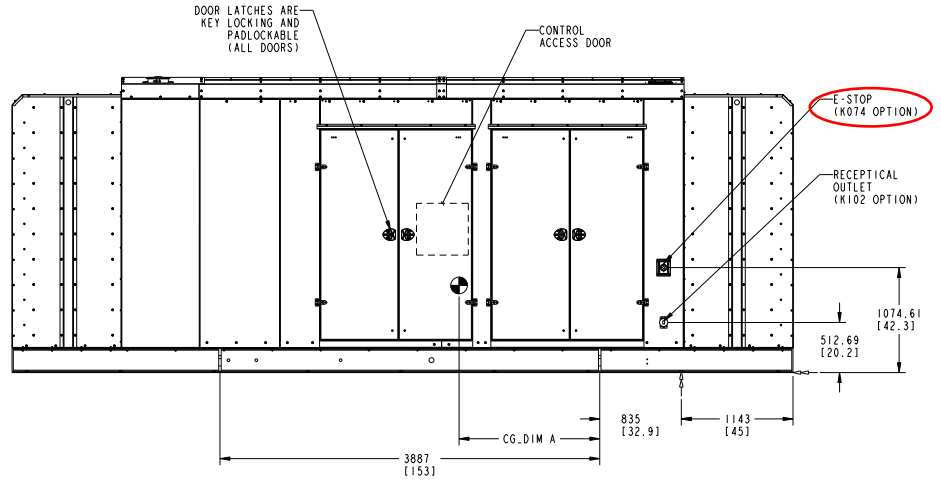
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 F202,F205  
 OPTIONAL FEATURE  
 CODE K074,K102**

TABULATION								
MODEL	GENERATOR	KW	STEEL ENCLOSURE WEIGHT KG (LBS) ±5%	ALUMINUM ENCLOSURE WEIGHT KG (LBS) ±5%	CG_DIM "A"	CG_DIM "B"	CG_DIM "C"	DIM.D ± 75 (3)
DOCA, DOCB DOCC	HC6G		12339 [27202]	10884 [23994]	2038 [80.2]		846 [33.3]	
	HC6H		2489 [27533]	11034 [24325]	2021 [79.6]		845 [33.3]	1529 [60]
	HC6J		12544 [27875]	11189 [24667]	2019 [79.5]		844 [33.2]	
DFGB, DFGE	HC6K		12914 [28477]	11462 [25269]	2031 [80]		842 [33.1]	
	HC5E		11373 [25074]	9918 [21866]	2199 [86.6]		1093 [43]	1490 [59]
	HC5F		11555 [26474]	10097 [22260]	2126 [83.7]		1057 [41.6]	
	HC6G		12008 [26474]	10553 [23266]	2080 [81.9]		1054 [41.5]	1599 [63]
	HC6H		12076 [26624]	10621 [23416]	2052 [80.8]		1054 [41.5]	
	HC6J		12371 [27274]	10916 [24066]	2020 [79.5]		1053 [41.5]	
DFHA, DFHB DFHC, DFHD DOFAA, DOFAB DOFAC, DOFAD	HC6G		12634 [27853]	11179 [24645]	2065 [81.3]	1244.7 [49]	794 [31.3]	
	HC6H		12872 [28377]	11417 [25169]	2041 [80.4]		791 [31.1]	1570 [62]
	HC6J		13095 [28869]	11540 [25661]	2017 [79.4]		788 [31]	
	HC6K		13170 [29034]	11716 [25826]	2009 [79.1]		787 [31]	
	P7B		13256 [29224]	11801 [26016]	1960 [77.2]		786 [30.9]	1698 [67]
	P7C		13514 [29794]	12059 [26586]	1945 [76.6]		784 [30.9]	
DOPAA, DOPAB	HC5F		11101 [24474]	9646 [21266]	2043 [80.4]		827 [32.6]	
	HC6G		11173 [24632]	9718 [21425]	2059 [81.1]		826 [32.5]	1438 [56.6]
	HC6H		11411 [25157]	9956 [21949]	2081 [81.9]		823 [32.4]	

\*\*\* WEIGHT & CG'S ARE SHOWN WITH F202 STEEL ENCLOSURE, AND STANDARD WET GENSET. ADDITION OF OTHER FEATURES MAY CHANGE THE WEIGHT.

