



RECORD ONLY SUBMITTAL PACKAGE

TURNKEY INDUSTRIES 2-500KW INVENTORY

Prepared For:

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The information presented in this submittal package has been approved
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Opportunity # O-765292

BMS# 41961

Customer PO# TKI-2500CH



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IMPORTANT: *The critical power solution information and specifications included in this pdf can be used by the site contractor(s) and/or engineer(s) to assist with planning for and accomplishing the overall power solution installation. Please forward this document to the appropriate personnel, as necessary.*

It is the obligation of the electrical contractor and reviewing engineer to determine that the item quantities and accuracy of this submittal is correct as required for the job. Any inaccuracies or deviations must be addressed with Cummins Inc. before release to manufacturing. Any releases of material to manufacturing by the above parties constitute an acceptance of the accuracy of the submittal. Any changes after release will be viewed as a change order, subject to pricing changes. Please take the time to review this package for accuracy to prevent any after-shipment problems that could cause delay in energization.

Cummins certifies that these drawings, material lists, specification and datasheets have been checked prior to submittal and they:

- accurately depict the proposed equipment*
- provide current information to the date of the submittal and*
- present true and accurate equipment information.*

This Approval Drawing Package is submitted as our interpretation of the project requirements and/or the specifications for this job. Please note that issuance of these submittals shall not be deemed or interpreted as performance nor acceptance of your purchase order terms and conditions.

For questions or comments regarding this submittal, please contact the Cummins Project Manager listed on the title page.

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SECTION 1

Project Information



Bill of Material

Feature Code	Description	Qty
DFEK	DFEK Commercial Diesel Generator Set, 500kW Standby 60Hz	1
500DFEK	500DFEK, Diesel Genset, 60Hz, 500kW-Standby Rating	
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
A331-2	Duty Rating - Standby Power (ESP)	
L170-2	Emission Certification, EPA, Tier 2, NSPS CI Stationary Emergency	
0220	None - Standards & Compliance	
0170	None - Vibration Isolators	
R002-2	Voltage - 277/480, 3 Phase, Wye, 4 Wire	
B246-2	Alternator - 60Hz, 12 Lead, Limited Range, 125/105C	
A292-2	Alternator Heater, 120 Volt AC	
F201-2	Steel Sound Attenuated Level 1 Enclosure, with Exhaust System	
P175-2	Enclosure Color - Green, Steel	
F209-2	Rain Hood-Cooling Air Inlet	
C205-2	Fuel Tank - Sub Base, 660 Gallon, UL142 Compliant	
L163-2	Listing, ULC - S601-07	
C127-2	Fuel Water Separator	
H609-2	Control Mounting - Left Facing	
H703-2	PowerCommand 2.3 Controller	
H678-2	LCD Control Display	
H536-2	Control Display Language - English	
KU94-2	Circuit Breaker or Entrance Box or Terminal Box - Right Only	
3250	Circuit Breaker or Entrance Box or Terminal Box, Left - None	
KC62-2	Circuit Breaker - 800A, Right Circuit Breaker on Right side, 3 - Pole, UL 600, IEC 690 100%	
3251	Circuit Breaker or Entrance Box or Terminal Box, Left - None	
KB72-2	Circuit Breaker or Entrance Box - Bottom Entry, Right Side	
4980	Engine Exhaust Connection - None	
D041-2	Engine Air Cleaner - Normal Duty	
B786-2	External Battery Charger - 12 Amp, Regulated	
E082-2	Engine Cooling - Radiator, 40C Ambient	
H389-2	Shutdown - Low Coolant Level	
H556-2	Coolant Heater - 208/240/480 Volts AC, 40F Minimum Ambient Temperature	
H487-2	Engine Oil Heater - 120 Volts AC, Single Phase	
L028-2	Genset Warranty - 2 Years Base	
L050-2	Literature - English	
A412-2	Packing - None, Base Mounted Housing	
DFEK	DFEK Commercial Diesel Generator Set, 500kW Standby 60Hz	1
500DFEK	500DFEK, Diesel Genset, 60Hz, 500kW-Standby Rating	
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
A331-2	Duty Rating - Standby Power (ESP)	
L170-2	Emission Certification, EPA, Tier 2, NSPS CI Stationary Emergency	
0220	None - Standards & Compliance	
0170	None - Vibration Isolators	
R002-2	Voltage - 277/480, 3 Phase, Wye, 4 Wire	

B246-2	Alternator - 60Hz, 12 Lead, Limited Range, 125/105C	
A292-2	Alternator Heater, 120 Volt AC	
F200-2	Steel Weather Protective Enclosure, with Exhaust System	
P175-2	Enclosure Color - Green, Steel	
F209-2	Rain Hood-Cooling Air Inlet	
C205-2	Fuel Tank - Sub Base, 660 Gallon, UL142 Compliant	
L163-2	Listing, ULC - S601-07	
C127-2	Fuel Water Separator	
H609-2	Control Mounting - Left Facing	
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H487-2	Engine Oil Heater - 120 Volts AC, Single Phase	
L028-2	Genset Warranty - 2 Years Base	
L050-2	Literature - English	
A412-2	Packing - None, Base Mounted Housing	

SECTION 2

Generator Specifications





Diesel generator set QSX15 series engine

450 kW – 500 kW Standby



Description

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

Features

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

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

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

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

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

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

Fuel tanks - Dual wall sub-base fuel tanks are also available.

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

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

	Standby rating	Prime rating	Continuous rating	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz
DFEJ	450 (563)	410 (513)		D-3400
DFEK	500 (625)	455 (569)		D-3401

Generator set specifications

Governor regulation class	ISO 8528 part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
EMS compatibility	IEC 61000-4-2: Level 4 Electrostatic discharge IEC 61000-4-3: Level 3 Radiated susceptibility

Engine specifications

Design	Turbocharged with air-to-air charge air-cooling
Bore	136.9 mm (5.39 in.)
Stroke	168.9 mm (6.65 in.)
Displacement	14.9 L (912.0 in ³)
Cylinder block	Cast iron with replaceable wet liners, in-line 6 cylinder
Battery capacity	1400 Amps minimum at ambient temperature 0 °C (32 °F)
Battery charging alternator	35 Amps
Starting voltage	24 volt, negative ground
Fuel system	Full authority electronic (FAE) Cummins HPI-TP
Fuel filter	
Air cleaner type	
Lube oil filter type(s)	Single spin-on combination full flow and bypass filters
Standard cooling system	40 °C (104 °F) ambient radiator

Alternator specifications

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

Available voltages

60 Hz Line – Neutral/Line - Line

- | | | | |
|-----------|-----------|-----------|-----------|
| • 110/190 | • 110/220 | • 115/200 | • 115/230 |
| • 120/208 | • 127/220 | • 139/240 | • 220/380 |
| • 230/400 | • 240/416 | • 255/440 | • 277/480 |
| • 347/600 | | | |

Note: Consult factory for other voltages.

Generator set options

Engine

- 208/240/480 V thermostatically controlled coolant heater for ambient above 4.5 °C (40 °F)
- 208/240/480 V thermostatically controlled coolant heater for ambient below 4.5 °C (40 °F)
- 120 V 300 W lube oil heater
- Heavy duty air cleaner with safety element

Alternator

- 80 °C rise
- 105 °C rise
- 150 °C rise
- 120/240 V 200 W anti-condensation heater

Exhaust system

- Critical grade exhaust silencer
- Exhaust packages
- Industrial grade exhaust silencer
- Residential grade exhaust silencer

Fuel system

- 1022 L (270 gal) sub-base tank
- 1136 L (300 gal) sub-base tank
- 1514 L (400 gal) sub-base tank
- 1893 L (500 gal) sub-base tank
- 2271 L (600 gal) sub-base tank
- 2498 L (660 gal) sub-base tank
- 3218 L (850 gal) sub-base tank
- 6435 L (1700 gal) sub-base tank
- 9558 L (2525 gal) sub-base tank

Cooling system

- High ambient 50 °C radiator

Control panel

- PC 3.3
- PC 3.3 with MLD
- 120/240 V 100 W control anti-condensation heater
- Ground fault indication
- Remote fault signal package
- Run relay package

Generator set

- AC entrance box
- Battery
- Battery charger
- Export box packaging
- UL 2200 Listed
- Main line circuit breaker
- Paralleling accessories
- Remote annunciator panel
- Spring isolators
- Enclosure: aluminium, steel, weather protective or sound attenuated
- 2 year standby power warranty
- 2 year prime power warranty
- 5 year basic power warranty
- 10 year major components warranty

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

Control system 2.3

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

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

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

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

Control boards - Potted for environmental protection.

Ambient operation - Suitable for operation in ambient temperatures from -40 °C to +70 °C and altitudes to 13,000 feet (5000 meters). Prototype tested - UL, CSA and CE compliant.

AC protection

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

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning

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

Operator/display panel

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

Alternator data

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

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature

Control functions

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

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

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

Other data

- Genset model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)
- Total kilowatt hours
- Load profile

Options

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

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

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

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):

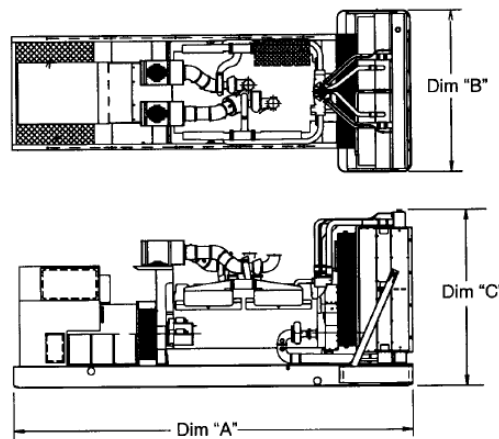
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

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 mm	Set weight wet* kg (lbs)
DFEJ	3864	4234 (9335)
DFEK	3864	4461 (9835)

Refer to drawings for specific weights and dimensions

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

Codes and standards

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

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		The generator set is available listed to UL 2200, Stationary Engine Generator Assemblies for all 60 Hz low voltage models. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.
	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.	U.S EPA	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
	All low voltage models are CSA certified to product class 4215-01.	International Building Code	The generator set package is available certified for seismic application in accordance with the following International Building Code: IBC2000, IBC2003, IBC2006, IBC2009 and IBC2012.

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

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Generator set data sheet



Model: DFEK
Frequency: 60 Hz
Fuel type: Diesel
kW rating: 500 Standby
 455 Prime
Emissions level: EPA NSPS Stationary Emergency Tier 2

Exhaust emission data sheet:	EDS-173
Exhaust emission compliance sheet:	EPA-1005
Sound performance data sheet:	MSP-177
Cooling performance data sheet:	MCP-105
Prototype test summary data sheet:	PTS-145
Standard set-mounted radiator cooling outline:	0500-3326
Optional set-mounted radiator cooling outline:	
Optional heat exchanger cooling outline:	
Optional remote radiator cooling outline:	

Fuel consumption	Standby				Prime				Continuous
	kW (kVA)				kW (kVA)				kW (kVA)
Ratings	500 (625)				455 (569)				
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full	Full
US gph	11.6	18.8	25.7	34.4	10.9	17.6	23.7	30.4	
L/hr	44	71	97	130	41	67	90	115	

Engine	Standby rating	Prime rating	Continuous rating
Engine manufacturer	Cummins Inc.		
Engine model	QSX15-G9		
Configuration	Cast iron with replaceable wet cylinder liners, in-line 6 cylinder		
Aspiration	Turbocharged with air-to-air charge air-cooling		
Gross engine power output, kWm (bhp)	563.0 (755.0)	507.3 (680.0)	
BMEP at set rated load, kPa (psi)	2433.9 (353.0)	2213.2 (321.0)	
Bore, mm (in.)	136.9 (5.39)		
Stroke, mm (in.)	168.9 (6.65)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	10.1 (1995.0)		
Compression ratio	17.0:1		
Lube oil capacity, L (qt)	83.3 (88.0)		
Overspeed limit, rpm	2150 ± 50		
Regenerative power, kW	52.00		

Fuel flow	Standby rating	Prime rating	Continuous rating
Maximum fuel flow, L/hr (US gph)	423.9 (112.0)		
Maximum inlet restriction, mm Hg (in Hg)	127.0 (5.0)		
Maximum return restriction, mm Hg (in Hg)	165.1 (6.5)		

Air			
Combustion air, m ³ /min (scfm)	41.6 (1470.0)	38.8 (1370.0)	
Maximum air cleaner restriction, kPa (in H ₂ O)	6.2 (25.0)		
Alternator cooling air, m ³ /min (scfm)	62.0 (1290.0)		

Exhaust			
Exhaust flow at set rated load, m ³ /min (cfm)	102.6 (3625.0)	88.7 (3135.0)	
Exhaust temperature, °C (°F)	482.8 (901.0)	466.7 (872.0)	
Maximum back pressure, kPa (in H ₂ O)	10.2 (41.0)		

Standard set-mounted radiator cooling			
Ambient design, °C (°F)	40 (104)		
Fan load, kW _m (HP)	19 (25.5)		
Coolant capacity (with radiator), L (US gal)	57.9 (15.3)		
Cooling system air flow, m ³ /min (scfm)	707.5 (25000.0)		
Total heat rejection, MJ/min (Btu/min)	19.6 (18485.0)	17.7 (16680.0)	
Maximum cooling air flow static restriction, kPa (in H ₂ O)	0.12 (0.5)		

Optional set-mounted radiator cooling			
Ambient design, °C (°F)	50 (122)		
Fan load, kW _m (HP)	19 (25.5)		
Coolant capacity (with radiator), L (US gal)	57.9 (15.3)		
Cooling system air flow, m ³ /min (scfm)	707.5 (25000.0)		
Total heat rejection, MJ/min (Btu/min)	19.6 (18485.0)	17.7 (16680.0)	
Maximum cooling air flow static restriction, kPa (in H ₂ O)	0.12 (0.5)		

Optional heat exchanger cooling			
Set coolant capacity, L (US Gal.)			
Heat rejected, jacket water circuit, MJ/min (Btu/min)			
Heat rejected, after-cooler circuit, MJ/min (Btu/min)			
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated room, MJ/min (Btu/min)			
Maximum raw water pressure, jacket water circuit, kPa (psi)			
Maximum raw water pressure, after-cooler circuit, kPa (psi)			
Maximum raw water pressure, fuel circuit, kPa (psi)			
Maximum raw water flow, jacket water circuit, L/min (US gal/min)			
Maximum raw water flow, after-cooler circuit, L/min (US gal/min)			
Maximum raw water flow, fuel circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, jacket water circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, after-cooler circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, fuel circuit, L/min (US gal/min)			

Derating factors

Standby	Genset may be operated at up to 1400 m (4593 ft) and 40°C (104°F) without power deration. For sustained operation above these conditions, derate by 3.1% per 305 m (1000 ft), and 9% per 10°C (9% per 18°F). Genset may be operated at up to 500 m (1640 ft) and 50°C (122°F) without power deration. For sustained operation above these conditions, derate by 3% per 305 m (1000 ft), and 9.5% per 10°C (9% per 18°F).
Prime	Genset may be operated at up to 2250 m (7382 ft) and 40°C (104°F) without power deration. For sustained operation above these conditions, derate by 3.2% per 305 m (1000 ft), and 16.6% per 10°C (16.6% per 18°F). Genset may be operated at up to 1600 m (5249 ft) and 50°C (122°F) without power deration. For sustained operation above these conditions, derate by 3.2% per 305 m (1000 ft), and 16.6% per 10°C (16.6% per 18°F).
Continuous	

Ratings definitions

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

Alternator data

Three phase table ¹		105 °C	105 °C	105 °C	125 °C	125 °C	125 °C	125 °C	125 °C	150 °C
Feature code		B262	B301	B252	B258	B252	B414	B246	B300	B413
Alternator data sheet number		308	307	307	308	307	308	306	306	307
Voltage ranges		110/190 thru 139/240 220/380 thru 277/480	347/600	120/208 thru 139/240 240/416 thru 277/480	110/190 thru 139/240 220/380 thru 277/480	120/208 thru 139/240 240/416 thru 277/480	120/208 thru 139/240 240/416 thru 277/480	277/480	347/600	120/208 thru 139/240 240/416 thru 277/480
Surge kW		514	517	514	514	514	516	515	515	514
Motor starting kVA (at 90% sustained voltage)	Shunt									
	PMG	2429	2208	2208	2429	2208	2429	1896	1896	2208
Full load current - amps at Standby rating		<u>110/190</u> 1901	<u>120/208</u> 1737	<u>110/220</u> 1642	<u>115/230</u> 1571	<u>139/240</u> 1505	<u>220/380</u> 951	<u>230/400</u> 903	<u>240/416</u> 868	<u>277/480</u> 753

Note:

¹ Single phase power can be taken from a three phase generator set at up to 40% of the generator set nameplate kW rating at unity 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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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 $\pm 0.25\%$ for any steady state load from no load to full load. Frequency drift will not exceed $\pm 0.5\%$ for a $33\text{ }^{\circ}\text{C}$ ($60\text{ }^{\circ}\text{F}$) change in ambient temperature over an 8 hour period.

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

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

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

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

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

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

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

Alternator Control

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

Major system features include:

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

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

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

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

Protective Functions

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

Battle Short Mode

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

Derate

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

Configurable Alarm and Status Inputs

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

Emergency Stop

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

Full Authority Electronic Engine Protection

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

General Engine Protection

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

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

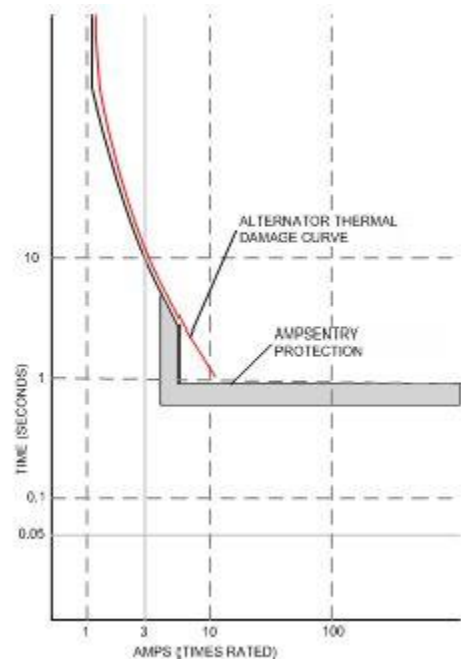
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crank sequence.

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

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

Alternator Protection

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

Field Control Interface

Input signals to the PowerCommand control include:

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

Output signals from the PowerCommand control include:

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

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

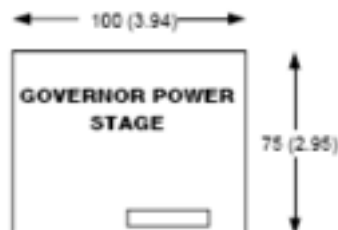
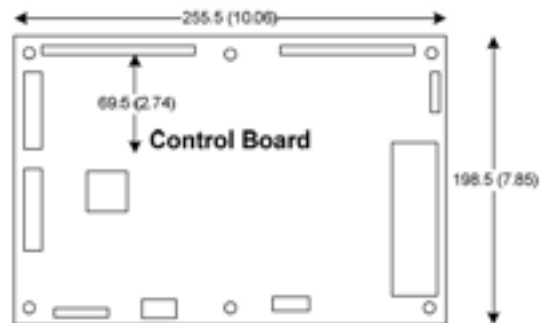
Communications Connections Include:

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

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

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

Mechanical Drawings



PowerCommand Human Machine Interface HMI320



Description

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

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

Features

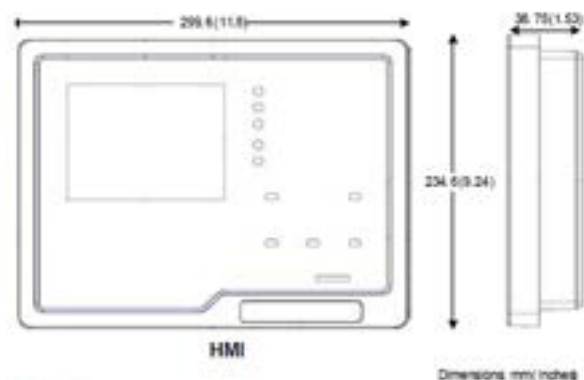
- LED indicating lamps:
 - Genset running
 - Remote start
 - Not in auto
 - Shutdown
 - Warning
 - Auto
 - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.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

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

Communications connections include:

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

Mechanical Drawing



Software

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

Environment

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

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

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

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

Certifications

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

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

Warranty

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



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Enclosures and Tanks

250-1000 kW Gensets



Enclosure Standard Features

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

Options

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

Fuel Tanks

Standard sub-base tank features

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

Sub-base tank options

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

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

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

Operating hours are measured at 60 Hz, standby rating.

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

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

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

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

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

Genset model	Weather protective enclosure (F200, F203)	QuietSite level 1 sound attenuated enclosure (F201, F204)	QuietSite level 2 sound attenuated enclosure (F202, F205)
250 DQDAA	90	88	72
275 DQDAB	90	88	73
300 DQDAC	90	88	73
300 DQHAB	89	88	76
450 DFEJ	88	85	74
500 DFEK	89	87	73
600 DQCA	90.6/86*	79.3/78*	74.1/73*
600 DQPAA	89.10	80.70	74.70
650 DQPAB	89.70	81.40	75
750 DQCB	91.1/87*	79.9/79*	75.3/74*
750 DQFAA	87.8	77.8	73.8
800 DQCC	91.3/87*	80.2/79*	75.7/74*
800 DQFAB	88.1	78.3	74
900 DQFAC	88.8	79.1	74.6
1000 DQFAD	89.6	80.1	75.3

- All data is 60 Hz, full load standby rating, steel enclosures only.

- Data is a measured average of 8 positions.

- Sound levels for aluminium enclosures are approximately 2 dB(A) higher than listed sound levels for steel enclosures.

* Sound data with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD)

Package Dimensions of Enclosure, Exhaust System, and UL Tank

250-500 kW

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

600-1000 kW

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

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



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



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

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

Our energy working for you.™





2025 EPA Tier 2 Exhaust Emission Compliance Statement 500DFEK Stationary Emergency 60 Hz Diesel Generator Set

Compliance Information:

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

Engine Manufacturer: Cummins Inc.
EPA Certificate Number: SCEXL015.AAJ-017
Effective Date: 11/12/2024
Date Issued: 11/12/2024
EPA Engine Family (Cummins Emissions Family): SCEXL015.AAJ

Engine Information:

Model: QSX/QSX15/QSX15-G/QSX15-G9 Bore: 5.39 in. (137 mm)
Engine Nameplate HP: 755 Stroke: 6.65 in. (169 mm)
Type: 4 Cycle, In-line, 6 Cylinder Diesel Displacement: 912 cu. in. (15 liters)
Aspiration: Turbocharged and CAC Compression ratio: 17.0:1
Emission Control Device: Electronic Control Exhaust stack diameter: 8 in. (203 mm)

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	<u>NO_x + NMHC</u>	<u>CO</u>	<u>PM</u>	<u>NO_x + NMHC</u>	<u>CO</u>	<u>PM</u>
EPA Emissions Limit	4.8	2.6	0.15	6.4	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 Sulfur

Reference conditions: Air Inlet Temperature: 25 °C (77 °F), Fuel Inlet Temperature: 40 °C (104 °F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H₂O/lb) of dry air; required for NO_x 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.



