RSN 1344261
PERMIT# 2018-1573853-LT

City of Aurora Public Works Department

ACKNOWLEDGEMENT OF SPECIAL INSPECTIONS

Building Division • 15151 E. Alameda Parkway, Ste 2400 • Aurora, CO 80012 • 303.739.7420
Email: permitcounter@auroragov.org

Project Address: 1501 S. Potomac St., Aurora, CO 80012		
Project Title: EPSS Upgrade		
Inspection Agency: Ground Engineering	Phone: 303-289-1989	Email: chris.echols@groundeng.com
Agency Contact Person: Chris Echols	Phone: 303-991-6910	Email: chris.echols@groundeng.com
Project Owner: Regina Shklyan	Phone: 303-873-4895	Email: regina.shklyan@healthonecares.com
Staff Person Reviewing Submittal: Regina Shklyan		Date: 2/27/19
Comments		

A pre-construction meeting is recommended for every project whose elements are subject to special inspections. This meeting can take place at any time either here within the City building or on the job site. Check Required Special Inspections - Per International Building Code, Section 1704:

- ☐ Structural Steel (1705.2)
- ☑ Structural Concrete and Reinforcing Steel (1705.3)
- ☑ Anchor Bolts in Concrete (1705.3)
- ☐ Prestressed Concrete and PT tendons (1705.3)
- ☐ Post-installed Anchors in Concrete (1705.3)
- ☐ Shotcrete Concrete Placement (1705.3)
- ☐ Masonry (1705.4)
- ☐ Structural Wood (1705.5)
- ☑ Soils (1705.6)
- ☐ Driven Deep Foundations (1705.7)
- ☐ Cast-in-place Deep Foundations (1705.8)
- ☐ Helical Pile Foundations (1705.9)
- ☑ Sprayed Fire-Resistant Materials (1705.14)
- ☐ Mastic and Intumescent Coatings (1705.15)
- ☐ Exterior Insulation and Finish System (1705.16)
- ☐ Fire-resistant Penetrations and Joints (1705.17)
- ☐ Smoke Control (1705.18)
- ☐ Other inspections as required by the Design Professional or the Building Official (1705.1.1)

In accordance to Section 1704 of the International Building Code (IBC), the owner or the owner's authorized agent, other than the contractor, shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in section 1705 and identify the approved agencies to the building official.

A. Registered Design Professional Responsibilities

1. Prepare a Statement of Special Inspections in accordance with IBC section 1704.3.1. The statement of special inspections shall identify the materials, systems, components and work required to have special inspections or tests. Note whether the special inspections are continuous or periodic. May be provided on the structural drawings or in document form. NOTE: This form does not take the place of the required statement of special inspections.
2. Review the special inspection reports and provide corrective action for work that may not conform to the approved plans. Provide this information to the Building Division.

B. Contractor's Responsibilities

1. The approved plans shall be readily accessible at the job site.
2. The contractor shall provide reasonable access to all work requiring special inspection.
3. The contractor is also responsible for retaining at the job site all special inspection records submitted by the special inspector, and providing these records for review by the Building Division's inspector upon request.

C. Duties of the Special Inspector

1. Provide written documentation to the Building Division demonstrating the competence and relevant experience or training of the special inspectors who perform the special inspections and tests during construction. Discrepancies shall be brought to the immediate attention of the contractor for correction. If any item is not corrected the special inspector shall notify both the engineer of record and the Building Division.
2. A final report documenting required special inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted to the Building Division prior to issuance of a certificate of occupancy.

D. Jurisdiction

1. The jurisdiction will review the implementation of Structural Tests and Special Inspection requirements.
2. The Building Division will only issue a Certificate of Occupancy after all special inspection reports and the final special inspection report, have been submitted and accepted.

ACKNOWLEDGMENTS

I have read and understand my responsibilities regarding special inspections.

Project Owner: Regina Shelyan Date: 02-27-2019

Or

Owner's Authorized Agent: _____ Date: _____

Medical Center of Aurora

Submittal
(2) 600kW DQCA Generator

Contractor:
Echo Power Engineering
2227 Chandler Street
Fort Collins, CO 80528
Phone 970-227-8718

Equipment Supplier:

Power Generation Division
8211 E. 96th Ave
Henderson, CO 80640
Local Service Number
1(800) 927-7201

Cummins Sales and Service

10/01/2018

Subj: Aurora Medical Center

Attn: Echo Power Engineering

General Notes:

1. All accessories shall be 120/208V.
Bill of Material (BOM) updated.

2. The idea is to have one platform in the middle of the two generators with stairs at both ends.
BOM and drawings updated to reflect.

Comments:

1. Please provide confirmation that pressure lubrication shall be supplied by a positive displacement lube oil pump.
The lubrication system uses a pump to push oil through the engine.

2. Please provide confirmation that the engine shall operate on mineral based oil. Synthetic oils shall not be required.
The engine will be filled with Cummins Blue 15/40 oil.

3. Please provide confirmations that engine shall have a unit mounted, thermostatically controlled water jacket heater(s) to aid quick starting.
Please refer to drawing 0500-4022 of the submittal.

4. Please provide confirmation that electric starter systems shall start using a positive shift solenoid to engage the starter motor and to crank the prime mover.
The engine is equipped with a starter motor designed and tested to provide a ten second start.

5. Please provide confirmation that battery charger be protected against a reverse polarity connection.
Battery charger changed to Sens NRG22-10-RC.

6. Please provide confirmation that engine suction line is fitted with a check valve in accordance with the specification as the submittal did not explicitly indicate.
Check valves will be added.

7. Please provide confirmation that nameplate shall include the sub-transient and transient reactance in %.
The factory engine and alternator nameplates do not have the requested information. That information can be found on the alternator data sheet in the submittal.

Cummins Sales and Service

8. Please provide confirmation that stator winding has multiple VPI treatments in accordance with the specification as submittal did not explicitly indicate.
   The insulation system is class 'H'. All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

9. Please provide confirmation that coolant fill box will have a visual means to determine level in accordance with the specification as the submittal did not explicitly indicate.
   There is a visual means to determine the level of antifreeze.

10. Please provide shunt trip on main circuit breaker.
    Main circuit breaker is Electronically Operated (EO). A signal can be sent to open or close the breaker as needed.

11. Please provide call out for load bank breaker (LI type) in accordance with the specification.
    The BOM has been updated. The load bank breaker will be the breaker on the right side of the alternator. (right and left are determined by standing at the alternator and the radiator farthest from you)

12. Set up for ground fault should be for 4-pole ATS's.
    The ground fault indication has been changed.

Prepared by:
Jim Van Dyke
Power Generation Product Application Engineer
Rocky Mountain Region

Cummins Sales and Service
(800) 927-7201 Toll Free
(303) 927-2237 Direct Line
James.R.Van.Dyke@Cummins.com

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Sales and Service

Please consider joining Cummins Rocky Mountain's efforts to protect our environment, by electing a digital only option for technical publications, Submittals, and Operation & Maintenance Manuals.

Digital delivery of technical information has the following benefits:

1. Lower Cost for Both Cummins Rocky mountain and our customers
2. Significantly faster delivery times.
3. Less waste… better for the environment (It is estimated that over 50% of pages printed are never looked at.)



Medical Center of Aurora

Bill Of Materials & Contractors Notes 1

Engine / Generator 2

Generator Accessories 3

Generator Outline Drawings and Wiring Diagrams 4

Warranty 5

Contractors Note

The generator set in this submittal package utilizes a base fuel tank with an integral electrical stub-up area. Any conduit or other items that need to stub-up to the generator set need to be within the areas shown on the base tank drawings. If you have any questions or have any concerns about where the stub-up area is located, please call Cummins Rocky Mountain for clarification.

Please refer to attached drawing **DQCA, SCGBT-4750-06484** in this submittal package for the stub-up location.

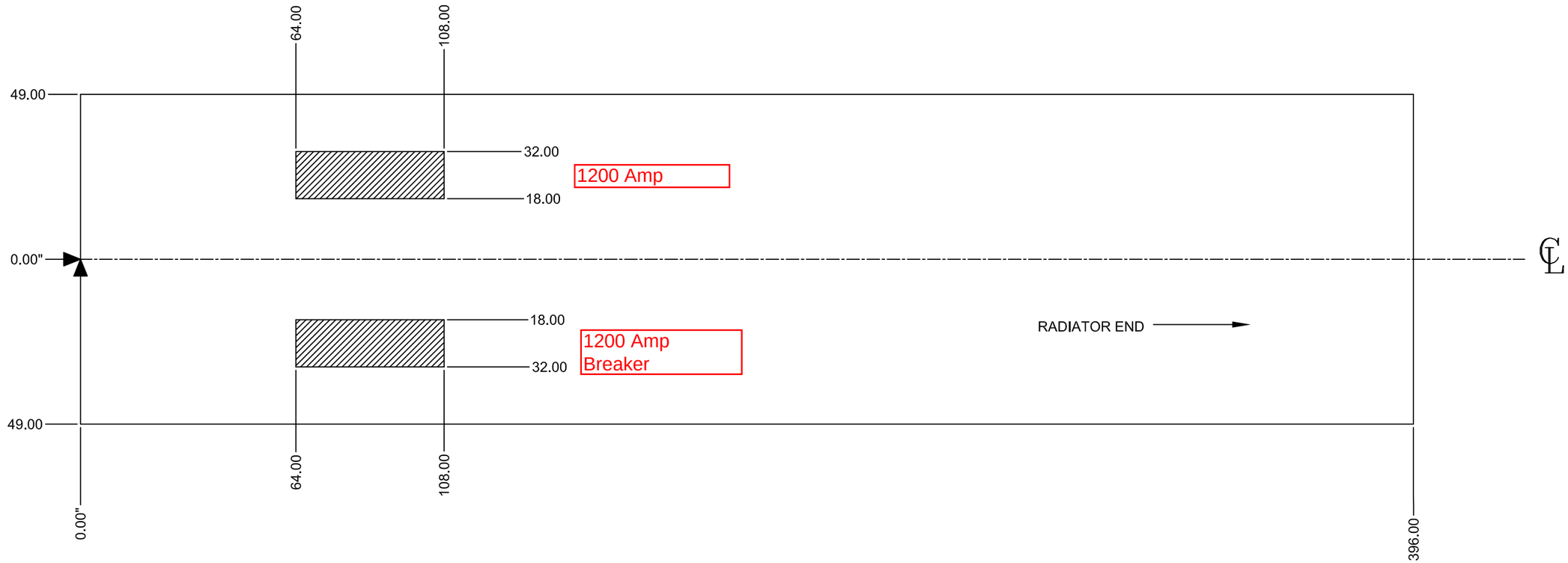
Prepared by:
Jim Van Dyke
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MOUNTING PAD ELECTRICAL STUB UP

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTES:
1) UNITS ARE INCHES
2) THE MINIMUM CLEARANCE TO ANY STRUCTURE SHALL BE:
   FROM THE ENCLOSURE AIR INLET, 10 FEET
   FROM THE RADIATOR AIR OUTLET, TURNING DUCT, WALKING CLEARANCE.
   FOR SERVICE SPACE AROUND THE GENSET, 6 FEET
   IF THIS IS NOT THE CASE, CONTACT CUMMINS ROCKY MOUNTAIN
3) CONCRETE BASE PAD MUST BE FLAT AND LEVEL IN ALL DIRECTIONS
4) UNLESS OTHERWISE SPECIFIED, DIMENSIONS FOR ANCHOR MOUNTING HOLES ARE MIRRORED ACROSS CENTER.
5) GENERATOR SET SHALL BE ANCHORED TO THE MOUNTING PAD BY THE INSTALLING CONTRACTOR.

UNLESS OTHERWISE SPECIFIED, ALL DIMS ARE IN INCHES

TOLERANCES:
FRACTIONAL: 1/4
.X: .06
.XX: .03
.XXX: .01
ANGLES: 5°

REFERENCES:

FINISH: N/A	MODIFIED BY:	CHKD BY:	PREP. BY:
	JRVD		
	9/05/2018		

ENGINE FAMILY:

Cummins Rocky Mountain
8211 E 96th AVE
HENDERSON, COLORADO 80640
PH: 303-287-0201
FAX: 303-287-4837

SITE NAME:	CONTACT NAME:	CUSTOMER PROJECT NO:	TITLE: ELECTRICAL STUB UP
CONTRACTOR NAME:	CONTACT NO:	CRM PROJECT NO:	SIZE: B | DWG NO: DQCA, SCGBT-4750-06484 | REV: A
			SCALE: NONE | DO NOT SCALE | SHEET: 1 OF 1

Generator Package Weight

	Weight in Pounds	Weight in Kilograms
Generator Wet Weight (oil & coolant)	13,973.00	6,338.04
Enclosure & Exhaust Silencer	13,229.00	6,000.57
Fuel Tank	13,400.00	6,078.13
Accessories	275.60	125.01

	Weight in Pounds	Weight in Kilograms
Total Ship Weight without Fuel	**40,877.60**	**18,541.75**

	Weight in Pounds	Weight in Kilograms
Total Pad Weight with Fuel	**78,877.60**	**35,778.28**

Generator Package Dimensions

	Length	Width	Height
Overall Dimensions (Inches)	396	109.5	158

	Length	Width
Footprint On Pad (Inches)	396	98

*These dimension do not include inlet or outlet air clearance, which must be accounted for.

Bill of Material (BOM)

Cummins Sales and Service - Rocky Mountain Region
Bill of Materials
Aurora Medical Center
(2) 600kW Generator Sets

Echo Power Engineering
CRMR Project #69619 , Revision # 2, 9/12/2018

Line	Qty.	Description	Part Number
1			
2		**Diesel Genset: 60Hz-600kW**	
3	2	U.S. EPA, Stationary Emergency Application	Install-US-Stat
4		Genset-Diesel,60Hz,**600kW**	600DQCA
5		Duty Rating-Standby Power	A331-2
6		Listing-UL 2200	L090-2
7		Emissions Certification, EPA, Tier 2, NSPS CI	L170-2
8		Stationary Emergency	
9		Enclosure-Steel,SndAtt,**Level 2**,Base Mtd,w/ExhSys	F202-2
10		Voltage-**277/480**,3 Phase,Wye,4 Wire	R002-2
11		Alternator-60Hz,3Ph,480V,105/80C-SP	B600-2
12		Generator Set Control-PowerCommand **3.3, Paralleling**	H704-2
13		Display Language-English	H536-2
14		**Heater-Control Cabinet**,120/240VAC compatible	A460-2
15		Display-Control, LCD	H678-2
16		Display, Running Time	K020-2
17		**Stop Switch**-Emergency,Externally Mounted	KP74-2
18		**Relays**-Genset Status, User Configured	K631-2
19		**Relay** - Alarm Shutdown	KU32-2
20		**Relays**-Paralleling Circuit Breaker Control	KU67-2
21		Control Mounting-**Left Facing**	H609-2
22		**Heater-Alternator**, 120 Volt AC	A292-2
23		CB or EB or TB-Right And Left	KU95-2
24		**EO-CirBrkr-1200A**,**Left**,3P,UL/IEC 600V,100%.	KX79-2
25		CB or EB or TB-Bottom Entry, Left	KB73-2
26		**CB-1200A**,3P,600/690V,UL/IEC,ServEnt,100%UL,**Right**	KP88-2
27		CB or EB or TB-Bottom Entry, Right, **Load Bank Breaker**	KB72-2
28		**Indication-Ground Fault**, Terminal Box (or) Circuit Breaker	H723-2
29		Box - Left	
30		Enclosure Color-Green,Steel Enclosure	P175-2
31		Cooling Air Outlet-Horizontal ,Sound Attenuated	F208-2
32		**Louvers-Air Inlet**,24VAC Motor Closed,Spring Opened	F211-2
33		**Louvers-AirOutlet**,24VAC Motor Closed,Spring Opened	F213-2
34		ServiceReceptacle-120V,20A,ExternalGFCI,NEMA 5-20R	K102-2
35		**Distribution Panel**-Prewired AC Features. 120/208VAC	H657-2

Bill of Materials
Aurora Medical Center
(2) 600kW Generator Sets

Echo Power Engineering
CRMR Project #69619 , Revision # 2, 9/12/2018

Line	Qty.	Description	Part Number
36			
37		Separator-Fuel/Water	C127-2
38		Engine Cooling-Radiator, 50C Ambient	E074-2
39		**Shutdown**-Low Coolant Level	H389-2
40		**Coolant Heater-208**/240/480V, Below 40F Ambient Temp	H557-2
41		Engine Air Cleaner-Normal Duty	D041-2
42		**Test Record**-Certified	L026-2
43		**Test Record**-Safety Shutdowns	L023-2
44		Genset Warranty- Base	L028-2
45		Literature-English	L050-2
46		Packing-None, Base Mounted Housing	A412-2
47		Common Parts Listing	CP01-2
48		Product Revision - P	SPEC-P
49	2	**Annunciator** - (RS485)	0300-5929-02
50			
51	2	**Battery Charger**, 10Amp, 12/24 VDC, 120 VAC	NRG22-10-RC
52			
53			
54	4	Starting Battery Kit, Lead Acid, Group 8D	8D-MHD
55			
56		**Engine Starting Batteries Warming Pads**	
57	4	Kim Battery Warming Pads, 120 VAC, 75 Watt Each	KB7515
58	2	Thermostat, On at 40°F, Off at 60°F	DIT46
59			
60		**Dayton 5kW Electric Unit Heater**	
61	2	Electric Unit Heater - 17,000 BTUH	3UG74
62		5kW-208 VAC 1 Phase - 20.9 Amps	
63		Built In Thermostat, Automatic Fan Time Delay	
64		Mounting Bracket, and Adjustable Louver	
65			
66	1	Platform, in between enclosures, Stairs both ends	
67		Generators Mounted 180 degrees in configuration	
68	2	Radiator Discharge Turning Duct	
69			
70			
71			

Bill of Materials
Aurora Medical Center
(2) 600kW Generator Sets

Echo Power Engineering
CRMR Project #69619 , Revision # 2, 9/12/2018

Line	Qty.	Description	Part Number
72			
73	2	**Sub Base Fuel Tank, UL 142 Listed**	SCGBT-4750
74		4750 Gallons, 13,400 lbs.	
75		396" L x 98" W x 39" T with stub up area	
76		Primary Normal Vents	
77		Primary and Secondary Emergency Vents	
78		Primed & Painted to SST Standard Specifications	
79		Cold Tar Epoxy Coating on Bottom of Tank	
80		Suction Drop Tube	
81		Return Droptube	
82		Low Level Switch	LLS
83		Leak Detection Switch	LKS
84		Rochester Gauge	RLG
85		2" Lockable Fill Cap	LCK
86		2" Spare Fitting	SPR
87			
88	2	Fuel Tank Pressurization Testing as required by Local	
89		Authority having Jurisdiction.	
90			
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Generator

RSN 1344261
PERMIT# 2018-1573853-LT

Specification sheet

Diesel generator set QSK23 series engine

600 kW - 800 kW 60 Hz
Standby



Description

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

Features

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

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

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

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

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

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

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

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

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

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

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

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Generator set specifications

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

Engine specifications

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

Alternator specifications

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

Available voltages

60 Hz Line-Neutral/Line-Line

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

Note: Consult factory for other voltages.

Generator set options and accessories

Engine

- 208/240/480 V coolant heater for ambient above 4.5 ºC (40 ºF)
- Fuel/water separator
- Heavy duty air cleaner

Alternator

- 80 °C rise
- 105 °C rise
- 125 °C rise
- 120/240 V anti-condensation heater
- Temperature sensor - alternator bearing RTD

Control panel

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

Cooling system

- 50 °C ambient

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Generator set options and accessories (continued)

Exhaust system

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

Generator set

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

- 2 year warranty
- 5 year warranty
- 10 year major components warranty

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

PowerCommand 2.3 – control system



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

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

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

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

Control boards - Potted for environmental protection.

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

Prototype tested - UL, CSA, and CE compliant.

AC protection

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

Engine protection

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

Operator/display panel

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

Alternator data

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

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature

Other data

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

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

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

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Control functions

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

Options

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

For further detail on PC 2.3, see document S-1569.
For further detail on PC 3.3, see document S-1570.

Ratings definitions

Emergency Standby Power (ESP):

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

Limited-Time Running Power (LTP):

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

Prime Power (PRP):

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

Base Load (Continuous) Power (COP):

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

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Codes and standards

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

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

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

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

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S-1551 (09/17)

Generator Set Data Sheet

Model: DQCA
Frequency: 60 Hz
Fuel type: Diesel
kW rating: 600 Standby
545 Prime
Emissions level: EPA NSPS Stationary Emergency Tier 2

Exhaust emission data sheet:	**EDS-1086**
Exhaust emission compliance sheet:	**EPA-1120**
Sound data sheet:	**MSP-1158**
Sound data sheet – with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD):	**MSP-1011**
Cooling system data in various ambient conditions:	**MCP-247**
Cooling system data in various ambient conditions – with seismic feature codes L228-2 (IBC) and/or L225-2 (OSHPD):	**MCP-173**
Prototype test summary data sheet:	**PTS-160**

Fuel Consumption

	Standby				Prime				Continuous
	kW (kVA)				kW (kVA)				kW (kVA)
Ratings	600 (750)				545 (681)				
Load	**1/4**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**	**Full**
US gph	13.0	22.5	33.0	42.0	12.0	21.0	30.0	38.5	
L/hr	49.2	85.2	124.9	159.0	45.4	79.5	113.6	145.7	

Engine

	Standby rating	Prime rating	Continuous rating
Engine manufacturer	Cummins Inc.		
Engine model	QSK23-G7 NR2		
Configuration	Cast iron, in line 6 cylinder		
Aspiration	Turbocharged and air-to-air after-cooled		
Gross engine power output, kWm (bhp)	910 (1220)	809 (1085)	
BMEP at set rated load, kPa (psi)	1944 (282)	1752 (254)	
Bore, mm (in.)	170 (6.69)		
Stroke, mm (in.)	170 (6.69)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	10.21 (2010)		
Compression ratio	16:1		
Lube oil capacity, L (qt)	102 (108)		
Overspeed limit, rpm	2100		
Regenerative power, kW	93		

Fuel Flow

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

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Air	Standby rating	Prime rating	Continuous rating
Combustion air, m^3/min (scfm)	59 (2081)	56 (1961)	
Maximum air cleaner restriction, kPa (in H_2O)	6.2 (25)		
Alternator cooling air, m^3/min (cfm)	117 (4156)		

Exhaust

Exhaust flow at set rated load, m^3/min (cfm)	137 (4830)	128 (4515)	
Exhaust temperature, °C (°F)	440 (824)	429 (804)	
Maximum back pressure, kPa (in H_2O)	10.1 (40.8)		

Standard Set-mounted Radiator Cooling (non-seismic)

Ambient design, °C (°F)	50 (122)		
Fan load, kW_m (HP)	24 (32)		
Coolant capacity (with radiator), L (US gal)	109.5 (29)		
Cooling system air flow, m^3/min (scfm)	1069.8 (37779.6)		
Total heat rejection, MJ/min (Btu/min)	26.4 (25002)	23.9 (22706)	
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	30.47 (9)		

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

Ambient design, °C (°F)	50 (122)		
Fan load, kW_m (HP)	27 (36)		
Coolant capacity (with radiator), L (US gal)	89 (23.5)		
Cooling system air flow, m^3/min (scfm)	1252 (44183)		
Total heat rejection, MJ/min (Btu/min)	26.4 (25002)	23.9 (22706)	
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	30.47 (9)		

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Derating Factors

Standby	Engine power available up to 2705 m (8875 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 4.4% per 305 m (1000 ft). Above 40 °C (104 °F), derate 10% per 10 °C (18 °F).
Prime	Engine power available up to 2641 m (8665 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 4.5% per 305 m (1000 ft). Above 40 °C (104 °F), derate 20.9% per 10 °C (18 °F).
Continuous	

Ratings Definitions

Emergency Standby Power (ESP):	**Limited-Time Running Power (LTP):**	**Prime Power (PRP):**	**Base Load (Continuous) Power (COP):**
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514. No sustained overload capability is available at this rating.

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
380-480	Wye	125/105	S/P		2944	312	ADS-309	B282-2
600	Wye	125/105	S/P		2944	7	ADS-309	B300-2
600	Wye	105/80	S/P		2944	7	ADS-309	B301-2
220/380	Wye	105/80	S/P		3313	311	ADS-310	B599-2
480	Wye	105/80	S/P		2944	312	ADS-309	B600-2
480	Wye	80	S		2944	312	ADS-309	B601-2
600	Wye	80	S		2944	7	ADS-309	B604-2
380	Wye	80	S		3866	312	ADS-311	B660-2
190-480	Wye	125/105	S/P		2944	311	ADS-309	B731-2
208/416	Wye	105/80	S/P		2944	311	ADS-309	B733-2
208/416	Wye	80	S		3313	311	ADS-310	B734-2
440	Wye	125/105	S/P		2944	312	ADS-309	B741-2

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 Factor[3]. 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	Single phase output
$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$	$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$

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-3352 (08/18)

RSN 1344261
PERMIT# 2018-1573853-LT

Alternator data sheet

Frame size: HC6G

Characteristics

Weights:	Wound stator assembly:	1998 lb	900 kg
	Rotor assembly:	1689 lb	761 kg
	Complete alternator:	4240 lb	1910 kg
Maximum speed:		2250 rpm	
Excitation current:	Full load:	2.5 Amps	
	No load:	0.5 Amps	
Insulation system:	Class H throughout		

3 Ø Ratings (0.8 power factor)		**60 Hz**				**50 Hz**		
(Based on specific temperature rise at 40° C ambient temperature)		110/190* 220/380	120/208* 240/416	139/240* (277/480)	347/600	110/190* 220/380	120/208* 240/415	127/220* 254/440
150° C rise ratings	kW	665	730	837	837	656	656	656
	kVA	831	913	1046	1046	820	820	820
125° C rise ratings	kW	640	700	800	800	640	640	640
	kVA	800	875	1000	1000	800	800	800
105° C rise ratings	kW	580	650	730	730	600	600	600
	kVA	725	813	913	913	750	750	750
80° C rise ratings	kW	520	568	632	632	520	520	520
	kVA	650	710	790	790	650	650	650

Reactances (per unit ± 10%)	110/190* 220/380	120/208* 240/416	139/240* 277/480	347/600	110/190* 220/380	120/208* 240/415	127/220* 254/440
(Based on full load at 125° C rise rating)							
Synchronous	3.87	3.53	3.03	2.96	3.14	2.63	2.34
Transient	0.31	0.28	0.24	0.22	0.25	0.21	0.19
Subtransient	0.23	0.21	0.18	0.16	0.17	0.15	0.13
Negative sequence	0.27	0.24	0.21	0.20	0.21	0.18	0.16
Zero sequence	0.03	0.03	0.03	0.03	0.03	0.02	0.02

Motor starting	Broad range	600	Broad range
Maximum kVA (90% sustained voltage)	2944	2944	2000

Time constants (sec)	Broad range	600	Broad range
Transient	0.185	0.185	0.185
Subtransient	0.025	0.025	0.025
Open circuit	2.350	2.350	2.350
DC	0.040	0.040	0.040

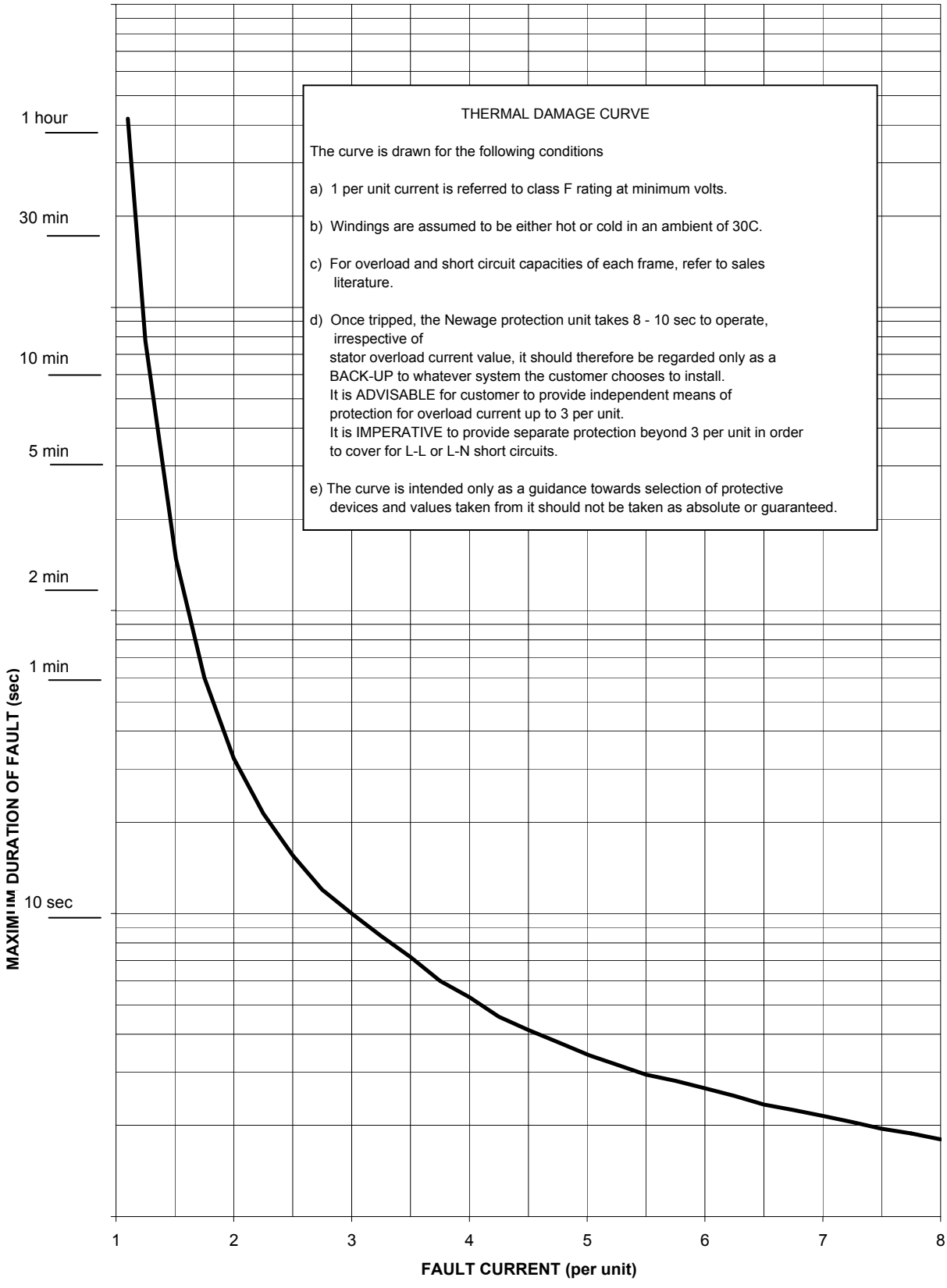
Windings (@ 20° C)	Broad range	600	Broad range
Stator resistance (Ohms per phase)	0.0074	0.0110	0.0074
Rotor resistance (Ohms)	1.3700	1.3700	1.3700
Number of leads	6 (12 optional)	6	6 (12 optional)

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

RSN 1344261
PERMIT# 2018-1573853-LT

NEWAGE INTERNATIONAL

THERMAL DAMAGE CURVE



Power Generation

Prototype Test Supported Emergency/Standby Generator Sets Certification

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

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

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

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

1. Confirm the engine and generator have reserve capacity beyond rating to minimize the potential of damage or shutdown during steady state or transient loading conditions, including momentary overloads.

2. Demonstrate generator set, controls and accessories capability to perform reliably and compatibly in service during disturbances common in actual load circuits.

3. Verify the integrity of the generator and excitation system insulation systems and electrical components to withstand heating under rated load and transient overcurrent conditions.

4. Evaluate generator set mechanical and electrical strength to perform without damage during abnormal operating conditions, such as short circuits or out-of-phase paralleling. While operating at rated load, the generator set must be subjected to several 3-phase short circuits of 20 second duration. After the tests, the generator set is inspected to verify that no electrical or mechanical damage was incurred by any components.

5. Determine by endurance testing that no resonance conditions exist in the generator set or accessories that will cause premature failure of components on production units.

6. Investigate and identify failure modes to minimize the risk of any single component failure or human error that could lead to lack of essential electrical supply.