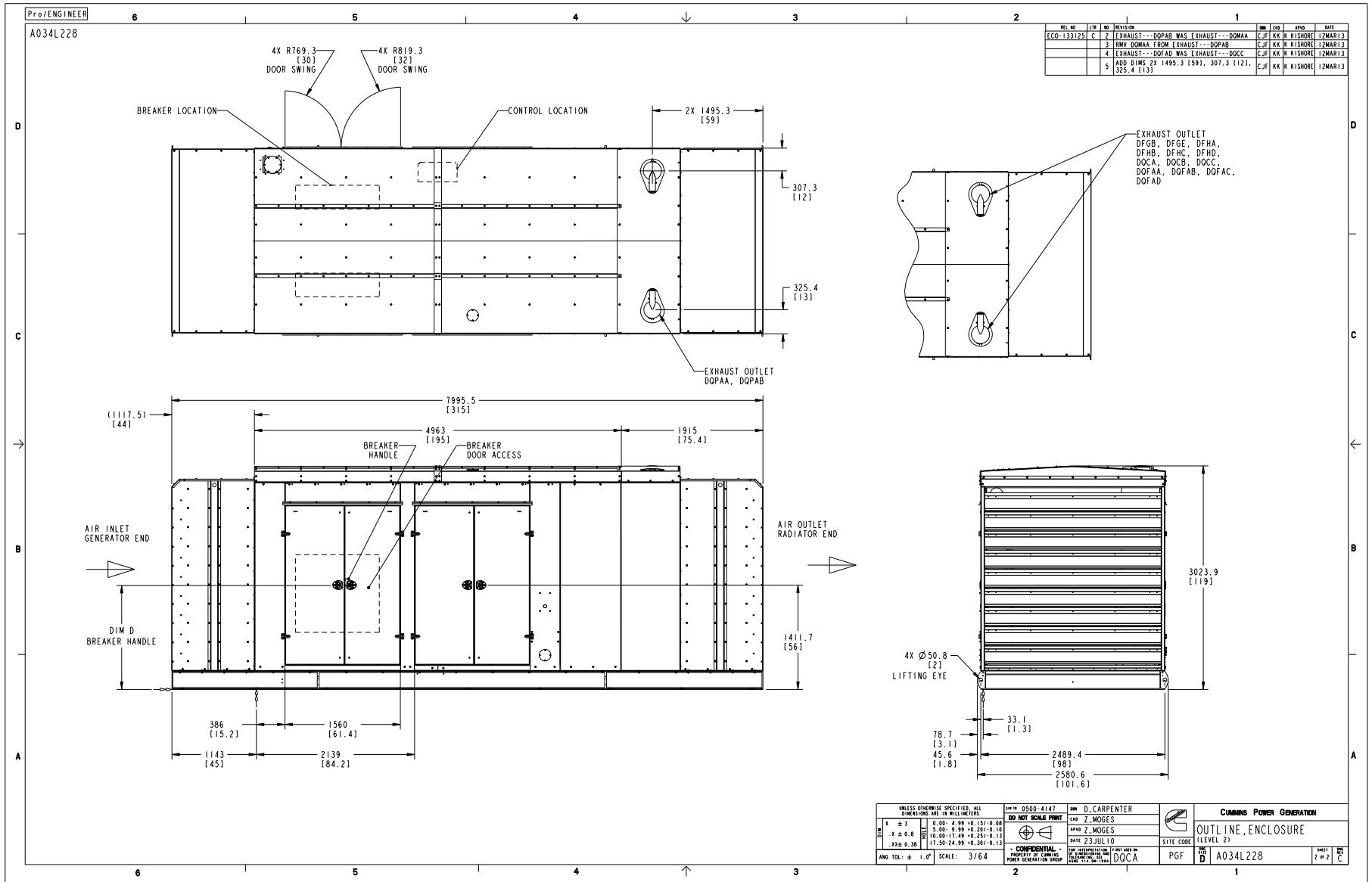
REL NO	DATE	BY	NO	REVISION	APPD	DATE
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			2	SEE SHEET 2	CJF	KK K KISHORE 12MAR13
			3	SEE SHEET 2	CJF	KK K KISHORE 12MAR13
			4	SEE SHEET 2	CJF	KK K KISHORE 12MAR13
			5	SEE SHEET 2	CJF	KK K KISHORE 12MAR13
			6	TITLE "OUTLINE, ENCLOSURE" WAS "ENCLOSURE, OUTLINE"	CJF	KK K KISHORE 12MAR13

- NOTES:
- DIMENSIONS SHOWN IN ( ) ARE INCHES.
  - FOUNDATION REFERENCE POINT (---) SEE FOUNDATION DRAWING FOR DETAILS.



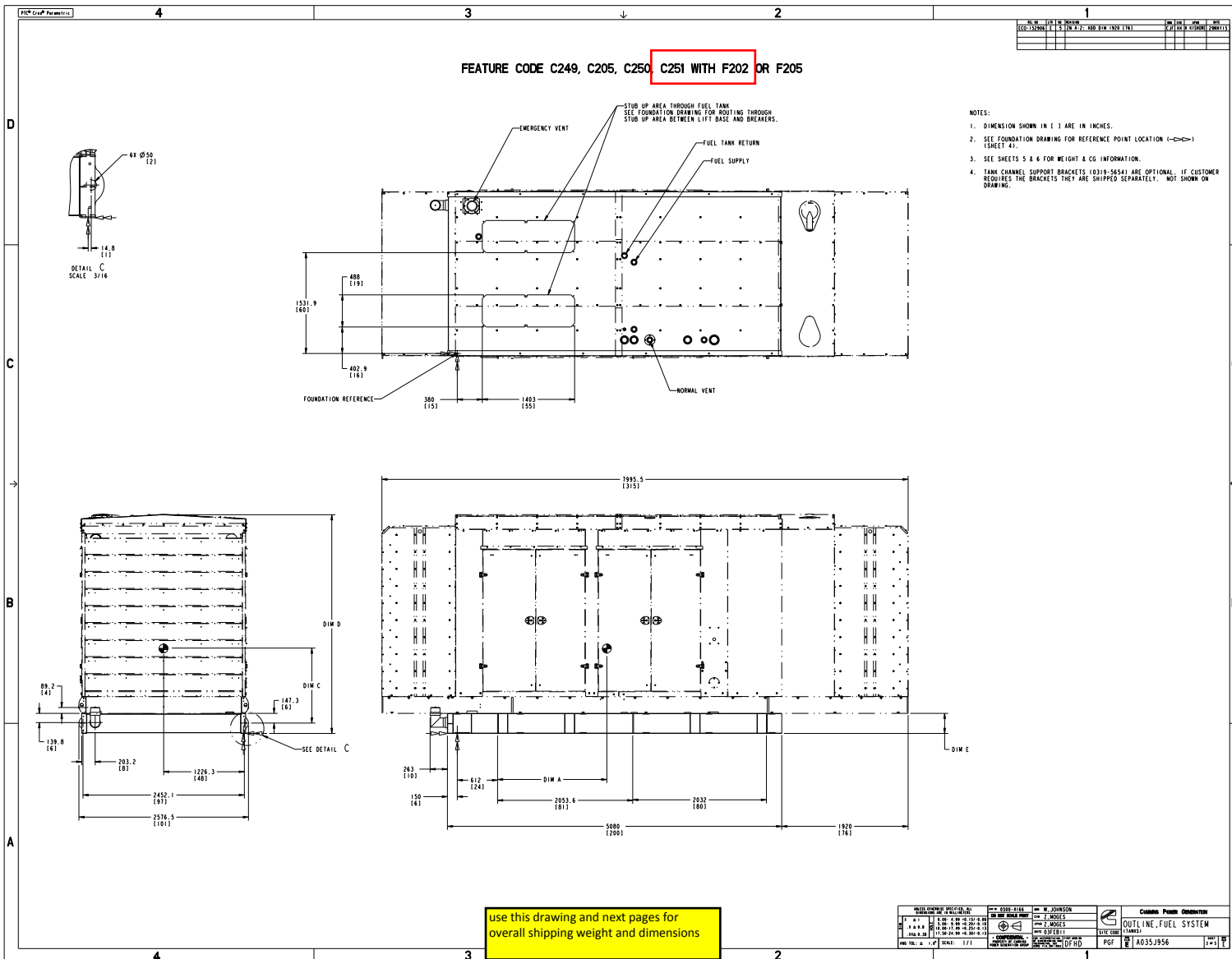
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		NO. 0500-4147	DR. D. CARPENTER	CUMMINS POWER GENERATION	
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DATE	23 JUL 10	NO. 0500-4147	DR. J. WOGES	PGF	
ANG. TOL.	± 1.0°	NO. 0500-4147	DR. J. WOGES	A034L228	
SCALE: 3/64		CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		SHEET 1 OF 2	