Exhaust Emission Data Sheet

500DFEK

60 Hz Diesel Generator Set
EPA NSPS Stationary Emergency

Engine Information:

Model:	Cummins Inc. QSX15-G9 NR 2	Bore:	5.39 in. (137 mm)
Nameplate BHP @ 1800 RPM:	755	Stroke:	6.65 in. (169 mm)
Type:	4 cycle, in-line, 6 cylinder diesel	Displacement:	912 cu. in. (14.9 liters)
Aspiration:	Turbocharged with air-to-air charge air cooling		
Compression Ratio:	17:1		
Emission Control Device:	Turbocharged with charge air-cooled		

	<u>1/4</u>	<u>1/2</u>	<u>3/4</u>	<u>Full</u>	<u>Full</u>
<u>Performance Data</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>	<u>Prime</u>
Engine HP @ Stated Load (1800 RPM)	202	379	555	732	668
Fuel Consumption (gal/Hr)	11.3	18.7	25.8	34.7	30.6
Exhaust Gas Flow (CFM)	1400	2150	2730	3625	3160
Exhaust Gas Temperature (°F)	745	830	820	900	880

Exhaust Emission Data

HC (Total Unburned Hydrocarbons)	0.24	0.09	0.07	0.14	0.12
NOx (Oxides of Nitrogen as NO ₂)	3.24	3.65	4.64	4.43	4.04
CO (Carbon Monoxide)	0.57	0.34	0.40	0.39	0.36
PM (Particulate Matter)	0.09	0.05	0.05	0.02	0.02
Smoke (Pierburg)	0.52	0.44	0.42	0.21	0.20

All values (except smoke) are cited: g/BHP-hr

Test Methods and Conditions

Steady-state emissions recorded per ISO8178-1 during operation at rated engine speed (+/- 2%) and stated constant load (+/- 2%) with engine temperatures, pressures and emission rated stabilized.

Fuel specification:	40-48 Cetane Number, 0.05 Wt.% max. Sulfur; Reference ISO8178-5, 40CFR86.1313-98 Type 2-D and ASTM D975 No. 2-D.
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 ₂ O/lb) of dry air (required for NOx correction)
Intake Restriction:	Set to maximum allowable limit for clean filter
Exhaust Back Pressure:	Set to maximum allowable limit

Data was taken from a single engine test according to the test methods, fuel specification and reference conditions stated above and is subjected to instrumentation and engine-to-engine variability. Tests conducted with alternate test methods, instrumentation, fuel or reference conditions can yield different results.



Sound data

500DFEK

60Hz Diesel

Sound pressure level @ 7 meters, dB(A)

See notes 1-8 listed below

Configuration		Measurement location number								Average
		1	2	3	4	5	6	7	8	
Standard – unhoused	Infinite exhaust	89	92	92	91	88	91	91	93	91
F183 – residential muffler	Mounted muffler	88	90	90	89	88	88	88	90	89
F200 – weather	Mounted muffler	91	90	85	88	89	88	85	91	89
F201 – quiet site II first stage	Mounted muffler	90	89	84	83	79	81	83	90	87
F202 – quiet site II second stage	Mounted muffler	71	73	71	72	73	74	74	73	73

Sound power level, dB(A)

See notes 2-6, 9, 10 listed below

Configuration		Octave band center frequency (Hz)								Overall sound power level
		63	125	250	500	1000	2000	4000	8000	
Standard – unhoused (note 3)	Infinite exhaust	82	98	104	109	112	113	111	113	119
F183 – residential muffler	Mounted muffler	105	114	115	111	108	108	102	101	119
F200 – weather	Mounted muffler	101	108	106	110	112	111	107	102	118
F201 – quiet site II first stage	Mounted muffler	101	108	105	108	111	109	106	99	116
F202 – quiet site II second stage	Mounted muffler	84	93	93	96	98	99	96	89	104

Exhaust sound power level, dB(A)

Open exhaust (no muffler) @ rated load	Octave band center frequency (Hz)								Overall sound power level
	63	125	250	500	1000	2000	4000	8000	
	103	119	125	123	125	126	127	121	133

Note:

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



PROTOTYPE TEST SUPPORT (PTS) 60 HZ TEST SUMMARY



GENERATOR SET MODELS	REPRESENTATIVE PROTOTYPE
450DFEJ	Model: 500DFEK
500DFEK	Engine: QSX15-G9
	Alternator: HC5F

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

Maximum Surge Power: 516 KW

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

Maximum Motor Starting: 2429 KVA

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

Torsional Analysis and Testing:

The generator set was tested to verify that the design is not subjected to harmful torsional stresses in excess of 5000psi. A spectrum analysis of the transducer output was conducted over the speed range of 1200 to 2000 RPM.

Cooling System: 50 °C Ambient
0.50 in. H2O restriction

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

Durability:

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

Electrical and Mechanical Strength:

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

Steady State Performance:

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

Voltage Regulation:	±0.5%
Random Voltage Variation:	±0.3%
Frequency Regulation:	Isochronous
Random Frequency Variation:	±0.25%

Transient Performance:

The generator set was tested with the standard alternator to verify single step loading capability as required by NFPA 110. Verify acceptable Voltage and frequency response on load addition or rejection were evaluated. The following results were recorded:

Full Load Acceptance:

Voltage Dip:	30.1 %
Recovery Time:	3.6 Second
Frequency Dip:	9.9 %
Recovery Time:	3.8 Second

Full Load Rejection:

Voltage Rise:	12.8 %
Recovery Time:	3.8 Second
Frequency Rise:	3.2 %
Recovery Time:	1.5 Second

Harmonic Analysis:

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

Line to Line

Line to Neutral

Harmonic	No Load	Full Load	No Load	Full Load
3	0.1	0.1	0.1	0.1
5	0.3	1.2	0.3	1.1
7	0.4	1.1	0.4	1.0
9	0.0	0.0	0.0	0.0
11	0.7	0.9	0.6	0.8
13	0.2	0.3	0.1	0.2
15	0.0	0.0	0.0	0.0



Cooling system data

500DFEK 60Hz

40 Degree C ambient radiator cooling system

Duty		Rating (kW)	Max cooling @ air flow static restriction, unhoused (inches water/mm water)					Housed in free air, no air discharge restriction			
			0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	F183	F200	F201	F202
			Maximum allowable ambient temperature, degree C								
60 Hz	Standby	500	43	43	43	43	40	43	43	43	43
	Prime	455	43	43	43	43	39	N/A	N/A	N/A	N/A
50 Hz	Standby	440	43	43	43	43	43	N/A	N/A	N/A	N/A
	Prime	400	43	43	43	43	43	N/A	N/A	N/A	N/A

50 Degree C ambient radiator cooling system

Duty		Rating (kW)	Max cooling @ air flow static restriction, unhoused (inches water/mm water)					Housed in free air, no air discharge restriction			
			0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	F183	F200	F201	F202
			Maximum allowable ambient temperature, degree C								
60 Hz	Standby	500	53	52	52	46	40	55	54	54	53
	Prime	455	53	52	52	43	39	N/A	N/A	N/A	N/A
50 Hz	Standby	440	55	55	55	55	54	N/A	N/A	N/A	N/A
	Prime	400	55	55	55	55	53	N/A	N/A	N/A	N/A

Notes:

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



Alternator Data Sheet

Frame Size: HC5D

Characteristics			1-bearing weight			2-bearing weight			
Weights:	Stator assembly:		1448 lb	657 kg	1448 lb	657 kg			
	Rotor assembly:		1241 lb	563 kg	1179 lb	535 kg			
	Complete assembly:		3071 lb	1393 kg	3075 lb	1395 kg			
Maximum speed:			2250 rpm						
Excitation current:	Full load:		2.6 Amps						
	No load:		0.6 Amps						
Insulation system:	Class H throughout								
3 Ø Ratings (0.8 power factor)			60 Hz (winding no)						
			<u>190/380</u> (311)	<u>208/416</u> (311)	<u>220/440</u> (311)	<u>230/460</u> (311)	<u>240/480</u> (311)	<u>240 Delta</u> (311)	<u>347/600</u> (17)
163° C rise ratings	@27C	kW	N/A	485	515	538	555	485	555
		kVA	N/A	606	644	673	694	606	694
150° C rise ratings	@40C	kW	428	470	500	524	540	470	540
		kVA	535	588	625	655	675	588	675
125° C rise ratings	@40C	kW	420	460	475	500	515	460	515
		kVA	525	575	594	625	644	575	644
105° C rise ratings	@40C	kW	376	415	430	450	470	415	470
		kVA	470	519	538	563	588	519	588
80° C rise ratings	@40C	kW	328	360	376	396	412	360	412
		kVA	410	450	470	495	515	450	515
3 Ø Reactances (per unit ± 10%)			<u>190/380</u> (311)	<u>208/416</u> (311)	<u>220/440</u> (311)	<u>230/460</u> (311)	<u>240/480</u> (311)	<u>240 Delta</u> (311)	<u>347/600</u> (17)
(Based on full load at 125° C rise rating)									
Synchronous			3.85	3.52	3.25	3.13	2.96	3.52	2.96
Transient			0.18	0.17	0.16	0.15	0.14	0.17	0.14
Subtransient			0.13	0.12	0.11	0.11	0.10	0.12	0.10
Negative sequence			0.25	0.22	0.20	0.20	0.19	0.22	0.19
Zero sequence			0.11	0.10	0.09	0.09	0.08	0.10	0.08
3 Ø Motor Starting (90% sustained voltage)			<u>190/380</u> (311)	<u>208/416</u> (311)	<u>220/440</u> (311)	<u>230/460</u> (311)	<u>240/480</u> (311)	<u>240 Delta</u> (311)	<u>347/600</u> (17)
Maximum kVA			1896	1896	1896	1625	1896	1896	1896
Time Constants (sec)			<u>190/380</u> (311)	<u>208/416</u> (311)	<u>220/440</u> (311)	<u>230/460</u> (311)	<u>240/480</u> (311)	<u>240 Delta</u> (311)	<u>347/600</u> (17)
Transient			0.080	0.080	0.080	0.080	0.080	0.080	0.080
Subtransient			0.012	0.012	0.012	0.012	0.012	0.012	0.012
Open circuit			2.2	2.2	2.2	2.2	2.2	2.2	2.2
DC			0.018	0.018	0.018	0.018	0.018	0.018	0.018
Windings (@22° C)			<u>190/380</u> (311)	<u>208/416</u> (311)	<u>220/440</u> (311)	<u>230/460</u> (311)	<u>240/480</u> (311)	<u>240 Delta</u> (311)	<u>347/600</u> (17)
Stator resistance	(Ohms L-L)		0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098
Rotor resistance	(Ohms)		1.77	1.77	1.77	1.77	1.77	1.77	1.77
Number of leads			12	12	12	12	12	12	12



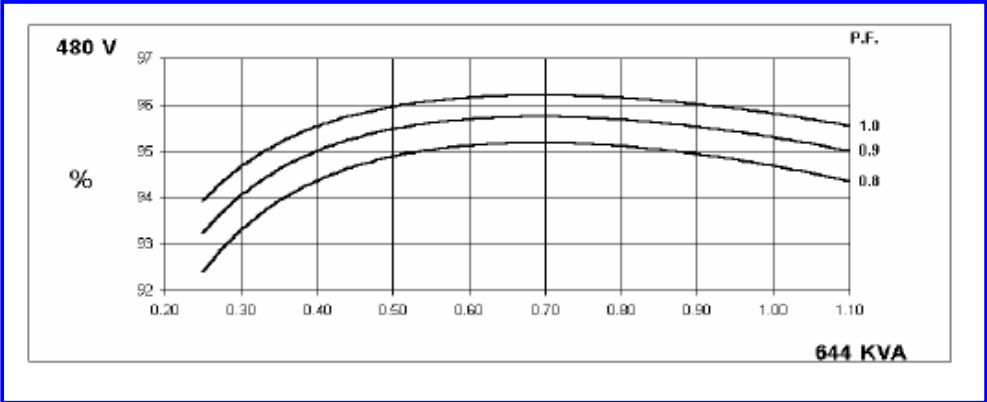
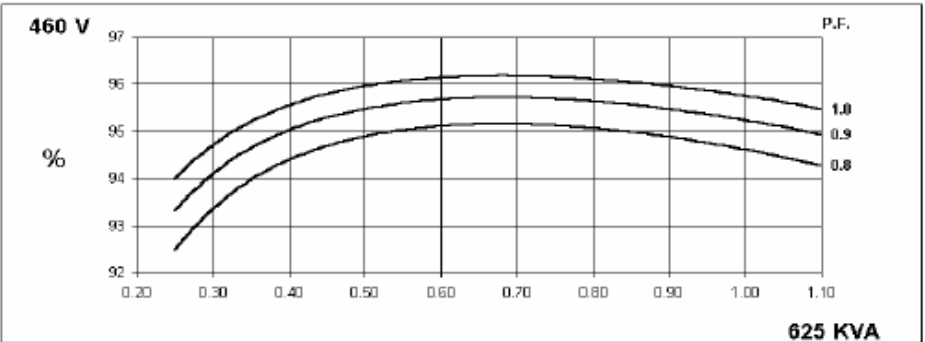
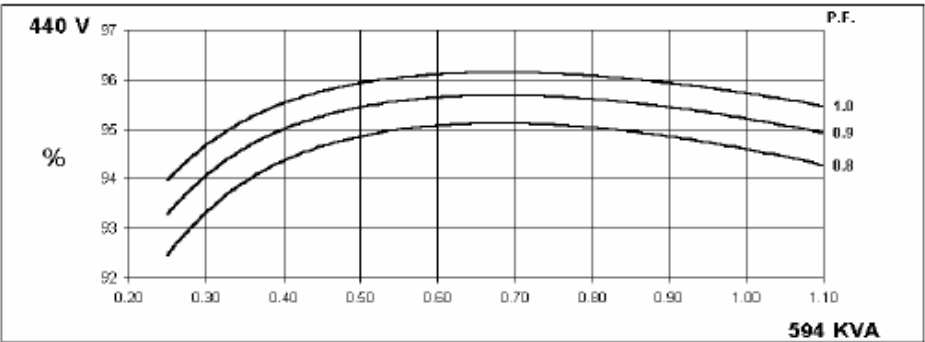
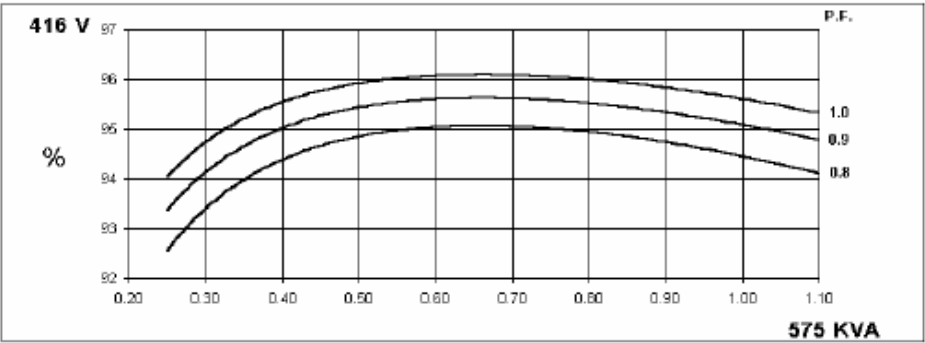
Alternator Data Sheet
Frame Size: HC5D

60
Hz

HCI534D/544D

Winding 311

THREE PHASE EFFICIENCY CURVES





Alternator Data Sheet
Frame Size: HC5D

HC1534D/544D

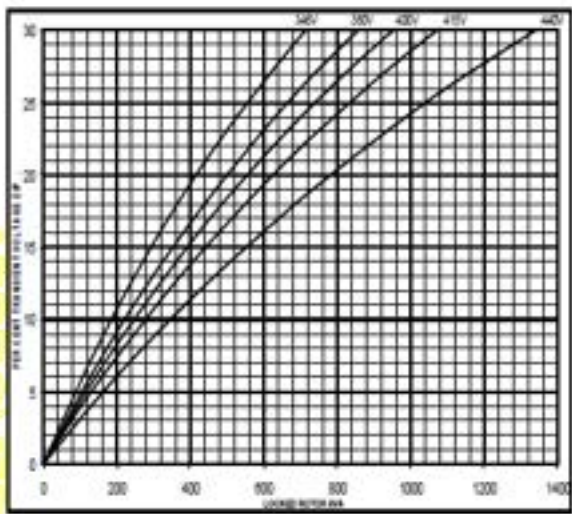
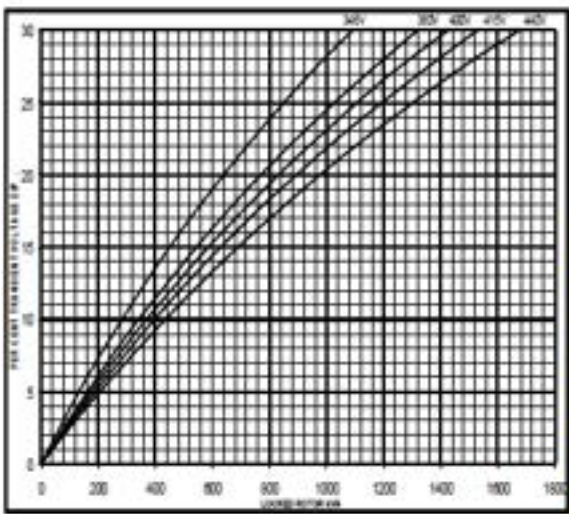
Winding 311

Locked Rotor Motor Starting Curve

50
Hz

MX

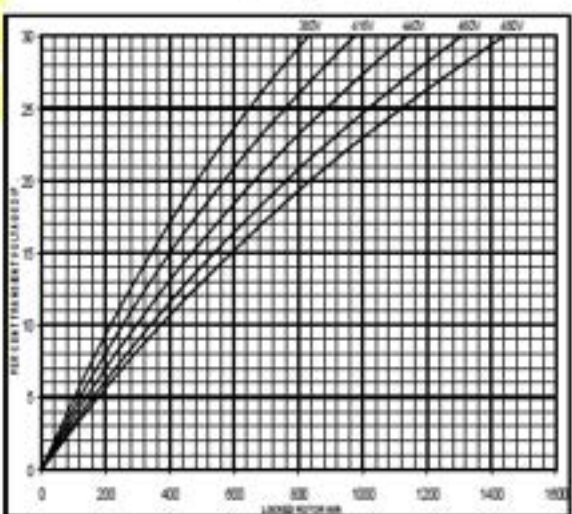
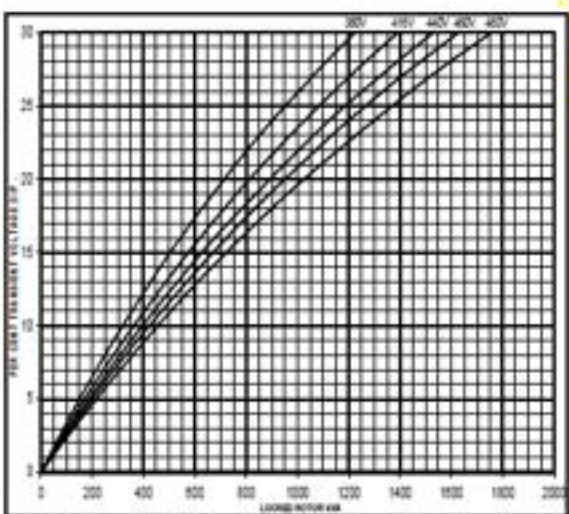
SX



60
Hz

MX

SX



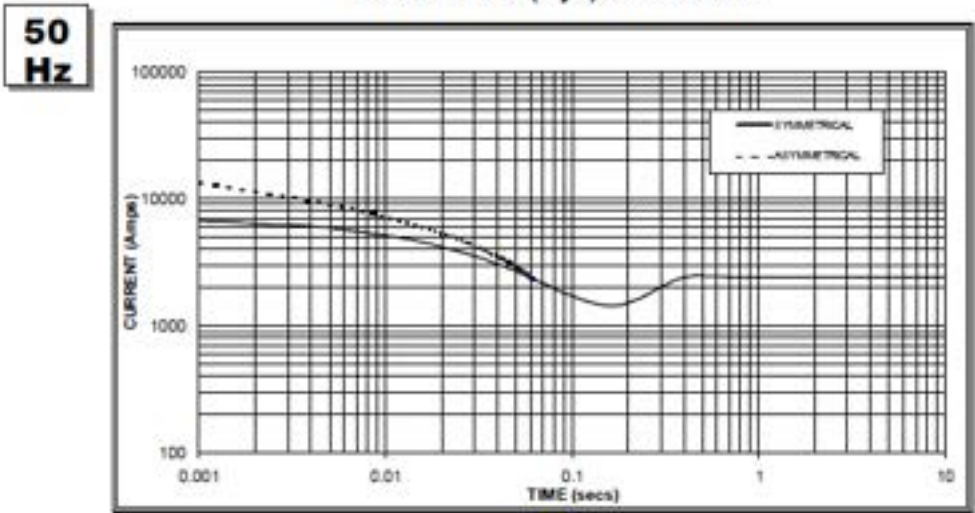


Alternator Data Sheet
Frame Size: HC5D

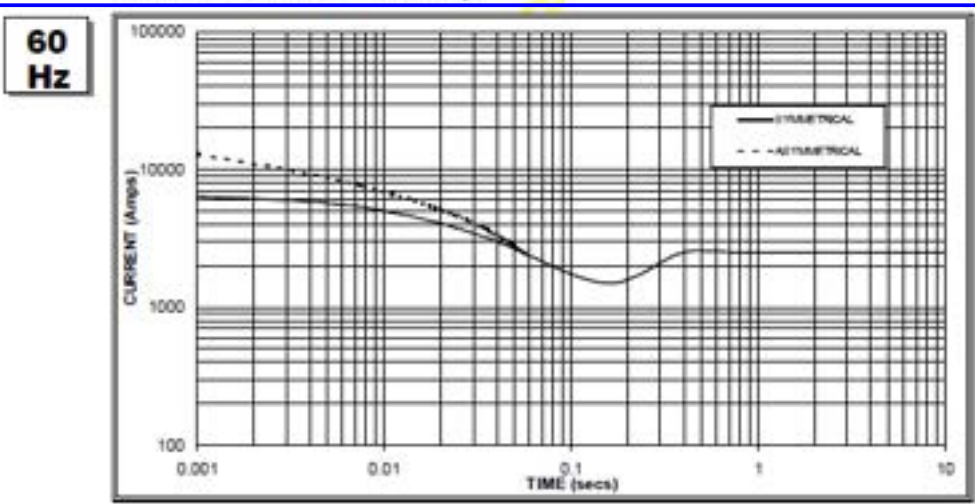
HC1534D/544D

Winding 311

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



Sustained Short Circuit = 2,400 Amps



Sustained Short Circuit = 2,500 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 1.06	440v	X 1.06
415v	X 1.09	460v	X 1.12
440v	X 1.12	480v	X 1.20

