

Feb 10, 2017

SASKATOON RESEARCH AND DEVELOPMENT CENTRE  
CONTRACT NO. 35 – GENERATOR INSTALLATION  
CONTRACT #465-1-28-C35

Addendum #2

Q1 – Can you provide specs / shop drawing for the new and old generator?

A1 – Specifications are attached.

Q2 – Is the small storage shed that's outside on skids?

A2 – No, it is on a 2x6 floor on a gravel pad.

Q3 - Is there a place to store the shed and SeaCan that need to be moved?

Q3 - Yes, the AAFC Facility Manager will make space in the parking lot.

Colby Collinge  
Materiel Manager AAFC  
Regina, Saskatchewan

10 février 2017

CENTRE DE RECHERCHE ET DÉVELOPPEMENT DE SASKATOON  
CONTRAT N° 35 – INSTALLATION DE GÉNÉRATRICE  
CONTRAT #465-1-28-C35

Addenda N° 2

Q1 – Pouvez-vous nous fournir les spécifications et les dessins pour la nouvelle génératrice ainsi que celle en place?

R1 – Les spécifications sont ci-jointes.

Q2 – Est-ce que l'abri d'entreposage à l'extérieur est sur un traineau?

R2 – Non, l'abri est sur un plancher de 2 x 6 qui repose sur un lit de gravier.

Q3 – Est-ce qu'il y a un lieu désigné pour l'entreposage de l'abri et du conteneur maritime?

R3 – Oui, le gestionnaire de locaux d'AAC a réservé un lieu dans le terrain de stationnement.

Colby Collinge  
Gestionnaire du matériel, AAC  
Regina (Saskatchewan)

# Diesel generator set QSK19 series engine

EPA emissions

600 kW and 650 kW 60 Hz



## Description

Cummins Power Generation 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.

**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.

**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.

Model	Standby rating		Prime rating		Continuous rating		Data sheets	
	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz	50 Hz
✓ DQPAA	600 (750)		545 (681)				NAD-5688	
DQPAB	650 (812.5)		545(681)				NAD-5752	

## Generator set specifications

Governor regulation class	ISO 8528 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 801.2 through IEC 801.5; MIL STD 461C, Part 9

## Engine specifications

Design	4 cycle, in-line, turbocharged and charge air aftercooled
Bore	159 mm (6.25 in)
Stroke	159 mm (6.25 in)
Displacement	19 L (1159 in <sup>3</sup> )
Cylinder block	Cast iron, 6 cylinder
Battery capacity	1400 amps minimum at ambient temperature of 0 °C to 10 °C (32 °F to 50 °F)
Battery charging alternator	70 amps
Starting voltage	24 volt, negative ground
Fuel system	Cummins modular common rail
Fuel filter	Dual element, 10 micron filtration, spin-on fuel filters with 15 micron water separator
Air cleaner type	Dry replaceable element with restriction indicator
Lube oil filter type(s)	Fleetguard spin-on
Standard cooling system	High ambient radiator

## Alternator specifications

Design	Brushless, 4 pole, revolving field
Stator	2/3 pitch
Rotor	Single bearing flexible disc
Insulation system	Class H
Standard temperature rise	125 °C standby
Exciter type	PMG (permanent magnet generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 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	50 Hz line-neutral/line-line
<ul style="list-style-type: none"> <li>• 110/190</li> <li>• 120/208</li> <li>• 127/220</li> <li>• 139/240</li> <li>• 220/380</li> <li>• 240/416</li> <li>• 255/440</li> <li>• 277/480</li> <li>• 347/600</li> </ul>	

Note: Consult factory for other voltages.

## Generator set options and accessories

### Engine

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

### Control Panel

- 120/240 V, 150 W control anti-condensation space heater
- Paralleling configurations
- Remote fault signal package
- Run relay package

### Alternator

- 50 °C rise alternator
- 105 °C rise alternator
- 125 °C rise alternator
- 120/240 V, anti-condensation heater

### Cooling system

- High ambient cooling system

### Exhaust System

- Industrial grade exhaust silencer
  - Residential grade exhaust silencer
  - Critical grade exhaust silencer
  - Super critical exhaust silencer
- ### Generator set
- AC terminal box
  - Batteries
  - Battery rack w/hold-down - floor standing

- Circuit breaker - set mounted
- PowerCommand Network
- Remote annunciator panel
- Spring isolators
- Top entry entrance box (bottom entry entrance box std)
- 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.

## Control system 2.3

**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 (overcrank) 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 genset running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -20 °C to +70 °C

### Alternator data

- Line-to-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

- Genset 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

**Emergency standby power (ESP):**

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

**Limited-time running power (LTP):**

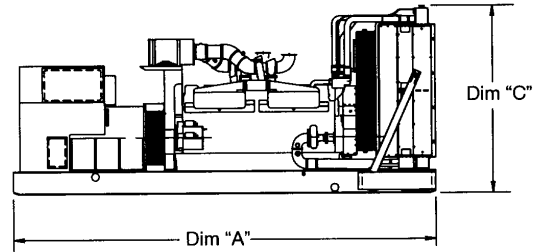
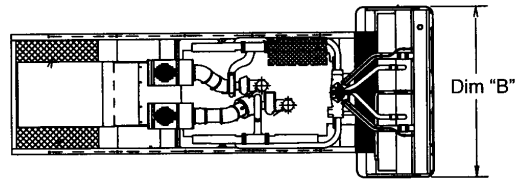
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

**Prime power (PRP):**

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

**Base load (continuous) power (COP):**

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



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





**Do not use for installation design**

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set Weight* dry kg (lbs)	Set Weight* wet kg (lbs)
<b>DQPAA</b>	4629 (182)	1742 (69)	2189 (86)	5211 (11488)	5352 (11799)
<b>DQPAB</b>	4629 (182)	1742 (69)	2189 (86)	5449 (12013)	5590 (12324)

\* 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>The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins Power Generation products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.</p>	 <p>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. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.</p>
 <p>All low voltage models are CSA certified to product class 4215-01.</p>	 <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><b>U.S. EPA</b> Engine certified to U.S. EPA Nonroad Source Emissions Standards, 40 CFR 89, Tier 2.</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.

North America  
1400 73rd Avenue N.E.  
Minneapolis, MN 55432  
USA  
Phone 763 574 5000  
Fax 763 574 5298

**Our energy working for you.™**

©2013 Cummins Power Generation Inc. All rights reserved.  
Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and “Our energy working for you.” are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. Specifications are subject to change without notice.  
NAS-5751a-EN (6/13)



[cumminspower.com](http://cumminspower.com)

## Generator set data sheet

**Model:** DQPAA  
**Frequency:** 60  
**Fuel type:** Diesel  
**KW rating:** 600 standby  
**Emissions level:** EPA NSPS Stationary Emergency Tier 2

<b>Exhaust emission data sheet:</b>	<b>EDS-1154</b>
<b>Exhaust emission compliance sheet:</b>	<b>EPA-1224</b>
<b>Sound performance data sheet:</b>	<b>MSP-1152</b>
<b>Cooling performance data sheet:</b>	<b>MCP-240</b>
<b>Prototype test summary data sheet:</b>	<b>PTS-316</b>
<b>Standard set-mounted radiator cooling outline:</b>	<b>A041U110</b>
<b>Optional set-mounted radiator cooling outline:</b>	
<b>Optional heat exchanger cooling outline:</b>	
<b>Optional remote radiator cooling outline:</b>	

<b>Fuel consumption</b>	<b>Standby</b>				<b>Prime</b>				<b>Continuous</b>
	<b>kW (kVA)</b>				<b>kW (kVA)</b>				<b>kW (kVA)</b>
<b>Ratings</b>	600 (750)				545 (681)				
<b>Load</b>	<b>1/4</b>	<b>1/2</b>	<b>3/4</b>	<b>Full</b>	<b>1/4</b>	<b>1/2</b>	<b>3/4</b>	<b>Full</b>	<b>Full</b>
<b>US gph</b>	13.0	23	33.5	45.4	12.2	21.2	29.8	41.0	
<b>L/hr</b>	49.2	87	123	171.8	46.2	80.3	112.8	155.2	

<b>Engine</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Engine manufacturer	Cummins Inc.		
Engine model	QSK19-G8		
Configuration	Cast Iron, in line 6 cylinder		
Aspiration	Turbocharged and charged aftercooled (air-to-air)		
Gross engine power output, kWm (bhp)	721 (967)	608 (815)	
BMEP at set rated load, kPa (psi)	2552 (370)	2151 (312)	
Bore, mm (in)	158.8 (6.25)		
Stroke, mm (in)	158.8 (6.25)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	9.5 (1875)		
Compression ratio	15:1		
Lube oil capacity, L (qt)	68.1 (72)		
Overspeed limit, rpm	2070		
Regenerative power, kW	59		

### Fuel flow

Maximum fuel flow, L/hr (US gph)	492 (130)	
Maximum fuel inlet restriction, kPa (in Hg)	30.5 (9)	
Maximum fuel inlet temperature, °C (°F)	71 (160)	
Maximum fuel return line restriction kPa (in Hg)	33.8 (10)	

<b>Air</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Combustion air, m <sup>3</sup> /min (scfm)	59.8 (2112)	56.3 (1689)	
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)	150 (5319)	138 (4901)	
Exhaust temperature, °C (°F)	508 (946)	486 (906)	
Maximum back pressure, kPa (in H <sub>2</sub> O)	3.4 (13.6)		

## Standard set-mounted radiator cooling

Ambient design, °C (°F)	52 (126)	50 (122)	
Fan load, kW <sub>m</sub> (HP)	26.1 (35)		
Coolant capacity (with radiator), L (US gal)	95 (25.3)		
Cooling system air flow, m <sup>3</sup> /min (scfm)	1007 (35588)		
Total heat rejection, MJ/min (Btu/min)	29.8 (28291)	24.4 (23118)	
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)	0.12 (0.5)		

## Optional set-mounted radiator cooling

Ambient design, °C (°F)			
Fan load, kW <sub>m</sub> (HP)			
Coolant capacity (with radiator), L (US gal)			
Cooling system air flow, m <sup>3</sup> /min (scfm)			
Total heat rejection, MJ/min (Btu/min)			
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)			
Maximum fuel return line restriction, kPa (in Hg)			

## Optional heat exchanger cooling

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



<b>Optional remote radiator cooling<sup>1</sup></b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
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)	5211 (11488)
Unit wet weight kgs (lbs)	5352 (11799)

### Notes:

<sup>1</sup> For non-standard remote installations contact your local Cummins Power Generation 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 1860 m (6102 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 1.7% per 300 m (1000 ft). Above 40 °C (104 °F) derate 6.7% per 10 °C (18 °F).
<b>Prime</b>	Engine power available up to 2174 m (7133 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 3% per 300 m (1000 ft). Above 40 °C (104 °F) derate 9% per 10 °C (18 °F).
<b>Continuous</b>	

## Ratings definitions

<b>Emergency standby power (ESP):</b>	<b>Limited-time running power (LTP):</b>	<b>Prime power (PRP):</b>	<b>Base load (continuous) power (COP):</b>
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
600	Wye	80	S/P		2944	7	ADS-309	B305-2
600	Wye	105	S/P		2429	17	ADS-308	B304-2
240/480	Wye	80	S/P		2944	311	ADS-309	B969-2
240/480	Wye	105	S/P		2429	311	ADS-308	B970-2
190/380-208/416	Wye	105	S/P		2429	14	ADS-308	B972-2
220/440-240-480	Wye	105	S		2944	311	ADS-309	B973-2
208/416-240/480	Wye	125	S		2944	311	ADS-309	B975-2
380	Wye	80	P		2944	13	ADS-309	B687-2
220/440-240/480	Wye	80	P		2944	311	ADS-309	B973-2
208/416-240/480	Wye	80	P		2944	311	ADS-309	B975-2

### 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.

North America  
1400 73rd Avenue N.E.  
Minneapolis, MN 55432  
USA

Phone 763 574 5000  
Fax 763 574 5298

**Our energy working for you.™**

©2013 Cummins Power Generation Inc. All rights reserved.

Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. Specifications are subject to change without notice.

NAD-5688b (11/13)



[cumminspower.com](http://cumminspower.com)

# PowerCommand® 2.3 control system



## > Specification sheet

Our energy working for you.™



### 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 - UL Listed 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 generator set 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 Power Generation 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 kilowatt hours, and load profile. (Control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

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

### Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kW, KVAR, power factor, KVA (three phase and total)
- Frequency

### 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:

**Our energy working for you.™**

[www.cumminspower.com](http://www.cumminspower.com)

©2008 | Cummins Power Generation Inc. | All rights reserved | Specifications subject to change without notice | Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. S-1569b (4/08) Page 2 of 7



### 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 wakeup 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

**Our energy working for you.™**

[www.cumminspower.com](http://www.cumminspower.com)

©2008 | Cummins Power Generation Inc. | All rights reserved | Specifications subject to change without notice | Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. S-1569b (4/08) Page 3 of 7



not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation are not bypassed. Please refer to the Control Application Guide or Manual for list of these faults.

### Derate

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

### Configurable alarm and status inputs

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

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

### Emergency stop

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

### Full authority electronic engine protection

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

### General engine protection

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

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

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

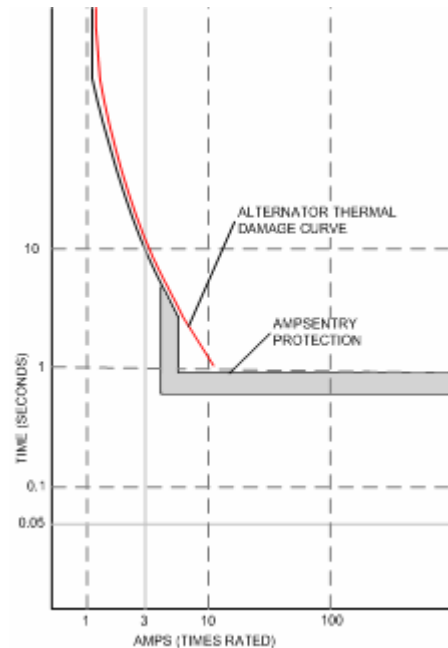
Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

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

### Alternator protection

AmpSentry Protective relay - A UL Listed 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.

**Our energy working for you.™**

[www.cumminspower.com](http://www.cumminspower.com)



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, 30VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (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.

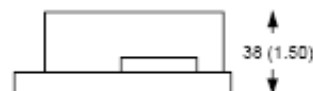
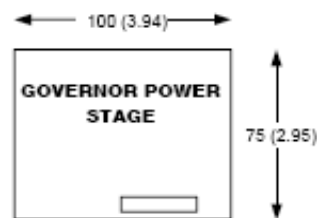
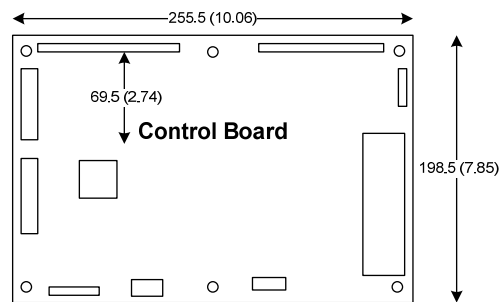
### Communications connections include:

- 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 Power Generation products.

## Mechanical drawings



**Our energy working for you.™**

[www.cumminspower.com](http://www.cumminspower.com)

©2008 | Cummins Power Generation Inc. | All rights reserved | Specifications subject to change without notice | Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. S-1569b (4/08) Page 5 of 7



# 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 generator set status LED lamps with both internationally accepted symbols and English text to comply with customers 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.

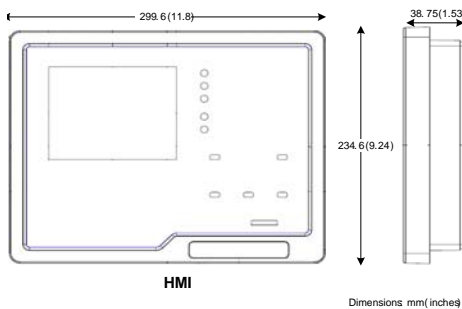
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian, Czech 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 (104 °F to 158 °F) and for storage from -55 °C to +80 °C (131 °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.

**Our energy working for you.™**

[www.cumminspower.com](http://www.cumminspower.com)

©2008 | Cummins Power Generation Inc. | All rights reserved | Specifications subject to change without notice | Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. S-1569b (4/08) Page 6 of 7





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.
- EN 50081-1,2 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 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.



## See your distributor for more information

### Cummins Power Generation

#### Americas

1400 73<sup>rd</sup> Avenue N.E.  
Minneapolis, MN 55432 USA  
Phone: 763 574 5000  
Fax: 763 574 5298

#### Europe, CIS, Middle East and Africa

Manston Park Columbus Ave.  
Manston Ramsgate  
Kent CT 12 5BF United Kingdom  
Phone 44 1843 255000  
Fax 44 1843 255902

#### Asia Pacific

10 Toh Guan Road #07-01  
TT International Tradepark  
Singapore 608838  
Phone 65 6417 2388  
Fax 65 6417 2399

**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.

### Our energy working for you.™

[www.cumminspower.com](http://www.cumminspower.com)

©2008 | Cummins Power Generation Inc. | All rights reserved | Specifications subject to change without notice | Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand, AmpSentry, InPower and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others.  
S-1569b (4/08) Page 7 of 7



# ALTERNATOR DATA SHEET

## Frame Size HC5F

### CHARACTERISTICS

<b>WEIGHTS:</b>	Wound Stator Assembly:	1776 lb	800 kg
	Rotor Assembly:	1512 lb	681 kg
	Complete Assembly:	3738 lb	1684 kg
<b>MAXIMUM SPEED:</b>		2250	rpm
<b>EXCITATION CURRENT:</b>	Full Load	1.72	Amps
	No Load	0.40	Amps
<b>INSULATION SYSTEM:</b>	Class H Throughout		

3 Ø RATINGS (0.8 power factor) (Based on specific temperature rise at 40°C ambient temperature)	60 Hz (winding no)				50 Hz (winding no)			
	110/190 220/380 (311/312)	120/208 240/416 (311/312)	139/240 277/480 (311/312)	347/600 (07/17)	110/190 220/380 (311/312)	120/208 240/416 (311/312)	127/220 254/440 (311/312)	
150°C Rise Ratings	kW	570	625	700	700	568	568	552
	kVA	713	781	875	875	710	710	690
125°C Rise Ratings	kW	538	590	660	660	536	536	520
	kVA	673	738	825	825	670	670	650
105°C Rise Ratings	kW	500	550	600	600	496	496	480
	kVA	625	688	750	750	620	620	600
80°C Rise Ratings	kW	440	484	528	528	432	432	416
	kVA	550	605	660	660	540	540	520
<b>REACTANCES</b> (per unit ± 10%) (Based on full load at 125C Rise Rating)		110/190 220/380	120/208 240/416	139/240 277/480	347/600	110/190 220/380	120/208 240/416	127/220 254/440
Synchronous		3.64	3.33	2.80	2.80	2.90	2.43	2.10
Transient		0.17	0.15	0.13	0.13	0.17	0.14	0.12
Subtransient		0.12	0.11	0.09	0.09	0.11	0.09	0.08
Negative Sequence		0.23	0.21	0.18	0.18	0.18	0.15	0.13
Zero Sequence		0.10	0.09	0.08	0.08	0.08	0.07	0.06
<b>MOTOR STARTING</b>		<u>Broad Range</u>		<u>600</u>	<u>Broad Range</u>			
Maximum kVA (90% Sustained Voltage)		2429		2429	1769			
<b>TIME CONSTANTS</b> (Sec)		<u>Broad Range</u>		<u>600</u>	<u>Broad Range</u>			
Transient		0.080		0.080	0.080			
Subtransient		0.012		0.012	0.012			
Open Circuit		2.500		2.500	2.500			
DC		0.019		0.019	0.019			
<b>WINDINGS</b> (@20°C)		<u>Broad Range</u>		<u>600</u>	<u>Broad Range</u>			
Stator Resistance (Ohms per phase)		0.0062		0.0098	0.0062			
Rotor Resistance (Ohms)		2.1600		2.1600	2.1600			
Number of Leads		12		6	12			

Single phase power can be taken up to 40% of 3 phase- ratings



# PROTOTYPE TEST SUPPORT (PTS) 60 HZ TEST SUMMARY



<u>GENERATOR SET MODELS</u>	<u>REPRESENTATIVE PROTOTYPE</u>
600DQPAA	Model: 650DQPAB
650DQPAB	Engine: QSK19-G8
	Alternator: HC6H

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: 665 KW**

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

**Maximum Motor Starting: 3313**

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

**Alternator Temperature Rise:**

The highest rated temperature rise ( 150°C ) test result are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with the rated voltages. Only the highest temperatures are reported.