**\*\*\*Reference Only\*\*\***  
 see below drawings for overall shipping weight and dimensions

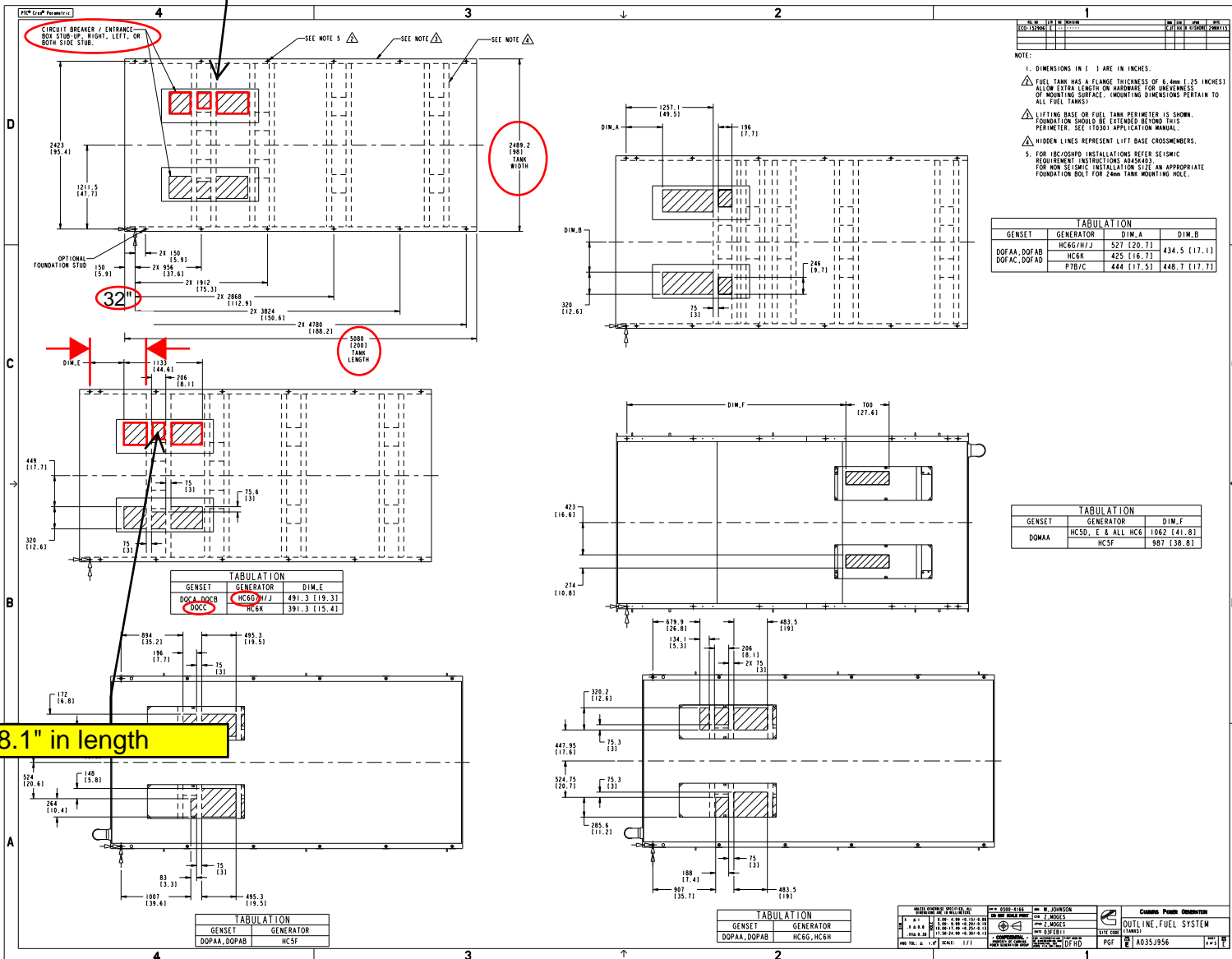


Drawing Name: A034L229 Revision: C  
 Part Name: A034L228 Revision: C  
 Sheet 2 of 3