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

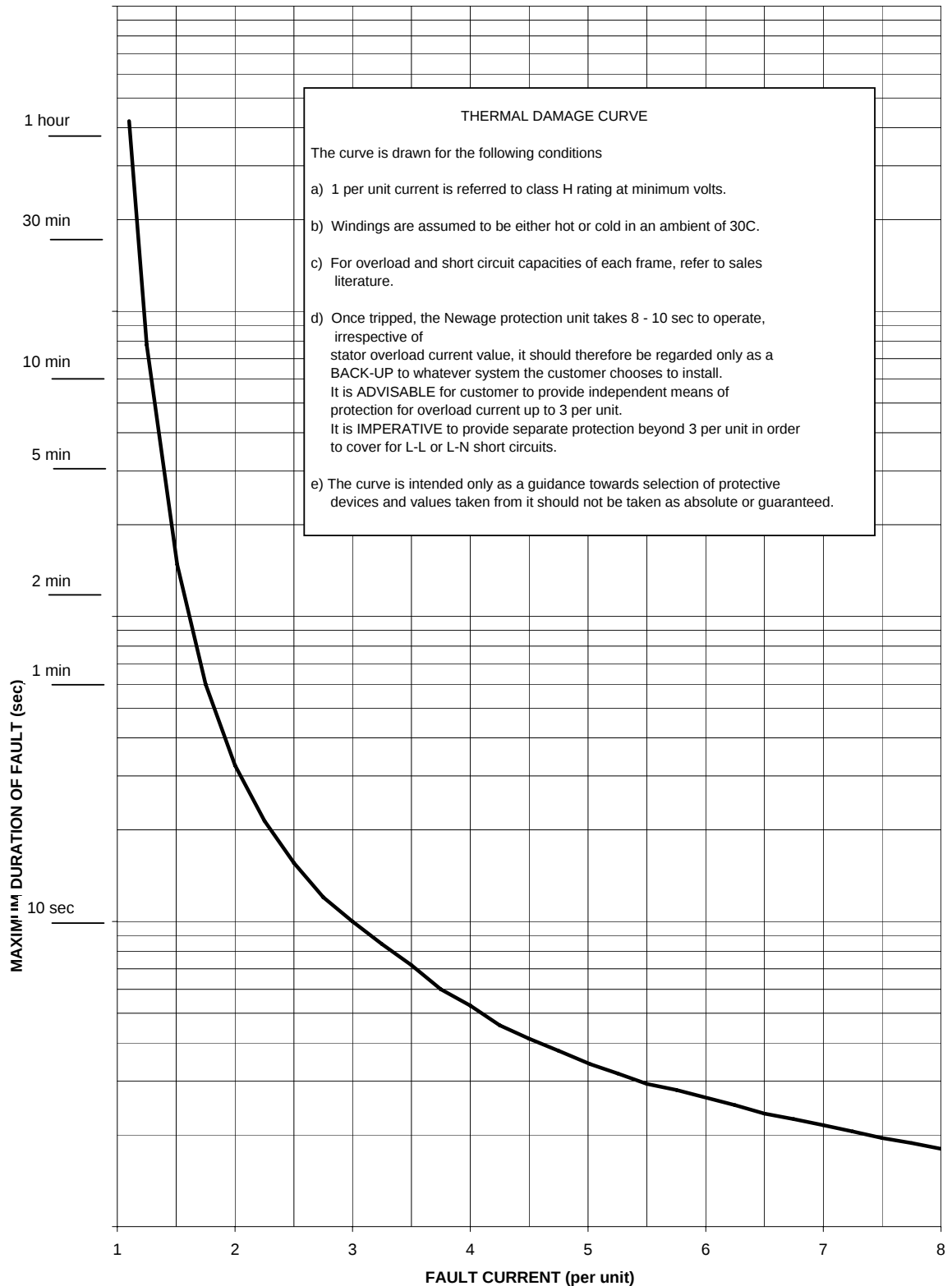
Note 3

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

THERMAL DAMAGE CURVE



SECTION 3

Generator Accessories



Four-stage battery charger

15 amp @ 12 volt

12 amp @ 24 volt



> **Specification sheet**

Our energy working for you.™



Description

Cummins Power Generation fully automatic battery chargers - using switched mode power electronics - 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 trickle, bulk, absorption and float. The trickle stage safely charges overly discharged batteries. It protects a damaged or shorted battery from excessive current. During bulk charge a constant current is applied to quickly restore the maximum battery charge level in the shortest amount of time. The absorption stage applies a constant voltage to the battery to bring the battery to 100% capacity. The float stage tailors the constant voltage output to maintain the battery at full capacity while serving DC operated loads.

An optional temperature sensor may be used to adjust charging rate based on internal battery temperature in the absorption and float stages. Use of a battery temperature sensor helps to increase battery life by preventing over or under charging of the battery. The battery temperature sensor also protects the battery from overheating. Temperature compensation is recommended in all applications, but is particularly valuable for generator sets in outdoor applications.

Battery chargers are field-configurable for charging either 12 or 24 VDC battery systems and for operation at 50 or 60 Hz. Output voltage and battery type selection is done through the alphanumeric display.

Features

Protection - All models include a 20 amp DC output breaker. Re-settable breakers are used for input voltages 240 VAC and lower. For over 240 VAC branch circuit rated fuses are used.

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 configuration options are indicated on the alphanumeric display.

Monitoring - An LED indicates the condition of the charger. Green indicates normal charging operation, amber indicates equalizing and red indicates a fault condition.

Adjustable float voltage - Float voltage can be set through the alpha-numeric display for optimum battery performance and life.

Temperature compensation - An optional external sensor is available for temperature compensated battery charging.

Faults - The charger senses and annunciates the following fault conditions: Input overvoltage, input undervoltage, AC power loss, battery overvoltage, battery undervoltage, charger circuitry over temperature, battery over temperature, unrecoverable battery and overload/overcurrent. Includes 30 volt/2 amp isolated contact for common alarm.

Parallel redundant operation - Chargers can be operated in parallel for redundant reliability or additional charging capacity.

Vibration resistant design - complies with UL 991 vibration resistance requirements.

UL 1236 (BBHH) Listing - for use with lead acid batteries in generator set installations. Also suitable for use with NiCad, gel and AGM batteries.

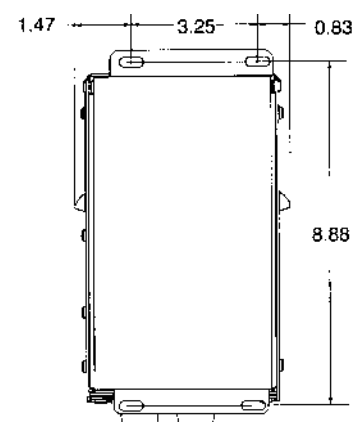
Specifications

Performance and physical characteristics

Output:	Nominal voltage	12 or 24 VDC
	Float voltage – 12 V batteries	12.8, 13.0, 13.3, 13.5, 13.6, 14.3
	Float voltage – 24 V batteries	25.7, 26.1, 26.6, 27.0, 27.2, 28.6
	Equalize-voltage	15.5 or 31.0 VDC
	Output voltage regulation	±1%
	Maximum output current	15 A @ 12 VDC or 12 A @ 24 VDC
Input:	Equalize charger time	0-12 hrs
	Voltage AC	120, 208, 240, 277, 380, 416, 480, 600
	Frequency	50 or 60 Hz
Approximate net weights:		11.6 lbs (5.3 Kg)
Approximate dimensions: height x width x depth - in (mm)		9.75 x 5.56 x 6.14 (248 x 141 x 156)
Ambient temperature operation:		-22 °F to 122 °F (-30 °C to 50 °C)



Input volts	Genset kit part number	ATS kit part number
120/208/240	0300-5878-01	0300-5878-13
277	0300-5878-02	0300-5878-14
380	0300-5878-03	0300-5878-15
416	0300-5878-04	0300-5878-16
480	0300-5878-05	0300-5878-17
600	0300-5878-06	0300-5878-18
Temperature sensor kit	0541-0918	0541-0918



Enclosure

The NEMA 1, corrosion resistant, aluminum enclosure is designed for wall mounting. When wall mounted, louvers protect cooling holes in the sides of the enclosure. Use 1/4 in (6.35 mm) diameter bolts for mounting.

Mounting dimensions – inches
Bottom view

RFI/EMI and voltage surge compliance

Charger complies with the requirements of EN61000-4-5 for voltage surge resistance, EN50082-2 (heavy industrial) for immunity, EN61000-4-2 for ESD, EN61000-4-3 for radiated immunity, ANSI/IEEE C62.41 Category B & EN 61000-4-4 for electrically fast transient, EN61000-4-6 for conducted, and FCC Part 15 Class A for emissions.

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Phone 65 6417 2388
Fax 65 6417 2399

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

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

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www.cumminspower.com

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S-1470d (5/08) Page 2 of 2



CUMMINS PREMIUM®

C34-HC

KEEP YOUR DAY POWERED WITH QUALITY AND DURABILITY.

Cummins offers batteries of outstanding performance and battery warranties for any transport which needs to resist high or low temperatures.

- 12-volt, heavy-duty commercial battery.
- Reliable battery for any weather.
- 18-month free replacement.
- Anchor bonded for vibration resistance.
- Sealed and reinforced polypropylene case.
- Maintenance free plate materials.



SPECIFICATIONS

Group Size	34
Terminal BCI Figure	SAE
Voltage	12
CCA 0°F (-18°C) (SAE-Standard)	800
CA 32°F (0°C) (SAE-Standard)	1000
RC @80°F (27°C) (SAE-Standard)	110
Ampere Hour	46
Weight (lb)	38.1
Electrolyte Quantity Gallons	0.916
Electrolyte Quantity Fluid Ounces	117.3

BATTERY DIMENSIONS

Terminal BCI Figure	Length: 10 5/16"	W	
 SAE	Width: 6 13/16"	L	
	Height: 7 13/16"	H	

*This battery is only available for purchase in the US

TYPE OF ELECTROLYTE

- Sulfuric Acid
- Water
- Solution

SDS #UN2794

For more information contact us: 1-800-CUMMINS™

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Product data sheet

Specifications

SQUARE D

Green Premium™



Circuit breaker, PowerPacT P, 800A, 3 pole, 600VAC, 25kA, lugs, Micrologic 3.0, type F plug

PJP36080U31F

Main

Range	PowerPact
Product name	PowerPact P
Product or Component Type	Circuit breaker
Device Application	Distribution

Complementary

Line Rated Current	800 A
Number of Poles	3P
Control type	Toggle
Breaking capacity code	J
Breaking capacity	AIR 100 kA 240 V AC 50/60 Hz UL 489 AIR 65 kA 480 V AC 50/60 Hz UL 489 AIR 25 kA 600 V AC 50/60 Hz UL 489 Icu 65 kA 240 V AC 50/60 Hz IEC 60947-2 Icu 50 kA 380/415 V AC 50/60 Hz IEC 60947-2
[Ue] rated operational voltage	600 V AC 50/60 Hz UL 489
Network Frequency	50/60 Hz
[Ics] rated service breaking capacity	35 kA 240 V AC 50/60 Hz IEC 60947-2 25 kA 380/415 V AC 50/60 Hz IEC 60947-2
[Uimp] rated impulse withstand voltage	8 kV IEC 60947-2
Trip unit technology	Electronic, standard, MicroLogic 3.0, LI
[Ui] rated insulation voltage	750 V IEC 60947-2
Trip unit name	MicroLogic 3.0
Accessory / separate part type	Plug
AWG gauge	Please see CB outline drawing for lug and termination details
Local signalling	Overload 1 1 LED amber) 1 trip indicator green)
Mounting mode	Unit mount lug)
Mounting Support	Lug
Electrical connection	Terminal nut line Lugs load

Terminal identifier	Please see CB outline drawing for lug and termination details
Long time pick-up adjustment range	0.4...1 x Ir
Tightening torque	442.54 lbf.in (50 N.m) 0.15...0.37 in² (95...240 mm²) (3 x AWG 3/0...500 kcmil) 8.85...11.51 lbf.in (1.0...1.3 N.m)
Number of slots	2 auxiliary switch OF plug-in) 1 alarm switch SD plug-in) 1 overcurrent trip switch SDE plug-in) 1 voltage release MN or MX plug-in)
Power wire stripping length	0.98 in (25 mm)
Height	12.86 in (326.64 mm)
Width	8.27 in (210.06 mm)
Depth	8.05 in (204.47 mm)
Net Weight	32 lb(US) (14.51 kg)
Quantity per Set	1
Circuit breaker application	HACR rated

Environment

Quality labels	CE
Standards	UL CSA NEMA NOM-003-SCFI-2000 IEC 60947-2
Product certifications	UL CSA NOM
IP degree of protection	Front cover IP40
Pollution degree	3 IEC 60947-1
Ambient air temperature for operation	28...158 °F (-2...70 °C)
Ambient Air Temperature for Storage	-58...185 °F (-50...85 °C)
Operating altitude	< 6561.68 ft (2000 m) without derating 13123.36 ft (4000 m) with derating

Ordering and shipping details

Category	01215-PG,H,J,K,L,N UNIT MT BREAKERS
Discount Schedule	DE2
GTIN	3606486285725
Returnability	Yes
Country of origin	US

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	11.75 in (29.845 cm)
Package 1 Width	11.63 in (29.528 cm)
Package 1 Length	20.25 in (51.435 cm)
Package 1 Weight	32.00 lb(US) (14.515 kg)

Offer Sustainability

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

Micrologic™ 3.0 Electronic Trip Unit

Instruction Bulletin

48049-207-05

Rev. 01, 07/2012

Retain for future use.



Section 1—General Information

Introduction

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

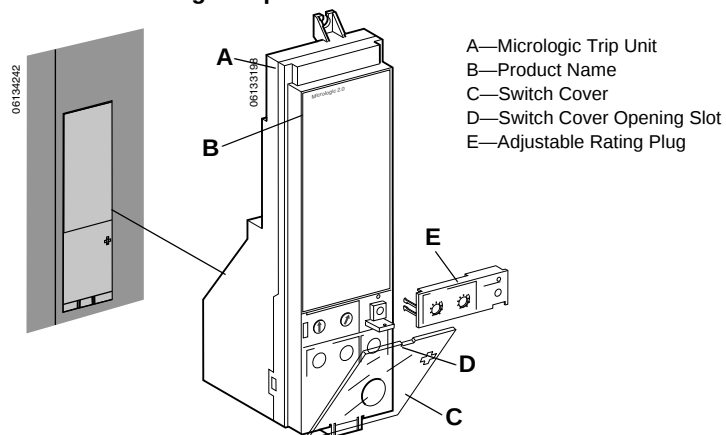
Micrologic 3.0 Trip Unit

- Type of protection
 - 2—Basic IEC protection (LS0)
 - 3—Basic UL protection (LI)
 - 5—Selective protection (LSI)
- Trip unit series
 - 0—Indicates the first version

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

Trip Unit Settings

Figure 1: Micrologic Trip Unit



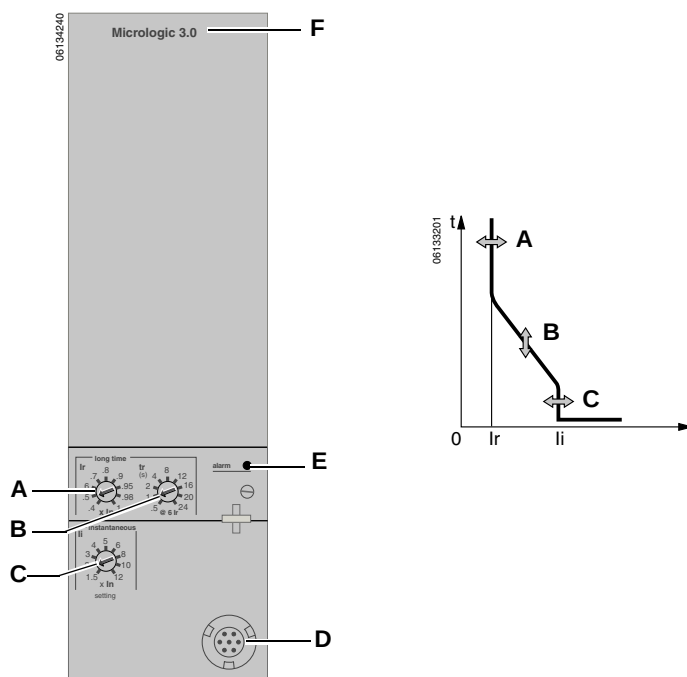
On the face of the trip unit are adjustable switches to allow changing of trip characteristics. Trip units are shipped with the long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings.

Micrologic 3.0 Trip Unit

The Micrologic 3.0 trip unit provides basic (LI) protection.

- A. Long-time pickup (I_r) switch
- B. Long-time delay (t_r) switch
- C. Instantaneous pickup (I_i) switch
- D. Test plug receptacle
- E. Overload indicator light
- F. Trip unit name

Figure 3: Micrologic 3.0 Trip Unit



Trip Unit Switches

Long-Time Protection

Long-time protection protects equipment against overloads.

- Long-time protection is standard on all trip units.
- The long-time pickup (Ir) (A) sets maximum current level (based on sensor plug rating In) which circuit breaker will carry continuously. If current exceeds this value, circuit breaker will trip after the preset time delay. The long-time pickup (Ir) is adjustable from 0.4–1.0 times the sensor plug rating (In).
- The long-time delay (tr) (B) sets the length of time that the circuit breaker will carry an overcurrent below the short-time or instantaneous pickup current level before tripping. See Table 1 for long-time delay settings.
- The overload indicator light (C) indicates that the Ir long-time pickup threshold has been exceeded.
- Both long-time pickup and long-time delay are on the field-replaceable adjustable rating plug. To change settings to more precisely match the application, various rating plugs are available. For instructions on replacing the rating plug, see Section 4—Adjustable Rating Plug Replacement.
- The In value can be changed by replacing the sensor plug below the trip unit. For further information, see the instructions packed with the sensor plug replacement kit.
- Long-time protection uses true RMS measurement.

Thermal imaging provides continuous temperature rise status of the wiring, both before and after the device trips. This allows the circuit breaker to respond to a series of overload conditions which could cause conductor overheating, but would go undetected if the long-time circuit was cleared every time the load dropped below the pickup setting or after every tripping event.

NOTE: If checking trip times, wait a minimum of 15 minutes after circuit breaker trips before resetting to allow the thermal imaging to reset completely to zero.

Figure 5: Long-Time Protection Switches

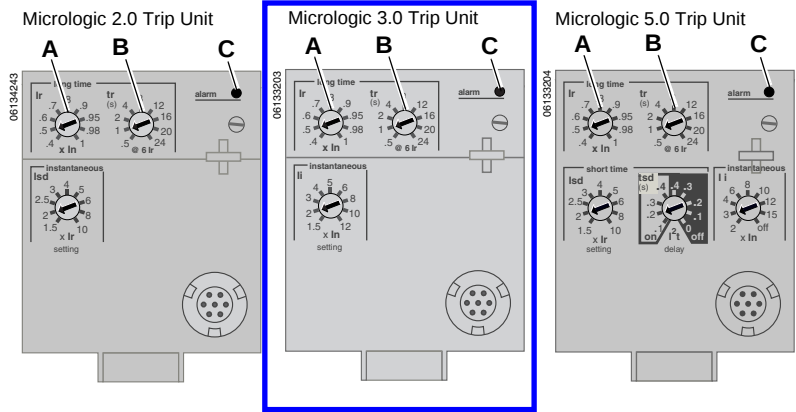


Table 1: Micrologic Trip Unit Long-Time Delay Values

Setting ¹	Long-Time Delay in Seconds ²								
tr at 1.5 x Ir	12.5	25	50	100	200	300	400	500	600
tr at 6 x Ir	0.5	1	2	4	8	12	16	20	24
tr at 7.2 x Ir	0.34 ³	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6

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

²Time-delay accuracy +0/-20%

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

Instantaneous Protection

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

- Instantaneous protection (Ii) (A) is standard on 3.0 and 5.0 trip units.*
- Instantaneous protection for 2.0 trip units is based on the circuit breaker sensor rating (Ir).
- Instantaneous protection for 3.0 and 5.0 trip units is based on the long-time delay pickup (In).
- Circuit breaker open command is issued as soon as threshold current is exceeded.
- Instantaneous protection for 3.0 and 5.0 trip units use peak current measurement. Instantaneous protection for 2.0 trip units use RMS current measurement.
- When instantaneous protection switch is set to off, the instantaneous protection is disabled.

*Instantaneous protection on 2.0 trip units is achieved by using short-time protection (Isd) with short-time delay factory set to 0 (zero).

Figure 7: Instantaneous Protection Switches

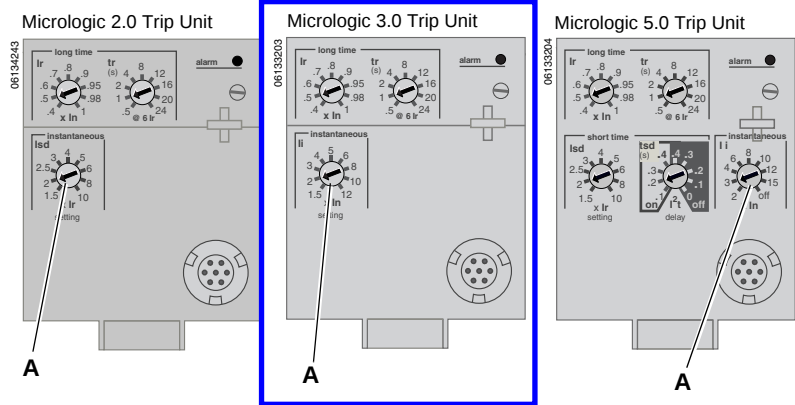


Table 3: Micrologic Instantaneous Values

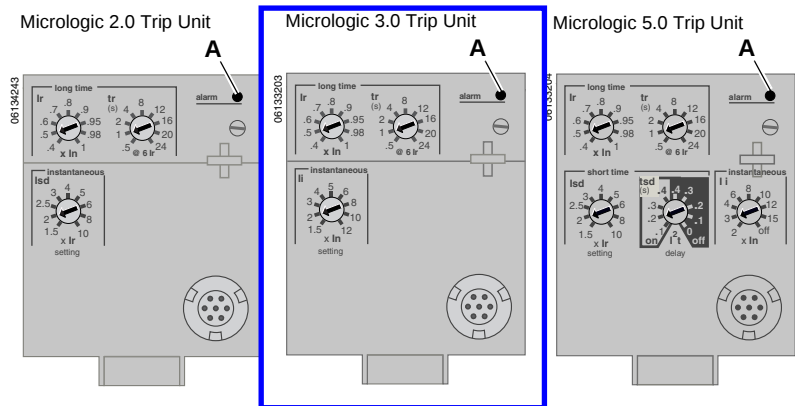
Setting	Interruption Current								
2.0 Isd (= Ir x..)	1.5	2	2.5	3	4	5	6	8	10
3.0 Ii (= In x..)	1.5	2	3	4	5	6	8	10	12
5.0 Ii (= In x..)	2	3	4	6	8	10	12	15	off

Ii = UL and ANSI instantaneous
Isd = IEC instantaneous (short-time with zero delay)
In = sensor rating
Ir = long-time pickup

Overload Indicator Light

The overload indicator light (A) lights when the Ir long-time pickup level has been exceeded.

