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# *Section 1 – Project Information*

March 6, 2023

**Bill of Material**

Feature Code	Description	Qty
C200D6D Install-US-Stat C200 D6D A331-2 L169-2 L090-2 L193-2 L224-2 B184-2 R002-2 BB95-2 F217-2 P176-2 F252-2 F179-2 C301-2 C127-2 C310-2 C312-2 C318-2 H609-2 H703-2 H012-2 H728-2 K796-2 KS52-2 H536-2 KV03-2 KX30-2 KB72-2 A366-2 A422-2 D041-2 A333-2 E125-2 H389-2 E089-2 H669-2 E153-2 H706-2 L028-2 L050-2 A322-2 F065-2 H268-2 L260-2 L262-2	<b>C200D6D, Diesel Genset, 60Hz, 200kW</b> U.S. EPA, Stationary Emergency Application C200D6D, Diesel Genset, 60Hz, 200kW Duty Rating - Standby Power (ESP) Emission Certification, EPA, Tier 3, NSPS CI Stationary Emergency Listing - UL 2200 NFPA 110 Type 10 Level 1 Capable IBC Seismic Certification Exciter/Regulator - Permanent Magnet Generator, 3 Phase Sensor Voltage - 277/480, 3 Phase, Wye, 4 Wire Alternator - 60Hz, 12L, 480/277V, 105C, 40C Ambient, Increased Motor Starting (IMS) Aluminum Sound Attenuated Level 2 Enclosure, with Exhaust System Enclosure Color - Green, Aluminum Enclosure - Wind Load 180 MPH, ASCE7 - 10 Skidbase - Housing Ready Fuel Tank - Regional, Dual Wall, Sub Base, 24 Hour Minimum Fuel Water Separator Low Fuel Level Switch, 40% Mechanical Fuel Gauge Switch - Fuel Tank, Rupture Basin Control Mounting - Left Facing PowerCommand 2.3 Controller Gauge - Oil Pressure Meters - AC Output Analog (kVA) Stop Switch - Emergency Relays - Auxiliary, Qty 2, 25A - 15V DC/10A - 30V DC Control Display Language - English Load Connection - Single Circuit Breaker, Location A, 125A - 400A, 3P, LSI, 600 Volts AC, 100%, UL Bottom Entry, Right Engine Governor - Electronic, Isochronous Engine Starter - 12 Volt DC Motor Engine Air Cleaner - Normal Duty Battery Charging Alternator Engine Cooling - Radiator, High Ambient Air Temperature, Ship Fitted Shutdown - Low Coolant Level Extension - Coolant Drain Engine Coolant - 50% Antifreeze, 50% Water Mixture Coolant Heater Engine Oil Genset Warranty - 2 Years Base Literature - English Packing - Skid, Poly Bag Battery Rack Extension - Oil Drain Green Sound Level 2 Intake Baffle - Ship Loose Ship Loose - Vent Kit B	2
A048G602	<b>10A Battery Charger</b>	2
A054X752	<b>Battery Heater Kit</b>	2
ACC-BAT-34	<b>Batteries</b>	4

# *Section 2 – Generator Spec Sheets*





# Diesel generator set

QSB7 series engine  
125-200 kW @ 60 Hz  
EPA Tier 3 emissions



## Description

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

## Features

**Heavy duty engine** - Rugged 4-cycle industrial diesel delivers reliable power and fast response to load changes.

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

**Control system** - The PowerCommand® 1.1 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

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

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

**Fuel tanks** - Dual wall sub-base fuel tanks are offered as optional features, providing economical and flexible solutions to meet extensive code requirements on diesel fuel tanks.

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

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

Model	Standby 60 Hz		Prime 60 Hz		Data sheets
	kW	kVA	kW	kVA	
C125D6D	125	156	113	141	NAD-6371-EN
C150D6D	150	188	135	169	NAD-6372-EN
C175D6D	175	219	158	197	NAD-6373-EN
<b>C200D6D</b>	<b>200</b>	250	180	225	NAD-6374-EN

## Generator set specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.50%
Radio frequency emissions compliance	FCC code title 47 part 15 class A and B

## Engine specifications

Design	Turbocharged and charge air cooled
Bore	107 mm (4.21 in.)
Stroke	124 mm (4.88 in.)
Displacement	6.7 L (408 in <sup>3</sup> )
Cylinder block	Cast iron, in-line 6 cylinder
Battery capacity	2 x 850 amps per battery at ambient temperature of 0 °C (32 °F)
Battery charging alternator	100 amps
Starting voltage	2 x 12 volt in parallel, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	High ambient radiator
Rated speed	1800 rpm

## Alternator specifications

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

## Available voltages

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

## Generator set options

### Fuel system

- Basic fuel tanks
- **Regional fuel tanks**

### Engine

- Engine air cleaner – normal or heavy duty
- Shut down – low oil pressure
- Extension – oil drain
- Engine oil heater

### Alternator

- 120 °C temperature rise alternator
- 105 °C temperature rise alternator
- PMG excitation
- Alternator heater, 120 V
- Reconnectable full 1 phase output alternator upto 175 kW

### Control

- AC output analog meters
- Stop switch – emergency
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)

### Electrical

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

### Enclosure

- Aluminium enclosure Sound Level 1 or Level 2, green color
- Aluminium weather protective enclosure with muffler installed, green color

### Cooling system

- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Coolant heater options:
  - <4 °C (40 °F) – cold weather
  - <-18 °C (0 °F) – extreme cold

### Exhaust system

- Exhaust connector NPT
- Exhaust muffler mounted

### Generator set application

- Base barrier – elevated genset
- Radiator outlet duct adapter

### Warranty

- Base warranty – 2 year/1000 hours, Standby
- Base warranty – 1 year/unlimited hours, Prime
- 3 & 5 year Standby warranty options

## Generator set accessories

- Coolant heater
- Battery heater kit
- Engine oil heater
- Remote control displays
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- Audible alarm
- Remote monitoring device – PowerCommand 500/550
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Base barrier – elevated generator set
- Mufflers – industrial, residential or critical
- Alternator PMG excitation
- Alternator heater
- Improved PC1.1 display readability
- Top conduit entry access

## Control system PowerCommand 1.1



**PowerCommand control** is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

### Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 °C to +70 °C
- Bargraph display (optional)

### AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

### 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

### Alternator data

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

### Engine data

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

### Other data

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

### Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

### Digital voltage regulation

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

### Control functions

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

## Options

- Auxiliary output relays (2)
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)

- AC output analog meters (bargraph)
  - Color-coded graphical display of:
    - 3-phase AC voltage
    - 3-phase current
    - Frequency
    - kVa
- Remote operator panel
- PowerCommand 2.3 control with AmpSentry protection

## Ratings definitions

### Emergency Standby Power (ESP):

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

### Limited-Time Running Power (LTP):

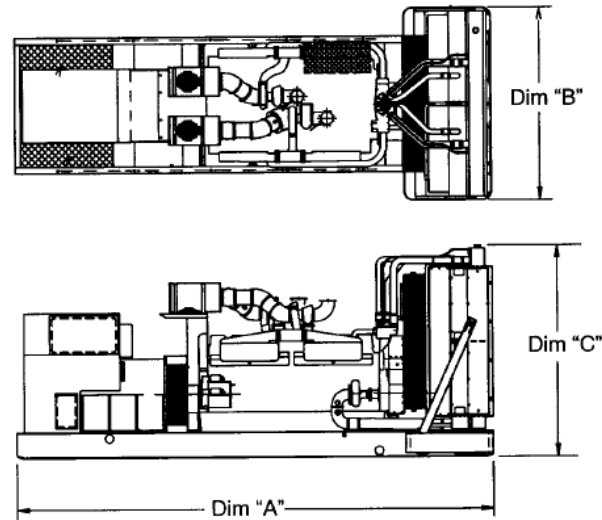
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

### Prime Power (PRP):

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

### Base Load (Continuous) Power (COP):

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



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





**Do not use for installation design**

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set weight* kg (lbs.)
<b>Open set</b>				
<b>C125D6D</b>	2867 (113)	1016 (40)	1415 (56)	1470 (3240)
<b>C150D6D</b>	2867 (113)	1016 (40)	1415 (56)	1470 (3240)
<b>C175D6D</b>	2867 (113)	1016 (40)	1415 (56)	1470 (3240)
<b>C200D6D</b>	2867 (113)	1016 (40)	1415 (56)	1470 (3240)
<b>Weather protective enclosure</b>				
<b>C125D6D</b>	2867 (113)	1016 (40)	1836 (72)	1600 (3527)
<b>C150D6D</b>	2867 (113)	1016 (40)	1836 (72)	1600 (3527)
<b>C175D6D</b>	2867 (113)	1016 (40)	1836 (72)	1600 (3527)
<b>C200D6D</b>	2867 (113)	1016 (40)	1836 (72)	1600 (3527)
<b>Sound attenuated enclosure Level 1</b>				
<b>C125D6D</b>	3621 (143)	1016 (40)	1836 (72)	1649 (3635)
<b>C150D6D</b>	3621 (143)	1016 (40)	1836 (72)	1649 (3635)
<b>C175D6D</b>	3621 (143)	1016 (40)	1836 (72)	1649 (3635)
<b>C200D6D</b>	3621 (143)	1016 (40)	1836 (72)	1649 (3635)
<b>Sound attenuated enclosure Level 2</b>				
<b>C125D6D</b>	4061 (160)	1016 (40)	1836 (72)	1665 (3671)
<b>C150D6D</b>	4061 (160)	1016 (40)	1836 (72)	1665 (3671)
<b>C175D6D</b>	4061 (160)	1016 (40)	1836 (72)	1665 (3671)
<b>C200D6D</b>	4061 (160)	1016 (40)	1836 (72)	1665 (3671)

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

## Codes and standards

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

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

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

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

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## Generator Set Data Sheet

**Model:** C200D6D  
**Frequency:** 60 Hz  
**Fuel Type:** Diesel  
**KW Rating:** 200 Standby  
 180 Prime  
**Emissions level:** EPA Tier 3, Stationary Emergency

Exhaust Emission Data Sheet:	EDS-3046
Exhaust Emission Compliance Sheet:	EPA-2035
Sound Performance Data Sheet:	MSP-4010
Cooling Performance Data Sheet:	MCP-2050
Prototype Test Summary Data Sheet:	PTS-636

Fuel Consumption	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	200 (250)				180 (225)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	5.7	8.7	11.7	14.9	5.3	8	10.7	13.6
L/hr	21.57	32.92	44.28	56.39	20.06	30.28	40.49	51.47

Engine	Standby rating	Prime rating
Engine Manufacturer	Cummins Inc.	
Engine Model	QSB7-G5	
Configuration	Cast iron, in-line, 6 cylinders	
Aspiration	Turbocharged and charge air cooled	
Gross Engine Power Output, kWm (bhp)	242 (324)	208 (279)
BMEP at set rated load, kPa (psi)	2276 (330)	2063 (299)
Bore, mm (in)	107 (4.21)	
Stroke, mm (in)	124 (4.88)	
Rated Speed, rpm	1800	
Piston Speed, m/s (ft/min)	7.44 (1464)	
Compression Ratio	17.2:1	
Lube Oil Capacity, L (qt)	17.4 (18.38)	
Overspeed limit, rpm	2250	

### Fuel Flow

Maximum Fuel Flow, L/hr (US gph)	103 (27.0)
Maximum Fuel Inlet Restriction with Clean Filter, mm Hg (in Hg)	127 (5.0)

Air	Standby rating	Prime rating
Combustion Air, m <sup>3</sup> /min (scfm)	15.86 (560)	15.38 (543)
Maximum Air Cleaner Restriction with Clean Filter, kPa (in H <sub>2</sub> O)	3.7 (15)	

## Exhaust

Exhaust Flow at set rated load, m <sup>3</sup> /min (cfm)	40.74 (1439)	37.8 (1335)
Exhaust Temperature, °C (°F)	512.22 (954)	484.44 (904)
Maximum Back Pressure, kPa (in H <sub>2</sub> O)	10 (40.19)	10 (40.19)
Actual Exhaust Back Pressure with CPG Sound level 2 Enclosure Muffler, kPa (in H <sub>2</sub> O)	10 (40.19)	9.9 (39.78)
Actual Exhaust Back Pressure with CPG Weather Enclosure Muffler, kPa (in H <sub>2</sub> O)	8.4 (33.76)	7.8 (31.47)

## Standard Set-Mounted Radiator Cooling

Ambient Design, °C (°F)	49 (120.2)	
Fan Load, kW <sub>m</sub> (HP)	14.02 (18.8)	
Coolant Capacity (with radiator), L (US Gal)	22 (5.9)	
Cooling System Air Flow, m <sup>3</sup> /min (scfm)	305.82 (10800)	
Total Heat Rejection, MJ/min (Btu/min)	10.06 (9538)	9.44 (8952)
Maximum Cooling Air Flow Static Restriction, kPa (in H <sub>2</sub> O)	0.12 (0.5)	

## Weight<sup>2</sup>

Unit Wet Weight kgs (lbs)	1583 (3491)
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### 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

Standby	Engine power available up to 2148 m (7049 ft.) at ambient temperatures up to 40° C (104° F) and 1086 m (3563 ft.) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
Prime	Engine power available up to 1944 m (6377 ft.) at ambient temperatures up to 40° C (104° F) and 811 m (2660 ft.) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.

## Ratings Definitions

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

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NAD-6374-EN (07/21) A061F589



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## Alternator Data

Standard Alternators	Single phase <sup>2</sup>	Three Phase <sup>1</sup>				
Maximum Temperature Rise above 40 °C Ambient	120 °C	120 °C				
Feature Code	BB90-2	B946-2	B986-2	B952-2	B943-2	BB86-2
Alternator Data Sheet Number	ADS-213	ADS-213	ADS-212	ADS-212	ADS-212	ADS-212
Voltage Ranges	120/240	120/208	120/240	347/600	277/480	127/220
Voltage Feature Code	R104-2	R098-2	R106-2	R114-2	R002-2	R020-2
Surge kW	205.7	211.1	213.4	214.3	213.4	211.6
Motor Starting kVA (at 90% sustained voltage) Shunt	770	770	672	770	770	770
Motor Starting kVA (at 90% sustained voltage) PMG	920	920	791	920	920	920
Full load Current Amps at Standby Rating	833	694	602	240	301	656

## Alternator Data

Standard Alternators	Three phase <sup>1</sup>				
Maximum Temperature Rise above 40 °C Ambient	105 °C	105 °C	105 °C	105 °C	105 °C
Feature Code	BB94-2	BB95-2	BB92-2	BB85-2	BB93-2
Alternator Data Sheet Number	ADS-212	ADS-212	ADS-212	ADS-212	ADS-213
Voltage Ranges	120/240	277/480	347/600	127/220	120/208
Voltage Feature Code	R106-2	R002-2	R114-2	R020-2	R098-2
Surge kW	213.4	213.4	214.3	211.6	211.1
Motor Starting kVA (at 90% sustained voltage) Shunt	770	770	770	770	770
Motor Starting kVA (at 90% sustained voltage) PMG	920	920	920	920	920
Full load current amps at standby rating	602	301	240	656	694

Notes:

<sup>1</sup> Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor

<sup>2</sup> Full single phase output up to full set rated 3-phase kW at 1.0 power factor

## Formulas for Calculating Full Load Currents:

Three phase output

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

Single phase output

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

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

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NAD-6374-EN (07/21) A061F589



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# PowerCommand® 2.3 Control System



### Control System Description

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

### Features

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

# PowerCommand Digital Genset Control PCC 2300



## Description

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

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

## Features

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

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

## Base Control Functions

### HMI Capability

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

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

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

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

#### Alternator data

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

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

#### Engine data

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

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

### Service adjustments (continued)

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

### **Engine Control**

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

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

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

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

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

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

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

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

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

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

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

### **Alternator Control**

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

Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/- 1.5% for a 40 °C (104 °F) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level. The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

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

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

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

### **Protective Functions**

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

Protective functions include:

#### **Battle Short Mode**

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

## Derate

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

## Configurable Alarm and Status Inputs

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

## Emergency Stop

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

## Full Authority Electronic Engine Protection

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

## General Engine Protection

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

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

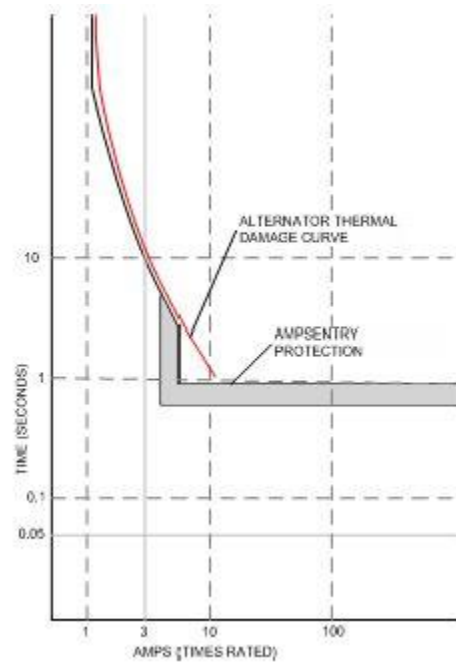
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crank sequence.

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

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

## Alternator Protection

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



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

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

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

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

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

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



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

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

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

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

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

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

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

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

## Field Control Interface

**Input signals to the PowerCommand control include:**

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

**Output signals from the PowerCommand control include:**

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

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

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

## Communications Connections Include:

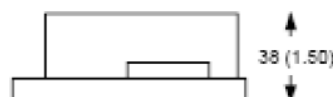
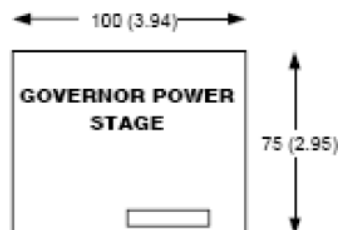
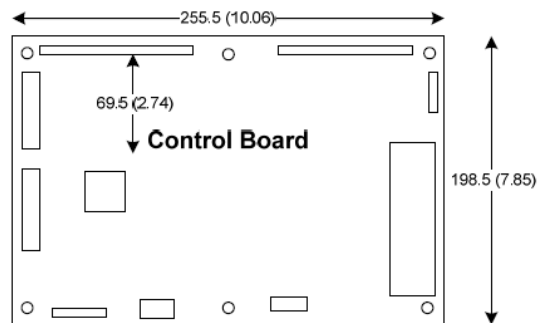
- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.

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

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

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

## Mechanical Drawings



# PowerCommand Human Machine Interface HMI320



## Description

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

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

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

## Features

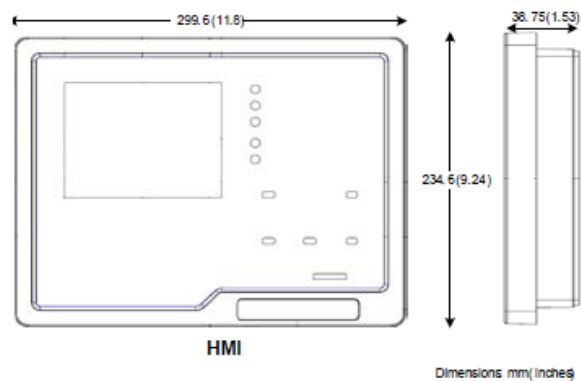
- LED indicating lamps:
  - Genset running
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the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

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

## Communications connections include:

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

## Mechanical Drawing



## Software

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

## Environment

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

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

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

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

## Certifications

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

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4: 1993 compliance, controls and switchgear.
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking: The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN50081-1,2 residential/light industrial emissions or industrial emissions.
- EN50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

## Warranty

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



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

**Our energy working for you.™**







# 2023 EPA Tier 3 Exhaust Emission Compliance Statement C200D6D Stationary Emergency 60 Hz Diesel Generator Set

**Compliance Information:**

The engine used in this generator set complies with Tier 3 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	PCEXL0409AAD-026
Effective Date:	05/24/2022
Date Issued:	05/24/2022
EPA Engine Family (Cummins Emissions Family):	PCEXL0409AAD

**Engine Information:**

Model:	QSB7-G5 NR3	Bore:	4.21 in. (106.9 mm)
Engine Nameplate HP:	324	Stroke:	4.88 in. (124 mm)
Type:	4 Cycle, In-line, 6 Cylinder Diesel	Displacement:	408 cu. in. (7 liters)
Aspiration:	Turbocharged and Charge Air Cooled	Compression ratio:	17.2:1
Emission Control Device:		Exhaust stack diameter:	4 in. (101.6)

**Diesel Fuel Emission Limits**

**D2 Cycle Exhaust Emissions**

	Grams per BHP-hr			Grams per kWm-hr		
	<u>NO<sub>x</sub> + NMHC</u>	<u>CO</u>	<u>PM</u>	<u>NO<sub>x</sub> + NMHC</u>	<u>CO</u>	<u>PM</u>
EPA Emissions Limit	3.0	2.6	0.15	4.0	3.5	0.20

**Test methods:** EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

**Diesel fuel specifications:** Cetane number: 40-50, Reference: ASTM D975 No. 2-D, 300-500 ppm Sulphur

**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 H<sub>2</sub>O/lb) of dry air; required for NO<sub>x</sub> 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.



# Sound Data

## C200D6D

### QSB7-G5 NR3 60Hz Diesel

### A-weighted Sound Pressure Level @ 7 meters, dB(A)

See notes 2, 5 and 7-11 listed below

Configuration	Exhaust	Applied Load	Position (Note 2)								8 Position Average
			1	2	3	4	5	6	7	8	
Standard – Unhoused	Infinite Exhaust	100% Standby	86	87	88	89	84	90	90	91	89
F216-2 Weather Aluminum	Mounted	100% Standby	87	86	84	89	85	91	84	88	87
F231-2 Sound Attenuated Level 1, Aluminum	Mounted	100% Standby	84	81	74	75	75	76	76	83	80
F217-2 Sound Attenuated Level 2, Aluminum	Mounted	100% Standby	74	73	72	73	73	73	72	74	73

### Average A-weighted Sound Pressure Level @ 1 meter, dB(A)

See notes 1, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	100% Standby	N/A	47	69	81	91	92	93	91	90	87	91	99
F216-2 Weather Aluminum	Mounted	100% Standby	N/A	44	67	84	92	90	91	89	86	81	83	97
F231-2 Sound Attenuated Level 1, Aluminum	Mounted	100% Standby	N/A	46	62	75	81	81	82	80	77	79	77	89
F217-2 Sound Attenuated Level 2, Aluminum	Mounted	100% Standby	N/A	46	64	73	77	77	78	77	74	73	68	85

### A-weighted Sound Pressure Level @ Operator Location, dB(A)

See notes 1, 3, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	100% Standby	N/A	43	69	79	87	90	90	91	90	89	99	101
F216-2 Weather Aluminum	Mounted	100% Standby	N/A	44	68	80	86	85	83	83	79	76	78	91
F231-2 Sound Attenuated Level 1, Aluminum	Mounted	100% Standby	N/A	50	66	75	81	82	83	79	76	76	66	88
F217-2 Sound Attenuated Level 2, Aluminum	Mounted	100% Standby	N/A	50	68	76	80	80	80	77	75	74	64	87



# Sound Data

## C200D6D

### QSB7-G5 NR3 60Hz Diesel

### A-weighted Sound Power Level, dB(A)

See notes 1, 3 and 6-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	100% Standby	N/A	64	86	99	108	109	110	109	107	104	108	117
F216-2 Weather Aluminum	Mounted	100% Standby	N/A	62	85	102	109	108	109	106	103	99	101	115
F231-2 Sound Attenuated Level 1, Aluminum	Mounted	100% Standby	N/A	64	81	93	99	99	101	99	95	97	95	107
F217-2 Sound Attenuated Level 2, Aluminum	Mounted	100% Standby	N/A	64	82	91	96	95	96	95	93	92	87	103

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

See notes 4 and 6-14 listed below

Configuration	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
		16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Open Exhaust (No Muffler)	100% Standby	N/A	63	94	107	117	118	115	114	115	107	95	123

**Global Notes:**

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counterclockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and/or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa
6. Reference Sound Power Level is 1 pW (10<sup>-12</sup> Watt)
7. Sound data for remote-cooled generator sets are based on rated load without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution
9. Published sound levels are measured at CE certified test site and are subject to instrumentation measurement, installation, and manufacturing variability.
10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind.
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosure installed over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.
12. Published sound levels meet the requirements India's Central Pollution Control Board (Ministry of Environment & Forests), vide GSR 371 (E), which states the A-weighted sound level at 1 meter from any diesel generator set up to a power output rating of 1000kVA shall not exceed 75 dB(A).
13. For updated noise pollution information for India see website: <http://www.envfor.nic.in/legis/legis.html>
14. Sound levels must meet India's Ambient Air Noise Quality Standards detailed for Daytime/Nighttime operation in Noise Pollution (Regulation and Control) Rules, 2000



# Cooling System Data

## C200D6D

### High Ambient Air Temperature Radiator Cooling System

	Fuel Type	Duty	Rating (kW)	Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)					Housed in Free Air, No Air Discharge Restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	Weather	Sound Level 1	Sound Level 2
				Maximum allowable ambient temperature, degree C							
60 Hz	Diesel	Standby	200	50	50	49	47	44	49	47	44
		Prime	180	50	50	47	45	43	48	46	43

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.