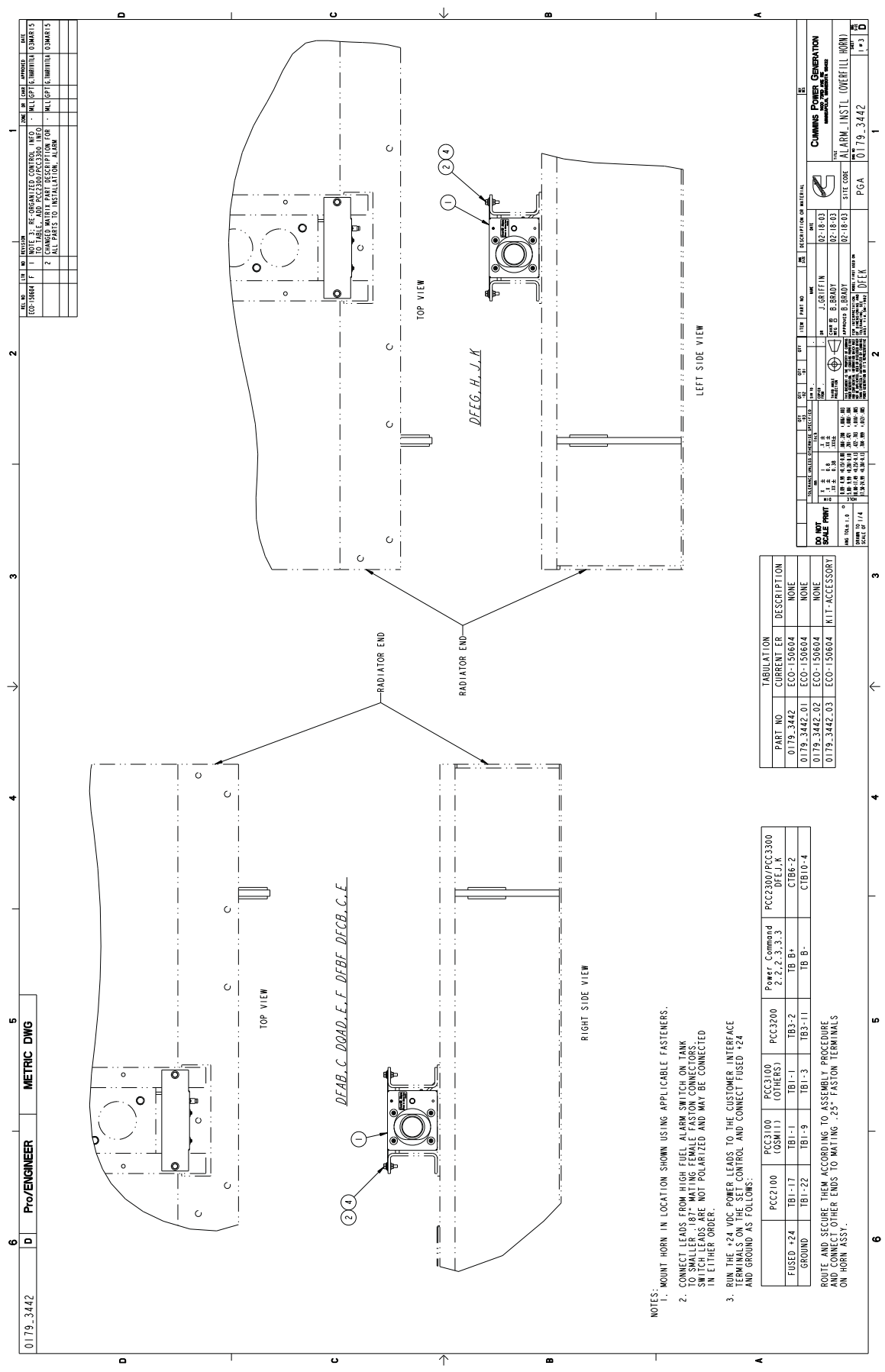


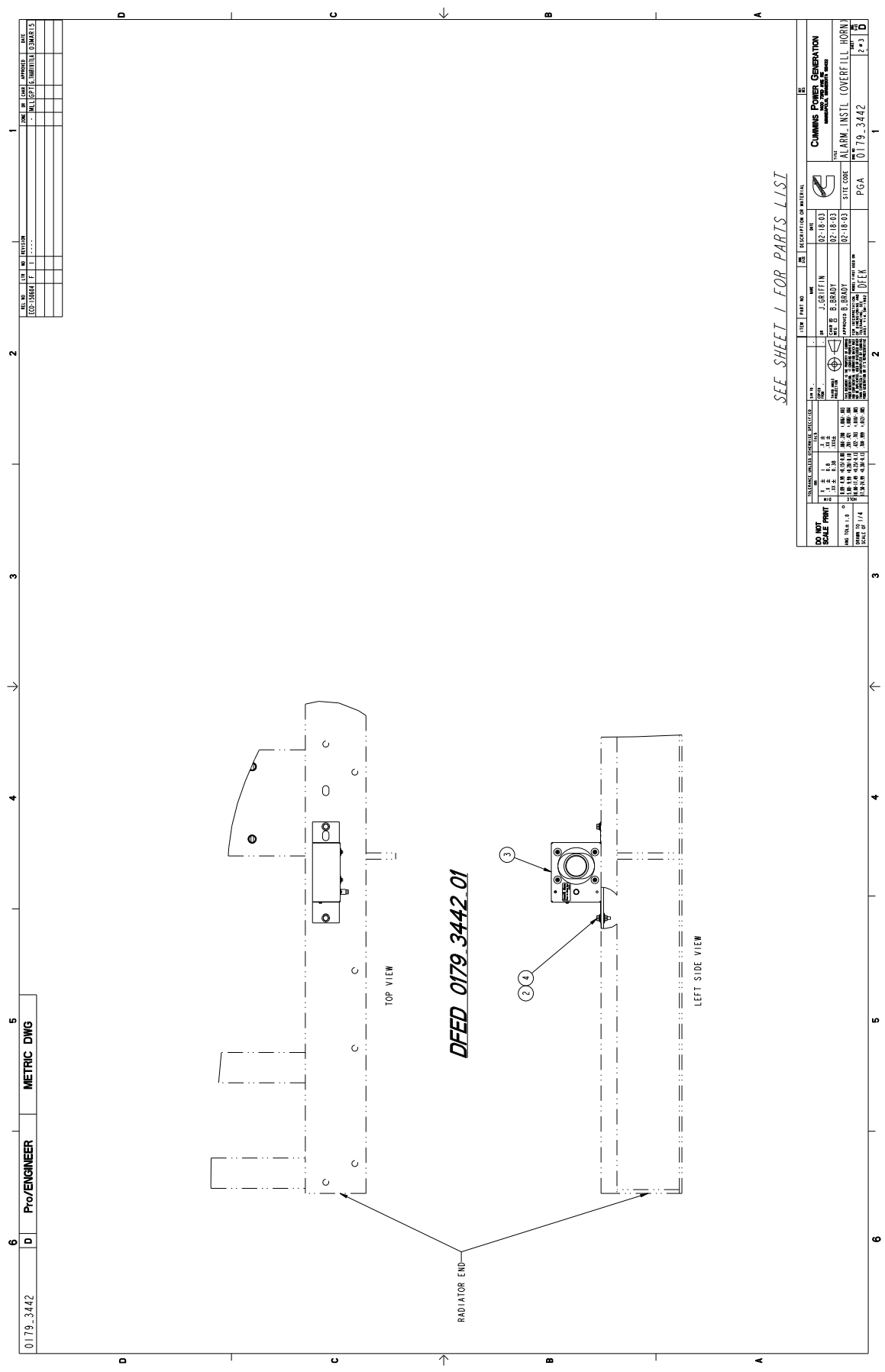


see specific stub for specific tank  
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REV. NO.	DATE	BY	CHKD.	DESCRIPTION	SCALE
001	1984-11-01	F	I	INITIAL DESIGN	1:1

NO.	DESCRIPTION	DATE

NO.	DESCRIPTION	DATE

