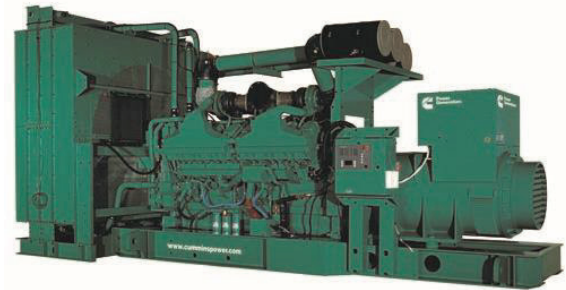


Section 2 – Generator Spec Sheets



Diesel Generator Set QSK60 Series Engine

1600 kW - 2000 kW 60 Hz



Description

Cummins® commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby and Prime Power applications. Codes or standards compliance may not be available with all model configurations – consult factory for availability.

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® digital 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™ protective relay, output metering and 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.

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

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

Model	Standby rating		Prime rating		Continuous rating		Data sheets	
	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz	50 Hz
DQKAA	1750 (2188)		1600 (2000)				D-3335	
DQKAB	2000 (2500)		1825 (2281)				D-3336	

Generator Set Specifications

Performance class	Genset models have been tested in accordance with ISO 8528-5. Consult factory for transient performance information.
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 801.2 through IEC 801.5; MIL STD 461C, Part 9

Engine Specifications

Bore	158.8 mm (6.25 in.)
Stroke	190.0 mm (7.48 in.)
Displacement	60.2 litres (3673 in ³)
Configuration	Cast iron, V 16 cylinder
Battery capacity	2200 amps minimum at ambient temperature of -18 °C to 0 °C (0 °F to 32 °F)
Battery charging alternator	40 amps
Starting voltage	24 volt, negative ground
Fuel system	Cummins' Modular Common Rail System
Fuel filter	Dual element, 10 micron filtration, spin-on fuel filters with 15 micron water separator
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient radiator

Alternator Specifications

Design	Brushless, 4 pole, drip proof revolving field
Stator	2/3 pitch
Rotor	Single bearing, flexible discs
Insulation system	Class H on low and medium voltage, Class F on high voltage
Standard temperature rise	150 °C Standby at 40 °C ambient
Exciter type	Permanent Magnet Generator (PMG)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic

Available Voltages

60 Hz Line-Neutral/Line-Line				50 Hz Line-Neutral/Line-Line			
• 219/380	• 277/480	• 2400/4160	• 7620/13200	• 220/380	• 240/415	• 1905/3300	• 3810/6600
• 254/440	• 347/600	• 7200/12470	• 7970/13800	• 230/400	• 254/440	• 3640/6300	• 6350/11000

* Note: Consult factory for other voltages.

Generator Set options and Accessories

Engine

- 208/240/480 V coolant heater for ambient above 4.5 °C (40 °F)
- 208/240/480 V coolant heater for ambient below 4.5 °C (40 °F)

Control panel

- PowerCommand 3.3
- Multiple language support
- 120/240 V 100 W control anti-condensation heater
- Exhaust pyrometer
- Ground fault indication
- Remote annunciator panel
- Paralleling relay package
- Shutdown alarm relay package
- Audible engine shutdown alarm
- AC output analog meters (bargraph)

Alternator

- 80 °C rise
- 105 °C rise
- 125 °C rise
- 120/240 V 300 W anti-condensation heater
- Temperature sensor - RTDs, 2/phase
- Temperature sensor – alternator bearing RTD
- Differential current transformers

Exhaust system

- Industrial grade exhaust silencer
- Residential grade exhaust silencer
- Critical grade exhaust silencer

Cooling system

- Remote radiator

Generator set

- AC entrance box
- Battery
- IBC and HCAI Certification

- Battery rack with hold-down - floor standing
- Circuit breaker - set mounted
- Disconnect switch – set mounted
- PowerCommand network
- Remote annunciator panel
- Spring isolators
- 2-year warranty
- 5-year warranty
- 10-year major components warranty

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

PowerCommand 3.3 – Control System



An integrated microprocessor-based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

Power management – Control function provides battery monitoring and testing features and smart starting control system.

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications interface – Control comes standard with PCCNet and Modbus interface.

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily upgradeable – PowerCommand controls are designed with common control interfaces.

Reliable design – The control system is designed for reliable operation in harsh environment.

Multi-language support

Operator Panel Features

Operator/display functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- First Start Sensor™ system selects first genset to close to bus
- Phase lock loop synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Load govern control for utility paralleling
- Extended paralleling (base load/peak shave) mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions.

Alternator data

- Line-to-Neutral and Line-to-Line AC volts
- 3-phase AC current
- Frequency
- kW, kVA, power factor kVA (three phase and total)

Engine data

- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data

- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)

Standard Control Functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire Line-to-Line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse Var shutdown
- Field overload shutdown

Engine protection

- Battery voltage monitoring, protection and testing
 - Overspeed shutdown
 - Low oil pressure warning and shutdown
 - High coolant temperature warning and shutdown
 - Low coolant level warning or shutdown
 - Low coolant temperature warning
 - Fail to start (overcrank) shutdown
 - Fail to crank shutdown
 - Cranking lockout
 - Sensor failure indication
 - Low fuel level warning or shutdown
 - Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Standard Control Functions (continued)

Control functions




- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

Options

- Auxiliary output relays (2)

Codes and Standards

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

<p>ISO 9001 ISO 14001 ISO 45001</p>	<p>This product was manufactured in a facility whose quality management system is certified to ISO 9001 and its Health Safety Environmental Management Systems certified to ISO 14001 and ISO 45001.</p>		<p>This product is listed to UL 2200, Stationary Engine Generator Assemblies.</p>
	<p>The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.</p>	<p>U.S. EPA</p>	<p>Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.</p>
	<p>All genset models are available as CSA certified to CSA C22.2 No.100.</p>	<p>International Building Code</p>	<p>The generator set package is available certified for seismic application in accordance with International Building Code.</p>

Ratings Definitions

Emergency Standby Power (ESP):

Applicable for supplying power continuously to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528 and ISO 3046-1, obtained and corrected in accordance with ISO 15550).

Limited-Time Running Power (LTP):

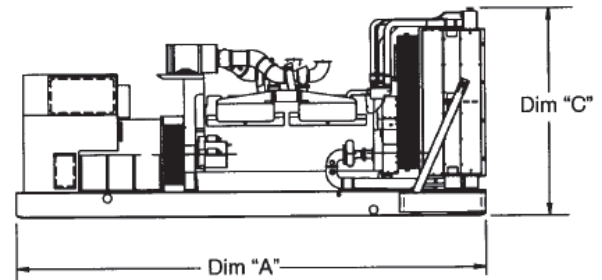
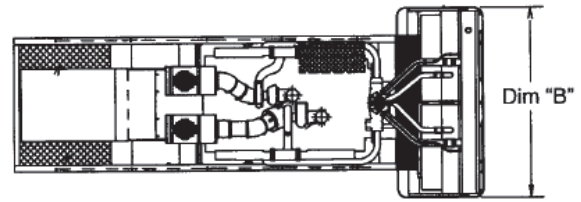
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

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 3046-1. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO 8528 and ISO 3046-1, obtained and corrected in accordance with ISO 15550).



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

Do not use for installation design

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set weight* dry kg (lbs)	Set weight* wet kg (lbs)
DQKAA	6175 (243)	2534 (100)	3043 (120)	15231 (33569)	15396 (33932)
DQKAB	6175 (243)	2534 (100)	3043 (120)	17382 (38309)	17908 (39470)

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

See your distributor for more information.

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S-1514 (07/22)

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Generator set data sheet

Model: DQKAB
Frequency: 60
Fuel type: Diesel
KW rating: 2000 standby
 1825 prime
Emissions level: EPA NSPS Stationary Emergency Tier 2

Exhaust emission data sheet:	EDS-1065
Exhaust emission compliance sheet:	EPA-1099
Sound performance data sheet:	MSP-1042
Cooling performance data sheet:	MCP-158
Prototype test summary data sheet:	PTS-267
Standard set-mounted radiator cooling outline:	A063L447
Optional set-mounted radiator cooling outline:	A030Y635
Optional remote radiator cooling outline:	A063H883

Fuel consumption	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	2000 (2500)				1825 (2281)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	47.7	76.9	106.1	135.3	45.1	71.8	98.4	125.1
L/hr	180	291	402	512	171	272	373	474

Engine	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	QSK60-G6 NR2	
Configuration	Cast iron, V 16 cylinder	
Aspiration	Turbocharged and low temperature aftercooled	
Gross engine power output, kWm (bhp)	2163 (2899)	1969 (2639)
BMEP at set rated load, kPa (psi)	2413 (350)	2179 (316)
Bore, mm (in)	159 (6.25)	
Stroke, mm (in)	190 (7.48)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	11.4 (2244)	
Compression ratio	14.5:1	
Lube oil capacity, L (qt)	334 (304)	
Overspeed limit, rpm	2100 ±50	
Regenerative power, kW	207	

Fuel flow

Maximum fuel flow, L/hr (US gph)	1033 (273)
Maximum fuel inlet restriction, kPa (in Hg)	16.9 (5)
Maximum fuel inlet temperature, °C (°F)	71 (160)

Air	Standby rating	Prime rating
Combustion air, m ³ /min (scfm)	178 (6295)	159 (5615)
Maximum air cleaner restriction, kPa (in H ₂ O)	3.7 (15)	
Alternator cooling air, m ³ /min (cfm)	204 (7300)	

Exhaust

Exhaust flow at set rated load, m ³ /min (cfm)	436 (15385)	385 (13580)
Exhaust temperature, °C (°F)	482 (900)	466 (870)
Maximum back pressure, kPa (in H ₂ O)	6.8 (27)	

Standard set-mounted radiator cooling

Ambient design, °C (°F)	40 (104)	
Fan load, kW _m (HP)	57 (77)	
Coolant capacity (with radiator), L (US gal)	492 (130)	
Cooling system air flow, m ³ /min (scfm)	1610 (56845)	
Total heat rejection, MJ/min (Btu/min)	99.5 (94395)	91.0 (86382)
Maximum cooling air flow static restriction, kPa (in H ₂ O)	0.12 (0.5)	
Maximum fuel return line restriction kPa (in Hg)	34 (10)	

Optional set-mounted radiator cooling

Ambient design, °C (°F)	50 (122)	
Fan load, kW _m (HP)	57 (77)	
Coolant capacity (with radiator), L (US gal)	617 (163)	
Cooling system air flow, m ³ /min (scfm)	3142 (110945)	
Total heat rejection, MJ/min (Btu/min)	99.5 (94395)	91 (86382)
Maximum cooling air flow static restriction, kPa (in H ₂ O)	0.12 (0.5)	
Maximum fuel return line restriction, kPa (in Hg)	34 (10)	

Optional remote radiator cooling¹

Set coolant capacity, L (US gal)		
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)	1902 (502)	
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)	606 (160)	
Heat rejected, jacket water circuit, MJ/min (Btu/min)	46.9 (44526)	44.1 (41824)
Heat rejected, aftercooler circuit, MJ/min (Btu/min)	33.9 (32156)	30.4 (28887)
Heat rejected, fuel circuit, MJ/min (Btu/min)		
Total heat radiated to room, MJ/min (Btu/min)	17.5 (16597)	16.1 (15282)
Maximum friction head, jacket water circuit, kPa (psi)	69 (10)	
Maximum friction head, aftercooler circuit, kPa (psi)	48 (7)	
Maximum static head, jacket water circuit, m (ft)	18 (60)	
Maximum static head, aftercooler circuit, m (ft)	18 (60)	
Maximum jacket water outlet temp, °C (°F)	104 (220)	100 (212)
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)	49 (120)	
Maximum aftercooler inlet temp, °C (°F)	66 (150)	
Maximum fuel flow, L/hr (US gph)	1033 (273)	
Maximum fuel return line restriction, kPa (in Hg)	34 (10)	

Weights²

Unit dry weight kgs (lbs)	15350 (33841)
Unit wet weight kgs (lbs)	15889 (35029)

Notes:

¹ For non-standard remote installations contact your local Cummins Power Generation representative.

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

Derating factors

Standby	Engine power available up to 447 m (1466 ft) at ambient temperatures up to 40°C (104°F). From 447m(1466 ft) up to 2001m(6562ft) engine derates at 5.1% per 305m(1000ft) for 40°C. Above these elevations, derate an additional at 5.8% per 305m (1000 ft). For temp above 40°C engine derates at 17.6% per 10°C (18°F).
Prime	Engine power available up to 447 m (1466 ft) at ambient temperatures up to 40°C (104°F). From 447m(1466 ft) up to 2001m(6562ft) engine derates at 5.1% per 305m(1000ft) for 40°C. Above these elevations, derate an additional at 5.8% per 305m (1000 ft). For temp above 40°C engine derates at 17.6% per 10°C (18°F).