Figure 8: Overload Indicator Lights



Trip Unit Testing

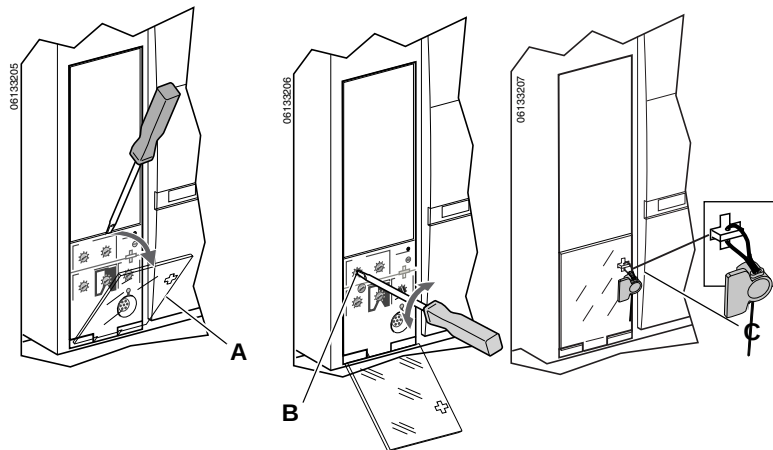
Trip unit functions can be tested using primary injection testing or secondary injection testing.

Section 2—Operation

Switch Adjustment

1. Open switch cover (A).
2. Adjust the appropriate switches (B) to desired values.
3. Replace switch cover. Use wire seal MICROTUSEAL (C), if necessary, to provide tamper evidence.

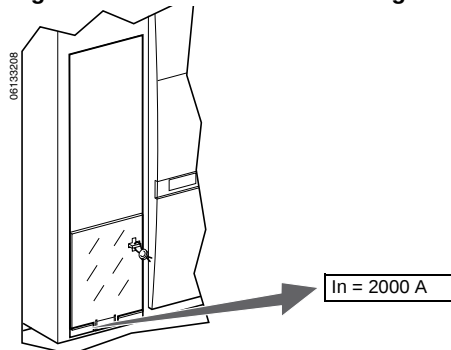
Figure 9: Adjust Switch Settings



Examples

Circuit breaker is rated 2000 A.

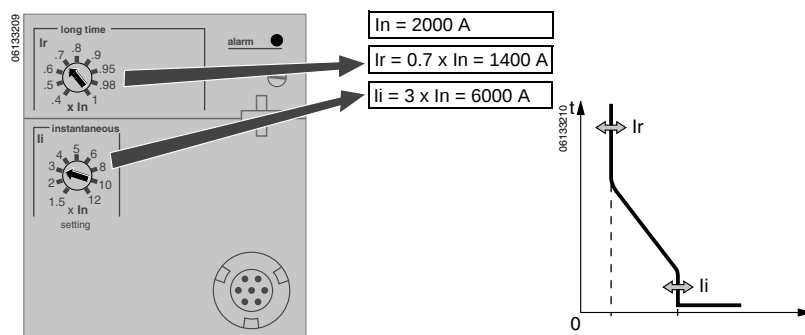
Figure 10: Circuit Breaker Rating



Micrologic 3.0 Trip Unit

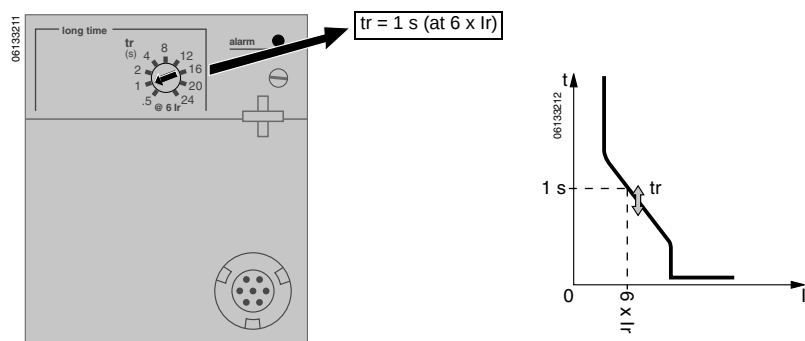
1. Set pickup levels.

Figure 13: Set Pickup Levels



2. Set time delay.

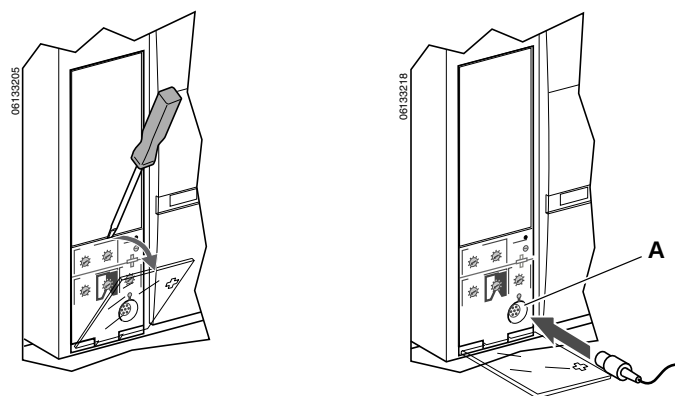
Figure 14: Set Time Delay



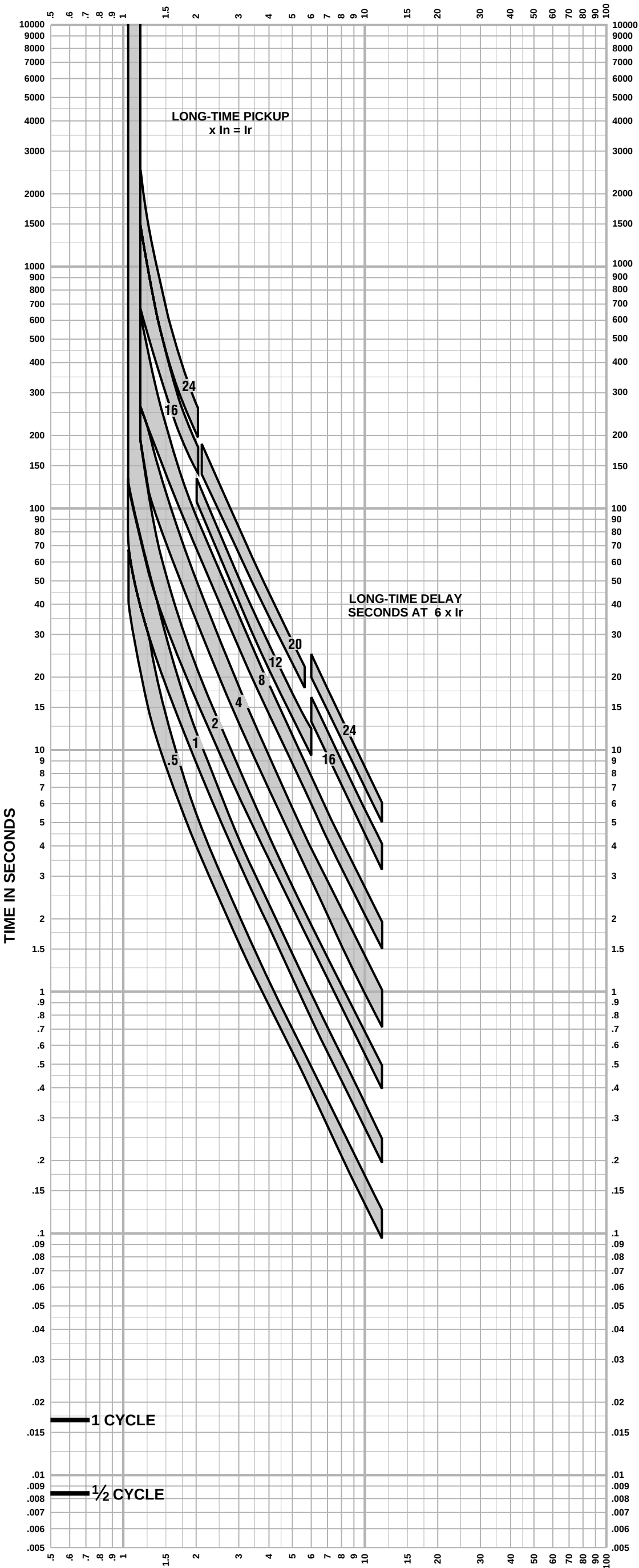
Trip Unit Operation Verification

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

Figure 17: Verify Trip Unit Operation

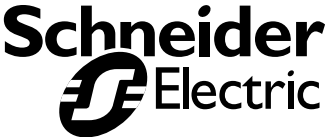


CURRENT IN MULTIPLES OF Ir (Ir = LONG-TIME SETTING x In)



CURRENT IN MULTIPLES OF Ir
(Ir = LONG-TIME SETTING x In)

Merlin Gerin
Modicon
Square D
Telemecanique
Federal Pioneer
Federal Pacific



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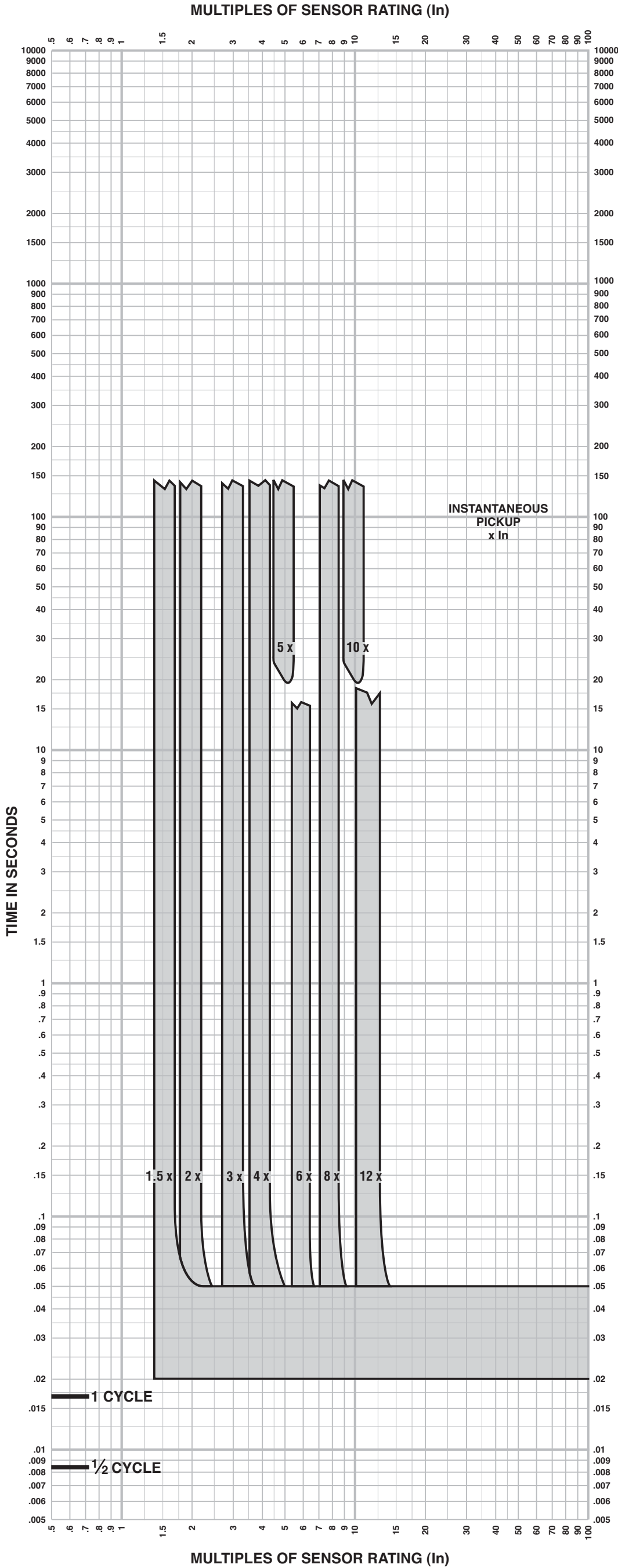
MICROLOGIC® 3.0 A TRIP UNIT
CHARACTERISTIC TRIP CURVE NO. 613-6

Long-time Pickup and Delay

The time-current curve information is to be used for application and coordination purposes only. Curves apply from -30°C to +60°C ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the instantaneous setting.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
4. See 613-8 for instantaneous pickup trip curve.



MICROLOGIC® 3.0 A TRIP UNIT
CHARACTERISTIC TRIP CURVE NO. 613-8
Instantaneous Pickup
1.5x-12x

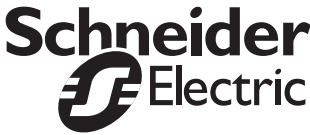
The time-current curve information is to be used for application and coordination purposes only.

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

Instantaneous override values are given on 613-10.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. See 613-6 for long-time pickup and delay trip curves.



INSTANTANEOUS OVERRIDE VALUES NO. 613-10

MASTERPACT NW/NT		MASTERPACT NW/NT		MASTERPACT NW/NT		POWERPACT / HORIZON / SELECT / COMPACT	
ANSI CB Model No.	Inst. Override (kA RMS) +/- 10%	UL CB Model No.	Inst. Override (kA RMS) +/- 10%	IEC CB Model No.	Inst. Override (kA RMS) +/- 10%	UL/IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N1 ★	24	NW08N ★	24	NW08N1	None	RG 600	57
NW08N1	None	NW08N	40	NW10N1	None	RG 800	57
NW16N1	None	NW12N	40	NW12N1	None	RG 1000	57
NW08H1 ★	24	NW16N	40	NW16N1	None	RG 1200	57
NW08H1	None	NW20N	40	NW08H1	None	RG 1600	57
NW16H1	None	NW08H ★	24	NW10H1	None	RG 2000	57
NW20H1	None	NW08H	40	NW12H1	None	RG 2500	57
NW32H1	None	NW12H	40	NW16H1	None	RJ 600	48▲
NW08H2 ★	24	NW16H	40	NW20H1	None	RJ 800	48▲
NW08H2	None	NW20H	40	NW25H1	None	RJ 1000	48▲
NW16H2	None	NW25H	65	NW32H1	None	RJ 1200	48▲
NW20H2	None	NW30H	65	NW40H1	None	RJ 1600	48▲
NW32H2	None	NW40H	75	NW50H1	None	RJ 2000	48▲
NW40H2	None	NW50H	75	NW63H1	None	RJ 2500	48▲
NW50H2	None	NW60H	75	NW08H2 ★	24	RK 600	57
NW08H3 ★	24	NW08L ★	24	NW08H2	85	RK 800	57
NW08H3	85	NW08L	35	NW10H2	85	RK 1000	57
NW16H3	85	NW08LF	24	NW16H2	85	RK 1200	57
NW20H3	85	NW12L	35	NW20H2	85	RK 1600	57
NW32H3	85	NW12LF	24	NW25H2	85	RK 2000	57
NW40H3	85	NW16L	35	NW32H2	85	RK 2500	57
NW50H3	85	NW16LF	24	NW40H2	85	RL 600	48▲
NW08L1 ★	24	NW20L	65	NW50H2	117	RL 800	48▲
NW08L1	35	NW20LF	24	NW63H2	117	RL 1000	48▲
NW08L1F	24	NW25L	65	NW20H3	65	RL 1200	48▲
NW16L1	35	NW30L	65	NW25H3	65	RL 1600	48▲
NW16L1F	24	NW40L	75	NW32H3	65	RL 2000	48▲
NW20L1	35	NW50L	75	NW40H3	65	RL 2500	48▲
NW20L1F	24	NW60L	75	NW08L1 ★	24	PG 250	24
NW32L1	117	NW08HF	40	NW08L1	35	PG 400	24
NW40L1	117	NW12HF	40	NW10L1	35	PG 600	24
NW50L1	117	NW16HF	40	NW12L1	35	PG 800	24
NW08HA	None	NW20HF	40	NW16L1	35	PG 1000	24
NW16HA	None	NW25HF	65	NW20L1	35	PG 1200	24
NW20HA	None	NW30HF	65	NW08H10	None	PJ 250	7
NW32HA	None	NW40HF	75	NW10H10	None	PJ 400	10
NW40HA	None	NW50HF	75	NW12H10	None	PJ 600	10
NW50HA	None	NW60HF	75	NW16H10	None	PJ 800	10
NW08HF	85	NW08HB	35	NW20H10	None	PJ 1000	10
NW16HF	85	NW12HB	35	NW25H10	None	PJ 1200	10
NW20HF	85	NW16HB	35	NW32H10	None	PK 250	24
NW32HF	85	NW20HB	65	NW40H10	None	PK 400	24
NW40HF	85	NW25HB	65	NW08NA	None	PK 600	24
NW50HF	85	NW30HB	65	NW10NA	None	PK 800	24
NW08HC	35	NW40HB	75	NW16NA	None	PK 1000	24
NW16HC	35	NW50HB	75	NW08HA	None	PK 1200	24
NW20HC	35	NW60HB	75	NW10HA	None	PL 250	7
NW32HC	117	NT08N ★	24	NW12HA	None	PL 400	10
NW40HC	117	NT08N	40	NW16HA	None	PL 600	10
NW50HC	117	NT12N	40	NW20HA	None	PL 800	10
NT08N1 ★	24	NT16N	40	NW25HA	None	PL 1000	10
NT08N1	None	NT08H ★	24	NW32HA	None	PL 1200	10
NT08H1 ★	24	NT08H	40	NW40HA	None	MG 300	12▲
NT08H1	None	NT12H	40	NW50HA	None	MG 350	12▲
NT08L1F	10	NT16H	40	NW63HA	None	MG 400	12▲
NT08NA	None	NT08L1	10	NW08HF	85	MG 450	12▲
		NT12L1	10	NW10HF	85	MG 500	12▲
		NT16L1	10	NW12HF	85	MG 600	12▲
		NT08L	10	NW16HF	85	MG 700	12▲
		NT08LF	10	NW20HF	85	MG 800	12▲
		NT12L	10	NW25HF	85	MJ 300	12▲
		NT16L	10	NW32HF	85	MJ 350	12▲
		NT12LF	10	NW40HF	85	MJ 400	12▲
		NT08HF	40	NW08HA10	None	MJ 450	12▲
		NT12HF	40	NW10HA10	None	MJ 500	12▲
				NW12HA10	None	MJ 600	12▲
				NW16HA10	None	MJ 700	12▲
				NW20HA10	None	MJ 800	12▲
				NW25HA10	None		
				NW32HA10	None		
				NW40HA10	None		
				NT08H1	None		
				NT10H1	None		
				NT12H1	None		
				NT16H1	None		
				NT08L1	10		
				NT08H10	None		
				NT10H10	None		
				NT12H10	None		
				NT16H10	None		
				NT08HA	None		
				NT10HA	None		
				NT12HA	None		
				NT16HA	None		
				NT08HA10	None		
				NT10HA10	None		
				NT12HA10	None		
				NT16HA10	None		

★ Maximum sensor plug 250 A

Note:

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



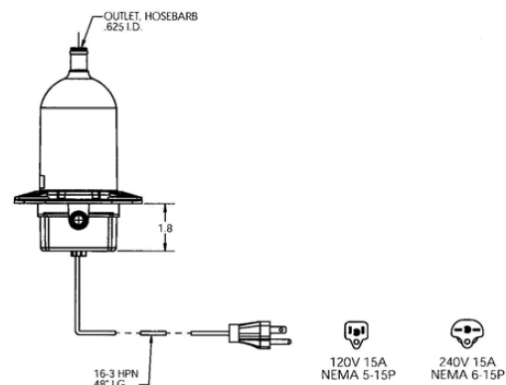
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▲ Tolerance +/- 15%

Curve No. 0613TC0610
February 2006
Drawing No. 48095-0613-10
(Replaces 0613TC0410)

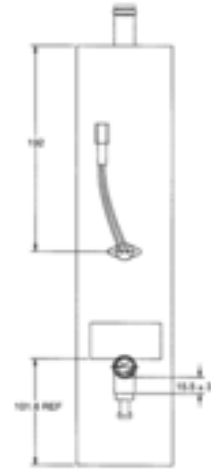
Coolant heaters

Control thermostat range	ON @ 80° F (27° C) OFF @ 100° F (38° C)
Control thermostat tolerance	± 7.0° F (4° C) on close (ON) ± 5.0° F (3° C) on open (OFF)
Approvals	UL listed CSA compliant CE compliant



Coolant heater kit	Critical component	Voltage	Wattage	Heater amps	Instruction sheet
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0541-0802-01	0333-0588-01	120	1000	8.3	000G-0539
0333-0548	0333-0588-01	120	1000	8.3	000G-0190
0179-4755-03	0333-0588-01	120	1000	8.3	000C-0703
0179-4938-03	0333-0588-01	120	1000	8.3	000G-0714
0333-0632-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0406
0333-0632-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0406
0541-0802-02	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0539
0333-0549	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0190
0179-4755-04	0333-0588-02	208/240	750/1000	3.6/4.16	000C-0703
0179-4938-04	0333-0588-02	208/240	750/1000	3.6/4.16	000G-0714
0300-5420-01	0333-0588-03	120	1500	12.5	000G-0447
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0630-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0179-4902-03	0333-0588-03	120	1500	12.5	
0179-4908-03	0333-0588-03	120	1500	12.5	
0333-0713-03	0333-0588-03	120	1500	12.5	000G-0664
0300-5420-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0447
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0333-0630-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0300-5422-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0453
0300-5422-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0453
0333-0631-02	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0406
0179-4902-04	0333-0588-04	208/240	1125/1500	5.4/6.25	
0179-4908-04	0333-0588-04	208/240	1125/1500	5.4/6.25	
0333-0713-04	0333-0588-04	208/240	1125/1500	5.4/6.25	000G-0664

Heater phase Single phase heater voltage
Element diameter .315 IN
Pressure tested by vendor 75 PSIG hydrostatic
Approvals UL listed
 CSA compliant