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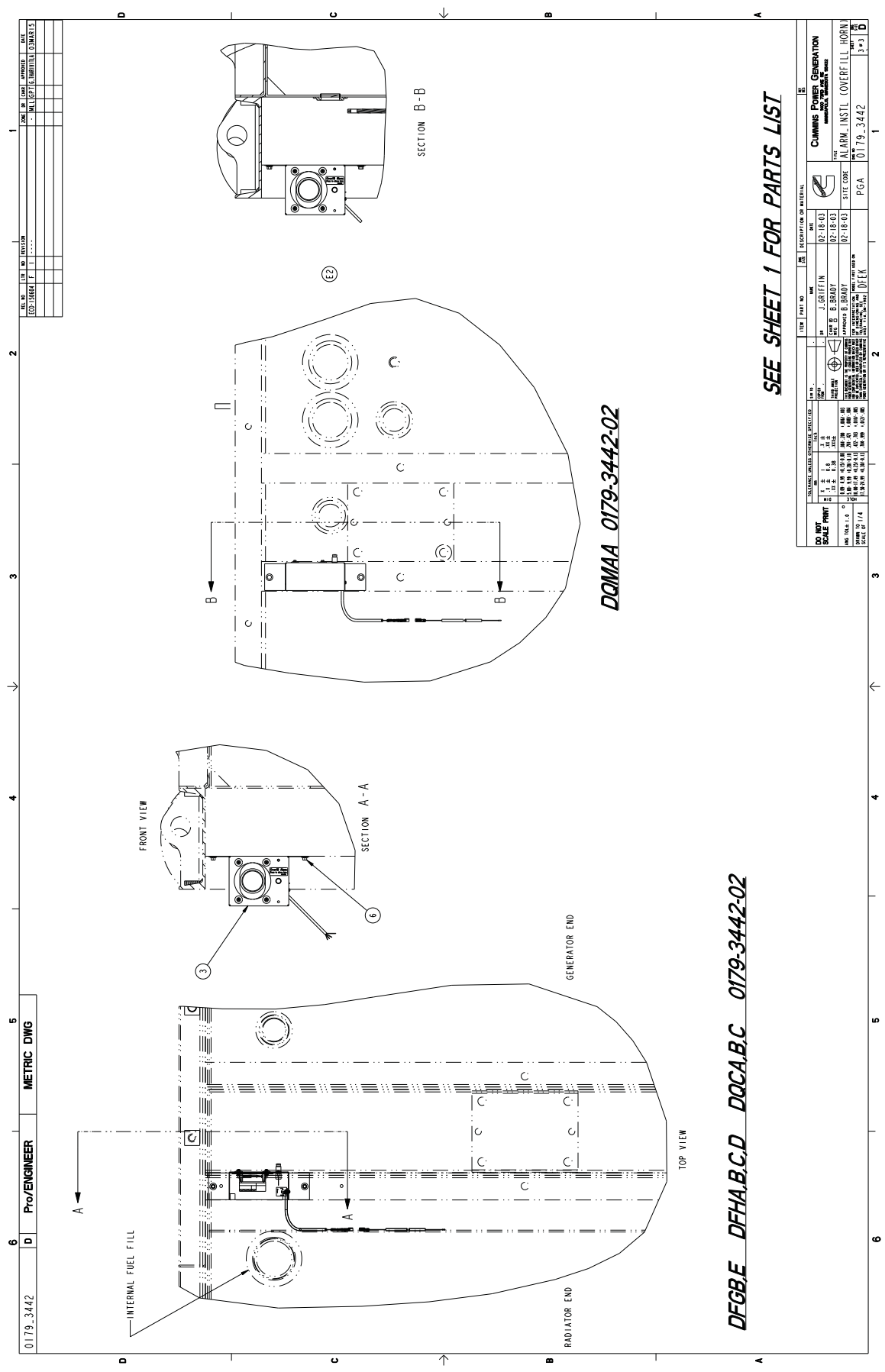
NO.	DESCRIPTION	DATE

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SEE SHEET 1 FOR PARTS LIST

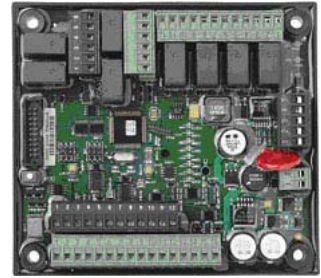
ITEM NO.	QTY.	DESCRIPTION OF MATERIAL	REV.