7. Provide a margin of safety, by actual trials, between the generator set component design and protection systems so that the components are not damaged before the protective devices activate a shutdown.

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

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

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

RSN 1344261
PERMIT# 2018-1573853-LT

Prototype Test Support (PTS)
60 Hz test summary

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

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity.

Prototype testing is conducted only on generator sets not sold as new equipment.

Maximum surge power: **833 kW**

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

Torsional analysis and testing:

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

Cooling system: 50 °C ambient
0.50 in H2O restriction

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

Durability:

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

Electrical and mechanical strength:

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

Steady state performance:

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

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

Transient performance:

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

Full load acceptance:

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

Full load rejection:

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

Harmonic analysis: Distortion percentage per MIL (per MIL-STD-705B, Method 601.4)

	Line to Line		Line to Neutral	
Harmonic	No load	Full load	No load	Full load
3	0.036	0.245	0.093	0.169
5	0.083	2.081	0.112	2.171
7	0.824	0.609	0.820	0.597
9	0.023	0.042	0.021	0.074
11	0.600	0.355	0.613	0.397
13	0.307	0.300	0.295	0.308
15	0.009	0.017	0.009	0.094

Sound Data
Generator set model: DQCA
Other pertinent descriptors (Engine, Frequency, Fuel, etc..): QSK23, 60Hz, Diesel
Date: April 2, 2018

A-weighted Sound Pressure Levels [dB(A)] @ 7 meters

See notes 2, 5, and 7-11 Listed Below

Configuration	Applied Load	7 meter measurement location number (see sketch)								8 Position Average
		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	
Standard - Unhoused with Infinite Exhaust with Mounted Cooling System	0% Prime	84.3	90.4	90.3	92.3	90.6	92.7	91.6	90.0	90.8
	75% Prime	86.1	91.4	92.1	93.6	91.4	93.7	92.6	91.2	92.0
	100% Prime	87.4	92.3	93.3	94.6	91.8	94.4	93.6	92.1	92.9
	100% Standby	87.1	92.7	93.6	94.9	91.8	94.5	93.9	92.4	93.1
F200 - Weather with Mounted Muffler	0% Prime	89.7	88.0	81.4	89.4	92.6	89.1	78.4	88.4	88.7
	75% Prime	91.0	89.2	82.7	90.6	93.3	90.1	79.8	89.5	89.8
	100% Prime	91.8	89.6	83.4	91.2	93.4	90.9	80.7	90.4	90.3
	100% Standby	92.4	90.1	83.7	91.3	93.7	90.9	81.1	90.6	90.6
F201 - Quiet Site II First Stage with Mounted Muffler	0% Prime	82.4	76.0	70.9	70.0	74.6	70.5	69.6	76.1	76.1
	75% Prime	83.6	78.2	74.2	72.7	76.7	74.2	72.6	77.8	77.9
	100% Prime	84.5	79.3	75.0	73.7	77.3	75.2	73.8	78.9	78.9
	100% Standby	85.1	79.5	75.0	74.2	77.6	75.5	74.2	79.3	79.3
F202 - Quiet Site II Second Stage with Mounted Muffler	0% Prime	67.5	68.5	69.5	70.6	73.3	70.1	68.1	67.0	69.8
	75% Prime	69.7	71.5	74.0	74.0	74.1	74.8	73.2	70.9	73.1
	100% Prime	70.7	72.5	74.4	74.0	74.3	75.9	74.2	72.3	73.8
	100% Standby	71.3	72.9	74.7	74.4	74.4	76.3	74.6	72.6	74.1

Average A-weighted Sound Pressure Levels [dB(A)] @ 1 Meter

See notes 1, 5, 7-14 Listed Below

Configuration	Applied Load	Octave Band Center Frequency, Hz											Overall dB(A) SPL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Standard - Unhoused with Infinite Exhaust with Mounted Cooling System	0% Prime	N/A	47.4	62.6	84.5	89.6	93.6	95.7	95.0	91.1	81.7	69.5	100.7
	75% Prime	N/A	48.7	64.8	84.9	90.2	94.2	96.9	96.0	92.0	85.8	73.6	101.8
	100% Prime	N/A	49.1	66.2	85.3	90.4	94.7	97.4	97.3	93.1	88.1	75.8	102.5
	100% Standby	N/A	49.4	66.9	85.5	90.4	94.7	97.7	97.5	93.4	88.4	76.2	102.7
F200 - Weather with Mounted Muffler	0% Prime	N/A	52.0	72.5	81.5	84.7	87.8	90.2	88.2	83.0	72.4	57.9	94.7
	75% Prime	N/A	49.0	77.4	83.5	84.8	88.2	91.3	89.1	84.2	76.5	66.3	95.7
	100% Prime	N/A	49.8	77.8	84.0	85.2	88.6	91.7	90.1	85.2	79.6	69.7	96.3
	100% Standby	N/A	50.5	78.5	84.7	85.6	89.1	92.2	90.8	86.2	81.6	71.4	97.0
F201 - Quiet Site II First Stage with Mounted Muffler	0% Prime	N/A	50.7	70.9	76.6	73.9	75.5	76.4	75.8	71.2	62.2	49.2	83.3
	75% Prime	N/A	48.8	75.9	80.1	75.1	77.2	78.8	78.1	74.8	67.0	58.9	86.1
	100% Prime	N/A	50.0	76.6	81.0	76.6	78.1	80.0	79.3	76.5	70.6	60.0	87.2
	100% Standby	N/A	50.1	76.7	81.2	77.1	79.0	80.5	79.8	77.0	71.6	60.7	87.7
F202 - Quiet Site II Second Stage with Mounted Muffler	0% Prime	N/A	42.8	60.4	71.4	73.3	69.6	71.0	71.1	65.8	57.7	43.0	78.8
	75% Prime	N/A	42.4	65.3	72.8	73.8	70.8	75.2	80.1	75.9	63.3	50.9	83.7
	100% Prime	N/A	43.2	65.4	73.1	74.2	71.1	77.0	80.8	77.5	67.4	52.5	84.7
	100% Standby	N/A	43.4	65.8	73.5	74.6	71.7	77.3	81.0	77.9	68.6	53.4	85.0

A-weighted Sound Pressure Levels [dB(A)] @ Operation Location

See Notes 1, 3, 5, 7-14 Listed Below

Configuration	Applied Load	Octave Band Center Frequency, Hz											Overall dB(A) SPL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Standard - Unhoused with Infinite Exhaust with Mounted Cooling System	100% Prime	N/A	50.0	66.4	82.8	86.6	91.5	92.2	91.3	86.4	79.4	67.6	97.5
	100% Standby	N/A	49.7	67.3	83.3	87.1	91.7	92.5	91.7	87.1	80.1	68.5	97.8
F200 - Weather with Mounted Muffler	100% Prime	N/A	57.9	70.0	92.6	97.7	102.2	107.6	107.4	101.5	96.1	85.1	111.9
	100% Standby	N/A	58.2	70.1	93.0	97.7	102.7	108.2	107.5	102.0	97.4	85.7	112.3
F201 - Quiet Site II First Stage with Mounted Muffler	100% Prime	N/A	55.0	67.7	86.3	89.1	93.8	98.4	95.2	89.6	86.0	75.5	101.8
	100% Standby	N/A	54.3	70.2	87.2	88.6	93.8	98.5	95.5	90.1	87.0	76.3	102.0
F202 - Quiet Site II Second Stage with Mounted Muffler	100% Prime	N/A	53.3	69.0	85.1	83.8	93.4	94.0	91.9	85.2	81.5	71.8	98.7
	100% Standby	N/A	53.4	70.3	85.4	84.5	93.9	94.6	92.5	85.8	82.2	72.8	99.2

A-weighted Sound Power Levels [dB(A)]

See Notes 1, 3, 6-14 Listed Below

Configuration	Applied Load	Octave Band Center Frequency, Hz											Overall dB(A) SPWL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Standard - Unhoused with Infinite Exhaust with Mounted Cooling System	0% Prime	N/A	67.2	82.4	104.3	109.4	113.3	115.4	114.8	110.9	101.5	89.3	120.5
	75% Prime	N/A	68.5	84.6	104.7	110.0	114.0	116.7	115.8	111.8	105.6	93.4	121.5
	100% Prime	N/A	68.9	86.0	105.1	110.2	114.5	117.1	117.1	112.8	107.9	95.6	122.3
	100% Standby	N/A	69.2	86.7	105.2	110.2	114.5	117.4	117.2	113.2	108.2	95.9	122.5
F200 - Weather with Mounted Muffler	0% Prime	N/A	73.6	94.0	103.1	106.2	109.3	111.8	109.7	104.6	94.0	79.5	116.3
	75% Prime	N/A	70.5	98.9	105.1	106.3	109.7	112.8	110.7	105.7	98.0	87.9	117.2
	100% Prime	N/A	71.4	99.3	105.6	106.7	110.2	113.2	111.6	106.8	101.1	91.3	117.9
	100% Standby	N/A	72.2	99.4	105.7	106.8	110.3	113.4	111.9	107.1	101.9	91.9	118.1
F201 - Quiet Site II First Stage with Mounted Muffler	0% Prime	N/A	72.6	92.9	98.6	95.9	97.4	98.4	97.7	93.2	84.2	71.1	105.3
	75% Prime	N/A	70.8	97.8	102.1	97.1	99.1	100.8	100.1	96.8	89.0	80.8	108.0
	100% Prime	N/A	72.0	98.6	103.0	98.6	100.1	1.0	101.2	98.5	92.5	81.9	109.2
	100% Standby	N/A	72.1	98.7	103.2	99.1	100.9	102.4	101.8	99.0	93.5	82.7	109.6
F202 - Quiet Site II Second Stage with Mounted Muffler	0% Prime	N/A	64.9	82.5	93.4	95.3	91.7	93.1	93.2	87.8	79.8	65.1	100.8
	75% Prime	N/A	64.5	87.3	94.9	95.8	92.9	97.3	102.2	97.9	85.3	73.0	105.8
	100% Prime	N/A	65.2	87.4	95.2	96.3	93.2	99.1	102.9	99.5	89.4	74.6	106.8
	100% Standby	N/A	65.5	87.9	95.6	96.6	93.8	99.4	103.1	100.0	90.7	75.5	107.1

Exhaust Sound Power Levels [dB(A)]

See Notes 4, 6-14 Listed Below

Configuration	Applied Load	Octave Band Center Frequency, Hz											Overall dB(A) SPWL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Open Exhaust (No muffler)	0% Prime	N/A	67.2	97.1	102.3	108.1	106.3	104.7	101.1	98.7	90.7	76.3	112.6
	75% Prime	N/A	66.1	105.9	112.0	122.9	122.4	119.2	118.6	114.6	108.2	93.1	127.6
	100% Prime	N/A	67.6	106.9	115.0	122.8	122.8	120.6	119.9	116.1	111.6	94.8	128.4
	100% Standby	N/A	67.9	107.4	114.9	123.4	123.2	120.9	120.0	116.7	113.2	97.0	128.8

Global Notes:

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

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Cooling System Data
DQCA
EPA NSPS Stationary Emergency: Tier 2

High Ambient Air Temperature Radiator Cooling System										
			Max Cooling @ Air Flow Static Restriction, Unhoused inches water (mm water)					Housed in Free Air, No Air Discharge Restriction		
			0.0 (0.0)	0.25 (6.4)	0.5 (12.7)	0.75 (19.1)	1.0 (25.4)	Weather	Sound Level1	Sound Level2
	Duty	Rating (kW)	**Maximum Allowable Ambient Temperature, Degree C**							
60	Standby	600	71.5	68.9	66.7	62.9	60.7	63.6	63.1	61.6
Hz	Prime	545	68.0	65.5	64.0	59.2	57.6	61.9	61.5	59.6

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 de-rate 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.

2017 EPA Tier 2 exhaust emission compliance statement 600DQCA 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:	HCEXL023.AAB-038
Effective date:	11/21/2016
Date Issued:	11/21/2016
EPA engine family:	HCEXL023.AAB

Engine information:

Model:	QSK23/QSX23-G7 NR2	Bore:	6.69 in. (170 mm)
Engine nameplate HP:	1220	Stroke:	6.69 in. (170 mm)
Type:	4 cycle, in-line, 6 cylinder diesel	Displacement:	1413 cu. in. (23.2 liters)
Aspiration:	Turbocharged and CAC	Compression ratio:	16.0:1
Emission control device:	Engine design modification	Exhaust stack diameter:	10 in.

Diesel fuel emissions limits

D2 cycle exhaust emissions

	Grams per BHP-hr			Grams per kW_m-hr		
	NO_X + NMHC	CO	PM	NO_X + NMHC	CO	PM
Test results - diesel fuel (300-4000 ppm sulfur)	4.3	0.3	0.10	5.7	0.4	0.13
EPA T4 F emissions limit	4.8	2.6	0.15	6.4	3.5	0.20
Test results - CARB diesel fuel (<15 ppm sulfur)	3.9	0.3	0.09	5.2	0.4	0.11
CARB emissions limit	4.8	2.6	0.15	6.4	3.5	0.20

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

Test methods: EPA/CARB nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for constant speed engines (ref. ISO8178-4, D2)

Diesel fuel specifications: Cetane number: 40-48. Reference: ASTM D975 No. 2-D.
Reference conditions: Air inlet temperature: 25°C (77°F), Fuel inlet temperature: 40°C (104°F). Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake restriction set to a maximum allowable limit for clean filter; Exhaust back pressure set to a maximum allowable limit.

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

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

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Exhaust emission data sheet 600DQCA

60 Hz Diesel generator set
EPA NSPS stationary emergency

Engine information:

Model:	Cummins Inc QSK23-G7 NR2	Bore:	6.69 in. (170 mm)
Type:	4 Cycle, In line, 6 cylinder diesel	Stroke:	6.69 in. (170 mm)
Aspiration:	Turbocharged and CAC	Displacement:	1413 cu. in. (23.1 liters)
Compression ratio:	16.0:1		
Emission control device:	Turbocharged with charge air-cooled		

Performance data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime
Engine HP @ stated load (1800 RPM)	220	440	660	880	792
Fuel consumption (gal/Hr)	12.9	22.6	32.3	41.8	38.1
Exhaust gas flow (CFM)	2029.9	2987.1	3862.8	4600.3	4390
Exhaust gas temperature (°F)	576.7	685.6	750.6	810	774
Exhaust emission data					
HC (Total unburned hydrocarbons)	1.1	0.51	0.28	0.18	0.25
NOx (Oxides of nitrogen as NO2)	2.99	3.15	3.64	4.49	4.05
CO (Carbon monoxide)	1.24	0.6	0.3	0.21	0.2
PM (Particular matter)	0.34	0.17	0.08	0.05	0.05
SO2 (Sulfur dioxide)	0.13	0.12	0.11	0.1	0.1
Smoke (Bosch)	0.8	0.63	0.44	0.35	0.36

All values are Grams per HP-Hour

Test conditions

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load (± 2%). Pressures, temperatures, and emission rates were stabilized.

Fuel specification:	46.5 Cetane Number, 0.035 Wt.% Sulfur; Reference ISO8178-5, 40CFR86. 1313-98 Type 2-D and ASTM D975 No. 2-D.
Fuel temperature:	99 ± 9 °F (at fuel pump inlet)
Intake air temperature:	77 ± 9 °F
Barometric pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference standard:	ISO 8178

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

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Specification sheet

PowerCommand® 3.3 control system



Control system description

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

Features

- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support.
- AmpSentry™ protection - for true alternator overcurrent protection.
- Digital power transfer control (AMF) 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 share
- 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 voltage regulation. Three phase full wave FET type regulator compatible with either shunt or PMG systems.
- Digital engine speed governing (where applicable)
- Generator set monitoring and protection.
- Utility/AC Bus metering and protection
- 12 and 24 V DC battery operation.
- ModBus® interface for interconnecting to customer equipment.
- Warranty and service. Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std. and CE standards.

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PowerCommand digital genset control PCC 3300



Description

The PowerCommand genset control is suitable for use on a wide range of diesel and lean burn natural gas gensets in paralleling applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC line-toline, 601-45,000 VAC with external PT.

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

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation - Three phase full wave FET type regulator compatible with either shunt or PMG systems. Sensing is three phase.
- Digital engine speed governing (where applicable) - Provides isochronous frequency regulation.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine Control Module (ECM).
- AmpSentry protection - for true alternator overcurrent protection.
- Genset monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system to sense and warn against a weak battery condition.
- Configurable for single or three phase AC metering.
- Engine starting - Includes relay drivers for starter, Fuel Shut Off (FSO), glow plug/spark ignition power and switch B+ applications.
- Genset protection – Protects engine and alternator.
- 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 (AMF) 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 share
- Droop kW and KVAr control
- Sync cCheck – The sync check function has adjustments for phase angle window, voltage window, frequency window and time delay.
- Utility/AC Bus metering and protection
- Advanced serviceability – using InPower™, a PC-based software service tool.
- Environmental protection – The control system is designed for reliable operation in harsh environments.
- The main control board is a fully encapsulated module that is protected from the elements.
- ModBus interface for interconnecting to customer equipment.
- Configurable inputs and outputs – Four discrete inputs and four dry contact relay outputs.
- Warranty and service – Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications – Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std. and CE standards.

Base control functions

HMI capability

Options – Local and remote HMI options.

Operator adjustments – The HMI 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 HMI or InPower.

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

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

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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)
- Alternator drive end bearing temperature
- Alternator non-drive end bearing temperature

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

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)

For lean burn natural gas engine applications:

- 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
- Manifold 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 (e.g., HT and LT)
- Coolant temperature 1 and 2 (e.g., HT and LT)
- Exhaust port temperature (up to 18 cylinders)
- Pre-filter oil pressure
- Exhaust back pressure
- CM700 internal temperature
- CM700 isolated battery voltage
- Speed bias
- CM558 internal temperature
- CM558 isolated battery voltage
- Knock level (up to 18 cylinders)
- Spark advance (up to 18 cylinders)
- Knock count (up to 18 cylinders)
- Auxiliary supply disconnector 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 HMI 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

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

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

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

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

Remote start mode - It accepts a ground signal from remote devices to automatically start the genset and immediately accelerates to rated speed and voltage or run at idle until engine temperature is adequate. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

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

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

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

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

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

For lean burn natural gas engine applications:

Engine start inhibit/enable – The function will allow application-specific processes to be started prior to the genset/engine start (e.g., pumps, boosters, etc.).

Alternator control

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

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/-1.5% for a 40 ºC
(104 ºF) 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.

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 is 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 Hz. 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.

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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- 300 sec, stop delay from 0-800 sec, transfer delay from
0- 120 sec, retransfer delay from 0-1800 sec, programmed transition delay from 0-60sec, and maximum parallel time from 0-1800 sec.

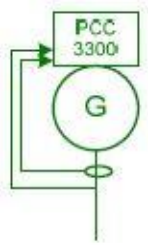
Breaker control – Utility and genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include contact failure, fail to close, fail to open, fail to disconnect, and tripped. Upon breaker failure, appropriate control action is taken to maintain system integrity.

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.

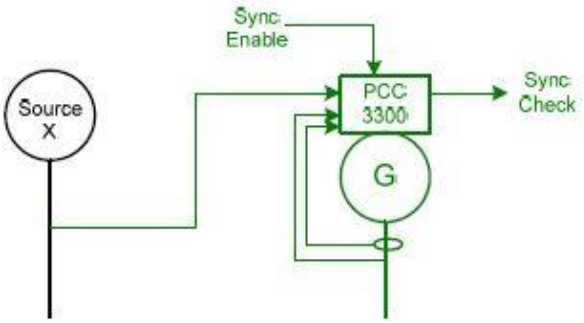
Exerciser clock –The exerciser clock (when enabled) allows the system to be operated at preset times in either test without load, test with load, or extended parallel mode. A real time clock is built in. Up to 12 different programs can be set for day of week, time of day, duration, repeat interval, and 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.

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.

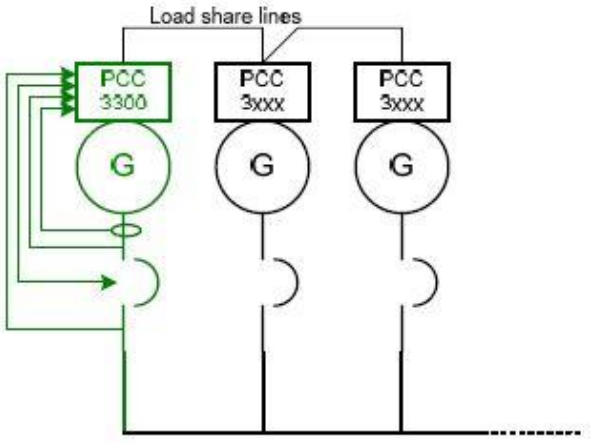


Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.

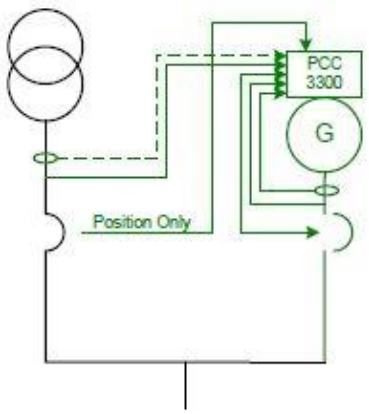


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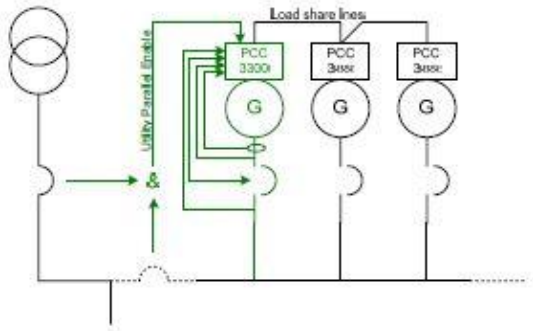
Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



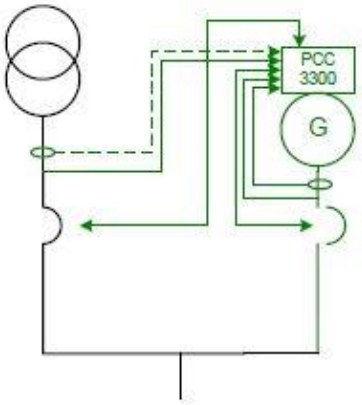
Utility single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



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.



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.

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General engine protection

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

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

Fail to start (overcrank) shutdown - The control system will indicate a fault if the genset fails to start by the completion of the engine crack 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.

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

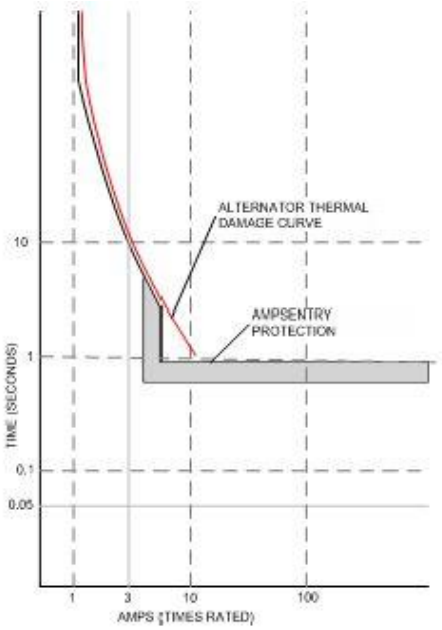
High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

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 so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. See document R1053 for a full size time over current curve. The control does not included protection required for interconnection to a utility (mains) service.



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.

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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 - 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 signalled to open. If the breaker does not open within and 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

For lean burn natural gas engine applications:

- Gearbox oil pressure/temperature protection
- Fire fault
- Earth fault
- Differential fault
- DC power supply fault
- Genset Interface Box (GIB) isolator open fault
- Start inhibit/enable (x3)
- Radiator fan trip

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- 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, 30 VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (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 (3.5 A, 30 VDC) for opening and closing of the genset and utility breakers.

For lean burn natural gas engine applications:

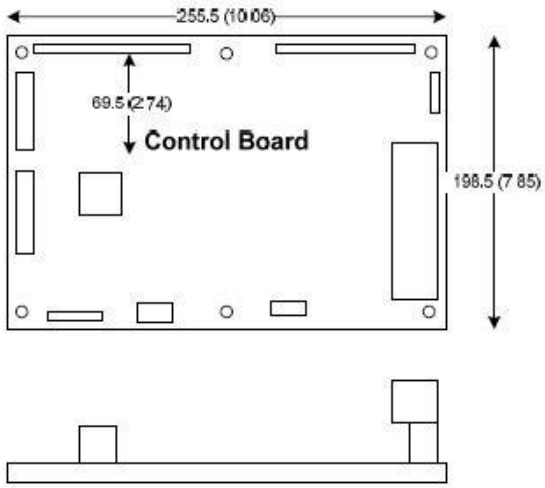
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

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 products.

Mechanical drawing



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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.

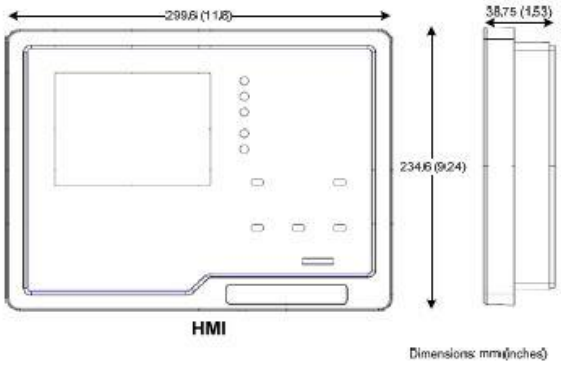
Features

- 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. and CE standards.
- LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian and Chinese characters.

Communications connections include:

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

Mechanical drawing



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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.

PCCNet COMPATIBLE

Environment

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

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

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: 1993 compliance, controls and switchgear.
- CE marking: The control system is suitable for use on generator sets to be CE-marked.
- EN 50081-1,2 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 508 recognized or Listed and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

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

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Accessories

RSN 1344261
PERMIT# 2018-1573853-LT

Specification sheet

Enclosures and Tanks

250-1000 kW Gensets



Enclosure Standard Features

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

Options

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

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

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

- All data is 60 Hz, full load standby rating, steel enclosures only.
- Data is a measured average of 8 positions.
- Sound levels for aluminium enclosures are approximately 2 dB(A) higher than listed sound levels for steel enclosures.

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

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Package Dimensions of Enclosure, Exhaust System, and UL Tank

250-500 kW

Tank size (gal)	Weather protective package length (in)	QuietSite level I package length (in)	QuietSite level 2 package length (in)	Width (in)	Height (in)
270	188	188	222	82	106
300	188	188	222	82	104
400	188	188	222	82	106
500	188	188	222	82	108
600	188	188	222	82	111
660	188	188	222	82	113
720	188	188	222	82	114
850	188	188	222	82	118
1420	200	200	222	82	128
1470	192	192	222	82	128
1700	234	234	234	82	128
2050	284	284	284	82	128
2525	346	346	346	82	128
Lifting base	188	188	222	82	100

600-1000 kW

Tank size (gal)	Weather protective package length (in)	QuietSite level I package length (in)	QuietSite level 2 package length (in)	Width (in)	Height (in)
200	260	303	315	98	137
660	260	303	315	98	137
1000	260	303	315	98	141
1500	260	303	315	98	146
2000	292	327	327	98	143
2400	338	338	338	98	143

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

	CSA - The generator set is CSA certified to product class 4215-01.
	UL - The generator set is available listed to UL 2200, stationary engine generator assemblies. The PowerCommand® control is listed to UL 508 - Category NITW7 for U.S. and Canadian usage.

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

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Data sheet

Circuit breakers

Description

This data sheet provides circuit breaker manufacturer part numbers and specifications. The circuit breaker box description is the rating of that breaker box installation on a Cummins® generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable models

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

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.

2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an “N”, use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

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

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

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

http://products.schneider-electric.us/technical-library/

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3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

*If the catalog number starts with “N”, skip the N and begin your search with the second letter.

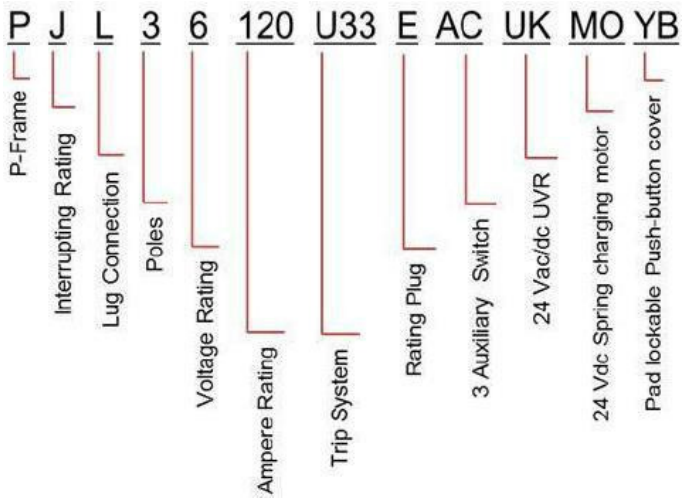
*If the first 3 letters are “PJP,” the search will not work. You will need to start with just “PJ” and use the description pages to obtain the information you are looking for on the “PJP.”

Example

After finding your circuit breaker catalog number to be "PJL36120U33EACUKMOYB," navigate to the P-frame catalog by using the link provided.

Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PJL36120.”