**Torsional Analysis and Testing:**

The generator set was tested to verify that the design is not subjected to harmful torsional stresses in excess of 5000 psi A spectrum analysis of the transducer output was conducted over the speed range of 1350 to 1950 RPM.

**Cooling System:** 45 °C Ambient  
0.5 in. H2O restriction

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

**Durability:**

The generator set was subjected to 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.

**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 to verify single step loading capability as required by NFPA 110 and verify acceptable voltage and frequency response on load addition or rejection. The following results were recorded:

Full Load Acceptance:

Voltage Dip:	36.3 %
Recovery Time:	4.4 sec
Frequency Dip:	11.2 %
Recovery Time:	4.2 sec

Full Load Rejection:

Voltage Rise:	19.8 %
Recovery Time:	3 sec
Frequency Rise:	3.2 %
Recovery Time:	0.7 sec

**Harmonic Analysis:**

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

<u>Harmonic</u>	<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	0.1	0.1	0.1	0.1
5	0.1	1.9	0.0	1.8
7	0.8	0.6	0.7	0.6
9	0.0	0.0	0.0	0.0
11	0.6	0.2	0.5	0.1
13	0.2	0.3	0.2	0.3
15	0.0	0.0	0.0	0.0

**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.



**Sound Pressure Level @ 7 meters, dB(A)**

See Notes 1-8 listed below

Configuration		Measurement Location Number								Average
		1	2	3	4	5	6	7	8	
Standard - Unhoused	Infinite Exhaust	86.70	91.40	89.80	93.30	91.10	93.10	93.20	92.10	91.70
F200 Weather	Mounted Muffler	93.50	89.30	83.60	89.10	89.10	89.70	81.10	87.20	89.10
F201 - Quiet Site II First Stage	Mounted Muffler	87.30	78.60	77.60	77.40	78.60	77.70	74.10	78.00	80.70
F202 - Quiet Site II Second Stage	Mounted Muffler	72.60	72.10	75.20	72.70	77.80	75.90	72.50	75.30	74.70

**Sound Power Level, dB(A)**

See Notes 2-6, 9, 10 listed below

Configuration		Octave Band Center Frequency (Hz)									Overall Sound Power Level
		31.5	63	125	250	500	1000	2000	4000	8000	
Standard - Unhoused	Infinite Exhaust	66.00	93.80	105.10	109.10	112.40	112.90	114.40	110.90	111.80	120.20
F200 Weather	Mounted Muffler	73.10	94.00	104.20	109.50	109.70	111.00	111.50	109.90	109.10	118.30
F201 - Quiet Site II First Stage	Mounted Muffler	73.50	93.20	103.10	104.80	102.10	101.70	105.50	101.30	100.40	111.70
F202 - Quiet Site II Second Stage	Mounted Muffler	66.10	93.30	102.90	97.50	92.50	98.10	98.80	94.00	88.40	106.70

**Exhaust Sound Power Level, dB(A)**

Open Exhaust (No Muffler Rated Load)	RPM	Applied Load	Octave Band Center Frequency (Hz)								Overall Sound Power Level	
			31.5	63	125	250	500	1000	2000	4000		8000
	1800	600KW	64.90	97.40	112.50	120.20	121.80	122.90	124.90	121.10	109.30	129.70

Note:

- Position 1 faces the engine front. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7m (23 ft) from the surface of the generator set and 1.2m (48") from floor level.
- Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
- Sound data with remote-cooled generator sets are based on rated loads without cooling fan noise.
- Sound levels for aluminum enclosures are approximately 2 dB(A)s higher than listed sound levels for steel enclosures.
- Sound data for generator set with infinite exhaust do not include exhaust noise.
- Data is based on full rated load with standard radiator-cooling fan package
- Sound Pressure Levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
- Reference sound pressure is 20 µPa.
- Sound Power Levels per ISO 3744 and ISO 8528-10, as applicable.
- Reference power = 1 pw (10<sup>-12</sup> W)
- Exhaust Sound Power Levels are per ISO 6798, as applicable.



# Exhaust Emission Data Sheet

## 600DQPAA

### 60 Hz Diesel Generator Set

### EPA Emission

**Engine Information:**

Model:	Cummins Inc. QSK19-G8	Bore:	6.25 in. (159 mm)
Type:	4 Cycle, In-Line, 6 Cylinder Diesel	Stroke:	6.25 in. (159 mm)
Aspiration:	Turbocharged and Charge Air Cooled	Displacement:	1150 cu. In. (18.9 liters)
Compression Ratio:	15:1		
Emission Control Device:	Electronic Control		

	<u>1/4</u>	<u>1/2</u>	<u>3/4</u>	<u>Full</u>	<u>Full</u>
<b>PERFORMANCE DATA</b>	<b>Standby</b>	<b>Standby</b>	<b>Standby</b>	<b>Standby</b>	<b>Prime</b>
BHP @ 1800 RPM (60 Hz)	223	447	670	893	815
Fuel Consumption (gal/Hr)	12.4	22.3	33.3	45.0	40.0
Exhaust Gas Flow (CFM)	2164.8	3290.1	4249.9	5406.8	4901
Exhaust Gas Temperature (°F)	698.9	796.5	847.8	949.2	906
<b>EXHAUST EMISSION DATA</b>					
HC (Total Unburned Hydrocarbons)	0.25	0.19	0.13	0.1	0.13
NOx (Oxides of Nitrogen as NO2)	3.6	3.9	4.4	4.5	4.62
CO (carbon Monoxide)	1.2	1.1	0.67	0.46	0.41
PM (Particular Matter)	0.19	0.17	0.07	0.04	0.03
SO2 (Sulfur Dioxide)	0.14	0.11	0.11	0.11	0.11
Smoke (Bosch)	0.52	0.65	0.32	0.24	0.15

All values are Grams per HP-Hour

**TEST CONDITIONS**

Data is representative of steady-state engine speed (± 25 RPM) at designated genset loads. Pressures, temperatures, and emission rates were stabilized.

Fuel Specification:	ASTM D975 No. 2-D diesel fuel with 0.03-0.05% sulfur content (by weight), and 40-48 cetane number.
Fuel Temperature:	99 ± 9 °F (at fuel pump inlet)
Intake Air Temperature:	77 ± 9 °F
Barometric Pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference Standard:	ISO 8178

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



# 2015 EPA Tier 2 Exhaust Emission Compliance Statement 600DQPAA Stationary Emergency 60 Hz Diesel Generator Set

### Compliance Information:

The engine used in this generator set complies with Tier 2 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.

Engine Manufacturer:	Cummins Inc
EPA Certificate Number:	FCEXL050.AAD-017
Effective Date:	09/22/2014
Date Issued:	09/22/2014
EPA Engine Family (Cummins Emissions Family):	FCEXL050.AAD (D283)

### Engine Information:

Model:	Cummins Inc QSK19-G8	Bore:	6.25 in. (159 mm)
Engine Nameplate HP:	967	Stroke:	6.25 in. (159 mm)
Type:	4 Cycle, Inline, 6 Cylinder	Displacement:	1150 cu. in. ( 18.9 liters )
Aspiration:	Turbocharged and Charge Air Cooled	Compression Ratio:	15.0:1
Emission Control Device:	Electronic Control		

### Diesel Fuel Emission Limits

#### D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	<u>NOx + NMHC</u>	<u>CO</u>	<u>PM</u>	<u>NOx + NMHC</u>	<u>CO</u>	<u>PM</u>
Test Results - Diesel Fuel (300-4000 ppm Sulfur)	4.3	1.3	0.06	5.8	1.8	0.08
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20
Test Results - CARB Diesel Fuel (<15 ppm Sulfur)	3.9	1.3	0.05	5.3	1.8	0.07
CARB Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

The CARB emission values are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.

**Test Methods:** EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for Constant Speed Engines (ref. ISO8178-4, D2)

**Diesel Fuel Specifications:** Cetane Number: 40-48. Reference: ASTM D975 No. 2-D.

**Reference Conditions:** Air Inlet Temperature: 25°C (77°F), Fuel Inlet Temperature: 40°C (104°F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit.

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

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



**High Ambient Air Temperature Radiator Cooling System**

	Duty	Rating (kW)	✓ Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)				Housed in Free Air, No Air Discharge Restriction		
			0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	F200/F203	F201/F204	F202/F205
			<b>Maximum Allowable Ambient Temperature, Degree C</b>						
60 Hz	Standby	600	57.02	55.09	52.89	50.44	54.9	54.9	53.7
	Prime	545	57.02	55.09	52.89	50.44	54.9	54.9	53.7
	Continuous		N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Enhanced High Ambient Air Temperature Radiator Cooling System**

	Duty	Rating (kW)	Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)				Housed in Free Air, No Air Discharge Restriction		
			0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	F200/F203	F201/F204	F202/F205
			<b>Maximum Allowable Ambient Temperature, Degree C</b>						
	Standby	600	N/A	N/A	N/A	N/A	N/A	N/A	N/A
60 Hz	Prime	545	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Continuous		N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Notes:**

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





**THE VMC GROUP**  
The Power of Together™



**Power  
Generation**

## CERTIFICATE OF COMPLIANCE

### SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS



Certification No.

**VMA-44898-CCS (REVISION 8)**

Expiration Date: 12/31/2016

#### Certification Parameters:

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

**IBC 2000, IBC 2003, IBC 2006, IBC 2009, IBC 2012**

The following model designations, options, and accessories are included in this certification. Reference report number **VMA-44898-1, -2, -3** as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

#### Cummins Power Generation Standard Engine Generator Set Packages

The above referenced equipment is **APPROVED** for seismic application when properly installed,<sup>3</sup> used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance<sup>4</sup>. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as  $I_p=1.5$ .

Certified Seismic Design Levels	
$S_{DS} \leq 1.94$	$S_{DS} \leq 0.64$
$z/h \leq 0.0$	$z/h \leq 1.0$
(Equipment at Grade)	(Equipment on Roof)
Soil Classes A, B, C, D, Seismic Risk Category I, II, III, IV, and Seismic Design Categories A, B, C, D, E, and F are all covered under this certification, limited by the $S_{DS}$ value stated above.	

Certified Seismic Installation Methods	
Rigid mounting from unit base to rigid structure	External isolation mounting from unit base to rigid structure

Shake Test of Active and Energized Components, Non-Active Components, and Equipment Structure:

Qualified by successful seismic shake table testing at the nationally recognized University of California Berkeley Pacific Earthquake Engineering Research Center under the witness of the Certified Seismic Qualification Agency, The VMC Group. Testing was conducted in accordance with ICC-ES AC-156 to envelope the required response spectrum (RRS) of maximum flexible region acceleration ( $A_{FLEX}$ ) of 1.94 g and a zero period acceleration ( $A_{RIG}$ ) of 0.78 g. This test level corresponds to an  $S_{DS} = 1.94$  g with a  $z/h$  of 0.0. Functionality was verified before and after the shake test.

Basis of Design for Supports and Attachments to the Building:

For calculations and analysis of the equipment attachment to the building structure, the equivalent static force method was applied using the Seismic Design Acceleration,  $F_p/W_p$ ,<sup>5</sup> for Load Resistance Factored Design (LRFD) methods. This includes but is not limited to the unit anchoring requirements and external isolation calculations.

Seismic Design Acceleration Equation  $F_p/W_p = 0.4 \times (S_{DS}=1.94) \times (I_p=1.5) \times (a_p/R_p=1.25) \times (1+2(z/h=0.0)) = 1.46$  g

$a_p/R_p$  is representative of the worst-case shake tested condition, as determined from Table 13.6-1 in ASCE7-10 Chapter 13.



**THE VMC GROUP**  
The Power of Together™



**Power  
Generation**

## CERTIFICATE OF COMPLIANCE

### SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

**Certified Product Table:**

Genset Type	Model Designation	Rating (kW)	EPA Rating	Open Genset with Packaged Radiator	Open Genset with Remote Radiator	Steel Enclosure Options			Aluminum Enclosure Options			Fuel Tank Options	
						Weather Protective	Sound Level 1	Sound Level 2	Weather Protective	Sound Level 1	Sound Level 2	Standard Sub-base	
Diesel 60 Hz ECO	DQFAH	1000	Tier 4	•	•	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	DQFAG	900		•	•	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	DQFAF	800		•	•	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	DQFAE	750		•	•	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Diesel 60 Hz  ✓	DQFAD	1000	Tier 2	•	•	•	•	•	•	•	•	≤2400 Gallons	
	DQFAC	900		•	•	•	•	•	•	•	•	•	≤2400 Gallons
	DQFAB	800		•	•	•	•	•	•	•	•	•	≤2400 Gallons
	DQFAA	750		•	•	•	•	•	•	•	•	•	≤2400 Gallons
	DQCC	800		•	•	•	•	•	•	•	•	•	≤2400 Gallons
	DQCB	750		•	•	•	•	•	•	•	•	•	≤2400 Gallons
	DQCA	600		•	•	•	•	•	•	•	•	•	≤2400 Gallons
	DQPAB	650		•	•	•	•	•	•	•	•	•	≤2400 Gallons
DQPAA	600	•	•	•	•	•	•	•	•	•	≤2400 Gallons		

This certification **includes** the open generator set and the enclosed generator set when installed with or without the sub-base tank and with or without a package mounted radiator, as limited by the table above. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification **excludes** all non-factory supplied accessories, including but not limited to mufflers, remote radiators, isolation/restraint devices and electrical components.



Issue Date: November 6, 2009  
Revision: January 30, 2014  
**Expiration Date: December 31, 2016**



THE VMC GROUP  
The Power of Together™



Power  
Generation

## CERTIFICATE OF COMPLIANCE

### SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

#### Notes and Comments:

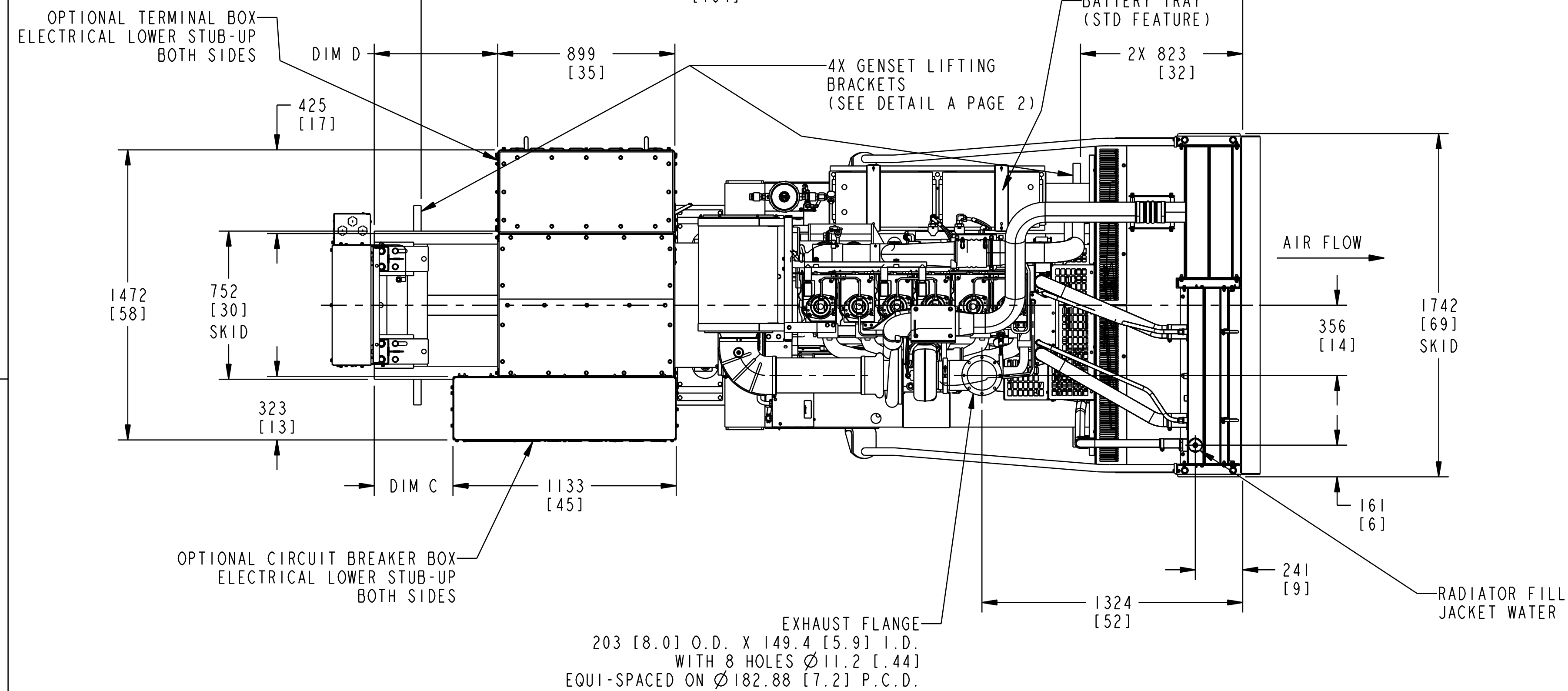
1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the required response spectrum (RRS) for all units tested. The units cited in this certification were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.
2. The following building codes are addressed under this certification:  
  
IBC 2012 – referencing ASCE7-10 and ICC AC-156  
IBC 2009 – referencing ASCE7-05 and ICC AC-156  
IBC 2006– referencing ASCE7-05 and ICC AC-156  
IBC 2003– referencing ASCE7-02 and ICC AC-156  
IBC 2000– referencing ASCE7-98 and ICC AC-156
3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) are specified on the installation drawings. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for observing the installation detailed in the seismic installation drawings and the proper installation of all anchors and mounting hardware.
4. For this certificate and certification to remain valid, this certificate must correspond to the “Seismic Certification Label” found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, The VMC Group, and meets the seismic design levels claimed by this certificate.
5. When the site soil properties or final equipment installation location are not known, the soil site coefficient,  $F_A$ , defaults to the Soil Site Class D coefficient. Soil Classes A, B, C, D, Seismic Risk Category I, II, III, IV, and Seismic Design Categories A, B, C, D, E, and F are all covered under this certification, limited by the  $S_{DS}$  values on page 1, respective to the applicable building code, Importance factor, and  $z/h$  ratio.
6. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification does not guarantee the equipment will remain compliant to UL or NEMA standards after a seismic event.