DO NOT SCALE PRINT	SCALE 1:1	DATE 1984-11-01	SCALE 1:1



Drawing Name: 0179-3442    Revision: F  
 Part Name: 0179-3442-03    Revision: F  
 Sheet 3 of 4

# PowerCommand<sup>®</sup> Input/output Expansion Module AUX 101 and AUX 102



## > Specification sheet

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## Power Generation

### Description

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

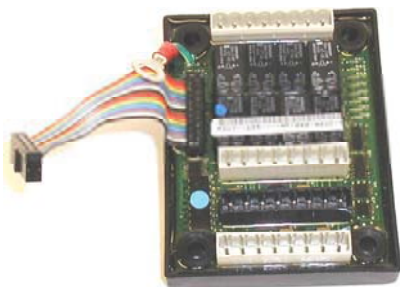
Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

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

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

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

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



AUX 102 - Expansion

### Features

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

## Specifications

### Signal requirements

Network connections - RS485, twisted-pair 78 kbps

Control power - 5-40 VDC

### Current

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

Terminations for control power accept wire up to 16 ga.

### Environment

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

### Relay ratings (AUX 101)

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

### Relay ratings (AUX 102)

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

### Input ratings (AUX 101)

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

Network length - Maximum 1219 m (4000 ft)

Approved wiring - Cat 4 or Cat 5 (stranded)

## Configurations

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

### Discrete/analog inputs:

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

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

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

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

Inputs are defaulted to disabled

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

### Relay outputs

Outputs can be configured to energize on occurrence of any event or fault code supported by the genset control.

The relay outputs default to the following:

#### AUX 101

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

#### AUX 102

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

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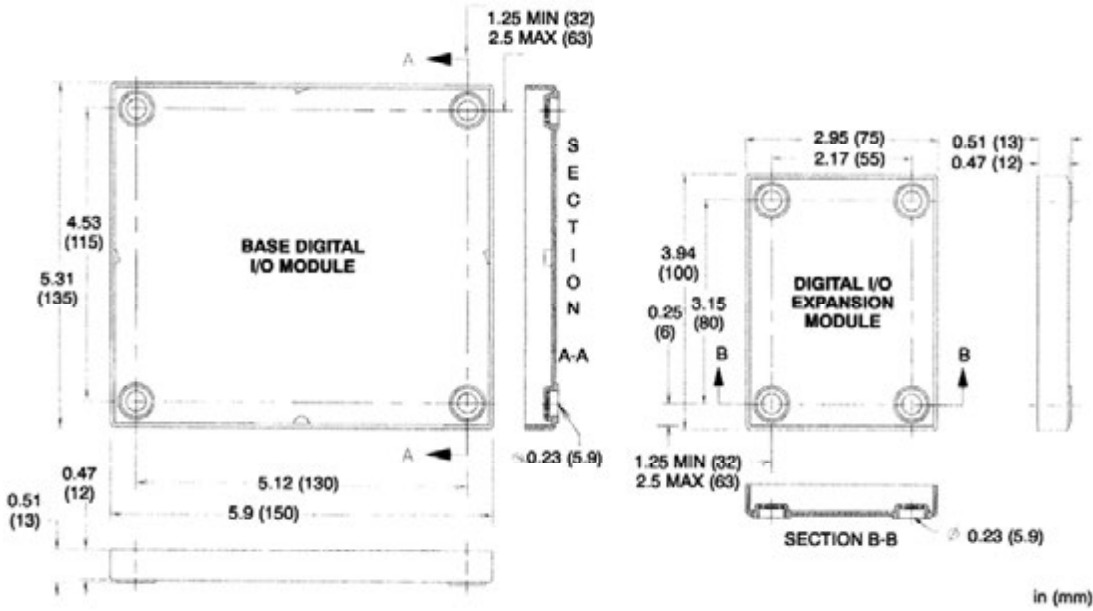
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## Dimensions



## Ordering information

Part number	Description
0541-1291	AUX 101 Digital Input/output Module - Base – PCC 1301
0184-0263	AUX 101 Digital Input/output Module - Base – PCC 1301 on DN and GN model generator sets
0630-3142	AUX 102 Digital Input/output Module wiring diagram - Instruction sheet C693
0541-0772	AUX 102 Digital Input/output Module - Expansion

located on/near  
genset control  
panel

## PCCNet Logo

Look for this logo on spec sheets of PCCNet compatible devices.



See your distributor for more information.