# Alternator data sheet

Frame size: **UCD3J**

## Characteristics

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

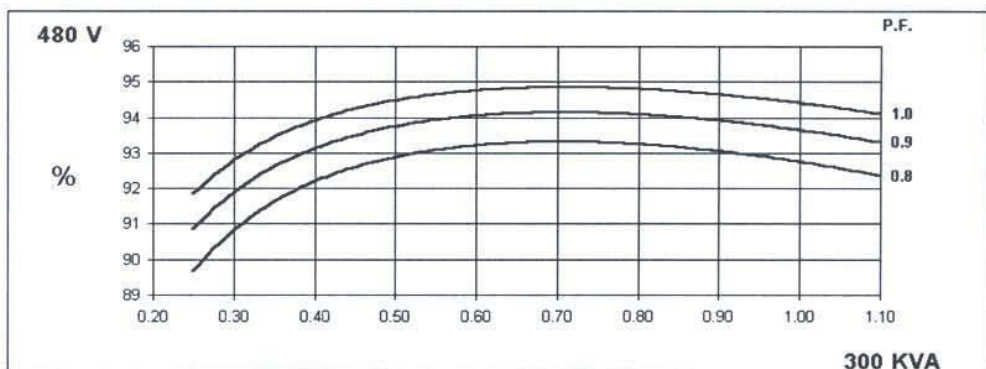
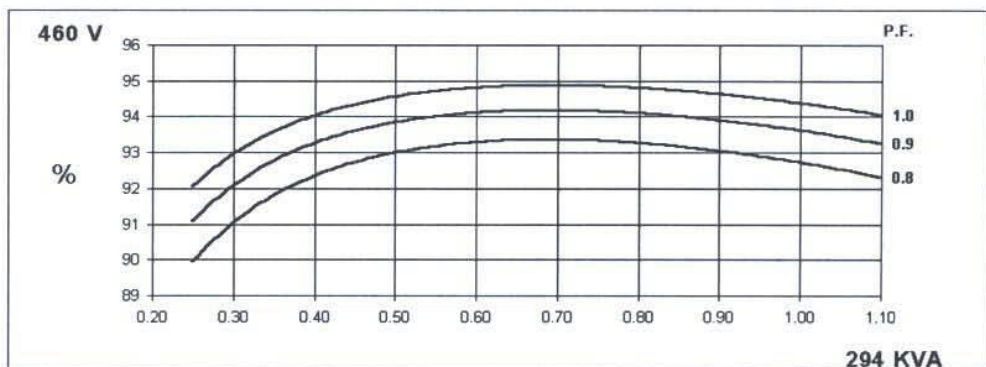
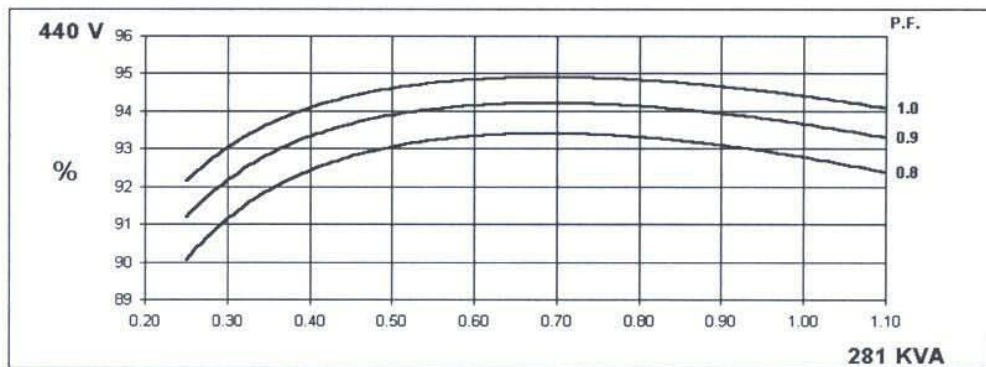
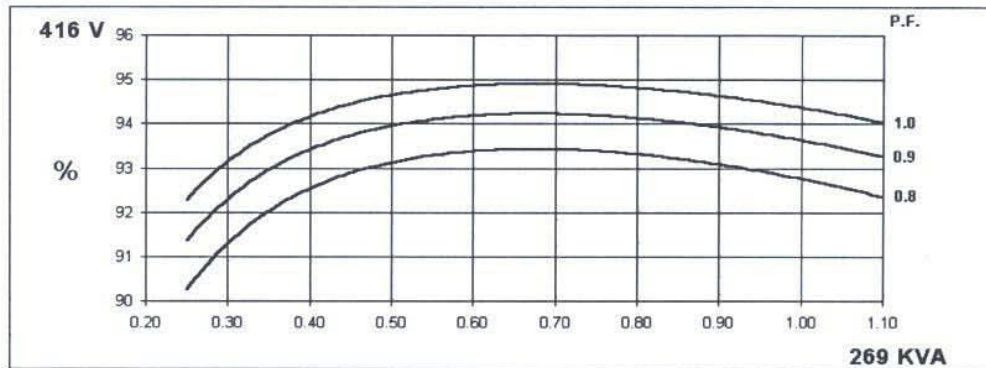
<b>1 ∅ Ratings</b> (1.0 power factor) <small>(Based on specific temperature rise at 40 °C ambient temperature)</small>	<b>60 Hz</b> (winding no)				<b>50 Hz</b> (winding no)				
	Double delta		4 lead		Double delta				
	<u>120/240</u>		<u>120/240</u>		110-120 <u>220-240</u>				
125 °C Rise ratings kW/kVA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

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



Winding 311

THREE PHASE EFFICIENCY CURVES



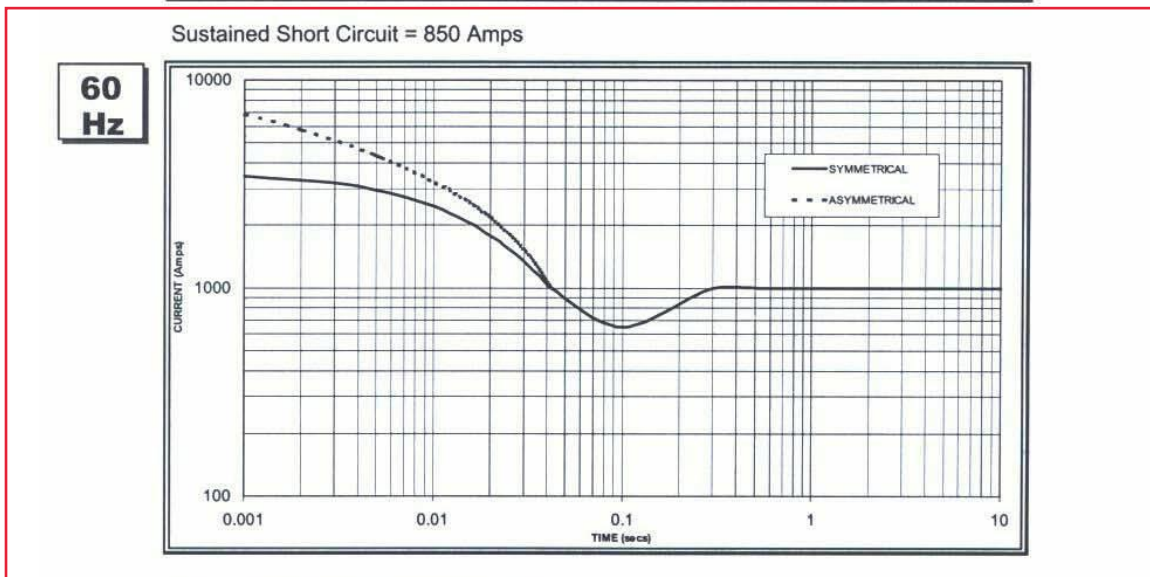
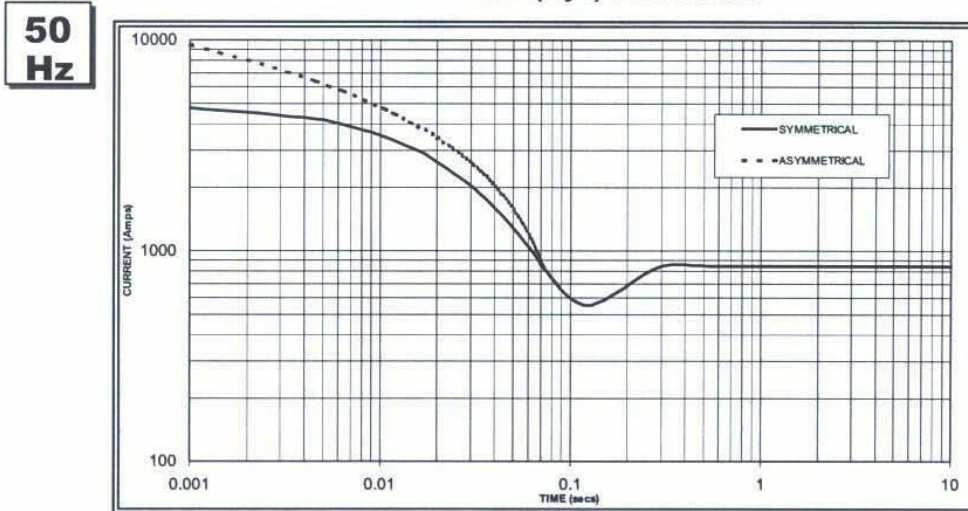




# Alternator data sheet

Frame size: UCD3J

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



Sustained Short Circuit = 1,000 Amps

**Note 1**

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

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.05	440v	X 1.07
415v	X 1.10	460v	X 1.12
440v	X 1.16	480v	X 1.16

The sustained current value is constant irrespective of voltage level

**Note 2**

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

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

All other times are unchanged

**Note 3**

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732



# Alternator data sheet

Frame size: UCD3J

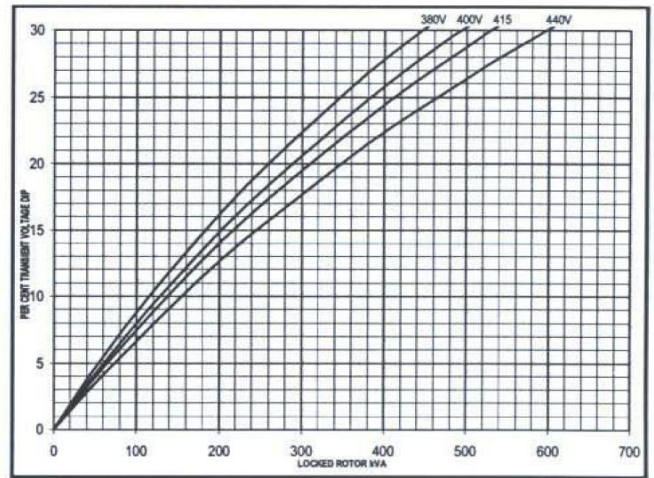
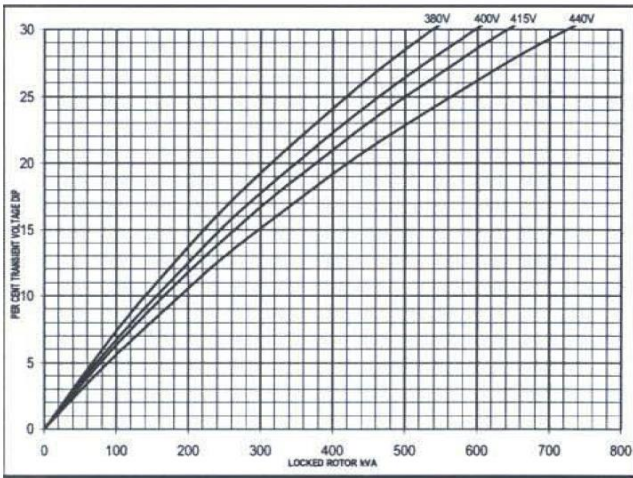
## Winding 311

### Locked Rotor Motor Starting Curve

50 Hz

MX

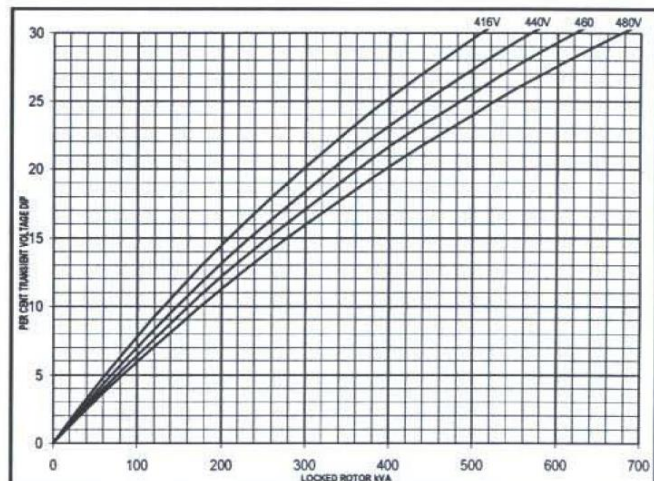
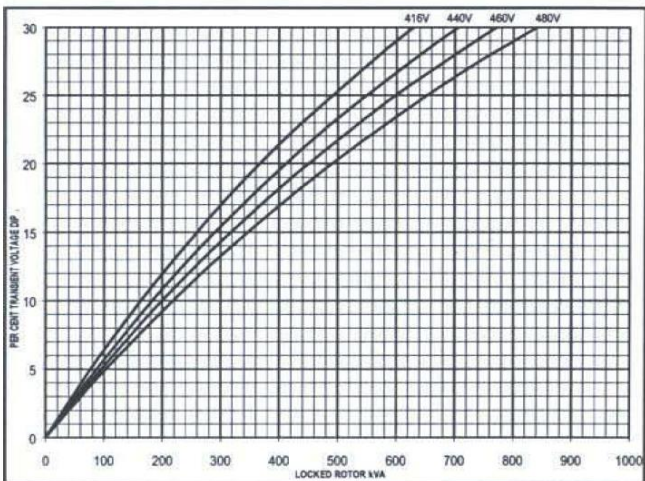
SX



60 Hz

MX

SX







# Dual wall sub-base diesel fuel tanks - 10-200 kW generator sets



## Description

Cummins® offers two series of fuel tanks (basic series and regional series) for the 10~125 kW diesel generator sets. The “basic” series of fuel tanks provide economical solutions for areas with no or minimal local/regional code requirements on diesel fuel tanks. The footprint of “basic” tanks matches the generator set’s footprint. The “regional” series of fuel tanks provide flexible and upgradable solutions for areas with extensive local/regional code requirements on diesel fuel tanks. The footprint of the “regional” series of fuel tanks extends beyond the generator set to allow room for installation of optional features at factory or accessories in the field for meeting local/regional code requirements or customer specification on diesel fuel tanks. All fuel tanks and optional features are compatible with factory installed enclosures.

These tanks are constructed of heavy gauge steel and include an internally reinforced baffle structure for supporting the generator set. The fuel tank design features fewer seams and welds for better corrosion resistance performance.

These tanks are pre-treated with a conversion coating and then finished with a textured powder paint. The paint has superior UV and chemical resistance with best-in-class adhesion, flexibility, and durability to resist chipping and substrate corrosion. Both interior compartments are treated with a rust preventative for extended corrosion protection.

These tanks are UL and ULC Listed as secondary containment generator base tanks. Inner and outer containments are leak checked per UL and ULC testing procedures to ensure their integrity.

These fuel tanks are offered in various sizes to satisfy different fuel capacities requirements.

## Compatible generator set model

Engine	D1703M	V2203M	4BT3.3-G5	4BTAA3.3-G7	QSB5-G5	QSB7-G5
Generator set model names	C10D6	C20D6	C25D6	C50D6	C50D6C	C125D6D
	C15D6		C30D6	C60D6	C60D6C	C150D6D
			C35D6		C80D6C	C175D6D
			C40D6		C100D6C	C200D6D
					C125D6C	

## Regional fuel tanks

### Standard features:

**UL 142 and ULC-S601 listed** - Minimum 110% secondary IBC 2012 and 2015 certified - All optional features are seismically certified with this range of tanks and generator sets. Requires factory-installed 2 ft vent extensions or higher.

**UL 142 & ULC-S601 listed** - Minimum 125% secondary containment capacity.

**NFPA & IFC** - Capable of meeting NFPA 30, NFPA 110, and IFC codes with available factory-installed optional features.

**Emergency pressure relief vents** - Ensure adequate ventilation of the primary and secondary tank compartments under extreme temperature and emergency conditions.

**Normal atmospheric vent** - "Mushroom" style vent ensures adequate venting of the primary tank during fill, generator set running, and temperature variations. Raised above fuel fill.

**Raised fuel fill** - Includes lockable sealed fuel cap.

**Lifting eyes** - Allow lifting of fuel tank with generator set installed.

### Optional features:

**Secondary containment basin switch (rupture switch)** - Activates a warning in the event of a primary tank leak. Side Mounted.

**Low fuel level switch** - Activates a warning when 40% of the fuel is left in the tank.

**Fuel level gauge** - Provides direct reading of fuel level. Top mounted.

**Electric fuel level sender with gauge** - Allows remote electrical monitoring of fuel tank level. Flying leads for customer connection.

**Tank to foundation clearance** - 2-inch bolt-thru risers allow visual inspection under tank including rodent barrier.

**Spill containment box for fuel fill** - 5 gallon capacity with integral drain (to tank). Lockable lid.

**Overfill prevention valve** - Shuts off fuel flow during filling at approximately 95% full\*. Includes fill down tube, as needed, to terminate within 6" of the bottom of the fuel tank. Uses a 2 inch type "F" cam lock adapter for filling.

**High fuel switch** - Activates at 90% of full fuel level. Flying leads for customer connection.

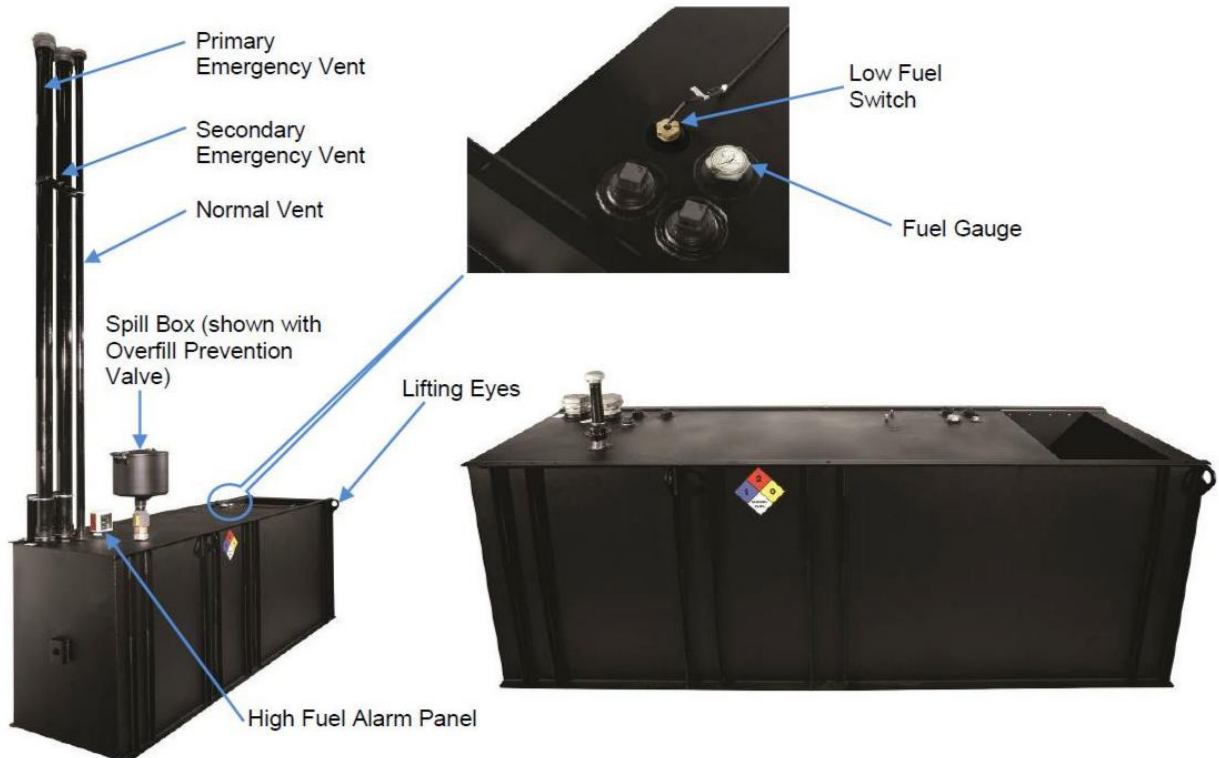
**High fuel alarm panel** - Provides audible & visual alarm when fuel level reaches 90% of full fuel level.

**Fill drop tube** - Terminates fuel fill location within 6" of the bottom of the fuel tank.

**Vent extensions** - Terminate normal and emergency vents (both primary and secondary) a minimum of 12 ft above the bottom of tank.

**Seismic vent extensions** - 2 ft normal and emergency (both primary & secondary) extensions to meet IBC/OSHPD seismic requirements.

\* The OFPV inherently shuts off fuel at approximately 2" below the top of the fuel tank. Some tanks will shut off below this 95% fill level.



\*Picture is for reference only. See outline drawing for tank specific information by model.

## Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OPFV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
10	C10 D6	D1703M	1.12	C301-2	24	87.6 x 34 x 15	510	74	66	56
				C303-2	48	87.6 x 34 x 15	510	74	66	56
				C305-2	72	87.6 x 34 x 23	723	132	118	107
				C307-2	96	87.6 x 34 x 23	723	132	118	107
15	C15 D6	D1703M	1.38	C301-2	24	87.6 x 34 x 15	510	74	53	45
				C303-2	48	87.6 x 34 x 15	510	74	53	45
				C305-2	72	87.6 x 34 x 23	723	132	95	86
				C307-2	96	87.6 x 34 x 32	962	195	141	132
20	C20 D6	V2203M	1.81	C301-2	24	87.6 x 34 x 15	510	74	41	35
				C303-2	48	87.6 x 34 x 23	723	132	73	66
				C305-2	72	87.6 x 34 x 32	962	195	108	101
				C307-2	96	87.6 x 34 x 32	962	195	108	101
25	C25 D6	4BT3.3-G5	2.42	C301-2	24	121 x 34 x 10.5	514	74	31	25
				C303-2	48	121 x 34 x 16.2	686	132	54	47
				C305-2	72	121 x 34 x 22.1	879	195	80	73
				C307-2	96	121 x 34 x 29.5	1120	263	109	101
30	C30 D6	4BT3.3-G5	2.81	C301-2	24	121 x 34 x 10.5	514	74	26	21
				C303-2	48	121 x 34 x 22.1	879	195	69	63
				C305-2	72	121 x 34 x 29.5	1120	263	94	87
				C307-2	96	121 x 34 x 42.0	1461	389	138	132
35	C35 D6	4BT3.3-G5	3.16	C301-2	24	121 x 34 x 16.2	686	132	42	36
				C303-2	48	121 x 34 x 22.1	879	195	62	56
				C305-2	72	121 x 34 x 29.5	1120	263	83	77
				C307-2	96	121 x 34 x 42.0	1461	389	123	117
40	C40 D6	4BT3.3-G5	3.66	C301-2	24	121 x 34 x 16.2	686	132	36	31
				C303-2	48	121 x 34 x 22.1	879	195	53	48
				C305-2	72	121 x 34 x 42.0	1461	389	106	101
				C307-2	96	121 x 34 x 42.0	1461	389	106	101
50	C50 D6	4BTAA3.3-G7	4.25	C301-2	24	121 x 34 x 16.2	686	132	31	27
				C303-2	48	121 x 34 x 29.5	1120	263	62	58
				C305-2	72	121 x 34 x 42.0	1461	389	92	87
60	C60 D6	4BTAA3.3-G7	5.04	C301-2	24	121 x 34 x 16.2	686	132	26	23
				C303-2	48	121 x 34 x 29.5	1120	263	52	49
				C305-2	72	121 x 34 x 42.0	1461	389	77	73
50	C50D6C	QSB5-G5	5.30	C301-2	24	154 x 40 x 22	1388	250	47	45
				C303-2	48	154 x 40 x 32	1657	425	80	76
				C305-2	72	154 x 40 x 32	1657	425	80	76
				C307-2	96	154 x 40 x 46	2096	625	118	112
60	C60D6C	QSB5-G5	6.10	C301-2	24	154 x 40 x 22	1388	250	41	39
				C303-2	48	154 x 40 x 32	1657	425	70	66
				C305-2	72	154 x 40 x 46	2096	625	102	97
				C307-2	96	154 x 40 x 46	2096	625	102	97
80	C80D6C	QSB5-G5	7.30	C301-2	24	154 x 40 x 22	1388	250	34	33
				C303-2	48	154 x 40 x 32	1657	425	58	55
				C305-2	72	154 x 40 x 46	2096	625	85	81
100	C100D6C	QSB5-G5	8.90	C301-2	24	154 x 40 x 22	1388	250	28	27
				C303-2	48	154 x 40 x 32	1657	425	48	45
				C305-2	72	154 x 40 x 46	2096	625	70	66
125	C125D6C	QSB5-G6	10.30	C301-2	24	154 x 40 x 22	1388	250	24	23
				C303-2	48	154 x 40 x 46	2096	625	60	58

\* All weights are approximate.

## Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
125	C125D6D	QSB7-G5	10.1	C301-2	24	180x40x21	1477	351	34	30
				C303-2	48	180x40x42	2302	737	72	69
				C305-2	72	180x40x42	2302	737	72	69
				C307-2	96	180x65.5x35.3	3552	1055	104	98
150	C150D6D		11.7	C301-2	24	180x40x21	1477	351	30	26
				C303-2	48	180x40x42	2302	737	63	59
				C305-2	72	180x65.5x35.3	3552	1055	90	84
175	C175D6D		13.3	C301-2	24	180x40x21	1477	351	26	23
				C303-2	48	180x40x42	2302	737	55	52
				C305-2	72	180x65.5x35.3	3552	1055	79	74
200	C200D6D		14.9	C301-2	24	180x40x21	1477	351	24	21
				C303-2	48	180x40x42	2302	737	49	47
		C305-2		72	180x65.5x35.3	3552	1055	72	66	

## Certifications/standards/codes



**UL 142 Listed** - Cummins dual wall sub-base tanks are UL Listed and constructed in accordance with Underwriters Laboratories Standard UL 142 "steel aboveground tanks for flammable and combustible liquids," as a "secondary containment generator base tank"



**NFPA** - Cummins tanks are built in accordance with all applicable NFPA codes:

- NFPA 30 - Flammable and Combustible Liquids code
- NFPA 37 - Standard for Installation and use of Stationary Combustible Engine and Gas Turbines
- NFPA 110 - Standard for Emergency and Standby Power Systems



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



**ULC** - Cummins tanks are built in accordance with all applicable ULC codes

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

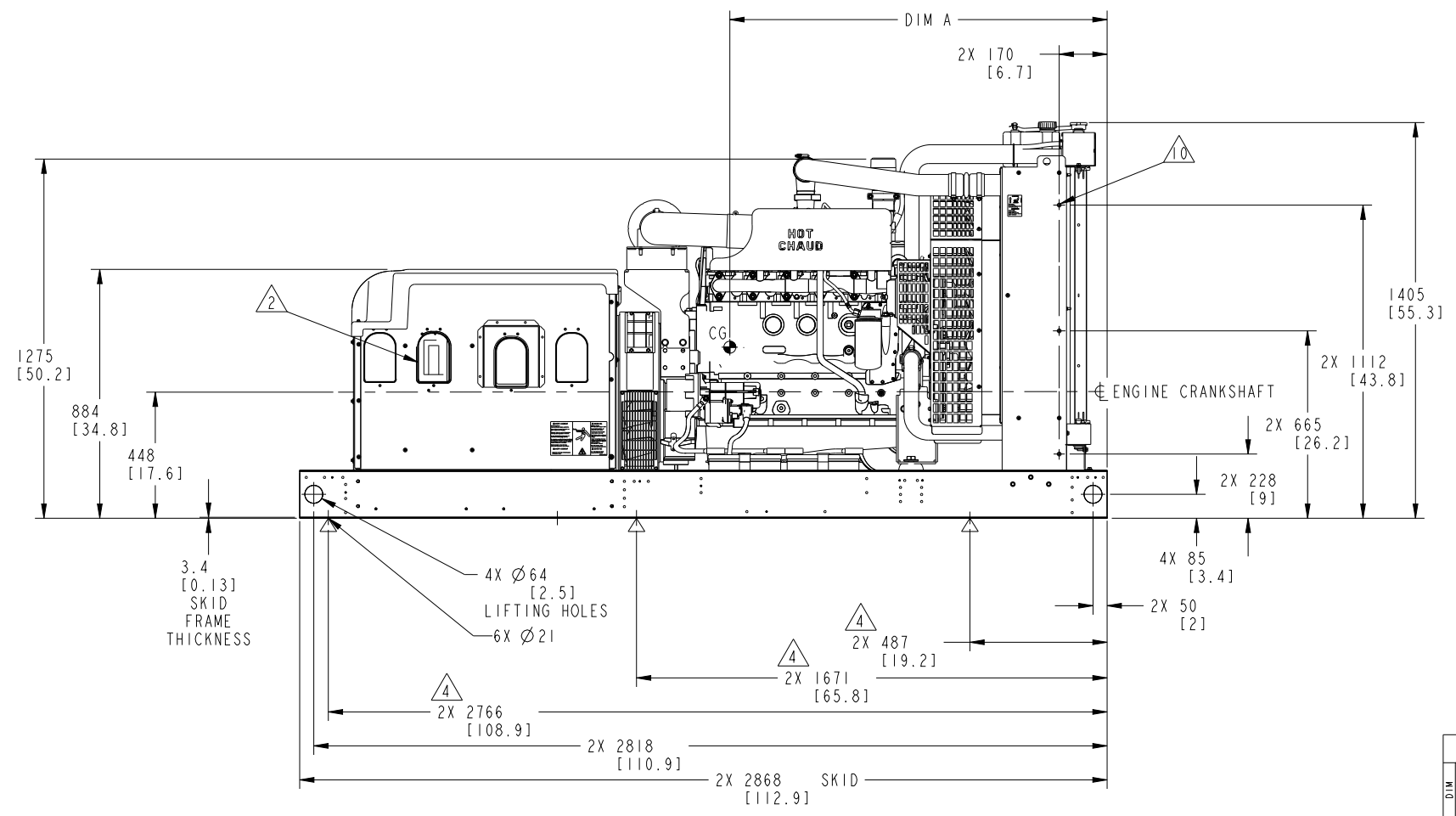
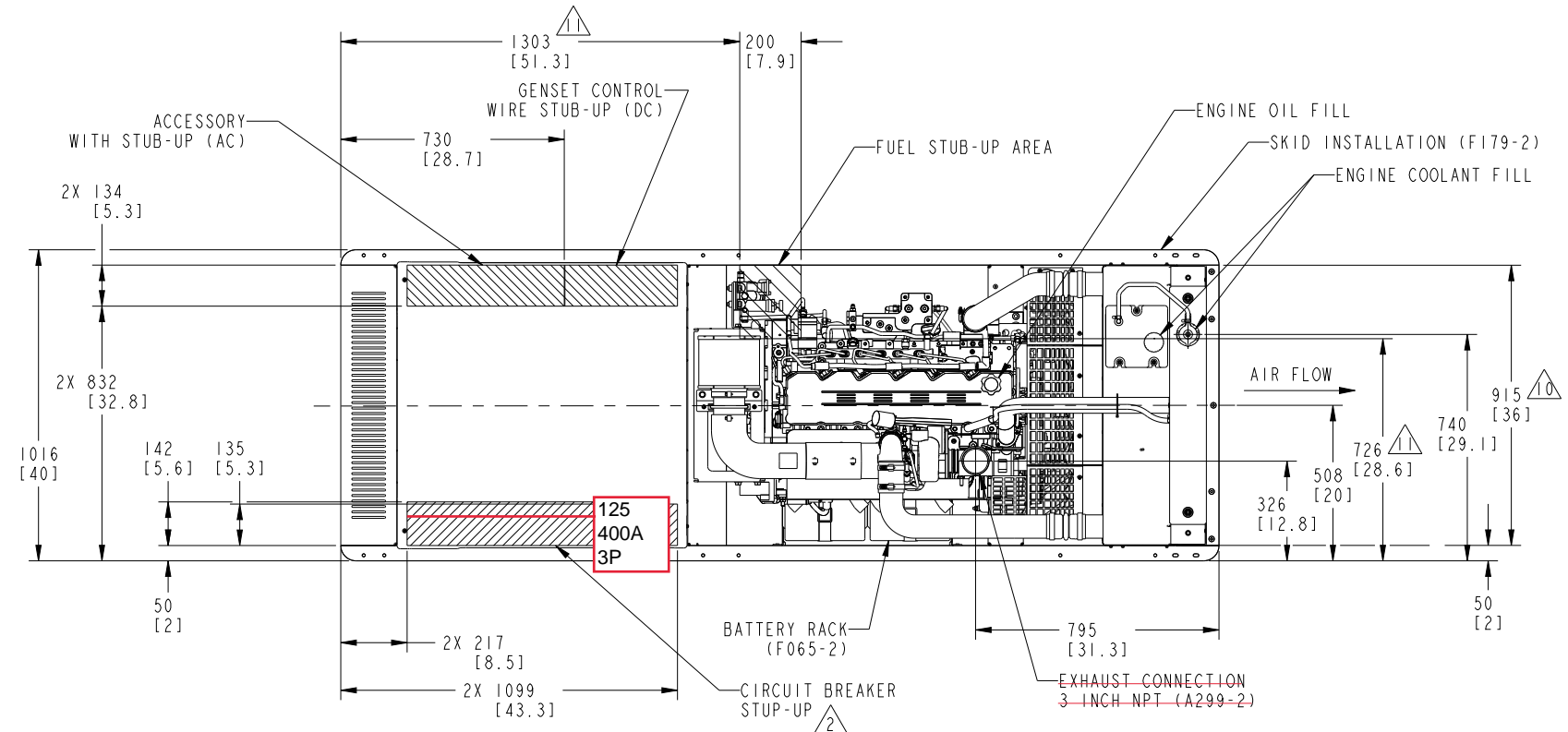
**Our energy working for you.™**

# *Section 3 – Generator Drawings*

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-176532	A	1	PRODUCTION RELEASE	DAH	DAH	GILLETT	04APR18

NOTES:

- ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.
- REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
- CONTROL INTERFACE CONNECTIONS SHOULD BE MADE WITH FLEXIBLE CONNECTIONS.
- Ø21 [0.8] HOLES MARKED BY FOR SECURING TO MOUNTING SURFACE. HOLES IN GENERATOR SET BASE AT THESE LOCATIONS ARE INTENDED FOR ATTACHMENT TO THE MOUNTING SURFACE. IF GENERATOR SET IS MOUNTED ON A FUEL TANK, REFER TO FUEL TANK OUTLINE DRAWING FOR LOCATION OF TANK ATTACHMENT POINTS.
- REFER TO GENSET OR FUEL TANK FOUNDATION OUTLINES FOR ELECTRICAL, FUEL AND OTHER FOUNDATION SPECIFICS.
- GENSET SUPPLIED WITH FLEXIBLE FUEL LINES THAT CAN BE CONNECTED TO ENGINE INTERFACE POINTS.
  - FUEL SUPPLY LINE: 670 [26] LONG WITH 1/4 INCH NPT MALE TERMINATION.
  - FUEL RETURN LINE: 930 [37] LONG WITH 1/4 INCH NPT MALE TERMINATION.
- OIL DRAIN EXTENSION: 5/8 INCH HOSE I.D.
- FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.
- DRY WEIGHT = WET WEIGHT - 38.5 KG (85 LB).
- 6X Ø7.3 HOLES FOR CUSTOMER-SUPPLIED COOLING EXHAUST AIR DUCT ADAPTER.
- FUEL SUPPLY AND RETURN STUB-UP AREA.

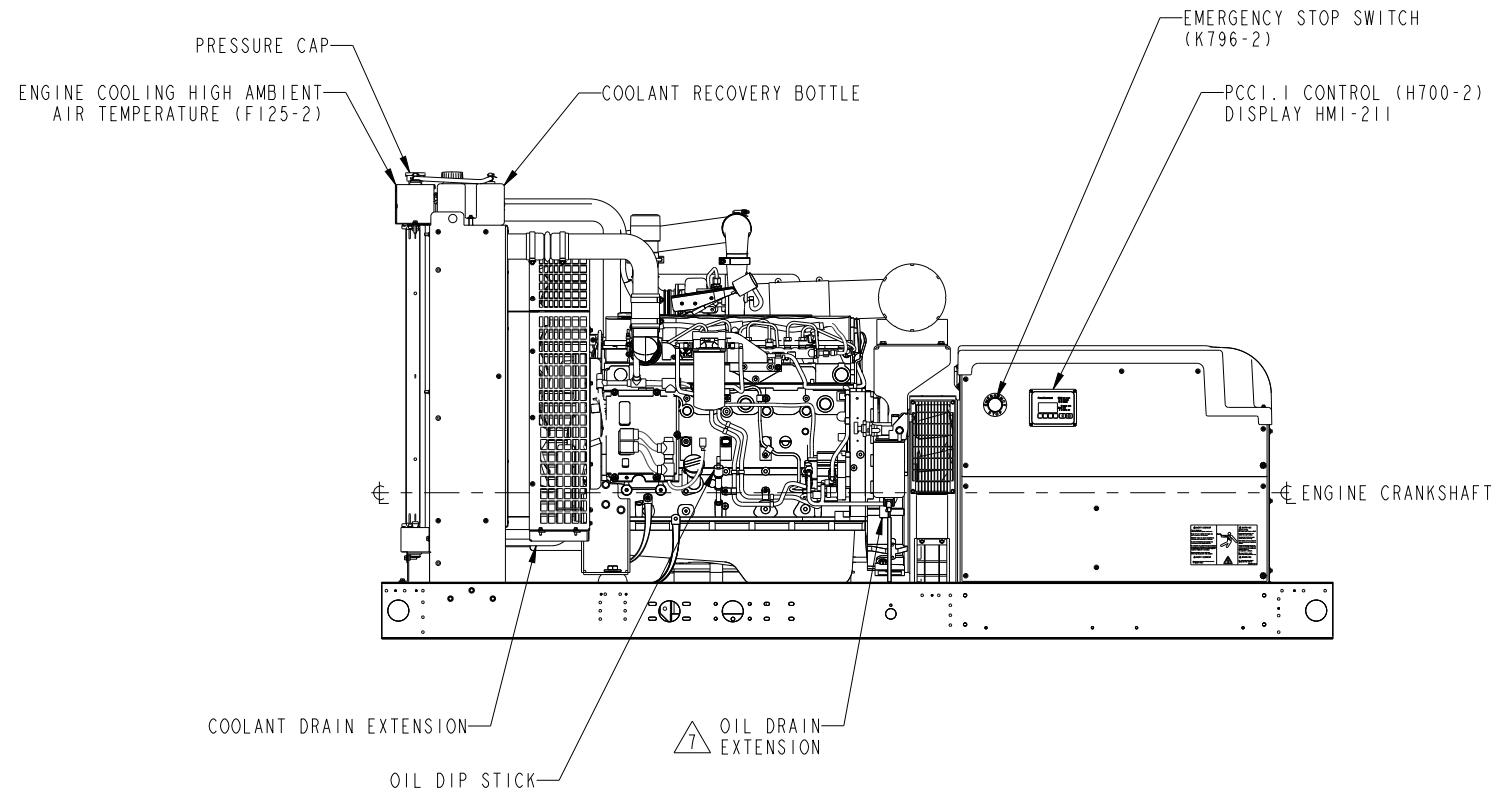
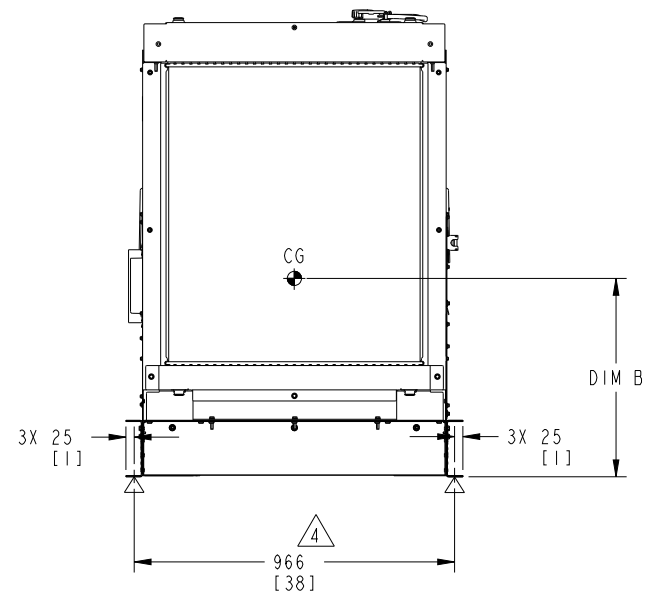


ALT DATA SHEET #	DIM A	DIM B	GENSET WET WEIGHT	
			KG	LB
ADS-208	1414	504	1340	2955
ADS-209	1443	502	1390	3064
ADS-210	1470	500	1442	3179
ADS-211	1493	499	1480	3262
ADS-212	1526	495	1583	3491
ADS-213	1526	495	1583	3491

C125D6D, C150D6D, C175D6D, **C200D6D**

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SW TO	DWN D HOFMEISTER		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT		CKD D HOFMEISTER	APVD D GILLETT		OUTLINE, GENSET	
DATE 04APR18		FIRST USED ON		SITE CODE	PGF	
ANG TOL ± 1.0°		SCALE 3:32	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	ARROW	FILE D	A060C858
						CAD SHEET 1 of 2

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-176532	A	1	PRODUCTION RELEASE	DAH	DAH	GILLETT	04APR18