The following link is another way to decode the Schneider products

https://www.productinfo.schneider-electric.com/portals/ui/digest/viewer/561d5d65e4b0c5c41a243bf2/561d5f9ae4b0c5c41a24480c/r/_17707021_83351#_17707021_83351

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

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

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Electrically operated breakers

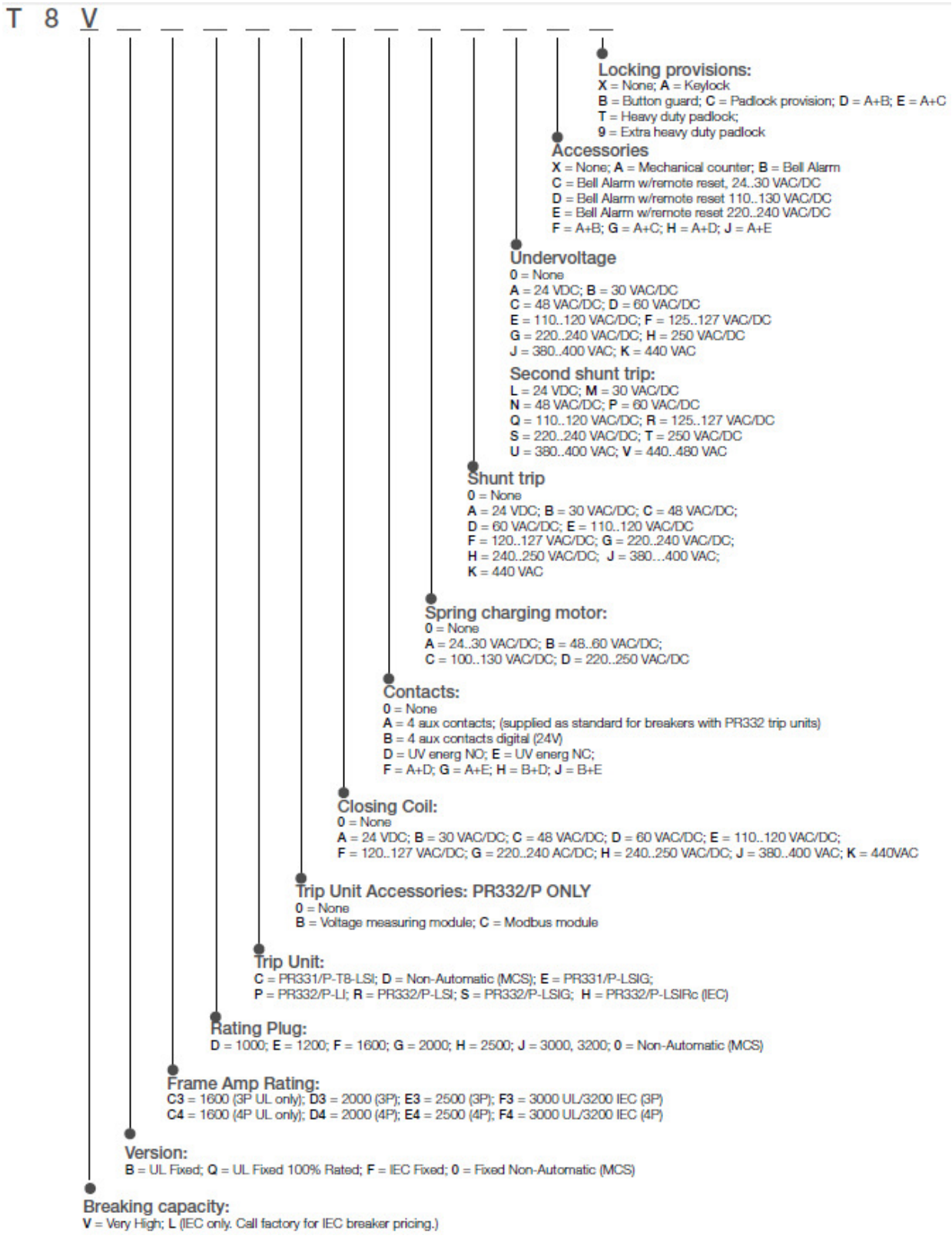
Feature code	Breaker box description	Cummins part #	Engine	Manufacturer	Breaker catalog number	Trip unit	Plug type	Under voltage relay
KX74-2	EO-CirBrkr-1200A, Right, 3P, UL/IEC 600V,100%	A050U825	QSK23-G7, QST30-G5	Schneider Electric	PJP36120U33EACUKMOYB	MicroLogic 5.0 LSI	E	24-30 VDC
KX75-2	EO-CirBrkr-800A, Right, 3P, UL/IEC 600V, 100%	A050U827	QSK23-G7, QST30-G5	Schneider Electric	PJP36080U33FACUKMOYB	MicroLogic 5.0 LSI	F	24-30 VDC
KX76-2	EO-CirBrkr-600A, Right, 3P, UL/IEC 600V, 100%	A050X073	QSK23-G7, QST30-G5	Schneider Electric	PJP36060U33FACUKMOYB	MicroLogic 5.0 LSI	F	24-30 VDC
KX79-2	EO-CirBrkr-1200A, Left, 3P, UL/IEC 600V, 100%	A050U825	QSK23-G7, QST30-G5	Schneider Electric	PJP36120U33EACUKMOYB	MicroLogic 5.0 LSI	E	24-30 VDC
KX80-2	EO-CirBrkr-800A, Left, 3P, UL/IEC 600V, 100%	A050U827	QSK23-G7, QST30-G5	Schneider Electric	PJP36080U33FACUKMOYB	MicroLogic 5.0 LSI	F	24-30 VDC
KX81-2	EO-CirBrkr-600A, Left, 3P, UL/IEC 600V, 100%	A050X073	QSK23-G7, QST30-G5	Schneider Electric	PJP36060U33FACUKMOYB	MicroLogic 5.0 LSI	F	24-30 VDC
KX84-2	EO-CirBrkr-1600A, Right, 3P, UL/IEC 600V, 100%	A054N784	QSK23-G7	Schneider Electric	WL3EEX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
		A050Z300	QST30-G5	ABB	T8VQC3FC0AAAAABXK8TL	PR331/P-T8-LSI		
KX85-2	EO-CirBrkr-2000A, Right, 3P, UL/IEC 600V, 100%	A054N786	QSK23-G7	Schneider Electric	WL3FFX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
		A050Z302	QST30-G5	ABB	T8VQD3GC0AAAAABXK8TL	PR331/P-T8-LSI		
KY02-2	EO-CirBrkr-2500A, Right, 3P, UL/IEC600V, 100%	A054N787	QSK23-G7	Schneider Electric	WL3GGX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
KY10-2	EO-CirBrkr-3000A, Right, 3P, UL/IEC 600V, 100%	A054V106	QSK23-G7	Schneider Electric	WL3HHX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
KX87-2	EO-CirBrkr-1600A, Left, 3P, UL/IEC 600V 100%	A054N784	QSK23-G7	Schneider Electric	WL3EEX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
		A050Z300	QST30-G5	ABB	T8VQC3FC0AAAAABXK8TL	PR331/P-T8-LSI		
KX88-2	EO-CirBrkr-2000A, Left, 3P, UL/IEC 600V, 100%	A054N786	QSK23-G7	Schneider Electric	WL3FFX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
		A050Z302	QST30-G5	ABB	T8VQD3GC0AAAAABXK8TL	PR331/P-T8-LSI		
KY03-2	EO-CirBrkr-2500A, Left, 3P, UL/IEC 600V, 100%	A054N787	QSK23-G7	Schneider Electric	WL3GGX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC
KY11-2	EO-CirBrkr-3000A, Left, 3P, UL/IEC 6000V, 100%	A054V106	QSK23-G7	Schneider Electric	WL3HHX33A9SCBBXAXXYO48	MicroLogic 5.0 LSI	A	24-30 VDC

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

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T8
Catalog number explanation



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Interstate Batteries 8D-MHD

3.7

The Workaholic provides dependable power for your heavy-duty applications. One out of six commercial batteries sold today is an Interstate brand battery! This battery works overtime-providing power and endurance over your long haul.



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Product ID:	8D-MHD
Cranking Amps:	1750
Cold Cranking Amps:	1400
Voltage:	12
Termination:	Common Code A
Weight (lbs):	132.3
Width (in):	11
Length (in):	20.75
Height (in):	9.63
ReserveCapacity-25:	450.00
WET/DRY:	W

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RSN 1344261
PERMIT# 2018-1573853-LT

NRG

Intelligent Engine Start Battery Charger



CONSULTING · SPECIFYING engineer 2009 PRODUCT OF THE YEAR Gold

The Smart Choice for Mission-Critical Engine Starting

- **Fast, accurate, mission-critical charging** – gives best starting reliability
- **4-rate, temperature-compensated output** – offers longest battery life
- **Replace nearly any charger** – without planning ahead
- **Industry-first battery-fault alarm** – helps dispatch service early
- **Lasting reliability** – field MTBF > 1 million hours with industry-best warranty
- **IBC seismic certification** – meets latest building codes, no installation delays
- **Optional OSHPD pre-approval** – already approved for California hospital projects

ISO 9000 · c UL us LISTED · CE · IBC · oshpd PRE-APPROVED

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NRG Battery Charger Benefits and Features



Failure to start due to battery problems is the leading cause of inoperable engine generator sets.

SENS NRG battery charger maximizes starting system reliability while slashing genset servicing costs:

One NRG replaces almost any charger without extra site visits. Installers can select or change at any time 120, 208 or 240 volts AC input, 12 or 24-volt battery and output settings optimized for nearly any lead-acid or nickel cadmium battery.

Easy to understand user interface provides state-of-the-art system status – including digital metering, NFPA 110 alarms and a battery fault alarm that can send service personnel to the site before failure to start.

Batteries charged by NRG give higher performance and last longer. In uncontrolled environments precision charging by SENS increases battery life and watering intervals 400% or more.

NRG meets all relevant industry standards – including UL, NFPA 110 and CE. Seismic Certification per International Building Code (IBC) 2000, 2003, 2006. All units are C-UL listed. 50/60 Hz units add CE marking to UL agency marks.

***EnerGenius* reliability technology built into every charger includes:**

- All-electronic operation with generous component de-rating
- Disconnected/reversed/incorrect voltage battery alarm and protection
- Protection of connected equipment against load dump transients
- Widest temperature rating, and overtemperature protection
- Superior lightning and voltage transient protection
- Demonstrated field MTBF > 1 million hours
- Standard 3-year warranty (10 years magnetics and power semiconductors) and available 10-year complete warranty with reimbursement of field service costs

Earn the best return on your charger investment – choose SENS NRG

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NRG Specifications

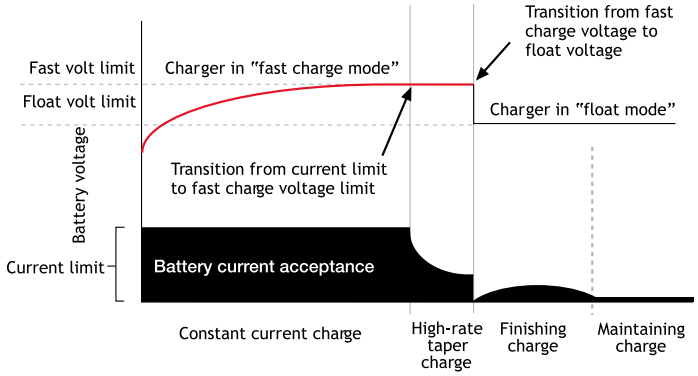
AC Input

Voltage	110-120/208-240 VAC, ±10%, single phase, field selectable
Input current	10A charger: 6.6/3.3 amps maximum
	20A charger: 12.6/6.3 amps maximum
Frequency	60 Hz ±5% standard; 50/60 Hz ±5% optional
Input protection	1-pole fuse, soft-start, transient suppression

Charger Output

Nominal voltage ratings	12 or 24 volt nominal
Optional voltage rating	12/24 volt, field selectable
Battery settings	Six discrete battery voltage programs
	- Low or high S.G. flooded
	- Low or high S.G. VRLA
	- Nickel cadmium 9, 10, 18, 19 or 20 cells
Regulation	±0.5% (1/2%) line and load regulation
Current	10 or 20 amps nominal
Electronic current limit	105% rated output typical – no crank disconnect required
Charge characteristic	Constant voltage, current limited, 4-rate automatic equalization
Temperature compensation	Enable or disable anytime, remote sensor optional
Output protection	Current limit, 1-pole fuse, transient suppression

Standard 4-rate charging



User Interface, Indication and Alarms

Digital meter	Automatic meter alternately displays output volts, amps[4]
Accuracy	±2% volts, ±5% amps
Alarms	LED and Form C contact(s) per table:



Front panel status display

Alarm System Functions

	Alarm code "1"[1]	Alarm code "C" (meets requirements of NFPA 110)
AC good	LED	LED
Float mode	LED	LED
Fast charge	LED	LED
Temp comp active	LED	LED
AC fail	LED[2]	LED and Form C contact
Low battery volts		LED and Form C contact
High battery volts		LED and Form C contact
Charger fail	LED[2]	LED and Form C contact
Battery fault[3]	LED[2]	LED and Form C contact

1. Alarms "1" available only on 10A charger
2. Form C contact provides summary alarm of these conditions. BBHH chargers include this alarm configuration. Contacts rated 2A @ 30 VDC resistive
3. Battery fault alarm indicates these fault conditions:
   - Battery disconnected - Battery polarity reversed - Mismatched charger battery voltage - Open or high resistance charger to battery connection - Open battery cell or excessive internal resistance
4. Three-position jumper allows user to select from three display settings: alternating volts / amps (normal), constant volts, or constant amps

Controls

AC input voltage select	Field-selectable switch
Optional 12/24-volt output select	Field-selectable two-position jumper
Battery program select	Field-selectable six-position jumper
Meter display select	Field-selectable three-position jumper
Fast charger enable/disable	Field-selectable two-position jumper
Temp compensation enable	Standard. Can be disabled or re-enabled in the field
Remote temp comp enable	Connect optional remote sensor to temp comp port



Simple field adjustments

Environmental

Operating temperature	-20C to +60C, meets full specification to +45C
Over temperature protection	Gradual current reduction to maintain safe power device temperature
Humidity	5% to 95%, non-condensing
Vibration (10A unit)	UL 991 Class B (2G sinusoidal)
Transient immunity	ANSI/IEEE C62.41, Cat. B, EN50082-2 heavy industrial, EN 61000-6-2
Seismic Certification	IBC 2000, 2003, 2006, 2009 Maximum S_{ds} of 2.28 g, Optional OSHPD pre-approval

Agency Standards

Safety	C-UL listed to UL 1236 (required for UL 2200 gensets), UL Category BBGQ, CSA standard 22.2 no. 107.2-M89 CE: 50/60 Hz units DOC to EN 60335
Agency marking	60 Hz: C-UL-US listed 50/60 Hz: C-UL-US listed plus CE marked
EMC	Emissions: FCC Part 15, Class B; EN 50081-2 Immunity: EN 61000-6-2
NFPA standards	NFPA 70, NFPA 110. (NFPA 110 requires Alarms "C")
Optional agency compliance	Units with Alarms "1" configuration available with additional compliance to UL Categories BBHH, QWIR, and NFPA 20 OSHPD pre-approval

Construction

Housing/configuration	Material: Non-corroding aluminum. Configuration options: • Fully enclosed: C-UL listed enclosure • Open frame: C-UL recognized
Packaging	Open-frame and Slimline configurations only available in bulk OEM quantities and packaging
Dimensions	See Drawings and Dimensions page for details
Printed circuit card	Surface mount technology, conformal coated
Cooling	Natural convection
Protection degree	Listed housing: NEMA-1 (IP20). Optional IP21 drip shield. Optional NEMA 3R enclosure
Damage prevention	Fully recessed display and controls
Electrical connections	Compression terminal blocks

Warranty

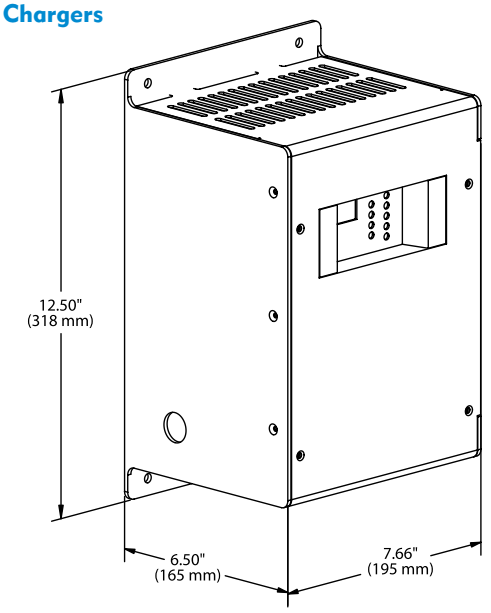
Standard warranty	Three year parts and labor warranty (10 years magnetics and power semiconductors) from date of shipment
Optional warranty	If specified at time of order, warranty coverage can be increased to reimburse customer's documented field service costs up to the original charger price or increased to 5 or 10 years with field service cost reimbursement. Contact the factory for full details

Optional features

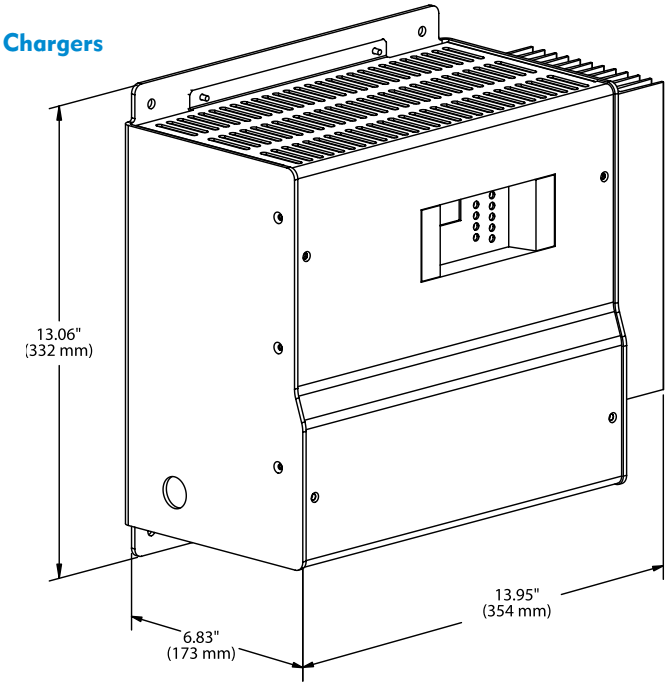
Input	Input frequency, 50/60 Hz
Remote temp comp sensor	Recommended where battery and charger are in different locations
Drip shield meets s/b (IP21)	Protects from dripping water
NEMA 3R housing	Enables outdoor installation (remote temp sensor recommended)
UL BBHH listing	Available in 10A units with Alarms "1"
Field service warranty	Reimbursement of customer field service expenses up to charger price for 3, 5, or 10 years

Drawings and Dimensions

10A Chargers



20A Chargers



Housing Dimensions Table

Amps	Width	Depth	Height
10	7.66" (195 mm)	6.50" (165 mm)	12.50" (318 mm)
20	13.95" (354 mm)	6.83" (173 mm)	13.06" (332 mm)

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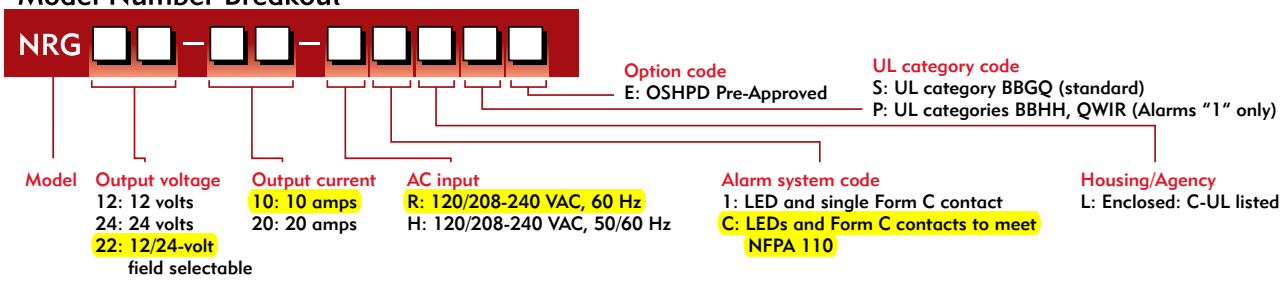
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NRG Ordering Information

Output volts	Output amps	Model	NFPA 110 Alarms	Lbs/Kg	Shipping Lbs/Kg
12	10	NRG12-10-RC	Yes	19 / 8.7	21 / 9.5
24	10	NRG24-10-RC	Yes	23 / 10.4	25 / 11.4
12/24	10	NRG22-10-RC	Yes	23 / 10.4	25 / 11.4
12/24	10	NRG22-10-RC	Yes	23 / 10.4	25 / 11.4
12	20	NRG12-20-RC	Yes	39 / 17.7	43 / 19.5
24	20	NRG24-20-RC	Yes	42 / 19.1	46 / 20.9
12/24	20	NRG22-20-RC	Yes	42 / 19.1	46 / 20.9

All models offer field-selectable input 120/208-240 volts. 60 Hz input is standard with C-UL listing. Optional 50/60 Hz input includes C-UL listing and adds CE mark.

Model Number Breakout



The Smart Choice for Mission-Critical Engine Starting

Additional Information

Contact SENS or your local sales representative for additional specification, engineering and installation information. Check the SENS web site for latest available data. Specification is subject to change without notice.

Contact Information

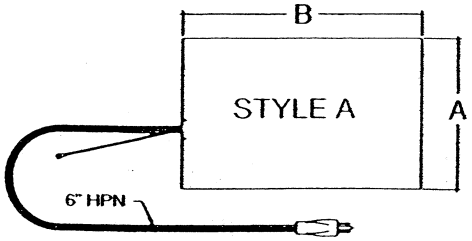
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www.sens-usa.com • info@sens-usa.com
1840 Industrial Circle, Longmont, CO 80501 USA

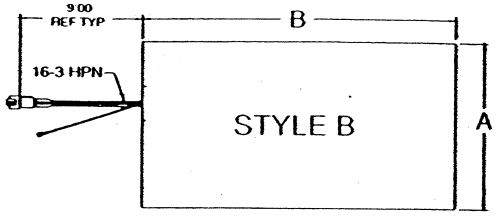
SENS®
STORED ENERGY SYSTEMS

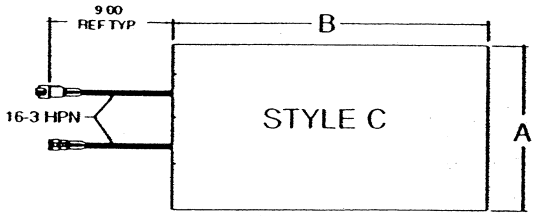
RSN 1344261
PERMIT# 2018-1573853-LT

BATTERY HEATING PADS

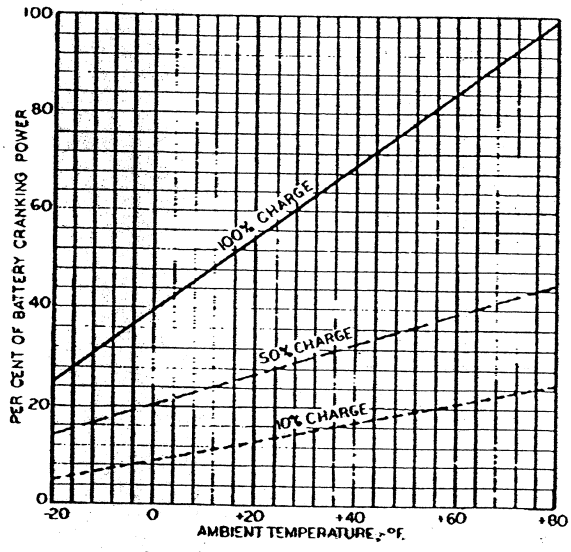
Model Number	Volts	Watts	Amps	Nominal Dimensions A	Nominal Dimensions B	Battery Size	Style
KB5015	120	50	.42	8 1/4	13	4D	A
KB5015-S	120	50	.42	8 1/4	13	4D	B
KB5015-D	120	50	.42	8 1/4	13	4D	C
KB7515	120	75	.63	10 1/2	18 1/2	8D	A
KB7515-S	120	75	.63	10 1/2	19 1/2	8D	B
KB7515-D	120	75	.63	10 1/2	19 1/2	8D	C
KB7523	240	75	.31	10 1/2	18 1/2	8D	A
KB7523-S	240	75	.31	10 1/2	19 1/2	8D	B
KB7523-D	240	75	.31	10 1/2	19 1/2	8D	C



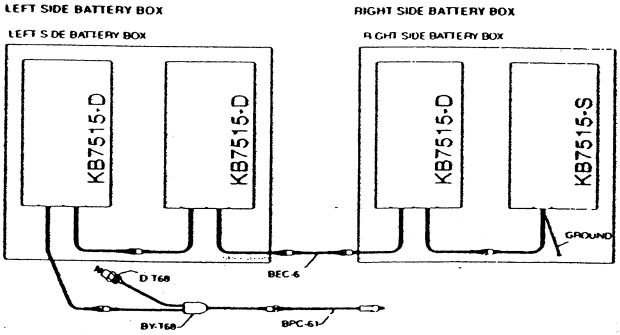




A fully charged battery has only 40% cranking power at 0° F when compared to 100% cranking power at 80° F.



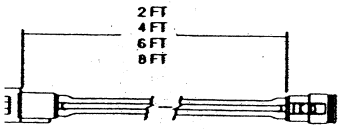
Typical Connection - 2 Batteries on Each Side of Vehicle



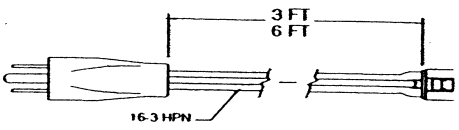
When batteries are placed in an insulated battery box, a thermostat is recommended to ense battery box temperature to prevent overheating the battery.

tery heater not recommended for nickel cadium batteries.

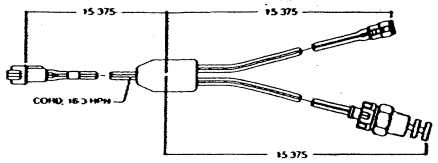
ccessories For Multiple Battery Heating



EXTENSION CORDS	
Model	Length
BEC-2	2'
BEC-4	4'
BEC-6	6'
BEC-8	8'



POWER SUPPLY CORDS		
Model	Length	Volts
BPC-31	3'	120
BPC-32	3'	240
BPC-61	6'	120
BPC-62	6'	240



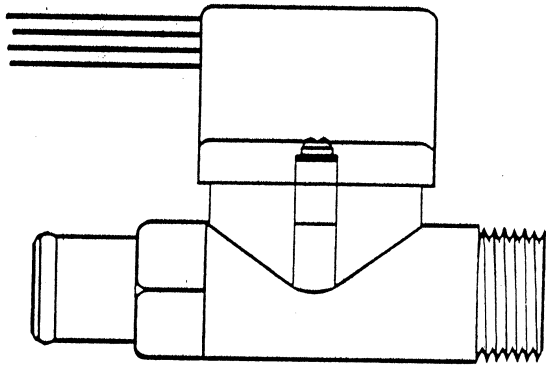
THERMOSTAT & "Y" CORD ASSEMBLY		
Model	Temperature Control	
	On	Off
BY-T68	60°F	80°F

RSN 1344261
PERMIT# 2018-1573853-LT

FLOW THROUGH COOLANT HEATER THERMOSTAT CONTROLS

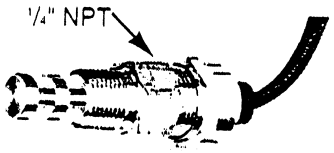
1" NPT on tank end and 3/4" Hose Barb on hose end

New Part Number	Old Part Number	Range On	Range Off
TFT8-3HB	KS810 and KS810WT	80°F	100°F
TFT10-3HB	KS1012 and KS1012WT	100°F	120°F
TFT12-3HB	KS1214 and KS1214WT	120°F	140°F
TFT14-3HB	KS1416 and KS1416WT	140°F	160°F



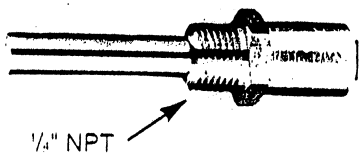
LUBE OIL TEMPERATURE CONTROLS

Range On	Range Off	Part Number
X 40°F	60°F	DIT46
60°F	80°F	DIT68
80°F	100°F	DIT810
100°F	120°F	DIT1012



ADJUSTABLE TEMPERATURE CONTROLS

From 75°F to 250°F	AT7525
Protective well for above	ATW





RSN 1344261
PERMIT# 2018-1573853-LT

Electric Utility Heater

HVAC/R fact sheet



Electric Utility Heater, 5/4.1 kW

Ideal for Auxiliary, supplementary or primary heat source in factories, stores, garages, basements, warehouses, public buildings, service stations, stockrooms, offices, workshops, toll booths, closing offices, large or exposed areas or additions. Heater comes equipped with ceiling mounting bracket for horizontal or vertical flow mounting or any position in between.

CATALOG NUMBER	VOLTS	WATTS	BTU PER HR.	PHASE	HP or FAN MOTOR WATTS	FAN MOTOR RPM	AIR VOLUME CFM	THROW	MIN. MTG. HT.	HEATER AMPS	WT. (LBS.)
Electric Utility Heater											
		1874	6396							9.0	
	208	2500	8553							12.0	
		3123	10659							15.0	
3UG73		3750	12799	1	6	1350	270	16’	6’	18.0	24
		2500	8533							10.4	
	240	3332	11365							13.9	
		4165	14215							17.4	
		5000	17065							20.9	



Electric Utility Heater, 5/4.1/3.3/2.5 kW

Ideal for Auxiliary, supplementary or primary heat source in factories, stores, garages, basements, warehouses, public buildings, service stations, stockrooms, offices, workshops, toll booths, closing offices, large or exposed areas or additions. Heater comes equipped with ceiling mounting bracket for horizontal or vertical flow mounting or any position in between.

CATALOG NUMBER	VOLTS	WATTS	BTU PER HR.	PHASE	HP or FAN MOTOR WATTS	FAN MOTOR RPM	AIR VOLUME CFM	THROW	MIN. MTG. HT.	HEATER AMPS	WT. (LBS.)
Electric Utility Heater											
		2500	8533							10.4	
3UG74	208	3332	11365	1	6	1350	270	16’	6’	13.9	24
		5000	17065							20.9	

c UL US

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Call or visit your local branch or go to **grainger.com/dayton** for complete product line information

RSN 1344261
PERMIT# 2018-1573853-LT

PowerCommand® Annunciator Discrete Input or PCCNet



> Specification sheet

Our energy working for you.™

Power Generation

Description

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

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

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

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

Features

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

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S-1472e (8/09)

Specifications

Signal requirements

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

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

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

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

Max conductor size for terminal: 12 ga

Relay outputs

0.2 A at 125 VAC and 1 A at 30 VDC

Network connections

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

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

Power

Maximum consumption: 15 watts

Battery voltage

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

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

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

Alarm horn

Sound level: 90 dB at 30 cm

Physical

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

Temperature

-20 °C to +70 °C (-4 °F to +158 °F)

Humidity

10% to 95% RH (non-condensing)

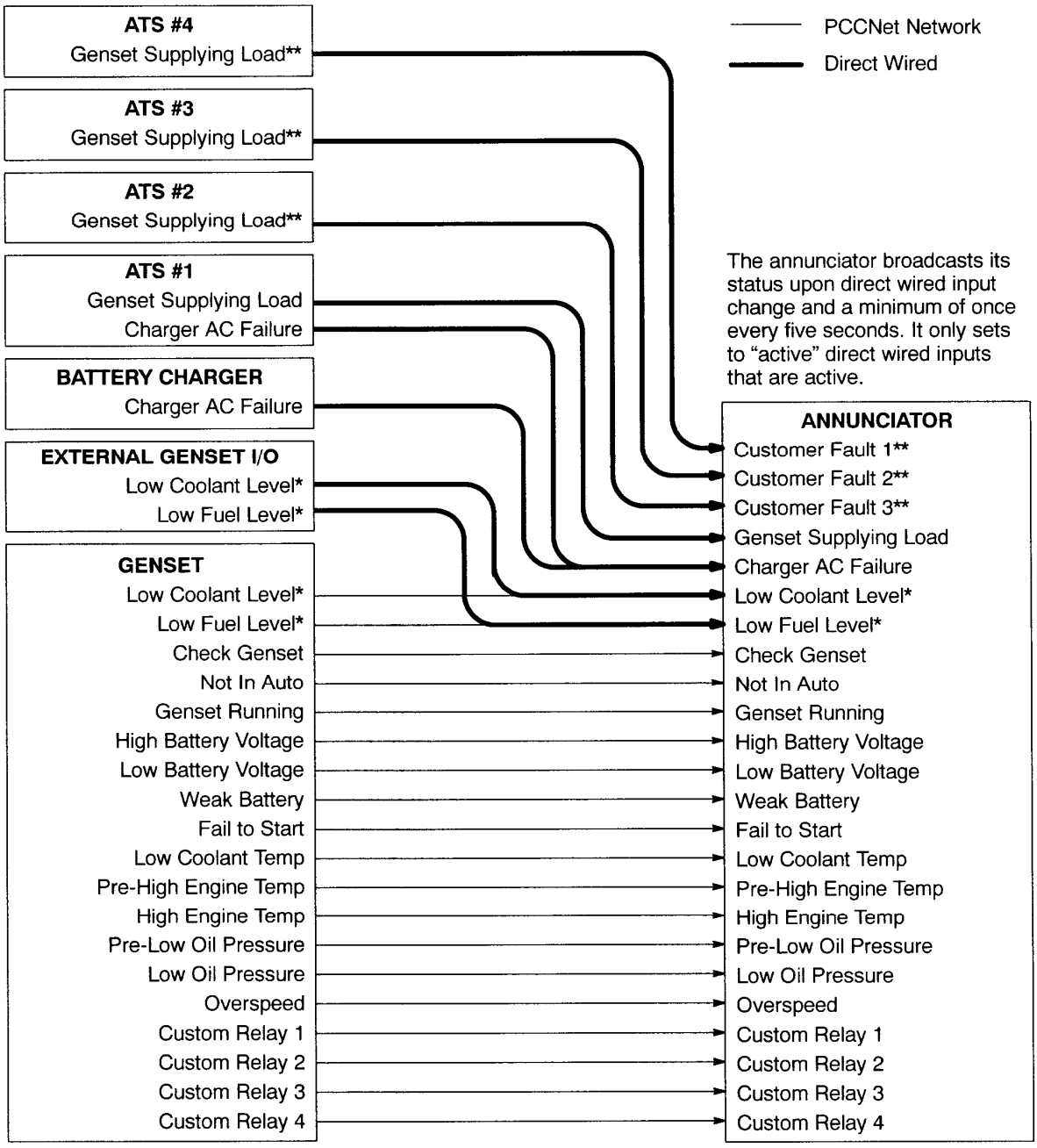
Default lamp configurations

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

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

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S-1472e (8/09)

Typical installation



* Low Coolant Level and Low Fuel Level statuses can be either direct wired from External Genset I/O or be part of the PCCNet network status coming from the genset. If direct wired, then the annunciator sets the appropriate bit for the genset to reference.