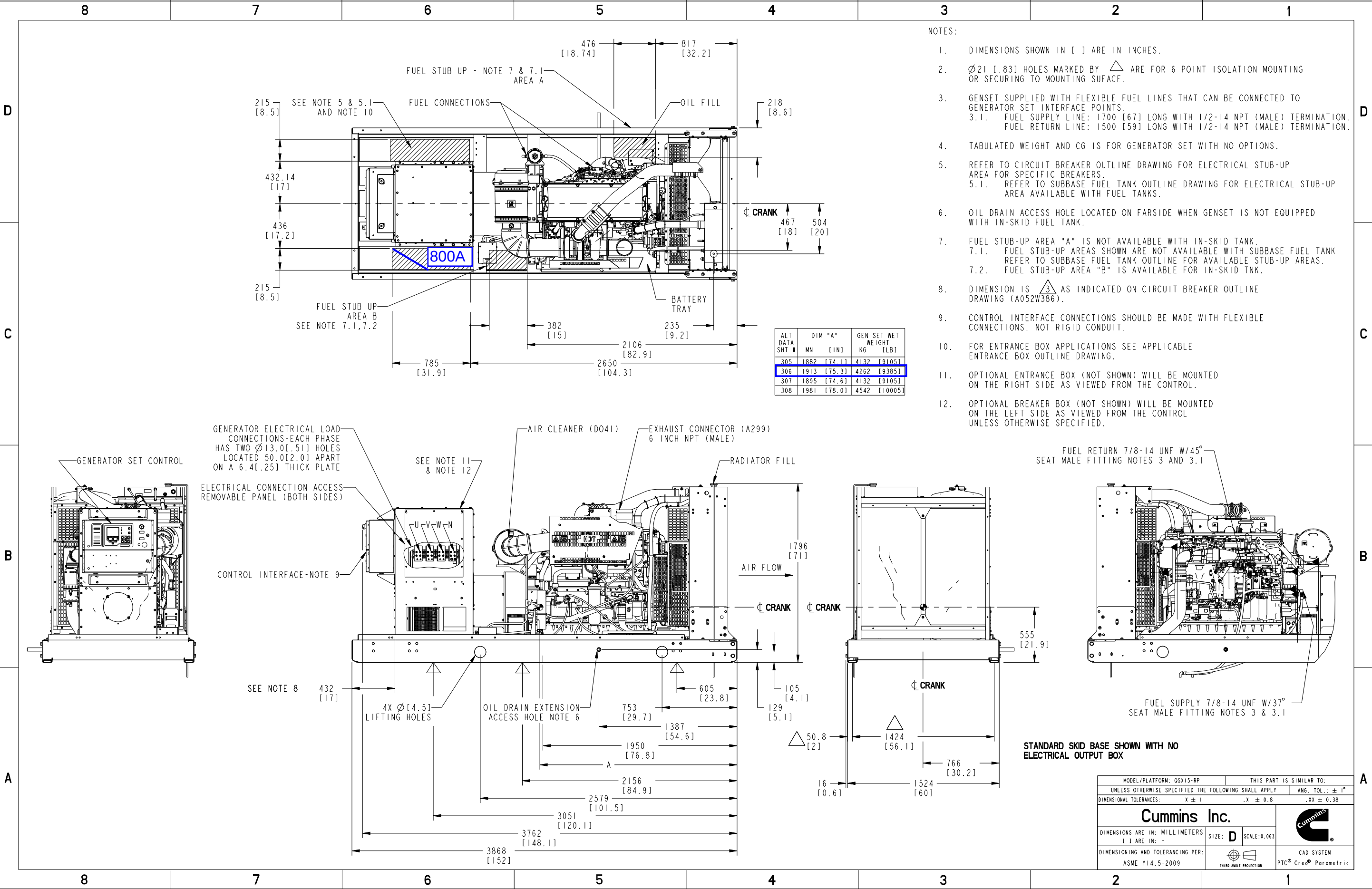


Coolant heater kit	Critical component	Voltage	Wattage	Heater amps	Heater qty	Element wire gauge	Element wire gauge
0179-3087-03	0333-0677-01	208/240/480	3744/4990/4990	23.1/26.8/13.4	2	24	000G-0617
0179-3268-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0618
0179-3325-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0616
0179-3536-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0615
0179-3577-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0639
0179-3578-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0638
0179-3579-05	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0641
0179-3579-07	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0641
0179-3817-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0640
0179-3850-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0637
0179-4299-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0662
0179-4329-03	0333-0677-01	208/240/480	3744/4990/4990	23.1/26.8/13.4	2	24	000G-0657
0179-4606-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	2	24	000G-0617
0179-4966-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0638
0179-5536-03	0333-0677-01	208/240/480	3744/4990/4990	18.0/20.8/10.4	1	24	000G-0640
0179-3087-04	0333-0677-02	208/240/480	4815/6420/6420	23.1/26.8/13.4	2	23	000G-0617
0179-3268-04	0333-0677-02	208/240/480	4325/6420/6420	23.2/26.75/13.375	2	23	000G-0618
0179-3325-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	2	23	000G-0616
0179-3536-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0615
0179-3577-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	2	23	000G-0639
0179-3578-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0638
0179-3579-06	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0641
0179-3579-08	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0641
0179-3817-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0640
0179-3850-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0637
0179-4299-04	0333-0677-02	208/240/480	4325/6420/6420	23.2/26.75/13.375	2	23	000G-0662
0179-4329-04	0333-0677-02	208/240/480	4325/6420/6420	23.2/26.75/13.375	2	23	000G-0657
0179-4606-04	0333-0677-02	208/240/480	4815/6420/6420	23.1/26.8/13.4	2	23	000G-0617
0179-4966-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0638
0179-5536-04	0333-0677-02	208/240/480	4825/6420/6420	23.2/26.75/13.375	1	23	000G-0640

SECTION 4

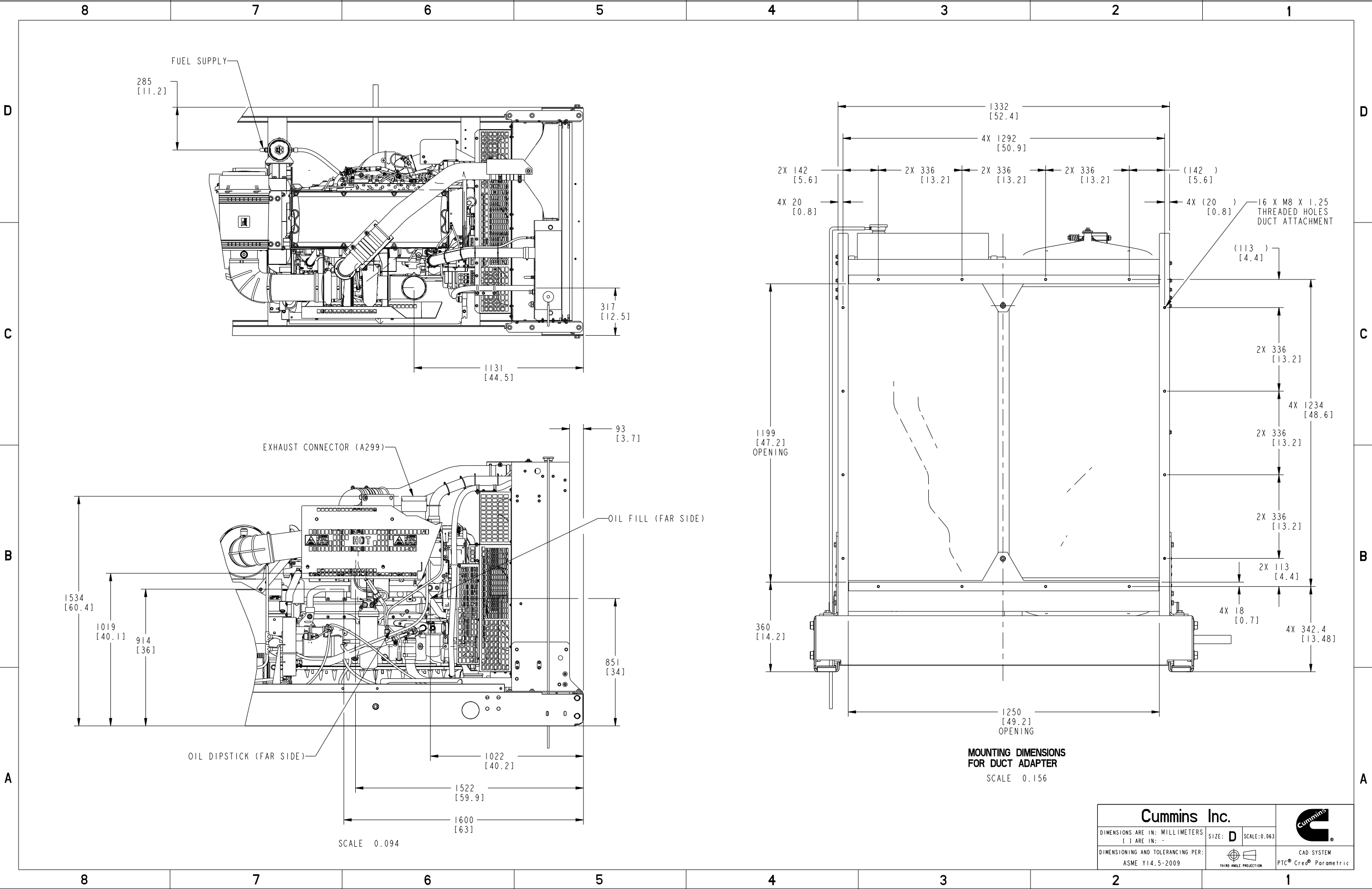
Generator Drawings





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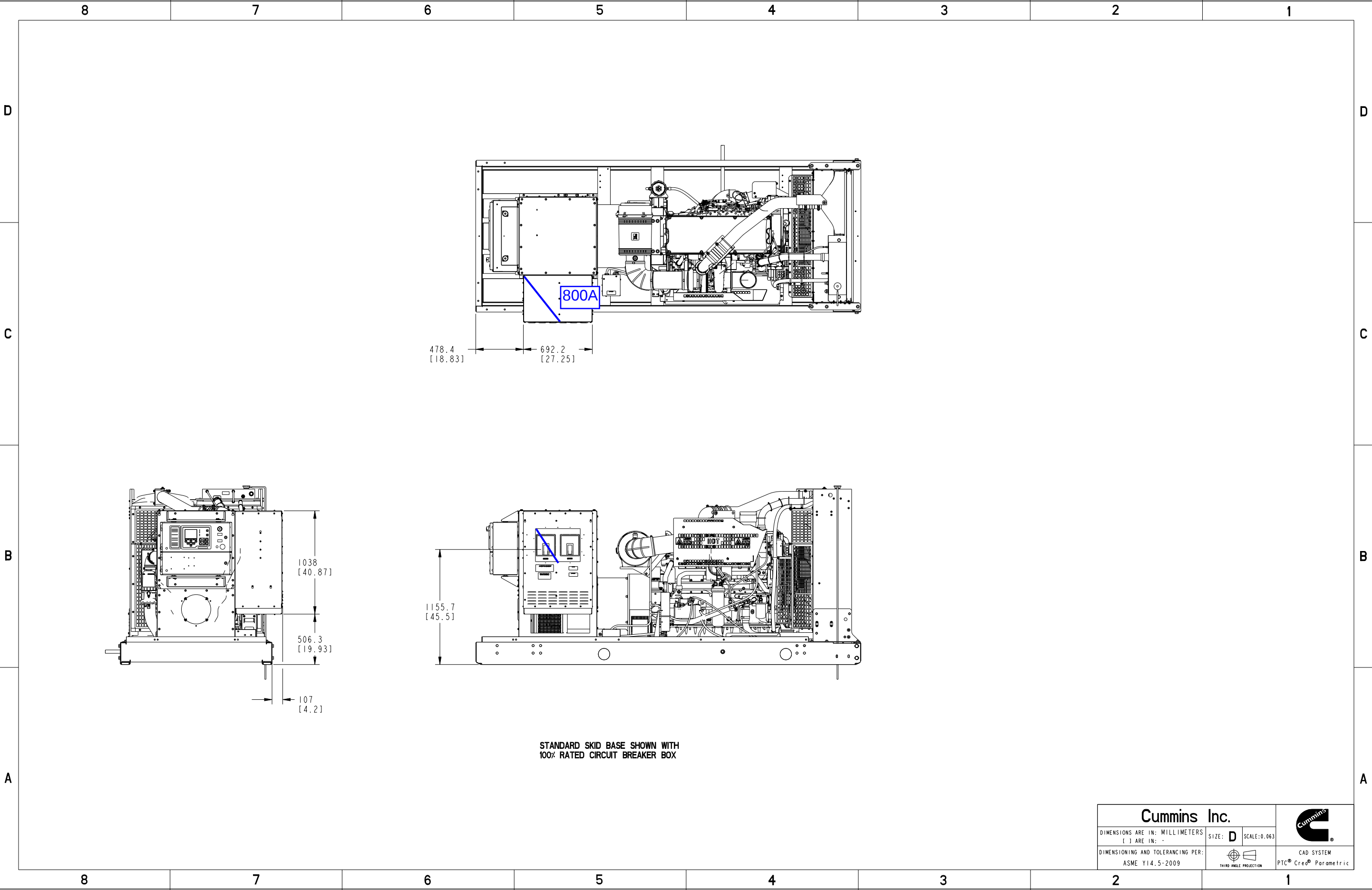
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Part Number: **A063J084** Part Revision: **B**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released** Sheet 2 of 5



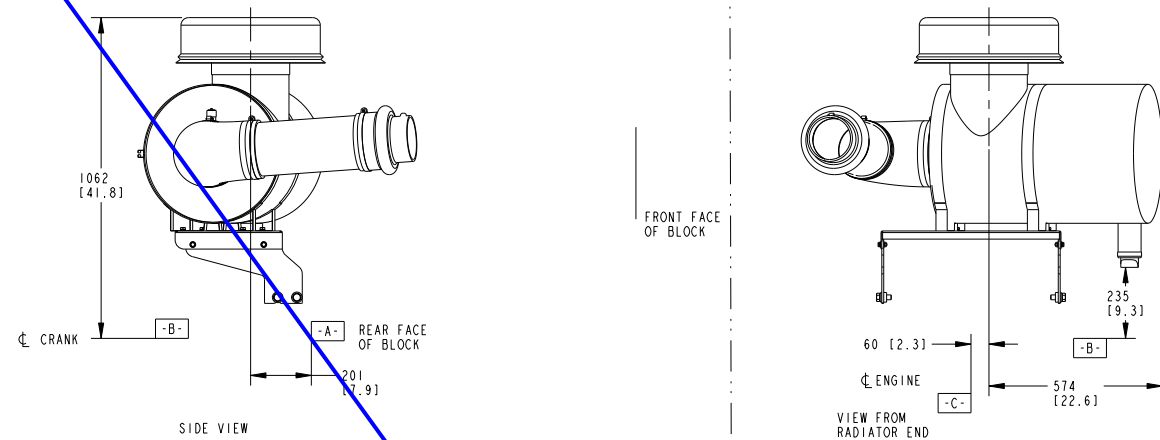
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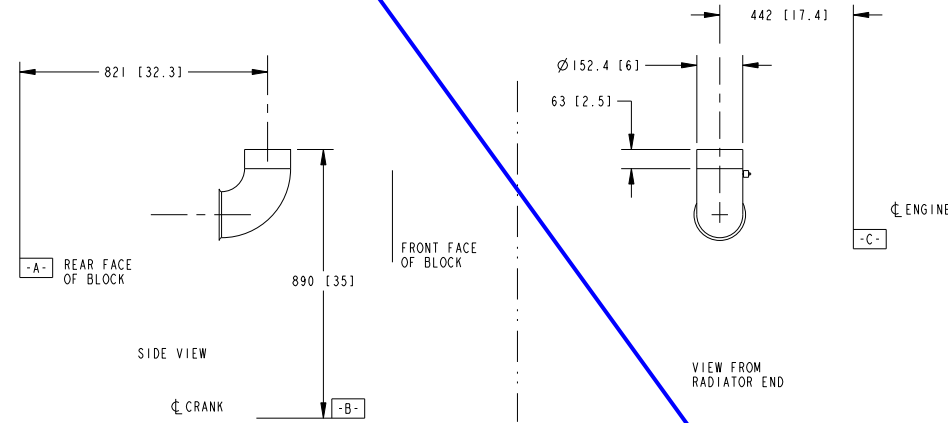
Part Number: **A063J084** Part Revision: **B**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released** Sheet 4 of 5

REL NO	LTR	NO	REVISION	DWN	CND	APVD	DATE
ECO-152559	A	1	PRODUCTION RELEASE	MLL	JCB	J.BRODY	19MAY15

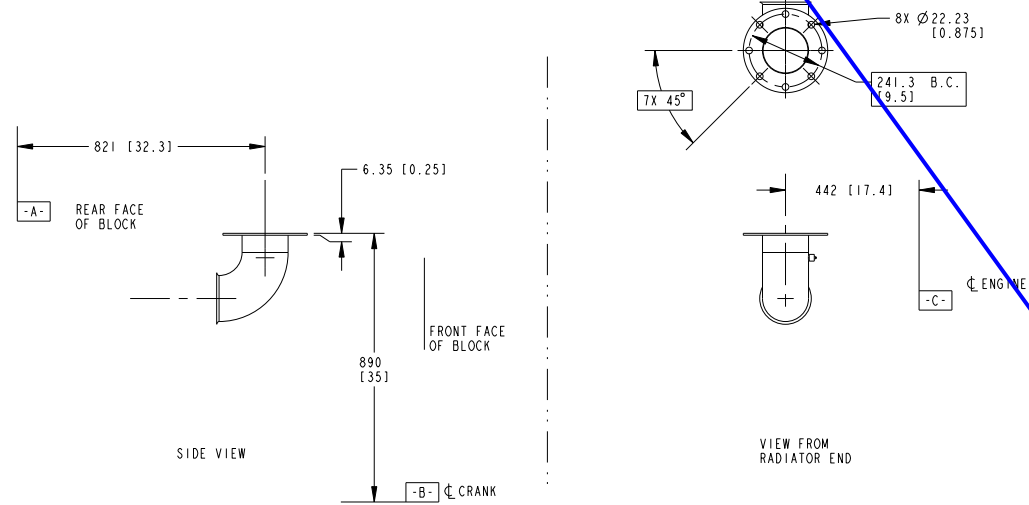
HEAVY DUTY AIR CLEANER (D036)



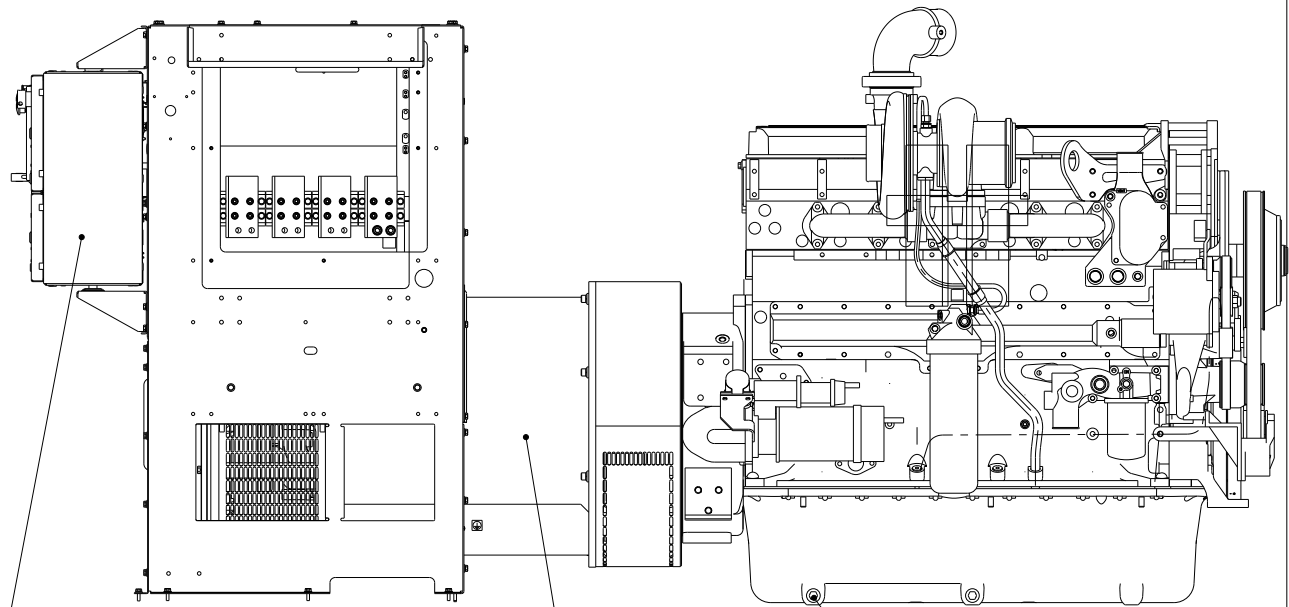
EXHAUST CONNECTOR - SLIP ON (A298)



EXHAUST CONNECTOR - ASA FLANGE (A335)



HEATERS



CONTROL CABINET HEATER

(A362):
120-240VAC, 100 WATTS
TINNED LEADS

ALTERNATOR HEATER

(A292):
110-125V, 300 WATTS
CONNECTION: COMPRESSION TERMINAL
BLOCK, #18 TO #12 AWG WIRE

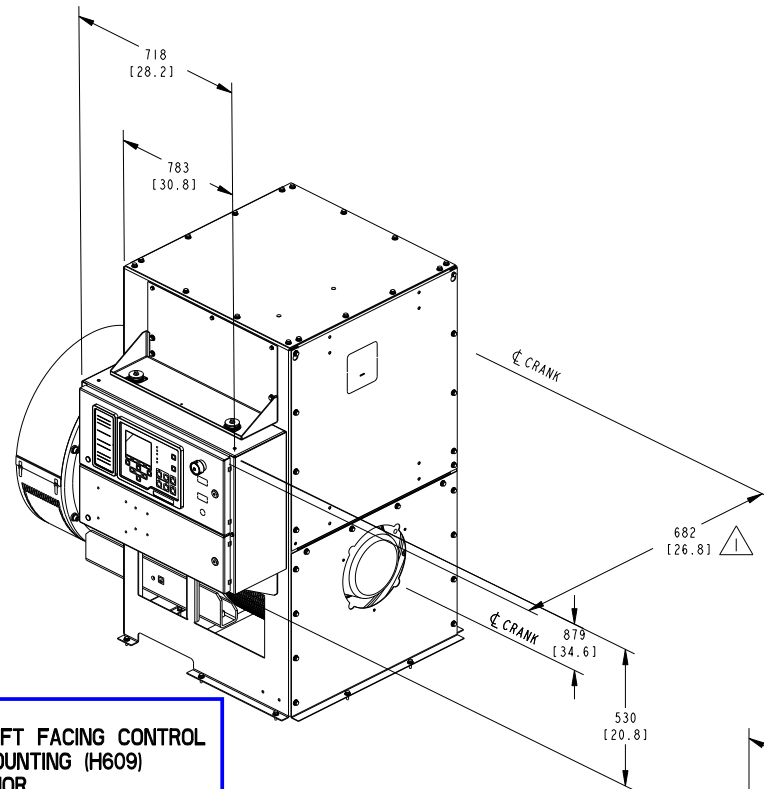
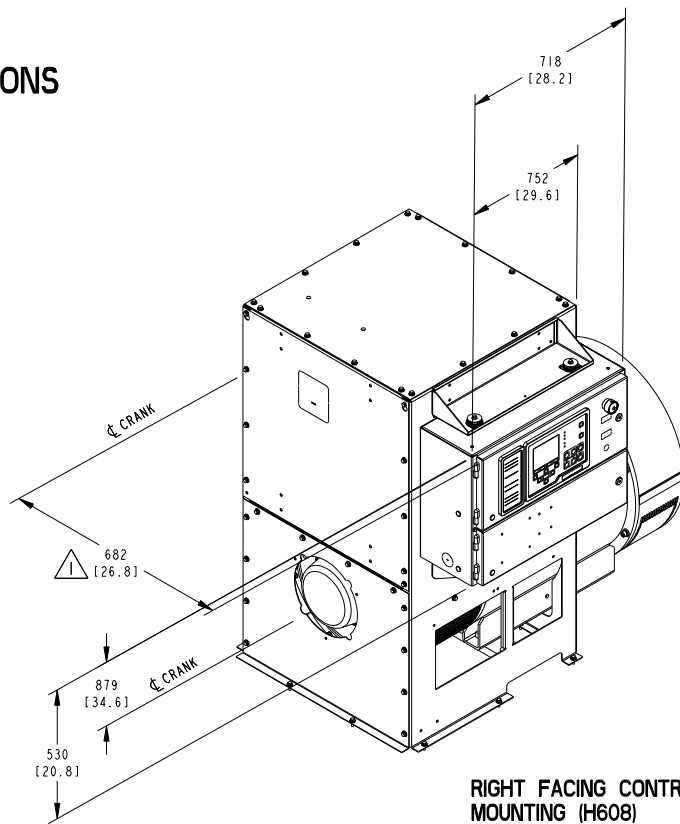
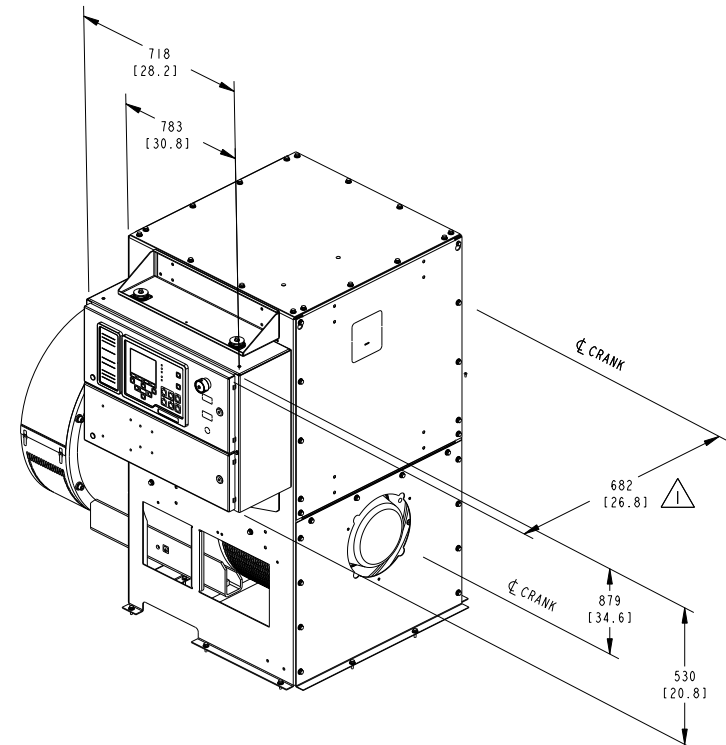
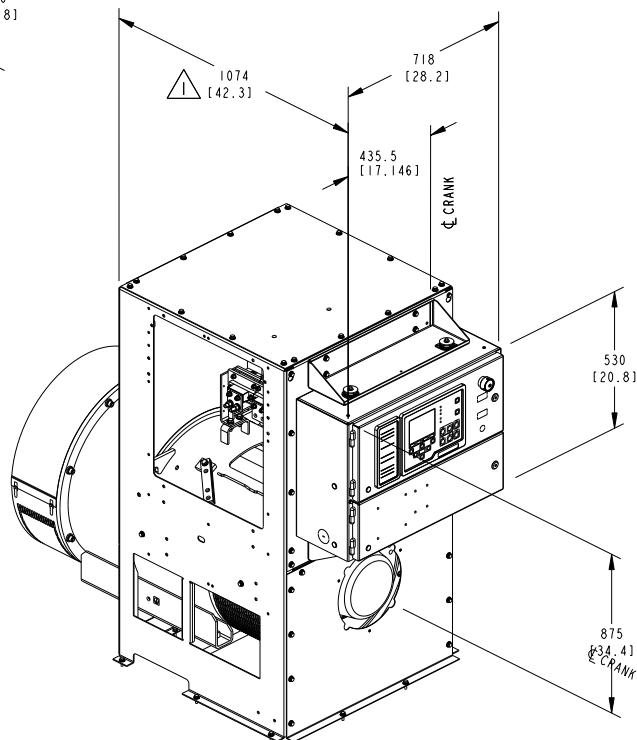
ENGINE OIL HEATER