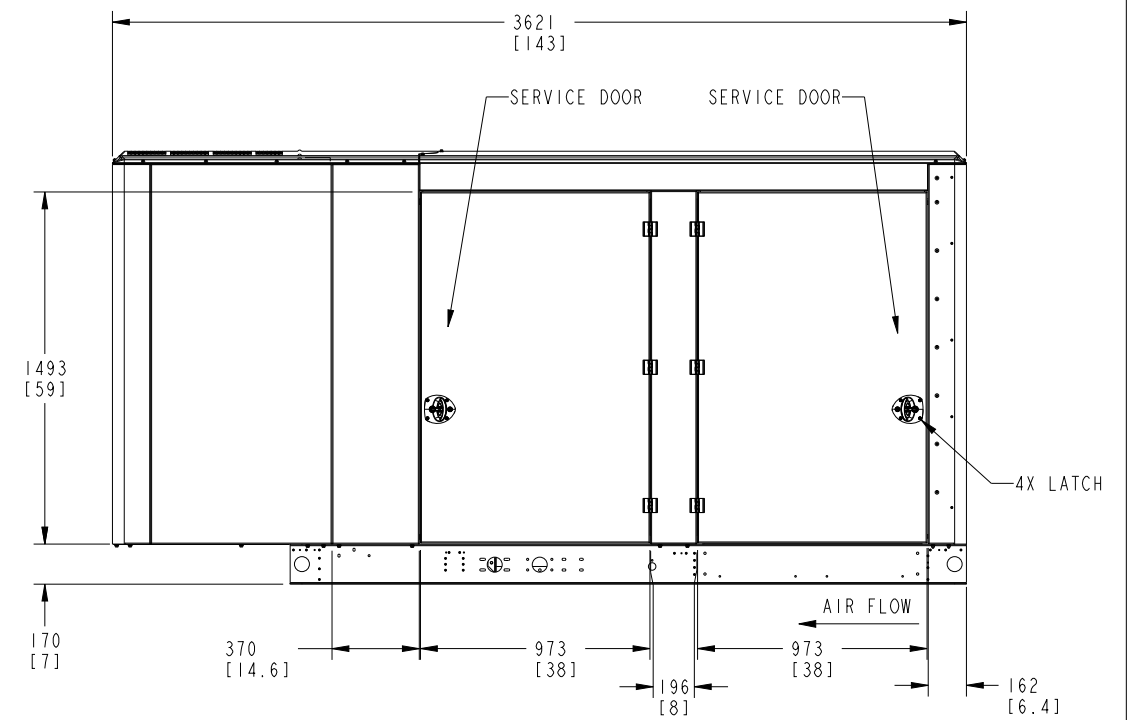
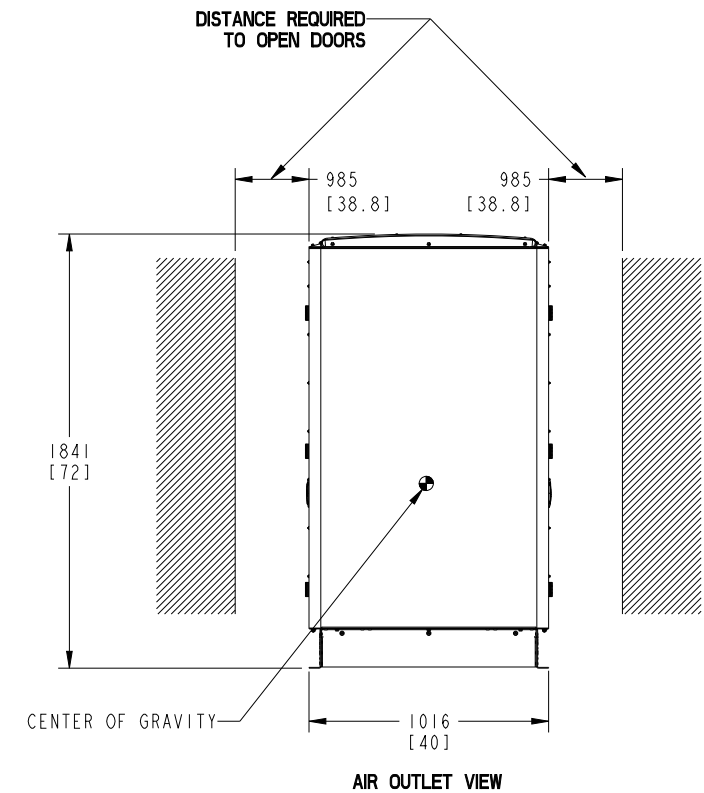
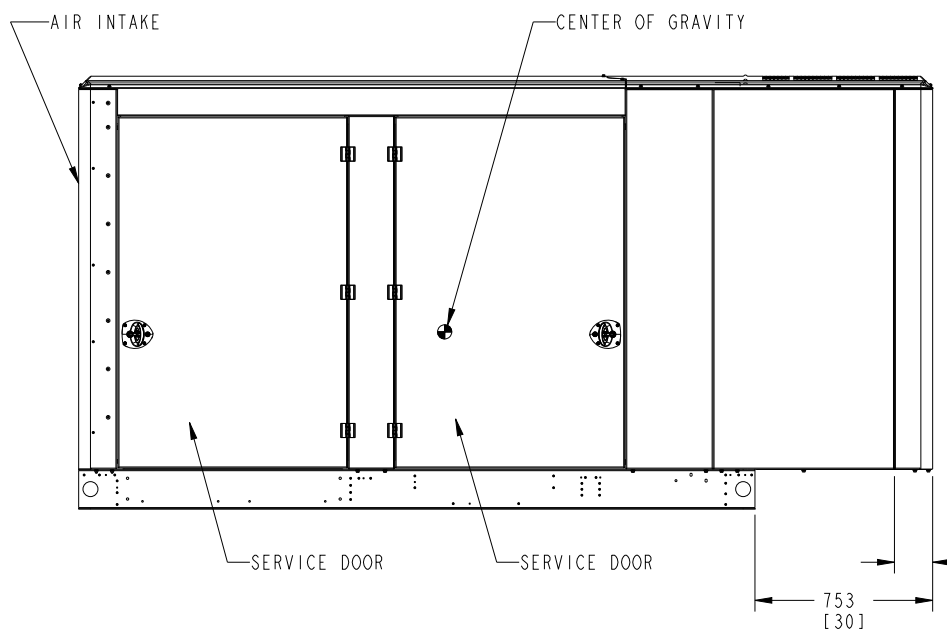
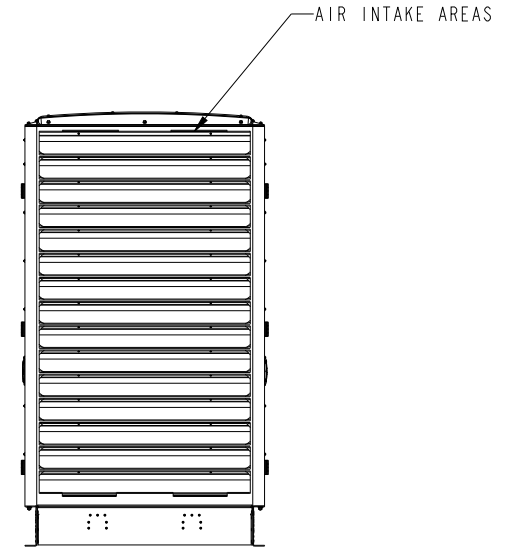
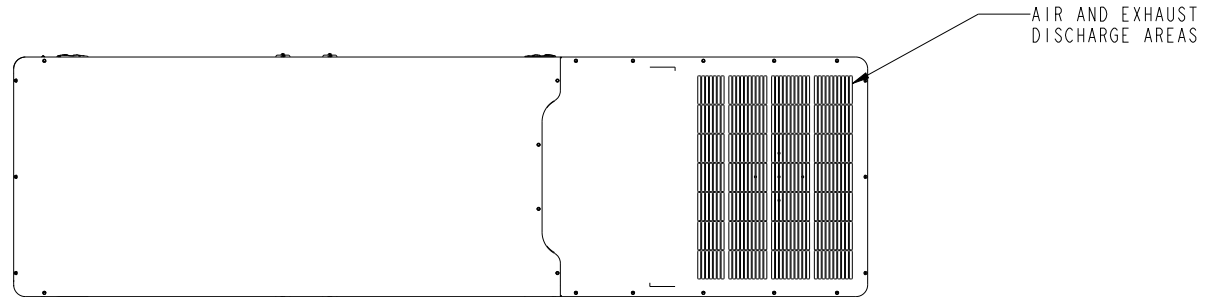


UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO	DWN D HOFMEISTER		CUMMINS POWER GENERATION
DO NOT SCALE PRINT			CKD D HOFMEISTER		OUTLINE, GENSET
DIM	TOLERANCE		DATE 04APR18	SITE CODE	
X ± 1	0.00- 4.99 +0.15/-0.08		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	PGF	SCALE D
.X ± 0.8	5.00- 9.99 +0.20/-0.10		ARROW	A060C858	CAD SHEET
.XX ± 0.38	10.00-17.49 +0.25/-0.13			2 of 2	
ANG TOL ± 1.0°	SCALE 3:32	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.			

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-176502	A	1	PRODUCTION RELEASE	DAH	DAH	GILLETT	29MAR18

NOTES:

- DIM [ ] IN INCHES
- WITH F231-2 ENCLOSURE INSTALLED THE GENERATOR SET WEIGHT INCREASES BY 179 KG (395 LBS).  
WITH F217-2 ENCLOSURE INSTALLED THE GENERATOR SET WEIGHT INCREASES BY 195 KG (429 LBS).
- WITH F231-2 INSTALLED THE CENTER OF GRAVITY OF THE GENERATOR SET SHIFTS APPROXIMATELY 42 MM (1.7 INCH) TOWARDS THE AIR DISCHARGE END AND 61MM (2.4 INCH) HIGHER.  
WITH F217-2 INSTALLED THE CENTER OF GRAVITY OF THE GENERATOR SET SHIFTS APPROXIMATELY 57 MM (2.2 INCH) HIGHER.  
CHANGES IN CENTER OF GRAVITY LISTED ARE FOR GENERATOR SETS WITHOUT SUBBASE FUEL TANKS.  
REFER TO OPEN GENERATOR SET OUTLINE DRAWING FOR CG LOCATIONS PRIOR TO ENCLOSURE INSTALLATION.



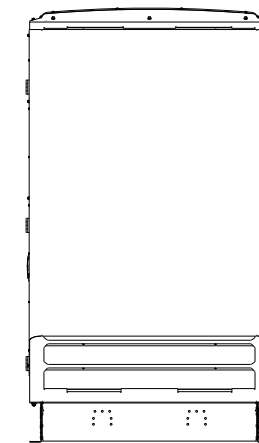
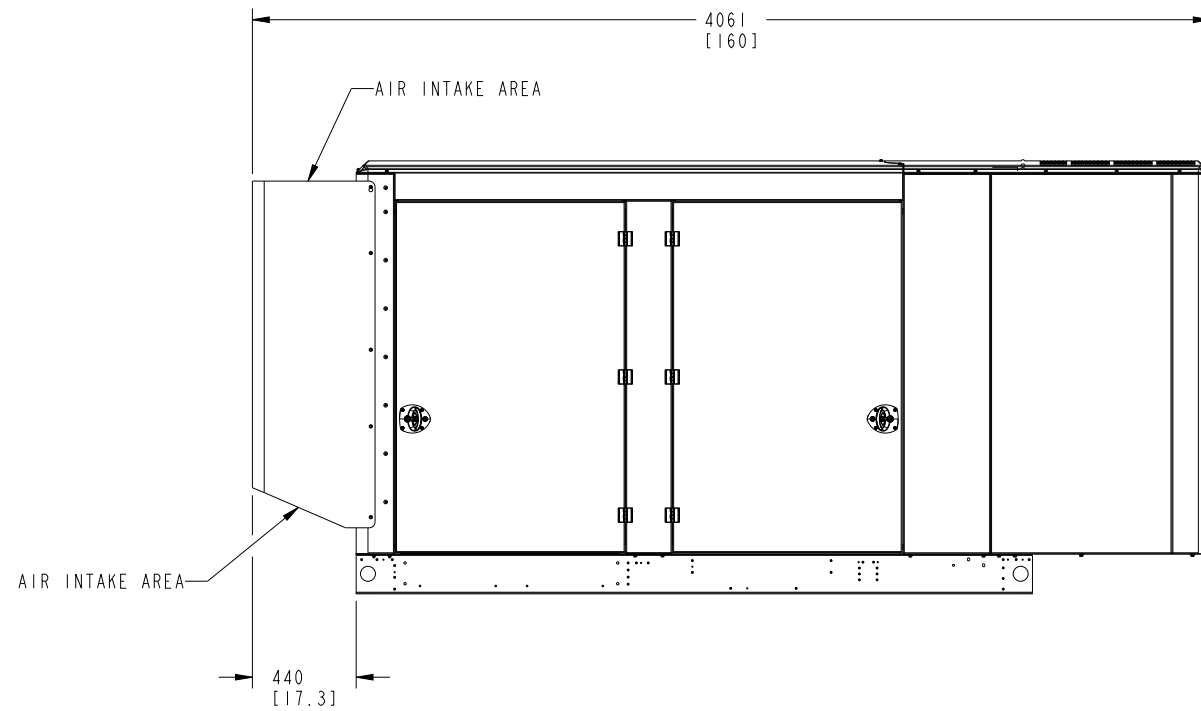
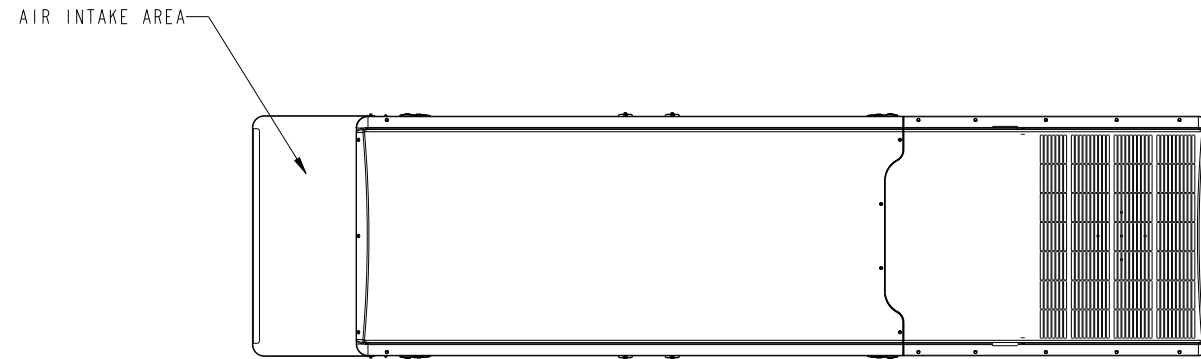
C125D6D, C150D6D, C175D6D, C200D6D

F231-2 ENCLOSURE CONFIGURATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO: A055V240	DWN: D HOFMEISTER		CUMMINS POWER GENERATION
DO NOT SCALE PRINT		CKD: D HOFMEISTER	APVD: D GILLETT		OUTLINE, ENCLOSURE
DATE: 29MAR18		FIRST USED ON: ARROW		SITE CODE: PGF	CAD SHEET: 1 OF 2
PART NO: A060C609		REV: D			



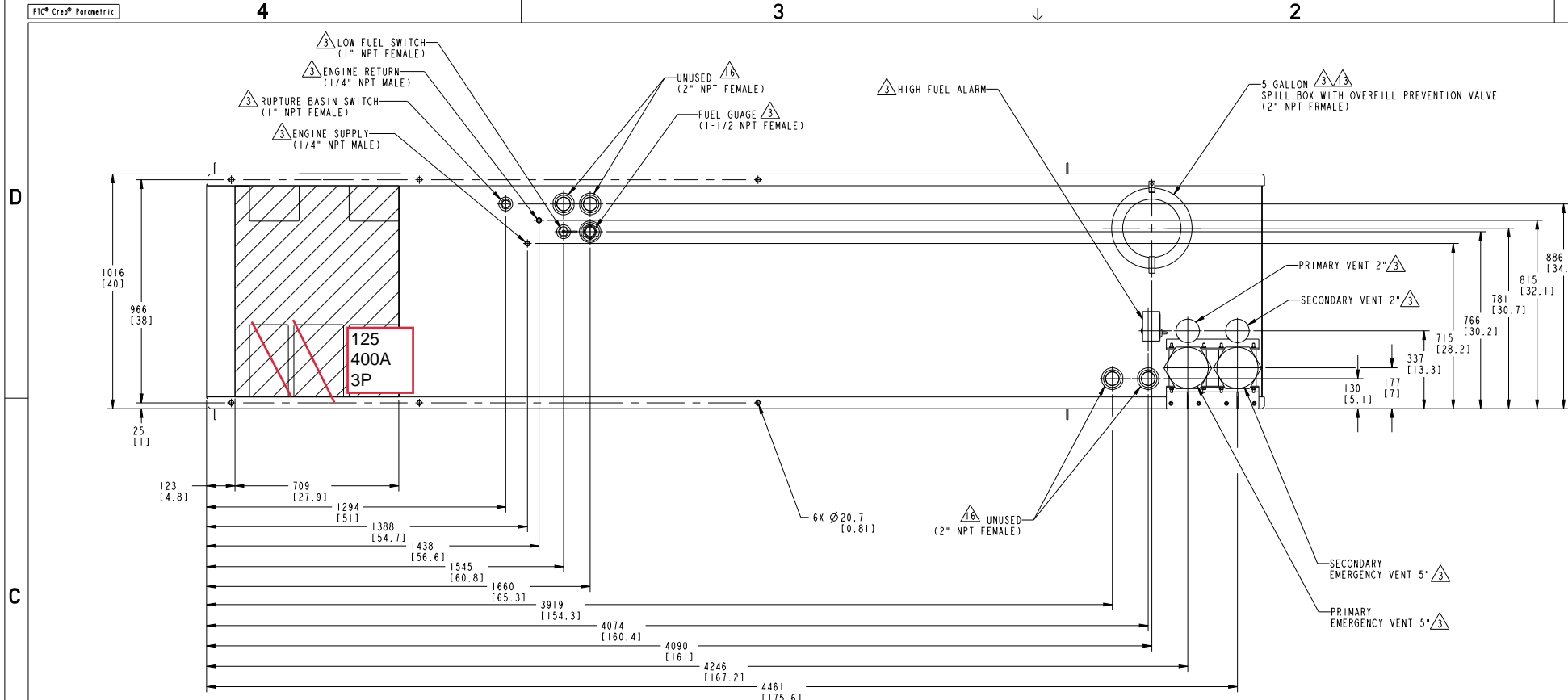
REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-176502	A	1	PRODUCTION RELEASE	DAH	DAH	GILLETT	29MAR18



### F217-2 ENCLOSURE CONFIGURATION

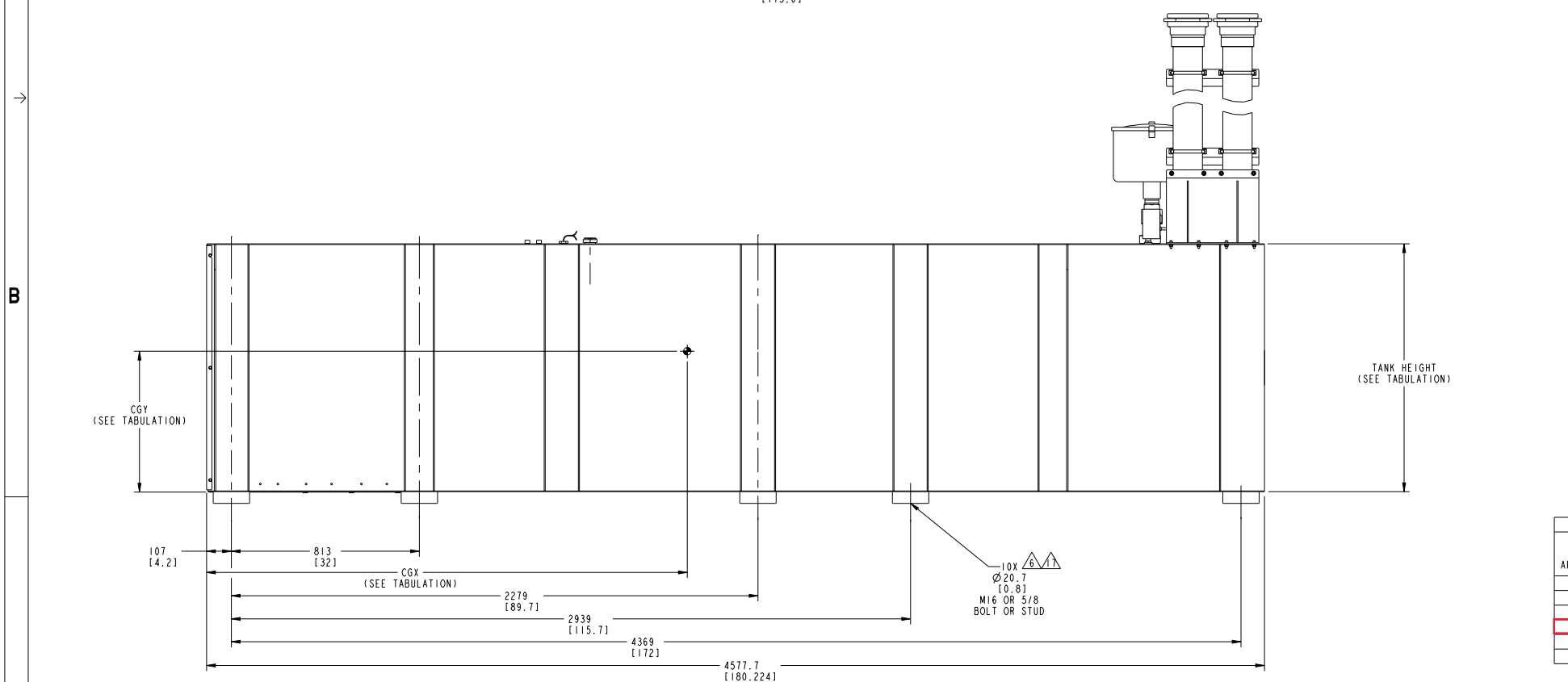
REFER TO PAGE 1 (F231-2 ENCLOSURE) FOR OTHER F217-2 ENCLOSURE DIMENSIONS

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO A055V240	DWN D HOFMEISTER		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT		CKD D HOFMEISTER	APVD D GILLETT		OUTLINE, ENCLOSURE	
DIM	TOL	0.00- 4.99 +0.15/-0.08 5.00- 9.99 +0.20/-0.10 10.00-17.49 +0.25/-0.13 17.50-24.99 +0.30/-0.13	DATE 29MAR18	SITE CODE		
ANG TOL	SCALE	± 1.0° 1/15	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	PGF	AW	2 of 2



REV NO	REV	NO	REVISION	NO	CD	APPD	DATE
ECO-170441	A	1	PRODUCTION RELEASE	DAH/DAH	STAFFENHAGEN	27FEB18	

- NOTES:
- TANKS ARE UL142 LISTED. SECONDARY CONTAINMENT FUEL TANK. REFER TO TANK LABELS AND LOCAL CODE TO DETERMINE VENTING REQUIREMENTS FOR BOTH COMPARTMENTS.
  - SUBBASE FUEL TANK MOUNTING. EXCESSIVE TWISTING OF THE FUEL TANK, MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO ENSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:
    - REFER TO APPLICATION MANUAL T030 FOR GENERAL SET MOUNTING GUIDELINES.
    - AFTER PLACING SET ON FOUNDATION, VERIFY ALL MOUNTING PADS CONTACT FOUNDATION.
    - THERE ARE SHIMS ATTACHED TO EACH FUEL TANK. THESE ARE INTENDED TO FILL ANY GAP BETWEEN THE MOUNTING PADS AND FOUNDATION.
    - INSERT THE MAXIMUM HEIGHT STACK OF SHIMS THAT WILL SLIDE INTO THE GAP.
    - TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.
- △ INDICATES PIPE SIZE OF FEATURE OR OPTION INDICATED.  
 4. DIMENSIONS IN [ ] ARE IN INCHES.  
 △ FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.  
 △ FUEL TANK HAS A FLANGE THICKNESS OF UP TO 10 mm [0.394 in]. ALLOW EXTRA LENGTH ON HARDWARE FOR UNEVENNESS OF MOUNTING SURFACE. RISER FEATURE WILL ADD ADDITIONAL 51 mm [2 in].  
 △ FUEL TANK PERIMETER IS SHOWN. FOUNDATION SHOULD BE EXTENDED BEYOND THIS PERIMETER. SEE (T030) APPLICATION MANUAL.  
 △ INSTALLATION & REMOVAL LIFTING AND SERVICE ACCESS CLEARANCE (SUGGESTED MINIMUM).  
 △ REMOVABLE STUB-UP ACCESS PANEL.  
 △ ELECTRICAL STUB-UP AREA WITH FUEL TANK RISER FEATURE INSTALLED.  
 △ MAINTAIN MIN 51 mm [2 in] CLEARANCE ABOVE E-VENT - (SEE SHEET 2).  
 12. WEIGHT AND CENTER OF GRAVITY INFORMATION IS ESTIMATED AND CHANGES WITH TANK FEATURE INSTALLATION.  
 △ FILL CAP LOCATED HERE IF OVERFILL PREVENTION VALVE IS NOT INSTALLED.  
 △ TANK ONLY.  
 △ TANK WITH FUEL AND ACCESSORIES.  
 △ PORT SEALED WITH REMOVABLE STEEL PLUG.  
 △ SHOWN WITH RISERS.