** These can be Genset Supplying Load 2 thru 4 or Customer Faults.

When enabled, High Battery Voltage, Low Battery Voltage, and Normal Battery Voltage takes precedence over the hardwired input.

Normal Battery voltage can replace Weak Battery.

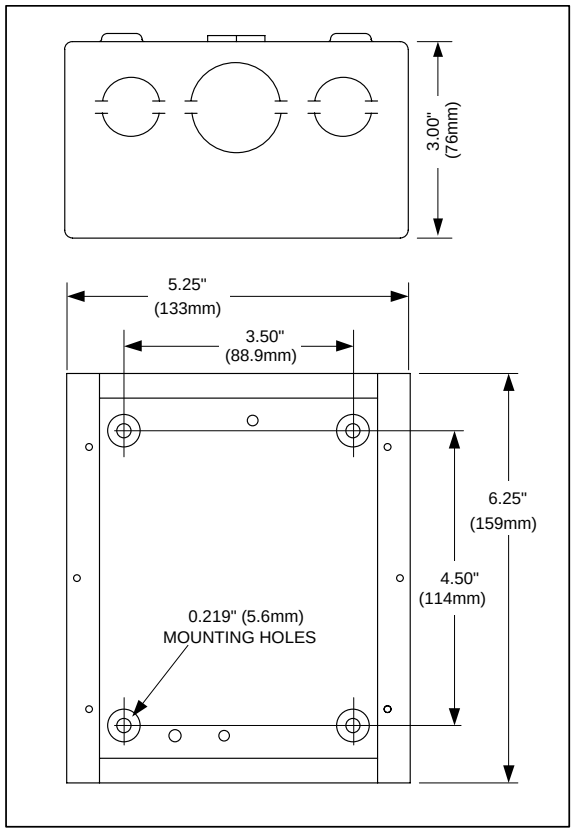
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S-1472e (8/09)

Cummins Power Generation

Dimensions



Dimensions: in (mm)

Ordering information

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

PCCNet COMPATIBLE

See your distributor for more information.

Cummins Power Generation

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

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

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

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S-1472e (8/09)

Cummins Power Generation

Drawings

RSN 1344261
PERMIT# 2018-1573853-LT

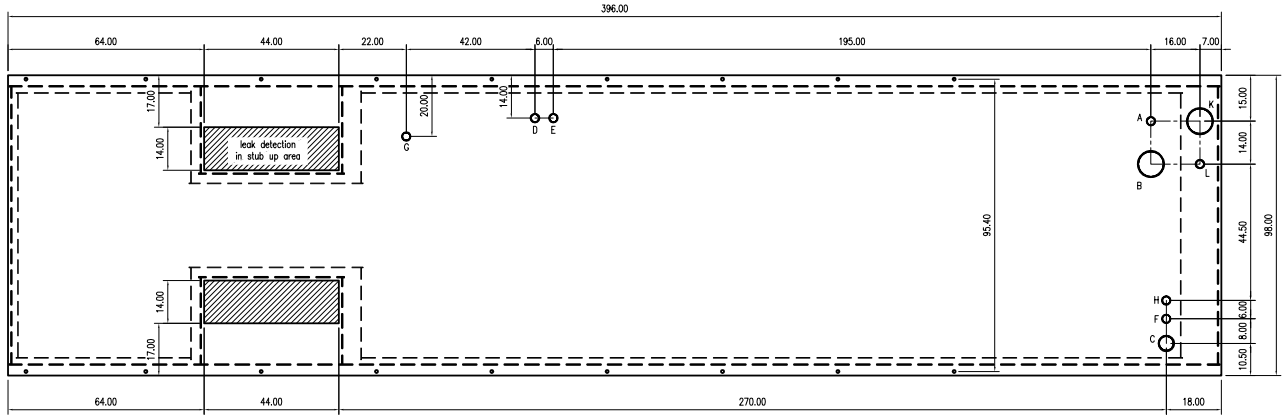
LISTED This drawing contains proprietary, confidential design data, which is the exclusive property of SST. Submission of this data does not convey the right to copy, sell, loan, distribute, or otherwise disclose said data without the prior written permission of SST.

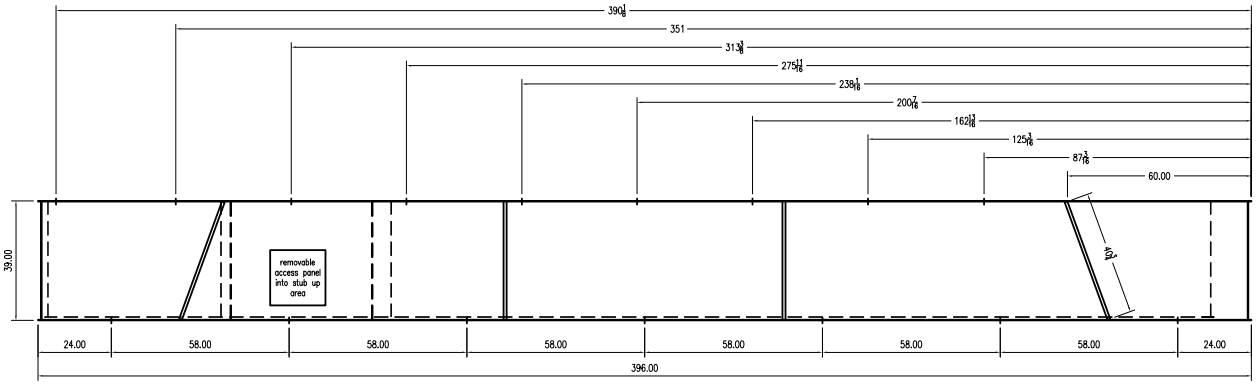
GENERAL NOTES:
1) TANK TO BE INSTALLED IN ACCORDANCE W/ AFFIXED LABELING. THE FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE, NFPA 30, AND ANY OTHER PREVAILING CODE.
2) THIS SUBBASE TANK IS DESIGNED TO SUPPORT A DIESEL ENGINE GENERATOR.
3) UL-2085 TANKS WILL TYP. HAVE A 3" FLANGE ON SIDES & UL-142 TANKS WILL TYP. HAVE A 3 1/2" FLANGE. ALL MOUNTING HOLES ON BOTTOM FLANGE TO BE 5/8" STRAIGHT HOLE UNLESS NOTED OTHERWISE.

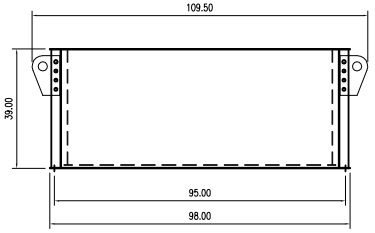
TANK CONSTRUCTION:
1) SIDE AND END CHANNELS ARE 3/16" STEEL
2) OUTER TANK TOP & BOTTOM IS 3/16" STEEL.
3) INNER TANK TOP IS 3/16" STEEL.
4) INTERNAL BRACING AND BOTTOM FLOOR SUPPORTS NOT SHOWN.
5) INTERIOR COATED WITH RUST INHIBITOR.
6) EXTERIOR PRIMED W/2-PART EPOXY AND FINISH PAINTED W/URETHANE.

TANK SPECIFICATIONS:
1) ENGINE TYPE: Diesel
2) GENSET WEIGHT: lbs (wet)
3) DOUBLE WALL SPECIFICATION
   ____ CLOSED TOP DIKED
   _X_ SECONDARY CONTAINMENT
   ____ PROTECTED SECONDARY CONTAINMENT
4) SUB-BASE TANK OPTIONS:
   _X_ LOW FUEL LEVEL SWITCH
   _X_ LIFTING RINGS
   _X_ HIGH FUEL LEVEL SWITCH
   _X_ FUEL IN BASIN SWITCH
   _X_ NORMAL VENT CAP
   _X_ EMERGENCY VENT CAP
   ____ REMOVABLE END CHANNEL
   _X_ 2" NPT LOCKABLE FILL CAP W/RISER
   TANK COMES STANDARD WITH A DIRECT READING MECHANICAL FUEL LEVEL GAUGE.

TANK FITTINGS:
A) 2" NPT PRIMARY ATMOSPHERIC VENT
B) 8" NPT PRIMARY EMERGENCY VENT FITTING PER NFPA 30
C) 4" NPT FUEL FILL FITTING
D) 2" NPT FOR REMOVABLE FUEL SUPPLY DIP TUBE
E) 2" NPT FOR REMOVABLE FUEL RETURN DIP TUBE
F) 2" NPT FUEL LEVEL GAUGE FITTING-ROCHESTER GAUGE
G) 2" NPT FOR OPTIONAL LOW FUEL LEVEL SWITCH
H) 2" NPT FOR SPARE FITTING
J) 2" NPT FOR LEAK DETECTION SWITCH (IN STUB UP AREA)
K) 8" NPT SECONDARY EMERGENCY VENT FITTING PER NFPA 30
L) 2" NPT SECONDARY ATMOSPHERIC VENT







Superior Systems & Technologies 274 County Rd 287 Merkel Tx 79536 325-690-0248 Fax: -4111		4750 Gallon UL142 Listed Sub-Base	P.O.#: ----	GENSET: 600 DQCA	NAME: ---- DATE: ----
DRAWN BY: F.Quitiveros	SCALE: NTS	CUSTOMER: CUMMINS ROCKY MOUNTAIN	WO #: ----	TANK WEIGHT: ---- LBS	☐ APPROVED AS IS: Manufacturing may proceed
DATE: 09-06-18	SHEET: 1 OF 1	JOB NAME: AURORA MEDICAL CENTER	QUOTE #: 06484 REV1	TANK COLOR: ----	☐ APPROVED WITH NOTED CHANGES: Resubmit drawing: manufacturing may proceed.
			REVISION: B	DRAWING #: SCGBT-4750-06484 REV1	☐ NOT APPROVED: Correct drawing as noted and resubmit for approval before manufacturing begins.

SUBMITTAL DRAWINGS

Tank Chart
06484 Rev1 Aurora Medical Center

Depth of Fuel (Inches)	Approx. Gallons
1	127
2	255
3	382
4	510
5	637
6	764
7	892
8	1019
9	1147
10	1274
11	1402
12	1529
13	1656
14	1784
15	1911
16	2039
17	2166
18	2293
19	2421
20	2548
21	2676
22	2803
23	2930
24	3058
25	3185
26	3313
27	3440
28	3567
29	3695
30	3822
31	3950
32	4077
33	4205
34	4332
35	4459
36	4587
37	4714
37 5/8	4794

Depth of Fuel (Inches)	Approx. Gallons

Depth of Fuel (Inches)	Approx. Gallons

Depth of Fuel (Inches)	Approx. Gallons

This chart is for approximation only. More accurate results will be obtained from a correctly callibrated dispenser.

Pro/ENGINEER

A034L228

FEATURE CODE F202,F205 OPTIONAL FEATURE CODE K074,K102

TABULATION

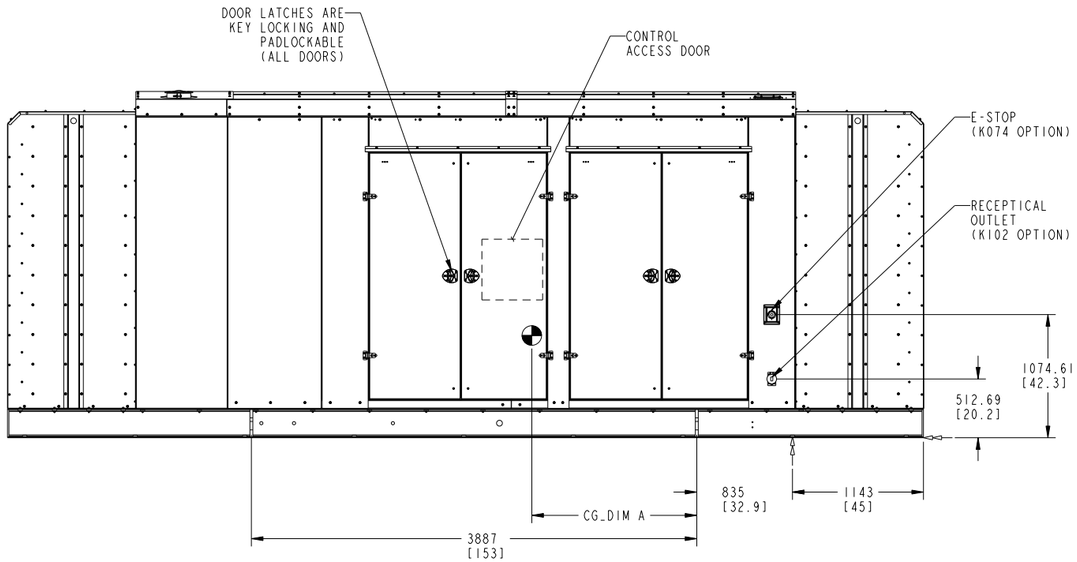
MODEL	GENERATOR	KW	STEEL ENCLOSURE WEIGHT KG (LBS) ±5%	ALUMINUM ENCLOSURE WEIGHT KG (LBS) ±5%	CG_DIM "A"	CG_DIM "B"	CG_DIM "C"	DIM_D ± 75 [3]
DQCA, DQCB DQCC	HC6G		12339 [27202]	10884 [23994]	2038 [80.2]	1244.7 [49]	846 [33.3]	1529 [60]
				11034 [24325]	2021 [79.6]		845 [33.3]	
	HC6J		12644 [27875]	11189 [24667]	2019 [79.5]		844 [33.2]	
	HC6K		12917 [28477]	11462 [25269]	2031 [80]		842 [33.1]	
DFGB, DFGE	HC5E		11373 [25074]	9918 [21866]	2199 [86.6]		1093 [43]	1490 [59]
	HC5F		11555 [25474]	10097 [22260]	2126 [83.7]		1057 [41.6]	
	HC6G		12008 [26474]	10553 [23266]	2080 [81.9]		1054 [41.5]	1599 [63]
	HC6H		12076 [26624]	10621 [23416]	2052 [80.8]		1054 [41.5]	
	HC6J		12371 [27274]	10916 [24066]	2020 [79.5]		1053 [41.5]	
DFHA, DFHB DFHC, DFHD DQFAA, DQFAB DQFAC, DQFAD	HC6G		12634 [27853]	11179 [24645]	2065 [81.3]		794 [31.3]	1570 [62]
	HC6H		12872 [28377]	11417 [25169]	2041 [80.4]		791 [31.1]	
	HC6J		13095 [28869]	11640 [25661]	2017 [79.4]		788 [31]	
	HC6K		13170 [29034]	11715 [25826]	2009 [79.1]		787 [31]	
	P7B		13256 [29224]	11801 [26016]	1960 [77.2]		786 [30.9]	1698 [67]
	P7C		13514 [29794]	12059 [26586]	1945 [76.6]		784 [30.9]	
DQPAA, DQPAB	HC5F		11101 [24474]	9646 [21266]	2043 [80.4]		827 [32.6]	1438 [56.6]
	HC6G		11173 [24632]	9718 [21425]	2059 [81.1]		826 [32.5]	
	HC6H		11411 [25157]	9956 [21949]	2081 [81.9]		823 [32.4]	

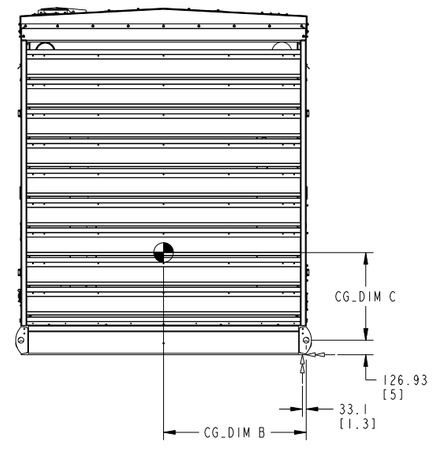
*** WEIGHT & CG'S ARE SHOWN WITH F202 STEEL ENCLOSURE, AND STANDARD WET GENSET. ADDITION OF OTHER FEATURES MAY CHANGE THE WEIGHT.

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-133125	C	1	ADD DQPAA,DQPAB INFO TO TABULATION	CJF	KK	K KISHORE	12MAR13
		2	SEE SHEET 2	CJF	KK	K KISHORE	12MAR13
		3	SEE SHEET 2	CJF	KK	K KISHORE	12MAR13
		4	SEE SHEET 2	CJF	KK	K KISHORE	12MAR13
		5	SEE SHEET 2	CJF	KK	K KISHORE	12MAR13
		6	TITLE "OUTLINE,ENCLOSURE" WAS "ENCLOSURE_OUTLINE"	CJF	KK	K KISHORE	12MAR13

NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE INCHES.
2. FOUNDATION REFERENCE POINT (⟜). SEE FOUNDATION DRAWING FOR DETAILS.





UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM: X ± 3; .X ± 0.8; .XX± 0.38

HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13

ANG TOL: ± 1.0° SCALE: 3/64

SIM TO 0500-4147

DO NOT SCALE PRINT

- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN D_CARPENTER
CKD Z_MOGES
APVD Z_MOGES
DATE 23JUL10
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON DQCA

SITE CODE PGF

CUMMINS POWER GENERATION

OUTLINE, ENCLOSURE (LEVEL 2)

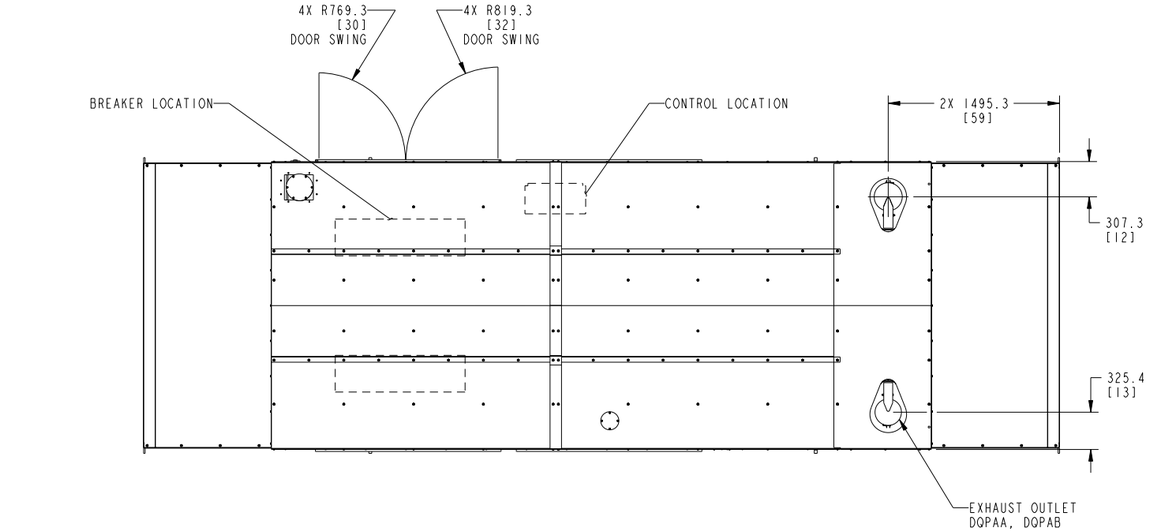
SIZE D | A034L228 | SHEET 1 OF 2 | REV C

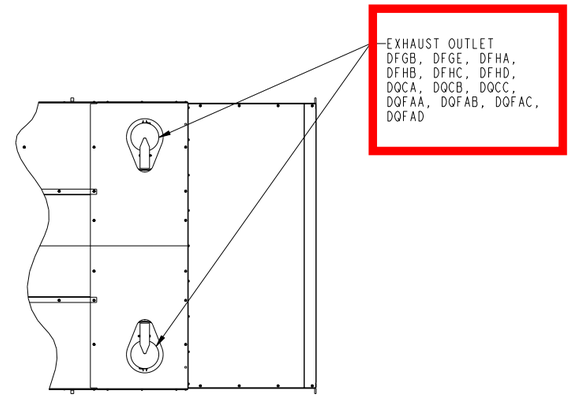
Drawing Name: A034L229 Revision: C
Part Name: A034L228 Revision: C
Sheet 1 of 3

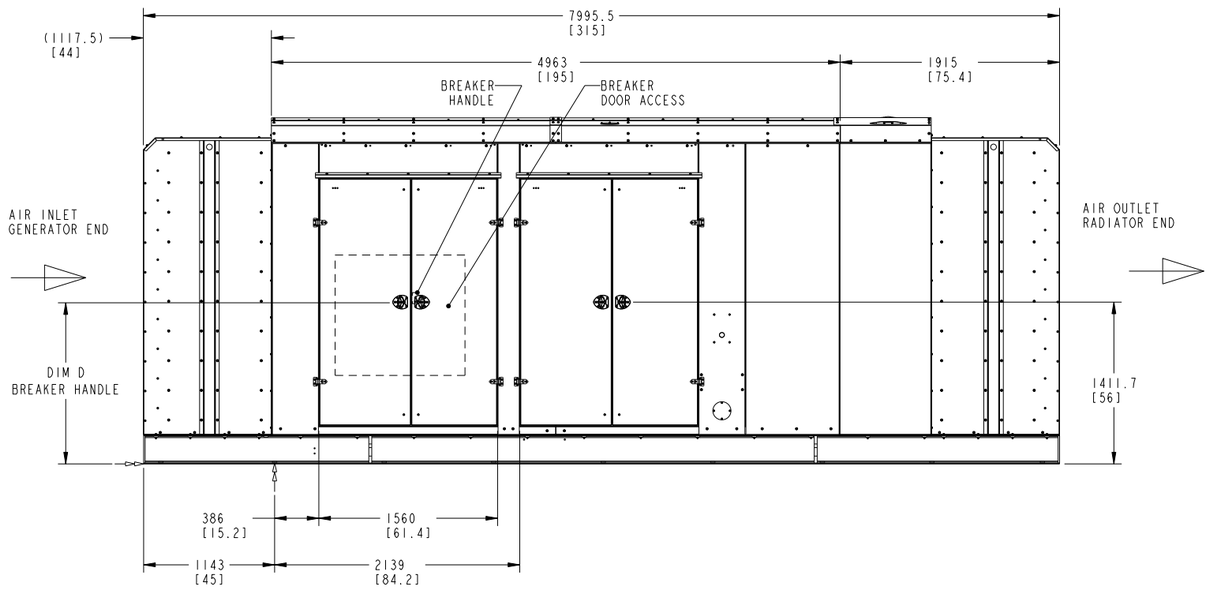
Pro/ENGINEER

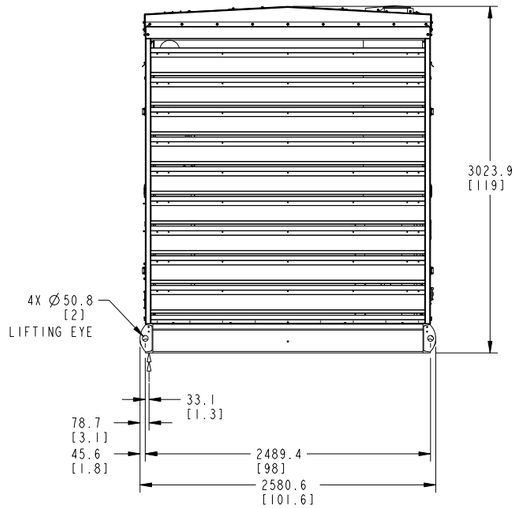
A034L228

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-133125	C	2	EXHAUST---DQPAB WAS EXHAUST---DQMAA	CJF	KK	K KISHORE	12MAR13
		3	RMV DQMAA FROM EXHAUST---DQPAB	CJF	KK	K KISHORE	12MAR13
		4	EXHAUST---DQFAD WAS EXHAUST---DQCC	CJF	KK	K KISHORE	12MAR13
		5	ADD DIMS 2X 1495.3 [59], 307.3 [12], 325.4 [13]	CJF	KK	K KISHORE	12MAR13









UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO 0500-4147	DWN D_CARPENTER		CUMMINS POWER GENERATION
DIM: X ±3; .X ±0.8; .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD Z_MOGES		OUTLINE, ENCLOSURE (LEVEL 2)
			APVD Z_MOGES	SITE CODE	
ANG TOL: ± 1.0°	SCALE: 3/64	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	DATE 23JUL10	PGF	SIZE D — A034L228 — SHEET 2 of 2 — DRG REV C
			FOR INTERPRETATION OF DIMENSION AND TOLERANCES SEE ASME Y14.5M-1994 — FIRST USED ON DQCA		

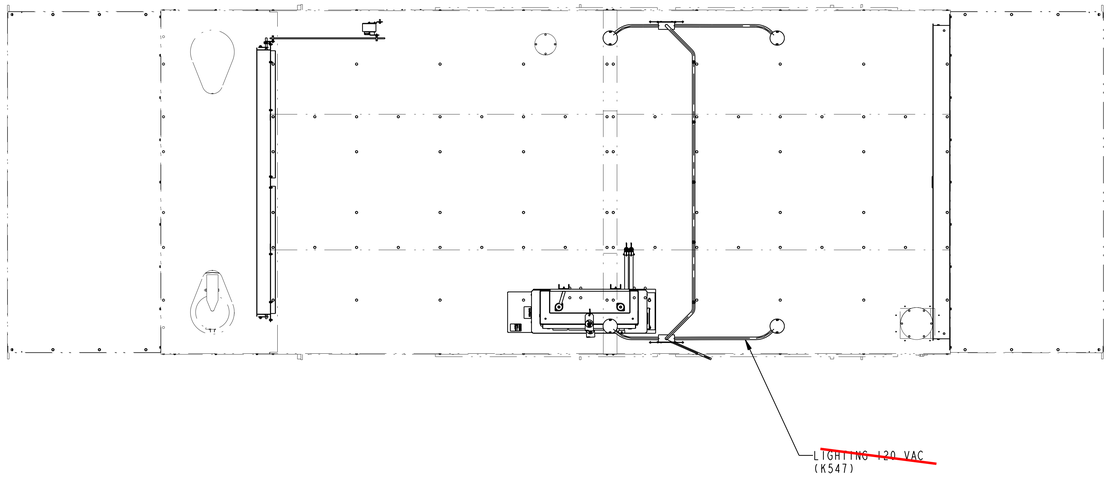
RSN 13444261
PERMIT# 2016-1573853-LT

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-153776	A	1	PRODUCTION_RELEASE	JNR	PWB	P.BAKER	17JUL15

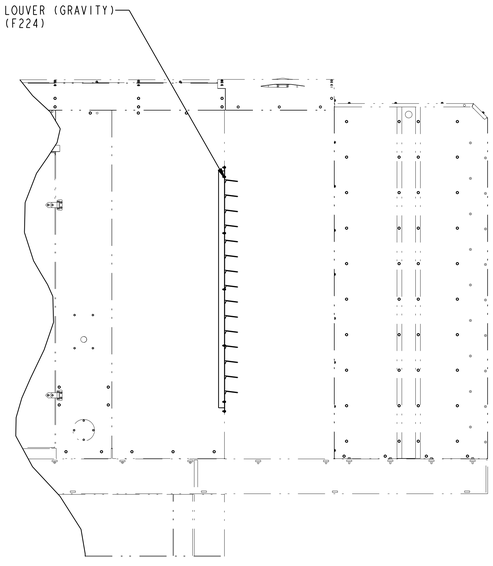
MODEL/FEATURE TABLE, FOR REFERENCE ONLY

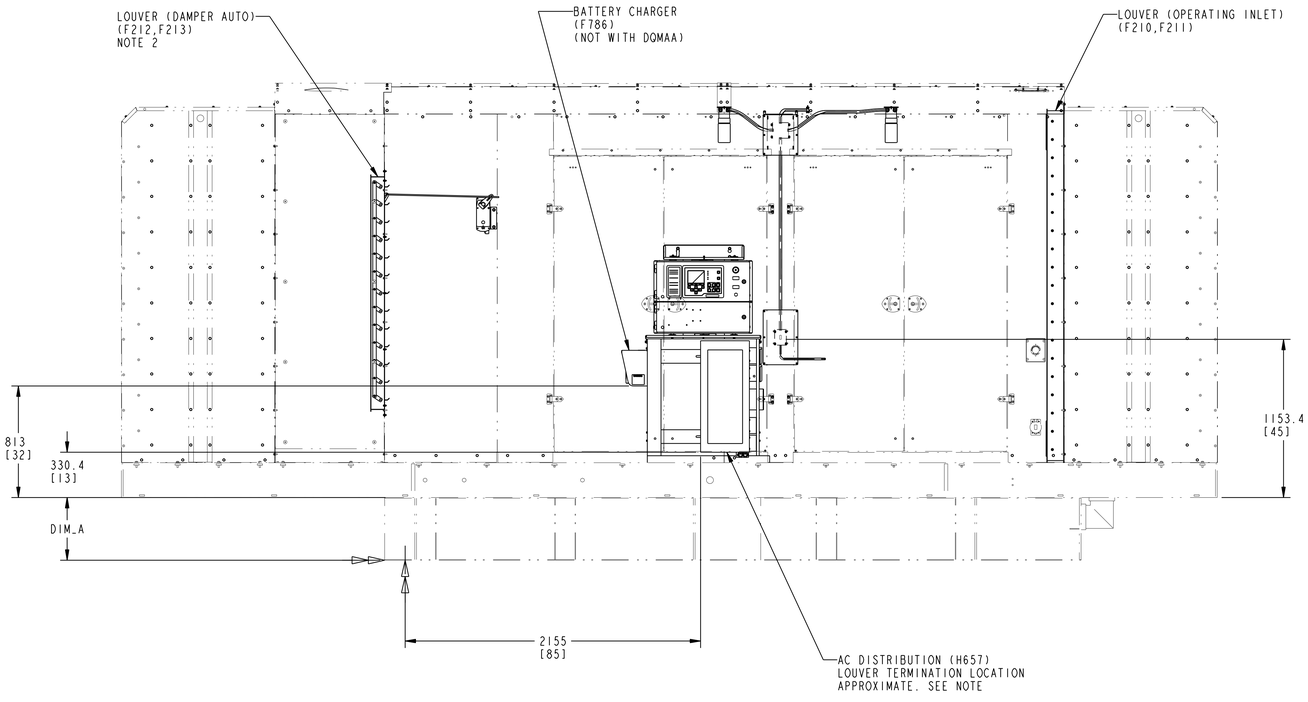
USE WITH MODELS	ENCLOSURE FEATURE CODE	FUEL TANK		DIM_A
		FEATURE CODE	CAPACITY GALLONS	
DFGB,GE DFHA,HB,HC,HD DQCA,CB,CC DQMAA DQFAA,AB.AC.AD	NO FUEL TANK	---	---	---
	F200, F203 (WEATHER) F201, F204 (QUITE SIDE 1) F202, F205 (QUITE SIDE 2)	C249	200	355.6 [14]
		C205	660	
		C250	1000	457.2 [18]
		C251	1500	584.2 [23]
		C252	2000	
		C253	2400	



NOTES:

1. WITH AN AC DISTRIBUTION PANEL (H657) THE MOTORIZED LOUVERS ARE PREWIRED. WITHOUT AN AC DISTRIBUTION PANEL, 18GA WIRING FOR MOTORIZED LOUVERS IS TERMINATED IN THE AC DISTRIBUTION PANEL LOCATION.
2. DIMENSION IN [ ] ARE INCHES.
3. SEE FOUNDATION DRAWING FOR REFERENCE POINT LOCATION (
4. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.





UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X	± 1	0.00- 4.99	+0.15/-0.08
.X	± 0.8	5.00- 9.99	+0.20/-0.10
.XX	± 0.38	10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL: ± 1.0° | SCALE: 1/16

SIM TO 0500-4203

DO NOT SCALE PRINT

- CONFIDENTIAL -
PROPERTY OF CUMMINS POWER GENERATION GROUP

DRN	J.ROBINSON
CKD	P.BAKER
APVD	P.BAKER
DATE	17JUL15

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994

FIRST USED ON: DQCA

CUMMINS POWER GENERATION

OUTLINE,GENSET
OPTIONS

SITE CODE: PGF

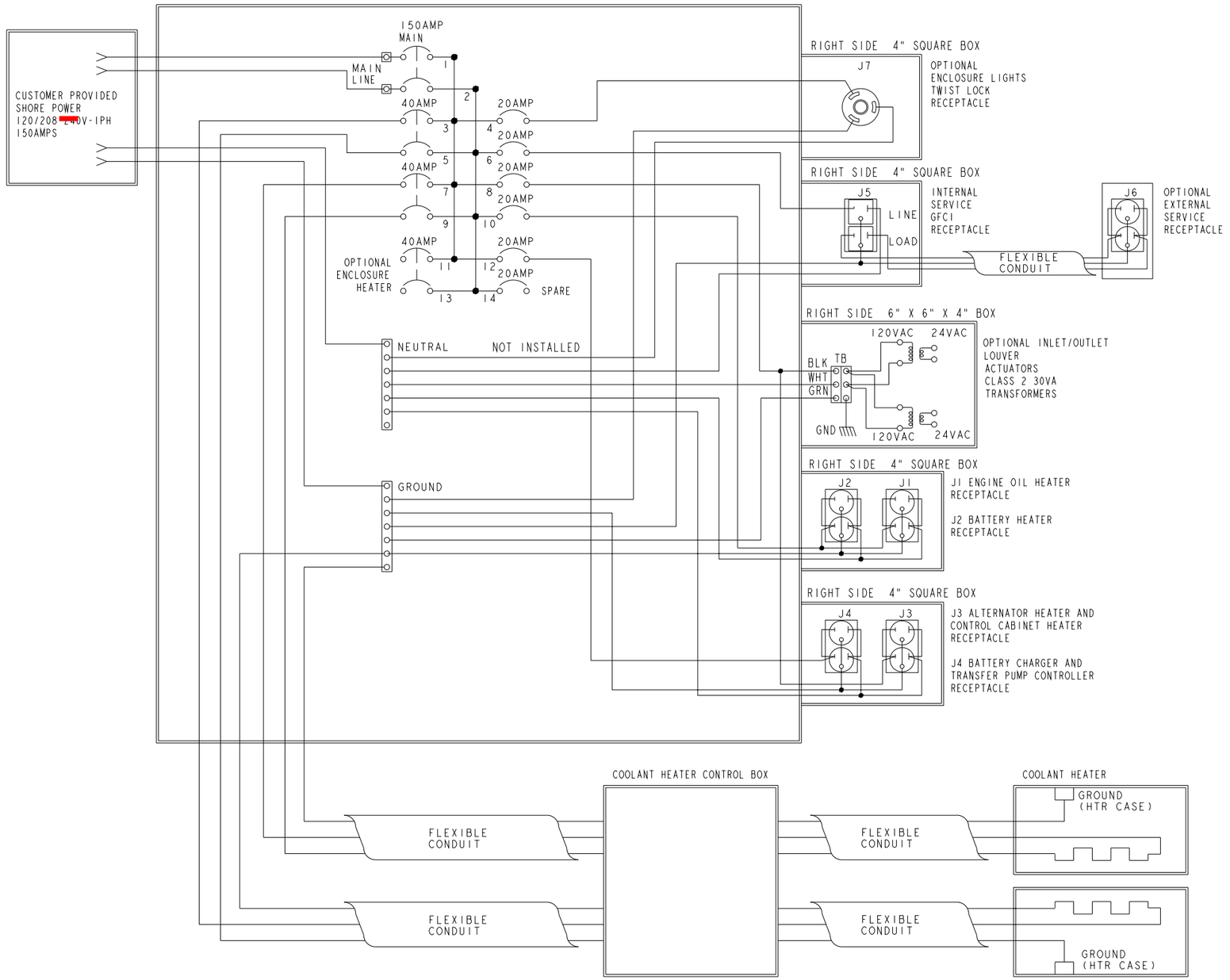
SIZE: E | A053G071 | SHEET 1 OF 1 | REV A

0320-2281 was exported on: Nov 30 2005 and is an Un-Controlled Document

0320_2281	D	Pro/ENGINEER	METRIC DWG

AC DISTRIBUTION PANEL

REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
FRD22835	A	1	PRODUCTION_RELEASE	-	BMM	RC	RC	01-25-05



TABULATION-LABEL LIST		
FROM	TO	DESCRIPTION-LABEL
CB1	CUSTOMER POWER SUPPLY	MAIN BREAKER
CB2		
CB3	ENGINE COOLANT HEATER	COOLANT HEATER
CB5		
CB7	ENGINE COOLANT HEATER	COOLANT HEATER
CB9		
CB11	ENCLOSURE HEATER	OPTIONAL ENCLOSURE HEATER
CB13		
CB4	J7	OPTIONAL ENCLOSURE LIGHTS
CB6	J5	SERVICE RECEPTACLES
	J6	
CB8	J3	J3: ALTERNATOR AND CONTROL CABINET HEATER/OPTIONAL LOUVER ACTUATORS
	LOUVER 120/24 VAC TX	
CB10	J1	ENGINE OIL HEATER
	J2	BATTERY HEATER
CB12	J4	BATTERY CHARGER AND TRANSFER PUMP CONTROL
CB14	SPARE	SPARE

DO NOT SCALE PRINT

ANG TOL± 1.0 °

DRAWN TO 1/4 SCALE OF

TOLERANCE UNLESS OTHERWISE SPECIFIED

DIM	mm	inch
	X ± 1	.X ±
	.X ± 0.8	.XX ±
	.XX ± 0.38	.XXX±
MOLE	0.00-4.99 ±0.15/-0.08	.000-.200 +.006/-.003
	5.00-9.99 ±0.20/-0.10	.201-.421 +.008/-.004
	10.00-17.49 ±0.25/-0.13	.422-.703 +.010/-.005
	17.50-24.99 ±0.38/-0.13	.704-.999 +.012/-.005

SIM TO .

COPIED FROM .

THIRD ANGLE PROJECTION

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FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ANSI Y14.5M-1982

MODEL FIRST USED ON DFHD

ITEM	PART NO	QTY SIZE	DESCRIPTION OR MATERIAL	REF DES

NAME		DATE
DR	MCLAUGHLIN	01-25-05
CHKR ☐ MFG ☐	R_CHANGELA	01-25-05
APPROVED	R_CHANGELA	01-25-05

SITE CODE PGA

CUMMINS POWER GENERATION
1400 73RD AVE NE
MINNEAPOLIS, MINNESOTA 55432

TITLE: CIRCUIT_BREAKER_ASSY (AC_DIST)

DRG NO 0320_2281 | SHEET 2 of 2 | DRG SIZE D

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

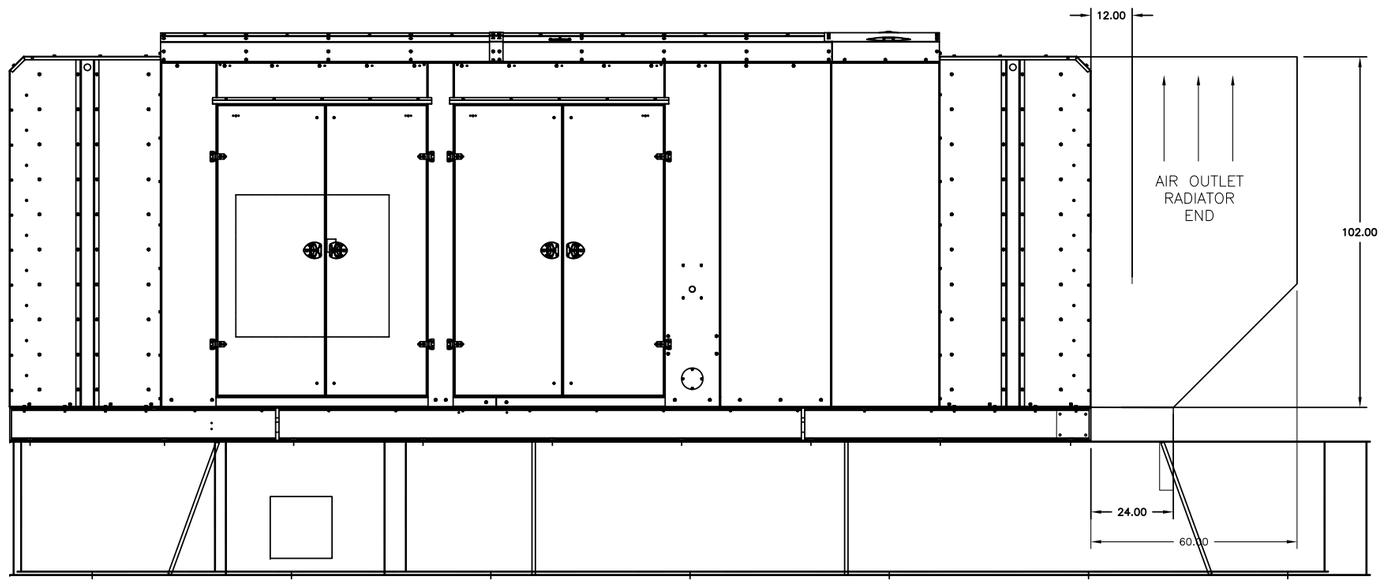
TOLERANCES:
FRACTIONAL: 1/4
.X: .06
.XX: .03
.XXX: .01
ANGLES: .5°

REFERENCES

PREP. BY:
CHKD BY:
MODIFIED BY: –

FINISH: N/A

ENGINE FAMILY:



NOTE: SUGGESTED SERVICE ACCESS CLEARANCE 5 FEET.
ENCLOSURE INLET AIR FLOW SHALL BE UNOBSTRUCTED.
RADIATOR DISCHARGE AIR FLOW SHALL BE UNOBSTRUCTED.

Rocky Mountain
8211 E 96th AVE
HENDERSON, COLORADO 80640
PH: 303-287-0201
FAX: 303-287-4837

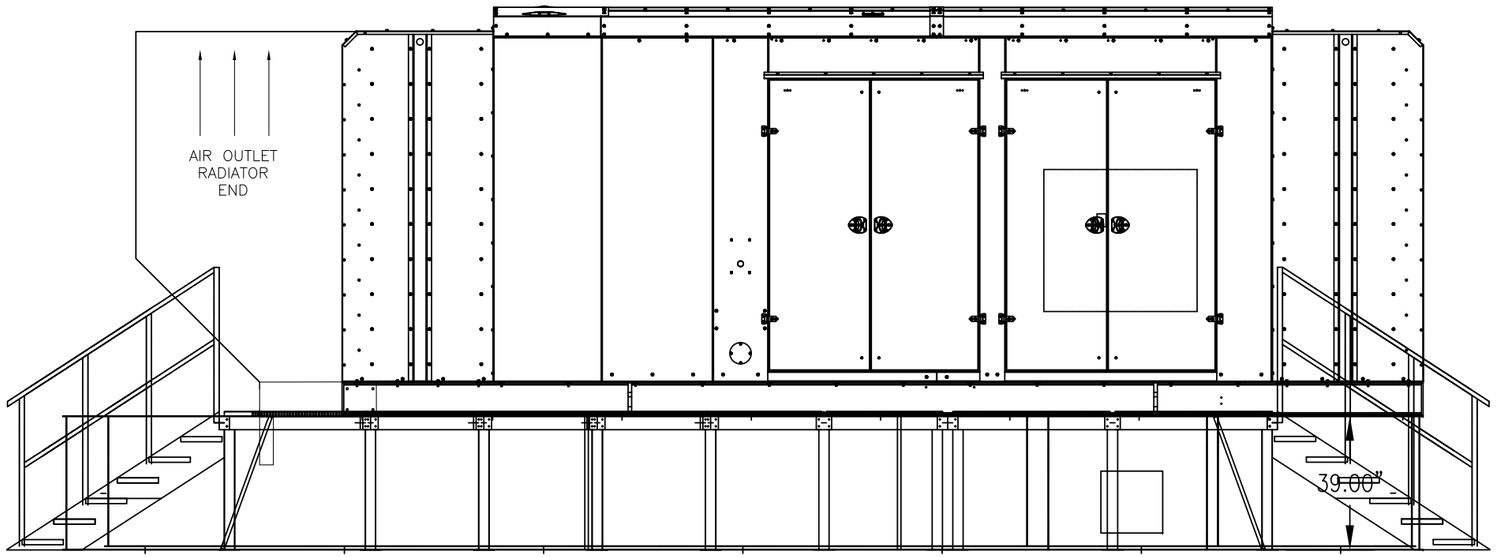
SITE NAME: –	CONTACT NAME: –	CUSTOMER PROJECT NO: –
CONTRACTOR NAME:	CONTACT NO: –	CRM PROJECT NO:

TITLE: DQCA – 600 KW GENERATOR SET
F202 SA ENCLOSURE

SIZE: C | DWG NO: | REV A

SCALE: NONE | DO NOT SCALE PRINT | SHEET 1 OF 4

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL: 1/4
.X: .06
.XX: .03
.XXX: .01
ANGLES: .5°

REFERENCES

PREP. BY:
CHKD BY:
MODIFIED BY:

FINISH: N/A

ENGINE FAMILY:

Cummins Rocky Mountain
8211 E 96th AVE
HENDERSON, COLORADO 80640
PH: 303-287-0201
FAX: 303-287-4837

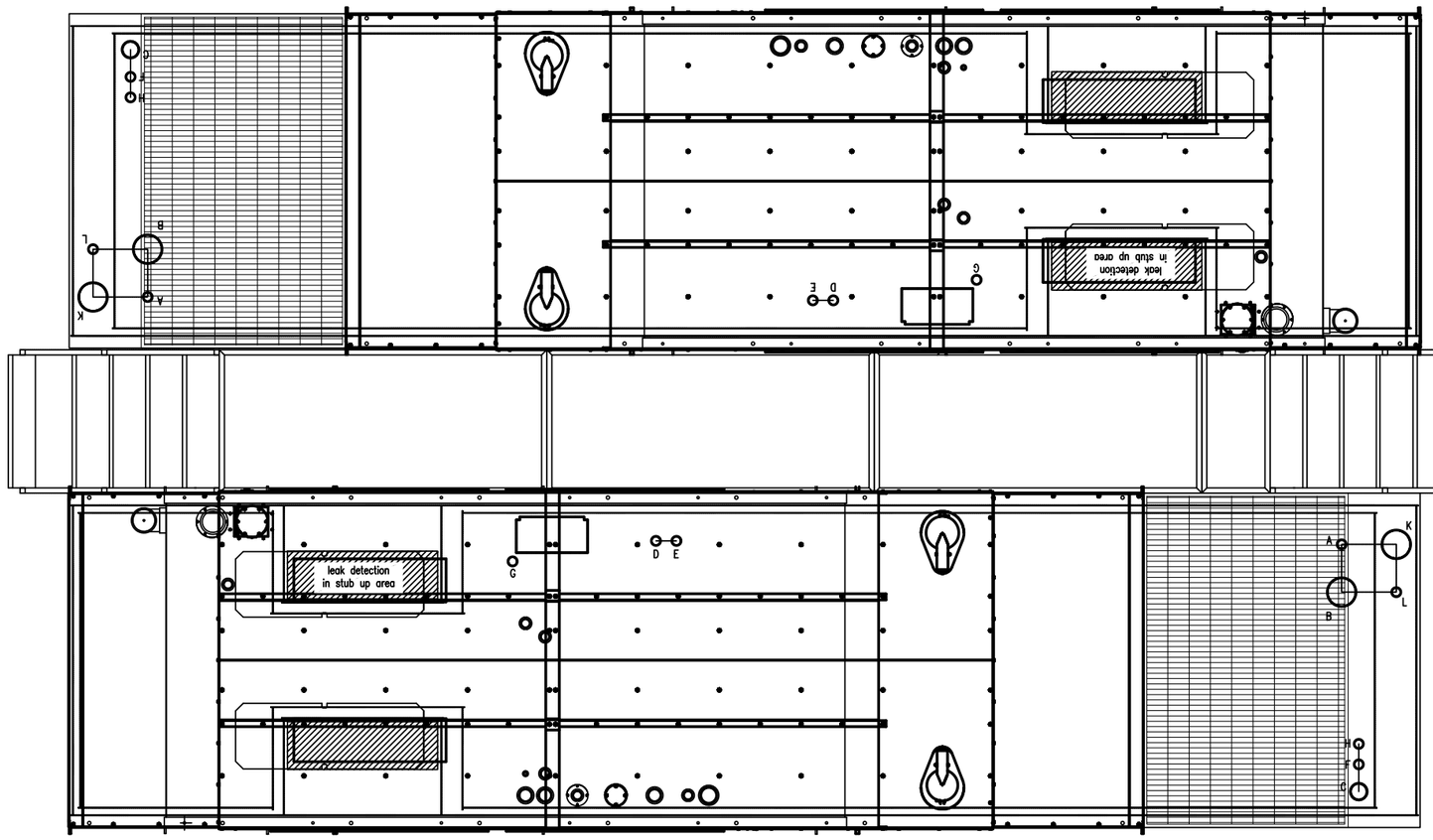
SITE NAME:	CONTACT NAME:	CUSTOMER PROJECT NO:
CONTRACTOR NAME:	CONTACT NO:	CRM PROJECT NO:

TITLE: DQCA – 600 KW GENERATOR SET
Stairs and Platform

SIZE: C | DWG NO: | REV A

SCALE: NONE | DO NOT SCALE PRINT | SHEET 3 OF 4

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL: 1/4
.X: .06
.XX: .03
.XXX: .01
ANGLES: .5°

REFERENCES

PREP. BY:
CHKD BY:
MODIFIED BY:

FINISH: N/A

ENGINE FAMILY:

Cummins Rocky Mountain
8211 E 96th AVE
HENDERSON, COLORADO 80640
PH: 303-287-0201
FAX: 303-287-4837

SITE NAME:	CONTACT NAME:	CUSTOMER PROJECT NO:	TITLE: DQCA – 600 KW GENERATOR SET Stairs and Platform
CONTRACTOR NAME:	CONTACT NO:	CRM PROJECT NO:	SIZE: C · DWG NO: · REV A
			SCALE: NONE · DO NOT SCALE PRINT · SHEET 3 OF 4

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

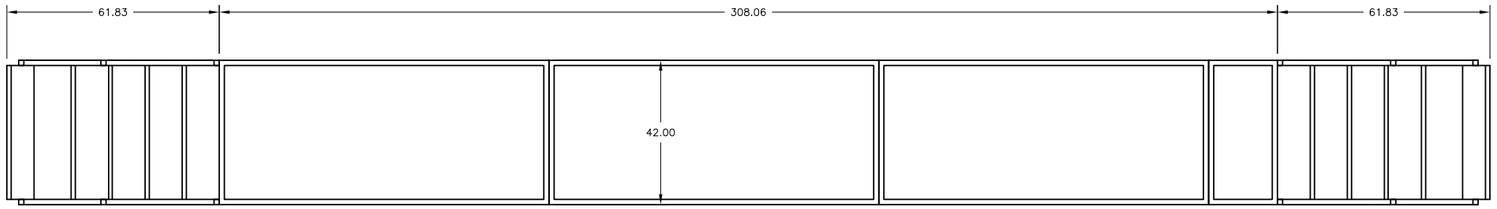
TOLERANCES:
FRACTIONAL: 1/4
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.XXX: .01
ANGLES: .5°

REFERENCES

PREP. BY:
CHKD BY:
MODIFIED BY:

FINISH: N/A

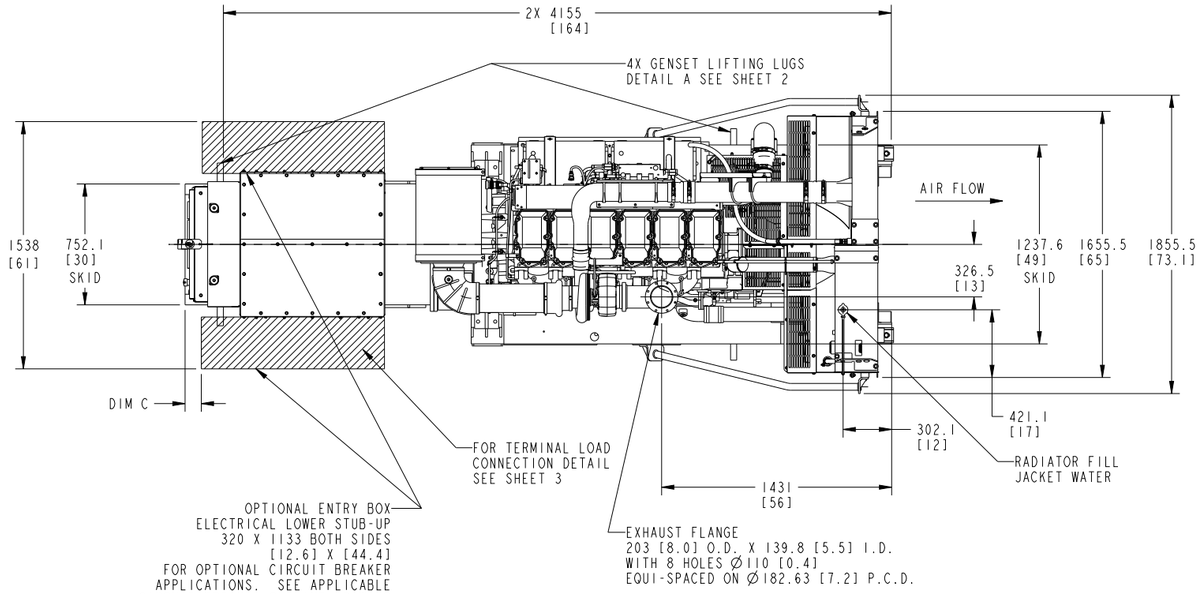
ENGINE FAMILY:



Cummins **Rocky Mountain** 8211 E 96th AVE HENDERSON, COLORADO 80640 PH: 303-287-0201 FAX: 303-287-4837	SITE NAME:	CONTACT NAME:	CUSTOMER PROJECT NO:	TITLE: DQCA – 600 KW GENERATOR SET Stairs and Platform
	CONTRACTOR NAME:	CONTACT NO:	CRM PROJECT NO:	SIZE: C DWG NO: REV A SCALE: NONE DO NOT SCALE PRINT SHEET 3 OF 4

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-169490	C	1	ZONE C-4: ADD DIM 1431 [56]	CJF	MW	K KISHORE	16MAY17
		2	ZONE C-4: 302.1 [12] WAS 299.9 [12]	CJF	MW	K KISHORE	16MAY17



NOTES:

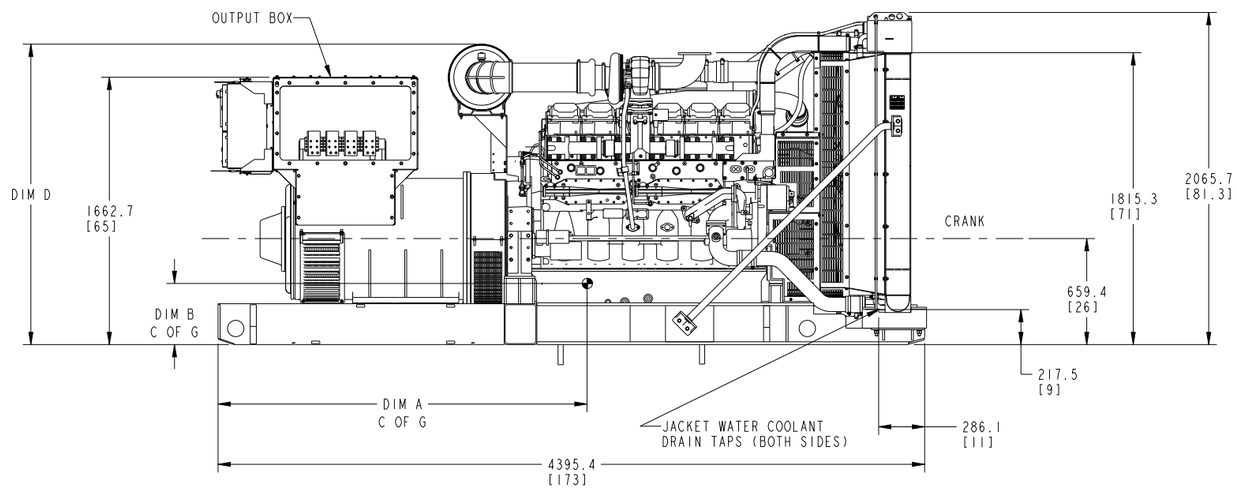
1. DIMENSIONS SHOWN IN [ ] BRACKETS ARE INCHES.
2. FUEL INLET HOSE-1650 [65] LONG WITH 1"-11.5 NPT EXTERNAL FITTING.
3. FUEL RETURN HOSE-2000 [79] LONG WITH 1"-11.5 NPT EXTERNAL FITTING.
4. GENSET SHIPPED FILLED WITH ENGINE OIL.
5. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.

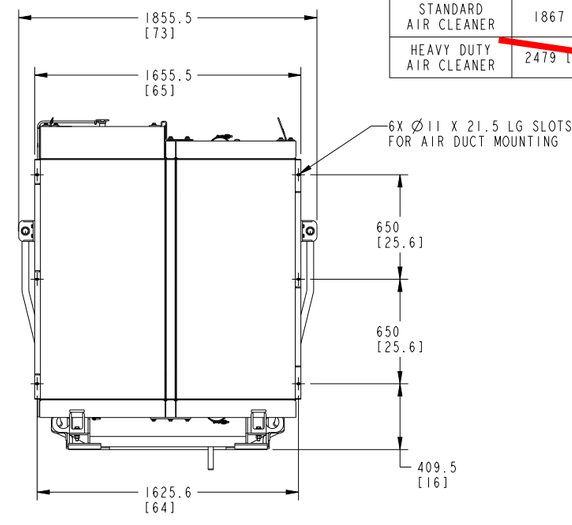
C OF G AND WEIGHT TABLE, FOR REFERENCE ONLY

GEN FRAME SIZE	DIM A C OF G	DIM B C OF G	DIM C	GENSET WT W/O COOLANT		GENSET WT W/COOLANT	
				KGS	LBS	KGS	LBS
HC6G	2031 [80]	764 [30.1]	109	6075	13395	6337	13973
HC6J	2038 [80.2]	764 [30.1]	109	6380	14068	6642	14645
HC6K	2112 [83.2]	758 [29.9]	109	6653	14670	6915	15247

AIR CLEANER REFERENCE TABLE

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





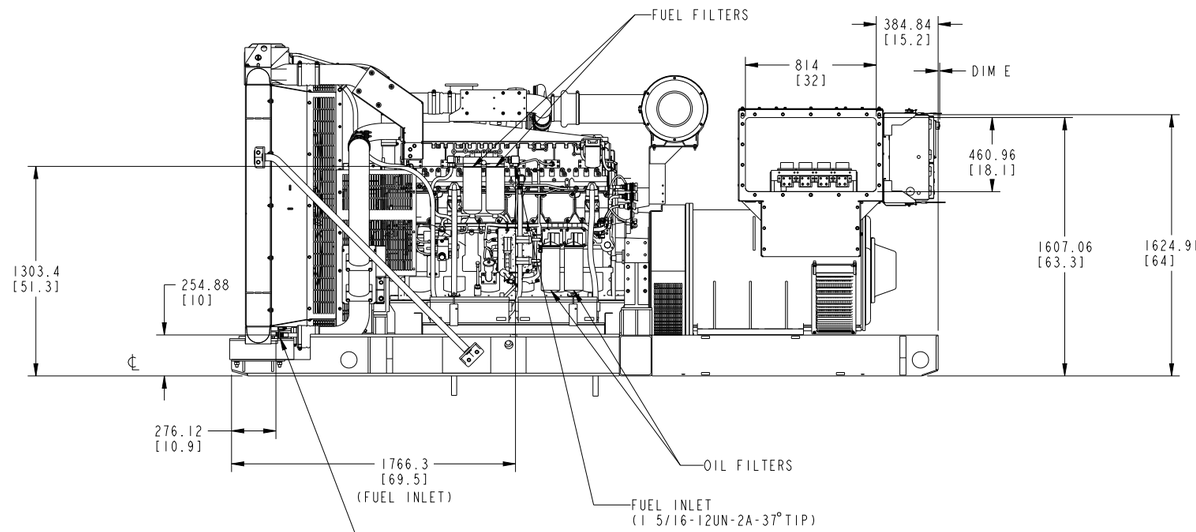
RADIATOR END VIEW

ALTERNATOR MOUNTED CONTROL/NON-SEISMIC COOLING PACKAGE

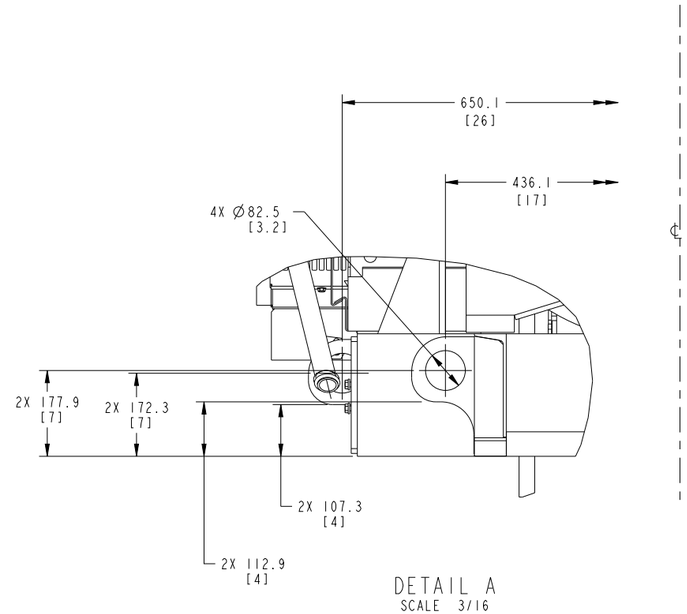
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO A045X135	DWN J.ROBINSON		CUMMINS POWER GENERATION
DIM X ±1, .X ±0.8, .XX± 0.38 / HOLE 0.00-4.99 +0.15/-0.08, 5.00-9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD J.BRODY		OUTLINE, GENSET (ALT MNT CNTRL, NON-SEISMIC COOLING)
			APVD J.BRODY		
			DATE 08DEC15	SITE CODE	
ANG TOL ± 1.0°	SCALE 1/16	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON DQCA,B,C	PGF	DWG SIZE D A054H775	CAD SHEET 1 of 3

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-169490	C	--	-----	CJF	MW	K KISHORE	16MAY17



DISTANCE TO E-STOP	
GEN FRAME SIZE	DIM E
HC6G,H,J	9.87 [0.39]
HC6K	110.87 [4.36]



DETAIL A
SCALE 3/16

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			SIM TO A045X135	DWN J.ROBINSON		CUMMINS POWER GENERATION
DIM X ±1 .X ±0.8 .XX± 0.38	HOLE 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD J.BRODY		
				APVD J.BRODY		OUTLINE,GENSET
				DATE 08DEC15		(ALT MNT CNTRL, NON-SEISMIC COOLING)
ANG TOL ± 1.0°	SCALE 1/16	THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON DQCA,B,C	SITE CODE PGF	DWG SIZE D A054H775	CAD SHEET 2 of 3

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-158588	A	1	PRODUCTION RELEASE	JNR	JCB	J.BRODY	14JAN16

NOTES:

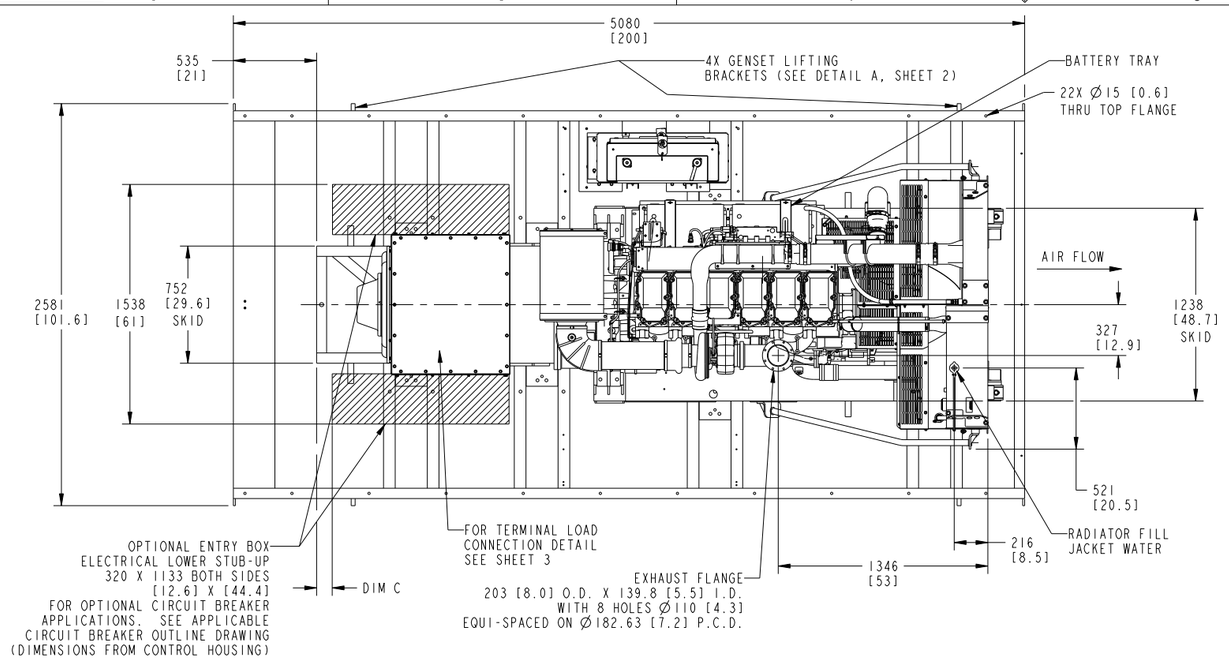
1. DIMENSIONS SHOWN IN [ ] BRACKETS ARE IN INCHES.
2. FUEL INLET HOSE-1650 [65] LONG WITH 1"-11.5 NPT EXTERNAL FITTING.
3. FUEL RETURN HOSE ROUTING SHOWN FOR REFERENCE ONLY. FUEL RETURN HOSE ONE END INSTALLED TO RADIATOR AND OPEN END TIE-WRAPPED AT FACTORY BEFORE SHIPPING. CONNECT OPEN END OF THE HOSE TO TANK DURING FIELD INSTALLATION. HOSE DETAILS REFER SHEET 2.
4. GENSET SHIPPED FILLED WITH ENGINE OIL.