Ratings definitions

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

Alternator data

Voltage	Connection ¹	Temp rise degrees C	Duty ²	Single phase factor ³	Max surge kVA ⁴	Winding No.	Alternator data sheet	Feature Code
380	Wye, 3-phase	150/125/105	S/P/C		7327	13	ADS-515	B595
380	Wye, 3-phase	125/105/80	S/P/C		7327	13	ADS-515	B598
380	Wye, 3-phase	105/80	S/P		7327	13	ADS-515	B599
380	Wye, 3-phase	80	S		7963	13	ADS-516	B660
380	Wye, 3-phase	125/105/80	S/P/C		7205	13	ADS-334	BA51
416	Wye, 3-phase	105/80	S/P		7695	12	ADS-517	B715
440	Wye, 3-phase	125/105/80	S/P/C		7361	312	ADS-334	B663
440	Wye, 3-phase	105	S		7284	12	ADS-515	B665
480	Wye, 3-phase	125/105/80	S/P/C		7361	312	ADS-334	B462
480	Wye, 3-phase	105/80	S/P		7695	312	ADS-335	B463
480	Wye, 3-phase	125/105	P/C		6716	312	ADS-332	B464
480	Wye, 3-phase	80	S		8412	12	ADS-516	B601
480	Wye, 3-phase	80	P		8412	12	ADS-516	B694
480	Wye, 3-phase	105	S		7695	12	ADS-517	B796
600	Wye, 3-phase	125/105/80	S/P/C		7361	07	ADS-334	B465
600	Wye, 3-phase	105/80	S/P		7695	07	ADS-335	B301
600	Wye, 3-phase	125/105	P/C		6716	07	ADS-333	B466
600	Wye, 3-phase	80	S		7265	07	ADS-516	B604
4160	Wye, 3-phase	105/80	S/P		6307	51	ADS-518	B937
4160	Wye, 3-phase	125/105/80	S/P/C		6307	51	ADS-518	B934
4160	Wye, 3-phase	80	S		6307	51	ADS-518	B935
4160	Wye, 3-phase	105	S		6307	51	ADS-520	B795
12470-13800	Wye, 3-phase	125/105/80	S/P/C		6062	91	ADS-521	B448
12470	Wye, 3-phase	105/80	S/P		6038	87	ADS-521	B567
13200-13800	Wye, 3-phase	105/80	S/P		6062	91	ADS-521	B612
12470	Wye, 3-phase	80	S		6685	7	ADS-522	B607
13200-13800	Wye, 3-phase	80	S		8012	91	ADS-523	B628
13800	Wye, 3-phase	80	S		6833	91	ADS-521	B610
13800	Wye, 3-phase	105	S		6062	91	ADS-523	B797

Notes:

¹ Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multiply the three phase kW rating by the Single Phase Factor³. All single phase ratings are at unity power factor.

² Standby (S), Prime (P) and Continuous ratings (C).

³ Factor for the *Single Phase Output from Three Phase Alternator* formula listed below.

⁴ Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

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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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D-3336 (05/22)



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PowerCommand[®] 3.3 Generator Set Digital Integrated Control System



Bargraph Optional

Introduction

The PowerCommand[®] 3.3 control system is a microprocessor-based generator set monitoring, metering, and control system, which is comprised of PowerCommand[®] Control 3300 and the Human Machine Interface 320. PCC3300 supports multiple operation modes including:

- Standalone,
- Synchronization only,
- Isolated bus paralleling,
- Utility single generator set paralleling,
- Utility multiple generator set paralleling,
- Utility single generator set paralleling with power transfer control (automatic mains failure),
- Isolated bus paralleling with Masterless Load Demand

PowerCommand[®] Control 3300 is designed to meet the exacting demands of the harsh and diverse environments of today's typical power generation applications for Full Authority Electronic or Hydromechanical engine power generator sets.

Offering enhanced reliability and performance over more conventional generator set controls via the integration of all generator control functions into a single system, PCC3300 is your Power of One generator set control solution.

Benefits and Features

- 320 x 240 pixels graphical LED backlit LCD
- Multiple languages supported
- AmpSentry[™] protection provides industry-leading generator overcurrent protection
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes

- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr control
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing is provided on applicable platforms
- Generator set monitoring (including metering) and protection with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- 12 V (DC) and 24 V (DC) battery operation
- RS-485 Modbus[®] interface for interconnecting to customer equipment
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA, and CE standards

PowerCommand® Generator Set Digital Control System PCC 3300



Introduction

PCC3300 is an industry-leading digital generator set control suitable for usage on a wide range of diesel and lean burn natural gas generator sets in both standalone as well as paralleling applications.

PowerCommand® is compatible with either shunt or PMG excitation, and is suitable for usage with reconnectable or non-reconnectable generators. Configuration for any frequency, voltage and power connection from 120 V (AC) to 600 V (AC) line-to-line or 601 V (AC) to 45k V (AC) with an external PT is supported. The PCC3300 derives its own power from the generator set starting batteries and functions over a voltage range of 8 V (DC) to 30 V (DC).

Features

- PCC3300 supports configurable control features via software download using InPower PC-compatible software
- 12 V (DC) and 24 V (DC) battery operation
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing on applicable platform is provided, which is capable of providing isochronous frequency regulation
- Full authority J1939 CANBus® prime mover communications and control is provided for platforms with an Engine 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 due to thermal overload or electrical faults by inverse time protection
- Generator set monitoring offers status information for all critical prime mover and generator functions
- AC and DC digital generator set metering is provided. AC measurements are configurable for single or three phase sensing with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Battery monitoring system continually monitors the battery output and warns of the potential occurrence of a weak battery condition
- Relay drivers for prime mover starter, fuel shutoff (FSO), glow plug/spark ignition power and switched B+ applications are provided
- Integrated generator set protection is offered to protect the prime mover and generator
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr Control
- The synchronization check function provides adjustments for phase angle window, voltage window, frequency window and time delay
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Advanced serviceability is offered via InPower™, a PC-based software service tool
- PCC3300 is designed for reliable operation in harsh environments with the unit itself being a fully encapsulated module
- RS-485 ModBus interface for interconnecting to customer equipment
- Native on PCC3300: Four discrete inputs, two dry contact relay outputs and two low-side driver outputs are provided and are all configurable.
 - Optional extra PCC3300 input and output capability available via AUX101
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards

Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

Operator adjustments: The HMI320 includes provisions for many set up and adjustment functions.

Genset hardware data: Access to the control and software part number, genset rating in kVA and genset model number is provided from the HMI320 or InPower.

Data logs: Information concerning all of the following parameters is periodically logged and available for viewing; engine run time, controller on time, number of start attempts, total kilowatt hours, and load profile. (Control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

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

Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kW, kVAR, Power Factor, kVA (three phase and total)
- Frequency

For Lean Burn Natural Gas Engine applications:

- Alternator heater status
- Alternator winding temperature (per phase) as well as alternator drive end and non-drive end bearing

Utility/AC bus data

- Voltage (three phase line-to-line and line-to-neutral)
- Current (three phase and total)
- 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
- Coolant temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Lean Burn Natural Gas (LBNG) application parameters include:

- Safety shutoff valve status
- Valve proving status
- Downstream gas pressure
- Gas inlet pressure
- Gas mass flow rate
- Control valve position
- Gas outlet pressure
- Manifold pressure and temperature
- Throttle position
- Compressor outlet pressure
- Turbo speed
- Compressor bypass position
- Cylinder configuration (e.g., drive end and non-drive end configurations)
- Coolant pressure 1 and 2 as well as coolant temperature 1 and 2 for both HT/LT respectively
- Exhaust port temperature (up to 18 cylinders)
- Pre-filter oil pressure
- Exhaust back pressure
- Parent ECM internal temperature and isolated battery voltage
- Speed bias
- Child ECM internal temperature and isolated battery voltage
- Knock level, spark advance, and knock count (for up to 18 cylinders)
- Auxiliary supply disconnect status
- Engine heater status
- Coolant circulating pump status
- Lube oil priming pump status
- Lube oil status
- Oil heater status
- Derate authorization status
- Start system status
- Ventilator fan status
- Ventilation louvre status
- Radiator fan status
- DC PSU status
- Start inhibit/enable status and setup

Service adjustments – The HMI320 includes provisions for adjustment and calibration of genset control functions. Adjustments are protected by a password. Functions include:

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

Prime Mover Control

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

12 V (DC) or 24 V (DC) nominal battery voltage is supported by PCC3300 for normal operation.

Temperature dependant prime mover governing dynamics: This function is supported enabling the engine to be responsive when warm and more stable when operating at lower temperature via providing control and modification over electronic governing parameters as a function of engine temperature.

Isochronous governing is provided in order to control prime mover speed within $\pm 0.25\%$ of nominal rated speed for any steady state load from no load to full load. During operation frequency drift should not exceed $\pm 0.5\%$ of nominal frequency given a 33°C (or 60°F) change in ambient temperature within an eight-hour period.

Drop electronic speed is governing capability is natively offered by PCC3300 to permit droop from 0% to 10% between no load to full load.

Remote start capability is built into the PCC3300 as the unit accepts a ground signal from remote devices to automatically command the starting of the generator set as well as the reaching of rated speed, voltage and frequency or otherwise run at idle speed until prime mover temperature is adequate. The presence of a remote start signal shall cause the PCC3300 to leave sleep mode and return to normal power mode. PCC3300 supports an option for delayed start or stop.

Remote Start Integrity: In compliance with NEC2017 Start Signal Integrity standard – NFPA70 Article 700.10(D)(3), the remote start circuit from ATS to PCC3300 is continuously monitored for signal disturbance due to broken, disconnected or shorted wires via a configurable input. Loss of signal integrity results in activation of a remote start signal.

Remote and local emergency stopping capability: PCC3300 accepts ground signal from a locally or remotely mounted emergency stop switch to cause the generator set to immediately shutdown. The generator set is prevented from either running or cranking with the emergency stop switch engaged. If PCC3300 is in sleep mode, then the activation of any emergency stop switch shall return PCC3300 to normal powered state along with the activation of the corresponding shutdown and run-prevention states.

Sleep mode: PowerCommand 3.3 supports a configurable low current draw state, which is design with consideration to the needs of prime applications or others application without a battery charger (in order to minimize battery current drain).

Automatic prime mover starting: Any generator set controlled by PCC3300 is capable of automatic starting achieved via either magnetic pickup or main alternator output frequency. PCC3300 additionally supports

configurable glow plug control where applicable.

Prime mover cycle cranking: PCC3300 supports configurable starting cycles and rest periods. Built in starter protection are incorporated to prevent the operator from specifying a starting sequence that may be damaging.

Configurable time delay functionality: PCC3300 supports time delayed generator set starting and stopping (for cooldown). Permissible time delays are as follows (noting a default setting is 0 seconds):

1. Start delay: 0 seconds to 300 seconds prior to starting after receiving a remote start signal.
2. Stop delay: 0 seconds to 600 seconds prior to shut down after receiving a signal to stop in normal operation modes.

Lean Burn Natural Gas application specific parameters

PCC3300 supports prime mover inhibiting in order to permit application-specific processes (i.e. Auxiliaries) to be started first.

Generator Control

PCC3300 performs both Genset voltage sensing and Genset voltage regulation as follows:

- Voltage sensing is integrated into PCC3300 via three phase line-to-line sensing that is compatible with shunt or PMG excitation systems
- Automatic voltage regulation is accomplished by using a three phase fully rectified input and has a FET output for good motor starting capability.

Major features of generator control 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 °C (104 °F) change in temperature in an eight-hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level.

The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

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

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

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

Cylinder Cut-off System (CCS): PCC 3300 supports Cylinder Cut-off System which is used to operate the engines on half bank at no load and light load conditions. CCS has below benefits on engine

performance- improved emission standards, improved fuel efficiency, reduced hydrocarbons, reduced white smoke, reduced wet stacking and higher exhaust temperature at light loads to improve turbocharger operations and catalyst performance.

Step Timing Control (STC): PCC 3300 supports STC functionality which is used to advance the engine timing of a hydro-mechanical engine during start up and light load conditions. During ADVANCED injection timing, it:

- Improves cold weather idling characteristics
- Reduces cold weather white smoke
- Improves light load fuel economy
- Reduces injector carboning

Paralleling Functions

First Start Sensor™ system – PowerCommand® provides a unique control function that positively prevents multiple gensets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between the gensets that allows the gensets to work together to determine which genset a system should be the first to close to the bus. The system includes an independent backup function, so that if the primary system is disabled the required functions are still performed.

Synchronizing – Control incorporates a digital synchronizing function to force the genset to match the frequency, phase and voltage of another source such as a utility grid. The synchronizer includes provisions to provide proper operation even with highly distorted bus voltage waveforms. The synchronizer can match other sources over a range of 60-110% of nominal voltage and -24 to +6 hertz. The synchronizer function is configurable for slip frequency synchronizing for applications requiring a known direction of power flow at instant of breaker closure or for applications where phase synchronization performance is otherwise inadequate.

Load sharing control – The genset control includes an integrated load sharing control system for both real (kW) and reactive (kVar) loads when the genset(s) are operating on an isolated bus. The control system determines kW load on the engine and kVar load on the alternator as a percent of genset capacity, and then regulates fuel and excitation systems to maintain system and genset at the same percent of load without impacting voltage or frequency regulation. The control can also be configured for operation in droop mode for kW or kVar load sharing.

Load govern control– When PowerCommand® receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW

values from 0-100% of standby rating, and 0.7-1.0 power factor (lagging). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAR load govern droop.

Load demand control – The control system includes the ability to respond to an external signal to initiate load demand operation. On command, the genset will ramp to no load, open its paralleling breaker, cool down, and shut down. On removal of the command, the genset will immediately start, synchronize, connect, and ramp to its share of the total load on the system.

Sync check – The sync check function decides when permissive conditions have been met to allow breaker closure. Adjustable criteria are: phase difference from 0.1-20 deg, frequency difference from 0.001-1.0 Hz, voltage difference from 0.5-10%, and a dwell time from 0.5-5.0 sec. Internally the sync check is used to perform closed transition operations. An external sync check output is also available.

Genset and utility/AC bus source AC metering – The control provides comprehensive three phase AC metering functions for both monitored sources, including: 3-phase voltage (L-L and L-N) and current, frequency, phase rotation, individual phase and totalized values of kW, kVAR, kVA and Power Factor; totalized positive and negative kW-hours, kVAR-hours, and kVA-hours. Three wire or four wire voltage connection with direct sensing of voltages to 600V, and up to 45kV with external transformers. Current sensing is accomplished with either 5 amp or 1 CT secondaries and with up to 10,000 amp primary. Maximum power readings are 32,000kW/kVAR/kVA.