John P. Giuliano, PE  
President, The VMC Group

Issue Date: November 6, 2009  
Revision: January 30, 2014  
**Expiration Date: December 31, 2016**



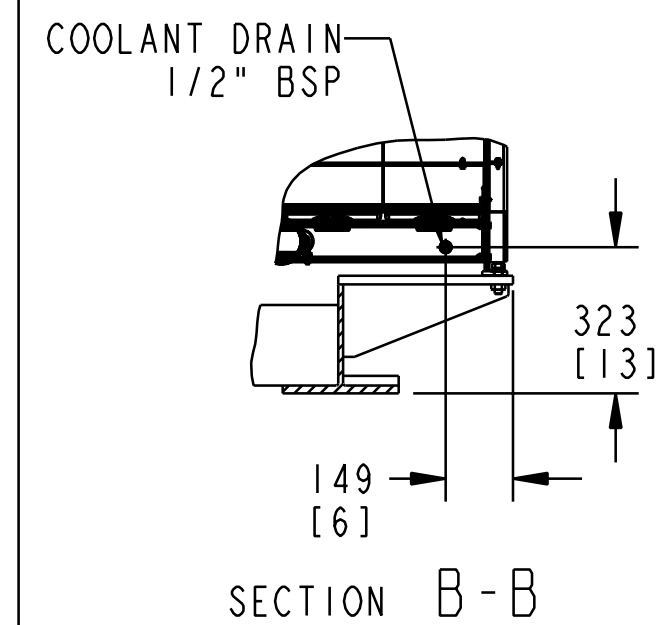
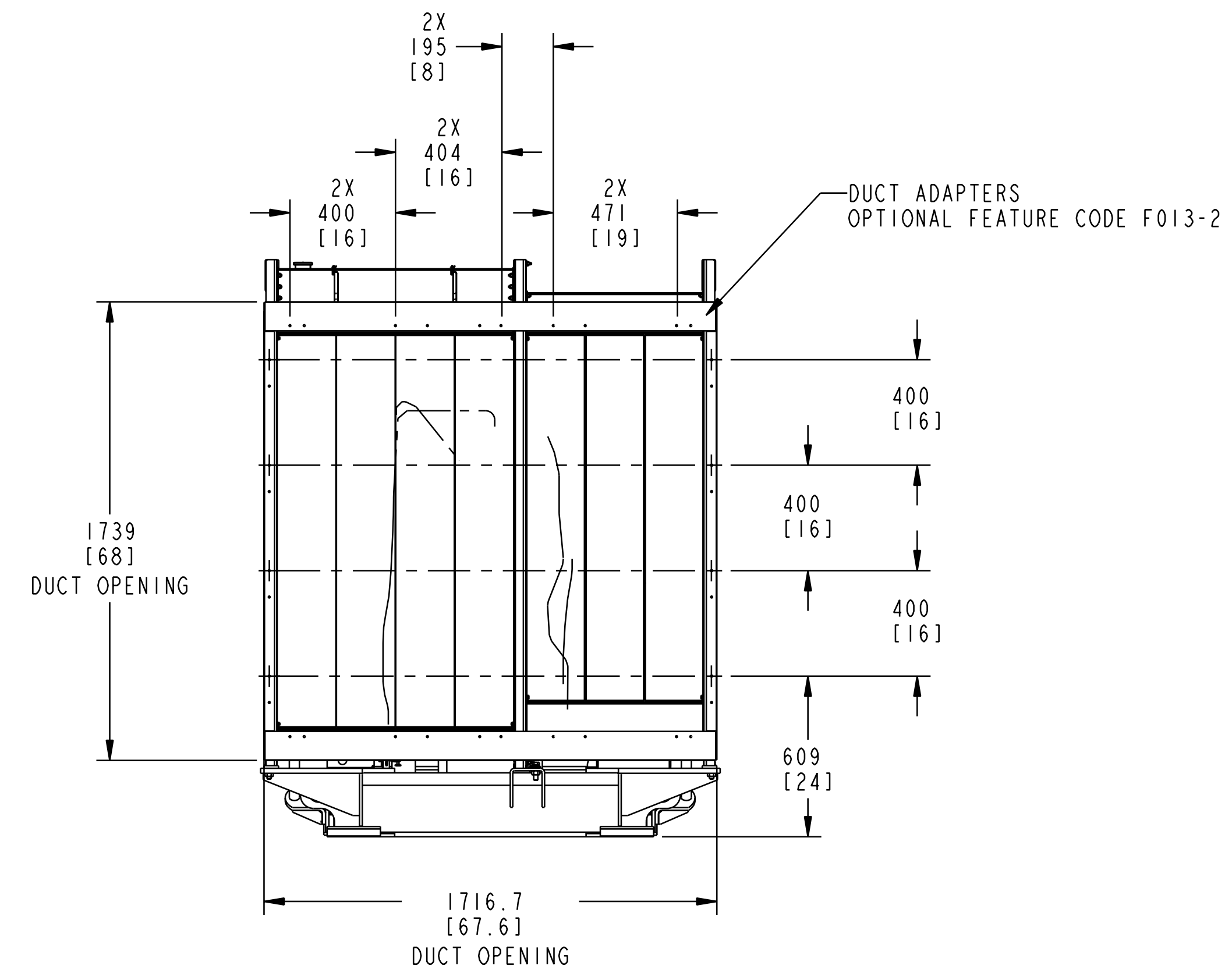
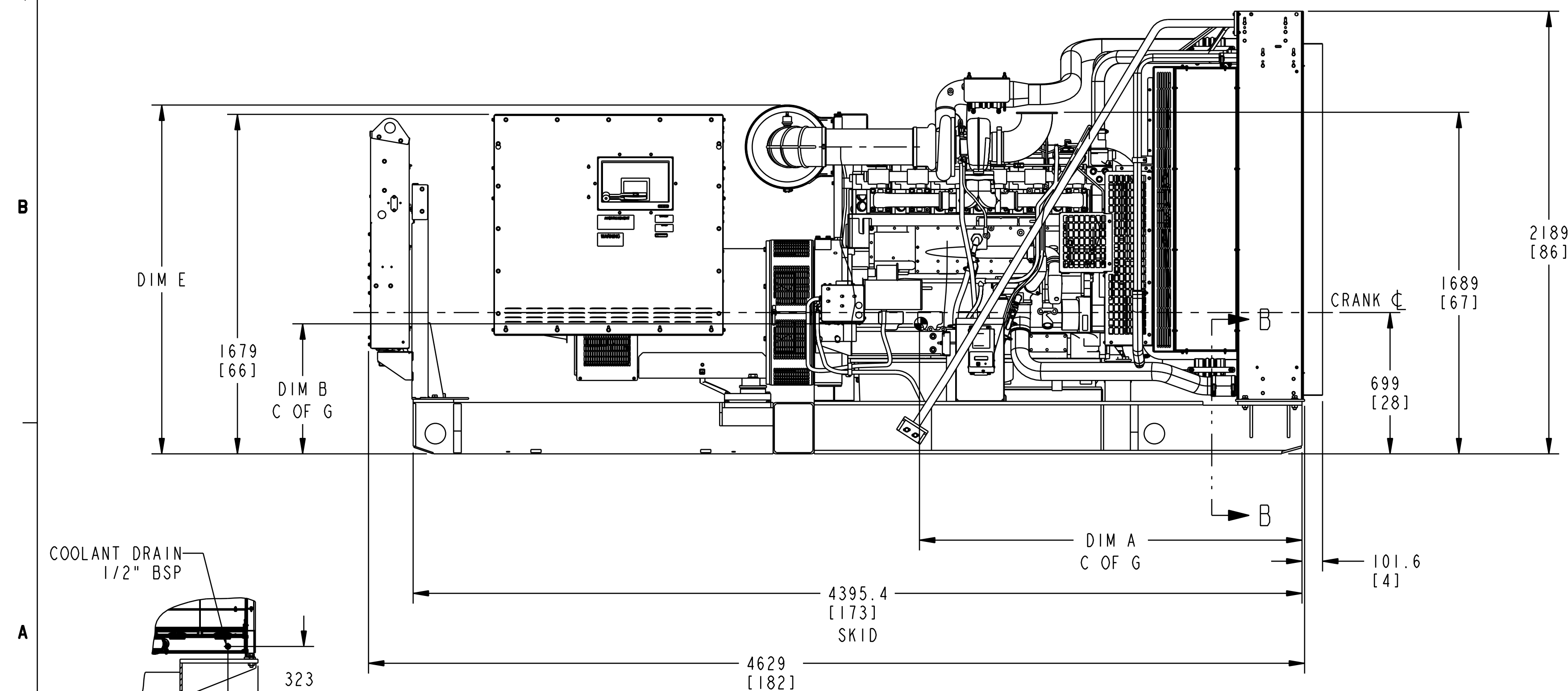
REL NO	LTR	NO	REVISION	DWN	CRD	APVD	DATE
ECO-129475	A	1	PRODUCTION RELEASE	CJF	KK	K KISHORE	01OCT12



- NOTES:
- DIMENSIONS IN [ ] ARE INCHES.
  - GENSET SHIPPED FILLED WITH ENGINE OIL.

GENSET FRAME SIZE	DIM A C OF G	DIM B C OF G	DIM C	DIM D	GENSET WEIGHT W/O COOLANT		GENSET WEIGHT W/ COOLANT	
					KGS	LBS	KGS	LBS
HC5F	2068	773	399.7 [16]	626.7 [25]	5139	11330	5280	11640

AIR CLEANER OPTION	DIM E
STANDARD AIR CLEANER	1725 [68]
HEAVY DUTY AIR CLEANER	2133 [84]

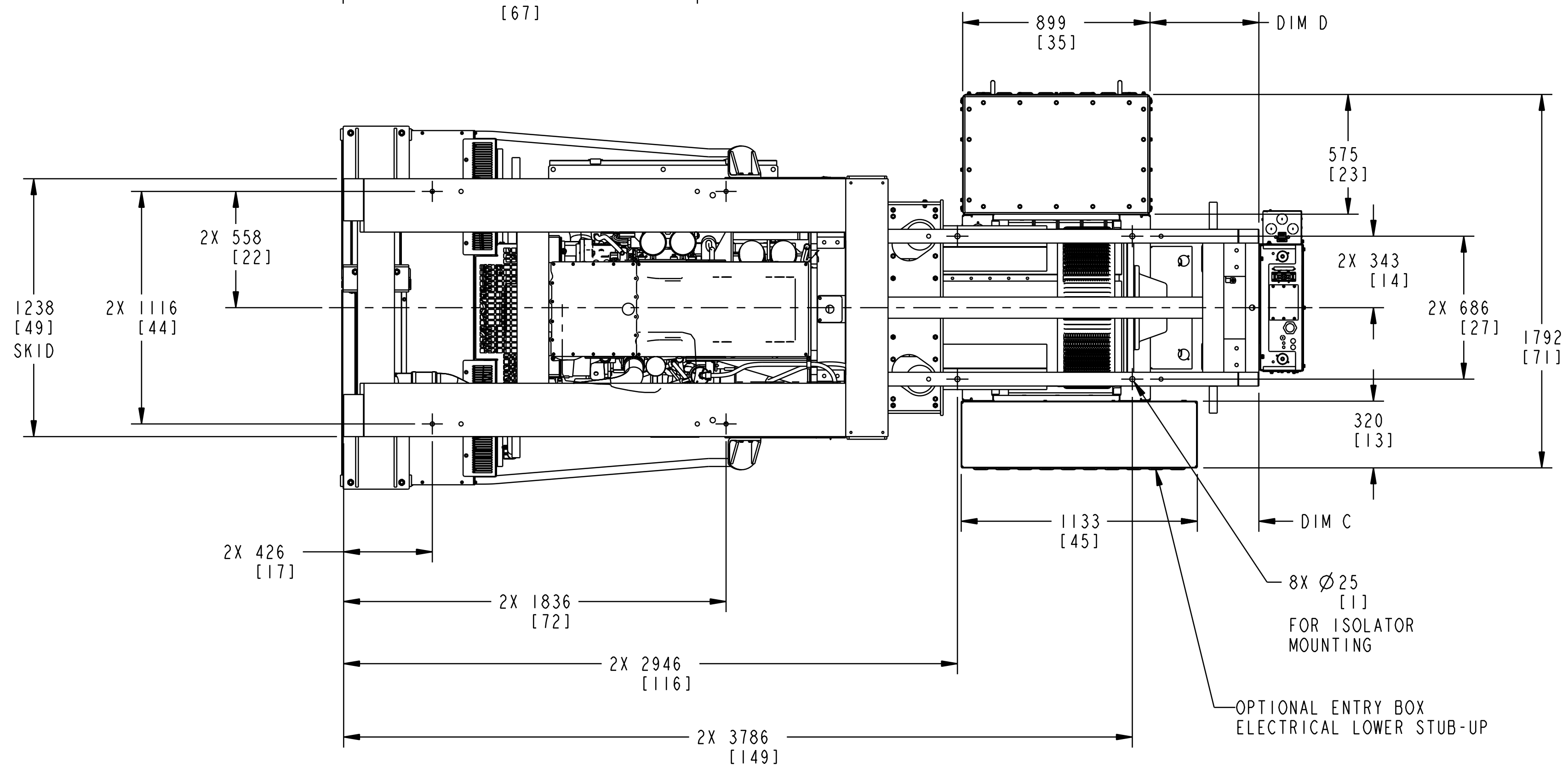
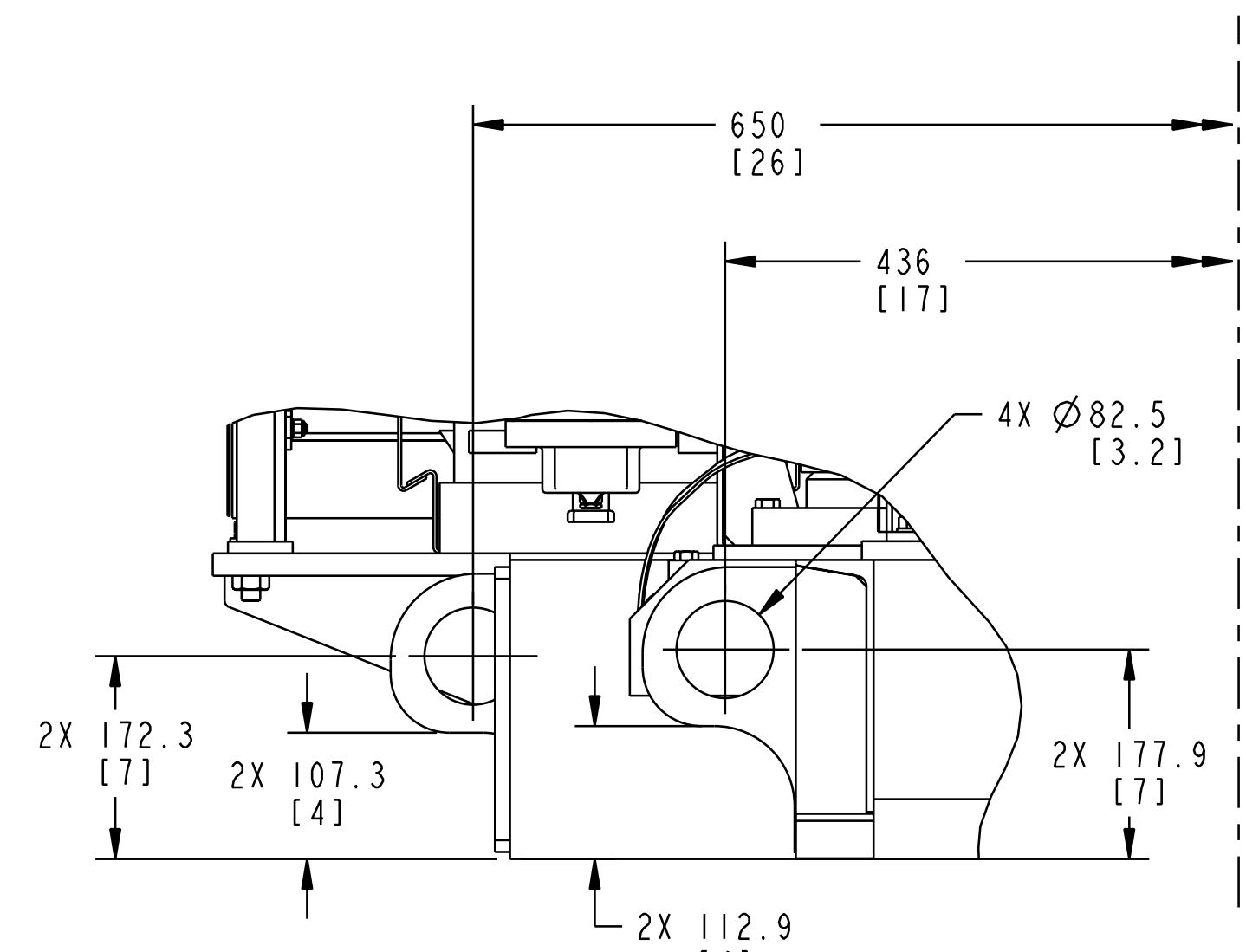
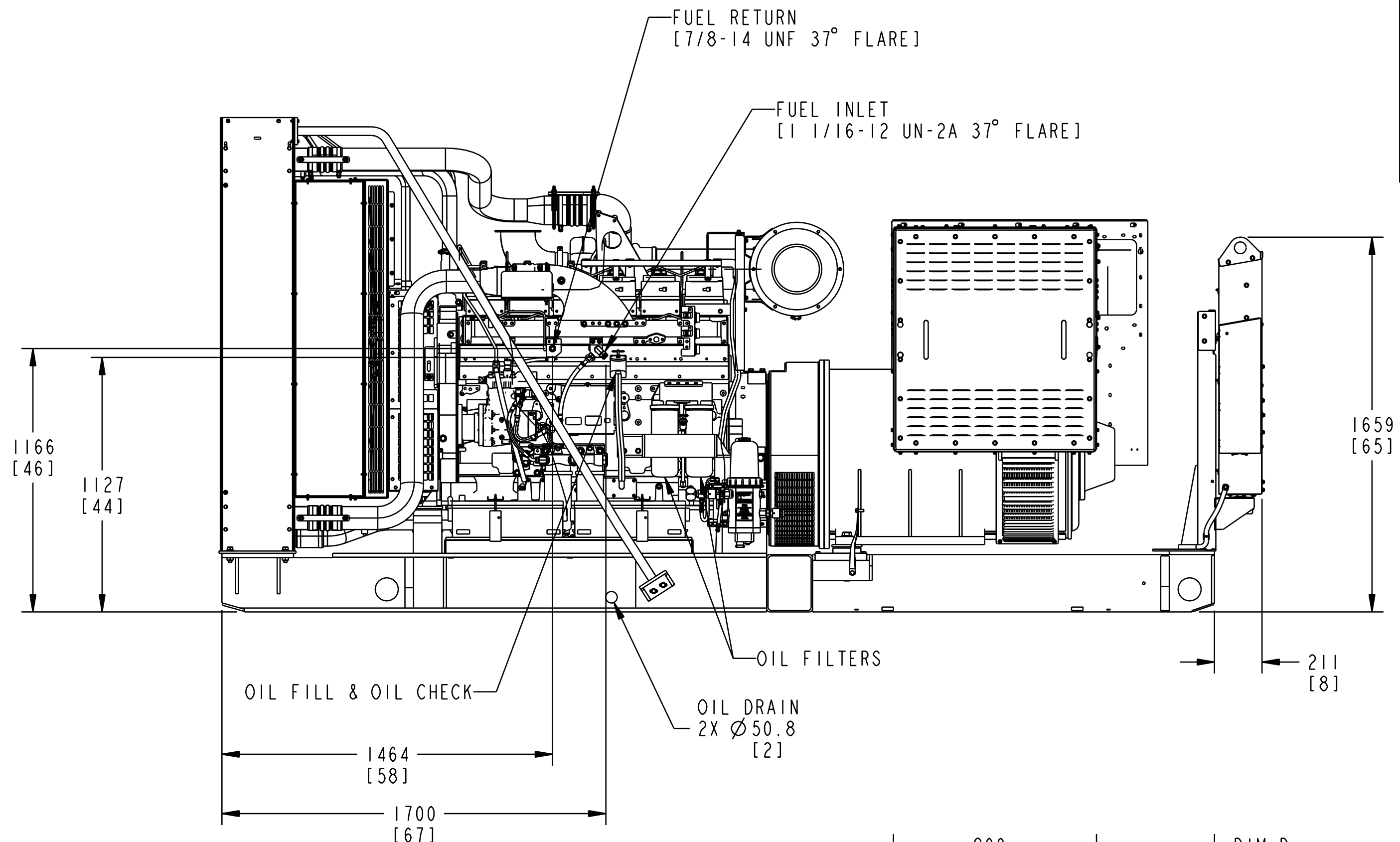


SHOWN WITH HC5 ALTERNATOR

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO A030Y52	DWN C FORNELL		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT		CRD K KISHORE	APVD K KISHORE		OUTLINE, GENSET	
DATE 01OCT12		ANG TOL: ± 1.0°	SCALE: 9/320	SITE CODE	PGF	
<small>FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994</small>		PROPERTY OF CUMMINS POWER GENERATION GROUP	CONFIDENTIAL	DATE 01OCT12	REV D	A041U110
					SHEET 1 OF 2	REV A