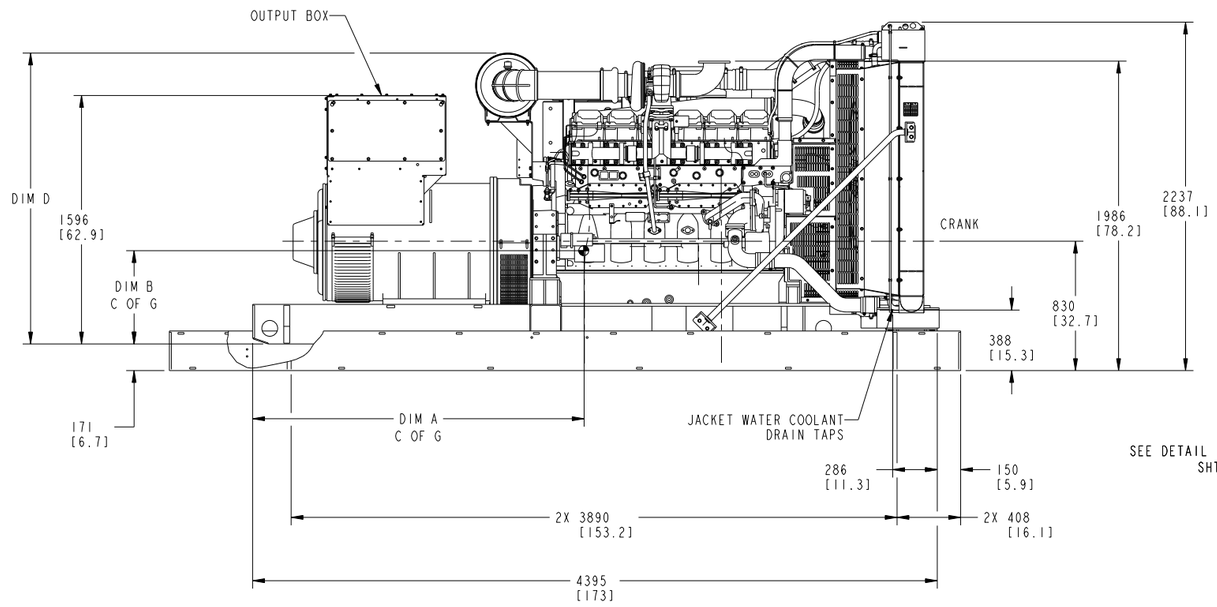
TABULATION

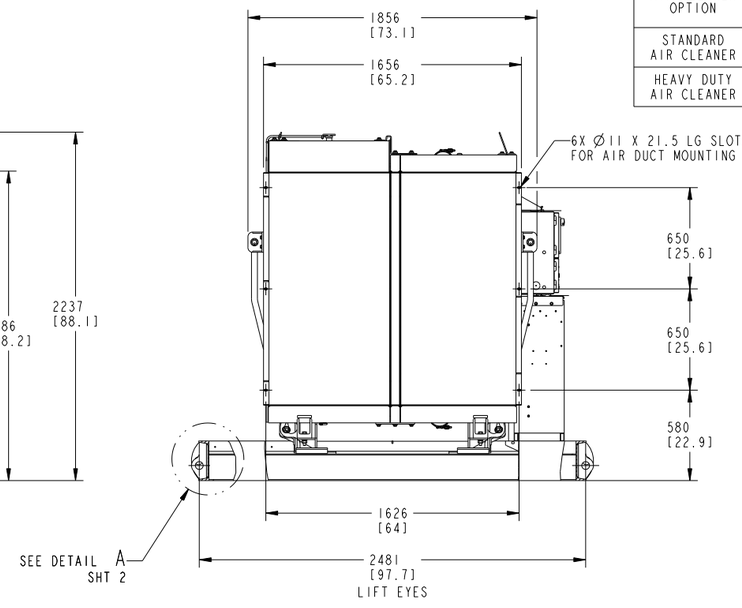
GEN FRAME SIZE	DIM A C OF G	DIM B C OF G	DIM C	GENSET WT W/O COOLANT KGS	GENSET WT W/O COOLANT LBS	GENSET WT W/COOLANT KGS	GENSET WT W/COOLANT LBS
HC6G	2024 [80]	669 [26]	109	6877	15161	7139	15739
HC6H	2053 [81]	668 [26]	109	7027	15492	7289	16070
HC6J	2030 [80]	673 [27]	109	7182	15834	7444	16411
HC6K	2096 [83]	671 [26]	109	7455	16436	7717	17013

TABULATION

AIR CLEANER OPTION	DIM D HEIGHT
STANDARD AIR CLEANER	1867 [74]
HEAVY DUTY AIR CLEANER	2480 [98]







RADIATOR END VIEW

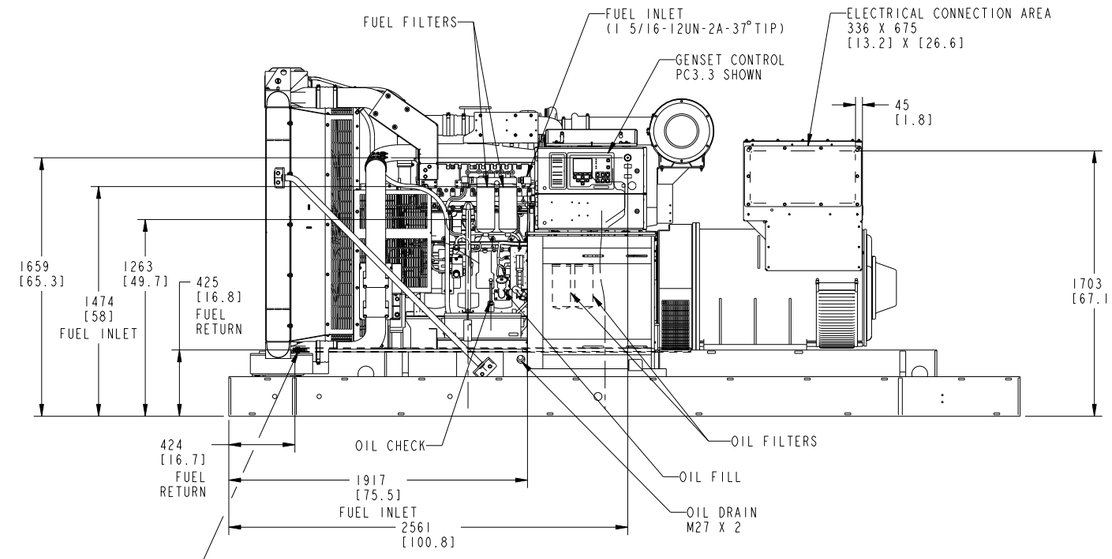
PEDESTAL MOUNTED CONTROL/NON-SEISMIC COOLING PACKAGE

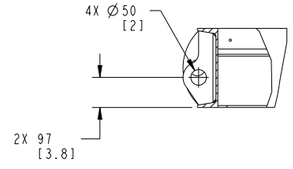
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO A048N135	DWN J.ROBINSON	CUMMINS POWER GENERATION
DIM: X ±1; .X ±0.8; .XX± 0.38	HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD J.BRODY APVD J.BRODY DATE 14JAN16	SITE CODE PGF
ANG TOL ± 1.0°	SCALE 1/16	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING PER ASME Y14.5-2009	FIRST USED ON DQCA,CB,CC	OUTLINE,GENSET (PED MNT, NON-SEISMIC COOLING)
				SIZE D — DWG A054M845 — CAD SHEET 1 OF 7

Drawing Name: A054M846 Revision: A
Part Name: A054M845 Revision: A
Sheet 1 of 8

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-158588	A	1	PRODUCTION RELEASE	JNR	JCB	J.BRODY	14JAN16





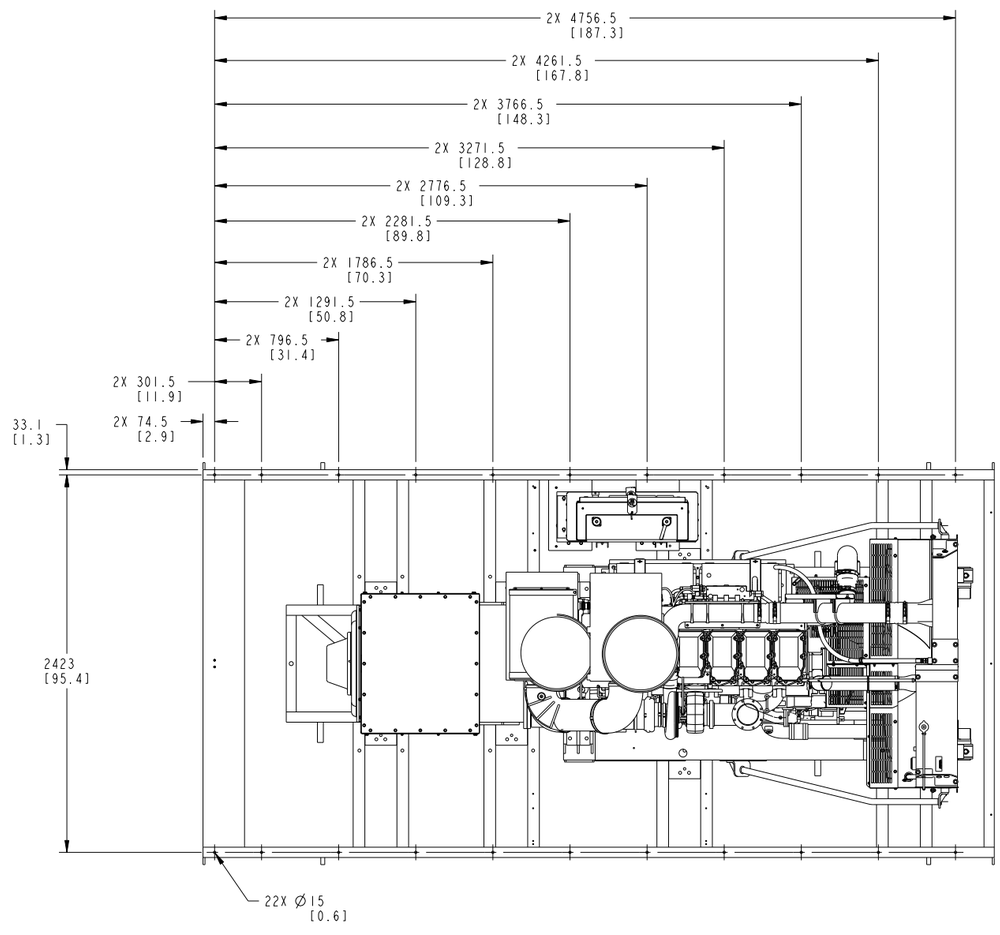
DETAIL A
SCALE: 1/8

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS				SIM TO A048N135	DWN J.ROBINSON	CUMMINS POWER GENERATION	
DIM	HOLE		DO NOT SCALE PRINT	CKD J.BRODY		
X ± 1		0.00- 4.99 +0.15/-0.08		APVD J.BRODY		OUTLINE, GENSET
.X ± 0.8		5.00- 9.99 +0.20/-0.10		DATE 14JAN16		(PED MNT, NON-SEISMIC COOLING)
.XX± 0.38		10.00-17.49 +0.25/-0.13				
ANG TOL ± 1.0°	SCALE 27/320	17.50-24.99 +0.30/-0.13	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON DOCA,CB,CC	SITE CODE PGF	DWG SIZE D A054M845	CAD SHEET 2 OF 7

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REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-158588	A	1	PRODUCTION RELEASE	JNR	JCB	J.BRODY	14JAN16

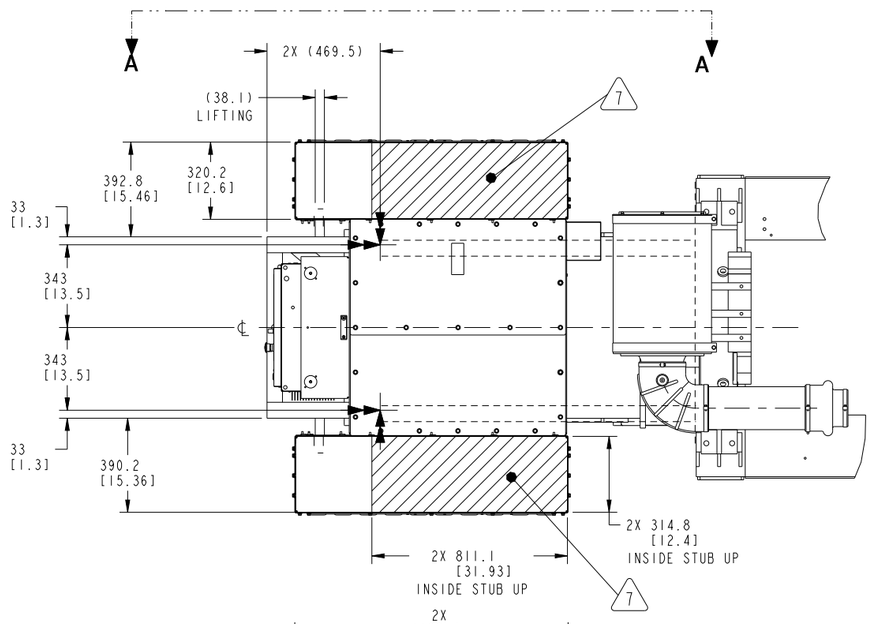


ENCLOSURE MOUNTING HOLES

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			SIM TO A048N135	DWN J.ROBINSON		CUMMINS POWER GENERATION
DIM: X ±1, .X ±0.8, .XX± 0.38	HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD J.BRODY	SITE CODE	OUTLINE, GENSET (PED MNT, NON-SEISMIC COOLING)
				APVD J.BRODY		
				DATE 14JAN16		
ANG TOL ± 1.0°	SCALE 1/16	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON DQCA,CB,CC	PGF	DWG SIZE D A054M845	CAD SHEET 7 of 7

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-165018	C	1	SEE SHEET 3	RAP	PCH	J.BRODY	05OCT16



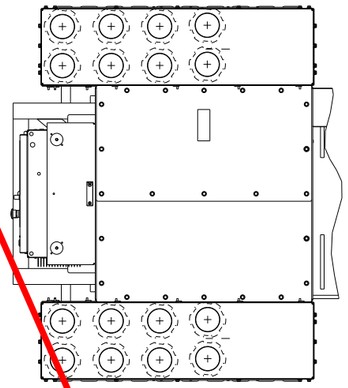
NOTE:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.
2. COMMON REFERENCE POINT ON GENSET SKID (⟶). POINTS TO ANCHORING HOLE ON SKID. SEE GENSET_OUTLINE (FOUNDATION) FOR DETAILS.
3. LISTED TORQUE VALUES ARE FOR MAXIMUM CONDUCTOR SIZES ACCOMMODATED. CONSULT UL 486 TABLE 7-4, 7-5 AND 7-6 FOR SMALLER CONDUCTOR SIZES.
4. ALL ITEMS SHOWN IN ILLUSTRATION ARE FOR REFERENCE ONLY.
5. ELECTRICAL CONDUITS MUST:
   - PROVIDE FLEXIBLE CONNECTION (USING FLEXIBLE CONDUIT AND CABLES).
   - INSTALLED IN A WAY THAT IT WILL ABSORB OR REDUCE VIBRATION CONDITIONS, FOR EXAMPLE: ADD OFF-SET BENDS, BETWEEN THE MOUNTING SURFACE OF THE CIRCUIT BREAKER ENCLOSURE AND THE STUB AREA ORIGINATING IN CONCRETE OR THE TYPE OF BASE FLOORING.
6. FLEXIBILITY IN CONDUIT AND CABLE INSTALLATION SHOULD BE PROVIDED TO ACCOUNT FOR MOVEMENT BETWEEN GENSET AND GROUND.
7. AREA SHOWN INDICATES APPROXIMATE OFFSET PLACEMENT OF THE ELECTRICAL FLEXIBLE CONDUIT STUB-UP AREA ORIGINATING IN CONCRETE OR OTHER TYPE OF BASE FLOORING RELATIVE TO CIRCUIT BREAKER LOCATION WITHIN ENCLOSURE TO PROVIDE VIBRATION PROTECTION.
8. WIRE-CONDUIT COMBINATIONS MEET NEC AND CEC. TO USE OTHER COMBINATIONS, REFER TO APPLICABLE CODES TO ENSURE THAT WIRE AMPACITY, BEND SPACE AND GUTTER SPACE MEET THE REQUIREMENTS.
9. SHUNT TRIP UNITS CAN BE OPERATED AT 75% OF NOMINAL VOLTAGE AND WILL ACCEPT MOMENTARY OR CONTINUOUS APPLIED VOLTAGE.
10. SHUNT TRIP UNITS CAN BE OPERATED AT 70% TO 100% OF NOMINAL VOLTAGE AND WILL ACCEPT MOMENTARY OR CONTINUOUS APPLIED VOLTAGE.
11. ALL DIMENSIONS SHOWN FOR RIGHT SIDE ENTRY ALSO APPLY TO LEFT SIDE ENTRY IN MIRROR ORIENTATION.
12. ALTERNATOR MODEL HC634G & R-FRAME CIRCUIT BREAKER ARE BEING SHOWN FOR DRAWING SIMPLICITY.
13. "NS" SHUNT TRIP HAS NO INTERNAL CONTACTS, IT MUST BE USED IN CONJUNCTION WITH AUXILIARY CONTACTS TO ACCEPT CONTINUOUS APPLIED VOLTAGE. IT CAN OPERATE AT 75% OF NOMINAL VOLTAGE.
14. 800 AMP BREAKER:
    A LUG ACCEPTING (2) 3/0-600 kcmil CONDUCTORS IS AVAILABLE THRU ACCESSORIES. PGA PART NUMBER 0332-4278.
15. 1200 AMP BREAKER:
    A LUG ACCEPTING (3) 3/0-600 kcmil CONDUCTORS IS AVAILABLE THRU ACCESSORIES. PGA PART NUMBER 0332-4279.
16. STANDARD FEATURE ON SCHNEIDER ELECTRIC NW BREAKER.

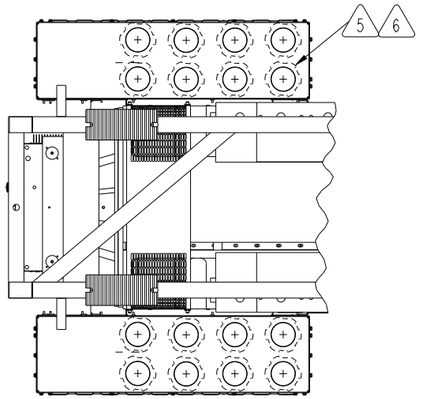
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO A040V225	DWN R.PAUTZKE	CUMMINS	CUMMINS POWER GENERATION
DIM X ±1 / .X ±0.8 / .XX± 0.38	HOLE 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD P.HERRLEY		
			APVD J.BRODY		OUTLINE,GENSET (CIRCUIT BREAKER 23L)
ANG TOL ± 1.0°	SCALE 3/32	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	DATE 09SEP16	SITE CODE PGF	
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON DQCA/B/C	DWG SIZE D A054F847	CAD SHEET 1 OF 3

PTC® Creo® Parametric

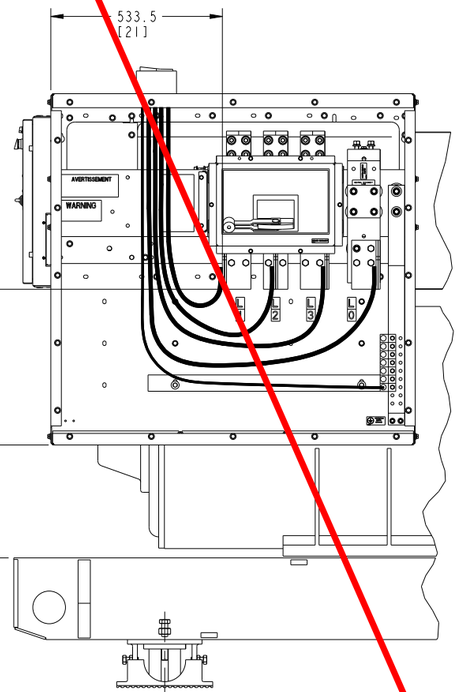
REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-165018	C	--	-----	RAP	PCH	J.BRODY	05OCT16



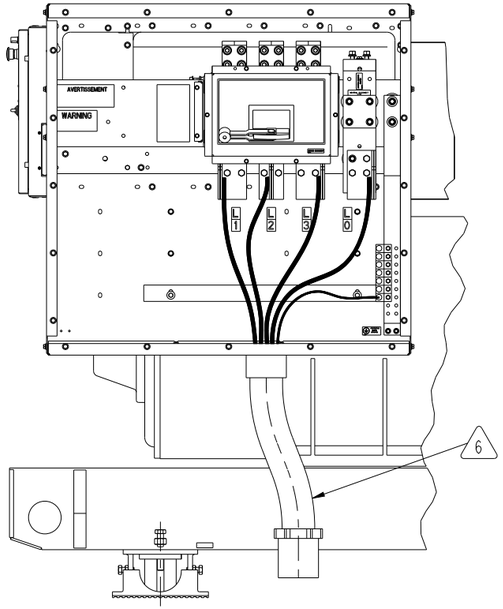
VIEW B-B
TOP ENTRANCE
SCALE 3/32



VIEW C-C
BOTTOM ENTRANCE
SCALE 3/32



RIGHT SIDE
TOP ENTRY ROUTING EXAMPLE
SCALE 1/8



RIGHT SIDE
BOTTOM ENTRY ROUTING EXAMPLE
SCALE 1/8

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			SIM TO A040V225	DWN R.PAUTZKE	CUMMINS POWER GENERATION
DIM: X ±1, .X ±0.8, .XX± 0.38	HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD P.HERRLEY	
ANG TOL ± 1.0°	SCALE 3/32	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		APVD J.BRODY	OUTLINE,GENSET (CIRCUIT BREAKER 23L)
				DATE 09SEP16	SITE CODE PGF
			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON D0CA1/B/C	DWG SIZE D A054F847 CAD SHEET 2 of 3

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-165018	C	1	UPDATED TABLE 2 COLUMN CABLE AMPACITY	RAP	PCH	J.BRODY	05OCT16

TABLE 1

UL/IEC LUGS							ACCESSORY SPECIFICATIONS			
LUG	FRAME	MAX AMPS	WIRE RANGE COPPER	DIM D ±25 [1.0]	DIM E ±25 [1.0]	DIM F ±25 [1.0]	ACCESSORY DESCRIPTION	CONTACT RATING	INRUSH	CONNECTION TYPE
	SQUARE D NLGL W/ MICROLOGIC 3.3S TRIP UNIT	600A 3-POLE	2/0-350 KCMIL	554 [21.8]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP (9)(13)	----------	10A (10)	COMPRESSION TERMINALS #20-16 AWG OR SMALLER TORQUE: 10 LB-IN
							1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM (9)(13)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	
(14)	SQUARE D P 800 W/MICROLOGIC 5.0 TRIP UNIT	800A 3-POLE	3/0-500 KCMIL	599 [23.5]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP (9)(13)	----------	200VA (10)	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM (9)(13)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
(15)	SQUARE D P 1200 W/MICROLOGIC 5.0 TRIP UNIT	1200A 3-POLE	3/0-500 KCMIL	556 [21.8]	1092 [43.02]	351.1 [13.82]	24 VDC SHUNT TRIP (9)(13)	----------	200VA (10)	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 1 AUX CONTACT + 1 TRIP ALARM (9)(13)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
	SCHNEIDER ELECTRIC NW 3000/2500/2000/1600 (ELECTRICALLY OPERATED) 1600-3000 AMP BREAKERS BUS BARS STANDARD W/MICROLOGIC 5.0 TRIP UNIT	NEMA HOLE PATTERN		473.2 [18.63]	1242.6 [48.92]	201.1 [7.92]	24 VDC SHUNT TRIP (9)(13)(16)	----------	200VA	PUSH-IN TERMINALS FOR 1 OR 2 #18-14 AWG.
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM (9)(13)(16)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	PUSH-IN TERMINALS FOR 1 OR 2 #18-16 AWG.
	SQUARE D R 2500/2000/1600 3-POLE 1600-2500 AMP BUS BARS STANDARD W/MICROLOGIC 5.0 TRIP UNIT	NEMA HOLE PATTERN	490 [19]	1092 [43.02]	351.1 [13.82]		24 VDC SHUNT TRIP (9)(13)	----------	200VA (10)	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM (9)(13)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
(3)	SCHNEIDER ELECTRIC NW 3000/2500/2000/1600 (ELECTRICALLY OPERATED) W/OPTIONAL LUG 1600-3000AMP BREAKERS TORQUE 375 IN LBS [42 Nm]	#2-600 KCMIL	473.2 [18.63]	1242.6 [48.92]	201.1 [7.92]		24 VDC SHUNT TRIP (9)(13)(16)	----------	200VA (10)	PUSH-IN TERMINALS FOR 1 OR 2 #18-16 AWG.
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM (9)(13)(16)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	PUSH-IN TERMINALS FOR 1 OR 2 #18-16 AWG.
	SQUARE D R 2500/2000/1600 W/OPTIONAL LUG 1600-2500 AMP BREAKERS TORQUE 375 IN LBS [42 Nm]	#2-600 KCMIL	490 [19]	1092 [43.02]	351.1 [13.82]		24 VDC SHUNT TRIP (9)(13)	----------	200VA (10)	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
							1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM (9)(13)	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN

TABLE 2

TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2014,ARTICLE 310.15, TABLES 310.15 (B)(16) AND 310.15 (B)(3)(a),FOR 90C TEMPERATURE RATED CONDUCTOR AT 30C AMBIENT, AND ANNEX C WITH 4 CURRENT-CARRYING CONDUCTORS IN EACH CONDUIT (8)

MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY	TOTAL NUMBER OF CONDUITS	
	QTY	SIZE		QTY	SIZE (IN INCHES)
3000A	8	600 KCMIL	380	8	4
2500A	7	600 KCMIL	380	7	4
2000A	6	500 KCMIL	344	6	4
1600A	6	350 KCMIL	280	6	3 1/2
1200A	4	400 KCMIL	304	4	3 1/2
800A	3	350 KCMIL	280	3	3
600A	3	4/0 AWG	208	3	3

TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2014, ARTICLE 310.15 AND TABLE 310-16 FOR 90C TEMPERATURE RATED CONDUCTOR AT 40C AMBIENT AND ANNEX C (8)

MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY	TOTAL NUMBER OF CONDUITS	
	QTY	SIZE		QTY	SIZE (IN INCHES)
3000A	8	700 KCMIL	379	8	4
2500A	8	500 KCMIL	313	8	4
2000A	8	350 KCMIL	255	8	3
1600A	7	300 KCMIL	233	7	3
1200A	4	500 KCMIL	313	4	4
800A	4	250 KCMIL	211	4	3
600A	3	250 KCMIL	211	3	3

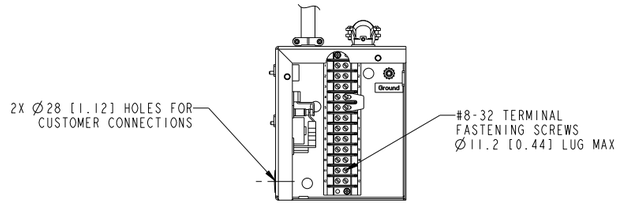
TABLE 3

GENSET MODEL	ALTERNATOR MODEL	DIM "A"
❑ DQCA ❑ DQCB ❑ DQCC	❑ HC634G	115.3 [4.54]
	❑ HC634H	115.3 [4.54]
	❑ HC634J	115.3 [4.54]
	❑ HC634K	14.3 [.56]

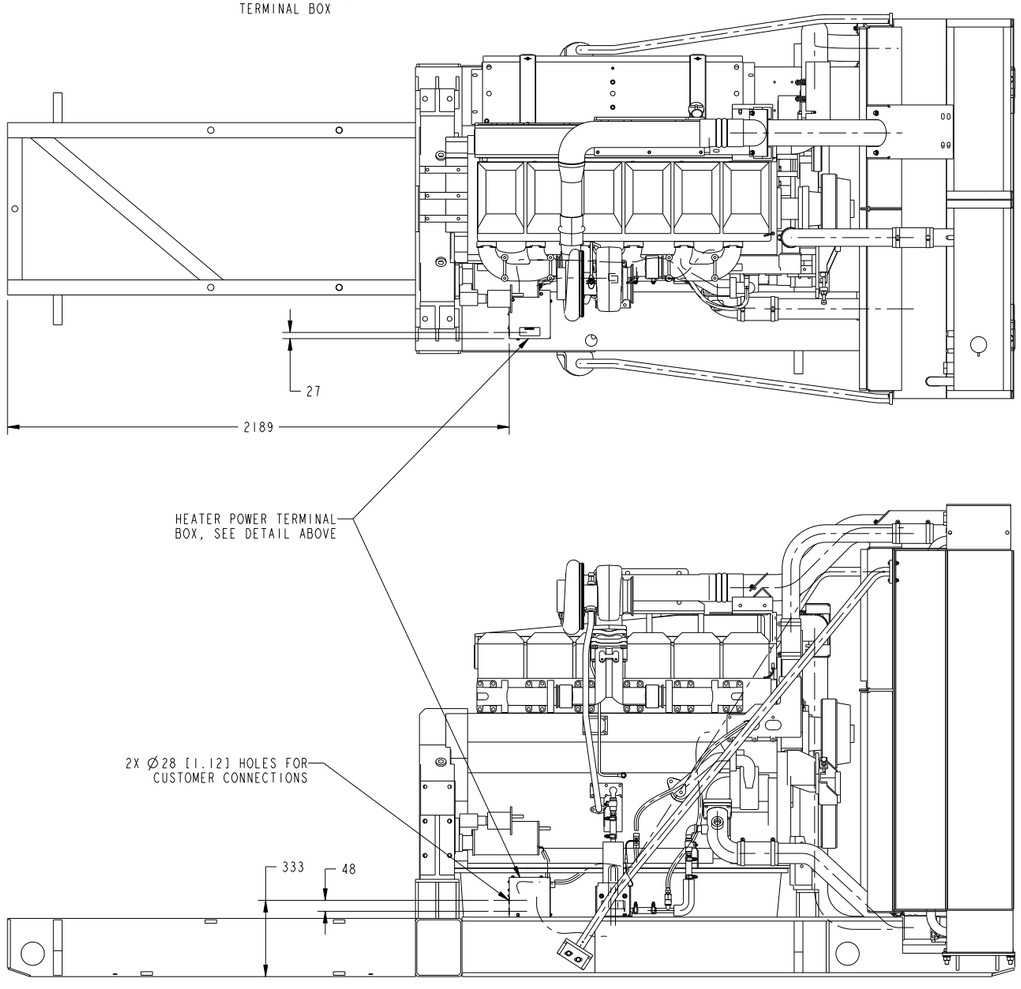
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO A040V225	DWN R.PAUTZKE		CUMMINS POWER GENERATION
DIM: X ±1, .X ±0.8, XX± 0.38 / HOLE: 0.00- 4.99 +0.15/-0.08, 5.00- 9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD P.HERRLEY		OUTLINE,GENSET (CIRCUIT BREAKER 23L)
			APVD J.BRODY	SITE CODE	
			DATE 09SEP16		
ANG TOL ± 1.0°	SCALE 3/32	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	FIRST USED ON DQCA/B/C	PGF	DWG SIZE D A054F847	CAD SHEET 3 of 3