Power transfer control – provides integrated automatic power transfer functions including source availability sensing, genset start/stop and transfer pair monitoring and control. The transfer/retransfer is configurable for open transition, fast closed transition (less than 100msec interconnect time), or soft closed transition (load ramping) sequences of operation. Utility source failure will automatically start genset and transfer load, retransferring when utility source returns. Test will start gensets and transfer load if test with load is enabled. Sensors and timers include:

Under voltage sensor: 3-phase L-N or L-L under voltage sensing adjustable for pickup from 85-100% of nominal. Dropout adjustable from 75-98% of pickup. Dropout delay adjustable from 0.1-30 sec.

Over voltage sensor: 3-phase L-N or L-L over voltage sensing adjustable for pickup from 95-99% of dropout. Dropout adjustable from 105-135% of nominal. Dropout delay adjustable from 0.5-120 sec. Standard configuration is disabled and is configurable to enabled in the field using the HMI or InPower service tools.

Over/Under frequency sensor: Center frequency adjustable from 45-65 Hz. Dropout bandwidth adjustable from 0.3-5% of center frequency beyond pickup bandwidth. Pickup bandwidth adjustable from 0.3-20% of center frequency. Field configurable to enable.

Loss of phase sensor: Detects out of range voltage phase angle relationship. Field configurable to enable.

Phase rotation sensor: Checks for valid phase rotation of source. Field configurable to enable.

Breaker tripped: If the breaker tripped input is active, the associated source will be considered as unavailable.

Timers: Control provides adjustable start delay from 0 - 300sec, stop delay from 0 - 800sec, transfer delay from 0-120sec, retransfer delay from 0-1800sec, programmed transition delay from 0-60sec, and maximum parallel time from 0-1800sec.

Negative Sequence Current Protection: PCC3300 supports this protection natively in order to determine if the generator is at any point was running subject to negative phase sequencing.

Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped. Upon breaker failure, appropriate control action is taken to maintain system integrity.

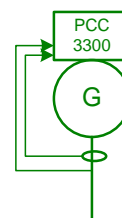
Exerciser clock –The exerciser clock (when enabled) allows the system to be operated at preset times in either test without load, test with load, or extended parallel mode. A Real Time Clock is built in. Up to 12 different programs can be set for day of week, time of day, duration, repeat interval, and mode. For example, a test with load for 1 hour every Tuesday at 2AM can be programmed. Up to 6 different exceptions can also be set up to block a program from running during a specific date and time period.

Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for either the genset metering point ("Base Load") or the utility metering point ("Peak Shave"). The control point for the reactive power (kVAR or Power Factor) can also be independently configured for either the genset metering point or the utility metering point. This flexibility would allow base kW load from the genset while maintaining the utility power factor at a reasonable value to avoid

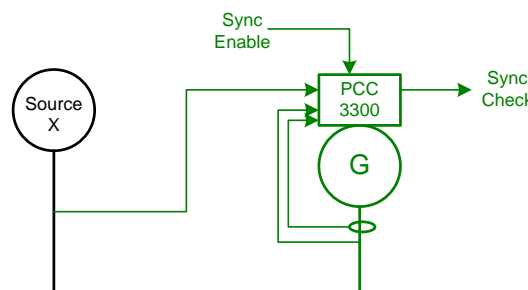
penalties due to low power factor. The System always operates within genset ratings. The control point can be changed while the system is in operation. Set points can be adjusted via hardwired analog input or adjusted through an operator panel display or service tool.

Application types – Controller is configured to operating in one of six possible application types. These topologies are often used in combinations in larger systems, with coordination of the controllers in the system either by external device or by interlocks provided in the control. Topologies that may be selected in the control include:

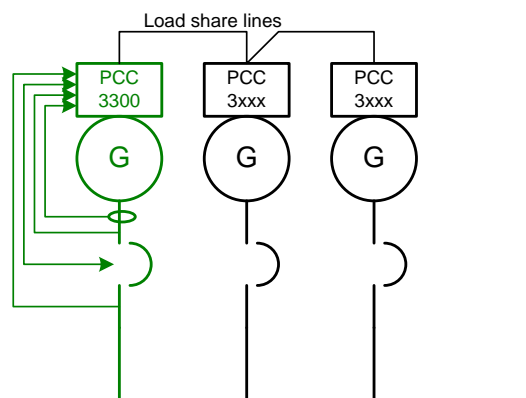
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



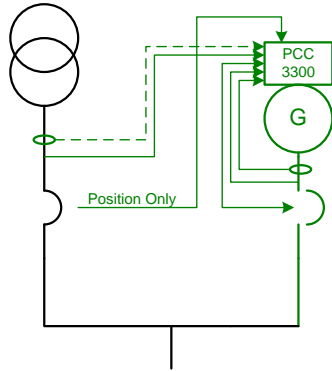
Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.



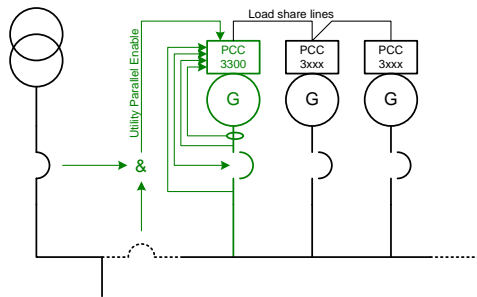
Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



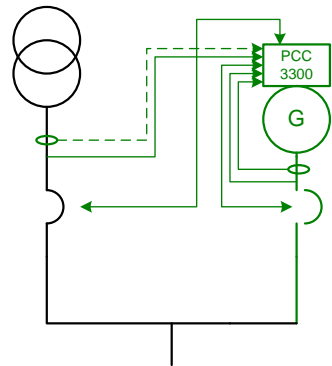
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



Utility Multiple: Supports all functionality of Isolated Bus and provides extended paralleling to the utility. Extended paralleling load set points follow a constant setting; dynamically follow an analog input, Modbus register or HMI.

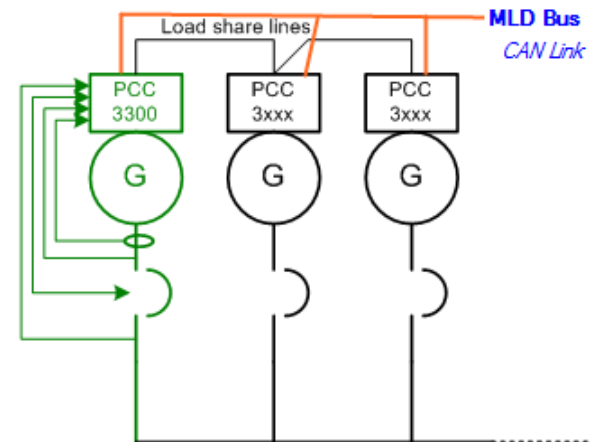
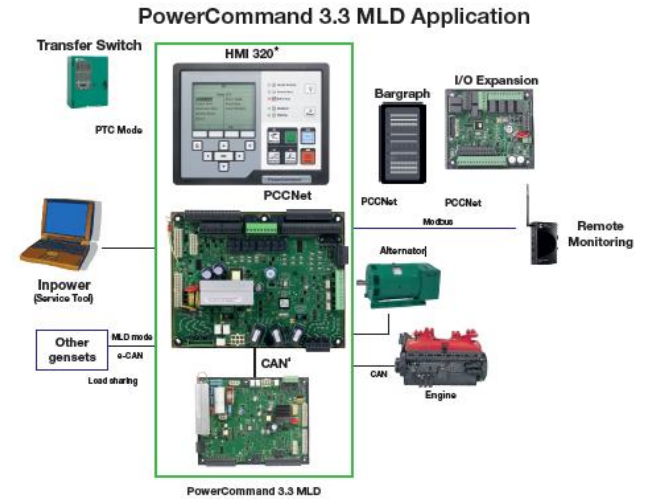


Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

PowerCommand® 3.3 with Masterless Load Demand (MLD) technology enables generator sets to start/stop automatically based on load demand. Masterless Load Demand-capable generators are equipped with an additional s-CAN network connection that allows sharing of information amongst paralleled generator sets. MLD has been designed for hassle-free installation, commissioning and operation. MLD functionality. Integrated on-board system logic provides the MLD topology control without the need for any additional system.



PCC3300 External Voltage and Frequency Biasing Inputs

PCC3300 supports externally driven voltage and frequency biasing capability in order to permit external paralleling (if intending to use this feature please contact your local distributor for further information).

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 (or are handled by the engine ECM) 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. If a Derate command occurs while in utility parallel mode, the control will actively reduce power by lowering the base load kW to the derated target kW.

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, derate, shutdown, shutdown with cooldown or status indication and for labeling the input.

Emergency stop

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

General prime mover 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 genset is signaled to start and indicate a warning if the battery indicates impending failure.

Low coolant level warning – Can be set up to be a warning or shutdown.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

Fail to start (overcrank) shutdown - The control system will indicate a fault if the genset 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.

Fault simulation –The control in conjunction with InPower software, will accept commands to allow a technician to verify the proper operation of the control and its interface by simulating failure modes or by forcing the control to operate outside of its normal operating ranges. InPower also provides a complete list of faults and settings for the protective functions provided by the controller.

For Lean Burn Natural Gas Engine applications:

Off load running (protection) – This feature protects the engine in the event the genset is being called to go off load for too long.

Hydro Mechanical fuel system engine protection:

Overspeed shutdown – Default setting is 115% of nominal

Low lube oil pressure warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High lube oil temperature warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High engine temperature warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

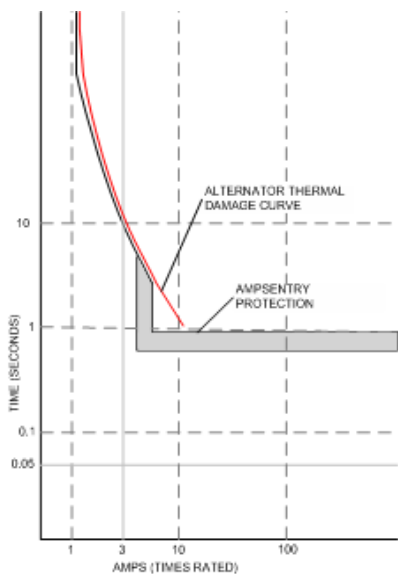
High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

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.

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 genset or in the load. It also provides single and three phase fault current regulation (3x Current) 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 (2sec for 1P short, 5sec for 2P short). See document R1053 for a full-size time over current curve. The control does not include protection required for interconnection to a utility (mains) service.



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 or synchronizing.

Under frequency shutdown (81 u) - Genset 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 (81o) - Genset 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 (51) - 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 genset will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown genset 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 (40) - 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.

Negative sequence overcurrent warning (46) - Control protects the generator from damage due to excessive imbalances in the three phase load currents and/or power factors.

Custom overcurrent warning/shutdown (51) - Control provides the ability to have a custom time overcurrent protection curve in addition to the AmpSentry protective relay function.

Ground fault overcurrent (51G) - Control detects a ground fault either by an external ground fault relay via a contact input or the control can measure the ground current from an external current transformer. Associated time delays and thresholds are adjustable via InPower or HMI.

Paralleling Protection

Breaker fail to close Warning: When the control signals a circuit breaker to close, it will monitor the breaker auxiliary contacts and verify that the breaker has closed. If the control does not sense a breaker closure within an adjustable time period after the close signal, the fail to close warning will be initiated.

Breaker fail to open warning: The control system monitors the operation of breakers that have been signaled to open. If the breaker does not open within an adjustable time delay, a Breaker Fail to Open warning is initiated.

Breaker position contact warning: The controller will monitor both 'a' and 'b' position contacts from the breaker. If the contacts disagree as to the breaker position, the breaker position contact warning will be initiated.

Breaker tripped warning: The control accepts inputs to monitor breaker trip / bell alarm contact and will initiate a breaker tripped warning if it should activate.

Fail to disconnect warning: In the controller is unable to open either breaker, a fail to disconnect warning is initiated. Typically, this would be mapped to a configurable output, allowing an external device to trip a breaker.

Fail to synchronize warning: Indicates that the genset could not be brought to synchronization with the bus. Configurable for adjustable time delay of 10 -900 seconds, 120 default.

Phase sequence sensing warning: Verifies that the genset phase sequence matches the bus prior to allowing the paralleling breaker to close.

Maximum parallel time warning (power transfer control mode only): During closed transition load transfers, control independently monitors paralleled time. If time is exceeded, warning is initiated and genset is disconnected.

Bus or genset PT input calibration warning: The control system monitors the sensed voltage from the bus and genset output voltage potential transformers. When the paralleling breaker is closed, it will indicate a warning condition if the read values are different.

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
 - Rupture basin
 - Start type signal
 - Battle short
 - Load demand stop
 - Synchronize enable
 - Genset circuit breaker inhibit
 - Utility circuit breaker inhibit
 - Single mode verify
 - Transfer inhibit – prevent transfer to utility (in power transfer control mode)
 - Retransfer inhibit – prevent retransfer to genset (in power transfer control mode)
 - kW and kVAR load setpoints
- 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

Input signals for Lean Burn Natural Gas Engine applications:

- Gearbox oil pressure/temperature protection
- Fire fault
- Earth fault support as a discrete input via an appropriate secondary detection device
- Differential fault
- DC power supply fault
- Genset Interface Box (GIB) isolator open fault
- Start inhibit/enable (x3)
- Radiator fan trip
- Ventilator fan trip
- Ventilation louvers closed
- Start system trip
- Alternator heater trip
- Alternator heater status
- Alternator winding temperature (PT100 RTDx3)
- Alternator drive end bearing temperature (PT100 RTD)
- Alternator non-drive end bearing temperature (PT100 RTD)

Output signals from the PowerCommand® control include:

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

- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (genset running) signal: Operates when the genset has reached 90% of rated speed and voltage and latches until genset is switched to off or idle mode.
- Paralleling circuit breaker relays outputs: Control includes (4) relay output contacts (3.5A, 30 VDC) for opening and closing of the genset and utility breakers.