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# Battery Charger

**A048G602 10A 50/60 Hz**

**A051H785 20A 50/60 Hz**



## Description

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

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

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

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

## Features

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

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

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

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

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

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

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

**Vibration resistant design** – complies with UL991 class B vibration resistance requirements.

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

**Warranty** – 5 year CPG warranty.



Status and Fault LED



Field selectable jumper

## Specifications

### Performance and physical characteristics

Output:	Nominal voltage	12VDC* or 24VDC
	Float voltage– 12VDC batteries	12.87, 13.08, 13.31, 13.50*, 13.62, 14.30
	Float voltage– 24VDC batteries	25.74, 26.16, 26.62, 27.00*, 27.24, 28.60
	Equalize-voltage	6.5% above float voltage sensing
	Output voltage regulation	±0.5% (1/2%) line and load regulation
	Maximum output current	10 or 20 amps nominal
	Equalize charging	Battery interactive auto-boost
Input:	Voltage AC	120, 208, 240 ±10%
	Frequency	60/50 Hz ±5%
Approximate net weight:		10A: 25 lbs. (11.36 Kg) 20A: 50 lbs. (22.68 Kg)
Approximate dimensions: height x width x depth-in		10A: 12.50" x 7.66" x 6.50"(318x195x165 mm) 20A: 13.06" x 13.95" x 6.83"(332x354x173 mm)
Ambient temperature operation: At full rated output		- 4°F to 104 °F (-20 °C to 45 °C)

### Note:

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

### Caution:

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

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# PowerCommand<sup>®</sup> Annunciator Discrete Input or PCCNet



## > Specification sheet

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## Power Generation

### Description

The Universal Annunciator Module provides visual and audible indication of up to 20 separate alarm or status conditions, based on discrete (relay) inputs or network inputs. Each LED can be controlled by either a discrete wire input or by a signal on the PCCNet network sent from an external device, such as a PCC1301 or PCC2100 (version 2.4 or later) control.

In addition to the LEDs, the annunciator can control four custom relays based on signals received over the PCCNet. When one of the annunciator's discrete inputs is activated, the annunciator will broadcast that information over the network. By taking advantage of the network, discrete inputs and custom relays, the annunciator can be used as expanded I/O for a genset controller.

Easily installed in a location to give immediate notification of an alarm or warning status. Designed to give operating/monitoring personnel quick-glance status information. The module directly senses battery voltage to provide green/yellow/red alarm and status information for that parameter.

Genset controller complies with NFPA level two requirements when used with the display but without the annunciator panel. When used with the annunciator it meets NFPA level one requirements (emergency and standby power systems). The annunciator module can also be used for monitoring of transfer switch or other equipment status.

### Features

- Visual and audible warnings of up to 20 separate alarm or status conditions.
- LEDs can be controlled either via PCCNet or discrete input.
- Status of discrete inputs is broadcast on network.
- Four custom relays can be controlled over the PCCNet network.
- Configurable LED color (red, yellow or green) and selectable horn operation allows maximum flexibility.
- Standard NFPA 110 label, field configurable for other alarm status and conditions.
- Each audible alarm is annunciated, regardless of the number of existing alarm conditions displayed.
- Sealed membrane panel design provides environmental protection for internal components and is easy to clean.
- Configurable for negative (ground) input or positive input.
- Integral DC voltage sensing.
- Flush or surface mount provisions.
- UL Listed and labeled; CSA certified; CE marked.

## Specifications

### Signal requirements

Positive - Input impedance is 1.82 kOhms to ground; maximum input voltage = 31 VDC.

Negative - Input impedance is 1.82 kOhms to Bat+; inputs are at Bat+ level when open.

Sink/source current threshold for detection - 150 uA minimum, 3 mA maximum.

Typical conductor size: 16 ga for 304.8 m (1000 ft)

Max conductor size for terminal: 12 ga

### Relay outputs

0.2 A at 125 VAC and 1 A at 30 VDC

### Network connections

Use Belden 9729 two pair, stranded, shielded 24 AWG twisted pair cable for all PCCNet connections. Total network length can not exceed 1219 m (4000 ft). Up to 20 nodes can be connected to the network.

Note: Any communications wire connected to the generator set should be stranded cable.

### Power

Maximum consumption: 15 watts

### Battery voltage

Functional range - Audible and visual conditions operational from 6.5 to 31 VDC.

Low voltage setting - 12.0 VDC for 12 Volt nominal systems; 24.0 for 24 Volt nominal systems.

High voltage setting - 16.0 Volt for 12 Volt nominal systems; 32.0 Volt for 24 Volt nominal systems.

### Alarm horn

Sound level: 90 dB at 30 cm

### Physical

Weight (with enclosure): 1.4 kg (3.0 lbs)

### Temperature

-20 °C to +70 °C (-4 °F to +158 °F)

### Humidity

10% to 95% RH (non-condensing)

## Default lamp configurations

Can be configured for current NFPA 110 standard or as a replacement for Legacy (pre-2001) NFPA 110 annunciator (300-4510 or 300 4511)

Lamp	Description	NFPA 110		
		Color	Horn	Flash
<b>DS1</b>	Customer fault 1	Green	No	No
<b>DS2</b>	Customer fault 2	Amber	No	No
<b>DS3</b>	Customer fault 3	Red	No	No
<b>DS4</b>	Genset supplying load	Amber	No	No
<b>DS5</b>	Charger AC failure	Amber	Yes	No
<b>DS6</b>	Low coolant level	Amber	Yes	No
<b>DS7</b>	Low fuel level	Red	Yes	No
<b>DS8</b>	Check generator set	Amber	No	No
<b>DS9</b>	Not in auto	Red	Yes	Yes
<b>DS10</b>	Generator set running	Amber	No	No
<b>DS11</b>	High battery voltage	Amber	Yes	No
<b>DS12</b>	Low battery voltage	Red	Yes	No
<b>DS13</b>	Weak battery	Red	Yes	No
<b>DS14</b>	Fail to start	Red	Yes	No
<b>DS15</b>	Low coolant temp	Red	Yes	No
<b>DS16</b>	Pre-high engine temp	Amber	Yes	No
<b>DS17</b>	High engine temp	Red	Yes	No
<b>DS18</b>	Pre-low oil pressure	Red	Yes	No
<b>DS19</b>	Low oil pressure	Red	Yes	No
<b>DS20</b>	Overspeed	Red	Yes	No