(H487):
120V, 450 WATTS
CONNECTION: 1830 [72 IN] CORD WITH
NEMA 5-15P [11P] CORD END

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS				SIN 10 A041F617	DWN M. LEHR		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT				CND J. BRODY	APVD J. BRODY		OUTLINE, GENSET	
DIM X ± 1 XX ± 0.38		HOLE 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 19MAY15	SITE CODE	
ANG TOL: ± 1.0° SCALE: 3/32				- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	PGF	SHEET 1 OF 2
						FIRST USED ON DFEJ.DFEK	A052W391	DRG REV

REL NO	LTR	NO	REVISION	DWN	CAD	APVD	DATE
ECO-152559	A	1	PRODUCTION RELEASE	MLL	JCB	J.BRODY	19MAY15

CONTROL BOX LOCATIONS

LEFT FACING CONTROL
MOUNTING (H609)
THORRIGHT FACING CONTROL
MOUNTING (H608)LEFT FACING CONTROL
MOUNTING (H609)
NONTHORFRONT FACING CONTROL
MOUNTING (H679)

NOTE:

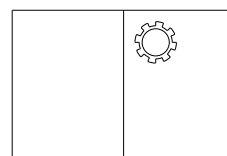
 DIMENSION TO FACE OF CONTROL BOX. COMPONENTS ON FACE
EXTEND 34.3 [1.35] BEYOND FACE.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			SIN 10 A041F617	DWN M. LEHR		CUMMINS POWER GENERATION	
DO NOT SCALE PRINT			DO NOT SCALE PRINT	CND J. BRODY		OUTLINE, GENSET	
X ± 1			0.00- 4.99 +0.15/-0.08	APVD J. BRODY	SITE CODE	PGF	A052W391
.X ± 0.8			5.00- 9.99 +0.20/-0.10	DATE 19MAY15			
.XX ± 0.38			10.00-17.49 +0.25/-0.13				
17.50-24.99 +0.30/-0.13							
ANG TOL: ± 1.0°			SCALE: 3/32	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994		FIRST USED ON POWER GENERATION GROUP D.F.E.J., D.F.E.K.	
				D		SHEET 2 OF 2	

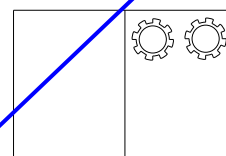
REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-180039	B	1	SEE SHEET 3	CJF	PA	L CASSENS	31AUG18
		2	SEE SHEET 3	CJF	PA	L CASSENS	31AUG18

CONDUIT AREA
BOTTOM ENTRANCEENGINE
ENDNSJ/NLG-FRAME 300-600A
RECOMMENDED CONDUIT LOCATIONS

SINGLE BREAKER

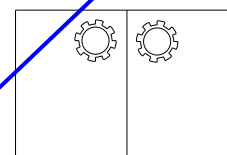


ONE CONDUIT

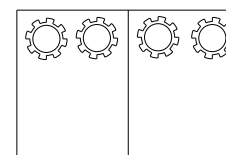


TWO CONDUITS

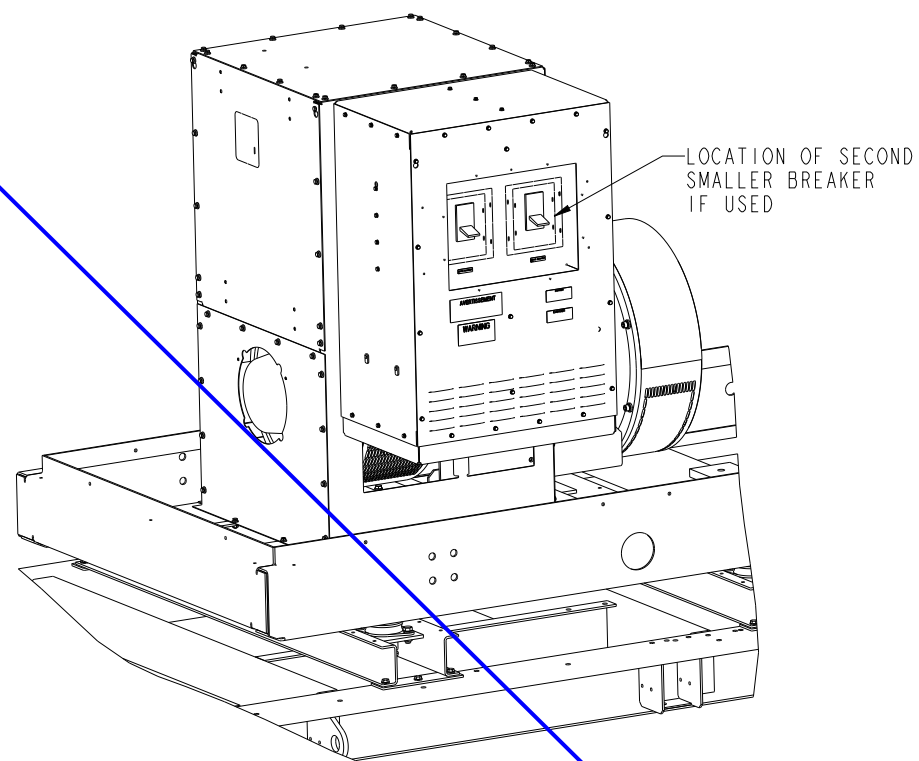
DUAL BREAKER



ONE CONDUIT



TWO CONDUITS

BOTTOM COVER
(LOOKING DOWN AT BOTTOM
OF BREAKER BOX)LOCATION OF SECOND
SMALLER BREAKER
IF USED

NOTES:

- 1 ALL DIMENSIONS ARE FOR REFERENCE ONLY
- 2 DIMENSIONS SHOWN IN [] ARE IN INCHES
- 3 BOTTOM COVER IS ADJUSTABLE VERTICALLY PLUS OR MINUS 6 [0.25] TO EASE CONDUIT ATTACHMENT
- 4 THESE WIRE-CONDUIT COMBINATIONS MEET NEC AND CEC. TO USE OTHER COMBINATIONS, REFER TO APPLICABLE CODES TO ENSURE THAT WIRE AMPACITY, BEND SPACE AND GUTTER SPACE MEET THE REQUIREMENTS
- 5 "NS" SHUNT TRIP HAS NO INTERNAL CONTACTS, IT MUST BE USED IN CONJUNCTION WITH AUXILIARY CONTACTS TO ACCEPT CONTINUOUS APPLIED VOLTAGE. IT CAN OPERATE AT 75% OF NOMINAL VOLTAGE
- 6 CONDUITS AND WIRING SHOULD BE DESIGNED AND INSTALLED TO ALLOW FOR NORMAL GENERATOR SET MOVEMENT DURING CRANKING SHUT DOWN OR EXPECTED SEISMIC DISTURBANCES
- 7 SEE FOUNDATION LAYOUT DRAWING (GENSET OUTLINE (FOUNDATION)) FOR THE LOCATION OF THE ELECTRICAL STUB UP AREAS AND FOUNDATION REFERENCE POINT ()
- 8 ON FLORIDA UNITS WITH TANKS (FEATURE CODE L116) ADD 106 [4.2] FOR RISER BEAMS THAT ARE REQUIRED ON THE UNDERSIDE OF THE TANK
- 9 BOX DIMENSIONS AND CONDUIT LOCATIONS ARE THE SAME FOR ENTRANCE BOX WITHOUT CONDUITS
- 10 EQUIPMENT GROUND AND GROUNDING ELECTRODE LUG IS MECHANICAL TYPE, COPPER 400 MCM-6 AWG SCREW 11/16"-16 UN-2B 5/16" HEX WRENCH
RECOMMENDED TORQUES:
250 MCM-1 AWG - 375 IN-LBS
2-6 AWG - 275 IN-LBS
- 11 NEUTRAL LUG IS MECHANICAL TYPE, COPPER #2-600 MCM SCREW 15/16"-16 UN-2B 3/8" HEX WRENCH
RECOMMENDED TORQUES:
600 MCM-4 AWG - 500 IN-LBS
- 12 TORQUE TO 9.8-11.9 Nm [7.2-8.8 FT-LBS]
HARDWARE IS PROVIDED WITH BONDING JUMPER.
- 13 250 MCM SYSTEM BONDING JUMPER SIZED PER NEC TABLE 250.122 USING COPPER CABLE FOR A MAXIMUM AMPACITY RATING OF 2000 AMPS.
- 14 CIRCUIT BREAKER LUGS - REFER TO RECOMMENDED TORQUE ON LABEL.
- 15 MINIMUM WIRE BENDING SPACE AT BREAKER TERMINALS CALCULATED PER NEC TABLE 312.6(B) USING 500 MCM CABLES (2 WIRES PER TERMINAL), MECHANICAL LUGS USED AS TERMINALS.

NUMBER OF CONDUCTORS PER PHASE CALCULATED PER TABLE 310.16 USING COPPER CABLES RATED AT 75° C ON A MAXIMUM AMBIENT TEMP OF 40° C.
- 16 MINIMUM WIRE BENDING SPACE AT GROUND TERMINALS CALCULATED PER NEC TABLE 312.6(A) USING [3/0-14] CABLES (1 WIRE PER TERMINAL), MECHANICAL LUGS USED AS TERMINALS.

DFEJ/DFEK
CIRCUIT BREAKER BOX
(RIGHT HAND BOTTOM ENTRY CONFIGURATION
NSJ/NLG-FRAME BREAKERS SHOWN)

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS				
DIM	X ± 1	HOLE	0.00 - 4.99	+0.15/-0.08
	.X ± 0.8		5.00 - 9.99	+0.20/-0.10
	.XX ± 0.38		10.00 - 17.49	+0.25/-0.13
			17.50 - 24.99	+0.30/-0.13
ANG TOL: ± 1.0°			SCALE:	3/32

SIN NO	A040J749
DO NOT SCALE PRINT	
DATE	25MAY11
FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	

DWN	M. LEHR
CKD	J. BRODY
APVD	J. BRODY
DATE	25MAY11

CUMMINS POWER GENERATION			
OUTLINE, CIRCUIT BREAKER			
SITE CODE	PGF	DATE	25MAY11
REV	D	NO	A052W389
SHEET	1 of 3	REV	B

D

C

B

A

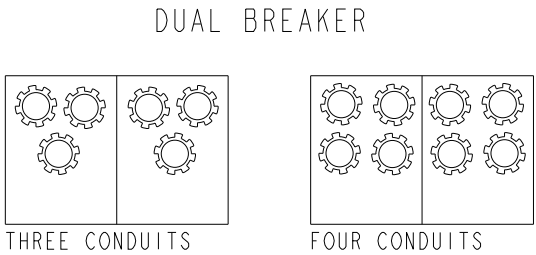
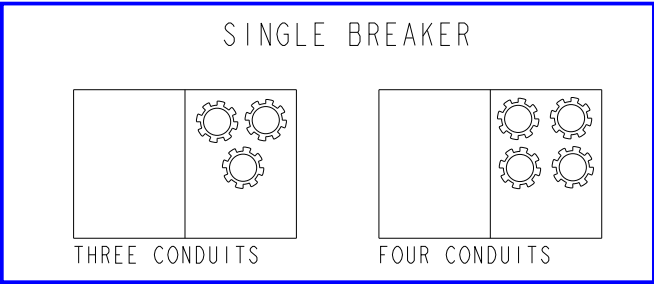
D

C

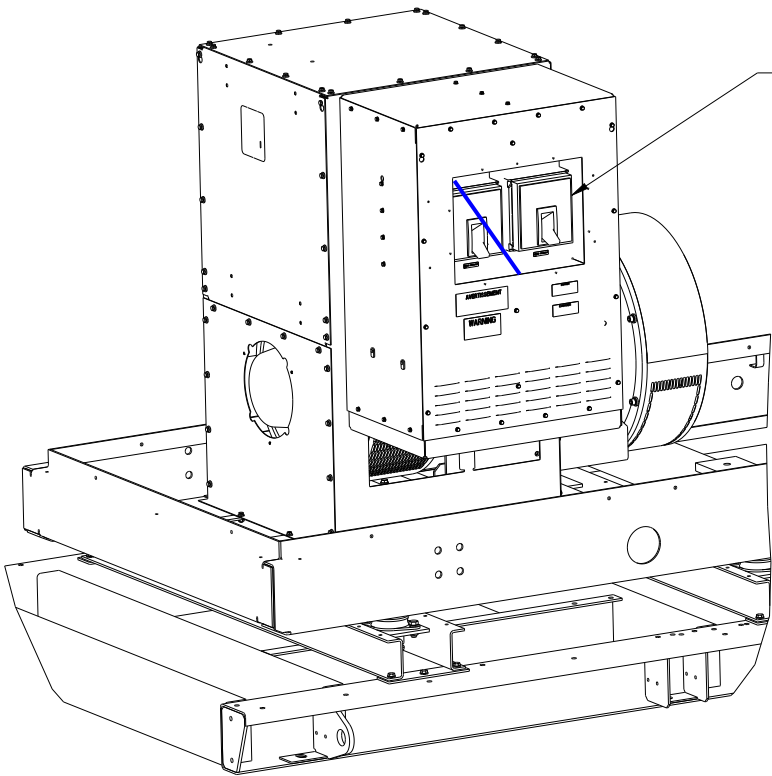
B

A

P-FRAME 800-1200A BREAKER
RECOMMENDED CONDUIT LOCATIONS



BOTTOM COVER
(LOOKING DOWN AT BOTTOM
OF BREAKER BOX)



LOCATION OF SECOND
SMALLER BREAKER
IF USED

CONDUIT AREA
BOTTOM ENTRANCE

800A

235
[9.3]

635
[25]

CIRCUIT
BREAKER
BOX

467 APPROX CIRCUIT BREAKER ϕ
[18.4]

225 APPROX CIRCUIT BREAKER ϕ
[8.9]

DIM_B
(SEE TABLE
SHEET 3)

LOAD
CONNECTION

DIM_B
(SEE TABLE
SHEET 3)

DIM_A
(SEE TABLE
SHEET 3)

DFEJ/DFEK
CIRCUIT BREAKER BOX
(RIGHT HAND BOTTOM ENTRY CONFIGURATION
P-FRAME BREAKERS SHOWN)

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS				SHEET NO. A040J749		DWN M. LEHR			CUMMINS POWER GENERATION		
DO NOT SCALE PRINT				CKD J. BRODY		APVD J. BRODY			OUTLINE, CIRCUIT BREAKER		
	X ± 1 XX ± 0.8 XXX ± 0.38		0.00 - 4.99 +0.15/-0.08			DATE 25MAY11		SITE CODE	PGF	A052W389	
			5.00 - 99.99 +0.20/-0.10 100.00 - 17.49 +0.25/-0.13 17.50 - 24.99 +0.30/-0.13								
ANG TOL: ± 1.0° SCALE: 3/32				- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		FOR INTERPRETATION OF DIMENSIONS AND TOLERANCES SEE ASME Y14.5M-1994		SHEET 2 of 3		DWG REV B	

PTC® Creo® Parametric

6

5

4

3

2

1

ECO-180039

B

1

ZONE D-5: "2-... (400 AMPS)" WAS "2-... KCMIL"

DWN

CKD

APVD

DATE

2

ZONE D-5: "270-500 KCMIL" WAS "270 350 KCMIL"

CJF

PA

L CASSENS

31AUG18

UL/IEC LUGS					ACCESSORY SPECIFICATIONS			
LUG	FRAME	MAX AMPS	WIRE RANGE COPPER	DIM.B	ACCESSORY DESCRIPTION	CONTACT RATING	INRUSH CURRENT	CONNECTION TYPE
	NSJ/NLG	400A 3 POLE	#2-600 KCMIL (250 AMPS) #2-500 KCMIL (400 AMPS)	565 [22.2]	24 VDC SHUNT TRIP	-	10A	COMPRESSION TERMINALS #20-16 AWG OR SMALLER TORQUE: 1.13 Nm [10 LB-IN]
		600A 3-POLE	270-500 KCMIL		1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM	6A AT 690 VAC 2.5A AT 48 VDC, 0.3A AT 250 VDC	-	
	P	800A 3-POLE	370-500 KCMIL	18.9 [480]	24 VDC SHUNT TRIP	-	200VA	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 1.13 Nm [10 LB-IN]
					1 EA. FORM C 4 AUX CONTACTS + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125 VDC, 0.3A AT 250 VDC	-	
	P	1200A 3-POLE	370-500 KCMIL	17.2 [437]	24 VDC SHUNT TRIP	-	200VA	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 1.13 Nm [10 LB-IN]
					1 EA. FORM C 4 AUX CONTACTS + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125 VDC, 0.3A AT 250 VAC	-	

TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2008, ARTICLE 310.15 AT 75C TEMPERATURE RATED CONDUCTOR AT 40C AMBIENT AND ANNEX C (LIQUID TIGHT FLEXIBLE METAL CONDUIT - LFCM)

MAX BRKR AMPS	WIRE (COPPER)		CONDUIT	
	QTY	SIZE	QTY	SIZE
1200	4	500 KCMIL	4	4"
800	3	350 KCMIL	3	3 1/2"
600	2	350 KCMIL	2	3 1/2"
500	2	300 KCMIL	2	3 1/2"
450	2	300 KCMIL	2	3 1/2"
400	1	600 KCMIL	1	4"
350	1	600 KCMIL	1	4"
300	1	500 KCMIL	1	4"

DIM_A TABULATION			
MODEL NAME	TANK/LIFT BASE FEATURE CODE	TANK CAPACITY (GAL)	HEIGHT DIM_A
DFEJ,DFEK	C201	300	958[37.7]
	C202	400	1009[39.7]
	C203	500	1060[41.7]
	C204	600	1136[44.7]
	C205	660	1174[46.2]
	C207	850	1314[51.7]
	C209	1700	1568[61.7]
	C211	2525	1568[61.7]
	C242	270	1009[39.7]
F214	NA	856[33.7]	