Output Signals for Lean Burn Natural Gas Engine applications:

- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

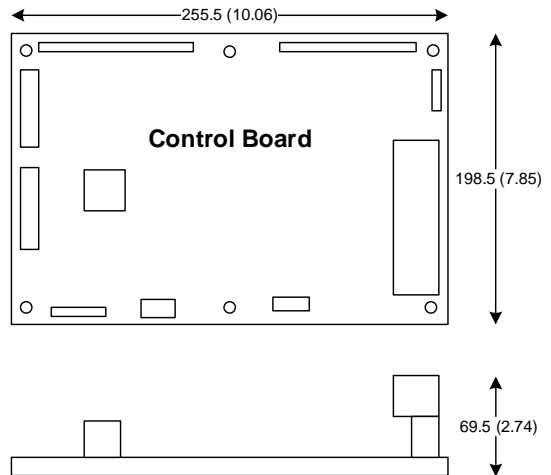
Communications connections include:

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

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

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

Mechanical Drawing



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:

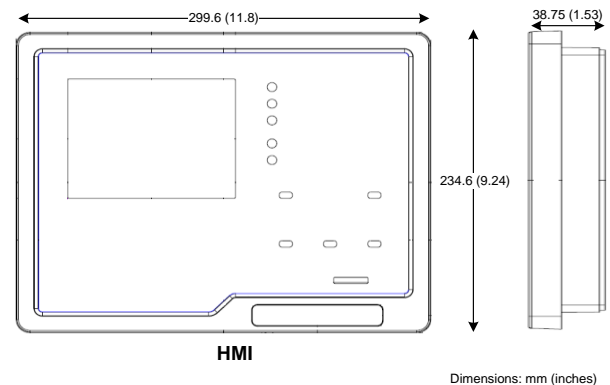
- LED indicating lamps
 - genset running
 - remote start
 - not in auto
 - shutdown
 - warning
 - auto
 - manual and stop
 - Circuit breaker open (if equipped)
 - Circuit breaker closed (if equipped)
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. 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 gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

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® gensets 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 (-40 °F) to +70 °C (158 °F), and for storage from -55 °C (-67 °F) to +80 °C (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 (-4 °F) to +70 °C (158 °F), and for storage from -30 °C (-22 °F) to +80 °C (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 genset. 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 8528-4:2005 compliance, controls and switchgear (second edition)
- 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.
- EN 61000-6-3,4 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized, 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.
- ROHS (Restriction of Hazardous substance) complaint both for HMI 320 & PCC3300v2.

Reference Documents

Please refer to the following reference documents available in the PowerSuite library:

- PowerCommand™ 3.3. Application Guide
- T-037: PowerCommand Control Application Manual (ANSI Protective Functions)
- T-040: PowerCommand 3.3 Paralleling Application Guide

Please refer to the following reference documents available on Cummins Quickserve:

- Service Manuals for PC3.3 (non-MLD) and PC3.3 (MLD)
- Modbus Register Mapping

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.





2023 EPA Tier 2 Exhaust Emission Compliance Statement 2000DQKAB Stationary Emergency 60 Hz Diesel Generator Set

Compliance Information:

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

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	PCEXL060.AAD-001
Effective Date:	04/13/2022
Date Issued:	04/13/2022
EPA Engine Family (Cummins Emissions Family):	PCEXL060.AAD

Engine Information:

Model:	QSK60-G6 NR2	Bore:	6.25 in. (159 mm)
Engine Nameplate HP:	2922	Stroke:	7.48 in. (190 mm)
Type:	4 Cycle, 60°V, 16 Cylinder Diesel	Displacement:	3673 cu. in. (60.2 liters)
Aspiration:	Turbocharged and CAC	Compression Ratio:	14.5:1
Emission Control Device:	Electronic Control	Exhaust Stack Diameter:	2 – 14 in.

Diesel Fuel Emissions Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kW _m -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.



High Ambient Air Temperature Radiator Cooling System

	Fuel Type	Duty	Rating (kW)	Max cooling @ air flow static restriction, unhooded (inches water/mm water)					Housed in free air, no air discharge restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	Weather	Sound level 1	Sound level 2
				Maximum allowable ambient temperature, degree C							
60 Hz	Diesel	Standby	2000	52.6	49.4	46.1	43.5	41.6	N/A	N/A	N/A
		Prime	1825	47.5	44.1	40.7	38.2	36.5	N/A	N/A	N/A
				Airflow (m ³ /s)							
				33.2	30.5	28.3	26.8	25.8	N/A	N/A	N/A

Enhanced High Ambient Air Temperature Radiator Cooling System

	Fuel Type	Duty	Rating (kW)	Max cooling @ air flow static restriction, unhooded (inches water/mm water)					Housed in free air, no air discharge restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	Weather	Sound level 1	Sound level 2
				Maximum allowable ambient temperature, degree C							
60 Hz	Diesel	Standby	2000	56.5	56.5	56.5	54.6	54	N/A	N/A	N/A
		Prime	1825	50.6	50.1	49.6	49	48.4	N/A	N/A	N/A
				Airflow (m ³ /s)							
				60.6	58.8	57.4	55.7	53.7	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.



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	99.2	99.6	100.1	99.9	96.8	100.8	99.6	100.4	99.7

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	Infinite Exhaust	90.6	106.7	118.9	123.4	121.3	117.8	118.7	120.4	128.3

Exhaust Sound Power Level, dB(A)

Open Exhaust (No Muffler Rated Load)	Octave Band Center Frequency (Hz)								Sound Power Level
	63	125	250	500	1000	2000	4000	8000	
		97.7	107.5	108.5	110.5	108.1	112.9	113.7	108.7

Note:

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



Alternator Data Sheet Frame Size: P734F

Characteristics						
Weights:	No of Bearings:		1-bearing		2-bearing	
	Stator assembly:		4206 lb	1908 kg	4206 lb	1908 kg
	Rotor assembly:		3547 lb	1609 kg	3450 lb	1565 kg
	Complete assembly:		8466 lb	3840 kg	8393 lb	3807 kg
Maximum speed:			2250 rpm			
Excitation current:	Full load:		3.6 Amps			
	No load:		0.5 Amps			
Insulation system:	Class H throughout					
3 ∅ Ratings	(0.8 power factor)	60 Hz (winding no)				
		<u>346/600</u>	<u>220/380</u>	<u>240/416</u>	<u>240/416</u>	<u>254/440</u>
		(07)	(13)	(13)	(312)	(312)
163° C rise ratings	@ 40° C	kW	2228	2144	2144	2004
		kVA	2785	2680	2680	2505
150° C rise ratings	@ 40° C	kW	2164	2084	2084	1948
		kVA	2705	2605	2605	2435
125° C rise ratings	@ 40° C	kW	2080	2004	2004	1876
		kVA	2600	2505	2505	2345
105° C rise ratings	@ 40° C	kW	1936	1864	1864	1752
		kVA	2420	2330	2330	2190
80° C rise ratings	@ 40° C	kW	1792	1724	1724	1612
		kVA	2240	2155	2155	2015
Reactances	(per unit ± 10%)	<u>346/600</u>	<u>220/380</u>	<u>240/416</u>	<u>240/416</u>	<u>254/440</u>
		(07)	(13)	(13)	(312)	(312)
(Based on full load at 125° C rise rating)						
	Synchronous	2.48	3.34	2.79	3.54	3.38
	Transient	0.13	0.20	0.17	0.21	0.20
	Subtransient	0.10	0.15	0.12	0.16	0.15
	Negative sequence	0.13	0.21	0.18	0.23	0.22
	Zero sequence	0.02	0.03	0.02	0.03	0.03
Motor starting		<u>346/600</u>	<u>220/380</u>	<u>240/416</u>	<u>240/416</u>	<u>254/440</u>
		(07)	(13)	(13)	(312)	(312)
Maximum kVA	(90% sustained voltage)	7361	7205	7205	7361	7361
Time constants	(sec)	<u>346/600</u>	<u>220/380</u>	<u>240/416</u>	<u>240/416</u>	<u>254/440</u>
		(07)	(13)	(13)	(312)	(312)
	Transient	0.154	0.154	0.154	0.154	0.154
	Subtransient	0.020	0.020	0.020	0.020	0.020
	Open circuit	2.540	2.540	2.540	2.540	2.540
	DC	0.020	0.020	0.020	0.020	0.020
Windings	(@22° C)	<u>346/600</u>	<u>220/380</u>	<u>240/416</u>	<u>240/416</u>	<u>254/440</u>
		(07)	(13)	(13)	(312)	(312)
Stator resistance	(L-L Ohms)	0.00220	0.00102	0.00102	0.00152	0.00152
Rotor resistance	(Ohms)	2.31	2.31	2.31	2.31	2.31
Number of leads		6	6	6	6	6



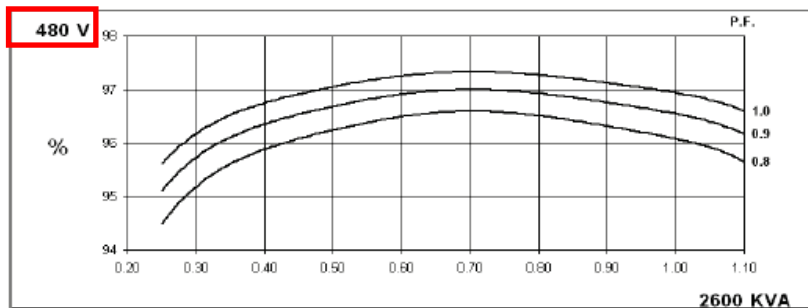
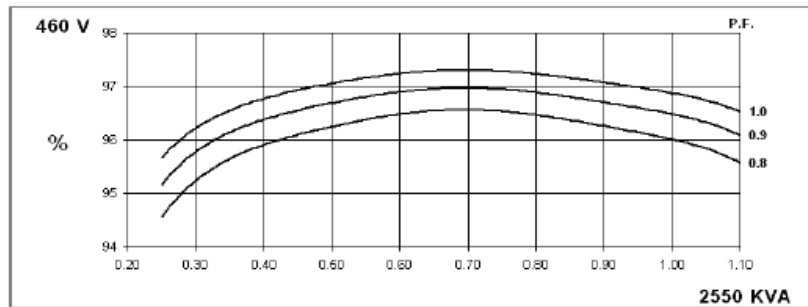
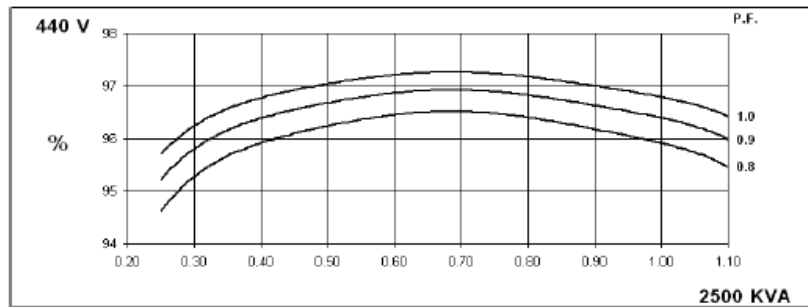
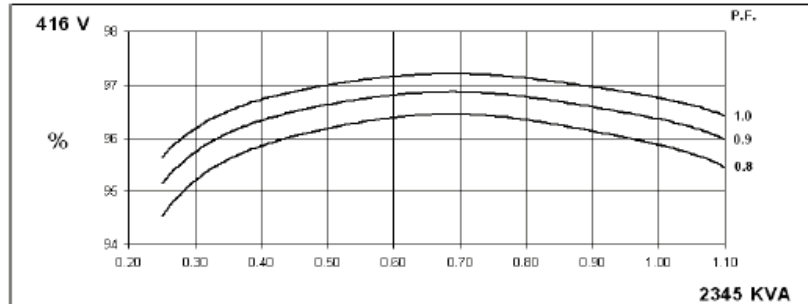
Alternator Data Sheet

Frame Size: P734F

**60
Hz**

Winding 312

THREE PHASE EFFICIENCY CURVES



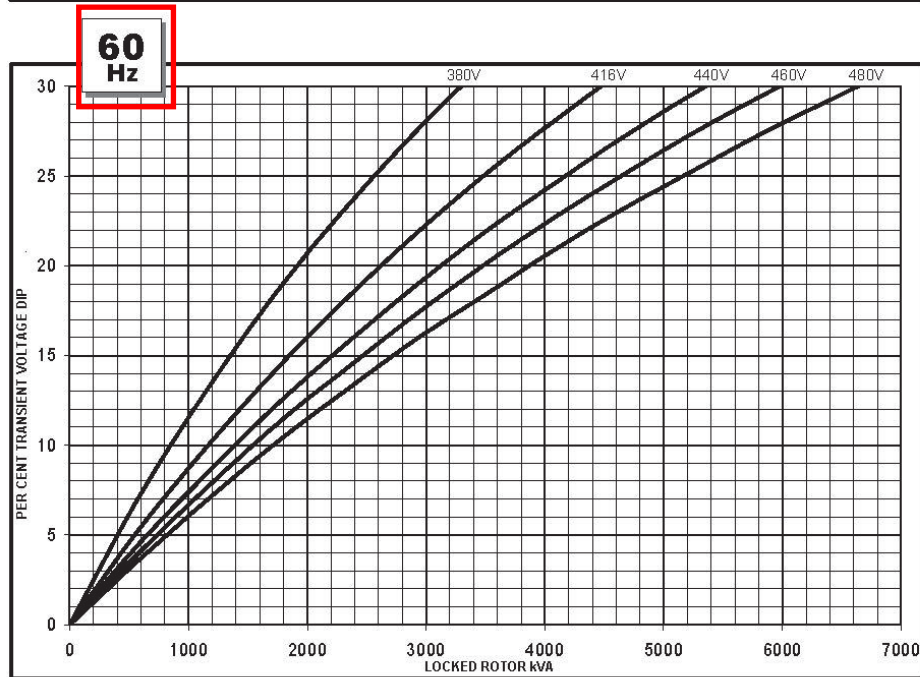
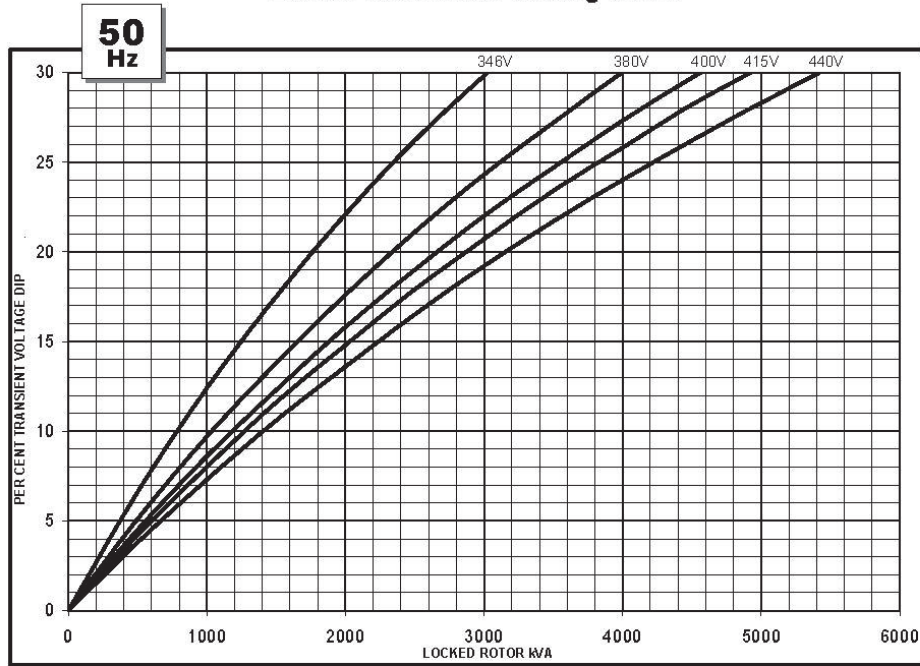