GENSET MODEL APPLICATION	TANK FEATURE CODE/RUN TIME				
	C301-2 24HR	C303-2 48HR	C305-2 72HR	C319-2 24 HR	C320-2 48 HR
C125D6D	A056Y392	A056Y394	A056Y394	-----	-----
C150D6D	A056Y392	A056Y394	-----	-----	A056Y394
C175D6D	A056Y392	A056Y394	-----	-----	A056Y394
C200D6D	A056Y392	A056Y394	-----	-----	A056Y394
C230D6D	A056Y394	-----	-----	A056Y394	-----
C250D6D	A056Y394	-----	-----	A056Y394	-----

TANK NUMBER	TANK HEIGHT	VENT EXTENSIONS HEIGHT WITH 10" PIPES MM [INCH]	VENT EXTENSIONS HEIGHT WITH 4" PIPES MM [INCH]	VENT HEIGHT WITH NO EXTENSIONS MM [INCH]	TANK VOLUME				WEIGHT				CG_X				CG_Y				TANK VOLUME BASED ON DISTANCE FROM BOTTOM OF TANK	
					TOTAL		USABLE		MINIMUM		MAXIMUM		MINIMUM		MAXIMUM		MINIMUM		MAXIMUM		LITER/MM	GALLON/INCH
					LITER	GALLON	LITER	GALLON	KG	LB	KG	LB	MM	IN	MM	IN	MM	IN	MM	IN		
A056Y392	533 [21]	2556 [101]	737 [29]	65 [2.6]	1417	374	1330	351	671	1477	1802	3969	2633	104	2613	103	260	10.2	26.4	10.4	2.9	19.4
A056Y394	1073 [42]	3106 [122]	1277 [50]	65 [2.6]	2975	785	2793	737	1045	2302	3421	7535	2440	96	2553	100	483	19.0	520	20.5	2.9	19.4

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

X ± 1 0.00-4.99 +0.15/-0.00  
 Y ± 0.8 5.00-9.99 +0.20/-0.10  
 Z ± 0.8 10.00-17.49 +0.25/-0.13  
 X ± 0.38 17.50-24.99 +0.20/-0.13

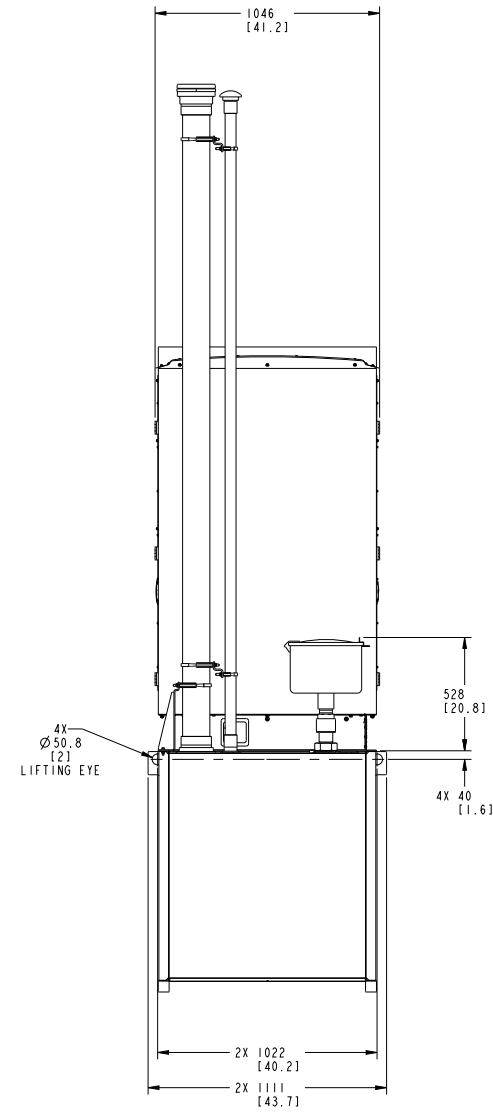
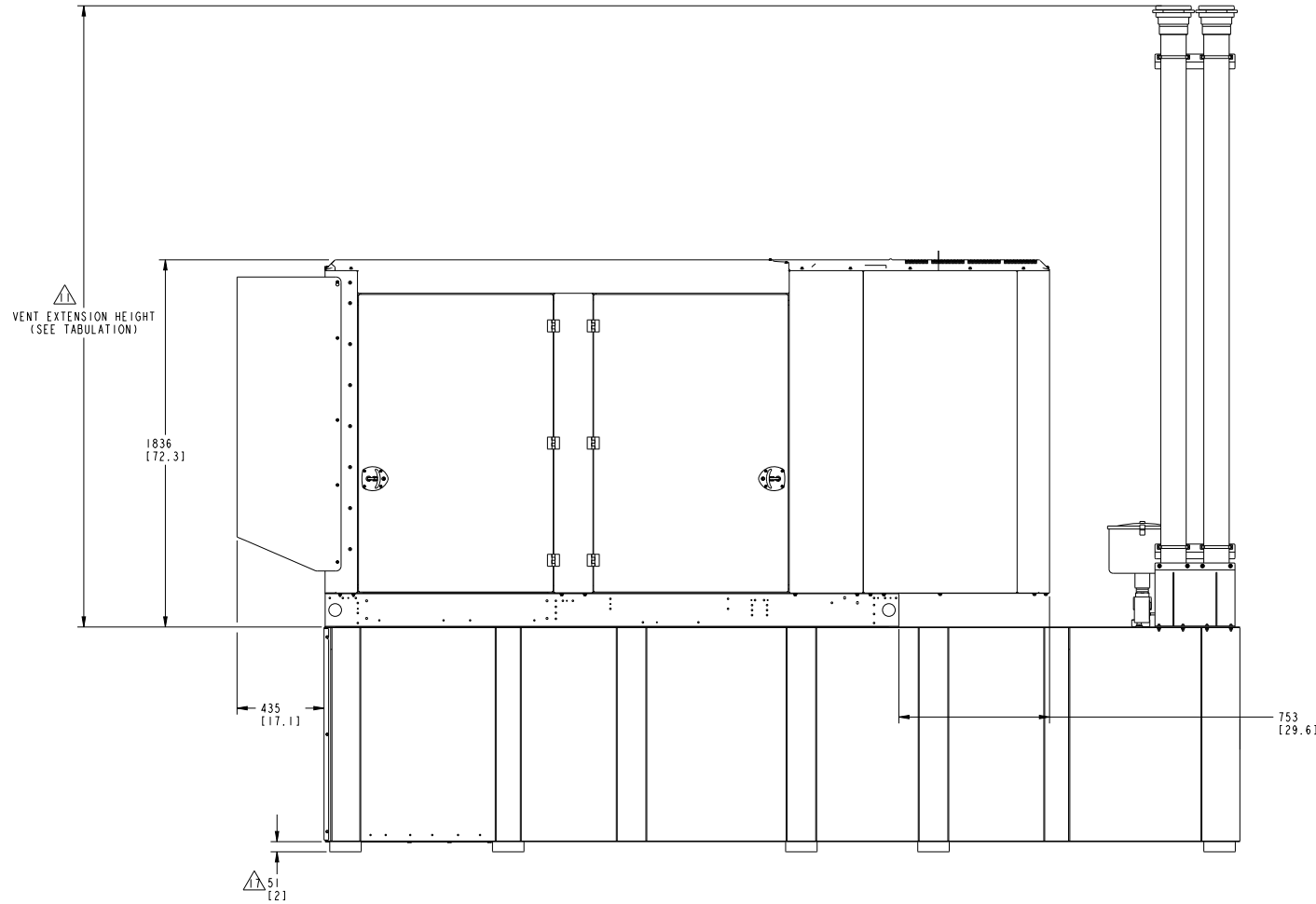
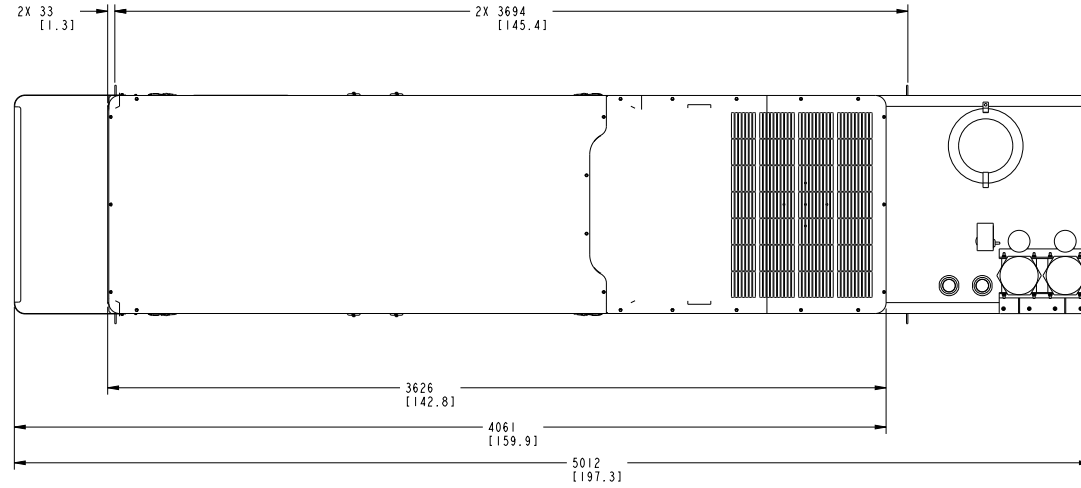
DOWNSIDE DIMENSIONS FROM CENTERLINE UNLESS NOTED OTHERWISE  
 DIMENSIONS TO CENTERLINE UNLESS NOTED OTHERWISE  
 DIMENSIONS TO FACE UNLESS NOTED OTHERWISE

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS  
 DO NOT SCALE PRINT  
 UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

D HOFMEISTER  
 D HOFMEISTER  
 G STAFFENHAGEN  
 DATE 27FEB18

CUMMINS POWER GENERATION  
 OUTLINE, TANK  
 REGIONAL  
 SITE CODE  
 PGF E A057P198  
 CAD SHEET 1 OF 3

REV NO	REV	NO	REVISION	NO	CHK	APPD	DATE
ECO-170441	A	1	PRODUCTION RELEASE	DAH	DAH	STAFFENHAGEN	27FEB18



4X  
∅ 50.8  
[2]  
LIFTING EYE

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		APP D HOFMEISTER	<b>CUMMINS POWER GENERATION</b>
DO NOT SCALE PRINT		CHK D HOFMEISTER	
DATE	SCALE	APP G STAFFENHAGEN	OUTLINE, TANK
DATE 27FEB18	SCALE 1:8	DATE 27FEB18	REGIONAL
ANG TOL ± 1.0°	SCALE 1:8	DATE 27FEB18	PGF
		DATE 27FEB18	APP E
		DATE 27FEB18	A057P198
		DATE 27FEB18	2 of 3

REV NO	REV	NO	REVISION	NO	CHK	APPD	DATE
ECO-170441	A	1	PRODUCTION RELEASE	DAH	DAH	STAFFENHAGEN	27FEB18

D

D

C

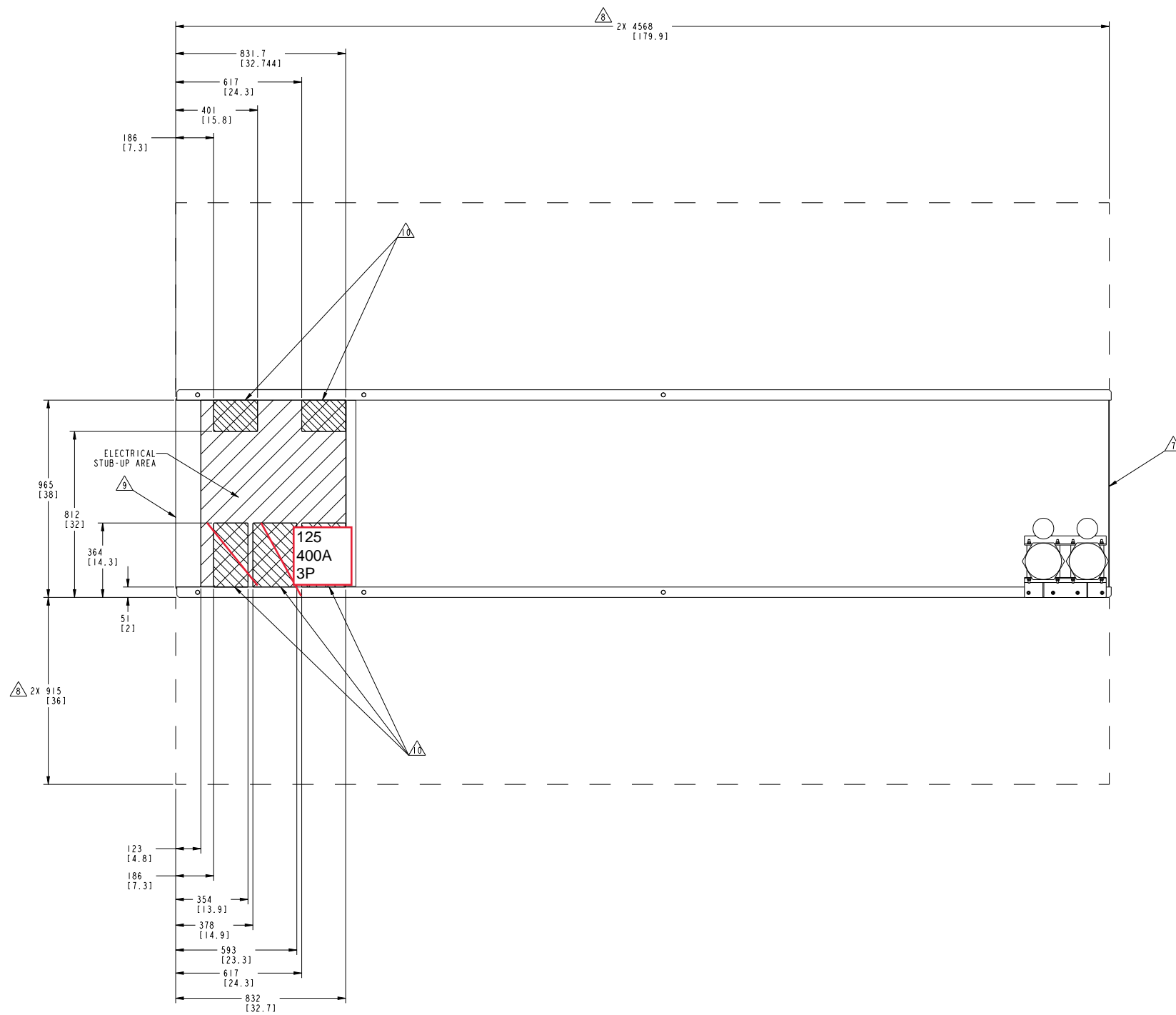
C

B

B

A

A



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		DO NOT SCALE PRINT	APPD D HOFMEISTER	DATE 27FEB18	DATE 27FEB18	DATE 27FEB18
± 0.1	0.00 - 4.99	± 0.15 / -0.00	APPD G STAFFENHAGEN	DATE 27FEB18	DATE 27FEB18	DATE 27FEB18
± 0.2	5.00 - 9.99	± 0.25 / -0.10				
± 0.3	10.00 - 17.49	± 0.25 / -0.13				
± 0.38	17.50 - 24.99	± 0.25 / -0.13				

# *Section 4 – Generator Accessories*



# Battery Charger

**A048G602** 10 A 50/60 Hz

**A051H785** 20 A 50/60 Hz



## Description

Cummins® 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 chargers 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 aluminium 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"(318 x 195 x 165 mm) 20A: 13.06" x 13.95" x 6.83"(332 x 354 x 173 mm)
Ambient temperature operation: At full rated output -		- 4 °F to 104 °F (-20 °C to 40 °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, stepdown transformer must be used. Review the respective Owner/Installation manual A050S537 for 10Amp and A051X126 20A chargers for supplier recommended stepdown 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.

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

Our energy working for you.™



REV NO	REV	NO	REVISION	REV	NO	DATE
ECO-181477	E	1	ADD SHEET 6	RT	MT	05NOV18
		2	ZONE (A1) ADD TABLE	RT	MT	05NOV18
		3	ZONE (B1) UPDATE 'CIRCUIT BREAKER ACCESSORIES' TABLE	RT	MT	05NOV18
				RT	MT	05NOV18


NOTES:

- 1 NEUTRAL LUG (1) #14-2/0.
- 2 GROUND LUG (1) #14-1/0.
- 3 NEUTRAL LUG (1) #6-350 kcmil.
- 4 NEUTRAL LG (2) #2-600 kcmil OR (4) 1/0-250 kcmil.

FRAME	LUG	LUG WIRE RANGE	WIRE STRIP LENGTH	CB LUG TORQUE
H-FRAME THERMAL-MAGNETIC 15-150 AMP 80% RATED	AL150HD	(1) AL #14 - 3/0 AWG (1) CU #14 - 3/0 AWG	0.65 inch	#14 - #10 50 lb-in (6.0 Nm) #8 - 3/0 120 lb-in (14.0 Nm)
J-FRAME THERMAL-MAGNETIC 175 AMP 80% RATED	AL175HD	(1) AL #4 - 4/0 AWG (1) CU #4 - 4/0 AWG	1.00 inch	225 lb-in (26.0 Nm)
J-FRAME THERMAL-MAGNETIC 200-250 AMP 80% RATED	AL250JD	(1) AL 3/0 - 350 kcmil (1) CU 3/0 - 350 kcmil	1.00 inch	225 lb-in (26.0 Nm)
J-FRAME LSI ELECTRONIC TRIP ADJUSTABLE TRIP 70-250 AMP 100% RATED, COPPER CONDUCTORS ONLY	CU250JD	(1) CU 1/0 - 300 kcmil	1.00 inch	250 lb-in (28.0 Nm)
L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 80% RATED	AL400L61K3	(1) AL #2 - 500 kcmil (1) CU #2 - 600 kcmil	1.20 inch	442 lb-in (50 Nm)
L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 100% RATED, COPPER CONDUCTORS ONLY	AL600LS52K3	(2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)
L-FRAME (600) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 200-600 AMP 80% RATED 100% RATED, COPPER CONDUCTORS ONLY	AL600LS52K3	(2) AL 2/0 - 500 kcmil (2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)
P-FRAME MANUAL & AUTOMATIC LSI ELECTRONIC TRIP ADJUSTABLE TRIP 400, 600 & 800 AMP 80% AND 100% RATED	AL800LS52K3	(3) AL 3/0 - 500 kcmil (3) CU 3/0 - 500 kcmil	(3) 1.20 inch	442 lb-in (50 Nm)

CIRCUIT BREAKER ACCESSORIES	
1	SHUNT TRIP (MX) P/N A043X760 12 VDC COIL BURDEN < 5 WATTS 10 AMP IN-RUSH
2	AUXILIARY CONTACTS P/N A043X785 OPEN/CLOSED (OF) TRIP INDICATION (SD) FORM C CONTACTS RATING: 6 AMPS AT 24 VAC, 48 VAC, 110 VAC 6 AMPS AT 24 VDC, 2.5 AMPS AT 48 VDC, 0.6 AMPS AT 110 VDC  H & J FRAME, MAXIMUM OF 4 CONTACTS PER CIRCUIT BREAKER  L FRAME, MAXIMUM OF 5 CONTACTS PER CIRCUIT BREAKER  P FRAME, MAXIMUM OF 5 CONTACTS PER CIRCUIT BREAKER
3	ACCESSORY KIT P/N A060M822 FOR TOP ENTRY LOAD CABLE ENTRY APPLICABLE FOR MODEL AND BREAKER CONFIGURATION AS PER "TABLE 1"

TABLE 1				
KIT PART NUMBER	MODELS AFFECTED	ENCLOSURES AFFECTED		
A060M822	C125 N6-C150 N6 C125 D6D- C200 D6D	OPEN ONLY		
KIT PART NUMBER	NUMBER OF CB'S	LIMITATION		
		POS A	POS B	POS C
A060M822	1	ANY RATING	-	-
	2	ANY RATING	600A OR BELOW	-
	3	ANY RATING	400A OR BELOW	250A OR BELOW

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		DO NOT SCALE PRINT	APP'D A. JOHNSON CER. A. JOHNSON	 <b>CUMMINS POWER GENERATION</b> OUTLINE, CIRCUIT BREAKER
DATE	SCALE	DATE	DATE	
1/4	1/4	02MAY16	02MAY16	SITE CODE PGF A055B603

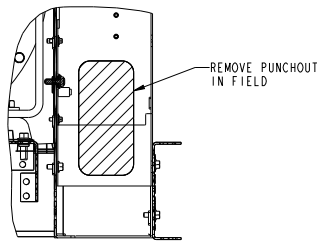
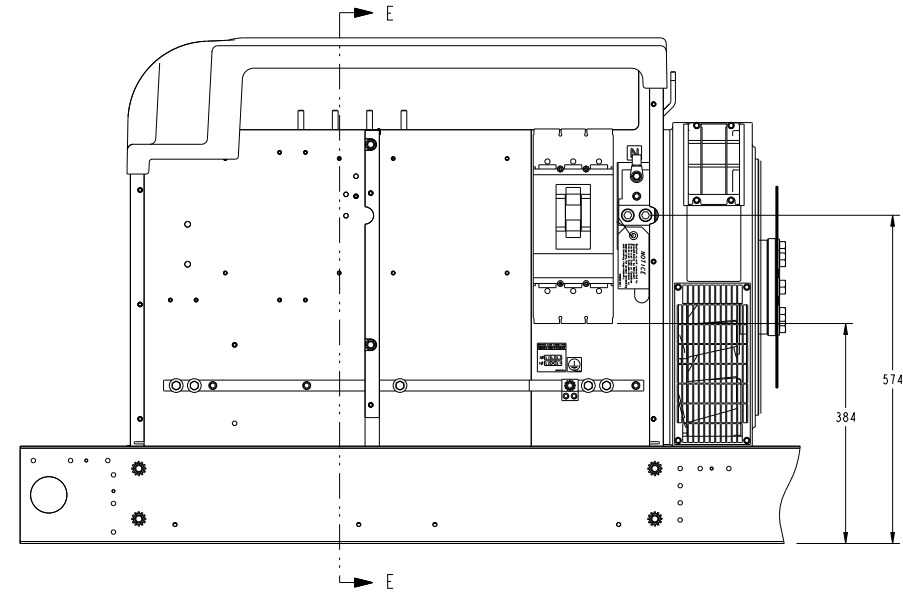
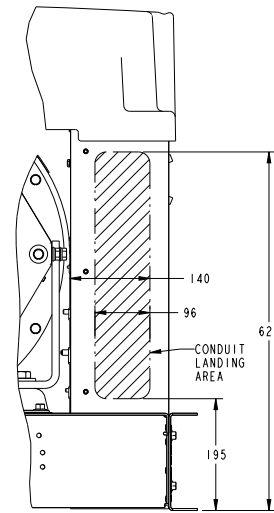
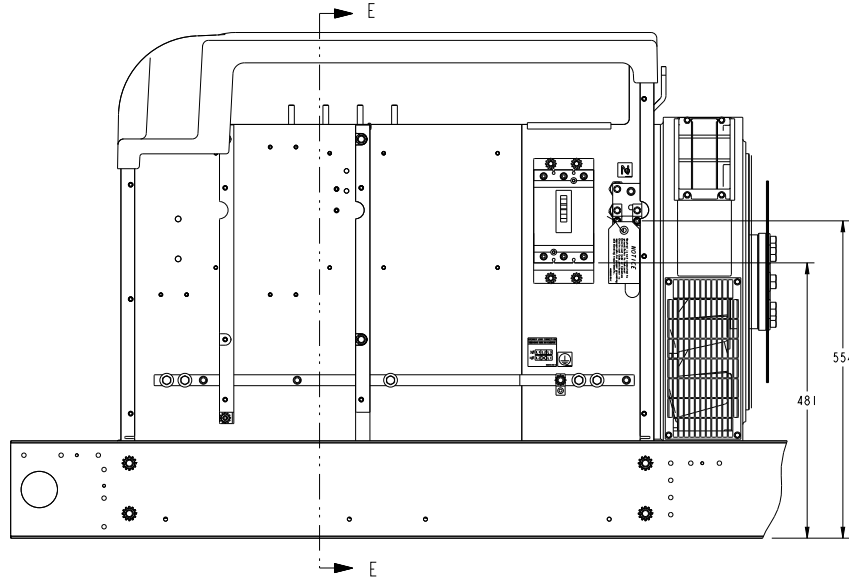
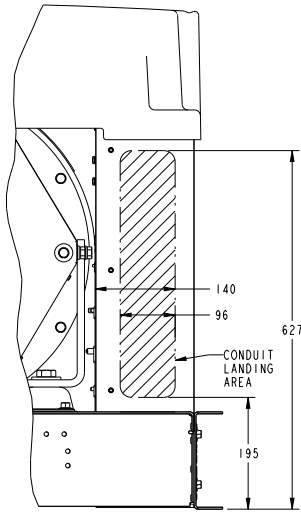




REV NO	REV	NO	REVISION	REV	NO	DATE
ECO-181477	E	-	-	RT	MT	05NOV18

"H" FRAME SHOWN (15 - 150 amp)