REL NO	LTR	NO	REVISION	DWN	CRD	APVD	DATE
ECO-129475	A	1	PRODUCTION RELEASE	CJF	KK	K KISHORE	01OCT12

GENSET FRAME SIZE	DIM A C OF G	DIM B C OF G	DIM C	DIM D	GENSET WEIGHT W/O COOLANT		GENSET WEIGHT W/ COOLANT	
					KGS	LBS	KGS	LBS
HC6G	2102	772	295.4 [11.6]	522.4 [21]	5211	11488	5352	11799
HC6H	2147	768	295.4 [11.6]	522.4 [21]	5449	12013	5590	12324
HC6J	2190	766	295.4 [11.6]	522.4 [21]	5672	12505	5813	12816



SHOWN WITH HC6 ALTERNATOR

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO A030Y52	DWN C FORNELL		CUMMINS POWER GENERATION															
DO NOT SCALE PRINT		CRD K KISHORE	APVD K KISHORE		OUTLINE, GENSET															
<table border="1"> <tr> <th>DIM</th> <th>TOL</th> <th>REF</th> </tr> <tr> <td>X ± 1</td> <td>0.00-4.99</td> <td>+0.15/-0.08</td> </tr> <tr> <td>.X ± 0.8</td> <td>5.00-9.99</td> <td>+0.20/-0.10</td> </tr> <tr> <td>.XX ± 0.38</td> <td>10.00-17.49</td> <td>+0.25/-0.13</td> </tr> <tr> <td></td> <td>17.50-24.99</td> <td>+0.30/-0.13</td> </tr> </table>		DIM	TOL	REF	X ± 1	0.00-4.99	+0.15/-0.08	.X ± 0.8	5.00-9.99	+0.20/-0.10	.XX ± 0.38	10.00-17.49	+0.25/-0.13		17.50-24.99	+0.30/-0.13	DATE 01OCT12	SITE CODE	PGF	
DIM	TOL	REF																		
X ± 1	0.00-4.99	+0.15/-0.08																		
.X ± 0.8	5.00-9.99	+0.20/-0.10																		
.XX ± 0.38	10.00-17.49	+0.25/-0.13																		
	17.50-24.99	+0.30/-0.13																		
ANG TOL: ± 1.0°		SCALE: 9/320	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	DQPAA	SHEET 2 OF 2															

REL NO	LTR	NO	REVISION	EN	CD	APVD	DATE
ECO-149219	D	1	GALLONS FOR FEATURE CODE C250 1000 WAS 1500	CJF	KK	K KISHORE	14 JAN 15
		2	GALLONS FOR FEATURE CODE C251 1500 WAS 1000	CJF	KK	K KISHORE	14 JAN 15
		3	SECURITY CLASS PUBLIC WAS PROPRIETARY	CJF	KK	K KISHORE	14 JAN 15

### GRADE/ROOF MOUNTED GENERATOR SETS

CUMMINS GENSET MODEL	CONFIGURATION	SEISMIC ISOLATOR	QTY	ATTACHMENT TO STEEL	ATTACHMENT TO CONCRETE				
				ISOLATOR ATTACHMENT HARDWARE TO STEEL	ISOLATOR ATTACHMENT HARDWARE TO CONCRETE	ANCHOR EMBEDMENT	MINIMUM EDGE DISTANCE (FROM ANCHOR LOCATION)	CONCRETE COMPRESSIVE STRENGTH	SLAB THICKNESS
1	DOCA, DOCB, DOCC	SET-MOUNTED COOLING	8	4 PER ISOLATOR (32 TOTAL) 3/4" DIA, ASTM A325 BOLTS	4 PER ISOLATOR (32 TOTAL) HILTI KWIK BOLT TZ - CS, Ø 3/4" X 4.75" (M20 X 120mm)	120mm MIN.	254mm MIN.	4,000 PSI MIN.	305mm MIN.
				A034C357	A050E753				
2	DOFAA, DOFAB, DOFAE, DOFAF DOFAC, DOFAD, DOFAG, DOFAH	SET-MOUNTED & REMOTE COOLING	10	4 PER ISOLATOR (40 TOTAL) 3/4" DIA, ASTM A325 BOLTS	4 PER ISOLATOR (40 TOTAL) HILTI KWIK BOLT TZ - CS, Ø 3/4" X 4.75" (M20 X 120mm)	120mm MIN.	356mm MIN.	4,000 PSI MIN.	305mm MIN.
				A034C357	A050E753				
3	✓ DOPAA, DOPAB	SET-MOUNTED COOLING	8	4 PER ISOLATOR (32 TOTAL) 3/4" DIA, ASTM A325 BOLTS	4 PER ISOLATOR (32 TOTAL) HILTI KWIK BOLT TZ - CS, Ø 3/4" X 4.75" (M20 X 120mm)	120mm MIN.	203mm MIN.	4,000 PSI MIN.	203mm MIN.
				A034C357	A050E753				

### GRADE/ROOF MOUNTED LIFTING BASES

CUMMINS GENSET MODEL	FEATURE CODE	CONFIGURATION	CONCRETE ANCHORS	ANCHOR EMBEDMENT	MINIMUM EDGE DISTANCE (FROM ANCHOR LOCATION)	CONCRETE COMPRESSIVE STRENGTH	CONCRETE SLAB THICKNESS
DOPAA, DOPAB, DOCA, DOCB, DOCC DOFAA, DOFAB, DOFAC, DOFAD	F200 F203	LIFTING BASE	HILTI KWIK BOLT TZ - CS, QTY 12 Ø 3/4" X 4.75" (M20 X 254mm)	120mm MIN.	305mm MIN.	4,000 PSI MIN.	305mm MIN.
DOPAA, DOPAB, DOCA, DOCB, DOCC DOFAA, DOFAB, DOFAC, DOFAD	F201 F204	LIFTING BASE	HILTI KWIK BOLT TZ - CS, QTY 16 Ø 3/4" X 4.75" (M20 X 254mm)	120mm MIN.	254mm MIN.	4,000 PSI MIN.	254mm MIN.
DOPAA, DOPAB, DOCA, DOCB, DOCC DOFAA, DOFAB, DOFAC, DOFAD	F202 F205	LIFTING BASE	HILTI KWIK BOLT TZ - CS, QTY 18 Ø 3/4" X 4.75" (M20 X 254mm)	120mm MIN.	254mm MIN.	4,000 PSI MIN.	254mm MIN.

### GRADE/ROOF MOUNTED FUEL TANKS

FEATURE CODE	CUMMINS FUEL TANK PART NUMBER	GALLONS	CONFIGURATION	SEISMIC LEVEL	CONCRETE ANCHORS	ANCHOR EMBEDMENT	EDGE DISTANCE (FROM CORNER ANCHOR LOCATION)	CONCRETE COMPRESSIVE STRENGTH	CONCRETE SLAB THICKNESS
C253	A045S870	2400	TANK	1.40 < SDS <= 1.94 Z/H = 0.0	(QTY 18) 0.79" DIA. UNDERCUT ANCHORS HILTI HDA-P, M20 X 250-50	250mm MIN.	305mm MIN.	4,000 PSI MIN.	356mm MIN.
				SDS < 1.40 Z/H = 0.0	(QTY 18) 3/4" DIA. EXPANSION ANCHORS HILTI KWIK BOLT TZ-CS	120mm MIN.	305mm MIN.	4,000 PSI MIN.	305mm MIN.
C252	A040X449	2000	TANK	1.20 < SDS <= 1.94 Z/H = 0.0	(QTY 16) 0.79" DIA. UNDERCUT ANCHORS HILTI HDA-P, M20 X 250-50	250mm MIN.	356mm MIN.	4,000 PSI MIN.	356mm MIN.
				SDS < 1.20 Z/H = 0.0	(QTY 16) 3/4" DIA. EXPANSION ANCHORS HILTI KWIK BOLT TZ-CS	120mm MIN.	305mm MIN.	4,000 PSI MIN.	305mm MIN.
C250 C251	A045P211 A045P210	1000 1500	TANK	0.95 < SDS <= 1.94 Z/H = 0.0	(QTY 12) 0.79" DIA. UNDERCUT ANCHORS HILTI HDA-P, M20 X 250-50	250mm MIN.	406.4mm MIN.	4,000 PSI MIN.	356mm MIN.
				SDS < 0.95 Z/H = 0.0	(QTY 12) 3/4" DIA. EXPANSION ANCHORS HILTI KWIK BOLT TZ-CS	120mm MIN.	305mm MIN.	4,000 PSI MIN.	305mm MIN.
C205 C249	A045P209 A045P208	660 200	TANK	1.10 < SDS <= 1.94 Z/H = 0.0	(QTY 12) 0.79" DIA. UNDERCUT ANCHORS HILTI HDA-P, M20 X 250-50	250mm MIN.	356mm MIN.	4,000 PSI MIN.	356mm MIN.
				SDS < 1.10 Z/H = 0.0	(QTY 12) 3/4" DIA. EXPANSION ANCHORS HILTI KWIK BOLT TZ-CS	120mm MIN.	254mm MIN.	4,000 PSI MIN.	305mm MIN.

**-THIS IS A CONTROLLED ITEM-**  
PER CPG PROCEDURE FRE-1002  
TO MAINTAIN COMPLIANCE WITH REQUIREMENTS OF THE CODES, STANDARDS, OR AGENCIES LISTED BELOW  
 CSA  AL  CE  RVIA  ABTC  
 IBC  OTHER \_\_\_\_\_  
CHANGES, DEVIATIONS, OR SUBSTITUTIONS OF MATERIAL, PROCESS, OR PERFORMANCE FOR THIS ITEM MUST BE APPROVED BY THE FOLLOWING CONTROLLED ITEM APPROVER  
RESPONSIBLE CIA ROLE: STATIONARY GENSET CIA  
RESPONSIBLE CIA NAME: \_\_\_\_\_  
RESPONSIBLE CIA ROLE: \_\_\_\_\_  
RESPONSIBLE CIA NAME: \_\_\_\_\_

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM 10 A030B114	ENR M. JURISCH		CUMMINS POWER GENERATION		
DO NOT SCALE PRINT		DO NOT SCALE PRINT	CND V. GUPTA		INSTALLATION, GENSET SEISMIC REQUIREMENTS		
X ± 1	0.00- 4.99 +0.15/-0.08		APVD V. KODIMALA	SITE CODE	PGF	SHEET 1 OF 3	
.X ± 0.8	5.00- 9.99 +0.20/-0.10		DATE 20FEB13				SHEET 1 OF 3
.XX ± 0.38	10.00-17.49 +0.25/-0.13		DATE 20FEB13				
ANG TOL: ± 1.0°	SCALE: 1/1	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON DQFAA	PGF	REV D	REV D	

REL NO	LTR	NO	REVISION	DNW	CAD	APVD	DATE
ECO-149219	D	--	-----	CJF	KK	K KISHORE	14 JAN 15

SEISMIC INSTALLATIONS NOTES:

1. THE INSTALLATION GUIDELINES IN THIS DRAWING ARE RECOMMENDATIONS FROM THE ISOLATOR SUPPLIER AND SHOULD BE CONTACTED IF IN DOUBT.
2. THE DESIGN OF POST-INSTALLED ANCHORS IN CONCRETE USED FOR THE COMPONENT ANCHORAGE IS PRE-QUALIFIED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 355.2" AND DOCUMENTED IN A REPORT BY A REPUTABLE TESTING AGENCY. (EX. THE EVALUATION SERVICE REPORT ISSUED BY THE INTERNATIONAL CODE COUNCIL)
3. EQUIPMENT ANCHORAGE MUST BE INSTALLED PER THE MANUFACTURER'S INSTRUCTIONS.
4. ANCHORS MUST BE INSTALLED IN MINIMUM 4000 PSI COMPRESSIVE STRENGTH NORMAL WEIGHT CONCRETE EXCEPT WHERE OTHERWISE INDICATED. CONCRETE AGGREGATE MUST COMPLY WITH "ASTM C33". INSTALLATION IN STRUCTURAL LIGHTWEIGHT CONCRETE IS NOT PERMITTED UNLESS OTHERWISE APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.
5. ANCHORS MUST BE INSTALLED TO THE TORQUE SPECIFICATION AS RECOMMENDED BY THE ANCHOR MANUFACTURER TO OBTAIN MAXIMUM LOADING.
6. ANCHORS MUST BE INSTALLED IN LOCATIONS SPECIFIED ON THIS INSTALLATION DRAWING.
7. WIDE WASHERS MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRIBUTION. WIDE WASHERS MUST BE SERIES "W" OF AMERICAN NATIONAL STANDARD TYPE "A" PLAIN WASHERS (ANSI B18.22.1-1965, R1975) WITH THE NOMINAL WASHER SIZE SELECTED TO MATCH THE SPECIFIED NOMINAL ANCHOR DIAMETER.
8. CONCRETE FLOOR SLAB AND CONCRETE HOUSEKEEPING PADS MUST BE DESIGNED AND REBAR REINFORCED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 318".
9. ALL HOUSEKEEPING PAD THICKNESSES MUST BE DESIGNED IN ACCORDANCE WITH THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1 OR A MINIMUM OF 1.5X THE ANCHOR EMBEDMENT DEPTH, WHICHEVER IS LARGEST.
10. ALL HOUSEKEEPING PADS MUST BE DOWELLED OR CAST INTO THE BUILDING STRUCTURAL FLOOR SLAB AND DESIGNED FOR SEISMIC APPLICATION PER "ACI 318" AND AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.
11. FLOOR MOUNTED EQUIPMENT (WITH OR WITHOUT A HOUSEKEEPING PAD) MUST BE INSTALLED TO A REBAR REINFORCED STRUCTURAL CONCRETE FLOOR THAT IS SEISMICALLY DESIGNED AND APPROVED BY THE ENGINEER OF RECORD TO RESIST THE ADDED SEISMIC LOADS FROM COMPONENTS BEING ANCHORED TO THE FLOOR.
12. WHEN INSTALLING TO A FLOOR, REBAR INTERFERENCE MUST BE CONSIDERED.
13. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO ANY FLOOR OR WALL OTHER THAN THOSE CONSTRUCTED OF STRUCTURAL CONCRETE AND DESIGNED TO ACCEPT THE SEISMIC LOADS FROM SAID EQUIPMENT IS NOT PERMITTED BY THIS SPECIFICATION AND BEYOND THE SCOPE OF THIS CERTIFICATION.
14. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO ANY FLOOR CONSTRUCTED OF LIGHT WEIGHT CONCRETE OVER STEEL DECKING IS NOT PERMITTED BY THIS SPECIFICATION AND BEYOND THE SCOPE OF THIS CERTIFICATION.
15. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO ANY CONCRETE BLOCK WALLS OR CINDER BLOCK WALLS IS NOT PERMITTED BY THIS SPECIFICATION AND BEYOND THE SCOPE OF THIS CERTIFICATION.
16. INSTALLATION UPON ANY STEEL DUNNAGE SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER OF RECORD. STEEL DUNNAGE MUST BE CERTIFIED BY OTHERS AS IS BEYOND THE SCOPE OF THIS REPORT.
17. INSTALLATION UPON ANY ROOFTOP CURB SHALL BE COORDINATED WITH THE CURB MANUFACTURER AND THE STRUCTURAL ENGINEER OF RECORD. ANY CURB OR CONCRETE PAD THAT SUPPORTS THE GENSET UNIT IS BEYOND THE SCOPE OF THIS CERTIFICATION.
18. ALL ACCESSORY ATTACHMENTS (PIPE, CONDUIT, ETC.) TO THE EQUIPMENT SHALL BE ATTACHED IN A MANNER THAT ALLOWS RELATIVE MOTION (FLEX, SWING, JOIN/ELBOW, ETC.) TO PREVENT FAILURE DUE TO DIFFERENTIAL MOVEMENT BETWEEN THE EQUIPMENT AND ATTACHED ACCESSORY CAUSED BY SEISMIC LOADING ON THE SYSTEM.
19. REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR ANCHOR REQUIREMENTS AND MOUNTING CONSIDERATIONS FOR SEISMIC APPLICATIONS. MOUNTING REQUIREMENT DETAILS SUCH AS BRAND, TYPE, EMBEDMENT DEPTH, EDGE SPACING, ANCHOR SPACING, CONCRETE STRENGTH, WALL BRACING, AND SPECIAL INSPECTION MUST BE OUTLINED AND APPROVED BY THE PROJECT STRUCTURAL ENGINEER OF RECORD. THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSTALLATION OF ALL ANCHORS AND MOUNTING HARDWARE, OBSERVING THE MOUNTING REQUIREMENT DETAILS OUTLINED BY THE ENGINEER OF RECORD. CONTACT THE MANUFACTURE'S REPRESENTATIVE IF A DETAILED SEISMIC INSTALLATION CALCULATION PACKAGE IS REQUIRED.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM 10 A030B114	DNW M. JURISCH		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT			CAD V. GUPTA		INSTALLATION, GENSET	
DIMENSIONS	X ± 1	0.00- 4.99 +0.15/-0.08	APVD V. KODIMALA	SITE CODE	SEISMIC REQUIREMENTS	
	.X ± 0.8	5.00- 9.99 +0.20/-0.10	DATE 20FEB13		PGF	A045K403
	.XX ± 0.38	10.00-17.49 +0.25/-0.13				
ANG TOL: ± 1.0°		SCALE: 1/1	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON DQFAA	REV D	



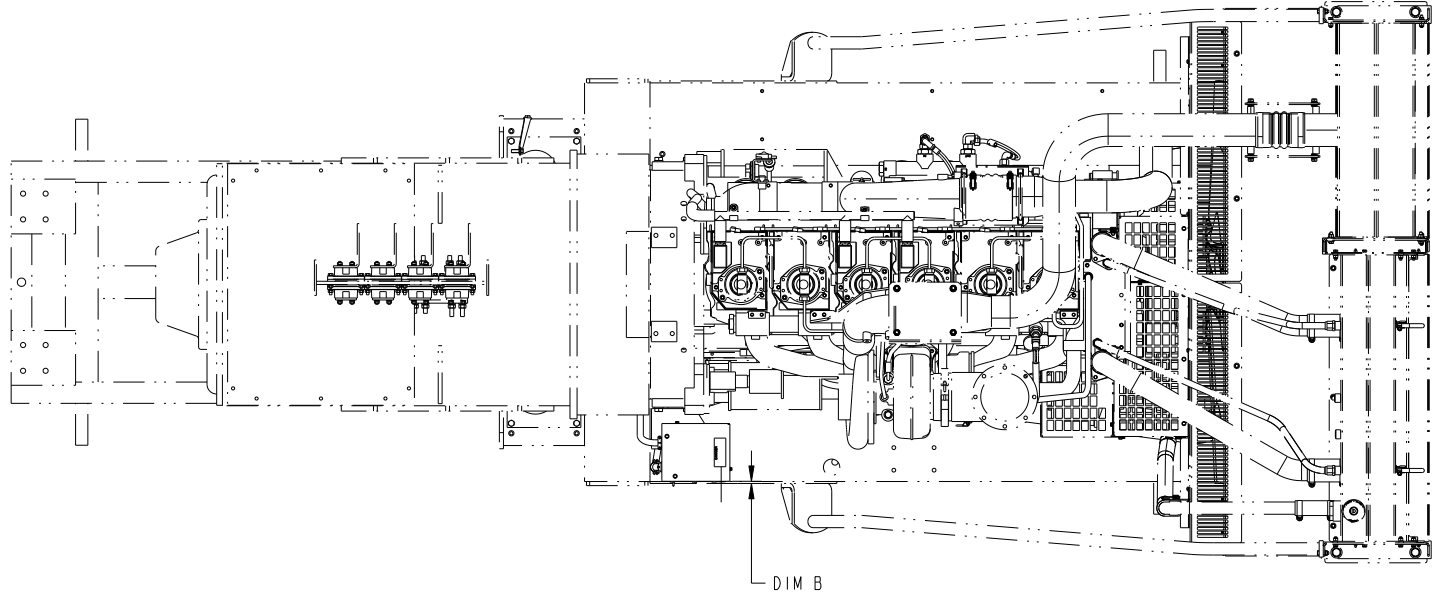
REL NO	LTR	NO	REVISION	OWN	CAD	APVD	DATE
ECO-149219	D	--	-----	CJF	KK	K KISHORE	14 JAN 15