Alternator Data Sheet

Frame Size: P734F

Winding 312

Locked Rotor Motor Starting Curve





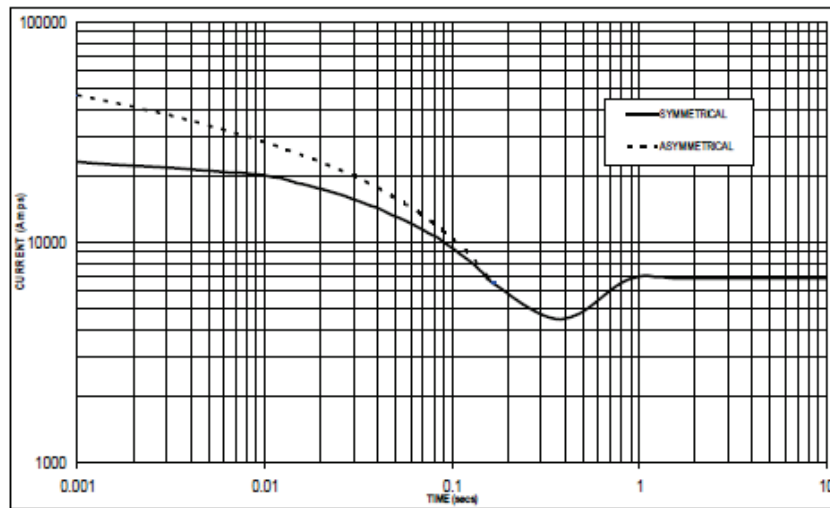
Alternator Data Sheet

Frame Size: P734F

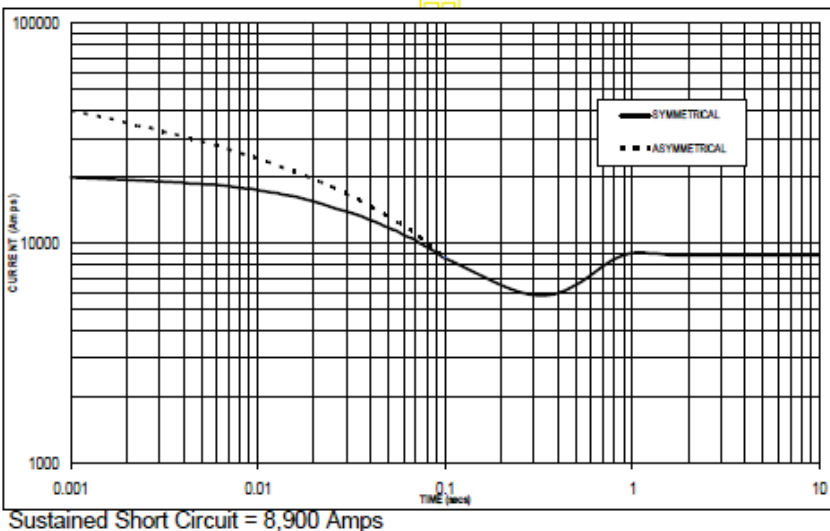
Winding 312

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

**50
Hz**



**60
Hz**



Note 1

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

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	x 1.00	416v	x 1.00
400v	x 1.05	440v	x 1.06
415v	x 1.09	460v	x 1.10
440v	x 1.16	480v	x 1.15

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.

Section 3 – Generator Drawings

8

7

6

5

4

3

2

1

D

D

C

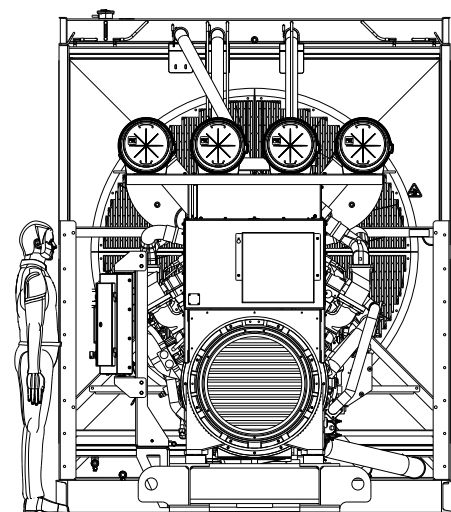
C

B

B

A

A



FRONT

SCALE 0.047

NOTES:

- 1. DIMENSIONS SHOWN IN [] ARE INCHES.
- 2. COOLANT CAPACITY WITH RADIATOR 492L (130 US GAL).
- 3. DO NOT ATTACH SOLID CONDUIT TO GENSET.
- 4. ONLY ONE OPTION OF RIGHT H608-2 AND LEFT H609-2 IS PROVIDED PER CUSTOMER SELECTION.
- 5. FOR SEISMIC ISOLATOR QUANTITY REQUIRED SEE GENSET SEISMIC INSTALLATION DRAWING.
- 6. FORCE CALCULATIONS BASED ON NOMINAL VALVES.
- 7. GUARD SUPPLIED WITH RADIATOR. REMOVED IN VIEW FOR DIMENSIONAL CLARITY.
- 8. FUEL IN HOSE $\varnothing 22$ [$\varnothing 0.64$] X 1270 [50.0] LONG WITH 1-11 1/2 NPTF EXTERNAL THREAD FITTING. FUEL OUT $\varnothing 16$ [$\varnothing 0.63$] X 1270 [50.0] LONG WITH 3/4-14 NPTF EXTERNAL THREAD FITTING.
- 9. GENSET SHIPPED FILLED WITH LUBE OIL TOTAL SYSTEM CAPACITY 334 L (88 GAL).
- 10. EACH 2 HOLE, NEMA TERMINAL WILL ACCOMMODATE UP TO 10 750 MCM LUGS.
- 11. LATERAL CENTER OF GRAVITY IS ON CRANKSHAFT CENTER LINE.
- 12. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.

RADIATOR FILL

~~2X OPTIONAL EXHAUST TEMPERATURE SENSOR (H244-2)~~

2X EXHAUST OUTLET

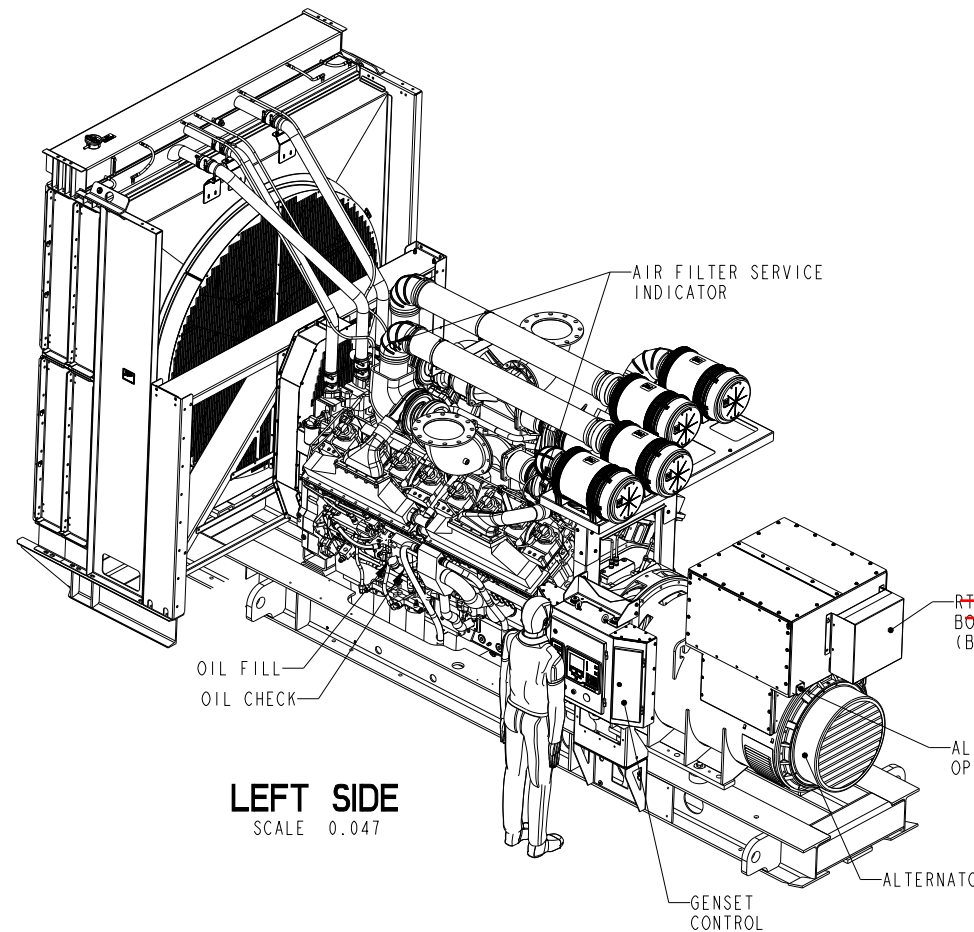
4X AIR FILTER

TERMINAL HOUSING

AIR FILTER SERVICE INDICATOR

RIGHT SIDE

SCALE 0.047



LEFT SIDE

SCALE 0.047

AIR FILTER SERVICE INDICATOR

OIL FILL
OIL CHECK

~~RTB AUXILIARY BOX OPTIONAL (B244-2)~~

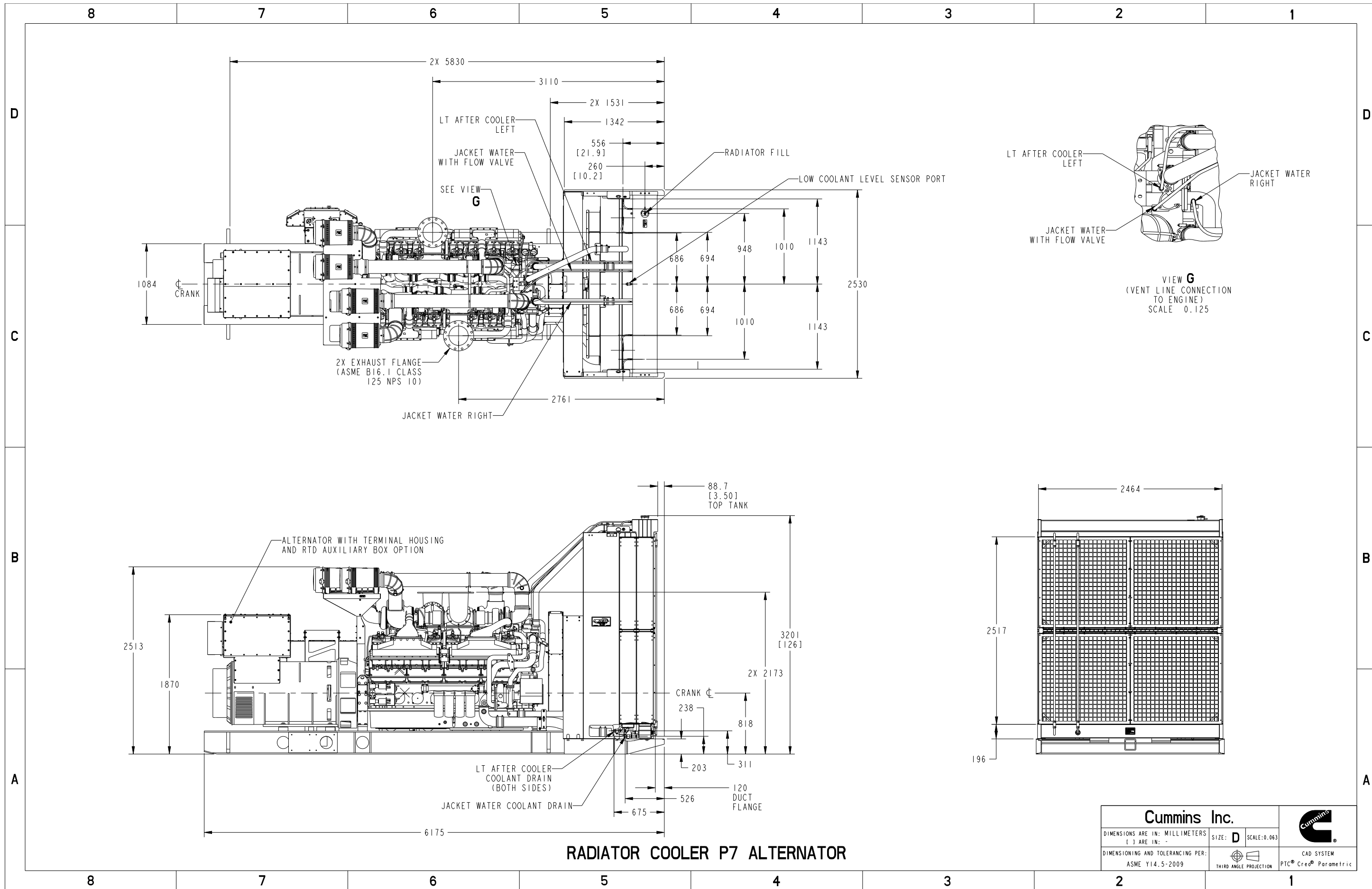
ALTERNATOR HEATER OPTIONAL

GENSET CONTROL

ALTERNATOR

MODEL/PLATFORM: DOKAB			
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY			
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [] ARE IN: "	SIZE: D	SCALE: 0.063	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric

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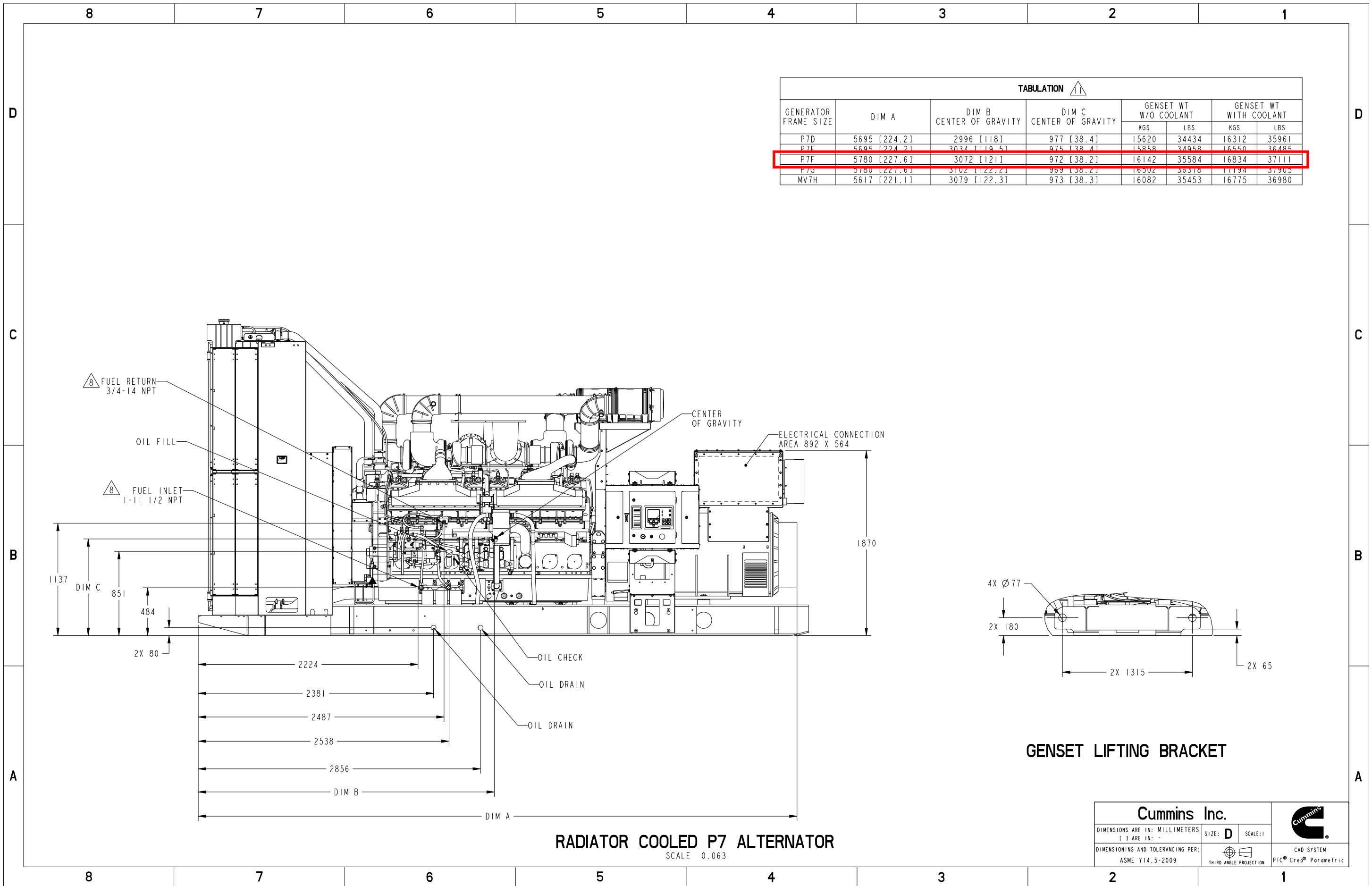
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Cummins Confidential

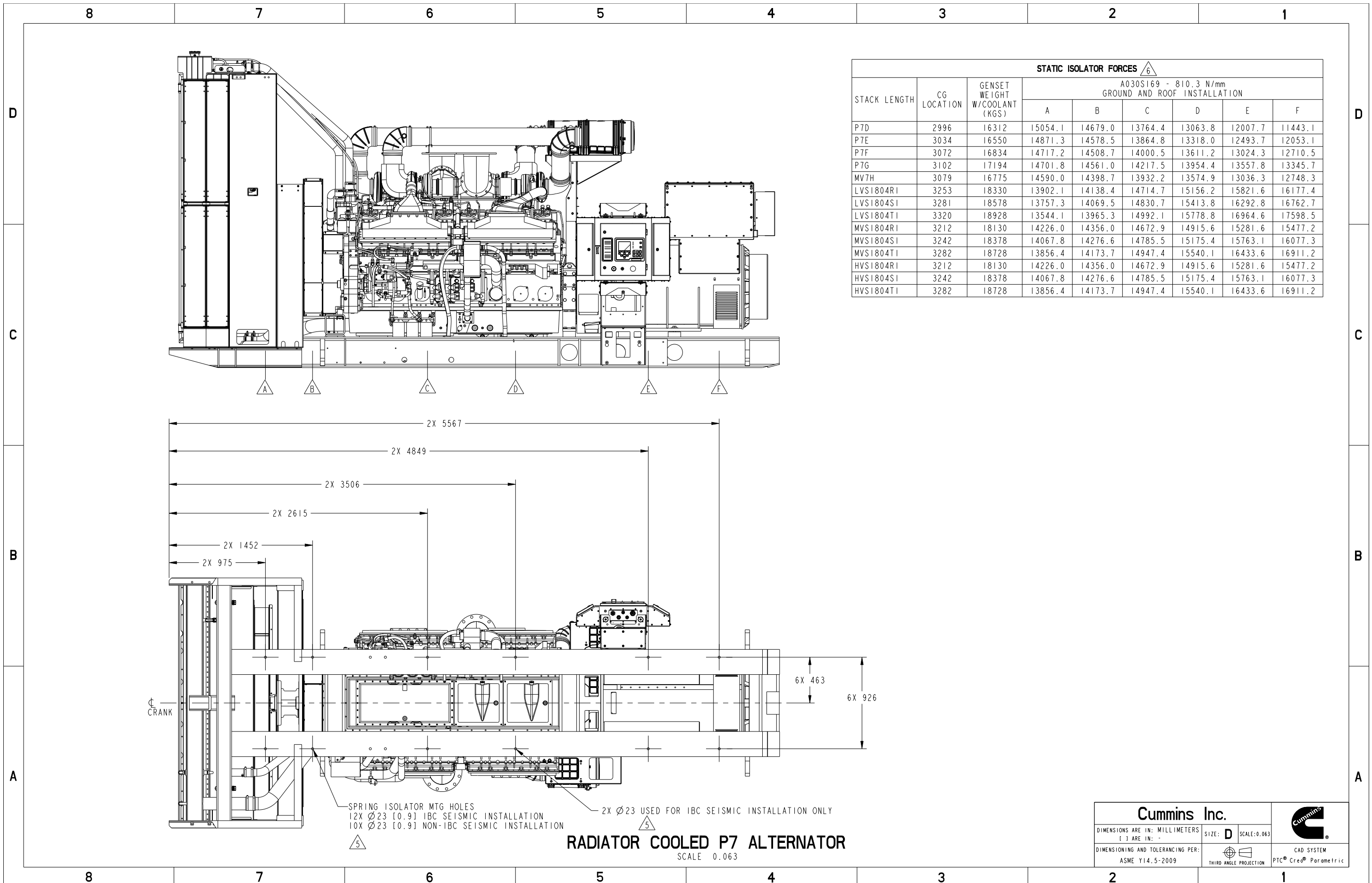
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Part Number: **A063J339** Part Revision: **B**
 Part Name: **OUTLINE, GENSET**
 Drawing Category: **Outline** State: **Released** Sheet 2 of 20

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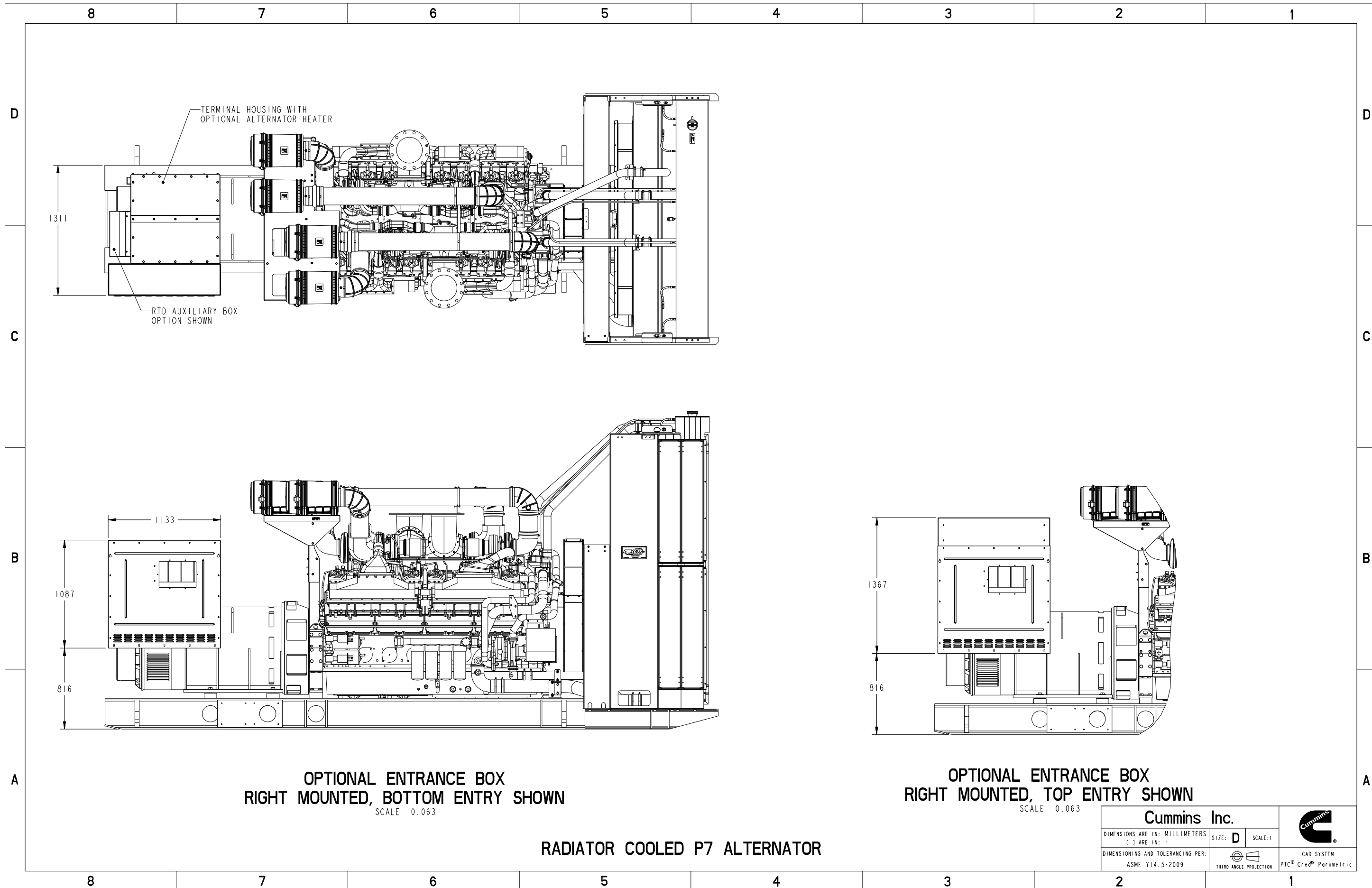
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Part Number: **A063J339** Part Revision: **B**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released** Sheet **4** of **20**