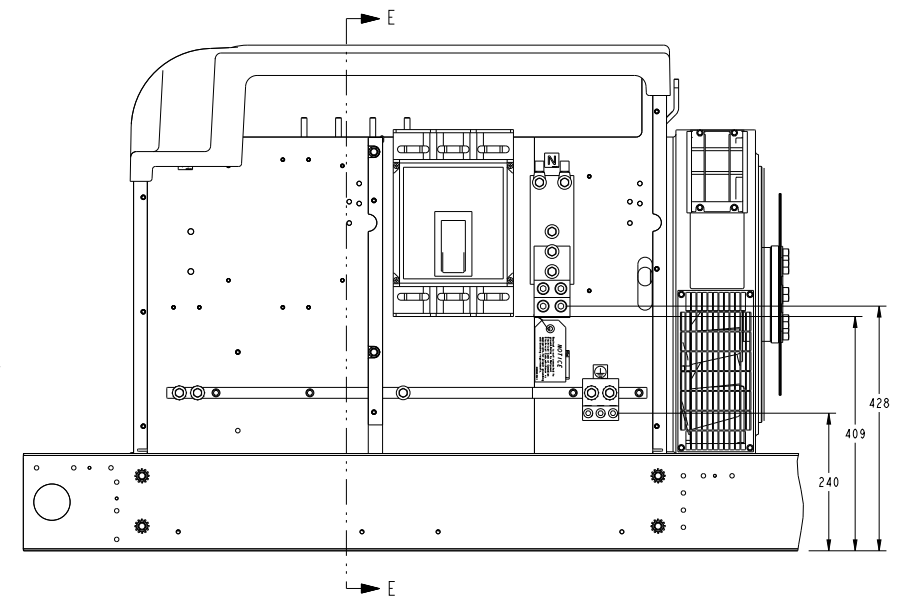
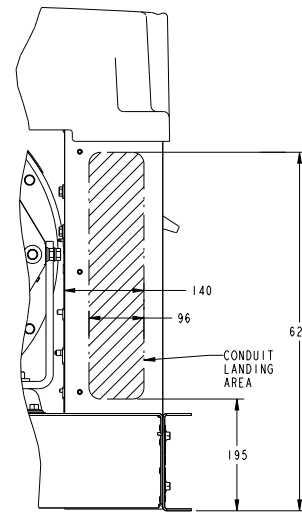
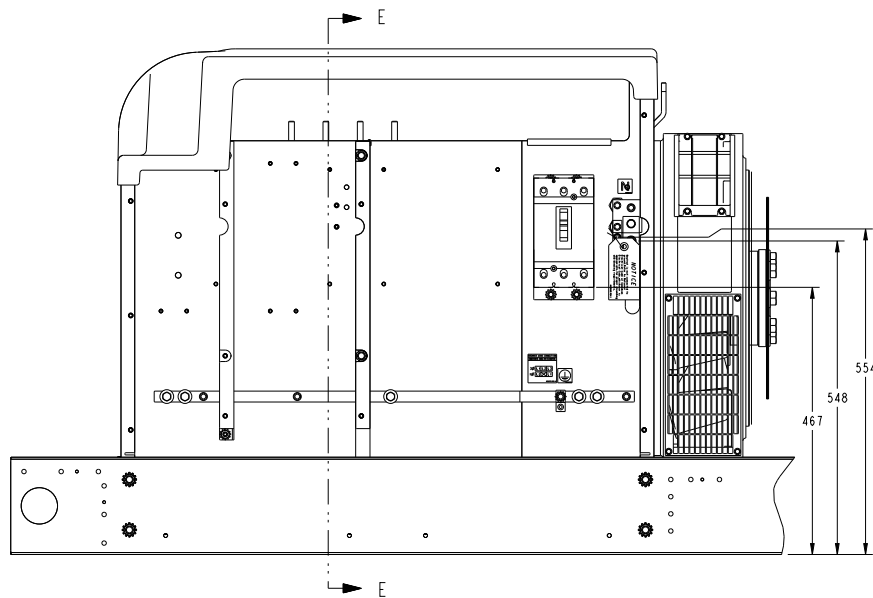
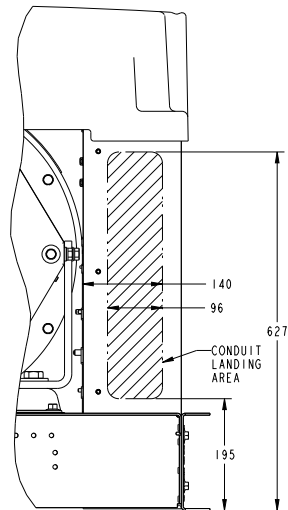
"L" FRAME SHOWN (400 - 600 amp)



SECTION E-E

"J" FRAME SHOWN (175 - 250 amp)

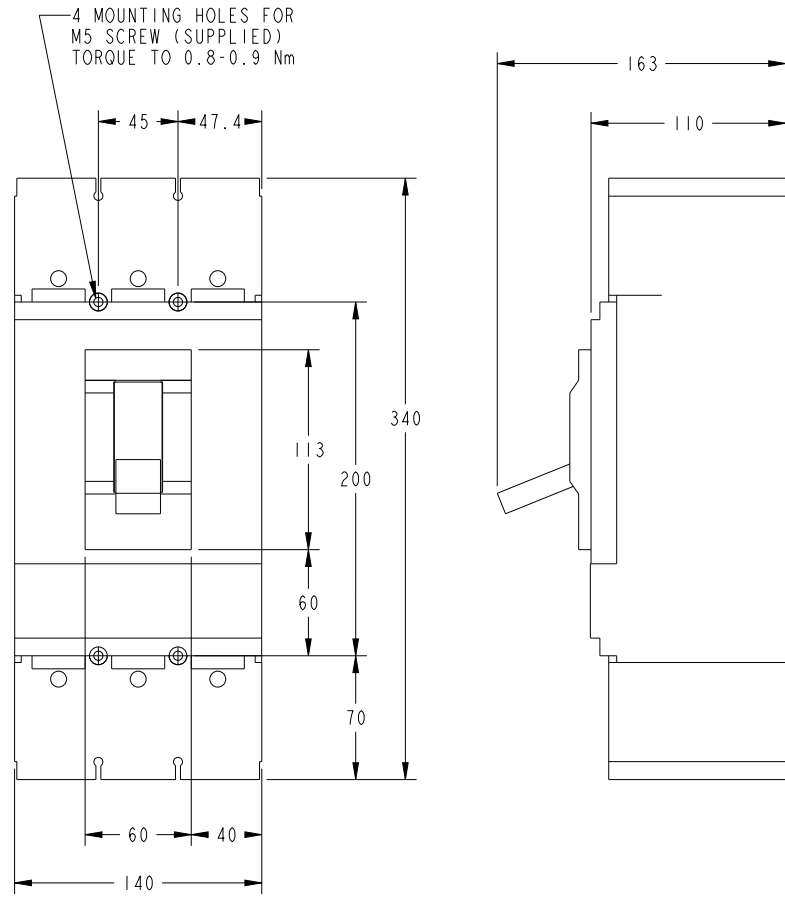
"P" FRAME SHOWN (400-800 amp)



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		DO NOT SCALE PRINT	APP'D A. JOHNSON	CUMMINS POWER GENERATION
DATE	SCALE	DATE	DATE	
± 1	1/4	02MAY16	02MAY16	OUTLINE, CIRCUIT BREAKER
± 0.8	1/4	02MAY16	02MAY16	
± 0.38	1/4	02MAY16	02MAY16	PGF E A055B603
± 1.0	1/4	02MAY16	02MAY16	

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-176287	B	1	UPDATE MEP	KSP	KAM	W.WINGFIELD	03APR18
		2	ZONE A3; RMV C11 LABEL	KSP	KAM	W.WINGFIELD	03APR18

3 POLE



NOTES:

1. THIS PART IS MANUFACTURER SOURCE CONTROLLED.
2. PART SPECIFICATIONS:  
RMS ELECTRONIC TRIP  
TRIP UNIT: MICROLOGIC 3.3S UNIT (LSI)  
  
LUGS INCLUDED ON ALL POLES  
(2) 2/0 AWG-500 KCMIL AL/CU  
  
EACH CB INCLUDES MOUNTING HARDWARE:  
M5 X 85 SCREWS, NUTS & LOCKWASHERS
3. AGENCIES: UL LISTED  
CSA CERTIFICATION
4. 100% RATED WHEN USED WITH TESTED ENCLOSURES.
5. ADJUSTABLE RANGE 125-400 AMPS.
6. 600 VOLTS, 3 POLE.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIN TO: A044T469	DWN: P_THEVAR		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT		CKD: P_LARSON	BREAKER, CIRCUIT			
DIM	X ± 1	0.00-4.99 +0.15/-0.08	APVD: P_LARSON	DATE: 27OCT14	SITE CODE	
	.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: 1/2	PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON GENERAL	PGF
					DWG FILE: A051D115	SHEET 1 OF 1

## L-Frame Circuit Breaker Catalog Numbers

### Unit-Mount Circuit Breaker Catalog Numbers

**Table 28: L-Frame 600 A Electronic Trip UL Rated 3P Circuit Breakers  
(600 Vac, 50/60 Hz) With Factory Sealed Trip Unit Suitable for Reverse Connection**

Electronic Trip Unit			Sensor Rating	Interrupting Rating (2nd Letter of Catalog Number)				
Type	Function	Trip Unit		D	G	J <sup>1</sup>	L <sup>1</sup>	R <sup>1</sup>
<b>Standard (80%) Rated, 600 Vac, 50/60 Hz</b>								
Standard	LI	3.3 <sup>2</sup>	250 A <sup>3</sup>	LDL36250U31X	LGL36250U31X	LJL36250U31X	LLL36250U31X	LRL36250U31X
			400 A <sup>4</sup>	LDL36400U31X	LGL36400U31X	LJL36400U31X	LLL36400U31X	LRL36400U31X
			600 A <sup>4</sup>	LDL36600U31X	LGL36600U31X	LJL36600U31X	LLL36600U31X	LRL36600U31X
Standard	LSI	3.3S <sup>2</sup>	250 A <sup>3</sup>	LDL36250U33X	LGL36250U33X	LJL36250U33X	LLL36250U33X	LRL36250U33X
			400 A <sup>4</sup>	LDL36400U33X	LGL36400U33X	LJL36400U33X	LLL36400U33X	LRL36400U33X
			600 A <sup>4</sup>	LDL36600U33X	LGL36600U33X	LJL36600U33X	LLL36600U33X	LRL36600U33X
Ammeter	LSI	5.3A	400 A <sup>4</sup>	LDL36400U43X	LGL36400U43X	LJL36400U43X	LLL36400U43X	LRL36400U43X
			600 A <sup>4</sup>	LDL36600U43X	LGL36600U43X	LJL36600U43X	LLL36600U43X	LRL36600U43X
Energy	LSI	5.3E	400 A <sup>4</sup>	LDL36400U53X	LGL36400U53X	LJL36400U53X	LLL36400U53X	LRL36400U53X
			600 A <sup>4</sup>	LDL36600U53X	LGL36600U53X	LJL36600U53X	LLL36600U53X	LRL36600U53X
Ammeter	LSIG	6.3A	400 A <sup>4</sup>	LDL36400U44X	LGL36400U44X	LJL36400U44X	LLL36400U44X	LRL36400U44X
			600 A <sup>4</sup>	LDL36600U44X	LGL36600U44X	LJL36600U44X	LLL36600U44X	LRL36600U44X
Energy	LSIG	6.3E	400 A <sup>4</sup>	LDL36400U54X	LGL36400U54X	LJL36400U54X	LLL36400U54X	LRL36400U54X
			600 A <sup>4</sup>	LDL36600U54X	LGL36600U54X	LJL36600U54X	LLL36600U54X	LRL36600U54X
<b>100% Rated, 600 Vac, 50/60 Hz</b>								
Standard	LI	3.3 <sup>2</sup>	250 A <sup>3</sup>	LDL36250CU31X	LGL36250CU31X	LJL36250CU31X	LLL36250CU31X	LRL36250CU31X
			400 A <sup>4</sup>	LDL36400CU31X	LGL36400CU31X	LJL36400CU31X	LLL36400CU31X	LRL36400CU31X
Standard	LSI	3.3S <sup>2</sup>	250 A <sup>3</sup>	LDL36250CU33X	LGL36250CU33X	LJL36250CU33X	LLL36250CU33X	LRL36250CU33X
			400 A <sup>4</sup>	LDL36400CU33X	LGL36400CU33X	LJL36400CU33X	LLL36400CU33X	LRL36400CU33X
Ammeter	LSI	5.3A	400 A <sup>4</sup>	LDL36400CU43X	LGL36400CU43X	LJL36400CU43X	LLL36400CU43X	LRL36400CU43X
Energy	LSI	5.3E	400 A <sup>4</sup>	LDL36400CU53X	LGL36400CU53X	LJL36400CU53X	LLL36400CU53X	LRL36400CU53X
Ammeter	LSIG	6.3A	400 A <sup>4</sup>	LDL36400CU44X	LGL36400CU44X	LJL36400CU44X	LLL36400CU44X	LRL36400CU44X
Energy	LSIG	6.3E	400 A <sup>4</sup>	LDL36400CU54X	LGL36400CU54X	LJL36400CU54X	LLL36400CU54X	LRL36400CU54X

<sup>1</sup> UL Listed/CSA Certified as current limiting circuit breakers.

<sup>2</sup> 3P circuit breakers with this trip unit can be used for 2P applications.

<sup>3</sup> Standard Lug Kit: AL400L61K3 Terminal Wire Range: (1) 2 AWG–600 kcmil Cu or (1) 2 AWG–500 kcmil Al. Type of Terminal Shield: Short.

<sup>4</sup> Standard Lug Kit: AL600LS52K3 Terminal Wire Range: (2) 2/0 AWG–500 kcmil Al/Cu. Type of Terminal Shield: Medium.

# PowerPact H-, J-, and L-Frame Circuit Breakers General Information

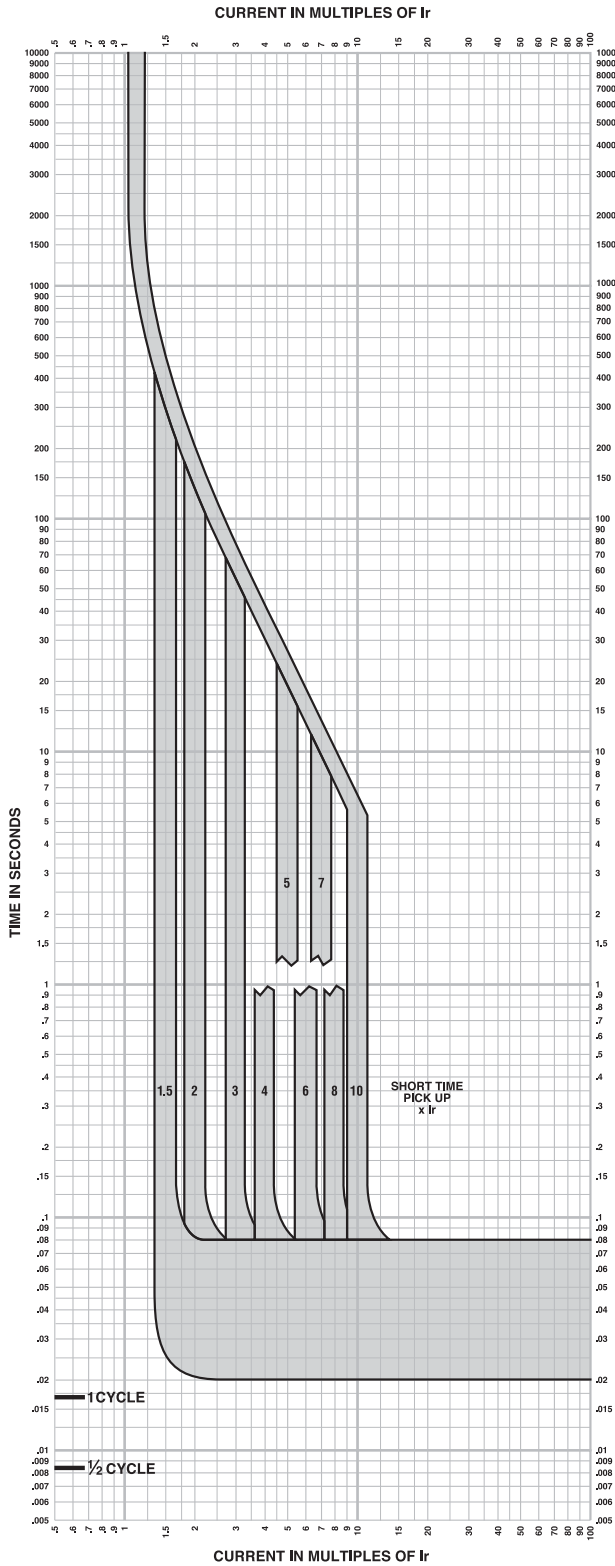
**Table 11: Circuit Breakers**

Circuit Breaker	150 A H-Frame					250 A J-Frame					400 A L-Frame					600 A L-Frame					1200 A L-Frame						
Circuit Breaker Type	HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR	LG	LL					
Number of poles <sup>1</sup>	2, 3					3					3, 4					3, 4					4						
Amperage Range (A)	15-150					70-250					70-400					200-600					700-1200						
UL 489 Circuit Breaker Ratings																											
Breaking Capacity (AIR)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	—	—				
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	—	—				
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	—	—				
	250 Vdc <sup>2</sup>	20	20	20	20	—	20	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—			
UL/CSA/NOM (kA rms)	500 Vdc <sup>2, 3</sup>	—	20	—	50	—	—	20	—	—	50	—	—	—	20	—	—	50	—	—	20	—	20	—	20	—	50
IEC 947-2 Circuit Breaker Ratings																											
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	—	—				
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—				
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—				
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75 <sup>4</sup>	—	—				
	690 Vac	—	—	—	—	20	—	—	—	—	—	20	—	—	—	—	—	—	20	—	—	—	—				
	250 Vdc <sup>2</sup>	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
500 Vdc <sup>2, 3</sup>	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%		—	—							
Insulation Voltage	V <sub>i</sub>	750 Vac					750 Vac					750 Vac					750 Vac		—	—							
Impulse Withstand Voltage	V <sub>imp</sub>	8 kVac					8 kVac					8 kVac					8 kVac		—	—							
Operational Voltage	V <sub>e</sub>	690 Vac					690 Vac					690 Vac					690 Vac		—	—							
Sensor Rating	I <sub>n</sub>	150 A					250 A					400 A					600 A		—	—							
Utilization Category	—	A					A					A					A		—	—							
Operations (Open-Close Cycles)																											
Without Current	—	4000					5000					5000					5000		—	—							
With Current	—	4000					1000					1000					1000		—	—							
Protection and Measurements																											
Short-circuit protection	Magnetic only	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	Thermal-magnetic	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	X	X				
	Electronic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	with neutral protection (Off-0.5-1-OSN) <sup>5</sup>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	with ground fault protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
with zone selective interlocking (ZSI) <sup>6</sup>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—					
Display / I, V, f, P, E, THD measurements / interrupted-current measurement																											
Options	Front display module (FDM121)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	Operating assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	Counters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	Histories and alarms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
	Metering Com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—				
Device status/control com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—					
Dimensions / Weight / Connections																											
Dimensions (Three-Pole Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)					13.38 (340)					
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)					5.51 (140)					
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)					4.33 (110)					
Weight - lb. (Kg)	4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)					13.7 (6.2)						
Connections / Terminations	Unit Mount	X					X					X					X					X					
	I-Line	X					X					X					X					—					
	Rear Connection	X					X					X					X					X <sup>7</sup>					
	Plug-In	X					X					X					X					—					
	Drawout	X					X					X					X					—					
Optional Lugs	X					X					X					X					—						

1 H and J-frame breakers with Micrologic trip units available only with three poles. The HJ, HL and the J-Frame two pole circuit breakers are three pole modules.  
 2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.  
 3 500 Vdc specific catalog numbers, ungrounded UPS systems only.  
 4 I<sub>CS</sub> for 600 A L-frame circuit breaker at 525 V is 19 kA.  
 5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).  
 6 ZSI using restraint wires.  
 7 Rear connection is not available for 700–1200 A four pole L-frame circuit breakers.

# PowerPact H-, J-, and L-Frame Circuit Breakers Trip Curves

Figure 117: **Micrologic 3.3S** and 3.3S-W Electronic Trip Unit Long Time/Short Time Trip Curve



## MICROLOGIC™ ELECTRONIC TRIP UNITS Micrologic™ 3.3S and 3.3S-W Long Time/Short Time Trip Curve 250A, 400A L-Frame

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

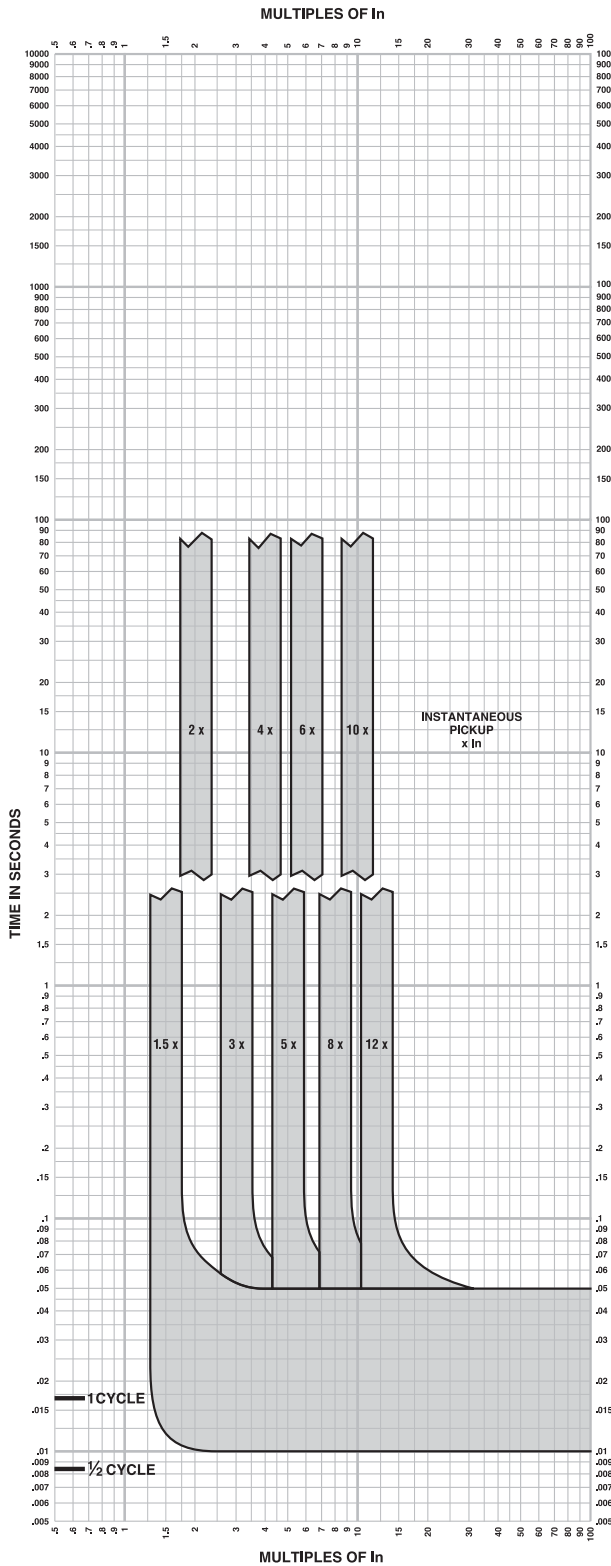
### Notes:

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

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

# PowerPact H-, J-, and L-Frame Circuit Breakers Trip Curves

Figure 119: Micrologic 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W Electronic Trip Unit Instantaneous Trip Curve



## MICROLOGIC™ ELECTRONIC TRIP UNITS Micrologic™ 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W Instantaneous Trip Curve 400A L-Frame

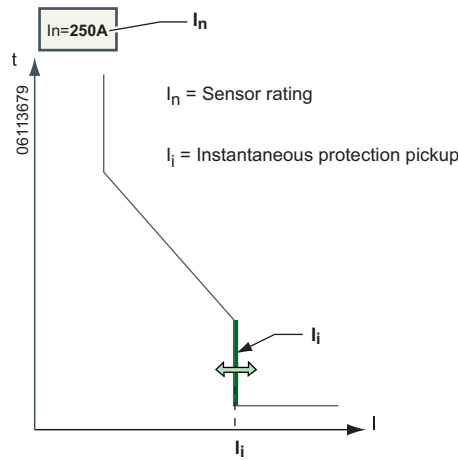
The time-current curve information is to be used for application and coordination purposes only.

### Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
  2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
  3.  $I_n$  = Maximum dial setting of  $I_r$ .  
400A L-Frame:  $I_n = 400A = \text{Max } I_r \text{ setting}$
- Curves apply from  $-35^\circ\text{C}$  to  $+70^\circ\text{C}$  ( $-31^\circ\text{F}$  to  $+158^\circ\text{F}$ ) ambient temperature.

### Instantaneous Protection

Figure 3: Instantaneous Protection Curve



Instantaneous protection on Micrologic 3.2 and 3.3 trip units protects all types of electrical distribution applications against very high short-circuit currents.

Instantaneous protection is definite time, set as  $I_i$  pickup and without a time delay.

To set the  $I_i$  pickup using the  $I_i$  dial.

The  $I_i$  pickup setting value is in multiples of  $I_n$ .

The default  $I_i$  pickup setting value is  $1.5 I_n$  (minimum value).

Table 4 shows the setting ranges and increments according to the Micrologic trip unit  $I_n$  rating.

- The accuracy range is +/- 10%.
- The hold time is 10 milliseconds.
- The maximum breaking time is 50 milliseconds.

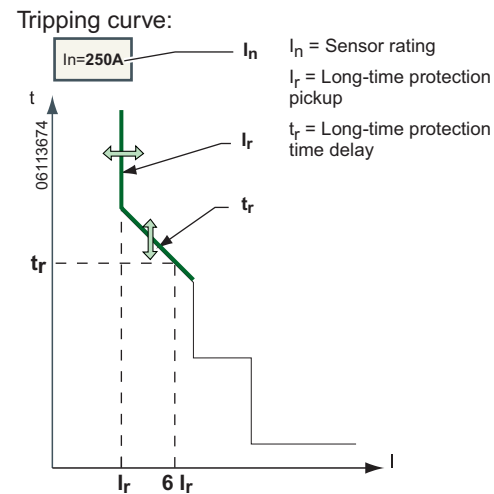
Table 4: Values of  $I_i$

$I_n$ Rating	Setting Range	Increment
60 A, 100 A and 150 A	1.5–15 $I_n$	0.5 $I_n$
250 A and 400 A	1.5–12 $I_n$	0.5 $I_n$
600 A	1.5–11 $I_n$	0.5 $I_n$

### Setting 3.2S/3.3S (LSI) Trip Units

#### Long-Time Protection

Figure 4: Long-Time Protection Curve



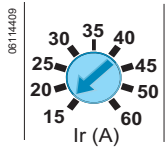
Long-time protection on Micrologic 3.2S and 3.3S trip units protect electrical distribution applications against overload currents.

Long-time protection is  $I^2t$  IDMT (Inverse Definite Minimum Time).

- It incorporates the thermal image function.
- It is set with the  $I_r$  pickup
- It has a fixed  $t_r$  trip time delay



### Setting the Long-Time Protection



To set the  $I_r$  pickup, use the  $I_r$  dial

The long-time protection tripping range is 1.05–1.20  $I_r$ .

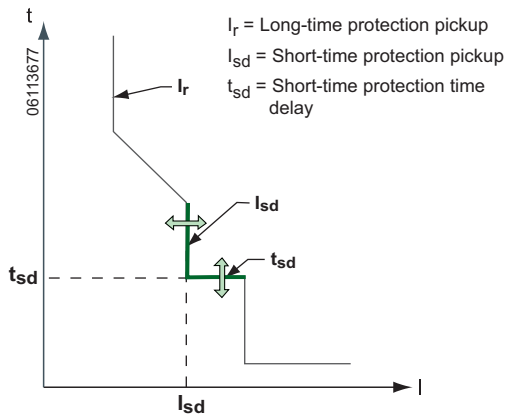
The default  $I_r$  pickup setting value is the maximum dial position  $I_n$ .

**Table 5: Values of  $I_r$  (A)**

$I_n$ Rating	Preset Values of $I_r$ Depending on the Trip Unit $I_n$ Rating and the Dial Position								
<b>60 A</b>	15 A	20 A	25 A	30 A	35 A	40 A	45 A	50 A	60 A
<b>100 A</b>	35 A	40 A	45 A	50 A	60 A	70 A	80 A	90 A	100 A
<b>150 A</b>	50 A	60 A	70 A	80 A	90 A	100 A	110 A	125 A	150 A
<b>250 A</b>	70 A	80 A	100 A	125 A	150 A	175 A	200 A	225 A	250 A
<b>400 A</b>	125 A	150 A	175 A	200 A	225 A	250 A	300 A	350 A	400 A
<b>600 A</b>	200 A	225 A	250 A	300 A	350 A	400 A	450 A	500 A	600 A

### Short-Time Protection

**Figure 5: Short-Time Protection Tripping Curve**



Short-time protection on Micrologic 3.2S and 3.3S trip units protects all types of electrical distribution applications against short-circuit currents.

Short-time protection:

- is definite time:
- has adjustable  $I_{sd}$  pickup
- has fixed short time delay  $t_{sd}$  on this trip unit

### Setting the Short-Time Protection

#### $I_{sd}$ Pickup Setting Values

Set the  $I_{sd}$  pickup using the dial of the face of the 3.2S or 3.3S trip unit.

The  $t_{sd}$  time delay is fixed and cannot be adjusted.

The  $I_{sd}$  pickup setting value is in multiples of  $I_r$ .

The default  $I_{sd}$  pickup setting value is 1.5  $I_r$  (minimum dial value).

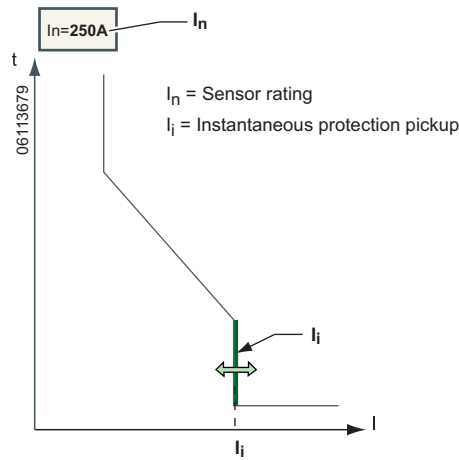
Table 6 shows the setting values.

**Table 6: Preset Values of  $I_{sd}$  (A)**

Value or Setting Range (x $I_r$ )									
1.5	2	3	4	5	6	8	10	12	

### Instantaneous Protection

Figure 6: Instantaneous Protection Curve



Instantaneous protection on Micrologic 3.2S and 3.3S trip units protects all types of electrical distribution applications against very high short-circuit currents.

Instantaneous protection is definite time, set as  $I_i$  pickup and without time delay.

Set the  $I_i$  pickup using the  $I_i$  dial.

The  $I_i$  pickup setting value is in multiples of  $I_n$ .

The default  $I_i$  pickup setting value is  $1.5 I_n$  (minimum value).

Table 7 shows the setting ranges and increments according to the Micrologic trip unit  $I_n$  rating.

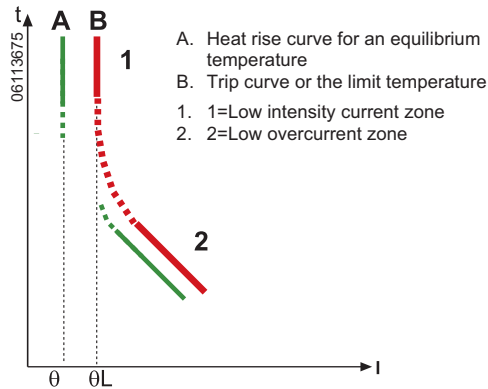
- The accuracy range is +/- 10%.
- The hold time is 10 milliseconds.
- The maximum breaking time is 50 milliseconds.

Table 7: Values of  $I_i$

$I_n$ Rating	Setting Range	Increment
60 A, 100 A and 150 A	$1.5-15 I_n$	$0.5 I_n$
250 A and 400 A	$1.5-12 I_n$	$0.5 I_n$
600 A	$1.5-11 I_n$	$0.5 I_n$

### Conductor Heat Rise and Tripping Curves

Figure 7: Heat Rise Curve



Use the analysis of the equation of heat rise in a conductor, through which a current  $I$  runs, to determine the nature of physical phenomena:

- For low- or medium-intensity currents ( $I < I_r$ ), the conductor equilibrium temperature (for an infinite time) only depends on the current quadratic demand value. The limit temperature corresponds to a limit current ( $I_r$  pickup for trip unit long-time protection).
- For low overcurrents ( $I_r < I < I_{sd}$ ), the conductor temperature only depends on the  $I^2t$  energy provided by the current. The limit temperature is an  $I^2t$  IDMT curve.
- For high overcurrents ( $I > I_{sd}$ ), the phenomenon is identical if the  $I^2t$  ON function of the short-time protection has been configured.

### Thermal Memory

Micrologic 3 trip units incorporate a thermal memory function to protect the cables or bus bars from overheating in cases of low amplitude repetitive faults. Traditional electronic protection does not protect against repetitive faults because the duration of each overload above the pickup setting is too short to cause tripping. Nevertheless, each overload causes a temperature rise in the installation, the cumulative effect could lead to overheating of the system.

The thermal memory function remembers and integrates the thermal heating caused by each pickup setting overrun. Before tripping, the thermal memory reduces the associated time delay and, therefore, the reaction of the trip unit is closer to the real heating of the power network system. After tripping, the function reduces the time delay when closing the circuit breaker on an overload.

The thermal memory function remembers for 20 minutes before or after tripping.

## PowerPact H-, J-, and L-frame Circuit Breaker Trip Units

Table 12: Micrologic Trip Unit Features

Features	Micrologic Trip Unit (X = Standard Feature, O = Available Option)					
	Standard		Ammeter		Energy	
	3.2/3.3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	X					
LSI <sup>1</sup>		X	X		X	
LSIG/Ground Fault Trip <sup>2</sup>				X		X
Ground-Fault Alarm Trip				X		X
Current Settings Directly in Amperes	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X
LED for Long-Time Pickup	X	X	X	X	X	X
LED for Long-Time Alarm	X	X	X	X	X	X
LED Green "Ready" Indicator	X	X	X	X	X	X
Up to 12 Alarms Used Together			X	X	X	X
Digital Ammeter			X	X	X	X
Zone-Selective Interlocking <sup>3</sup>			X	X	X	X
Communications	O	O	O	O	O	O
LCD Display			X	X	X	X
Front Display Module FDM121			O	O	O	O
Advanced User Interface			X	X	X	X
Neutral Protection			X	X	X	X
Contact Wear Indication <sup>4</sup>			X	X	X	X
Incremental Fine Tuning of Settings			X	X	X	X
Load Profile <sup>4, 5</sup>			X	X	X	X
Power Measurement					X	X
Power Quality Measurements					X	X

<sup>1</sup> The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.

<sup>2</sup> Requires neutral current transformer on three-phase four-wire loads.

<sup>3</sup> ZSI for H/J-frame devices is only OUT. ZSI for L-frame devices is IN and OUT.

<sup>4</sup> Indication available using the communication system only.

<sup>5</sup> % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% I<sub>n</sub>.

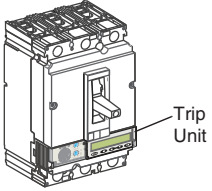
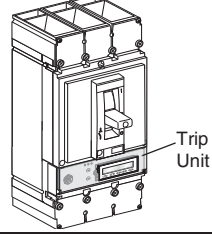
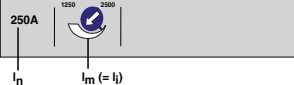

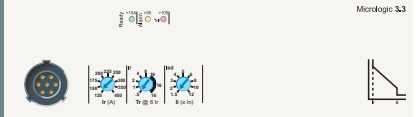

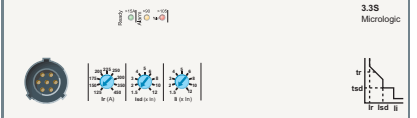






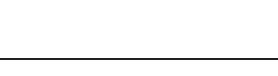

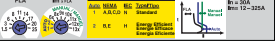


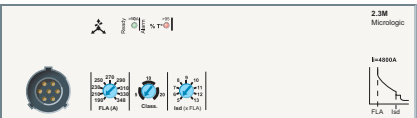
### Thermal-Magnetic or Electronic Trip Unit?

Thermal-magnetic trip units (available on H- and J-frame circuit breakers only) protect against overcurrents and short-circuits using tried and true techniques. For applications requiring installation optimization and energy efficiency, electronic trip units offering more advanced protection functions combined with measurements.

Trip units using digital electronics are faster as well as more accurate. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate events and plan any necessary servicing.

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

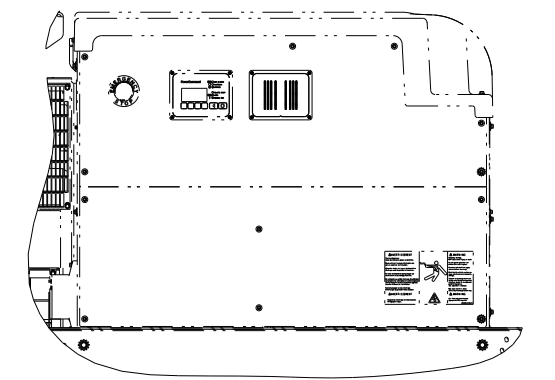
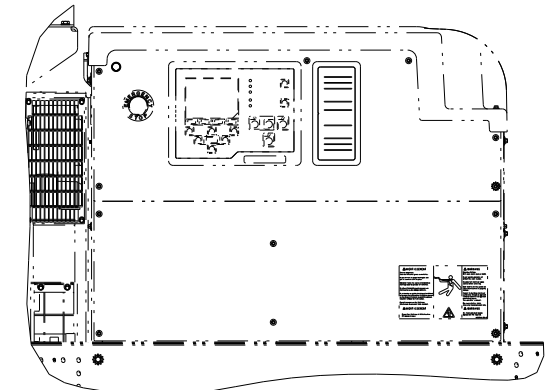
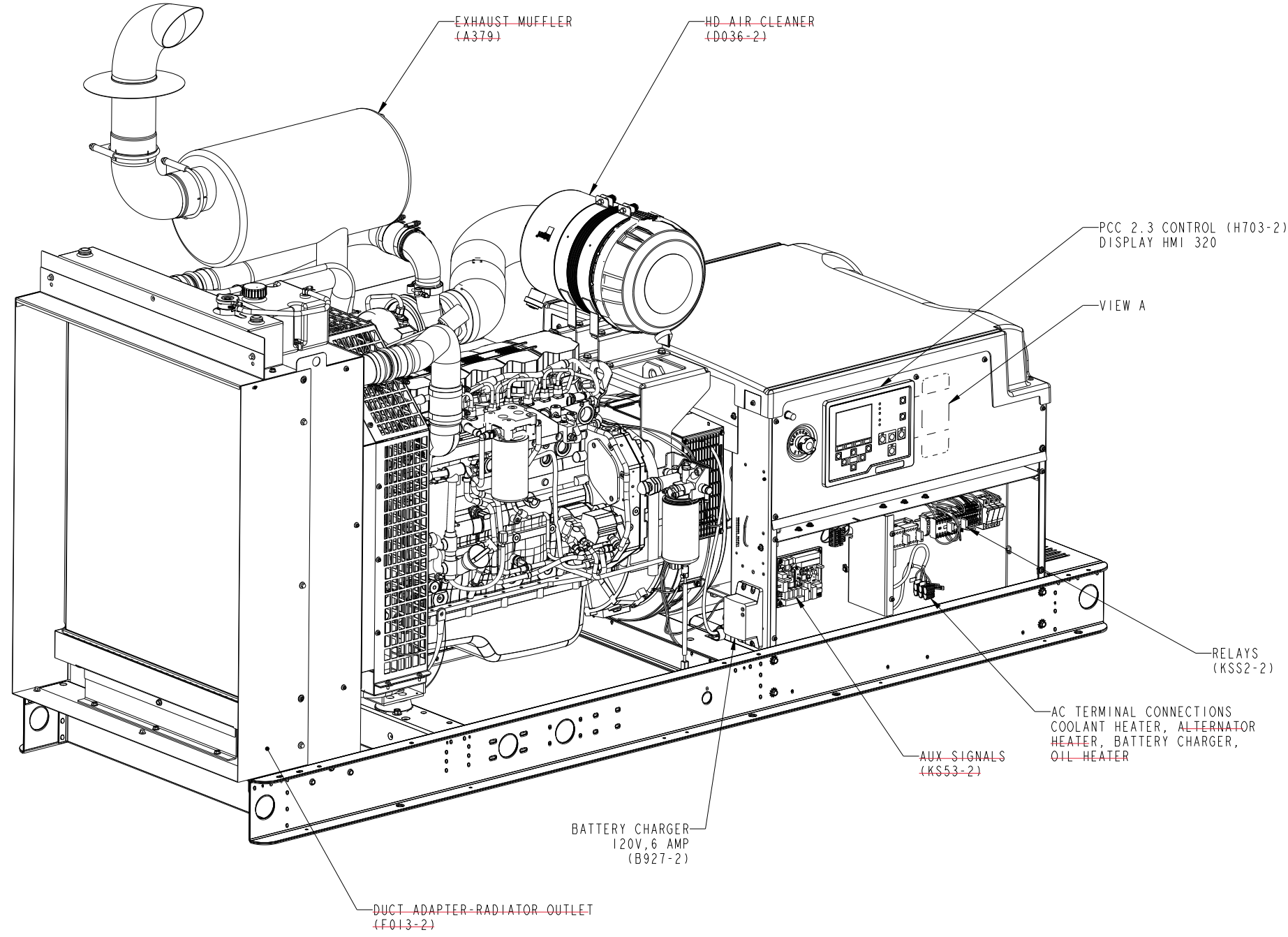
**Table 62: Trip Unit Availability**

Trip Unit Type	Trip Unit	<b>H-, J-Frame</b> 	Trip Unit	<b>L-Frame</b> 
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		<b>Micrologic 3.3S</b> and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

**NOTE:** W = mission critical trip unit.

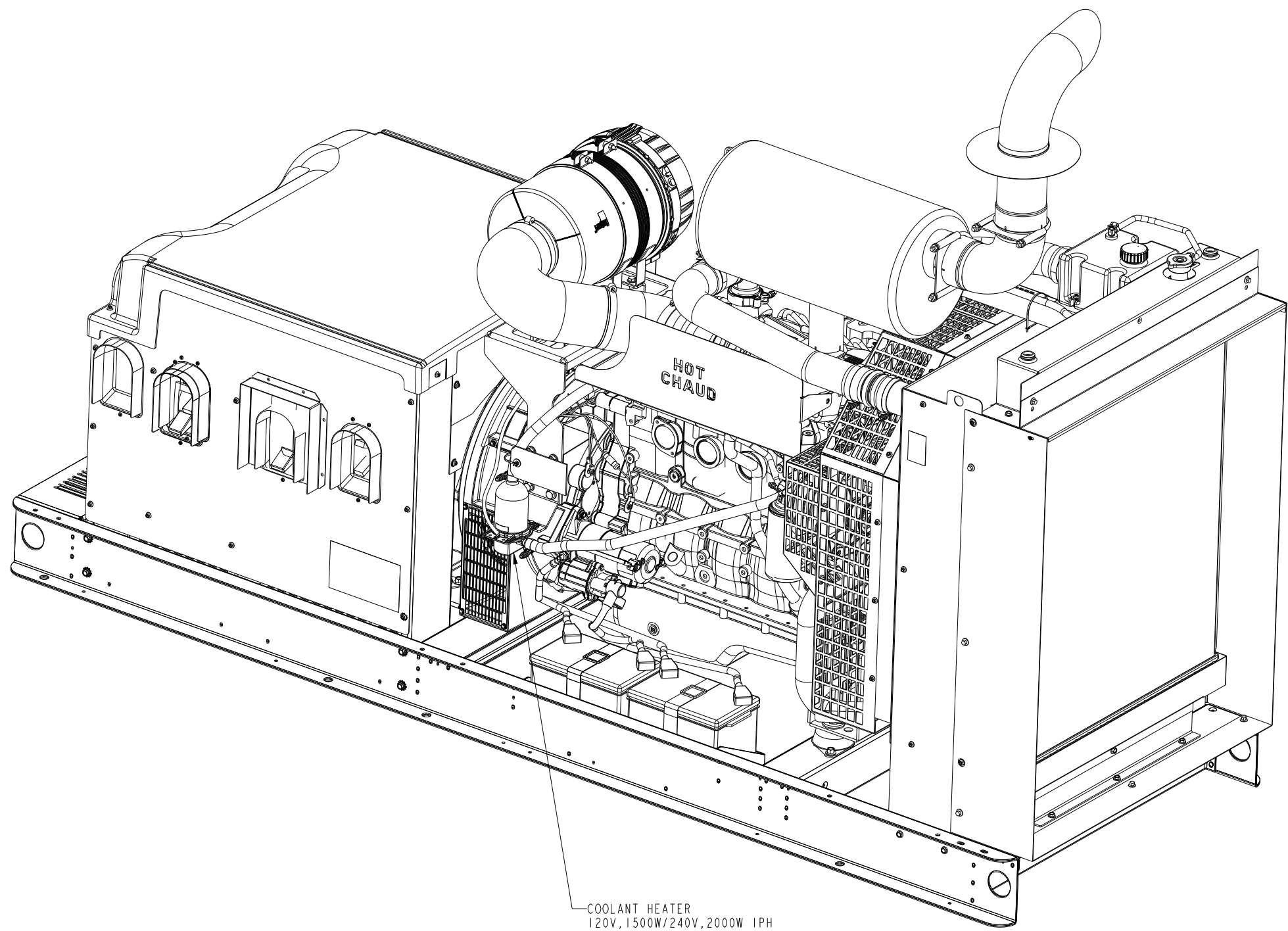
REL NO	REV NO	REVISION	DRN	CKD	APVD	DATE
ECO-176532	A	1	DAH	DAH	GILLETT	10APR18

NOTE:  
1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO A055J592	DWN D HOFMEISTER		CUMMINS POWER GENERATION												
DO NOT SCALE PRINT			CKD D HOFMEISTER		OUTLINE, GENSET												
<table border="1"> <tr> <th>DIM</th> <th>TOL</th> <th>SCALE</th> </tr> <tr> <td>X ± 1</td> <td>0.00-4.99 +0.15/-0.08</td> <td rowspan="4">3:16</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></td> <td>17.50-24.99 +0.30/-0.13</td> </tr> </table>		DIM	TOL	SCALE	X ± 1	0.00-4.99 +0.15/-0.08	3:16	.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 10APR18	APVD D GILLETT	SITE CODE	OPTIONS
DIM	TOL	SCALE															
X ± 1	0.00-4.99 +0.15/-0.08	3:16															
.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 3:16	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON ARROW	PGF			A060G756	CAD SHEET 1 of 3								