REQUIREMENTS FOR GENSETS DQPAA, DQPAB, DQCA, DQCB, DQCC DQFAA, DQFAB, DQFAC, DQFAD DQFAE, DQFAF, DQFAG, DQFAH	
PARAMETERS	IBC 2000, 2003, 2006, 2009, 2012
	Sds<=0.647      Sds<=1.94
	Ip<=1.5            Ip<=1.5
	ap/Rp<=1.25      ap/Rp<=1.25
	z/h=1.0 (ROOF)    z/h=0 (GRADE)
	Fp/Wp<=1.46 LRFD    Fp/Wp<=1.46 LRFD

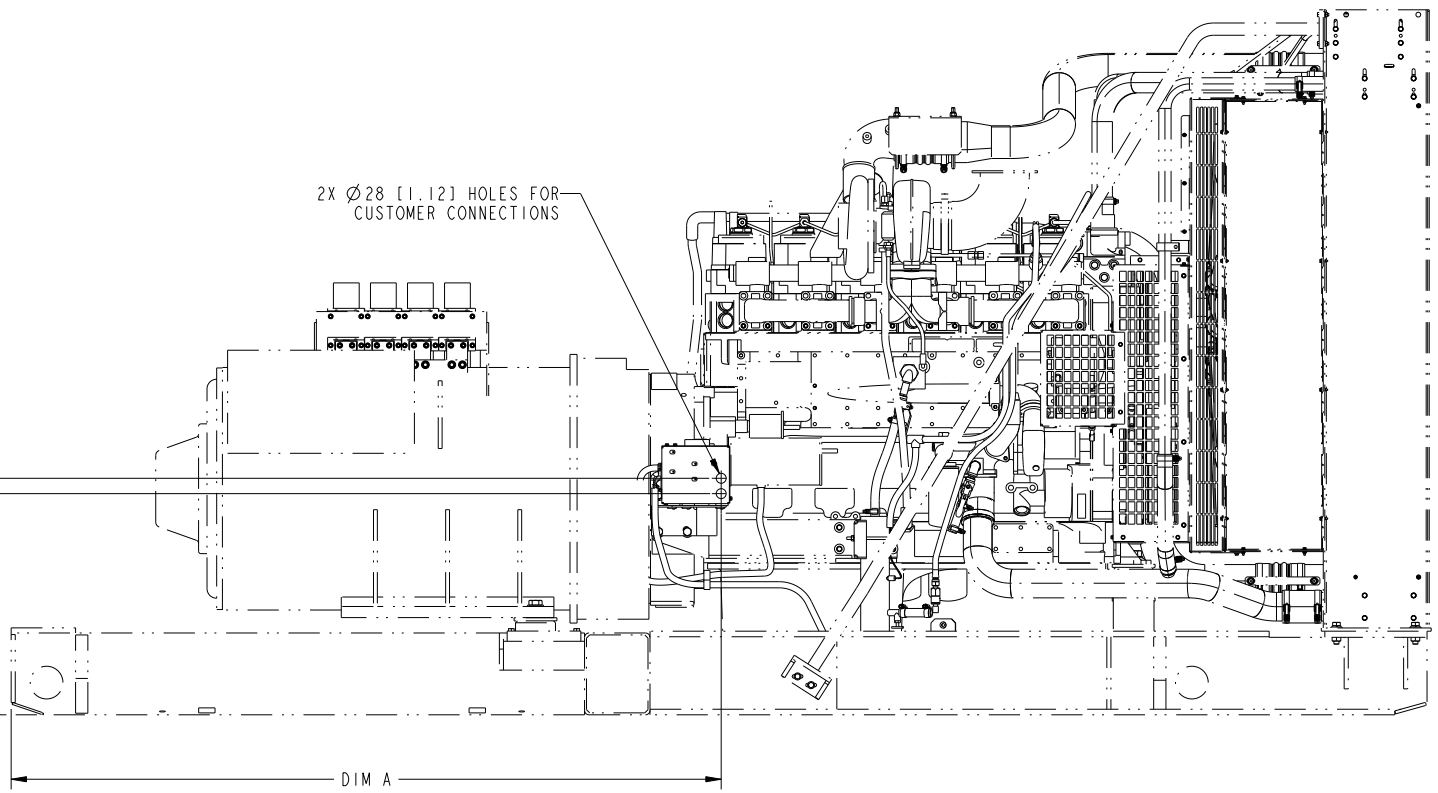
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM 10 A030B114	OWN M. JURISCH		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT		CND V. GUPTA	APVD V. KODIMALA		INSTALLATION, GENSET	
ANG TOL: ± 1.0°	SCALE: 1/1	DATE 20FEB13	SITE CODE	SEISMIC REQUIREMENTS		
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON DQFAA	PGF	D	A045K403
					SHEET 3 OF 3	REV D



REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
ECO-132224	C	1	ADD SHEET 2	-	PT	KK	K.KISHORE	25FEB13



DIM B



2X Ø28 [1.12] HOLES FOR CUSTOMER CONNECTIONS

48 [1.9]

DIM C

DIM A

MODEL DOPAA, AB SHOWN

TOLERANCE UNLESS OTHERWISE SPECIFIED		QTY	ITEM	PART NO	DESCR	DESCRIPTION OR MATERIAL								
<table border="1"> <tr> <th>DIM</th> <th>TOL</th> </tr> <tr> <td>X ±</td> <td>.12</td> </tr> <tr> <td>.X ±</td> <td>0.8</td> </tr> <tr> <td>.XX ±</td> <td>0.38</td> </tr> </table>		DIM	TOL	X ±	.12	.X ±	0.8	.XX ±	0.38	SIM TO 0500-3137	DR	W.PELTIER	DATE	03-05-04
DIM	TOL													
X ±	.12													
.X ±	0.8													
.XX ±	0.38													
<table border="1"> <tr> <th>ANG</th> <th>TOL</th> </tr> <tr> <td>±</td> <td>1.0</td> </tr> </table>		ANG	TOL	±	1.0	COPIED FROM 0500-3873	CHKR	W.PELTIER	DATE	04-16-04				
ANG	TOL													
±	1.0													
<table border="1"> <tr> <th>SCALE</th> <th>TOL</th> </tr> <tr> <td>1:1</td> <td>±</td> </tr> </table>		SCALE	TOL	1:1	±	THIRD ANGLE PROJECTION	MFG	W.PELTIER	DATE	04-16-04				
SCALE	TOL													
1:1	±													
<p>APPROVED H SEPPANEN</p>		<p>FOR INTERPRETATION MODEL FIRST USED ON</p>		<p>DATE</p>		<p>DATE</p>								
<p>THIS DOCUMENT IS THE PROPERTY OF CUMMINS. IT IS TO BE KEPT IN THE ORIGINAL ENVELOPE AND NOT REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT THE WRITTEN PERMISSION OF CUMMINS, THIS DOCUMENT IS TO BE DESTROYED.</p>		<p>APPROVED H SEPPANEN</p>		<p>DATE</p>		<p>DATE</p>								
<p>DO NOT SCALE PRINT</p>		<p>APPROVED H SEPPANEN</p>		<p>DATE</p>		<p>DATE</p>								
<p>DRAWN TO SCALE OF 1/1</p>		<p>APPROVED H SEPPANEN</p>		<p>DATE</p>		<p>DATE</p>								

## 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.

Americas  
1400 73rd Avenue N.E.  
Minneapolis, MN 55432 USA  
Phone: 763 574 5000  
Fax: 763 574 5298

Europe, CIS, Middle East and Africa  
Manston Park Columbus Ave.  
Manston Ramsgate  
Kent CT 12 5BF United Kingdom  
Phone 44 1843 255000  
Fax 44 1843 255902

Asia Pacific  
10 Toh Guan Road #07-01  
TT International Tradepark  
Singapore 608838  
Phone 65 6417 2388  
Fax 65 6417 2399

# PowerCommand® Annunciator

## Discrete Input or PCCNet



### > Specification sheet

Our energy working for you.™



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

Our energy working for you.™

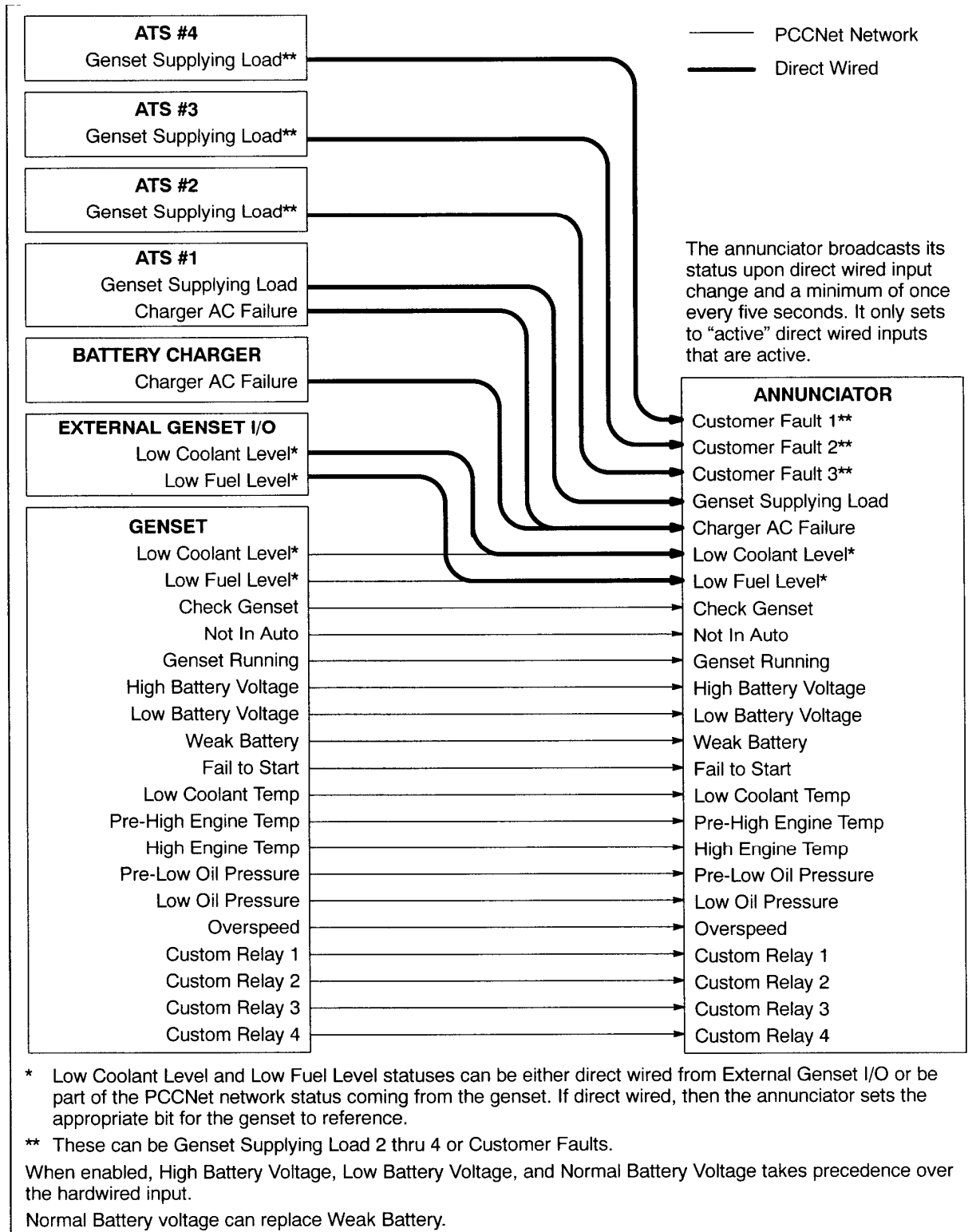
[www.cumminspower.com](http://www.cumminspower.com)

©2009 Cummins Power Generation Inc. All rights reserved. Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. Specifications are subject to change without notice. S-1472e (8/09)

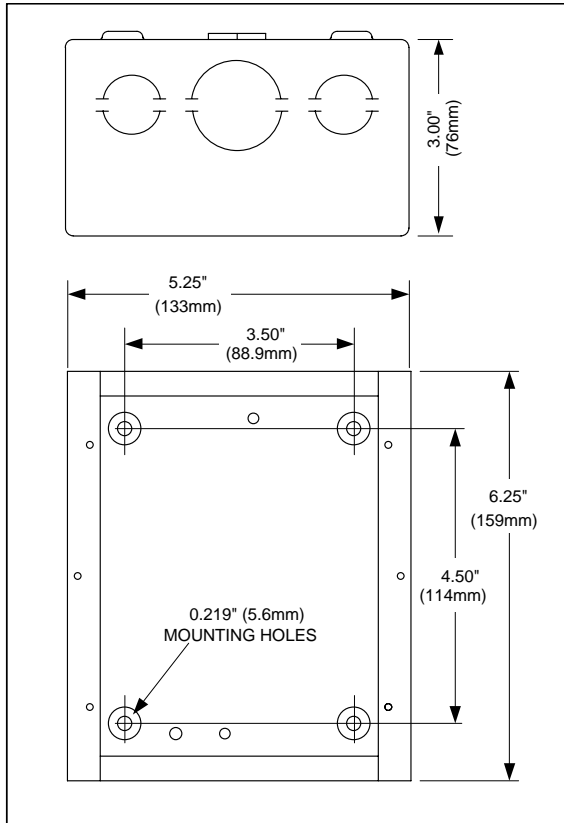




## Typical installation



## Dimensions



Dimensions: in (mm)

## Ordering information

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

**PCCNet**  
  
**COMPATIBLE**

See your distributor for more information.

Cummins Power Generation

Americas  
 1400 73rd Avenue N.E.  
 Minneapolis, MN 55432 USA  
 Phone: 763 574 5000  
 Fax: 763 574 5298

Europe, CIS, Middle East and Africa  
 Manston Park Columbus Ave.  
 Manston Ramsgate  
 Kent CT 12 5BF United Kingdom  
 Phone 44 1843 255000  
 Fax 44 1843 255902

Asia Pacific  
 10 Toh Guan Road #07-01  
 TT International Tradepark  
 Singapore 608838  
 Phone 65 6417 2388  
 Fax 65 6417 2399

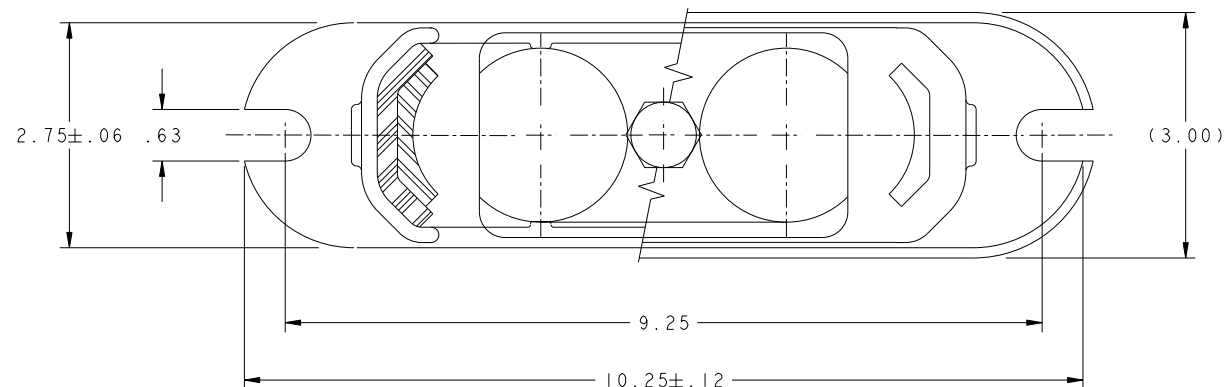
Our energy working for you.™

[www.cumminspower.com](http://www.cumminspower.com)

©2009 Cummins Power Generation Inc. All rights reserved. Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. PowerCommand and "Our energy working for you." are trademarks of Cummins Power Generation. Other company, product, or service names may be trademarks or service marks of others. Specifications are subject to change without notice. S-1472e (8/09)

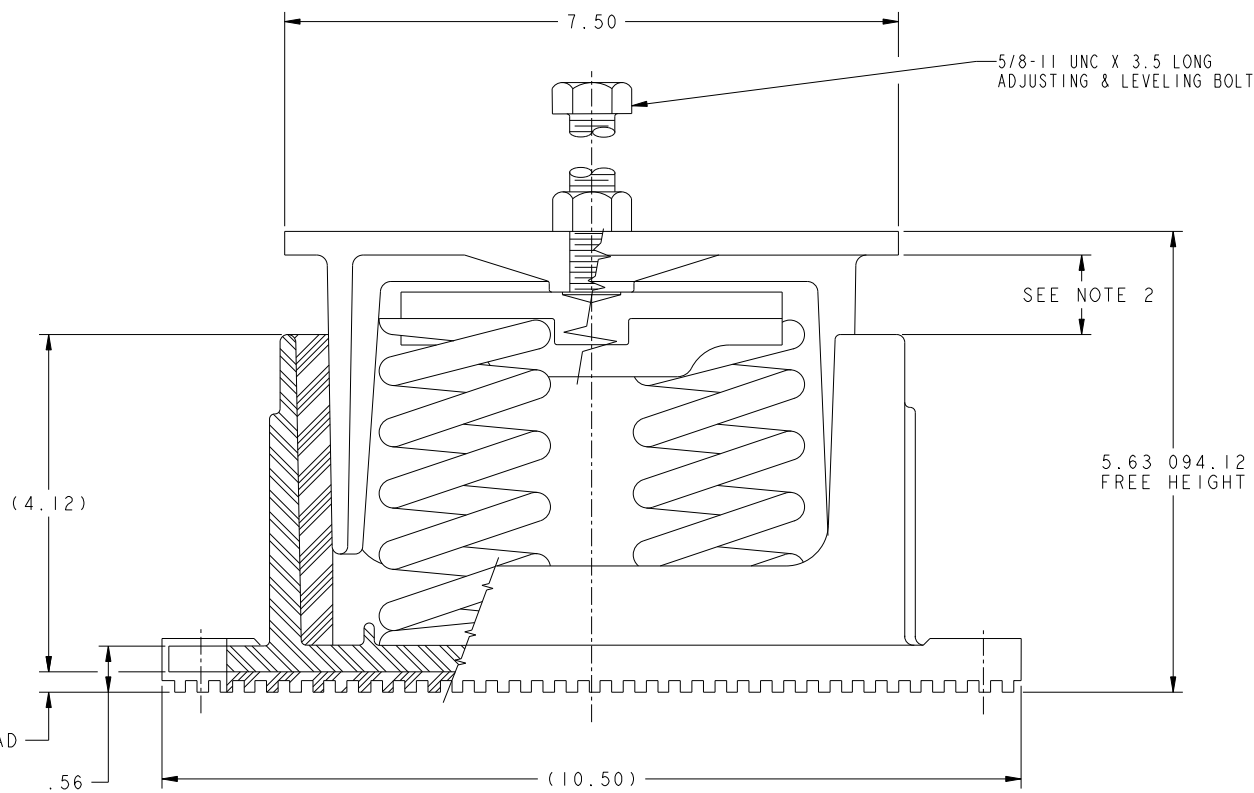


REL NO	LTR	NO	REVISION	OWN	CAD	APVD	DATE
ECO-134886	D	1	REDRAWN WITH CHANGES	WGM/VLF	S.ANDERSON		10JUL13
		2	NOTE 1, "THIS PART IS..." WAS "FIRST SUPPLIER..."	WGM/VLF	S.ANDERSON		10JUL13
		3	ADDED NOTE 3, "ALL DIMENSIONS..."	WGM/VLF	S.ANDERSON		10JUL13
		4	RMV VENDOR P/N COLUMNS FROM LARGE TABLE	WGM/VLF	S.ANDERSON		10JUL13
		5	CREATE NEW MEP FOR EACH PART	WGM/VLF	S.ANDERSON		10JUL13
		6	CHANGE PART ATTRIBUTE FROM DESIGN TO PURCHASE	WGM/VLF	S.ANDERSON		10JUL13



NOTES:

1. THIS PART IS MANUFACTURER SOURCE CONTROLLED.
  - 1.1 MAX RATED STEADY LOAD (LBS) ----- 2200  
ISOLATOR CONSTANT (LBS/IN) ----- 2654  
DEFLECTION @ RATED LOAD (IN) ----- .83  
SPRING COLOR CODE ----- GRAY
  - 1.2 MAX RATED STEADY LOAD (LBS) ----- 2600  
ISOLATOR CONSTANT (LBS/IN) ----- 3516  
DEFLECTION @ RATED LOAD (IN) ----- .74  
SPRING COLOR CODE ----- WHITE
2. ADJUST ISOLATOR SO THAT THIS CLEARANCE IS AT LEAST .25" AND NOT MORE THAN .50".
3. ALL DIMENSIONS ARE IN INCHES.