Cummins Inc.			
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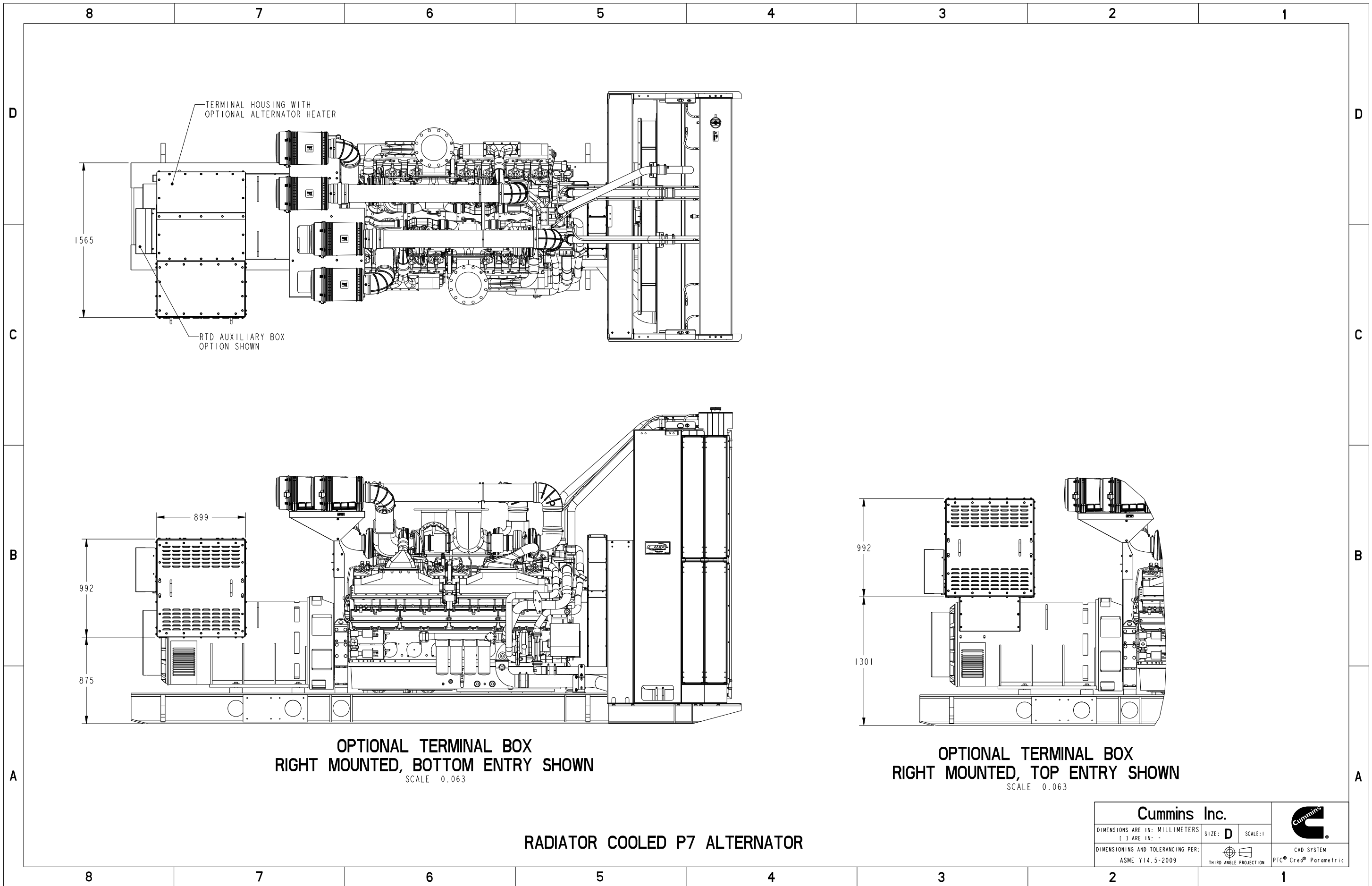
OPTIONAL ENTRANCE BOX
RIGHT MOUNTED, BOTTOM ENTRY SHOWN
SCALE 0.063

OPTIONAL ENTRANCE BOX
RIGHT MOUNTED, TOP ENTRY SHOWN
SCALE 0.063

RADIATOR COOLED P7 ALTERNATOR

Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [] ARE IN: -	SIZE: D	SCALE: 1	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric

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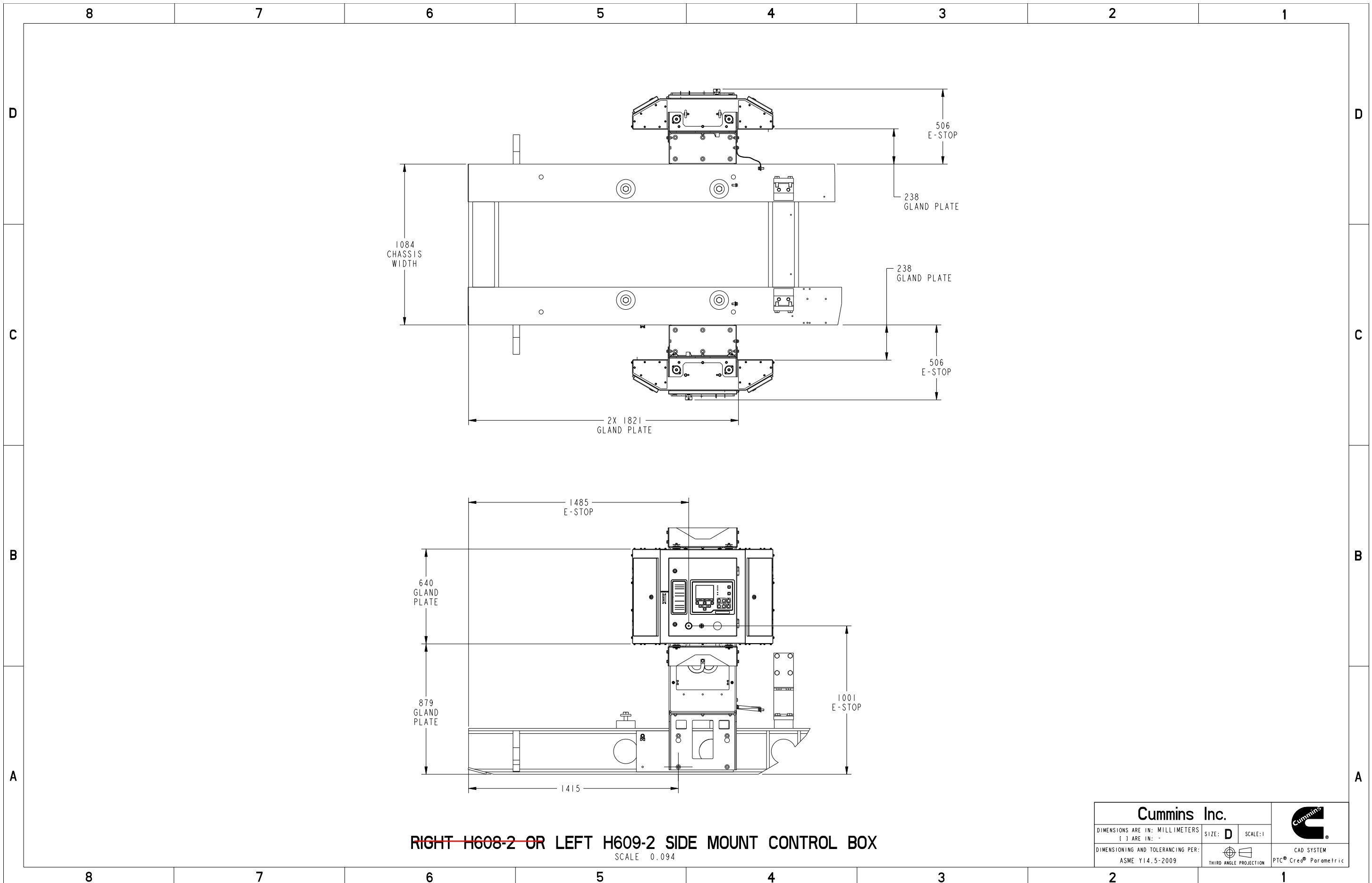
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Part Number: **A063J339** Part Revision: **B**
 Part Name: **OUTLINE,GENSET**
 Drawing Category: **Outline** State: **Released** Sheet **6** of **20**



~~RIGHT H608-2 OR LEFT H609-2~~ SIDE MOUNT CONTROL BOX
SCALE 0.094

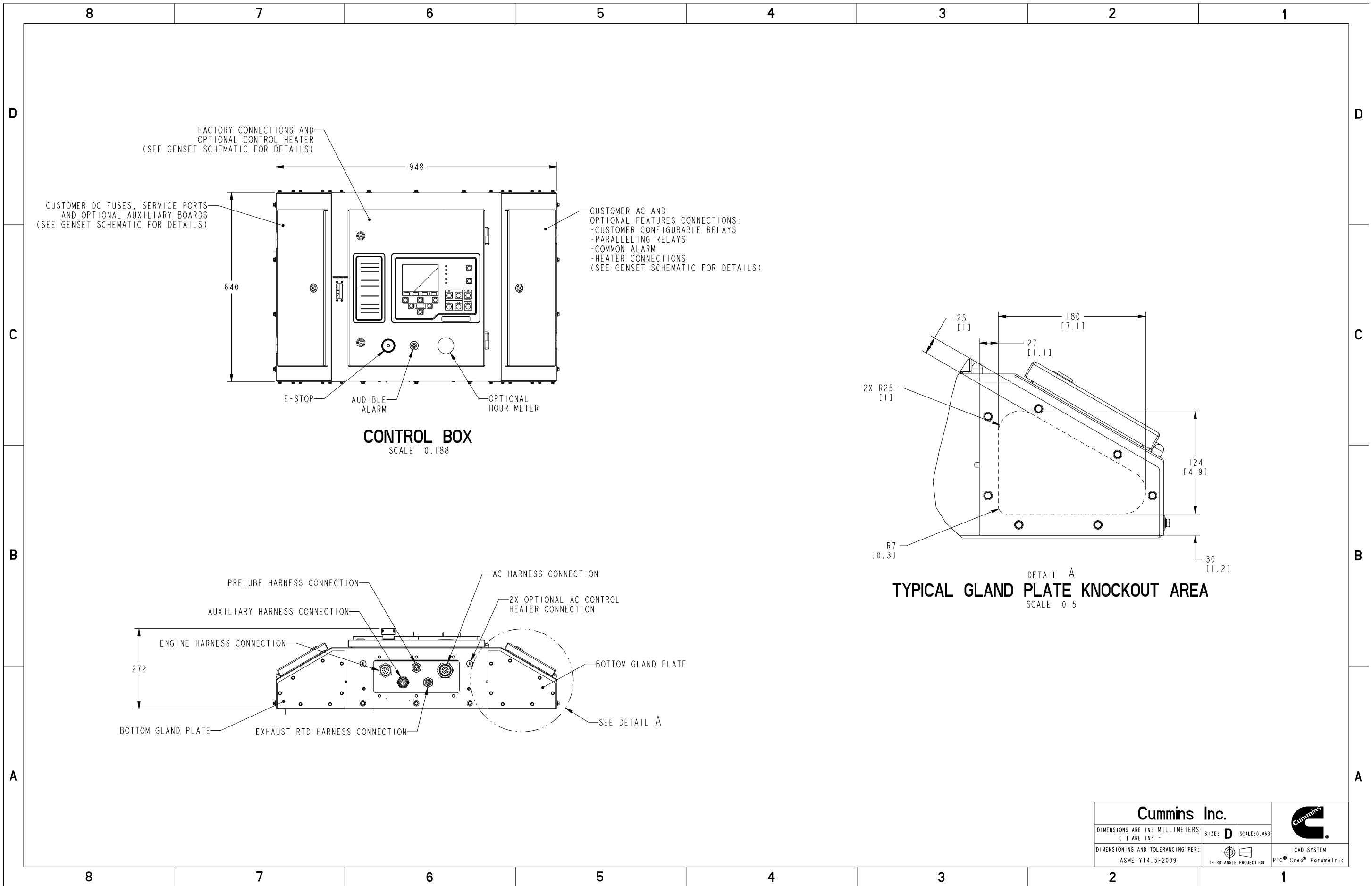
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Part Number: **A063J339** Part Revision: **B**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released** Sheet **7** of **20**



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Part Number: **A063J339** Part Revision: **B**
Part Name: **OUTLINE, GENSET**
Drawing Category: **Outline** State: **Released** Sheet **8** of **20**

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8 7 6 5 4 3 2 1

D

D

C

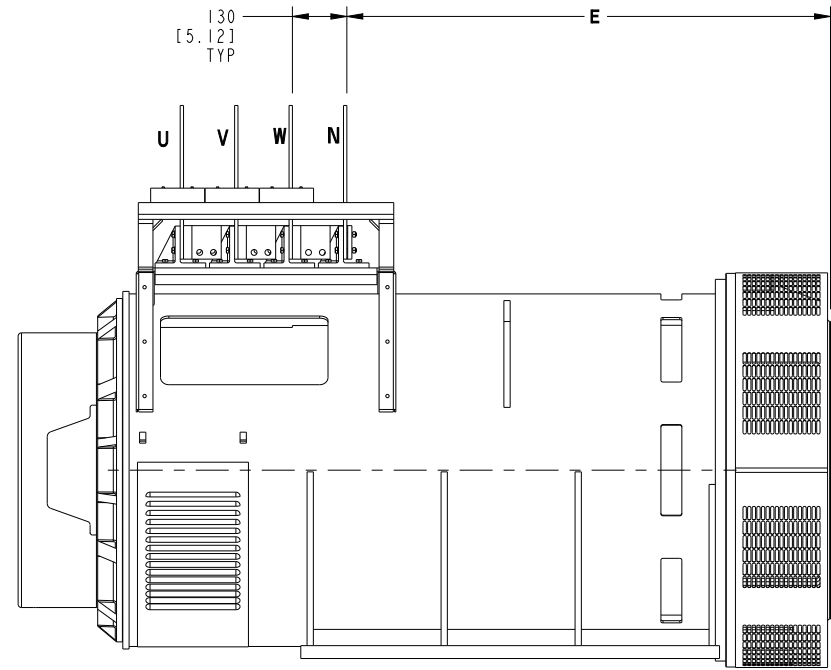
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B