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

SW TO A040J749

DWN M_LEHR

CKD J_BRODY

APVD J_BRODY

DATE 25MAY11

SITE CODE

PGF

A052W389

3 OF 3

B

DO NOT SCALE PRINT

CONFIDENTIAL

PROPERTY OF CUMMINS POWER GENERATION GROUP

FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994

FIRST USED ON DFEJ,DFEK

CUMMINS POWER GENERATION

OUTLINE,CIRCUIT BREAKER

6

5

4

3

2

1

874

ECO-180039

ECO-180039

ECO-180039

ECO-180039

ECO-180039

ECO-180039

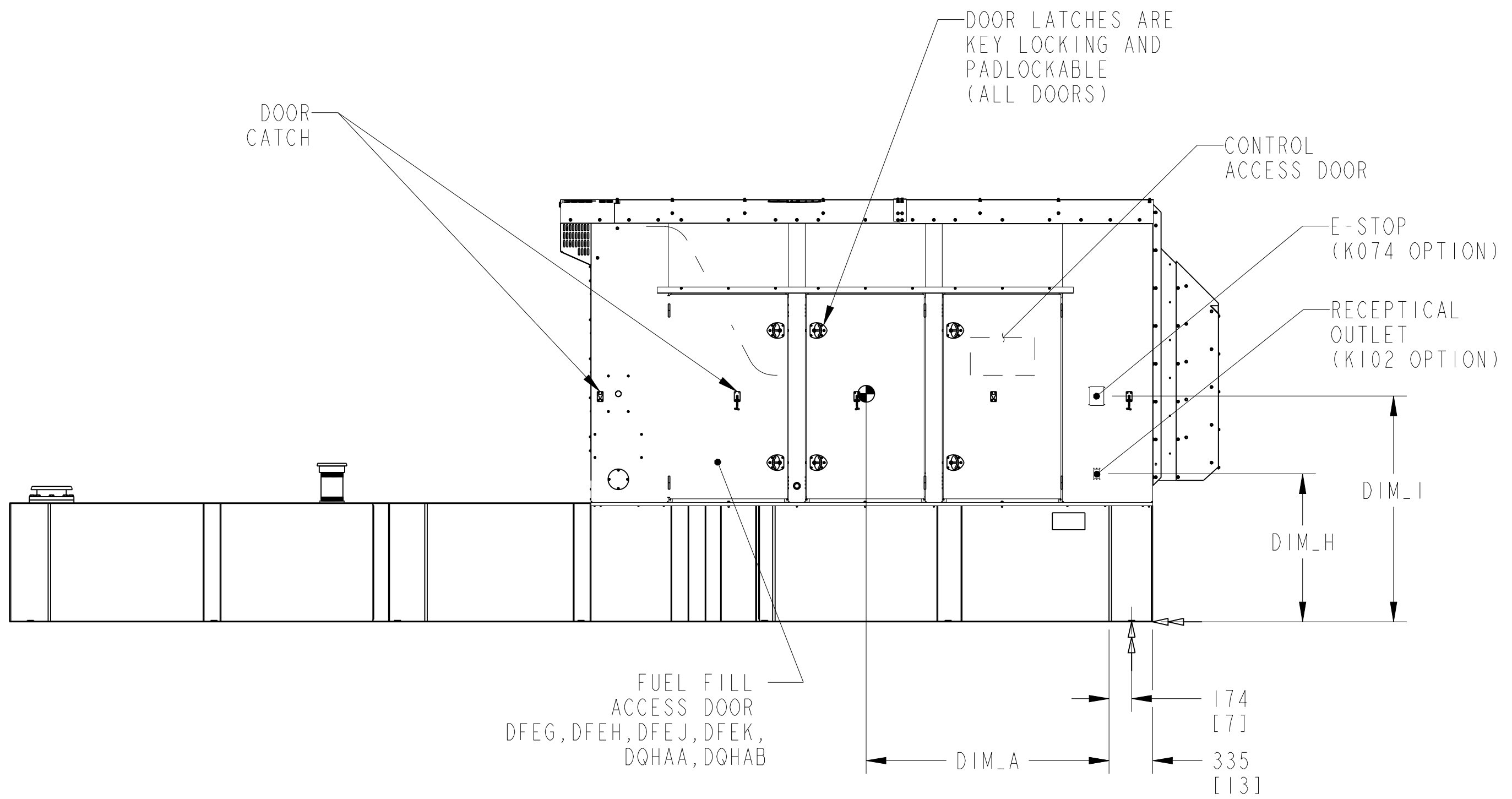
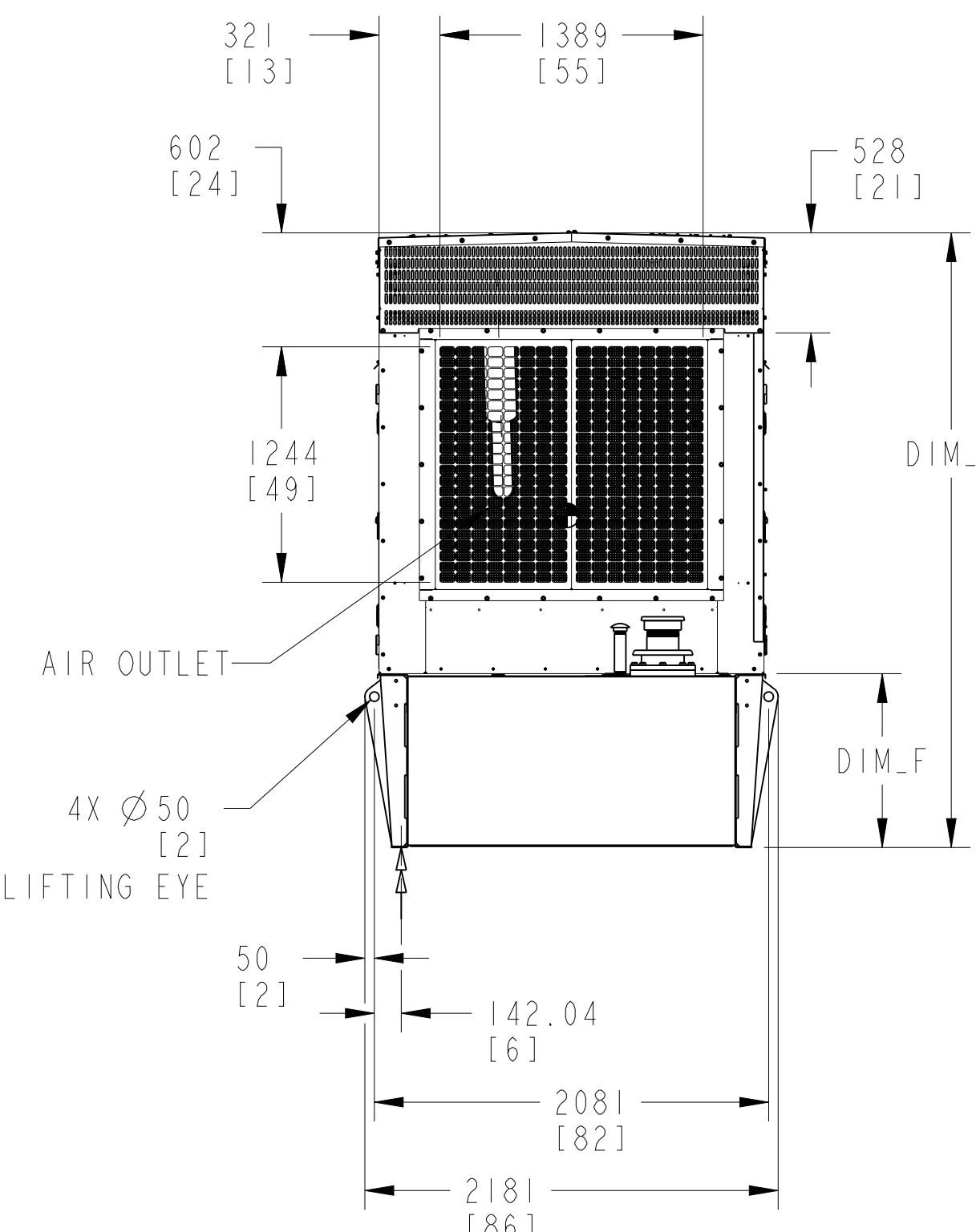
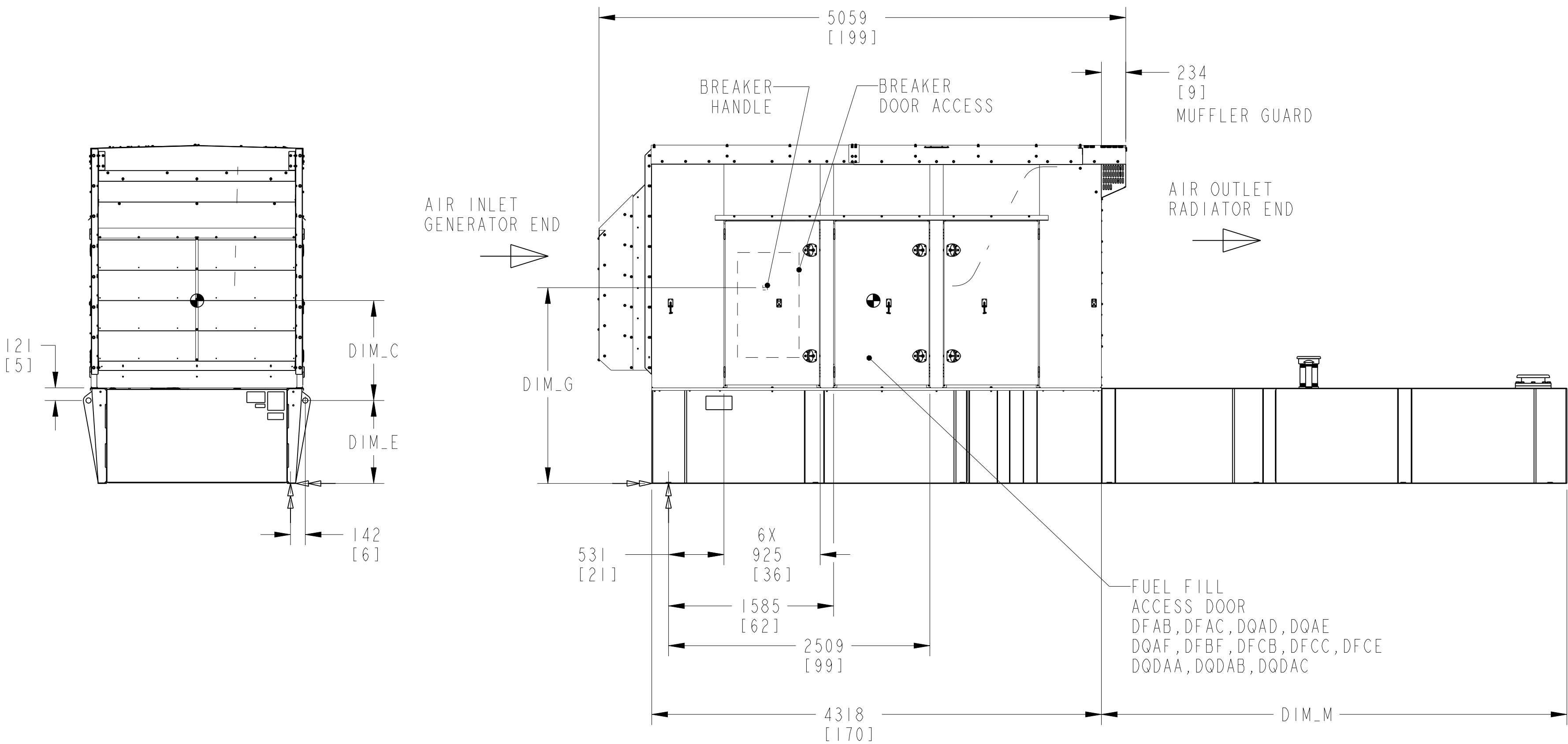
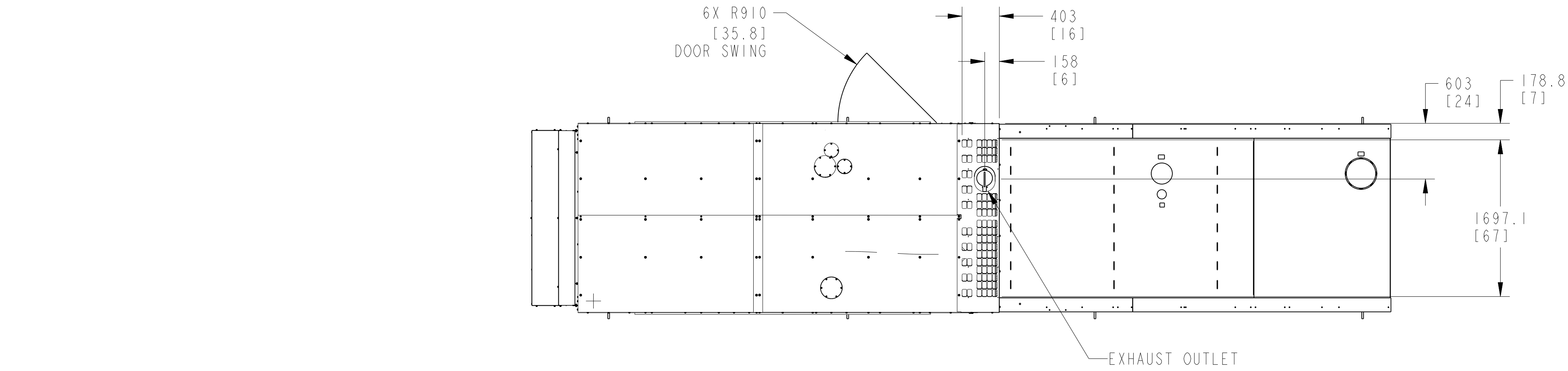
TABULATION									
TANK/LIFT BASE FEATURE CODE	TANK CAPACITY	TANK WEIGHT DRY KG (LBS)	DIM_D	DIM_E	DIM_F	DIM_H	DIM_I	DIM_K	DIM_M
C201	300	1060 (2338)	2643 (104)	183 (7.2)	305 (12)	526 (20.7)	1126 (44.3)	614.7 (24.2)	-
C202/C242	400/270	1105 (2438)	2694 (106)	234 (9.2)	356 (14)	577 (22.7)	1177 (46.3)	665 (26.2)	-
C203	500	1171 (2584)	2743 (108)	284 (11.2)	406 (16)	627 (24.7)	1228 (48.3)	716.3 (28.2)	-
C204	600	1253 (2765)	2819 (111)	361 (14.2)	483 (19)	704 (27.7)	1304 (51.3)	792.5 (31.2)	-
C205	660	1295 (2857)	2858 (112.5)	399 (15.7)	521 (20.5)	742 (29.2)	1343 (52.8)	830.6 (32.7)	-
C206	720	1275 (2814)	2895 (114)	437 (17.2)	559 (22)	780 (30.7)	1381 (54.3)	868.7 (34.2)	-
C207	850	1445 (3189)	2997 (118)	538 (21.2)	660 (26)	881 (34.7)	1481 (58.3)	970.3 (38.2)	-
F214	N/A	N/A	2540 (100)	81 (3.2)	203 (8)	424 (16.7)	1024 (40.3)	513.1 (20.2)	558.7
C208	1470	1702 (3756)	3324 (127.3)	771 (30.3)	914 (36)	1150.2 (45.3)	1748.2 (68.8)	665 (26.2)	2896
C209	1700	1962 (4331)	3324 (127.3)	771 (30.3)	914 (36)	1150.2 (45.3)	1748.2 (68.8)	665 (26.2)	1422.4
C211	2525	2811 (6204)	3324 (127.3)	771 (30.3)	914 (36)	1150.2 (45.3)	1748.2 (68.8)	665 (26.2)	4470.4

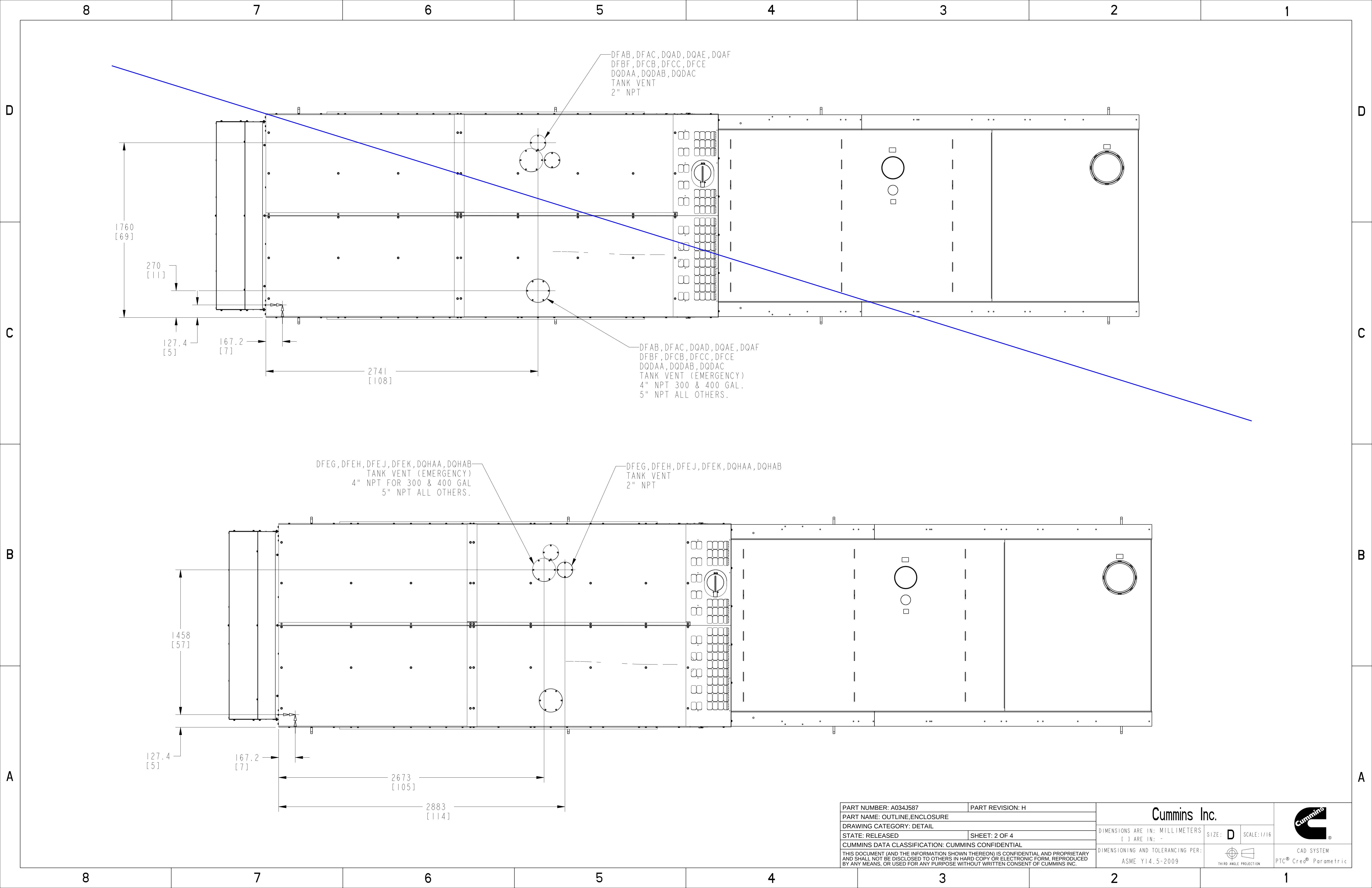
TABULATION					
MODEL	KW	CG_DIM "A"	CG_DIM "B"	CG_DIM "C"	STEEL ENCLOSURE WEIGHT KG (LBS)
DFEG	350	1836 [72.3]	1041 [41]	721 [28.4]	7237 (15955)
DFEH	400	1821 [71.7]			7367 (16241)
DFEJ	450	1803 [71.0]			7520 (16579)
DFEK	500	1783 [70.2]			7656 (16879)
DODAA	250				7296 (16079)
DODAB	275	2179 [85.8]		697 [27.4]	5519 (12167)
DODAC	300	2193 [86.3]		699 [27.5]	5467 (12089)
DOHAA	275	1905 [75.0]		853 [33.5]	5765 (12709)
DOHAB	300	1897 [74.7]		856 [33.7]	5878 (12959)
***WEIGHT & CG'S ARE SHOWN WITH HIGHEST GALLON FUEL TANK, ENCLOSURE, AND STANDARD WET GENSET. ADDITION OF OTHER FEATURES MAY CHANGE THE WEIGHT.					

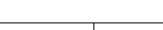
TABULATION						
TANK/LIFT BASE FEATURE CODE	TANK CAPACITY	DIM_G QSL9 L-FRAME	DIM_G QSL9 P-FRAME	DIM_G QSM11 L-FRAME	DIM_G QSM11 P-FRAME	DIM_G QSX15 L-FRAME
C201	300	1457.2 [57.37]	1309.4 [51.55]	1495.3 [58.87]	1347.5 [53.05]	1707.9 [67.24]
C202/C242	400/270	1508 [59.37]	1360.2 [53.55]	1546.1 [60.87]	1398.3 [55.05]	1758.7 [69.24]
C203	500	1558.8 [61.37]	1411 [55.55]	1596.9 [62.87]	1449.1 [57.05]	1809.5 [71.24]
C204	600	1635 [64.37]	1487.2 [58.55]	1673.1 [65.87]	1525.3 [60.05]	1885.7 [74.24]
C205	660	1673 [65.87]	1525.3 [60.05]	1711.2 [67.37]	1563.4 [61.55]	1923.8 [75.74]
C206	720	1711.2 [67.37]	1563.4 [61.55]	N/A	N/A	N/A
C207	850	N/A	N/A	1851 [72.87]	1703.1 [67.05]	2063.5 [81.24]
F214	N/A	1355.6 [53.37]	1207.8 [47.55]	1393.7 [54.87]	1245.9 [49.05]	1606.3 [63.24]
C208	1470	2066.8 [81.37]	1919 [75.55]	N/A	N/A	N/A
C209	1700	N/A	N/A	2104.9 [82.87]	1957.1 [77.05]	2317.5 [91.24]
C211	2525	N/A	N/A	N/A	N/A	2317.5 [91.24]

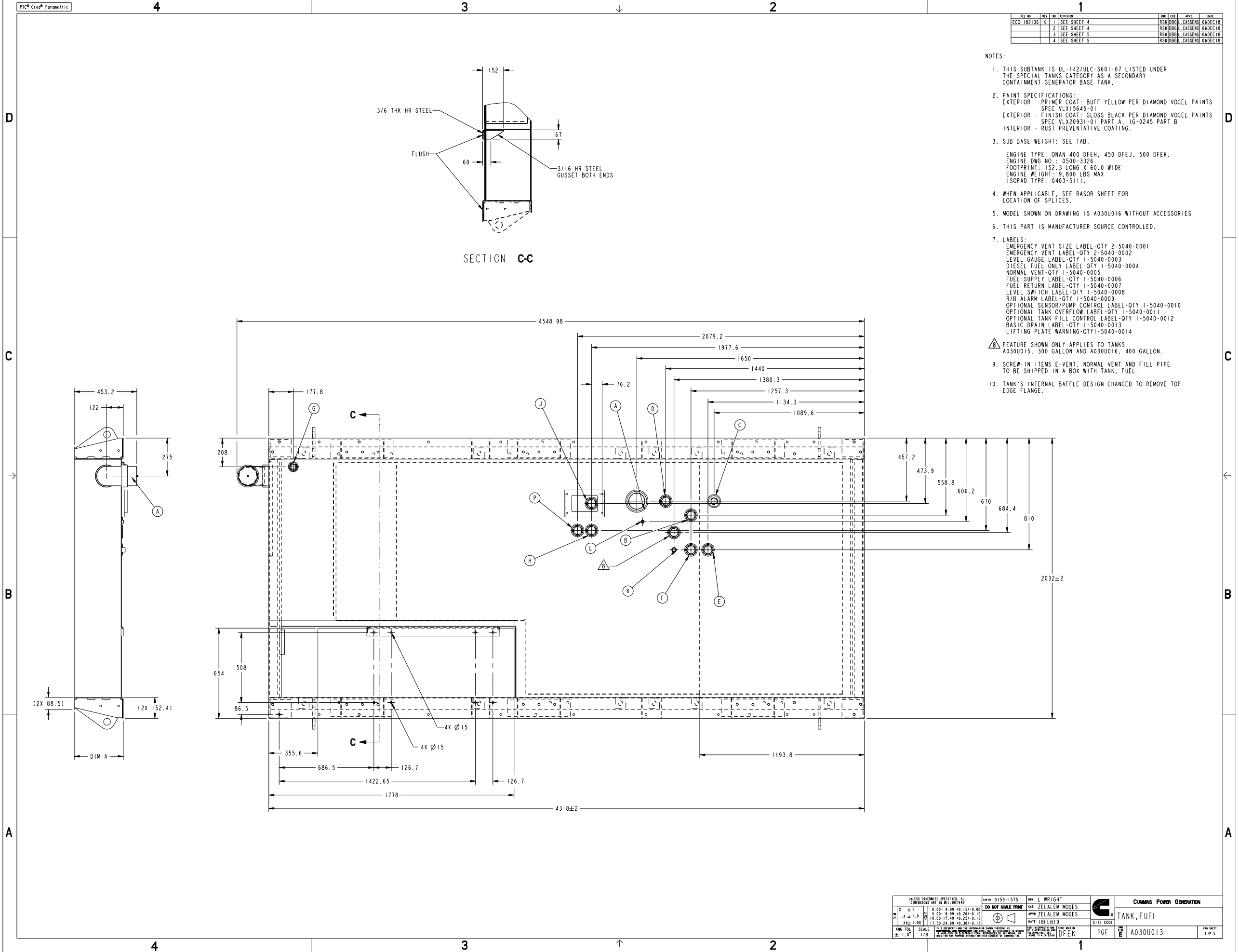
- NOTES:
- DIMENSIONS SHOWN IN [] ARE INCHES.
 - FOUNDATION REFERENCE POINT (—○—). SEE FOUNDATION DRAWING FOR DETAILS.
 - FOR FEATURE CODE L116 & L120 (FLORIDA & MICHIGAN TANKS) ADD 162.6 [6.4] TO DIMS D-J
 - SEE SHEET 2 FOR TANK VENT LOCATIONS.
 - EXCESSIVE TWISTING OF THE FUEL TANK, WHEN FASTENING IT TO A FOUNDATION, MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO INSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:
 - REFER TO CUMMINS APPLICATION MANUAL TO30 FOR GENERAL GENSET/TANK MOUNTING GUIDELINES.
 - (NOTE REMOVED)
 - (NOTE REMOVED)
 - (NOTE REMOVED)
 - TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.
 - FUEL TANK SHOWN IS 2525 GALLON MODEL. FUEL TANKS MAY BE SIZED DIFFERENTLY THAN THE MODEL SHOWN. REFER TO TABULATION FOR EXACT HEIGHT AND OPEN SET OUTLINE DRAWING FOR EXACT LENGTH FOR SPECIFIC CONFIGURATIONS.