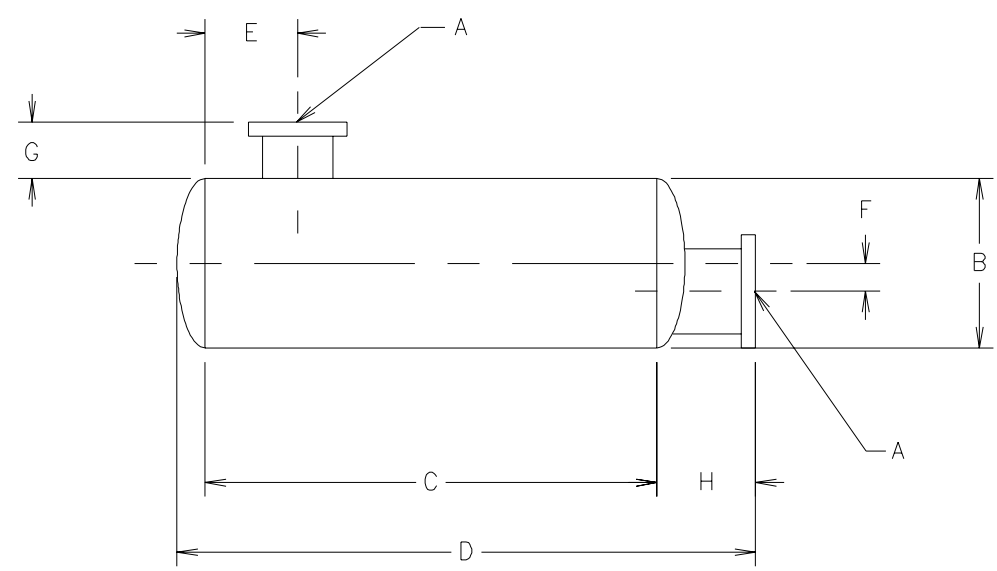


TABULATION	
PART NO	CURRENT ER
0402-0691-01	ECO-134886
0402-0691-02	ECO-134886
0402-0691-03	ECO-134886
0402-0691-04	ECO-134886

PACKAGE OF 2 ISOLATORS	ISOLATOR	ISOLATOR MODEL NO	NOTE
PART NO	PART NO		
0402-0691-02	0402-0691-01	CE-2-31	1.1
0402-0691-04	0402-0691-03	CE-2-32	1.2

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM 10	OWN T. A. SORENSEN		CUMMINS POWER GENERATION							
DO NOT SCALE PRINT		CAD B. GROSS	APVD J. DERUYTER									
INCH TOLERANCE	<table border="1"> <tr> <td>X ± .1</td> <td>0.00- 4.99 +0.15/-0.08</td> </tr> <tr> <td>.X ± 0.8</td> <td>5.00- 9.99 +0.20/-0.10</td> </tr> <tr> <td>.XX ± 0.38</td> <td>10.00-17.49 +0.25/-0.13</td> </tr> <tr> <td>.XXX ± .015</td> <td>17.50-24.99 +0.30/-0.13</td> </tr> </table>	X ± .1	0.00- 4.99 +0.15/-0.08	.X ± 0.8	5.00- 9.99 +0.20/-0.10	.XX ± 0.38	10.00-17.49 +0.25/-0.13	.XXX ± .015	17.50-24.99 +0.30/-0.13	DATE 29APR95	SITE CODE	ISOLATER
X ± .1	0.00- 4.99 +0.15/-0.08											
.X ± 0.8	5.00- 9.99 +0.20/-0.10											
.XX ± 0.38	10.00-17.49 +0.25/-0.13											
.XXX ± .015	17.50-24.99 +0.30/-0.13											
ANG TOL: ± 1.0°	SCALE: 1:1	DF SERIES	PGF	0402-0691								

ER NO.	LTR	NO.	REVISION	ZONE	DR	CHKR	APPROVED	DATE
63391	E	1	REDRAWN TO CAD W/CHANGES PER ER	-	CC	BG	CLT	07-27-92
63284	G	1	ADD NOTE 4	2-C	DR	DY	RJG	01-25-93
		2	ADD -09 TAB	4-A	DR	DY	RJG	01-25-93
65236	H	1	-11 THRU -19 PRODUCTION RELEASE	-	JFK	GS	BGG	06-05-93
		2	ADDED MATERIAL TO TAB	-	JFK	GS	BGG	06-05-93
72644	J	1	OSBOLETE -11 THRU -19 (SEE ER)	-	CC	BG	RJG	04-18-96
72644	J	1	OSBOLETE -11 THRU -19 (SEE ER)	-	CC	BG	RJG	04-18-96
FRD691	K	1	ADD -10 TAB	4-A	SZR	BVM	BVM	02-11-99
FRD1300	L	1	-10 TAB: ADD DIMENSINS C, E, H, & WEIGHT	4-A	GWH	BVM	BVM	04-13-99
FRD1754	M	1	-10, DIM "H" 9.5 WAS 3.4	4-A	CB	BG	BVM	05-26-99
FRD3714	N	1	NOTE 1 WAS "PART NAME: NELSON..."	2C	CB	BG	DCK	12-22-99
		2	RMV NOTE 2 "VENDOR..."	2C	CB	BG	DCK	12-22-99
		3	ADD CODES & STANDARDS LABEL	4A	CB	BG	DCK	12-22-99
		4	RMV NELSON PART NUMBER COLUMN FROM TAB	4B	CB	BG	DCK	12-22-99
FRD4796	P	1	-01 DIM D WAS 76.4, -02 DIM D WAS 82.3	4B	RMM	BG	GILLET	06-14-00
		2	-03 DIM D WAS 79.5, -04 DIM D WAS 108.4	4B	RMM	BG	GILLET	06-14-00
		3	-05 DIM D WAS 66.5, -06 DIM D WAS 61.2	4B	RMM	BG	GILLET	06-14-00
		4	-07 DIM D WAS 52.8, -08 DIM D WAS 49.6	4B	RMM	BG	GILLET	06-14-00
		5	-09 DIM D WAS 42.4, -10 DIM D WAS 111.6	4A	RMM	BG	GILLET	06-14-00
FRD6540	R	1	REVISED PER ECOR	-	RMM	BG	GILLET	09-19-00



NOTES:

- (N1) 1. THIS PART IS VENDOR SOURCE CONTROLLED (SEE APVL).
- (N2) 2.
- 3. FLANGES DRILLED TO 125#ASA STANDARD.
- (G1) 4. SILENCER COATED WITH BAKED ON HIGH HEAT RESISTING SILICONE BLACK PAINT.

TABULATION

ITEM DASH NO.	CURRENT ER NUMBER	FLANGE "A"	DIM. B	DIM. C	DIM. D	DIM. E	DIM. F	DIM. G	DIM. H	WEIGHT (LBS)	
-01	FRD6540	6" ASA FLANGE	16.12	69.0	76.4	5.0	3.06	4.0	5.9	180	
-02	FRD6540	8" ASA FLANGE	22.12	72.1	82.3	8.0	0.0	4.0	6.9	255	
-03	FRD6540	10" ASA FLANGE	26.12	72.1	83.4	9.0	0.0	4.0	7.4	387	
-04	FRD6540	12" ASA FLANGE	30.12	96.0	108.4	10.0	0.0	4.0	8.0	610	
-05	FRD6540	5" ASA FLANGE	14.12	60.0	67.5	4.0	2.56	4.0	5.7	112	
-06	FRD6540	4" NPT	12.12	55.0	61.2	4.0	1.82	3.0	4.5	82	
-07	FRD6540	3" NPT	11.12	47.0	52.8	3.0	0.0	3.0	4.3	58	
-08	FRD6540	2.5" NPT	10.12	45.0	49.3	3.0	0.0	2.5	3.5	50	
-09	FRD6540	2" NPT	9.00	38.0	42.4	2.5	0.0	2.0	3.0	34	
(P1) (P2) (P3) (P4) (P5) (G2) (M1) (K1) (L1) ✓	-10	FRD6540	14" ASA FLANGE	42.25	96.0	111.6	10.0	0.0	4.0	9.5	1290

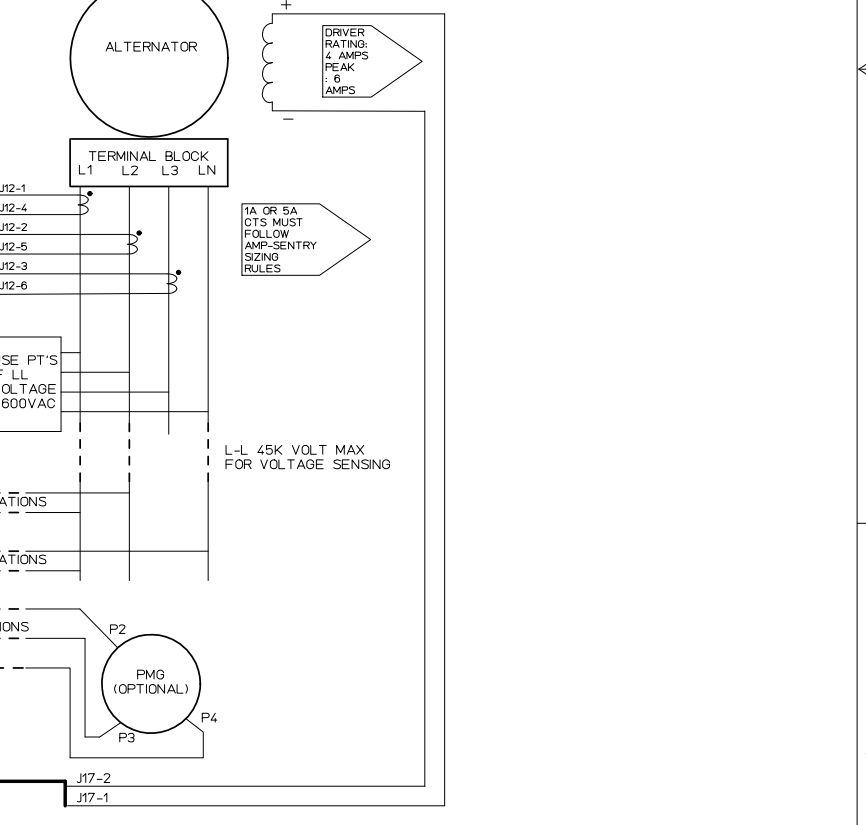
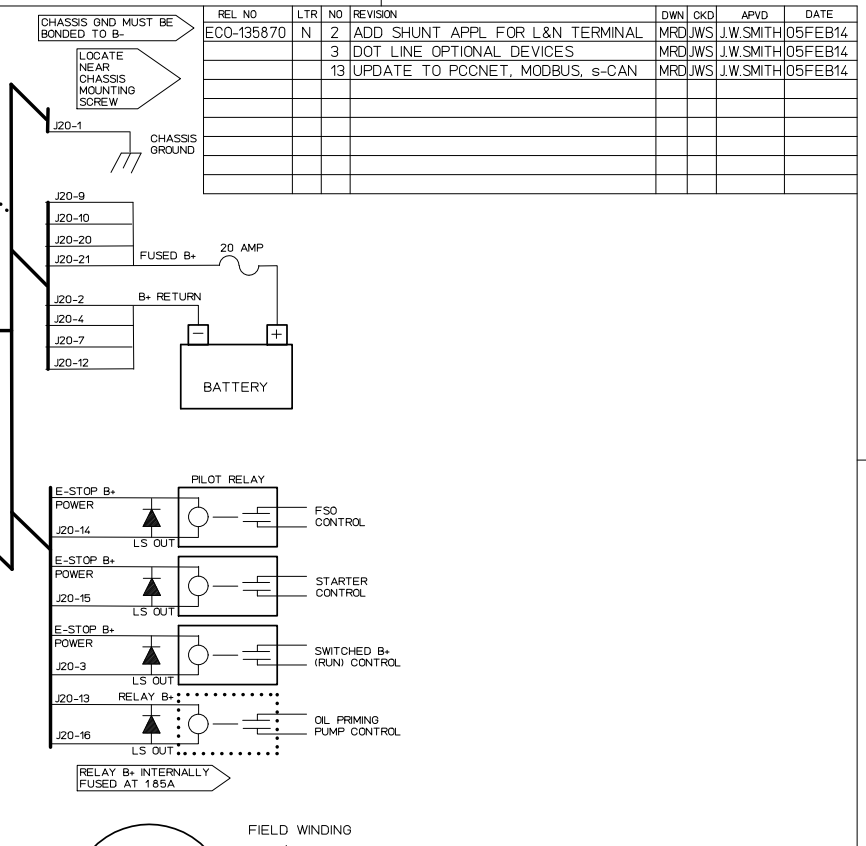
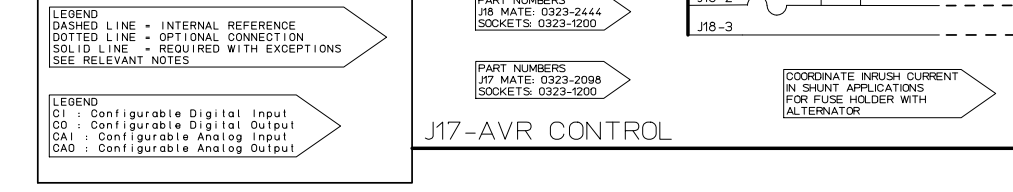
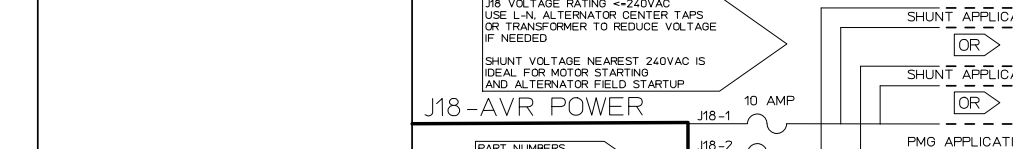
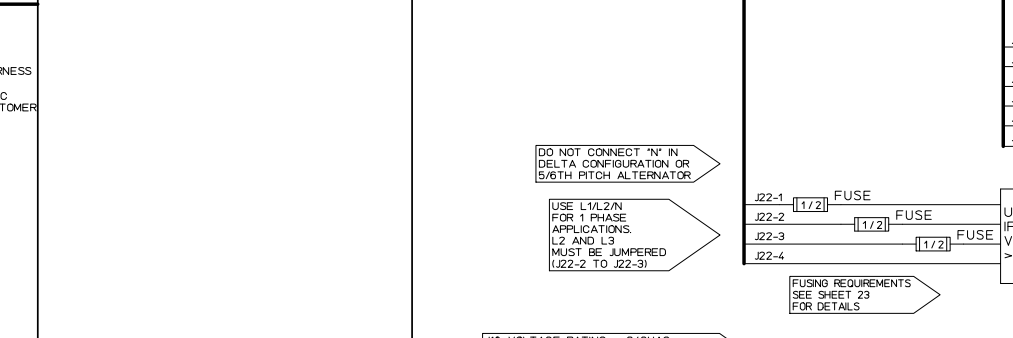
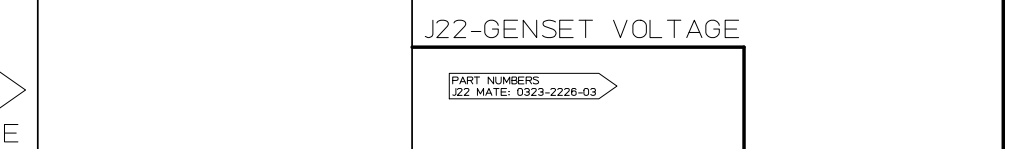
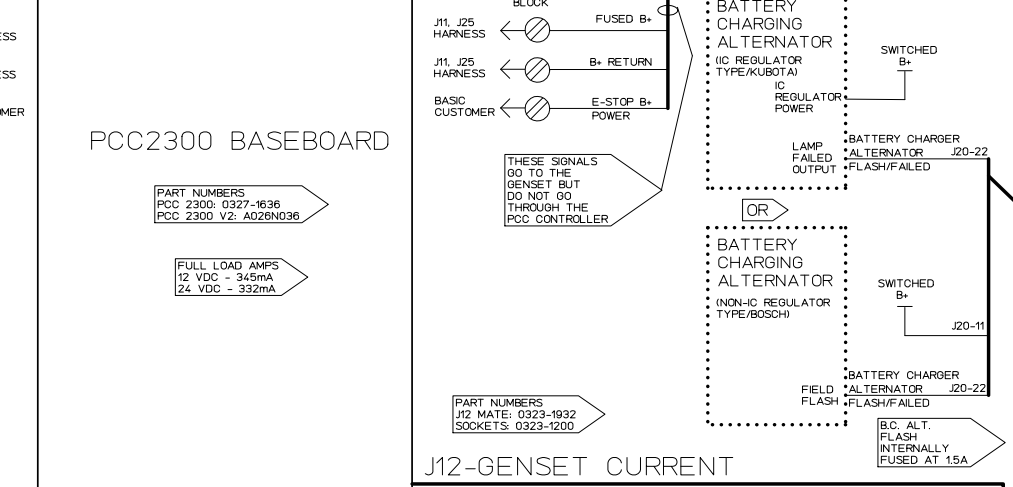
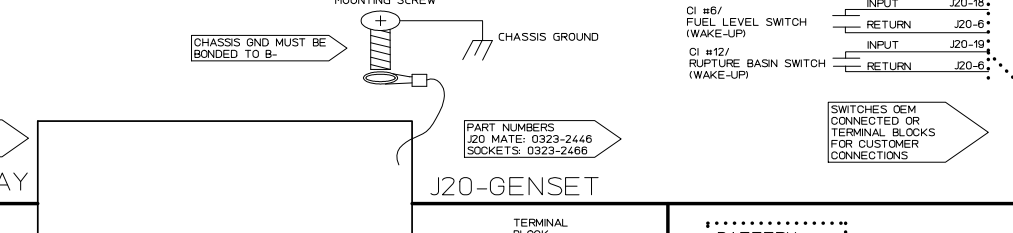
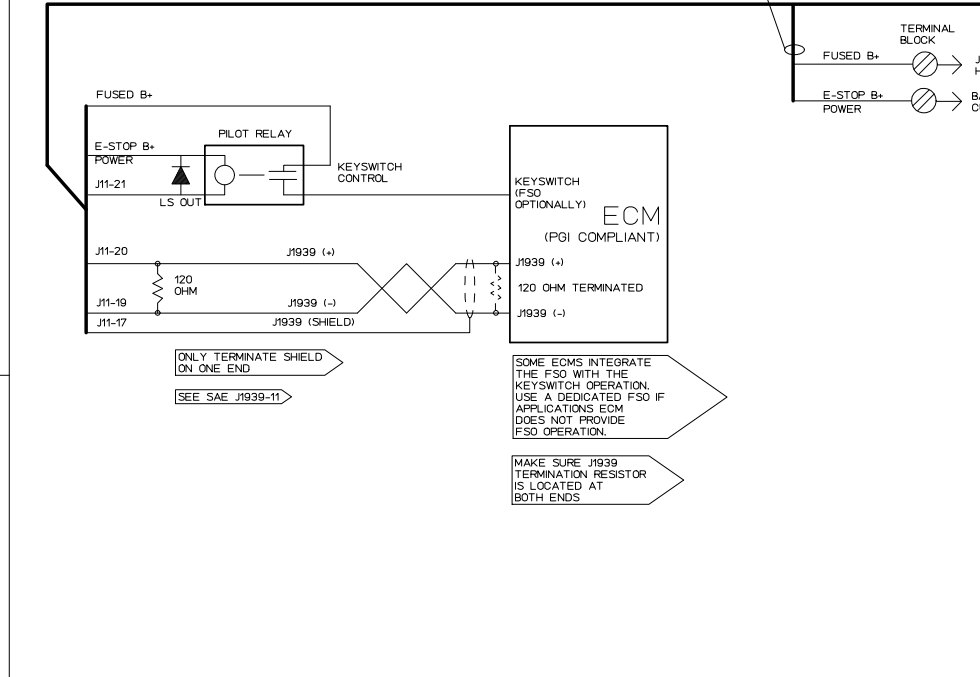
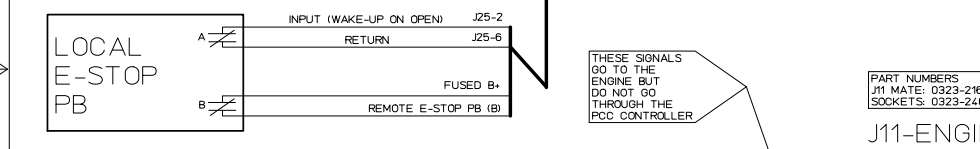
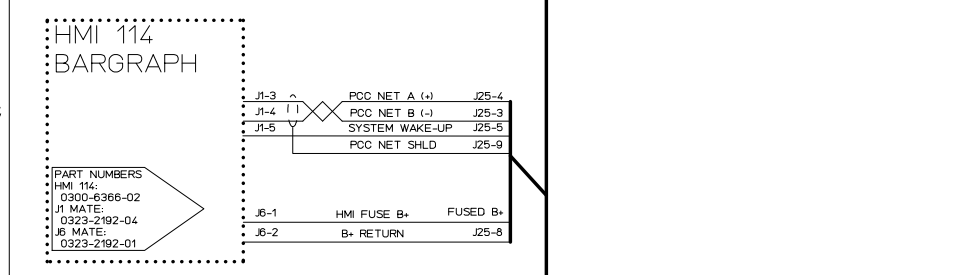
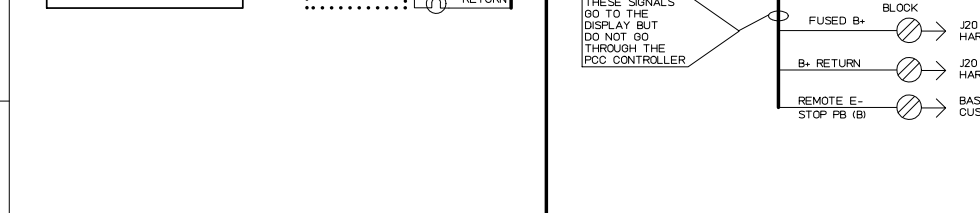
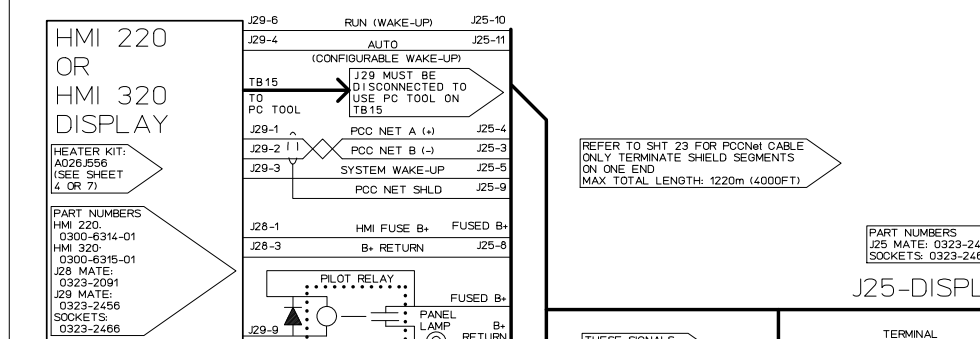
(N3) -THIS IS A CONTROLLED PRODUCT-  
PER ONAN PROCEDURE FRE-1002  
TO MAINTAIN COMPLIANCE WITH REQUIREMENTS OF THE CODES, STANDARDS, OR AGENCIES LISTED BELOW  
 CSA  UL  EC  RVIA  ABYC  
 OTHER  OTHER  
AND/OR ASSIGN INTERNAL ONAN DESIGN CONTROL FACILITIES   
CHANGES, DEVIATIONS, OR SUBSTITUTIONS OF MATERIAL, PROCESS, OR PERFORMANCE FOR THIS PRODUCT MUST BE APPROVED BY THE FOLLOWING DESIGN CONTROL FACILITIES  
DESIGN CONTROL FACILITY TRIDLEY  
DESIGN CONTROL FACILITY