B

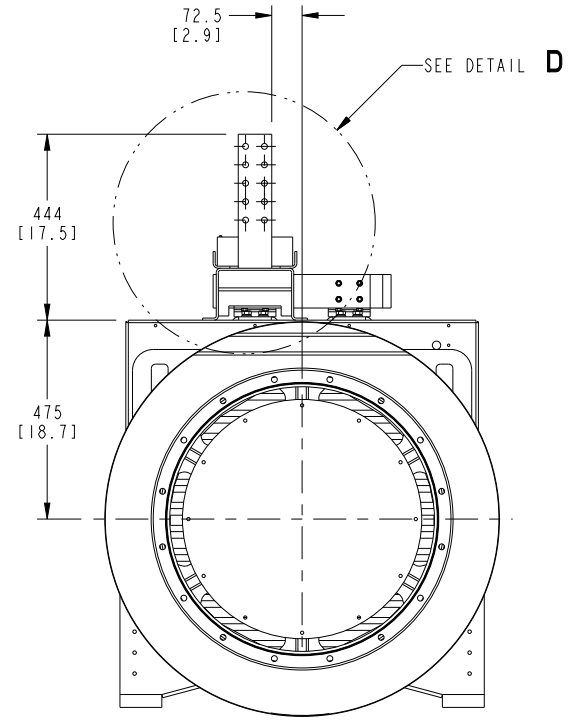
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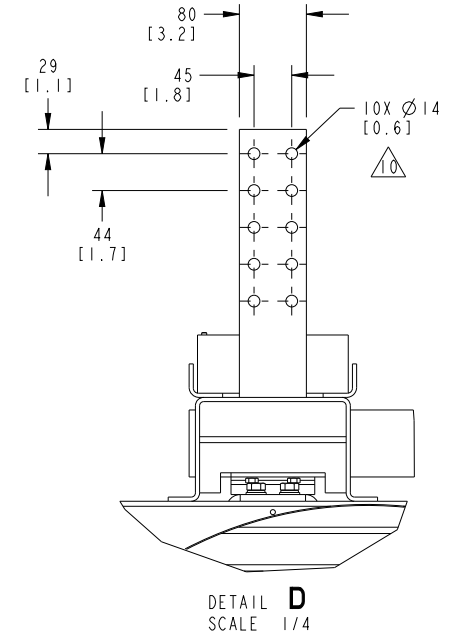


TABULATION	
ALTERNATOR CORE	DIM E
B	919
C	919
D	1069
E	1069
F	1154
G	1154

P7 ALTERNATOR
ELECTRICAL CONNECTION DETAIL
(OUTPUT BOX NOT SHOWN)

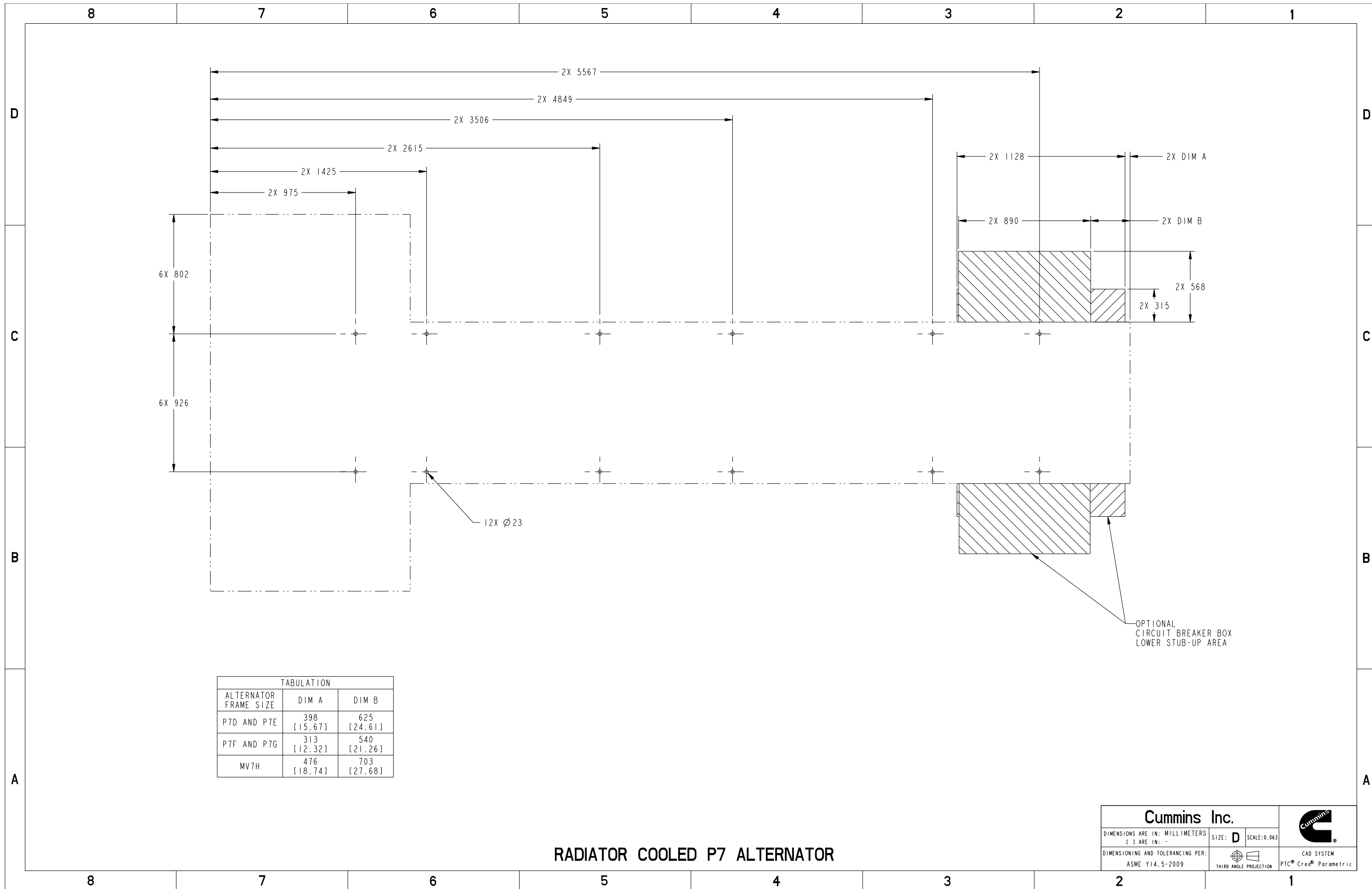


**2 HOLE LUG, NEMA
CORES B THRU G
(KR78)**



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DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009		THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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RADIATOR COOLED P7 ALTERNATOR

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DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009		CAD SYSTEM PTC® Creo® Parametric

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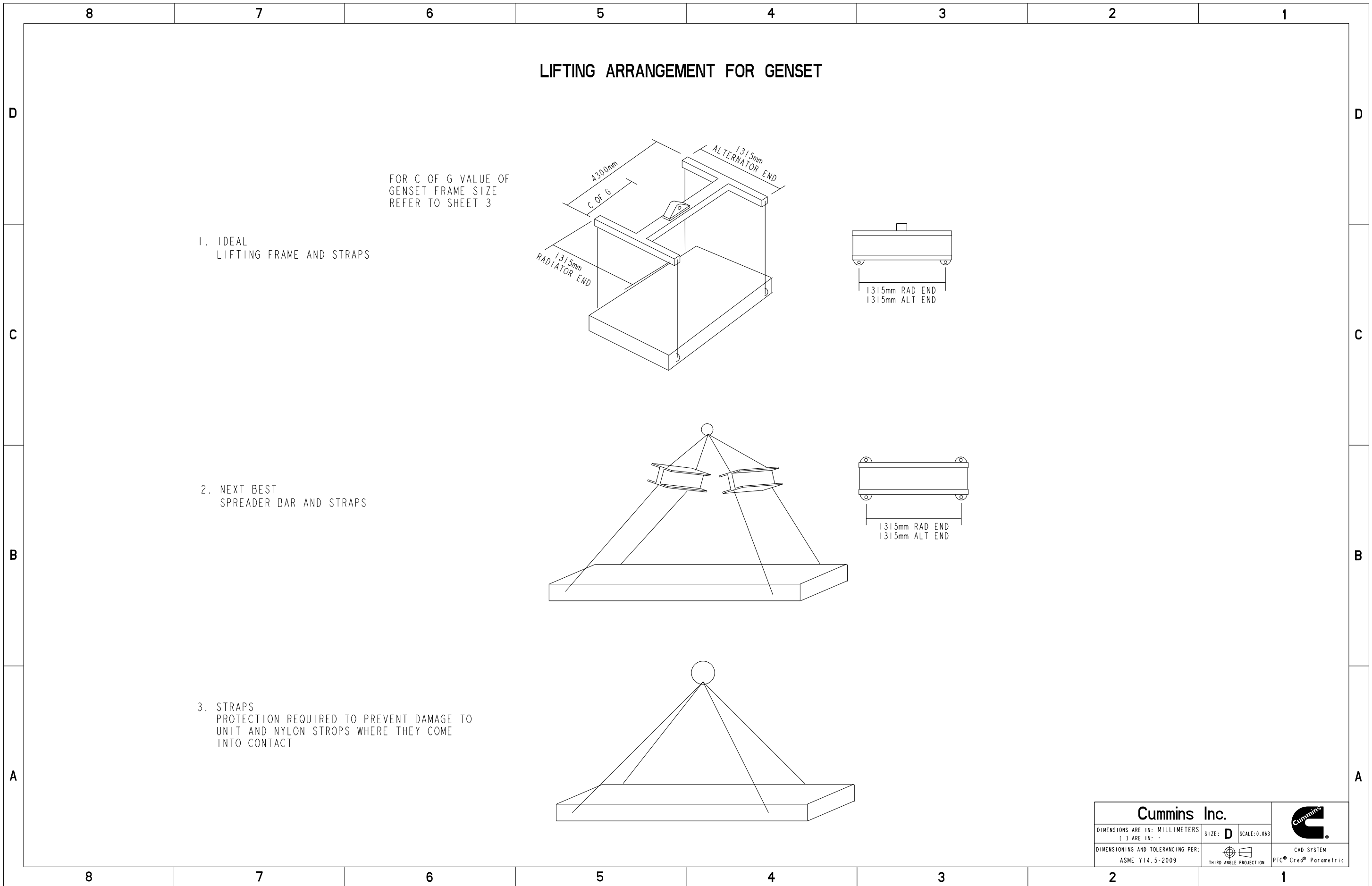
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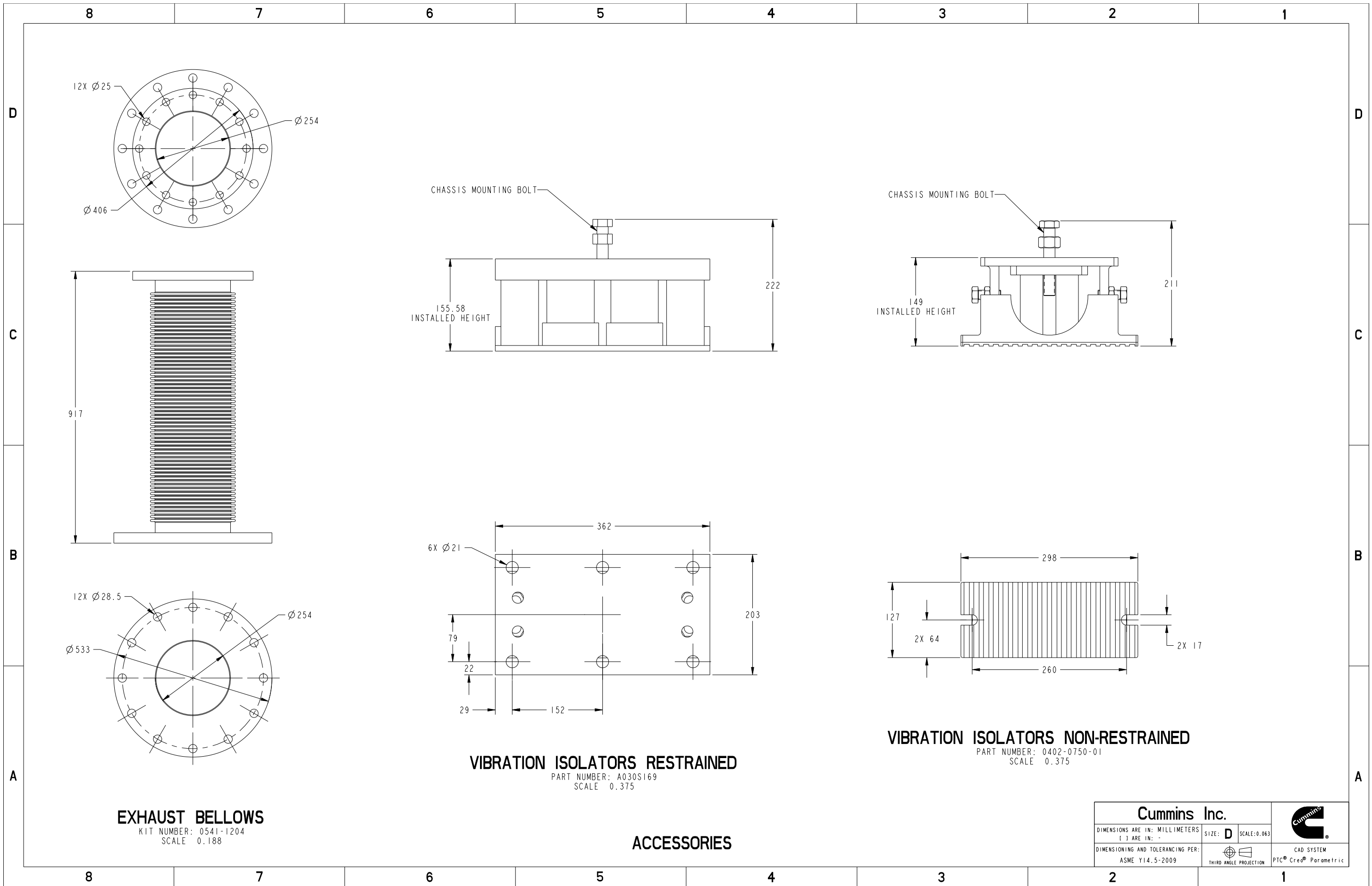
Part Name: OUTLINE, GENSET

Drawing Category: Outline State: Released Sheet 16 of 20



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Section 3

Warranty



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.

www.power.cummins.com

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

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

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

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