REL NO	REV NO	REVISION	DWN	CKD	APVD	DATE
ECO-176532	A	1	DAH	DAH	GILLETT	10APR18

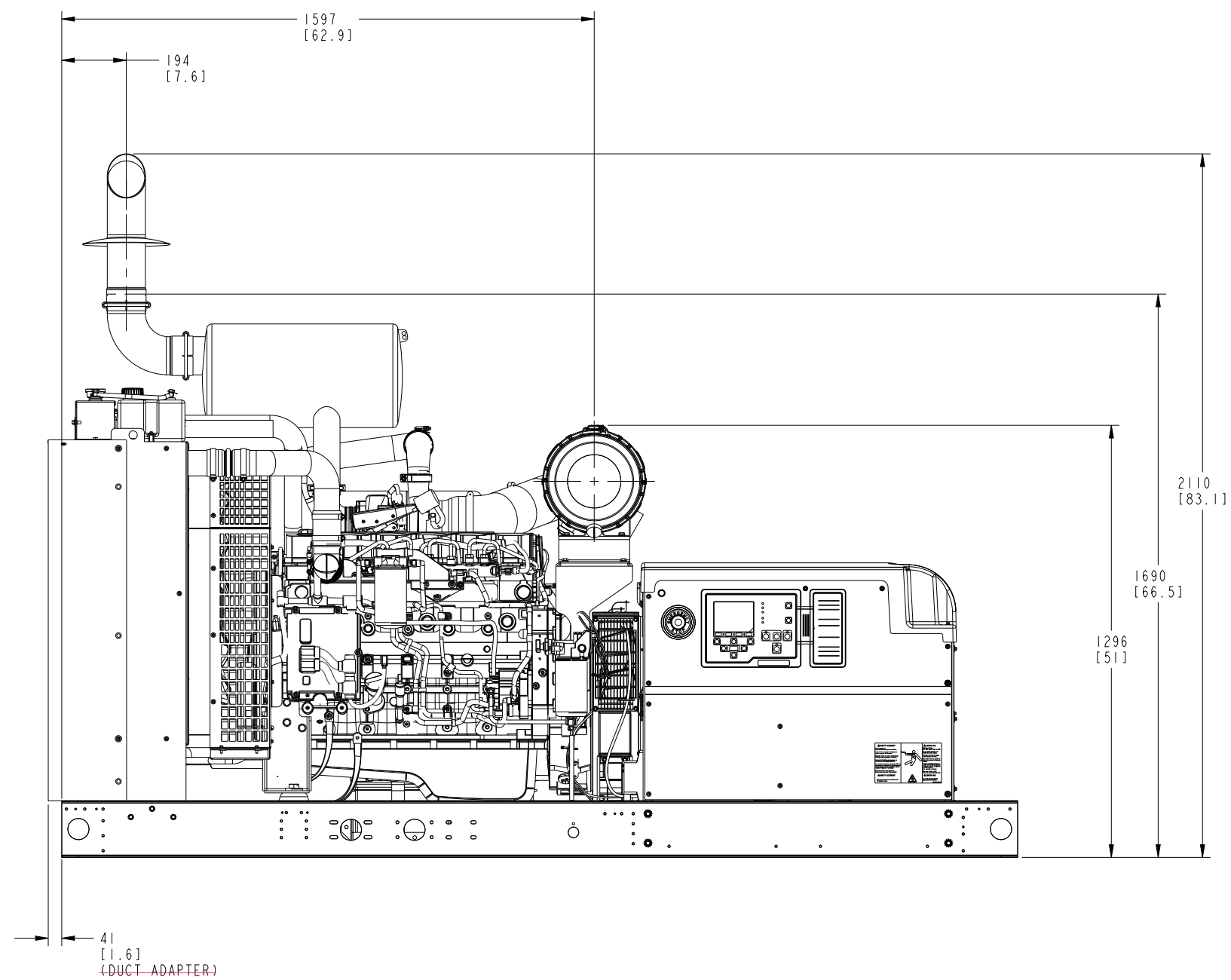
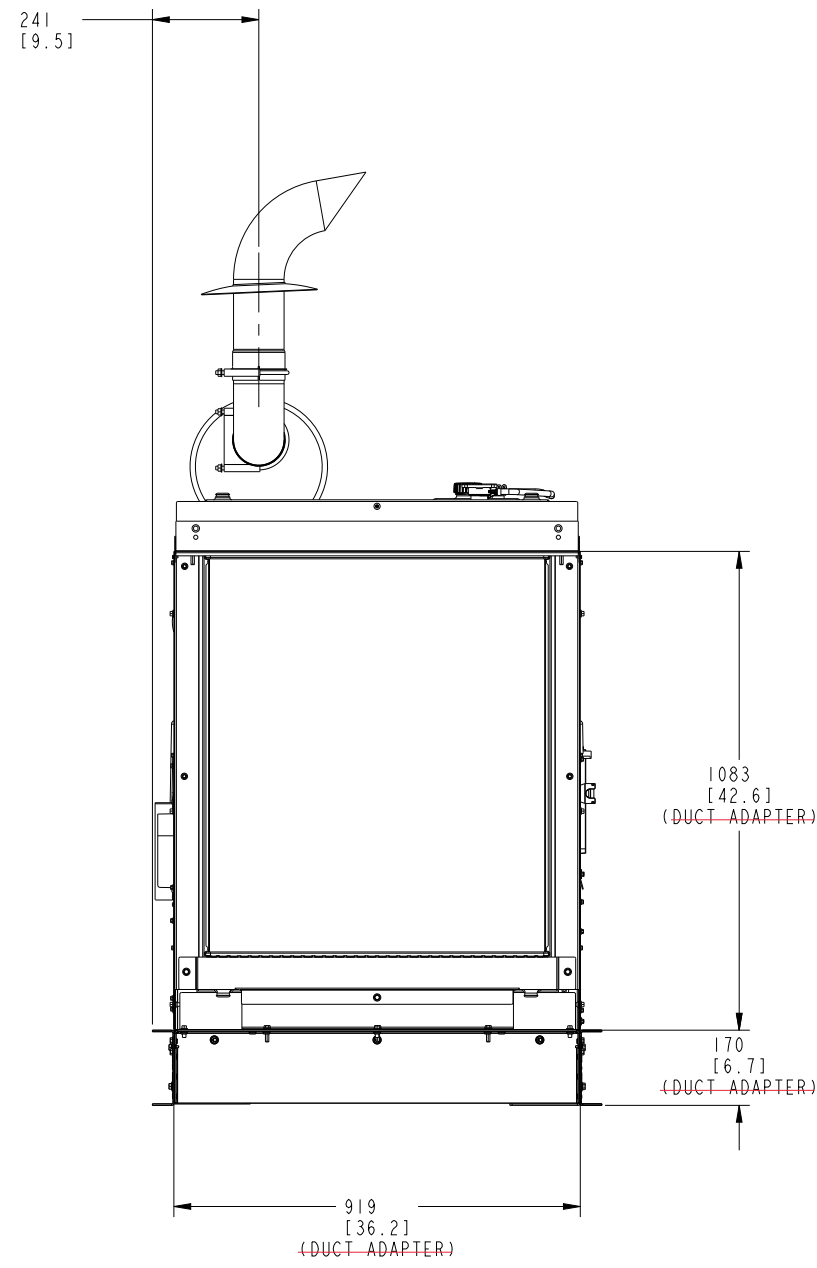


COOLANT HEATER  
120V, 1500W/240V, 2000W IPH  
(E153-2/E154-2)

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO A055J592	DWN D HOFMEISTER	<b>CUMMINS POWER GENERATION</b>
DO NOT SCALE PRINT			CKD D HOFMEISTER	
DIM	TOL	0.00-4.99 +0.15/-0.08	APVD D GILLETT	<b>OUTLINE, GENSET</b> OPTIONS
		5.00-9.99 +0.20/-0.10	DATE 10APR18	
		10.00-17.49 +0.25/-0.13		SITE CODE
		17.50-24.99 +0.30/-0.13		PGF
ANG TOL	SCALE	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FIRST USED ON ARROW
± 1.0°	3:16			PART NO <b>A060G756</b>
				CAD SHEET 2 of 3



REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-176532	A	1	PRODUCTION RELEASE	DAH	DAH	GILLETT	10APR18



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO A055J592	DWN D HOFMEISTER		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT			CKD D HOFMEISTER		OUTLINE, GENSET	
DIM	TOLERANCE		APVD D GILLETT	SITE CODE	OPTIONS	
X ± 1	0.00- 4.99 +0.15/-0.08		DATE 10APR18			
.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	SCALE	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FIRST USED ON	PGF	CAD SHEET	
± 1.0°	3:16		ARROW	D	A060G756	3 of 3



# Connect Series Accessories

## Batteries

Part Number	Standby/Cold	Group	Compatibility
<b>A052Y816</b>	Standby Battery	51R – 450 CCA	RS13A, RS17A, RS20A
<b>0416-1051</b>	Standby Battery	26 – 530 CCA	RS22, RS25, RS30, RS36, RS40, RX30, RX36, RX40, RX45, RX50, RX60
<b>A045P632</b>	Cold Starting	34 – 850 CCA	RS22, RS25, RS30, RS36, RS40, RX30, RX36, RX40, RX45, RX50, RX60
<b>A045P632</b>	Standby Battery	34 – 850 CCA	RS50, RS60, RS80, RS100 RS125 *, RS150 *
<b>A030Y976</b>	Cold Starting	4D – 1050 CCA	RS50, RS60, RS80, RS100

\* - For Cold Starting, these generators take 2 of these batteries

## Battery Accessories

### Battery Heater Kits

Improves cold weather starting performance. Requires external power source connected to heater.

Part Number	Compatibility	Kit Includes
<b>A046G494</b>	RS22, RS25, RS30, RS36, RS40 RX30, RX36, RX40, RX45, RX50, RX60	Heater pad with build-in thermostat, cable ties, instruction sheet
<b>A052E356</b>	RS50, RS60, RS80, RS100	Heater pad with build-in thermostat, cable ties, instruction sheet
<b>A054X752</b>	RS125, RS150	Heater pad with build-in thermostat, cable ties, instruction sheet



A046G494

### Battery Tray Kits

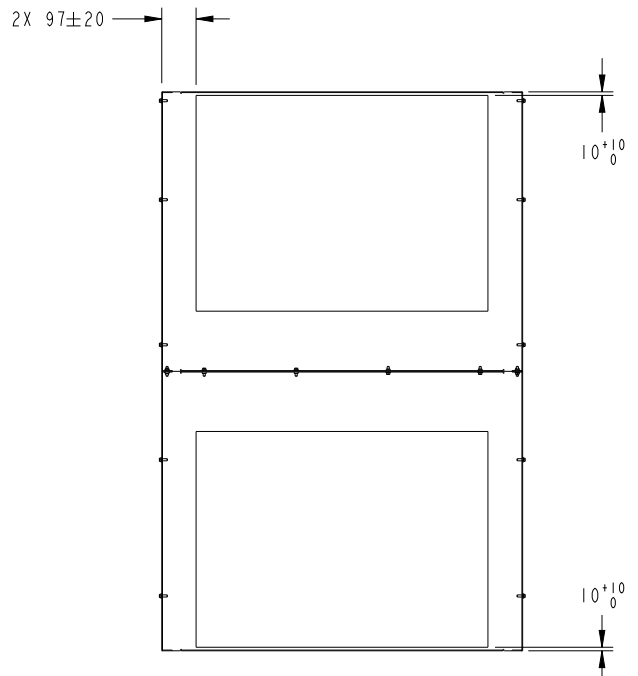
Larger tray which allows for installation of larger battery in place of the standard battery.

Part Number	Compatibility	Kit Includes
<b>A052A484</b>	RS50, RS60, RS80, RS100	Battery tray, battery strap, screws, grommet, tie cable

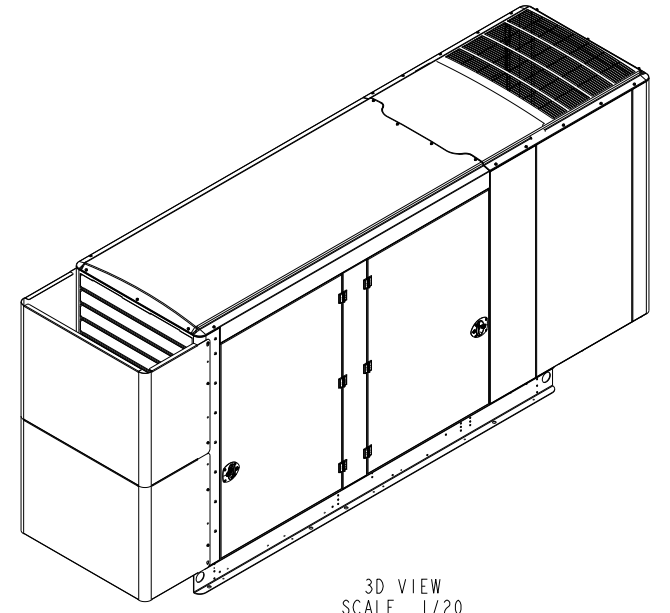
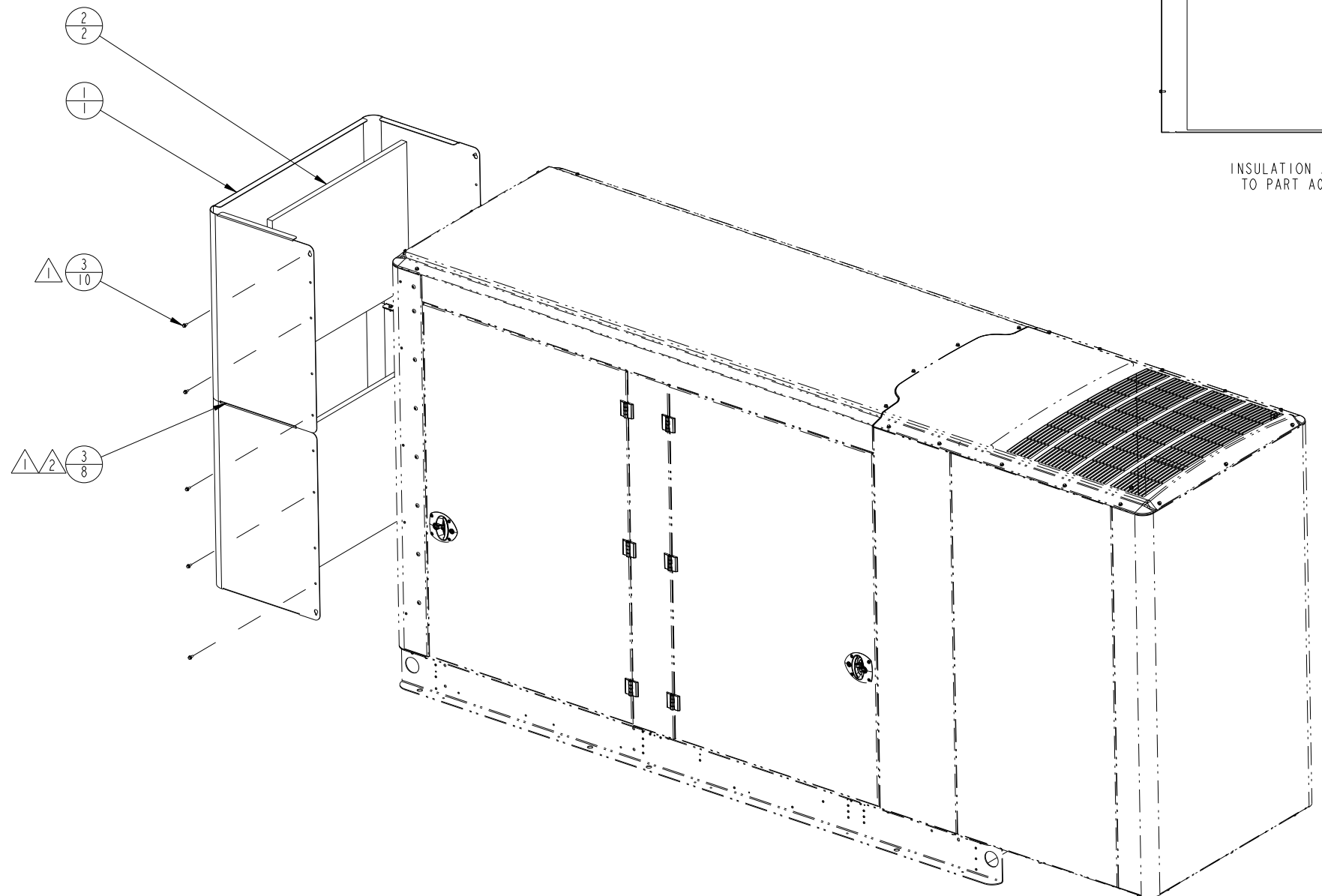
REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-182895	A	1	PRODUCTION RELEASE	DAH	DAH	GILLETT	30 JAN 18

NOTE:

- 1. TORQUE TO 6 - 8 Nm.
- 2. HARDWARE IN THIS LOCATION FOR HOLDING DUCT PIECES TOGETHER.

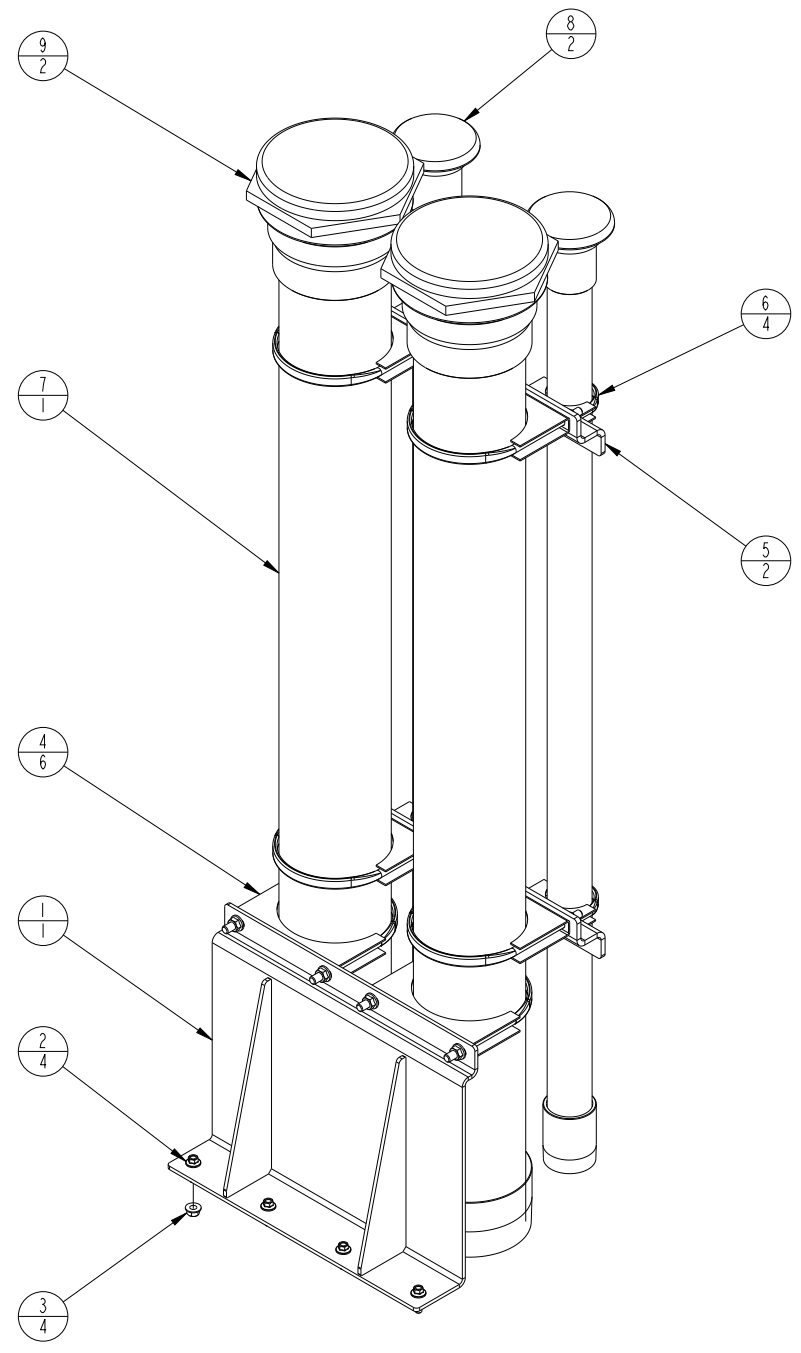


INSULATION ATTACHED TO PART A062J646



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO A054F439	DWN D HOFMEISTER		CUMMINS POWER GENERATION
DO NOT SCALE PRINT		CKD D HOFMEISTER	APVD D GILLETT		INSTALLATION, ENCLOSURE
ANG TOL	SCALE	DATE 30 JAN 18		SITE CODE	
± 1.0°	1/10	FIRST USED ON ARROW		PGF	
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				CAD SHEET	1 of 1

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-177313	A	1	PRODUCTION_RELEASE	RAH	GBS	G.STAFFENHAGEN	03MAY18



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SHW TO A057C503	DWN R_HALVERSON		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT			CKD G_STAFFENHAGEN		KIT, FUEL SYSTEM	
DIM	X ± 1 .X ± 0.8 .XX ± 0.38	TOL	APVD G_STAFFENHAGEN	SITE CODE	VENT EXTENSION - 4FT-5 INCH DIA	
ANG TOL	± 1.0°	SCALE	DATE 03MAY18	PGF	DWG NO A060M240	CAD SHEET 1 of 1
<small>THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC. © 2018 CUMMINS INC.</small>			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	ARROW		

# *Section 5 – Startup & Warranty*



## Cummins Sales and Service

### Customer / Contractor Pre Commissioning Inspection Form

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

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

Project Name/End User: \_\_\_\_\_

Contractor: \_\_\_\_\_

Address: \_\_\_\_\_ Contact: \_\_\_\_\_

Business Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

#### **ON SITE INFORMATION**

On-Site Contact Information: \_\_\_\_\_

Address: \_\_\_\_\_

Time Requested Onsite: \_\_\_\_\_

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

Does the facility have the following:    Loading Dock    Elevator

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

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

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

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

    If yes when is the inspector scheduled for: \_\_\_\_\_



**ON SITE INFORMATION CONTINUED**

YES	NA	NO

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

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

Will customer representative be on site for operator training?  
On site contact for operator training: \_\_\_\_\_

**MECHANICAL LOCATION AND PLACEMENT OF THE GENERATOR SET**

YES	NA	NO

Generator is properly secured to pad or vibration isolators

Generator Enclosure and/or Room is free of all debris

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

Room is designed for adequate inlet and outlet airflow

**GASEOUS FUEL Natural Gas/LP Vapor/LP Liquid**

YES	NA	NO

Natural gas and/or LPG fuel supply is connected.

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

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

Fuel pressure after service regulator is: \_\_\_\_\_ inches of H2O

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

\_\_\_\_\_  
**Contractor "requestor" Signature**

\_\_\_\_\_  
**Date**

### DIESEL FUELED GENERATORS

YES    NA    NO


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

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

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

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

### EXHAUST SYSTEM

YES    NA    NO


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

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

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

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

### GENERATOR ELECTRICAL CONNECTIONS

YES    NA    NO


Load conductors connected to breakers

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

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

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

Ground fault connected/functioning on generator, if supplied

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

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

Generator is grounded in compliance with local codes

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

### GENERATOR ELECTRICAL CONNECTIONS CONTINUED

YES    NA    NO


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

Where is annunciator located? \_\_\_\_\_

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

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

### TRANSFER SWITCH ELECTRICAL CONNECTIONS

YES    NA    NO


Conductors connected for Utility, Load and Emergency

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

Four Pole Transfer Switch: Is generator neutral grounded?

### DAY OF STARTUP

YES    NA    NO


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

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

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

Exercise with or without load? \_\_\_\_\_

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

\_\_\_\_\_  
Contractor "requestor" Signature

\_\_\_\_\_  
Printed Name

Date: \_\_\_\_\_

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



# Warranty Statement

## Global Commercial Warranty Statement

Generator Set

## Limited Warranty

### Commercial Generating Set

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

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

### Warranty Period:

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

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

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

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

**Emergency Standby Power (ESP)** is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 500 hours of operation per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

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

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

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

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

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

### Cummins Power Generation® Responsibilities:

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

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

### Owner Responsibilities:

The owner will be responsible for the following:

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

**Limitations:**

This limited warranty does not cover Product failures resulting from:

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

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

This limited warranty does not cover costs resulting from:

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

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

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

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

**CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:**

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

**Extended Warranty:**

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

[www.power.cummins.com](http://www.power.cummins.com)

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

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

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

Product Model Number: \_\_\_\_\_  
 Product Serial Number: \_\_\_\_\_  
 Date in Service: \_\_\_\_\_