REVISIO DWG

TOLERANCE UNLESS OTHERWISE SPECIFIED		SIM TO 155-2340 C		ITEM PART NO.		DWG SIZE		DESCRIPTION OR MATERIAL		REF DES	
mm		Inch		NAME		DATE		MINNEAPOLIS, MINNESOTA 55432		TITILE	
X .X .X .XX .XX		.X .X .X .XX .XX		CYNTHIA CLARK		07-27-92		MUFFLER (CRITICAL)		DWG NO.	
0.09-4.99 +0.15/-0.08		.004-.300 +.004/- .003		CHKR MFG		07-27-92		155-2342		SHEET	
5.00-9.99 +0.20/-0.10		.021-.421 +.004/- .004		APPROVED G THOMPSON		07-29-92		DM SERIES		1 of 1	
10.00-17.99 +0.25/-0.13		.422-.703 +.010/- .005		THIS DOCUMENT IS THE PROPERTY OF ONAN CORPORATION. IT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH MUST NOT BE DUPLICATED, USED OR DISCLOSED OTHER THAN AS EXPRESSLY AUTHORIZED BY ONAN CORPORATION OR ITS REPRESENTATIVE.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ANSI Y14.5M-1982		155-2342		C	
17.50-24.99 +0.30/-0.13		.704-.999 +.012/- .005		DRAWN TO SCALE OF NONE							
ANG TOL .XXX											

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-135870	N	2	ADD SHUNT APPL FOR L&N TERMINAL	MRO	JWS	J.W.SMITH	05FEB14
		3	DOT LINE OPTIONAL DEVICES	MRO	JWS	J.W.SMITH	05FEB14
		13	UPDATE TO PCCNET, MODBUS, s-CAN	MRO	JWS	J.W.SMITH	05FEB14

### POWER COMMAND 2.2 AND 2.3 OEM GENSET ECM ENGINE CONNECTION



LEGEND:  
NOTES/INFORMATION

LEGEND  
DASHED LINE - INTERNAL REFERENCE  
DOTTED LINE - OPTIONAL CONNECTION  
SOLID LINE - REQUIRED WITH EXCEPTIONS  
SEE RELEVANT NOTES

LEGEND  
CI : Configurable Digital Input  
CO : Configurable Digital Output  
CAI : Configurable Analog Input  
CAO : Configurable Analog Output

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES		SM TO SIMILAR TO	DWN MARK R. DALSKJE	CUMMINS POWER GENERATION
DO NOT SCALE PRINT		CKD BEN FUCHS	APVD JACOB W. SMITH	
DATE 25-JAN-07		SITE CODE		WD-CONTROL (PCC CCS)
ANG TOL: ± 1.0°		SCALE: NONE		
PROPERTY OF CUMMINS POWER GENERATION GROUP		FIRST USED ON PCC		SHEET 6 OF 23
FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5-2004		PGF		

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-135870		4	ADD ANALOG INPUTS TO AUX101			MROJWS	J.W.SMITH 05FEB14
		6	ADD OPTIONAL DEVICES FLAG			MROJWS	J.W.SMITH 05FEB14
		13	UPDATE TO PCCNET, MODBUS, s-CAN			MROJWS	J.W.SMITH 05FEB14

POWER COMMAND 2.2/2.3 AND 3.3  
CUSTOMER CONNECTIONS:  
PCC NET DEVICES

ALL DEVICES ARE OPTIONAL

MAXIMUM OF 4 HMI113'S CAN BE USED PER GENSET

5A MAX CURRENT DIRECT CONNECTION TO GENSET TERMINAL BLOCK REQUIRED. DO NOT POWER HEATER THROUGH THE PCC CONTROLLER OR DISPLAY

PCC NET MUST USE A DAISY CHAIN TOPOLOGY ONLY

PCCNET CABLE REQUIREMENTS:  
BELDEN 9729  
MAX TOTAL LENGTH: 1220m (4000FT)

USE A LOCAL FLOATING (NON-GROUNDED) DC POWER SUPPLY IF B+ LINE HAS HIGH RESISTANCE (>1 OHM) DUE TO LONG RUNS. TO PREVENT BRIEF POWER OUTAGES DURING GENSET STARTS

PCCNET DEVICES ARE INTERNALLY TERMINATED NO TERMINATING RESISTOR REQUIRED

FULL LOAD AMPS  
PCC3300  
12 VDC - 530mA  
24 VDC - 523mA  
PCC2300  
12 VDC - 345mA  
24 VDC - 332mA

LEGEND  
DASHED LINE = INTERNAL REFERENCE  
DOTTED LINE = OPTIONAL CONNECTION  
SOLID LINE = REQUIRED WITH EXCEPTIONS  
SEE RELEVANT NOTES

D

D

C

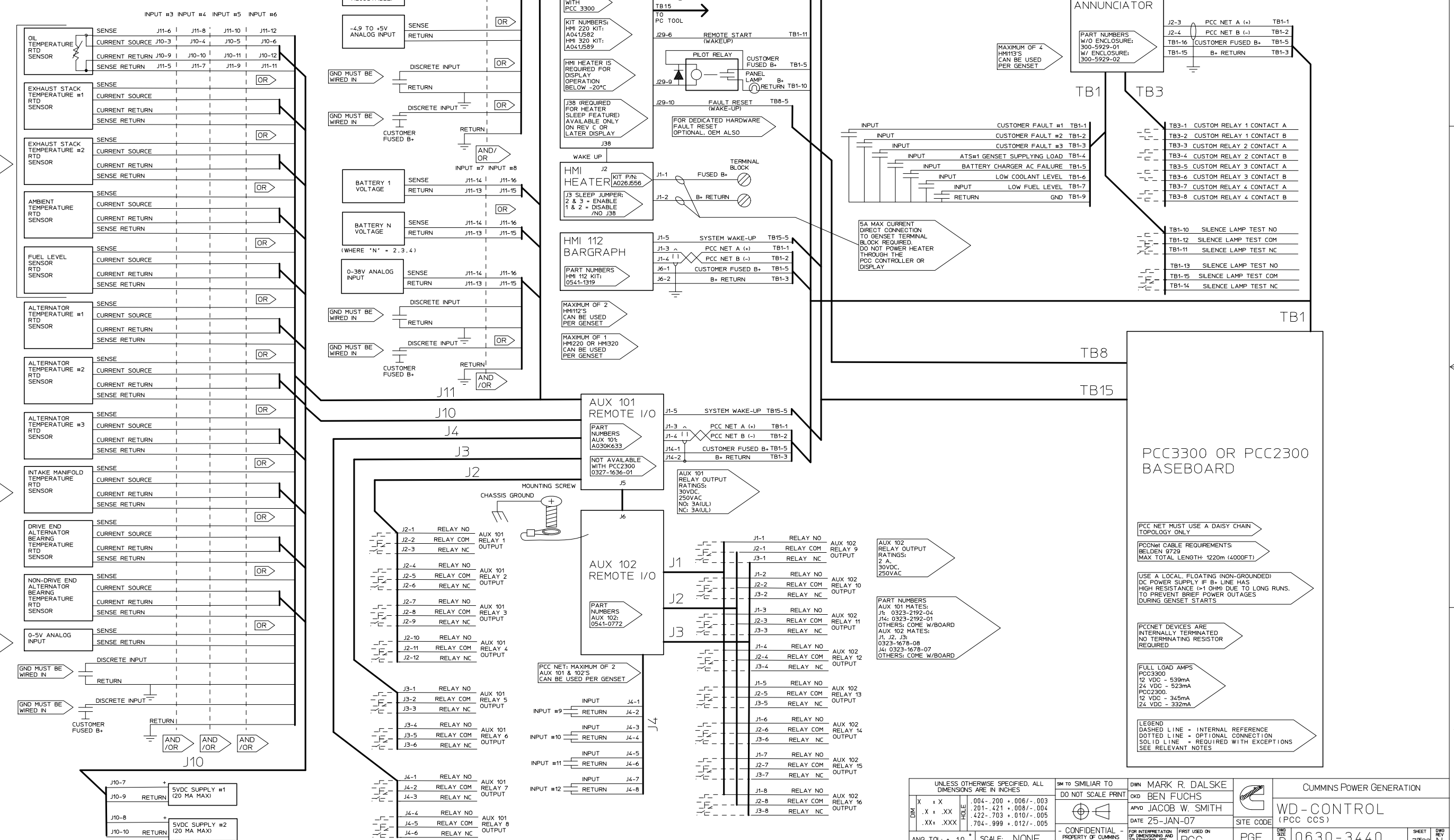
C

B

B

A

A



NOT AVAILABLE J1939 AUX101'S SEE SHEET 9 FOR DETAILS

NOT AVAILABLE J1939 AUX101'S SEE SHEET 9 FOR DETAILS

NOT AVAILABLE J1939 AUX101'S SEE SHEET 9 FOR DETAILS

PCC NET, MAXIMUM OF 2 AUX 101 & 102'S CAN BE USED PER GENSET

AUX 102 RELAY OUTPUT RATINGS:  
2 A  
30VDC,  
250VAC

PART NUMBERS  
AUX 101 MATES:  
J1: 0323-2192-04  
J14: 0323-2192-01  
OTHERS: COME W/BOARD  
AUX 102 MATES:  
J1, J2, J3:  
0323-678-08  
J4: 0323-678-07  
OTHERS: COME W/BOARD

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES		SM TO SIMILAR TO	DWN	MARK R. DALSKO	CUMMINS POWER GENERATION	
DO NOT SCALE PRINT		OKD	BEN FUCHS	WD-CONTROL (PCC CCS)		
DATE 25-JAN-07		APVD	JACOB W. SMITH	PGF		
SCALE: NONE		FIRST USED ON PCC		0630-3440		
ANG TOL: ± 1.0		PROPERTY OF CUMMINS POWER GENERATION GROUP		SHEET 7 OF 23		



REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-135870	N	11	ADD THIS SHEET AS SHEET 21	MFRONS		J.W.SMITH	05FEB14

POWER COMMAND 500/550  
NETWORK CONNECTIONS FOR TB2

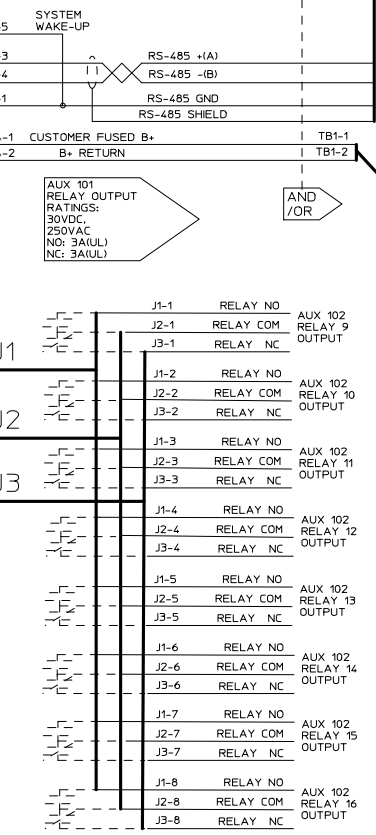
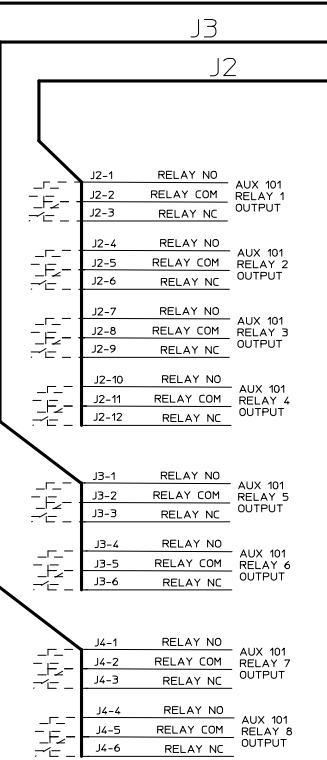
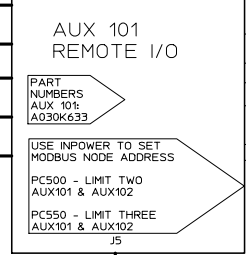
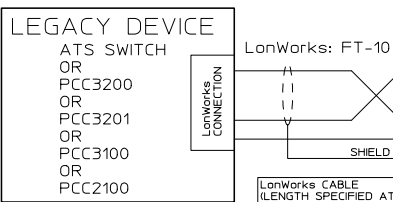
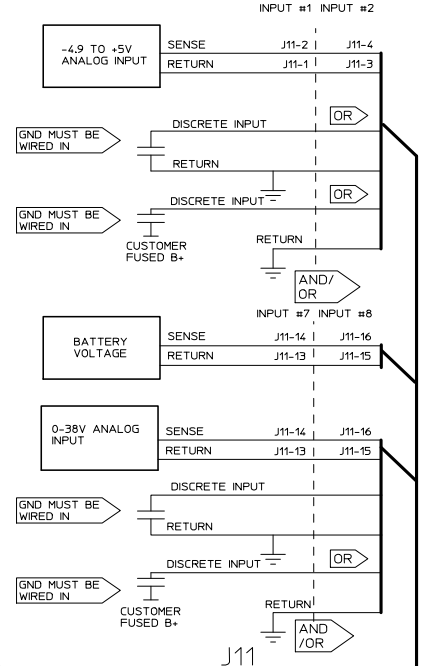
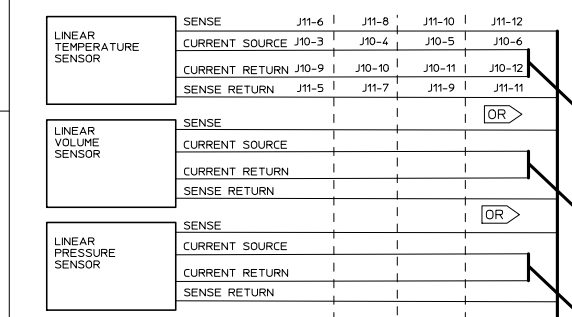
ALL DEVICES ARE OPTIONAL

PCC DEVICES INTERFACE

LEGACY DEVICES INTERFACE VIA ModLon

AUX101 DEVICE INTERFACE

SET UP CURRENT SOURCE WITH  
MAXIMUM OHMS\* CURRENT IS +5VDC  
CURRENT RANGE: 2 - 20mA



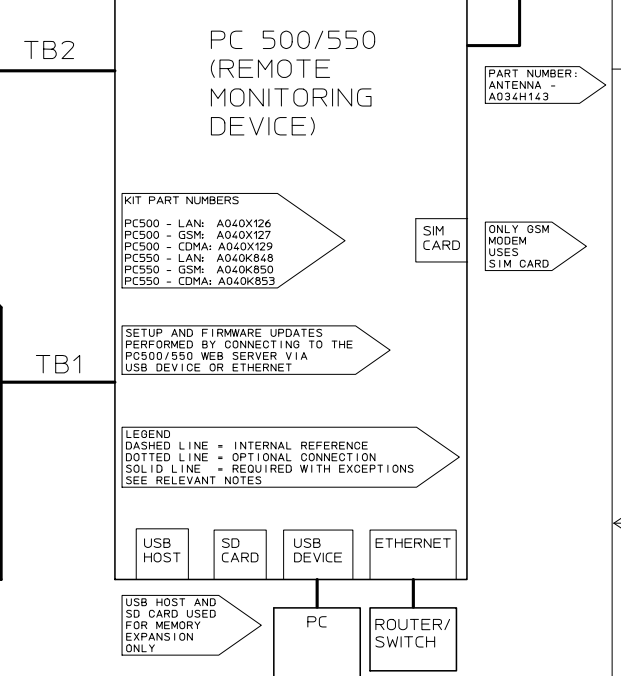
PC500: MAXIMUM 2 MODBUS SLAVES CAN BE CONNECTED

PC550: MAXIMUM 12 MODBUS SLAVES CAN BE CONNECTED (RECOMMENDED MAXIMUM 6 MODBUS SLAVES CONNECTED PER MODBUS CHANNEL)