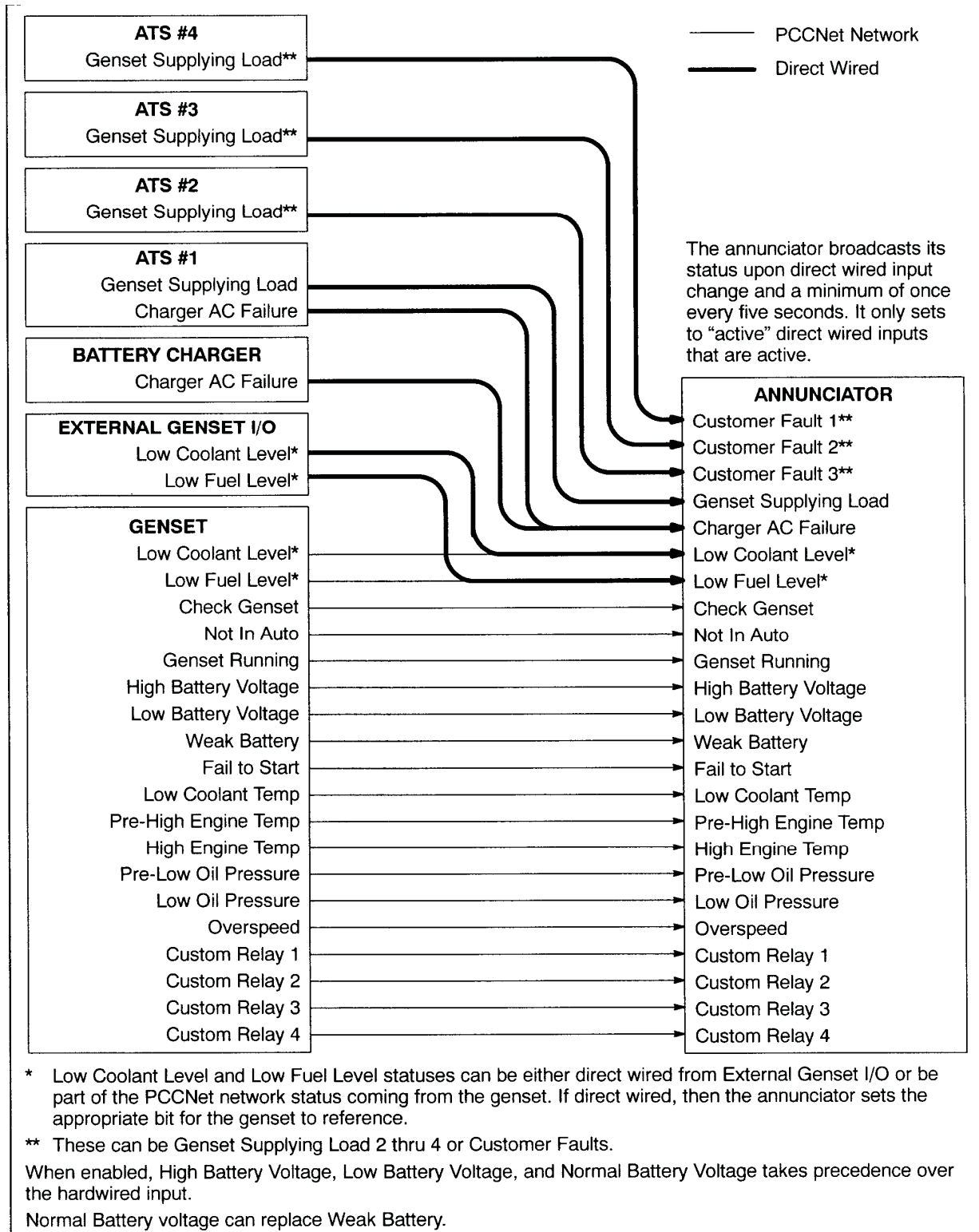
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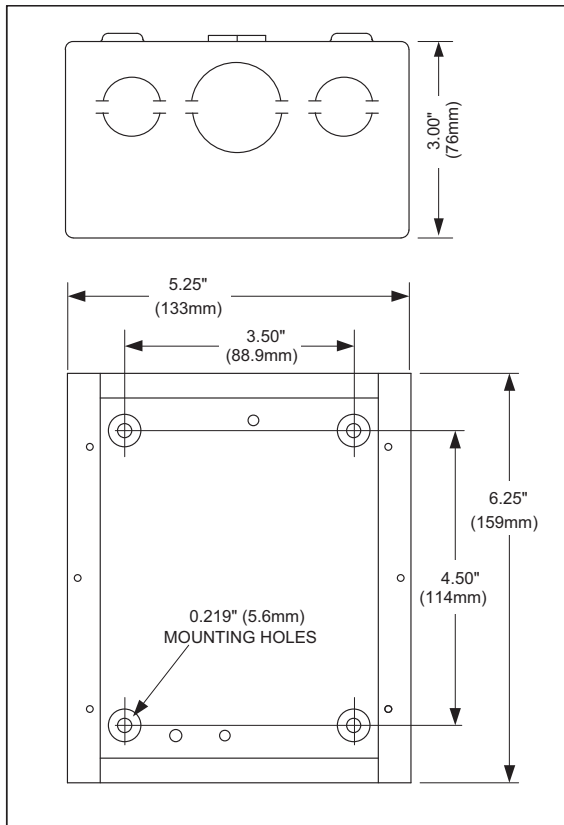
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## Typical installation



## Dimensions



Dimensions: in (mm)

## Ordering information

Part number	Description
0300-5929-01	Panel mount
0300-5929-02	Panel with enclosure



**See your distributor for more information.**

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**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<sup>†</sup> 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

<sup>†</sup> 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.

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