OPTIONAL FEATURE
F200,F201,F203,F204



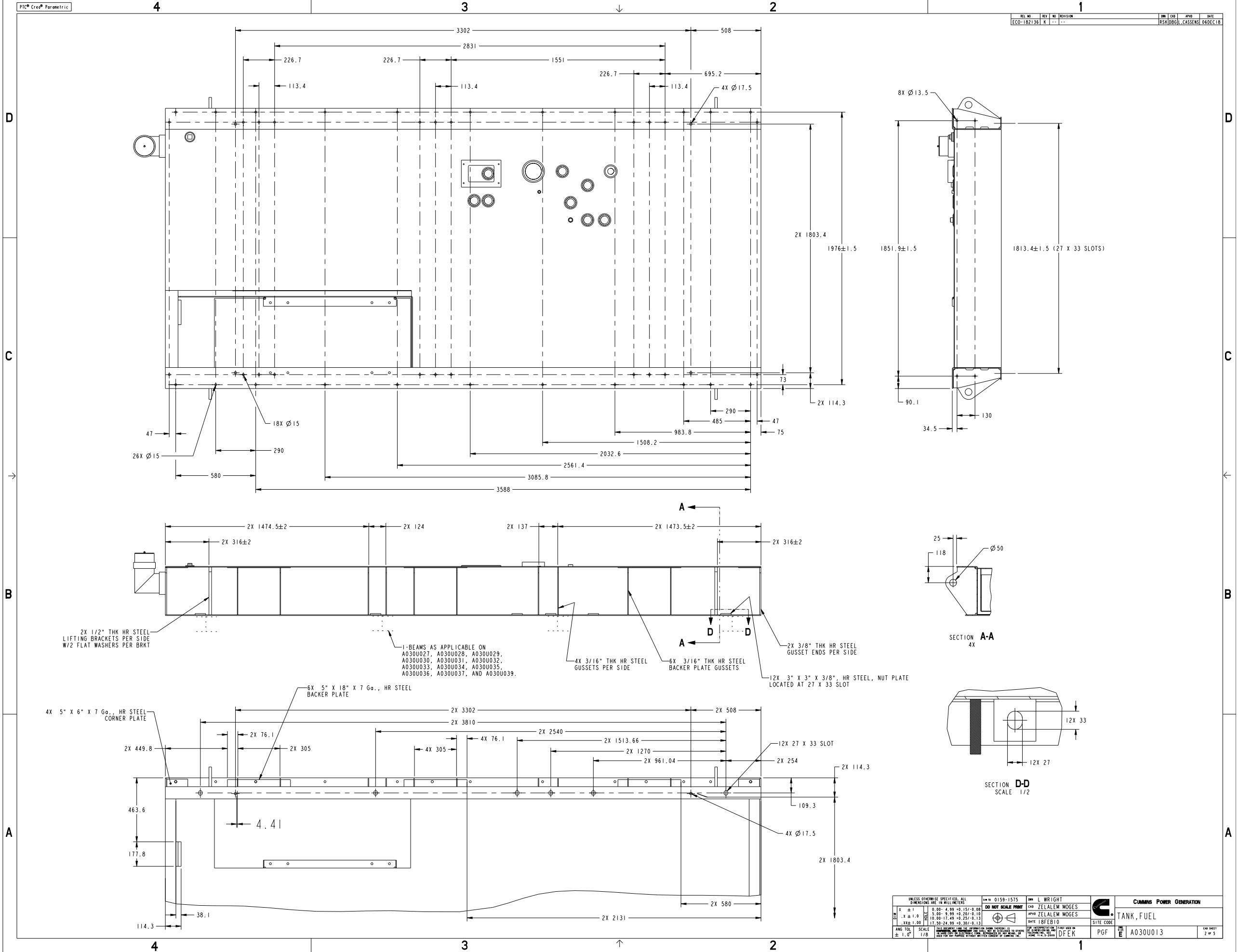


PART NUMBER: A034J587		PART REVISION: H		Cummins Inc.		
PART NAME: OUTLINE,ENCLOSURE						
DRAWING CATEGORY: DETAIL				DIMENSIONS ARE IN: MILLIMETERS [] ARE IN: -	SIZE: D	SCALE: 1/16
STATE: RELEASED		SHEET: 2 OF 4				
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL				DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009		CAD SYSTEM PTC® Creo® Parametric
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.						



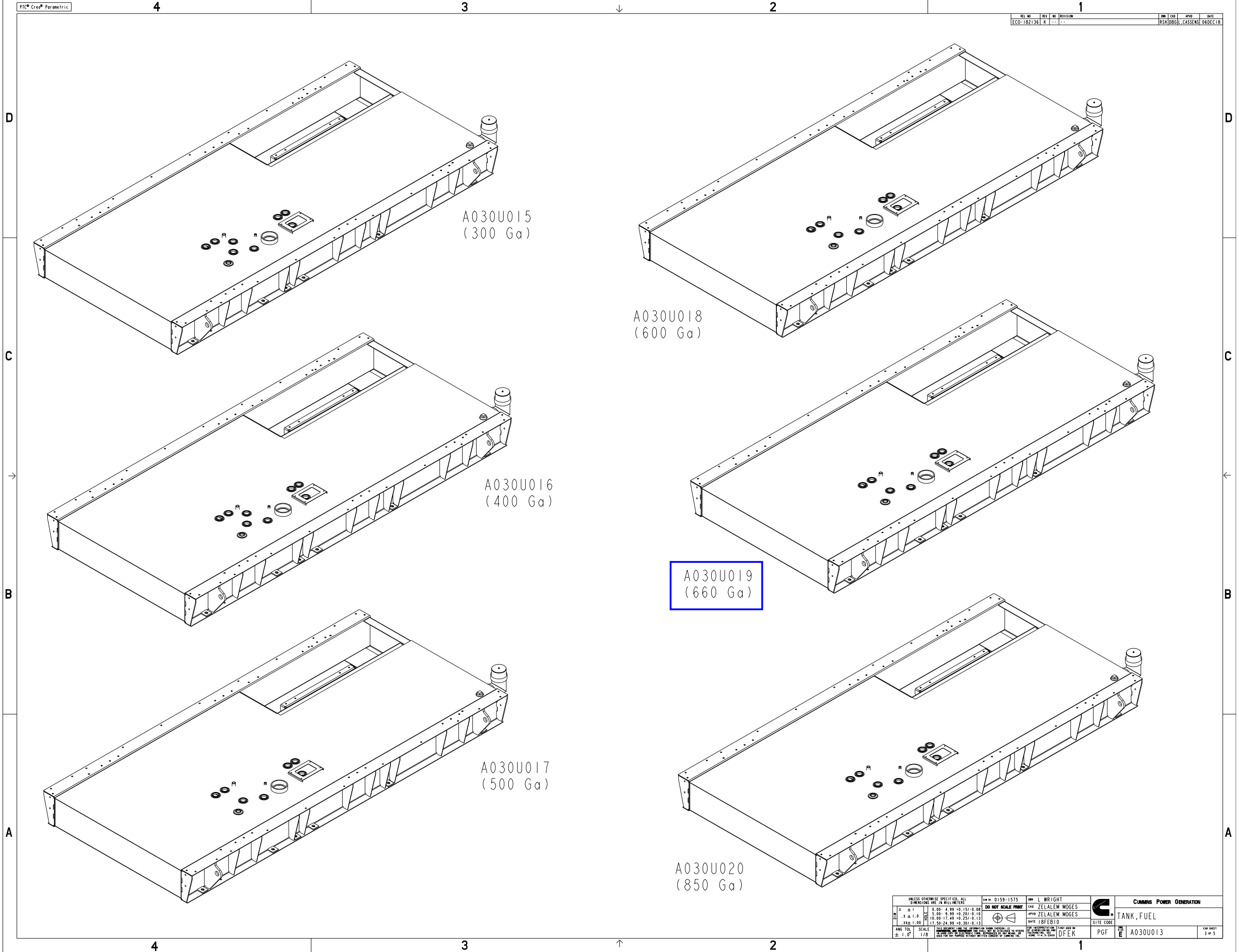
REV NO	REV	NO	REVISION	REV	NO	APPRO	DATE
ECO-182136	K	1	SEE SHEET 4	RSK	DBGL	CASSENS	06DEC18
		2	SEE SHEET 4	RSK	DBGL	CASSENS	06DEC18
		3	SEE SHEET 5	RSK	DBGL	CASSENS	06DEC18
		4	SEE SHEET 5	RSK	DBGL	CASSENS	06DEC18

- NOTES:
- THIS SUBTANK IS UL-142/ULC-S601-07 LISTED UNDER THE SPECIAL TANKS CATEGORY AS A SECONDARY CONTAINMENT GENERATOR BASE TANK.
 - PAINT SPECIFICATIONS:
EXTERIOR - PRIMER COAT: BUFF YELLOW PER DIAMOND VOGEL PAINTS SPEC VLX15645-01
EXTERIOR - FINISH COAT: GLOSS BLACK PER DIAMOND VOGEL PAINTS SPEC VLX20931-01 PART A, 16-0245 PART B
INTERIOR - RUST PREVENTATIVE COATING.
 - SUB BASE WEIGHT: SEE TAB.
ENGINE TYPE: ONAN 400 DFEH, 450 DFEJ, 500 DFEK.
ENGINE DWG NO.: 0500-3326
FOOTPRINT: 152.3 LONG X 60.0 WIDE
ENGINE WEIGHT: 9,800 LBS MAX
ISOPAD TYPE: 0403-S111.
 - WHEN APPLICABLE, SEE RASOR SHEET FOR LOCATION OF SPLICES.
 - MODEL SHOWN ON DRAWING IS A030U016 WITHOUT ACCESSORIES.
 - THIS PART IS MANUFACTURER SOURCE CONTROLLED.
 - LABELS:
EMERGENCY VENT SIZE LABEL-QTY 2-5040-0001
EMERGENCY VENT LABEL-QTY 2-5040-0002
LEVEL GAUGE LABEL-QTY 1-5040-0003
DIESEL FUEL ONLY LABEL-QTY 1-5040-0004
NORMAL VENT-QTY 1-5040-0005
FUEL SUPPLY LABEL-QTY 1-5040-0006
FUEL RETURN LABEL-QTY 1-5040-0007
LEVEL SWITCH LABEL-QTY 1-5040-0008
R/B ALARM LABEL-QTY 1-5040-0009
OPTIONAL SENSOR/PUMP CONTROL LABEL-QTY 1-5040-0010
OPTIONAL TANK OVERFLOW LABEL-QTY 1-5040-0011
OPTIONAL TANK FILL CONTROL LABEL-QTY 1-5040-0012
BASIC DRAIN LABEL-QTY 1-5040-0013
LIFTING PLATE WARNING-QTY 1-5040-0014
 - FEATURE SHOWN ONLY APPLIES TO TANKS A030U015, 300 GALLON AND A030U016, 400 GALLON.
 - SCREW-IN ITEMS E-VENT, NORMAL VENT AND FILL PIPE TO BE SHIPPED IN A BOX WITH TANK, FUEL.
 - TANK'S INTERNAL BAFFLE DESIGN CHANGED TO REMOVE TOP EDGE FLANGE.



Regulatory Review and Approval is required prior to changing this item per PGG 1-01-01-116. This item impacts compliance with these External Regulations: UL,CUL,IBC

Drawing Name: A030U013 Revision: K
Part Name: A030U019 Revision: J
ECO-182136 Sheet 2 of 6



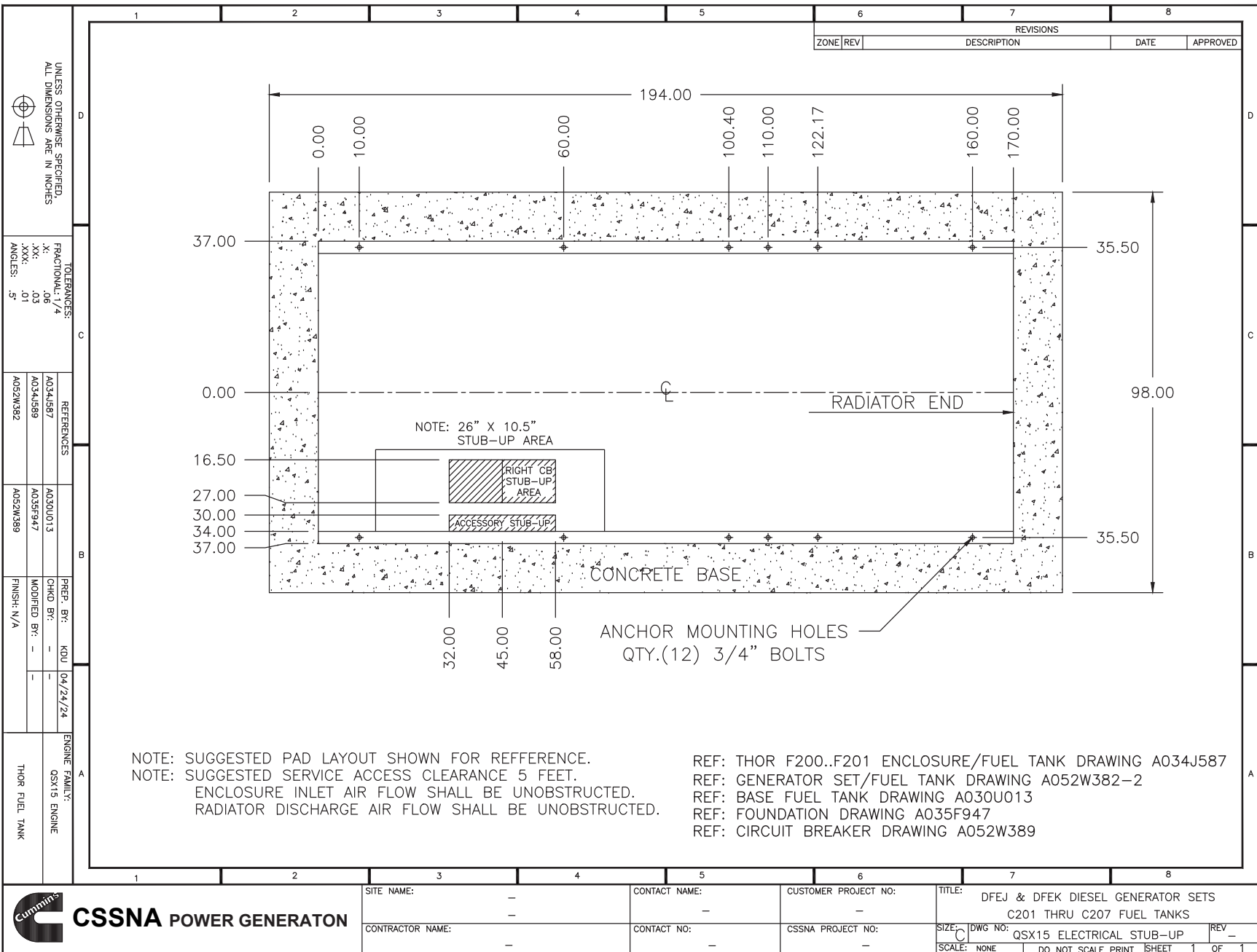
Regulatory Review and Approval is required prior to changing this item per
PGG 1-01-01-116. This item impacts compliance with these External Regulations:
UL,CUL,IBC

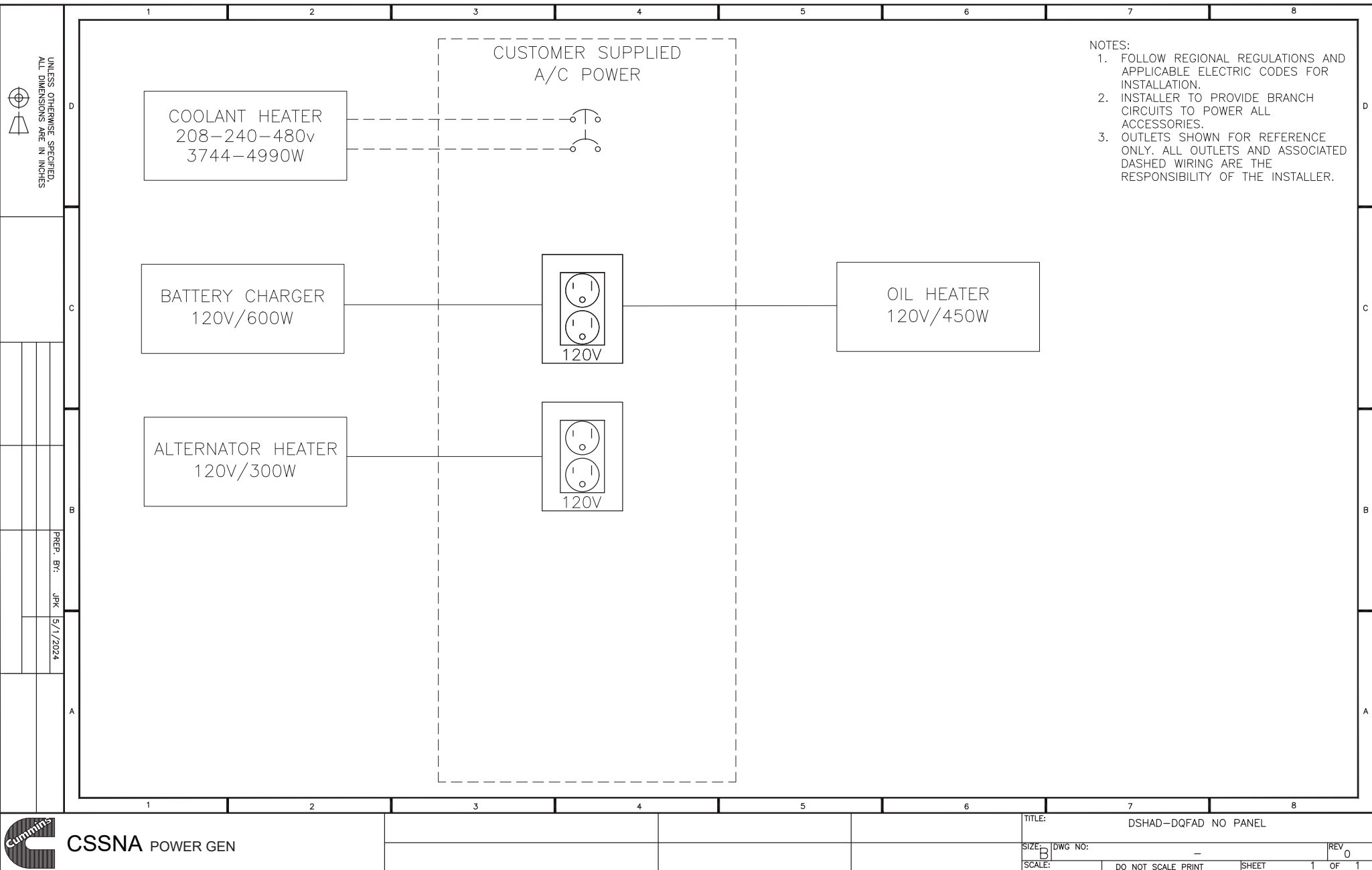
Drawing Name: A030U013 Revision: K
Part Name: A030U019 Revision: J
ECO-182136 Sheet 3 of 6

SEE WIRE LENGTH TABLE

WIRE LENGTH TABLE:

[illegible]





- NOTES:
- 1. FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRIC CODES FOR INSTALLATION.
 - 2. INSTALLER TO PROVIDE BRANCH CIRCUITS TO POWER ALL ACCESSORIES.
 - 3. OUTLETS SHOWN FOR REFERENCE ONLY. ALL OUTLETS AND ASSOCIATED DASHED WIRING ARE THE RESPONSIBILITY OF THE INSTALLER.

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

YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
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

YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
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

YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
YES	NA	NO
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.

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL

Generator

PROJECT:

Training will be conducted by a factory-trained maintenance specialist in engine / generator maintenance and service. Training duration will be approximately 1 hour with a question and answer session to last as long as needed to satisfy owner.

LESSON PLAN

- I. Safety
 - a. General safety precautions
 - b. Equipment safety code
 - c. Electrical shock and arc flash
- II. Equipment Operation
 - a. Engine/generator operation process
 - b. Fundamental operating principals of the engine/generator
 - c. Identify all components of equipment – mechanical, electrical, and electronic
 - i. Standard operating procedures – start-up, monitoring, and shut-down
- III. Component Description
 - a. Identify each component's function – Engine/generator and Automatic Transfer Switch and their relationship to one another (if applicable)
- IV. Preventive Maintenance
 - a. Inspection Procedures
 - i. Inspection with equipment in operation
 - ii. Potential trouble symptoms
 - iii. Planned maintenance requirements and intervals
 - b. Procedures for testing equipment after maintenance has been performed
- V. Service Events
 - a. Alarms / Display Messages
 - b. Procedures
 - i. E-stop reset
 - c. Symptom list
 - d. Equipment Troubleshooting
 - e. Probable Cause & Recommended Correction

“HANDS-ON” DEMONSTRATION

The instructor will demonstrate the engine/generator functionality in auto and manual modes.

Disclaimer

Training is for informational purposes only. If you have any specific safety or operational questions refer to the Operators Manual and/or Sequence of Operations documentation.



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

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

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

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

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

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

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

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

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

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

Cummins Power Generation® Responsibilities:

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

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

Owner Responsibilities:

The owner will be responsible for the following:

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

Limitations:

This limited warranty does not cover Product failures resulting from:

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

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

This limited warranty does not cover costs resulting from:

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

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

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

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

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

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

Extended Warranty:

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

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

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