ANTENNA IS AN OPTION WHICH IS REQUIRED FOR WIRELESS CONNECTION

ANTENNA COMES WITH GSM & CDMA KIT

ANTENNA EXTENSION CABLE (3.6m) PART NUMBER: A035C381



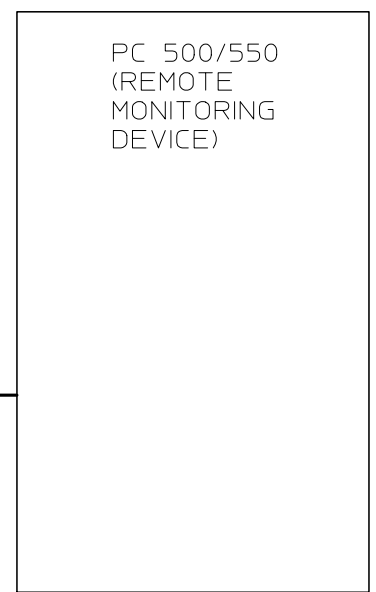
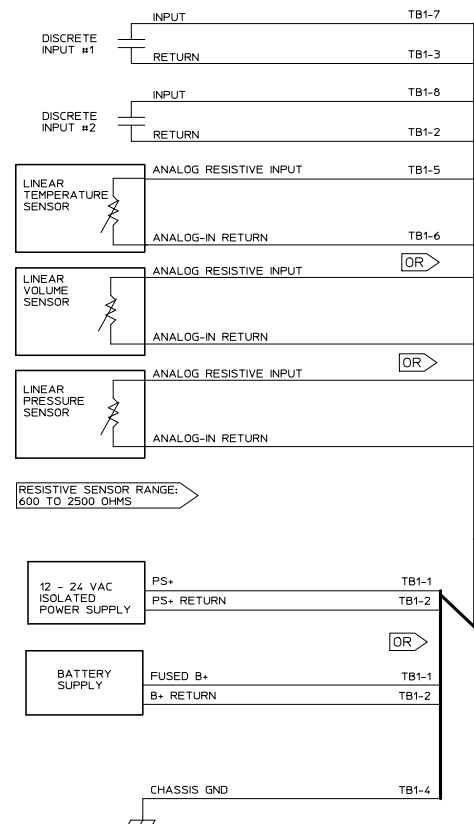
LEGEND:  
NOTES/  
INFORMATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES		SM TO SIMILAR TO	DWN MARK R. DALSKE	CUMMINS POWER GENERATION
X ± X	.004 - .200 ± .006 / -.003	DO NOT SCALE PRINT	CKD NISHAD SAYYAD	
.X ± .XX	.201 - .421 ± .008 / -.004	CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD JACOB W. SMITH	WD-CONTROL (PCC CCS)
.XX ± .XXX	.422 - .703 ± .010 / -.005		DATE 23JAN14	
ANG TOL: ± 1.0	SCALE: NONE	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCES, SEE ASME Y14.5M-1994	PGF	DWG NO 0630-3440
			FIRST USED ON PCC	SHEET 21 OF 23

# POWER COMMAND 500/550 CUSTOMER CONNECTIONS FOR TB1

ALL DEVICES ARE OPTIONAL  
EXCEPT FOR  
POWER SUPPLY & CHASSIS

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-135870	N	11	ADD THIS SHEET AS SHEET 22	MFRONS	J.W.SMITH	05FEB14	



TB1-13	DOUT2 NO	PC500/550
TB1-12	DOUT2 COM	DISCRETE
TB1-14	DOUT2 NC	OUTPUT 2
TB1-10	DOUT1 NO	PC500/550
TB1-9	DOUT1 COM	DISCRETE
TB1-11	DOUT1 NC	OUTPUT 1

PC500/550  
DISCRETE OUTPUT  
RATINGS:  
0.25A  
<60VDC  
<42VAC

USE SEPARATE POWER SUPPLY. IF BATTERY VOLTAGE CONNECTION DISTANCE CREATES VOLTAGE DROP OF MORE THAN 0.5 VOLTS, OTHERWISE PC 500/550 WILL DROP OUT DURING GENSET STARTING.

IF SEPARATE POWER SUPPLY IS USED, TB1-2 NEEDS TO BE REFERENCED TO ALL SLAVE DEVICES MODBUS SIGNAL REFERENCE

POWER CONSUMPTION:  
5W MAX, 2W NOMINAL

LEGEND:  
NOTES/  
INFORMATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES		SM TO SIMILIAR TO	DWN MARK R. DALSKE	CUMMINS POWER GENERATION	
DIM	X ± X	DO NOT SCALE PRINT	CKD NISHAD SAYYAD	WD-CONTROL (PCC CCS)	SHEET 22 OF 23
	.X ± .XX	CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD JACOB W. SMITH		
	.XX ± .XXX		DATE 23JAN14		
ANG TOL: ± 1.0 °	SCALE: NONE	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON PCC	SITE CODE PGF	DWG NO 0630-3440

PCC GENERAL INFORMATION

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-135870	N	11	ADD THIS SHEET AS SHT 23	MFRDMS		J.W.SMITH	05FEB14

RECOMMENDED TWISTED PAIR CABLE

CABLE TYPE/MFG & PART NUMBER	PCCNet	s-CAN	RS-485 MODBUS	LOAD SHARE	FIRST START
TWISTED, SHIELDED PAIR, 22AWG OR LARGER				X	X
BELDEN 9729 (2 PAIR)	X 2)		X 2)		
BELDEN 3106A (1.5 PAIR)		X	X	X 1)	X
BELDEN 3107A (2 PAIR)		X 2)	X 2)	X	X 3)

NOTES:

- 1) TWO INDIVIDUAL CABLES ARE NEEDED TO MEET THE REQUIREMENT FOR THIS SIGNAL
- 2) SECOND PAIR USED FOR GND REFERENCE ONLY
- 3) SECOND PAIR NOT USED

GENERAL NOTE:

NO TWO SIGNALS LISTED ABOVE MAY BE COMBINED INTO A SINGLE CABLE WITH EXCEPTION TO kW AND kVARLOAD SHARE

CONTROL DEVICE COMPATIBILITY

CONTROL PLATFORM	CONTROL	BARGRAPH				LOCAL DISPLAY				REMOTE DISPLAY		
		HMI 112-01 KVA ONLY	HMI 112-02 KW + PF	HMI 114 KVA ONLY	HMI 114 KW + PF	HMI 211	HMI 220	HMI 320-01 W/O CB	HMI 320-02 W/ CB	HMI 211	HMI 220-03	HMI 320-03
POWER COMMAND 1.1/1.2	PCC1302	X		X		X	X			X	X	
POWER COMMAND 2.2/2.3	PCC2300		X		X		X	X			X	X
POWER COMMAND 3.3	PCC3300		X		X			X				X

MAXIMUM NUMBER OF EACH DEVICE ON PCCNet BY PLATFORM

CONTROL PLATFORM	CONTROL	LOCAL DISPLAY	REMOTE DISPLAY	BARGRAPH	AUX101/AUX102 REMOTE I/O	HMI 113 NFPA 110 ANNUNCIATOR
POWER COMMAND 1.1/1.2	1	1	1	2	1	4
POWER COMMAND 2.2/2.3	1	1	1	2	2	4
POWER COMMAND 3.3	1	1	1	2	2	4

FUSING REQUIREMENTS FOR J22 AND TB7:

- FUSE PER NFPA 70E
- FUSING REQUIRED UNLESS ALL 3 OF THE FOLLOWING ARE TRUE:
  - A) LL VOLTAGE <= 240 VAC ON TB7/J22
  - B) NOT PARALLELED OR USING A SIGNAL TRANSFORMER
  - C) SIZE <= 125 KVA
- USE FUSE FERRAZ SHAWMUT ATMR 1/2 OR EQUIV.
- USE FUSE HOLDER FERRAZ SHAWMUT 3Ø323R (ONLY 200K AIC) OR EQUIV.
- PLACE IN ALTERNATOR HOUSING FOR J22
- PLACE NEAR BUS SOURCE FOR TB7
- FUSE TRANSFORMER PRIMARY AS NEEDED FOR TB7 IF APPLICABLE

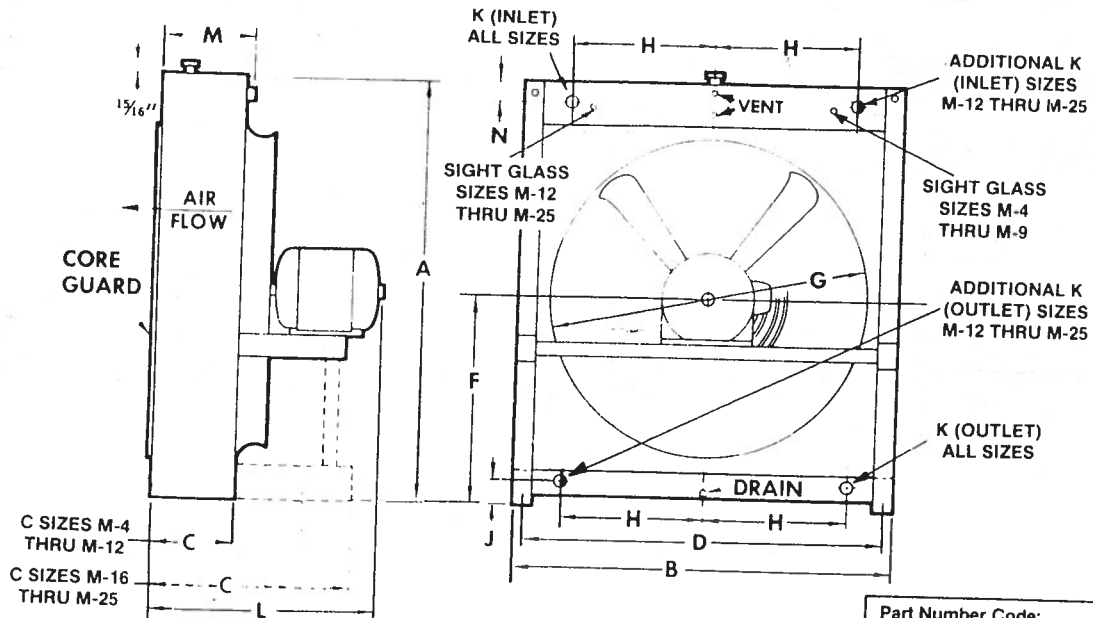
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES		SM TO SIMILIAR TO	DWN MARK R. DALSKE	CUMMINS POWER GENERATION									
<table border="1"> <tr><td>Ø</td><td>.004 - .200 +.006 / -.003</td></tr> <tr><td>.X ± .XX</td><td>.201 - .421 +.008 / -.004</td></tr> <tr><td>.XX ± .XXX</td><td>.422 - .703 +.010 / -.005</td></tr> <tr><td></td><td>.704 - .999 +.012 / -.005</td></tr> </table>	Ø	.004 - .200 +.006 / -.003	.X ± .XX	.201 - .421 +.008 / -.004	.XX ± .XXX	.422 - .703 +.010 / -.005		.704 - .999 +.012 / -.005	DO NOT SCALE PRINT	OKD M.SCHEUERELL	 WD-CONTROL (PCC CCS)		
	Ø	.004 - .200 +.006 / -.003											
	.X ± .XX	.201 - .421 +.008 / -.004											
.XX ± .XXX	.422 - .703 +.010 / -.005												
	.704 - .999 +.012 / -.005												
ANG TOL: ± 1.0 °	SCALE: NONE	APVD JACOB W. SMITH											
PROPERTY OF CUMMINS POWER GENERATION GROUP		DATE 05FEB14	SITE CODE	PGF	DWG NO 0630-3440								



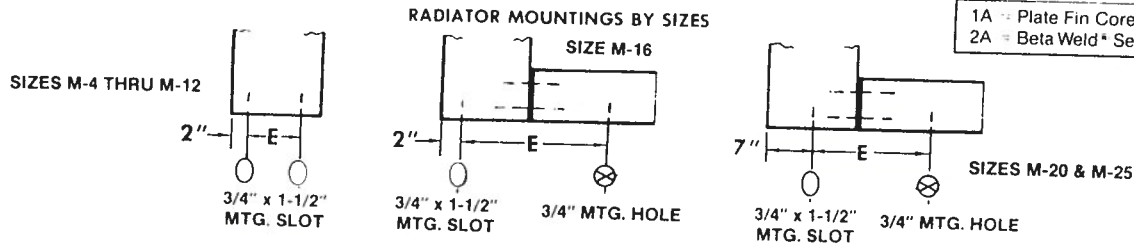
September 13, 1993

## SUBMITTAL DATA standard industrial radiator

### STANDARD MODELS ELECTRIC MOTOR/DIRECT-BELT DRIVE



**Part Number Code:**  
 1A = Plate Fin Core  
 2A = Beta Weld® Serp Fin Core

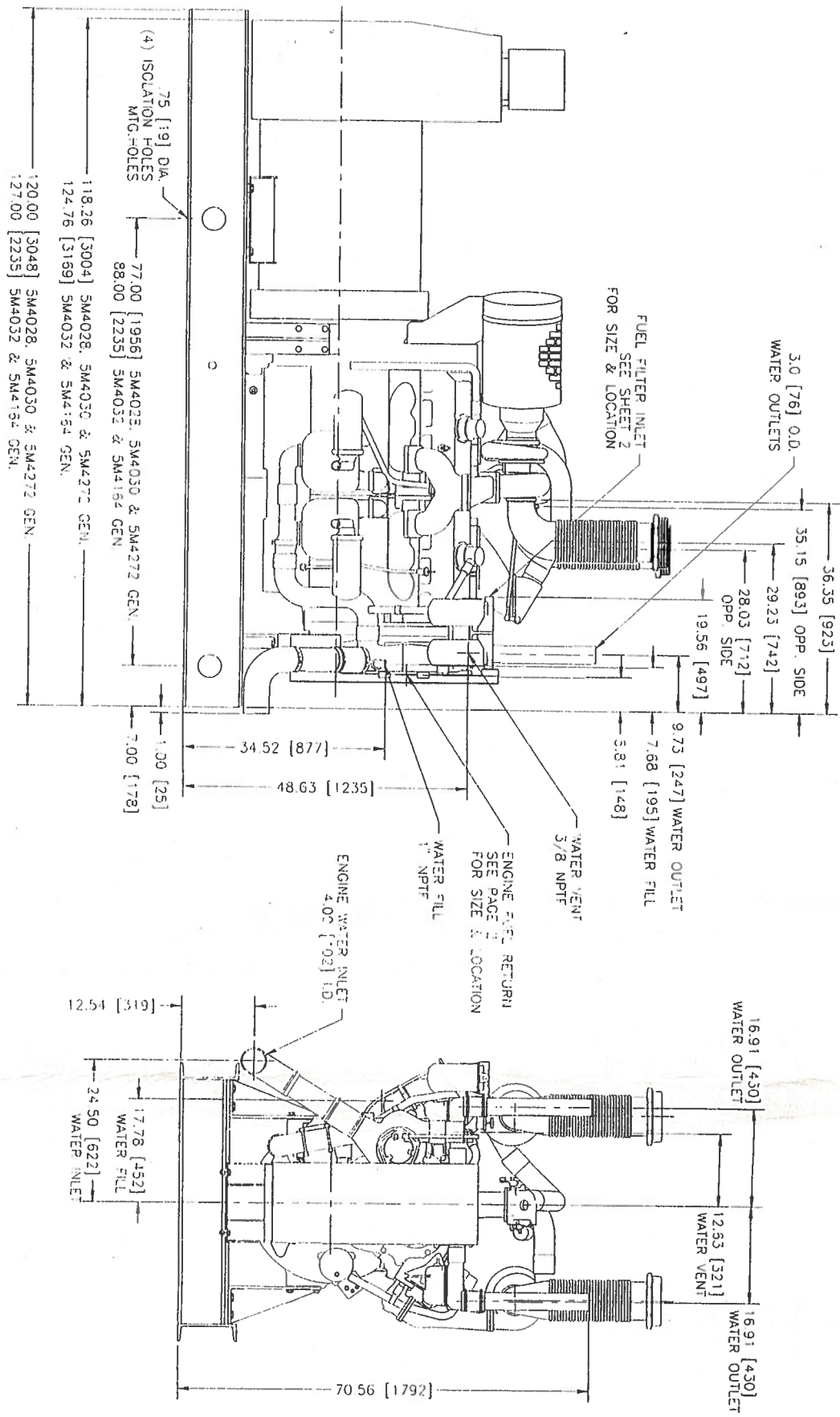


### SPECIFICATIONS (INCHES)

Modine No. Model No.	M-25-VR (-)	M-20-VR (GK3)	M-16-VR (FK3)	M-12-VR (EK3)	M-9-VR (DK3)	M-7-VR (CK3)	M-5-VR (BK3)	M-4-VR (AK3)
HP - Part No.	15-1A15943	10-1A9975 15-1A9973	7.5-1A9967 10-1A9965	5-1A/2A9957 7.5-1A/2A9955 10-1A/2A9953	3-1A/2A9949 5-1A/2A9947	2-1A/2A9945	2-1A/2A9943	1-1A9941
A	76.25	71.31	65.19	59.25	50.94	46.09	41.69	38.59
B	68.00	63.00	56.00	50.00	44.00	38.00	34.00	31.00
C	33.75	31.25	29.25	12.00	10.75	10.75	10.75	10.75
D	65.00	59.98	53.73	47.73	41.73	36.36	32.36	29.36
E	20.25	17.75	20.75	8.00	6.75	6.75	6.75	6.75
F	37.91	36.00	32.98	29.91	26.72	24.03	21.84	20.28
G	55.00	48.88	42.88	36.88	30.88	24.88	24.88	18.75
H	25.00	23.00	20.00	17.00	16.00	13.00	11.00	10.00
J	3.47	3.54	3.69	3.34	4.47	3.97	3.97	3.97
K-NPT (Male)	4.00	4.00	4.00	4.00	2.50	2.50	2.50	2.50
L	43.50	42.12	36.69	32.50	27.82	25.72	25.59	23.47
M	16.76	15.76	13.76	13.76	12.26	12.26	12.51	12.51
N	3.50	3.50	3.50	3.50	2.66	2.66	2.66	2.66
Liquid Capacity (gal.)	24	21	18	16	11	9	8	7
Dry Weight est. (lbs.)	1800	1600	1300	1150	750	550	450	400
Motor RPM	875	1160	1160	1750	1750	1750	1750	1750
Assembly Dwg. No.	-	8A2165D	8A2164D	8A2163D	8A2162D	8A2161D	8A2160D	8A2159D

#### NOTES:

- 1) Inlet/outlet connections have plastic caps to prevent shipping damage. Alternate connections marked have metal pipe caps.
- 2) 7 psi pressure cap included.
- 3) All models have 3-phase, 60 Hertz, 230-460 volt, TEFC motors.
- 4) L dimension varies with motor size. Largest motor size shown.
- 5) Vent and drain connections are 1/2-14 NPTF.



NOTE: DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.

600 KW  
 12V-92TA DDC  
 RECONNECTABLE  
 380V & 600V GENERATOR  
 (REMOTE RADIATOR)

REV	DATE	BY	CHKD
1			
2			
3			
4			
5			