0500_4022	D	Pro/ENGINEER	METRIC DWG

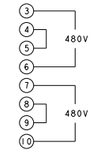
REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
ECO-155278	B	1	RMV CONNECTION IN DC SCHEMATIC	B2	JPR	KK	K KISHORE	08SEP15
		2	DIM 333 WAS 332	A5	JPR	KK	K KISHORE	08SEP15
		3	DIM 27 WAS 25	B5	JPR	KK	K KISHORE	08SEP15



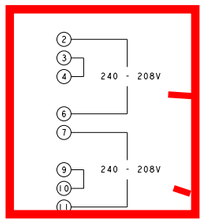
DETAIL OF HEATER TERMINAL BOX



HEATER AMPERAGE TABLE				
SINGLE PHASE HEATER VOLTAGE	FEATURE CODE H556 ONE HEATER		FEATURE CODE H557 ONE HEATER	
	HEATER AMPS	TOTAL WATTS	HEATER AMPS	TOTAL WATTS
208	18.0	3744	23.2	4825
240	20.8	4990	26.75	6420
480	10.4	4990	13.375	6420

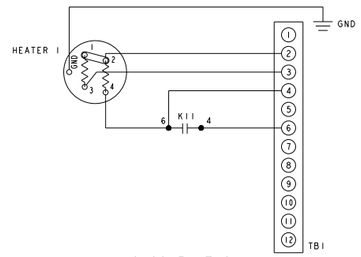


480 VOLT CONNECTION

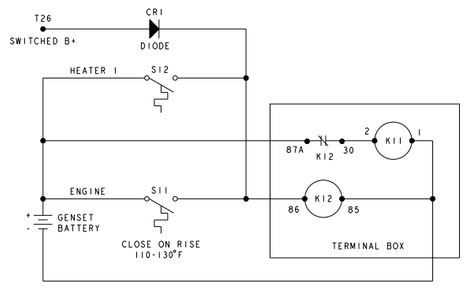


240 - 208 VOLT CONNECTION

JUMPERS ARE FACTORY INSTALLED IN THE 480 VOLT CONFIGURATION FOR 240 - 208 VOLT MOVE JUMPERS AS SHOWN



AC SCHEMATIC



DC SCHEMATIC

QTY	ITEM	PART NO	DWG SIZE	DESCRIPTION OR MATERIAL	REF DES

DO NOT SCALE PRINT

ANG TOL± 1.0

DRAWN TO 3/32 SCALE OF

TOLERANCE UNLESS OTHERWISE SPECIFIED

	mm	inch
DIM	X ± 1 .X ± 0.8 .XX ± 0.38	X ± .XX ± .XXX ±
HOLE	0.89-4.99 +0.15/-0.08 5.00-9.99 +0.20/-0.10 10.00-17.49 +0.25/-0.13 17.50-24.99 +0.30/-0.13	.004-.200 +.006/-.003 .201-.421 +.008/-.004 .422-.703 +.010/-.005 .704-.999 +.012/-.005

SIM TO . . .
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THIRD-ANGLE PROJECTION

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	NAME	DATE
DR	M_T_ABEL	04-24-04
CHKR MFG	B_HENNING	04-24-04
APPROVED	B_HENNING	04-24-04

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ANSI Y14.5M-1982

MODEL FIRST USED ON: DQCA,CB,CC

SITE CODE: PGA

CUMMINS POWER GENERATION
1400 73RD AVE NE
MINNEAPOLIS, MINNESOTA 55432

TITLE: INTERFACE_OUTLINE (HEATER)

DWG NO: 0500_4022

SHEET: 1 of 1

DWG SIZE: D

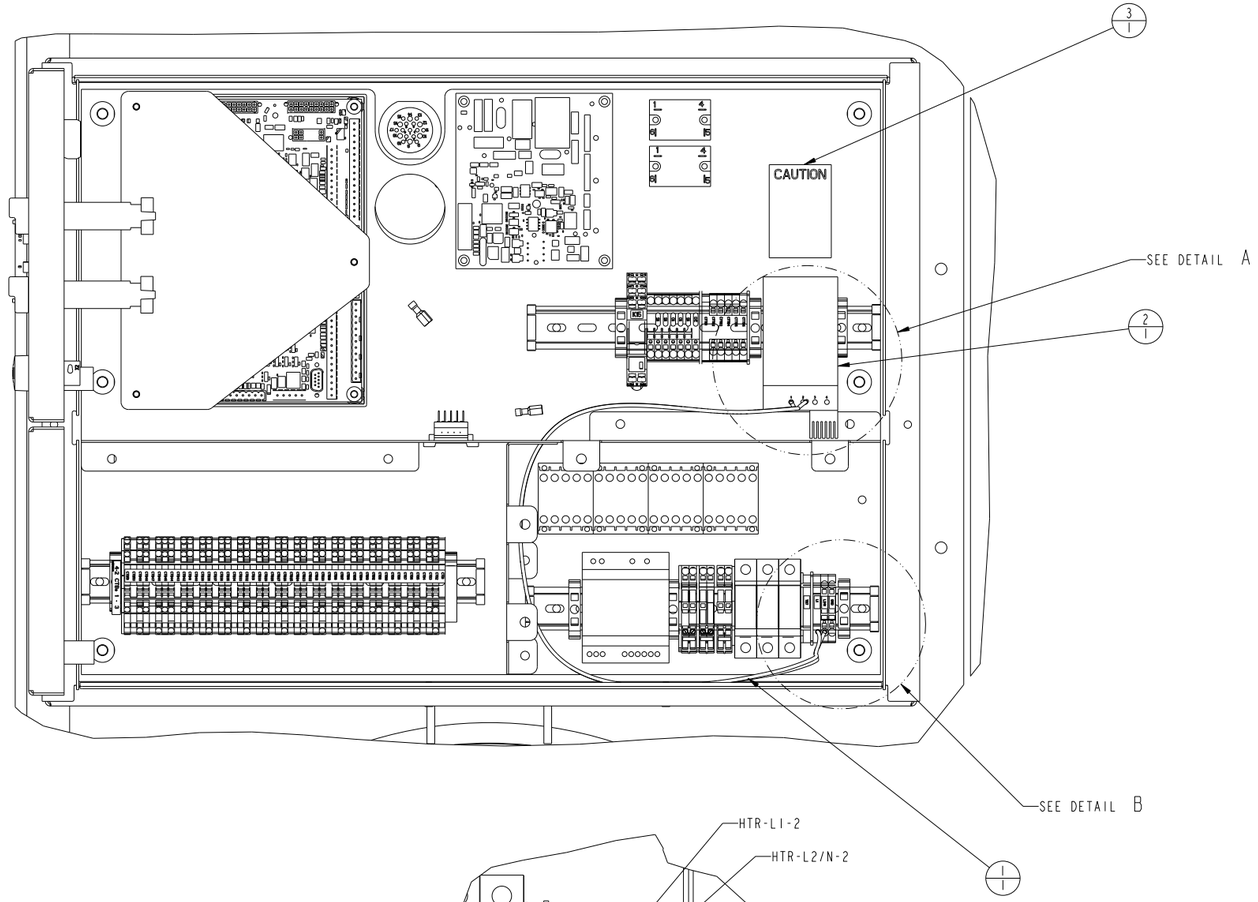
Drawing Name: 0500-4022 Revision: B
Part Name: 0500-4022 Revision: B
Sheet 1 of 2

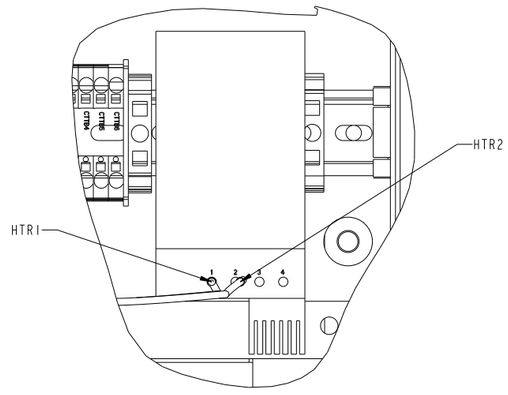
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-151597	B	1	PRODUCTION_RELEASE	JCA	GPT	G.THARIVITLA	08APR15
		2	RELOCATED HTR-L1, HTR-L2/N	JCA	GPT	G.THARIVITLA	08APR15
		3	RMV FLAG FROM NOTE 1	JCA	GPT	G.THARIVITLA	08APR15
		4	RMV FLAG NOTE 1 FROM DETAIL B	JCA	GPT	G.THARIVITLA	08APR15
		5	NOTE 1 RMV "TERMINAL BLOCK" AND "SHOWN IN DETAIL B"	JCA	GPT	G.THARIVITLA	08APR15

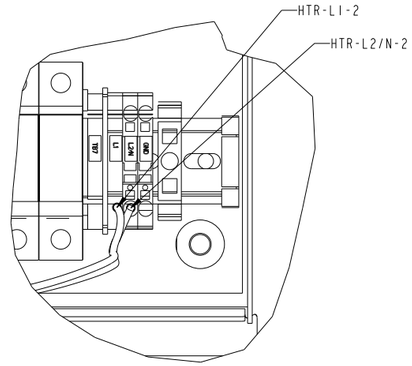
NOTES:

1. PCC3300 CONTROL SHOWN. CONNECTIONS ARE THE SAME FOR PCC2300 CONTROL.





DETAIL A
SCALE 1/1



DETAIL B
SCALE 1/1

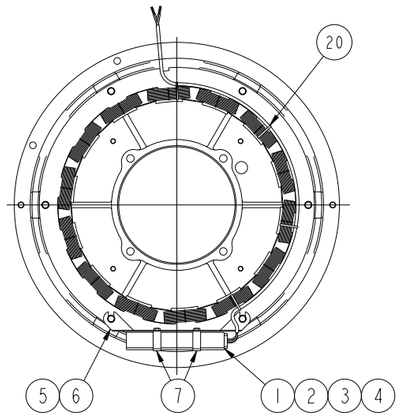
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS					
DIM	X ± 1	HOLE	0.00- 4.99 +0.15/-0.08	SIM TO NONE	DRN M_LEHR
	.X ± 0.8		5.00- 9.99 +0.20/-0.10	DO NOT SCALE PRINT	CKD G_THARIVITLA
	.XX± 0.38		10.00-17.49 +0.25/-0.13		APVD G_THARIVITLA
			17.50-24.99 +0.30/-0.13		DATE 14JAN15
ANG TOL: ± 1.0°		SCALE: 1/2		- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 FIRST USED ON DFEJ,DFEK

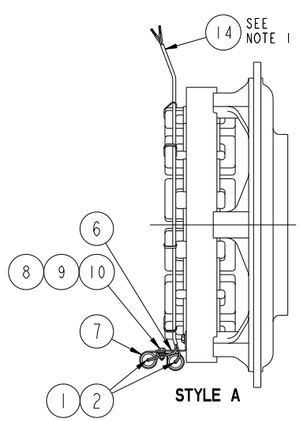
	CUMMINS POWER GENERATION	
	INSTALLATION,HEATER	
SITE CODE		
PGF	DWG SIZE D: A050W770	SHEET 1 OF 1 — DWG REV B

Drawing Name: A050W771 Revision: B
Part Name: A050W770 Revision: B
Sheet 1 of 2

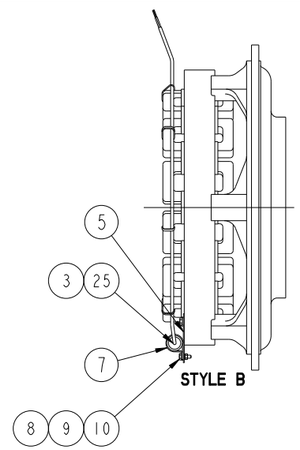
Pro/ENGINEER

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-131964	ZE	1	ADD WATTAGE COLUMN TO TABULATION	JPR	KK	K KISHORE	22JAN13
		2	UPDATE DRAWING FORMAT	JPR	KK	K KISHORE	22JAN13
		3	DIM (Ø16.06) WAS Ø16.06	JPR	KK	K KISHORE	22JAN13
		4	DIM (2X Ø5) WAS 2X Ø5	JPR	KK	K KISHORE	22JAN13
		5	DIM (42) WAS 42	JPR	KK	K KISHORE	22JAN13
		6	DIM (29) WAS 29	JPR	KK	K KISHORE	22JAN13
		7	DIM (58) WAS 58	JPR	KK	K KISHORE	22JAN13

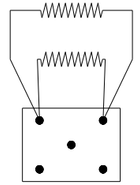




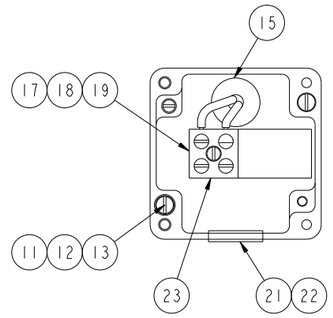
STYLE A

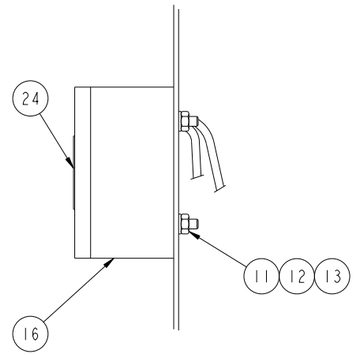


STYLE B

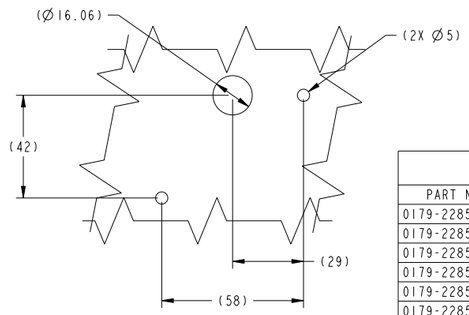


SCHEMATIC FOR DUAL HEATER CONNECTION (NOTE 1)





ITEM 16 WITHOUT COVER AND GASKET SCALE 1:1 (NOTE 2)



TERMINAL BOX (ITEM 16) MOUNTING HOLE PATTERN SCALE 1:1 (NOTE 2)

NOTES:

1. WHEN INSTALLING DUAL HEATERS (STYLE A), CONNECT ONE LEAD WIRE FROM ONE HEATER TO ONE LEAD WIRE OF OTHER HEATER. TWIST THE ENDS OF THE LEADS TOGETHER. REPEAT FOR OTHER TWO LEADS. SLIDE BOTH SETS OF LEADS THRU SLEEVING (PART A030F216). CONNECT EACH SET OF LEADS TO TERMINAL BLOCK.
2. INSTALL TERMINAL BOX (PART 0332-3023) TO GENERATOR TERMINAL BOX USING HOLES PROVIDED OR DRILL MOUNTING HOLE PATTERN IN DESIRED LOCATION.
3. CONNECT CABLE ASSY (PART 0335-0173-04) TO OTHER SIDE OF TERMINAL BLOCK AND GROUND.
4. CONNECT ELECTRICAL LEADS FROM ALTERNATOR HEATER, (PARTS 0333-0438-03, 0333-0438-04 OR 0333-0438-05) TO TERMINAL BOX (PART 0330-0142).
5. WHEN GENERATOR ASSEMBLY 0200-3132-01 THRU -05, -09 THRU -12, 0200-3132-08,-15,-16 AND 0179-2285-03 ARE INDICATED ON AR FILE: UN-INSTALL EXISTING ALTERNATOR HEATER (0333-0438-04), RETURN TO STOCK AND REPLACE WITH 0333-0438-05. CONNECT ELECTRICAL LEADS TO TERMINAL BOX (PER NOTE 4).
6. WHEN GENERATOR ASSEMBLY 0200-3132-01 THRU -05, -09 THRU -12, 0200-3132-08,-15,-16 AND 0179-2285-04 ARE INDICATED ON AR FILE: CONNECT EXISTING ALTERNATOR HEATER ELECTRICAL LEADS TO TERMINAL BOX (PER NOTE 4).
7. WHEN INSTALLING ALTERNATOR HEATER METAL TERMINAL BOX (0330-0142), ENSURE THAT IT IS EARTHED TO THE MAIN ALTERNATOR BODY.

-THIS IS A CONTROLLED ITEM-
PER CPG PROCEDURE FRE-1002

TO MAINTAIN COMPLIANCE WITH REQUIREMENTS OF THE CODES, STANDARDS, OR AGENCIES LISTED BELOW

☒ CSA ☒ UL ☐ CE ☐ RVIA ☐ ABYC
☐ IBC ☐ OTHER _____ ☐ OTHER _____

CHANGES, DEVIATIONS, OR SUBSTITUTIONS OF MATERIAL, PROCESS, OR PERFORMANCE FOR THIS ITEM MUST BE APPROVED BY THE FOLLOWING CONTROLLED ITEM APPROVER

RESPONSIBLE C1A ROLE STATIONARY GENSET
RESPONSIBLE C1A ROLE _____
RESPONSIBLE C1A ROLE _____

TABULATION

PART NO.	CURRENT ER	HEATER STYLE	VOLTAGE RANGE	ALT USED ON	STATUS	WATTAGE
0179-2285-01	ECO-131964	A	110-125	HC4	RELEASED	300
0179-2285-01-B	ECO-131964	A	110-125	HC4	RELEASED	300
0179-2285-02	ECO-131964	A	220-260	HC4	RELEASED	300
0179-2285-02-B	ECO-131964	A	220-260	HC4	RELEASED	300
0179-2285-03	ECO-131964	B	110-125	HC5,HC6,HC7,MV7	RELEASED	300
0179-2285-03-B	ECO-131964	B	110-125	HC5,HC6,HC7	RELEASED	300
0179-2285-04	ECO-131964	B	220-260	HC5,HC6,HC7,MV7	RELEASED	300
0179-2285-04-B	ECO-131964	B	220-260	HC5,HC6,HC7	RELEASED	300
0179-2285-05	FRD3063	B	110-125	HC6	OBSOLETE	-
0179-2285-06	FRD3063	B	220-260	HC6	OBSOLETE	-
0179-2285-07	FRD3063	B	110-125	HC7	OBSOLETE	-
0179-2285-08	FRD3063	B	220-260	HC7	OBSOLETE	-
0179-2285-09	ECO-131964	A	110-125	HC4	RELEASED	300
0179-2285-10	ECO-131964	B	110-125	HC5,HC6,HC7	RELEASED	300

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

SIM TO: DO NOT SCALE PRINT
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN JJOHNSON
CKD F.DEMEIRELES
APVD B_BRADY
DATE 04-30-03
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON HC4 THRU HC7
SITE CODE PGA

CUMMINS POWER GENERATION
INSTALLATION,HEATER
DWG SIZE D | 0179_2285 | SHEET 1 OF 1 | DWG REV ZE

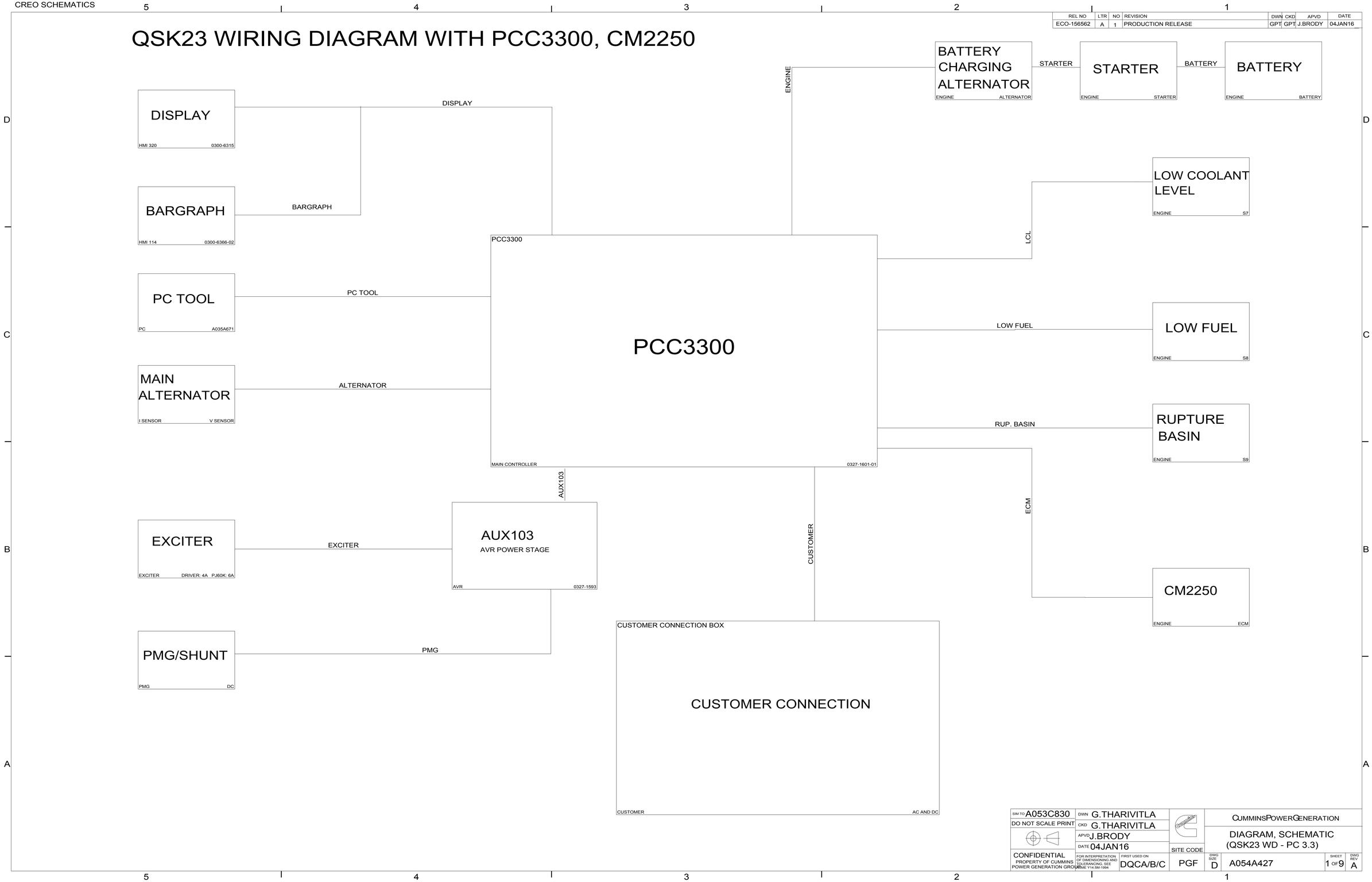
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Part Name: 0179-2285-01 Revision: ZB
Sheet 1 of 2

RSN 1344261
PERMIT# 2018-1573853-LT

CREO SCHEMATICS

QSK23 WIRING DIAGRAM WITH PCC3300, CM2250

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16



SIM TO A053C830	DWN G.THARIVITLA		CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)
	APVD J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 / FIRST USED ON DQCA/B/C	PGF	DWG SIZE D / A054A427 / SHEET 1 OF 9 / DWG REV A

RSN 1344261
PERMIT# 2018-1573853-LT

CREO SCHEMATICS

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

HMI 320 DISPLAY

PART # 0300-6315-02

A049F334

J28-320 P28-320

HMI FUSED B+ 1
B+ RETURN 3
W-001
W-004
W-017
SP1
SP2
J6 P6
F03-1!1
W-097 [14,D]

J29-320 P29-320

PCCNet B (-) 2
PCCNet A (+) 1
SYSTEM WAKE UP 3
RUN (WAKE-UP) 6
AUTO 4
C-4/C-002
C-4/C-003
W-010
SP3
SP4
SP5
SP6

P25 J25

W-005 B+ RETURN
W-226 LOCAL E-STOP
W-225 DISCRETE INPUT RETURN
ESTOP-B-1
ESTOP-B-2
C-10/C-002 PCCNet B
C-10/C-003 PCCNet A
W-011 PCCNet SHLD
W-007 PCCNet SYSTEM WAKEUP
W-008 MANUAL
AUTO

W-205
W-245
C-3/C-003
C-3/C-002
W-006

HMI 114 BARGRAPH

PART # 0300-6366-02

J1-114 P1-114

J6-114 P6-114

PCC3300 BASEBOARD

PART # A051L545
A051L546 (w/MLD)

TB15 P15

RETURN 1
RS485 A 3
RS485 B 4
PCCNet WAKE UP 5

A051D676

C-6/C-003
C-6/C-002
W-244
W-126 CTB1-3 1 [18,D]

J65

PC TOOL

J12 P12

CT3 3
CT3 COMMON 6
CT2 2
CT2 COMMON 5
CT1 1
CT1 COMMON 4

A049F329

W-361
W-020
W-362
W-021
W-364
W-022

J21 P21

J22 P22

L1 1
L2 2
L3 3
LN 4

W-024
W-027
W-030
W-358

A051B920

W-046 CT3-1
W-047 CT3-2/3
W-063 CT2-1
W-093 CT2-2/3
W-171 CT1-1
W-262 CT1-2/3

CT3
CT2
CT1

GENERATOR

DRIVER
RATINGS: 4A
PJ60K: 6A

L1 (U)
L2 (V)
L3 (W)
(N)

W-282
W-287
W-288
W-289

F1U
F1V
F1W

W-263
W-264
W-265

W-025 U
W-028 V
W-031 W
W-271 N

W-293
W-294

AUX103

AVR POWER STAGE

PART # 0327-1593

J18 P18

PMG 1/SHUNT L1 1
PMG 2/SHUNT L2 2
PMG 3 3

F10A-1
F10A-2
F10B-1
F10B-2

W-033
W-032
W-034
W-041
W-054

W-266
W-267
W-268

P2
P3
P4

PMG

J17 P17

FIELD + 1
FIELD - 2

W-043
W-042

W-269
W-270

F1/F+
F2/F-

SIM TO A053C830	DWN G.THARIVITLA		CUMMINSPOWERGENERATION	
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)	
	APVD J.BRODY			
	DATE 04JAN16	SITE CODE		
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON DQCA/B/C	PGF	DWG SIZE D	A054A427	SHEET 2 OF 9	DWG REV A

RSN 1344261
PERMIT# 2018-1573853-LT

CREO SCHEMATICS

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

PART #A051L545, A051L546 (w/MLD)

PCC3300 BASEBOARD PART #A051L545

A049F325

GND-1 W-242

J20 P20

B+ INPUT	9	9	W-059
B+ INPUT	10	10	W-060
B+ INPUT	20	20	W-061
B+ INPUT	21	21	W-062
RELAY COIL B+	13	13	W-065 ESTOP-LOCAL-A1 ESTOP-LOCAL-A2
RUPTURE BASIN RETURN	8	8	W-131P20 8 [18,C]
STARTER RELAY DRIVER	15	15	W-072
SWITCHED B+ LOW SIDE DRIVER	3	3	W-073
B+ RETURN	2	2	W-366
B+ RETURN	4	4	W-075
B+ RETURN	7	7	W-076
B+ RETURN	12	12	W-077
CHASSIS GND	1	1	W-078
FSO RELAY DRIVER	14	14	
LOW FUEL RETURN	6	6	[18,C] W-164 CTB17-3 1
ALT FLASH INPUT	22	22	
STARTER DISCONNECT INPUT	11	11	
OIL PRIMING PUMP RELAY	16	16	
COOLANT LEVEL RETURN	5	5	[18,C] W-166 P20 5
#5 LOW COOLANT LEVEL	17	17	[18,C] W-183 P20 17
#6 LOW FUEL SWITCH	18	18	[18,C] W-165 P20 18
#12 RAPTURE BASIN	19	19	[18,C] W-163 P20 19

SP15 SP14

[9,D] W-097 P6 1

F03 (15A) F03-1 F03-2 W-055
F04 (15A) F04-1 F04-2 W-056
F05 (5A) F05-1 F05-2 W-058
F02 (20A) F02-1 F02-2 W-221
F07 (15A) F07-1 F07-2 W-064

W-019
W-094
W-127 CTB2-3!1 [18,D]
W-092

B+ 1 2 SP17

W-098
W-099
W-100
W-230

NOC-1 K5-1 K5-4 K5-5 K5-6 COIL-1 K5

W-410 SP16 [18,C] W-129 CTB13-3!1 W-334 J14-P11 [25,C]

W-246

SP34 W-224 W-228 W-227

[18,A] W-190 CTB50-3 1 [18,A]
W-203 CTB51-3 1

K4 K4-5 K4-1 COIL-1 NOC-1 K4-6 K4-4

W-231

B+ RTN SP18 [23,B] W-182 J16 1 [19,D] W-053 SP18 2 [18,D] W-128 CTB7-3 1

5A FUSED B+ NOC-1 K15,11 K15,14 K15,A2 K15,A1 COIL-1 K15

W-080

W-082
W-085
W-096
W-368

P50 120Ω C B A

C-25!C-003 C-25!C-002 SP11 SP12 SP13

C-21/C-003 C-21/C-002

J60 P60

B+	8	W-247
B+	10	W-343
B+	18	W-344
CRANK	19	W-050
B+ RTN	12	W-217
B+ RTN	14	W-074
B+ RTN	16	W-071
	13	W-406
	15	W-256
FUSED B+	4	
FUSED B+	17	
KEYSWITCH	9	
SHIELD	6	
CAN HI	1	C-11/C-003
CAN LO	3	C-11/C-002

A053R739

COOLANT HEATER

P13 A C B

F06 (10A) 2 1 (LOAD) W-257

W-321

K-CRANK NOC-1 K-CRANK(BATT) K-CRANK(SW) K-CRANK(S1) K-CRANK(S2) COIL-1

W-218
W-229
W-057
W-069

B+ SP10 W-070

F08 (30A)

B+ RTN SP27 W-373

W-353 [36,B] PFHS W-352 G1_GND

B1_GND2 B1_GND1 B1 SW B1_BATT2 B1_BATT1 B1_BATT3 B1_BATT4

STARTER MOTOR 12V 24V 12V G

W-323 F12 (40A) W-324 G1_B+(1)

W-354 PFHS [37,B]

W-322 W-102 C-003 C-002

LCL LCL(S7) A +5V SUPPLY C RETURN B CL SIGNAL COOLANT LEVEL SENSOR

W-308 W-309 W-310

CO4 CO4 A C B

J1939

C 37 J1939 SHIELD
B 47 J1939 LOW
A 46 J1939 HIGH

J1939

CM2250

CO1 CO1

W-296
B+ RTN SP28 W-290 W-291
B+ SP29 W-285 W-286

H	H	
L	L	
K	K	W-290
J	J	W-291
F	F	W-285
D	D	
C	C	
A	A	W-286

16 PIN OEM CONNECTOR

A051M926

J26 P26 J11 P11

J1939 SHIELD	1	1	W-295	C-20/C-003
J1939 HIGH	11	11	W-181	
J1939 LOW	10	10	W-178	C-20/C-002
PCCNet SHIELD	4	4		
N/A	6	6		
B+ RETURN	8	8		
PCCNET A	12	12		
PCCNET B	13	13		
N/A	17	17		
KEY SWITCH B+	18	18	W-081	
KEY SWITCH LOW SIDE	15	15	W-084	
AVR B+	9	9	W-370	
AVR B+ RETURN	5	5	W-372	
AVR PWM+	16	16	W-086	
AVR PWM-	3	3	W-087	
FIELD CURRENT +	14	14	W-088	
FIELD CURRENT -	7	7	W-089	
BACKUP START DISC +	2	2	W-090	

17	17	
20	20	
19	19	
22	22	(NOT USED)
21	21	W-104

AUX103
AVR POWER STAGE
PART # 0327-1593

P19 J19

5	5	
6	6	
7	7	
11	11	
12	12	
13	13	
14	14	CHASSIS GND
1	1	AVR B+
8	8	AVR B+ RETURN
2	2	AVR PWM+
9	9	AVR PWM-
4	4	FIELD CURRENT +
10	10	FIELD CURRENT -
3	3	BACKUP START DISC +

GND W-371

SIM TO A053C830	DWN G.THARIVITLA		CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)
	APVR J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 / FIRST USED ON DQCA/B/C	PGF	DWG SIZE D / A054A427 / SHEET 3 OF 9 / DWG REV A

RSN 1344261
PERMIT# 2018-1573853-LT

CREO SCHEMATICS

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

A051D676

P1/TB1

1	PCCNet A (+)	C-5/C-003
2	PCCNet B (-)	C-5/C-002
3	B+ RETURN/SHIELD	
4	READY TO LOAD DRIVER	W-376
5	CUSTOMER FUSED B+	W-377
6	CUSTOMER OUTPUT #1 NO	W-147
7	CUSTOMER OUTPUT #1 COM	W-146
8	CUSTOMER OUTPUT #2 NO	W-144
9	CUSTOMER OUTPUT #2 COM	W-142
10	REMOTE START RTN	W-140
11	REMOTE START INPUT	W-138
12	CUSTOMER INPUT #1	W-136
13	CUSTOMER INPUT #1 RTN	W-134
14	CUSTOMER INPUT #2	W-133
15	REMOTE E-STOP RTN	W-132
16	REMOTE E-STOP INPUT	

P8/TB8

1	FAULT RESET INPUT RTN	W-148
2	START TYPE INPUT RTN	W-149
3	DELAYED OFF DRIVER	W-150
4	SWITCHED B+ DRIVER	W-151
5	FAULT RESET INPUT	W-152
6	START TYPE INPUT	W-153

P 3/TB3

1	TRANSFER INHIBIT/C1 #20 RTN	W-118
2	MASTER CAN SHIELD	
3	MASTER CAN L	C-2/C-003
4	MASTER CAN H	C-2/C-002
5	LOW-SIDE OUTPUT	W-113
6	LOW-SIDE OUTPUT	W-112
8	LOW-SIDE OUTPUT	W-108
9	TRANSFER INHIBIT/C1 #20	W-119
10	RETRANSFER INHIBIT/C1 #21	W-117
11	MASTER FIRST START ARBITRATION	W-107
12	MASTER FIRST START RETURN	W-106

P5/TB5

1	GENSET CB CLOSE - NO	W-009
2	GENSET CB CLOSE - COM	W-014
4	GENSET CB OPEN - COM	W-016
5	GENSET CB OPEN - NC	W-018
6	UTILITY CB CLOSE - NO	W-023
7	UTILITY CB CLOSE - COM	W-026
8	UTILITY CB OPEN - NC	W-029
9	UTILITY CB OPEN -COM	W-035

P9/TB9

1	KW LOAD SET POINT SENSE	W-036
2	KW & KVAR SET POINTS RTN	W-037
3	KVAR SET POINTS RTN	W-038
4	VOLTAGE BIAS ANALOG OUT	W-039
5	SPEED BIAS ANALOG OUT	W-048
6	VOLTAGE & SPEED ANALOG RTN	W-049
		W-281

C-1/C-003 CTB2-1 1 [23,C]
C-1/C-002 CTB1-1 1 [23,C]

CTB1 2 … CTB26 2 (1 CTB1 2 … 1 CTB26 2)

W-002 CTB5-2!1 [35,C]
W-051 CTB9-2!1 [33,C]
W-052 CTB10-2!1 [33,B]
W-053 CTB11-2!1 [14,C]
W-306 GFR 14!1 [39,A]
W-307 GFR 15!1 [39,A]
[23,D] W-219 ESTOP_REM_B2 1
[23,D] W-220 ESTOP REM-B1 1
[24,B] W-079 CTB37-2 1
[25,A] W-255
[25,A] W-258
[23,B] W-103 K17-A2 1
[25,A] W-259
[25,A] W-260
[32,D] W-223 CTB51-2!1

W-095

[7,D] W-126 P15 5
[14,D] W-127 F02-1!1
[14,C] W-128 SP18 2
[24,A] W-091 SP25!2
[36,C] W-045 TIMER(-)!1
[13,D] W-129 SP16 2
[36,C] W-044 TIMER(+)!1
[14,D] W-131 CTB15-3 1
[15,C] W-163 CTB16-3 1
[15,C] W-164 P20 6
[15,C] W-165 CTB18-3 1
[15,C] W-166 CTB19-3 1
[15,C] W-183 P20 17

B+
B-
SW+
HOUR METER
HOUR METER

CTB1 4 … CTB26 4 (3 CTB1 4 … 3 CTB26 4)

W-317 GFR 1!1 [39,D]
W-222 ALARM X1 1 [32,D]
W-355 PYRO-98!1 [21,D]
W-305 GFR 2!1 [39,D]
W-356 PYRO-99!1 [21,D]
PFHS RELAY W-351 [36,B]
PFHS RELAY W-350 [37,B]
RUPTURE BASIN RTN W-320 [32,B]
RUPTURE BASIN IN W-319 [32,B]
LOW FUEL SWITCH RTN
LOW FUEL SWITCH IN
LOW COOLANT LVL RTN
LOW COOLANT LVL IN
W-298 05 1 [32,B]
30L XFER PUMP
W-122 CTB24-4 1 [33,C]
W-123 CTB25-4 1 [33,B]
W-297 04 1 [32,B]
30L XFER PUMP
W-116 J24 9 [23,B]
W-121 J24 7 [23,B]
W-240 J24 8 [23,B]
W-241 CTB43-4 1 [23,B]
W-124 ESTOP REMOTE-A1 1 [23,D]
REMOVABLE JUMPER
W-125 ESTOP REMOTE-A2 1 [23,D]

A051D676

P8/TB8

13	CUSTOMER INPUT #4 RTN	W-158
12	CUSTOMER INPUT #3 RTN	W-159
11	LOAD DUMP DRIVER	W-160
10	CUSTOMER OUTPUT #3 DRIVER	W-161
9	CUSTOMER OUTPUT #4 DRIVER	W-162
8	CUSTOMER INPUT #4	W-168
7	CUSTOMER INPUT #3	W-154

P10/TB10

17	RTN	W-196
16	RTN	W-193
15	EXTENDED PARALLEL	W-195
14	LOAD DEMAND STOP	W-198
13	SYNCHRONIZER ENABLE	W-197
12	SINGLE MODE VERIFY	W-194
11	GENSET CB INHIBIT	W-192
10	GENSET CB TRIPPED STATUS	W-186
9	RTN	W-187
8	GEN CB B STATUS	W-185
7	GEN CB A STATUS	W-184
6	GENSET CB INHIBIT	W-188
5	UTIL CB TRIP STATUS	W-179
4	UTILITY CB B STATUS	W-177
3	UTILITY CB A STATUS	W-176
2	RTN	W-180
1	RTN	W-169

P9/TB9

11	KVAR LOAD SHARE -	C-7!C-002
10	KVAR LOAD SHARE +	C-7!C-003
9	SHIELD	
8	KW LOAD SHARE +	C-9!C-002
7	KW LOAD SHARE -	C-9!C-003

[14,D] W-190 ESTOP-LOCAL-A2 1
[14,D] W-203 SP34 1

A049F342

C-8/C-002
C-8/C-003
W-111
W-115
W-120

P1-101 J1-101 AUX101 J5 J6 AUX102
PART # 0327-1265
J14-101 P14-101
PART # 0327-1536

A051D676

CTB1-1 … CTB6-1 (CTU, CTV, CTW)
W-232, W-233, W-234
CTB1-2 … CTB6-2
W-378, W-235, W-379, W-236, W-380, W-237
SB1-2 … SB6-2

TB7 P7
L1 W-012 FX1-2 FX1-1
L2 W-003 FX2-2 FX2-1
L3 W-013 FX3-2 FX3-1
LN W-381 TB7-2
FUSE HOLDER

UTILITY SIDE
U V W N

SIM TO	A053C830
	DO NOT SCALE PRINT
DWN	G.THARIVITLA
CKD	G.THARIVITLA
APVD	J.BRODY
DATE	04JAN16
SITE CODE	PGF
FIRST USED ON	DQCA/B/C
DWG SIZE	D
DWG	A054A427
SHEET	4 OF 9
DWG REV	A

CONFIDENTIAL
PROPERTY OF CUMMINS POWER GENERATION GROUP

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

CUMMINS POWER GENERATION

DIAGRAM, SCHEMATIC
(QSK23 WD - PC 3.3)

RSN 1344261
PERMIT# 2018-1573853-LT

CREO SCHEMATICS

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

J14 (SERVICE TOOL) - A051D676

PCC3300
BASEBOARD

PART # A051L545
A051L546 (w/MLD)

P14 — 48 — J14

9	W-206	9
8	W-207	8
7	W-208	7
6	W-209	6
5	W-210	5
4	W-211	4
3	W-212	3
2	W-213	2
1	W-214	1

REMOTE ESTOP (OPTIONAL)- A052M126

[19,C]	W-220 CTB19-2 1		
[19,C]	W-219 CTB18-2 1	ESTOP_REM_B2	ESTOP REM-B1
[17,A]	W-124 CTB50-4 1		
[17,A]	W-125 CTB51-4 1	ESTOP REMOTE-A2	ESTOP REMOTE-A1

PCC NET- A051D676

J01

[19,D]	C-1/C-002 J01-1!1	J01-1 — 1
[19,D]	C-1/C-003J01-2!1	J01-2 — 2
		J01-3 — 3

PYROMETER (OPTIONAL)- A050Y679

PYRO-98	W-355 CTB5-4!1	[17,D]
PYRO-99	W-356 CTB9-4!1	[17,D]

CUSTOMER PARALLELING RELAYS
GEN BREAKER CONTROL RELAYS

A049F340

[13,D] — W-334 SP16!2 — J14-P — P14-P — W-191

W-384 — SP19

SP20

W-386	K16-13	K16 NOC-2 / NCC-2 / NOC-1 / NCC-1 COIL-1	K16-14	
W-330	K16-A1		K16-A2	[19,B] W-079 K16-A2!1
W-249	K17-13	K17 NOC-2 / NCC-2 / NOC-1 / NCC-1 COIL-1	K17-14	[19,A]
W-331	K17-A1		K17-A2	W-103 K17-A2!1

CB CLOSE CONTROL

CB OPEN CONTROL

J16 — P16

[14,C] W-182 SP18!2	1 — 1	W-199
[17,A] W-241 J24 6		
[17,B] W-121 CTB37-4 1		
[17,B] W-240 CTB38-4 1		
[17,B] W-116 CTB35-4 1		

PARALLELING EXT HARNESS (ABB)- A052A234

J24 — P24

W-200	1	1 — W-272
W-251	2	2 — W-273
W-250	3	3 — W-274
W-248	4	4 — W-275
W-199	5	5 — W-276
	6	6 — W-277
W-121 CTB37-4 1	7	7 — W-278
W-240 CTB38-4 1	8	8 — W-279
W-116 CTB35-4 1	9	9 — W-280

CIRCUIT BREAKER OPERATION

CB-D1	YU	UNDERVOLTAGE RELEASE	CB-D2	W-201
CB-C11	YO	TRIP COIL	CB-C12	W-300
CB-C1	YC	CLOSE COIL	CB-C2	W-202
CB-U1	M	CHARGING MOTOR	CB-U2	W-299

W-201 / W-300 / W-202 / W-299 → SP33 2

CIRCUIT BREAKER STATUS

AUX CONTACT

	CB-12	CB-11	GEN BREAKER OPENED	W-254
	CB-24	CB-21	GEN BREAKER CLOSED	W-253 → SP21 2 — 1
	CB-98	CB-95	GEN BREAKER TRIPPED	W-252

BELL ALARM

	ABB	P- FRAME Schneider	NW- FRAME Schneider
UNDERVOLTAGE RELEASE	CB-D1/CB-D2	D1/D2	NW-D1/NW-D2
TRIP COIL	CB-C11/CB-C12	A4/A1	NW-C2/NW-C1
CLOSE COIL	CB-C1/CB-C2	A2/A1	NW-A2/NW-A1
CHARGING MOTOR	CB-U1/CB-U2	B4/A1	NW-B2/NW-B1
GEN BREAKER OPENED	CB-12/CB-11	OF3-31/OF3-32	NW OF3-31/NW OF3-32
GEN BREAKER CLOSED	CB-24/CB-21	OF2-21/OF2-24	NW OF2-21/NW OF2-24
GEN BREAKER TRIPPED	CB-98/CB-95	SDE-81/SDE-84	NW SDE-81/NW SDE-84

CUSTOMER PARALLELING RELAYS
UTILITY BREAKER CONTROL RELAYS

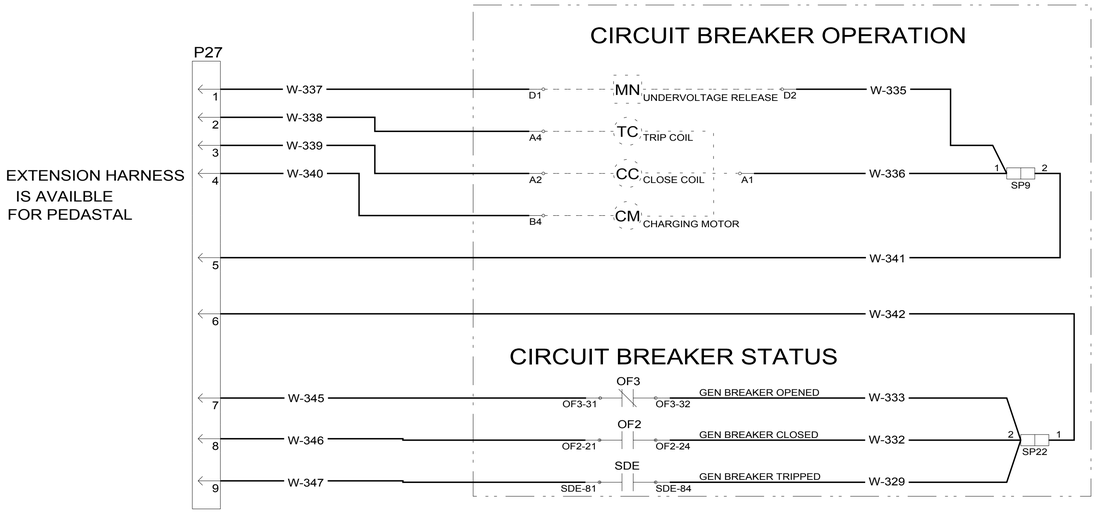
[19,A]	W-260 CTB44-2!1		
[19,A]	W-259 CTB42-2!1		
[19,B]	W-255 CTB38-2!1	1 — 2 W-091 SP25!2	[18,D]
[19,A]	W-258 CTB39-2!1	SP25	

SIM TO A053C830	DWN G.THARIVITLA		CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)
	APVD J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL — PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 — FIRST USED ON DQCA/B/C	PGF	DWG SIZE D — A054A427 — SHEET 5 OF 9 — DWG REV A

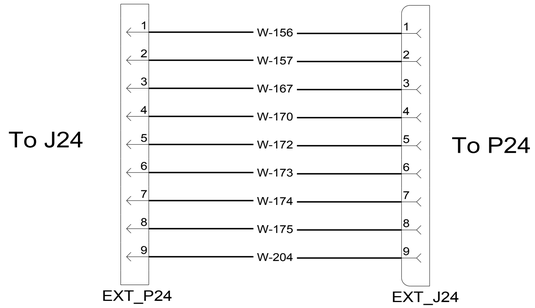
RSN 1344261
PERMIT# 2018-1573853-LT

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

PARALLELING EXT HARNESS (P- FRAME SCHNEIDER) - A051N617



PARALLELING EXTENSION HARNESS (P- FRAME SCHNEIDER)- A052Y190



PARALLELING EXT HARNESS (NW- FRAME SCHNEIDER)- A054X498

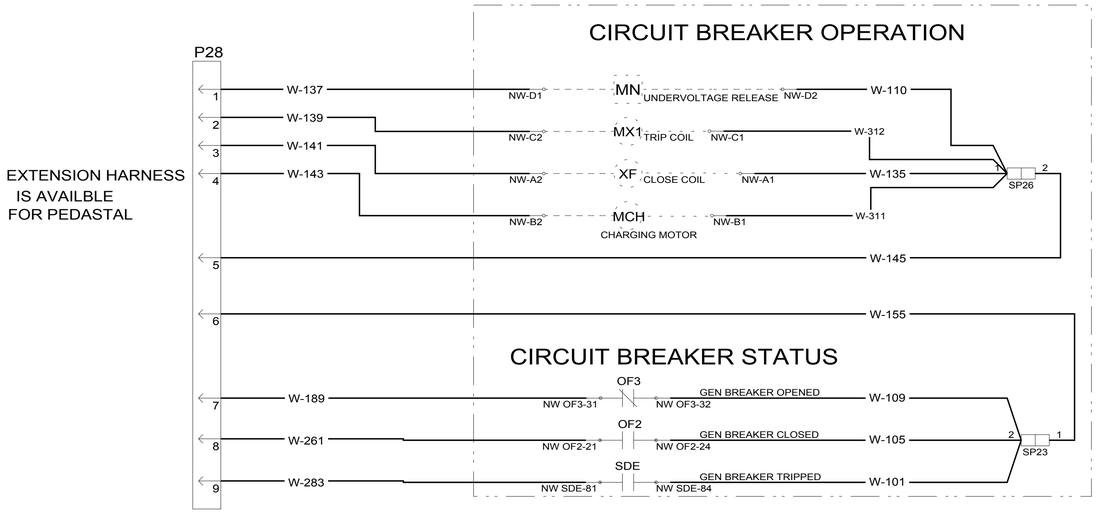


	ABB	P- FRAME Schneider	NW- FRAME Schneider
UNDERVOLTAGE RELEASE	CB-D1/CB-D2	D1/D2	NW-D1/NW-D2
TRIP COIL	CB-C11/CB-C12	A4/A1	NW-C2/NW-C1
CLOSE COIL	CB-C1/CB-C2	A2/A1	NW-A2/NW-A1
CHARGING MOTOR	CB-U1/CB-U2	B4/A1	NW-B2/NW-B1
GEN BREAKER OPENED	CB-12/CB-11	OF3-31/OF3-32	NW OF3-31/NW OF3-32
GEN BREAKER CLOSED	CB-24/CB-21	OF2-21/OF2-24	NW OF2-21/NW OF2-24
GEN BREAKER TRIPPED	CB-98/CB-95	SDE-81/SDE-84	NW SDE-81/NW SDE-84

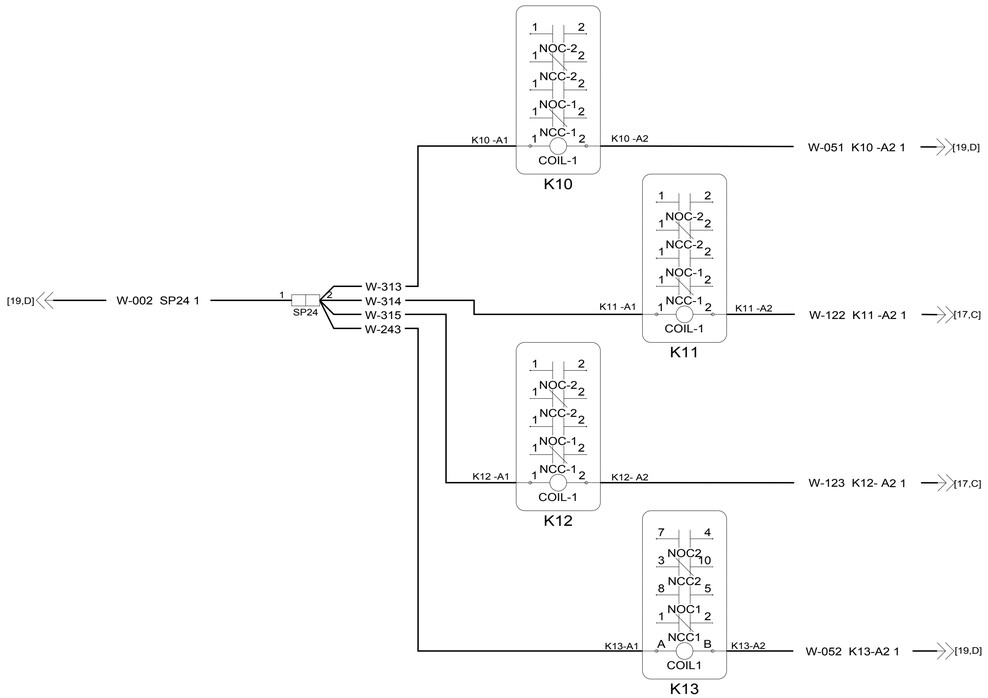
SIM TO A053C830	DWN G.THARIVITLA		CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)
	APVD J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 / FIRST USED ON DQCA/B/C	PGF	DWG SIZE D / A054A427 / SHEET 6 OF 9 / DWG REV A

RSN 1344261
PERMIT# 2018-1573853-LT

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

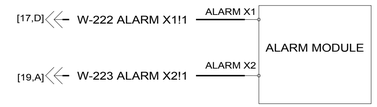
CUSTOMER RELAYS (OPTIONAL)-A049F344

CONFIGURABLE RELAYS (K10, K11 AND K12)

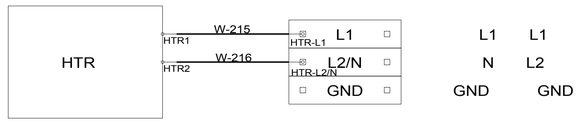


COMMON ALARM RELAY (K13)

CONTROL ALARM (OPTIONAL)-A051W829

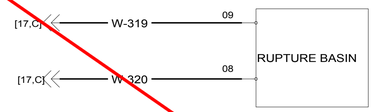


CONTROL HEATER (OPTIONAL)-A050Y672



FUEL XFER PUMP (OPTIONAL)- A052W743

FUEL RUPTURE BASIN (OPTIONAL)



IF REQUIRED FOR THOR OPTIONS, B+, B- AND SWITCH B+ ARE AVAILABLE ON CUSTOMER CONNECTIONS

SEE SHEET 4

SIM TO A053C830	DWN G.THARIVITLA		CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)
	APVR J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 / FIRST USED ON DQCA/B/C	PGF	DWG SIZE D / A054A427 / SHEET 7 OF 9 / DWG REV A

RSN 1344261
PERMIT# 2018-1573853-LT

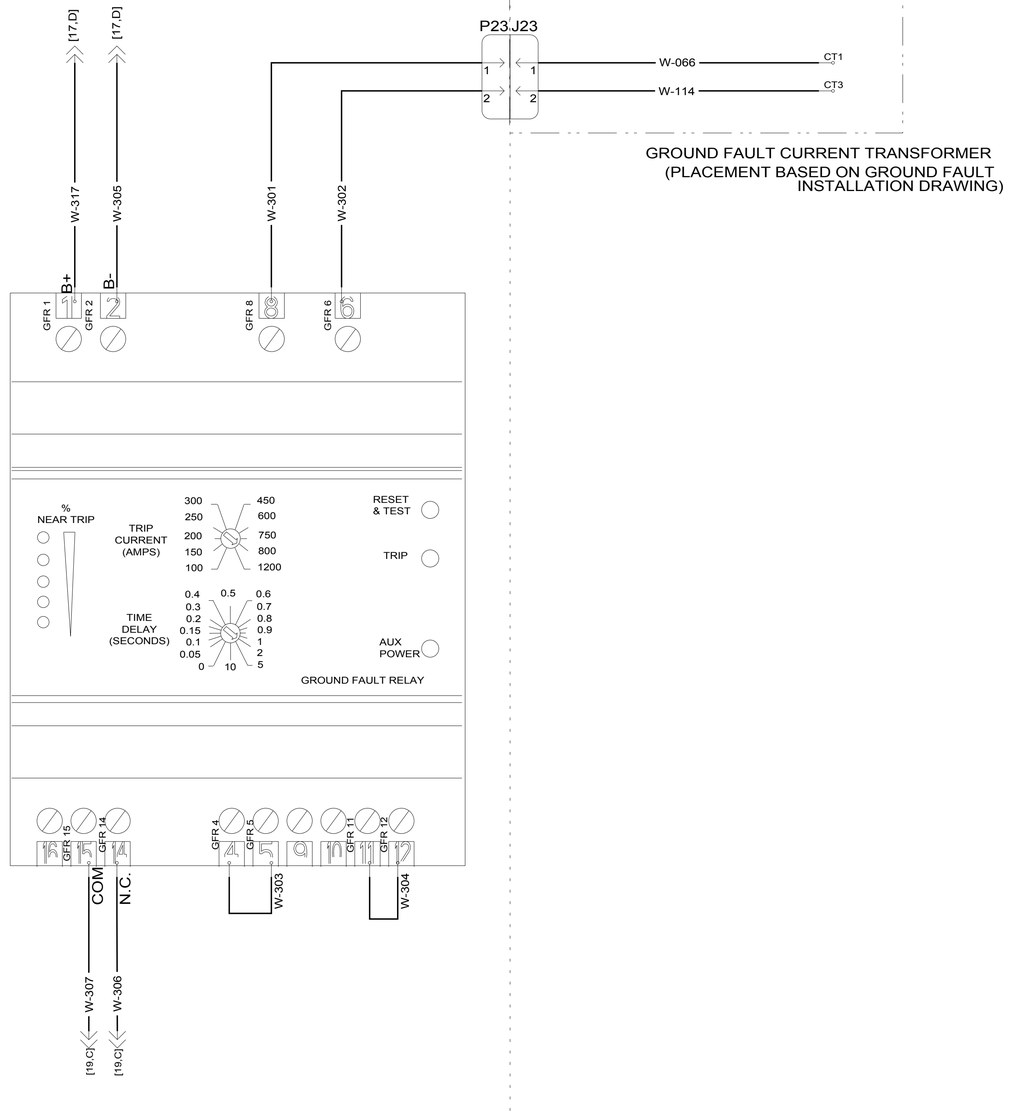
CREO SCHEMATICS

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

GROUND FAULT RELAY (OPTIONAL)

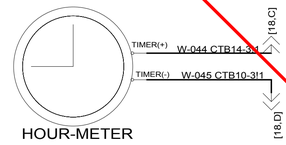
GFR-EXTENSION- A052J508

GFR-INTERNAL- A051L596

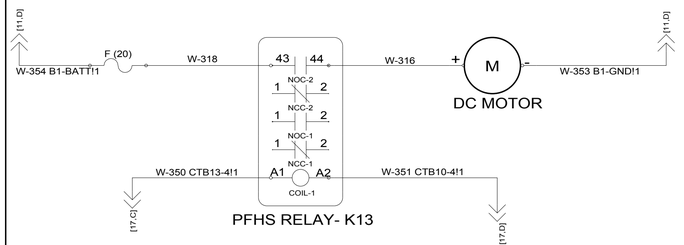


GROUND FAULT CURRENT TRANSFORMER
(PLACEMENT BASED ON GROUND FAULT
INSTALLATION DRAWING)

HOUR-METER (OPTIONAL)- A054B991



POSITIVE FUEL HEAD SYSTEM- A054E124



SIM TO A053C830	DWN G.THARIVITLA		CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD - PC 3.3)
	APVR J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 / FIRST USED ON DQCA/B/C	PGF	DWG SIZE D / A054A427 / SHEET 8 OF 9 / DWG REV A

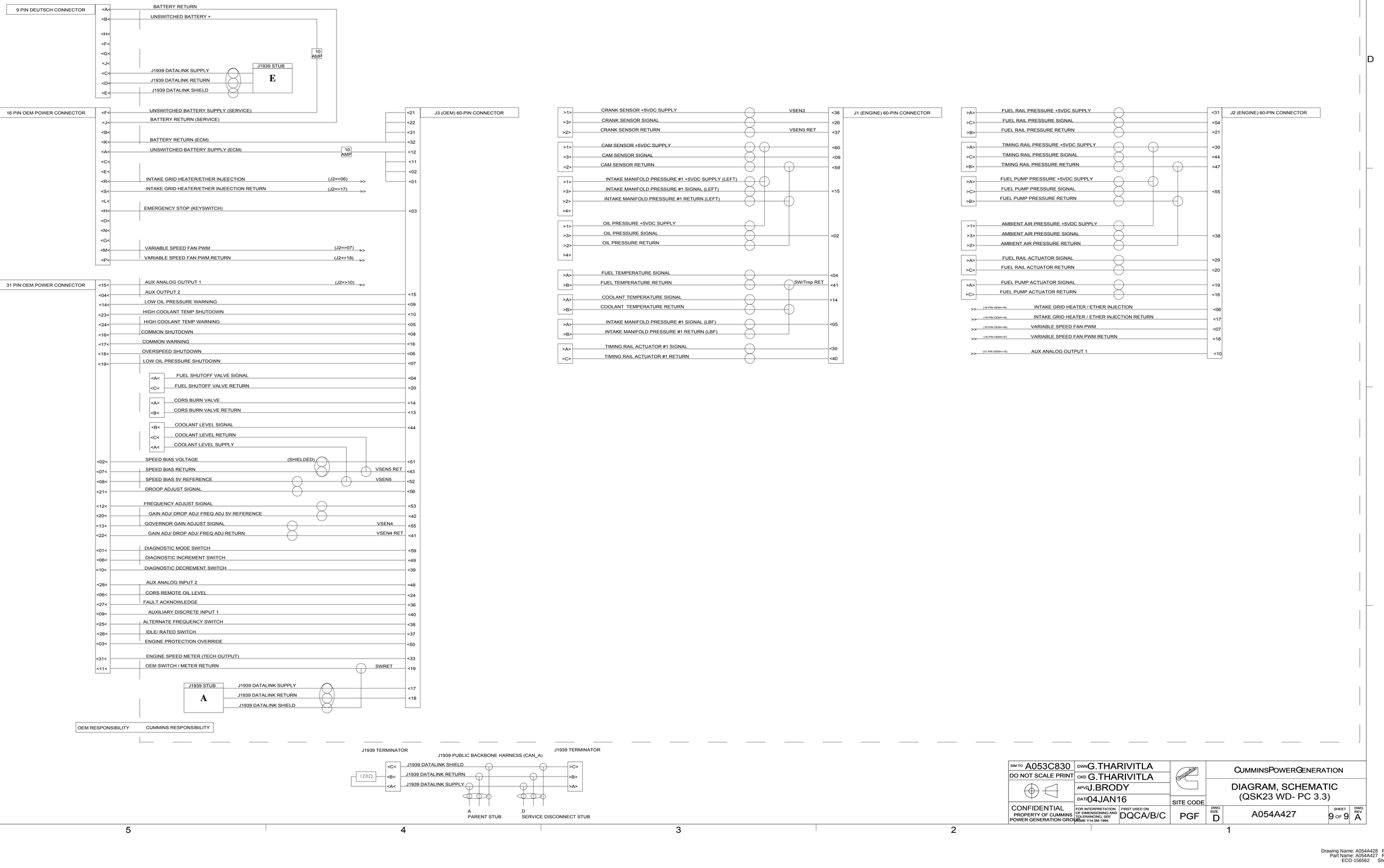
RSN 1344261
PERMIT# 2018-1573853-LT

RS Designer

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-156562	A	1	PRODUCTION RELEASE	GPT	GPT	J.BRODY	04JAN16

FOR REFERENCE:

QSK23 HPI_PGI- CM2250



SIM TO A053C830	DWN G.THARIVITLA	Cummins	CUMMINS POWER GENERATION
DO NOT SCALE PRINT	CKD G.THARIVITLA		DIAGRAM, SCHEMATIC (QSK23 WD- PC 3.3)
	APVD J.BRODY		
	DATE 04JAN16	SITE CODE	
CONFIDENTIAL PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 / FIRST USED ON DQCA/B/C	PGF	DWG SIZE D · A054A427 · SHEET 9 OF 9 · DWG REV A

Warranty

RSN 1344261
PERMIT# 2018-1573853-LT

Warranty Statement

Our energy working for you.™

Power Generation

Global Commercial Warranty Statement

Generating Set

Our energy working for you.™

Power Generation

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 200 hours of operation per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Base Warranty Coverage Duration (Whichever occurs first)

Rating	Months	Max. Hours
COP	12	Unlimited
PRP	12	Unlimited
LTP	12	500 hrs
ESP	24	400 hrs

† 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.

In addition, the owner will be responsible for:

- 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.
- 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.

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.cumminspower.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:_____

Notes:


Cummins