

SUBMITTAL PACKAGE

CSDG - 5157-5160
(1500KW GENERATOR)

Prepared For:

Central States Diesel Generators, LLC
2001 S Prairie Ave
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DISCLAIMER

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Cummins power solutions are supported by the largest and best-trained worldwide certified sales/distributor network in the industry. This network will help you select and install the critical power solution to meet the requirements of your specific application. This same network provides experts with advanced technology to make your life easier while providing a seamless support experience.

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

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

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

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

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

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

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SECTION 1

Project Information

Bill of Material

Feature Code	Description	Qty
C1500D6E	**C1500D6E, Diesel Genset, 60Hz, 1500kW**	**2**
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
L170-2	Emission Certification, EPA, Tier 2, NSPS CI Stationary Emergency	
L090-2	Listing - UL 2200	
A331-2	Duty Rating - Standby Power (ESP)	
R184-2	Low Voltage (220/380V - 347/600V)	
R002-2	Voltage - 277/480, 3 Phase, Wye, 4 Wire	
E170-2	40C/104F Ambient Temperature (Standard Cooling System)	
E169-2	240VAC	
L050-2	Literature - English	
H536-2	Control Display Language - English	
KR78-2	Output Terminals - 2 - Hole Lug, NEMA	
BE11-2	125C Temperature Rise	
B731-2	Alternator - 60Hz, Wye, 380 - 480V, 125/105C - Standby/Prime	
H679-2	Control Mounting - Front Facing	
H704-2	PowerCommand 3.3 Controller, Paralleling Capable	
H606-2	Analog Meters - AC Output	
H720-2	AmpSentryTM UL Listed Protective Relay	
KA08-2	Alarm - Audible, Engine Shutdown	
H678-2	LCD Control Display	
M683-2	Circuit Breaker or Entrance Box - Single	
M700-2	Manual Circuit Breaker - Right	
0431	CB dual breaker type_None	
KB72-2	Circuit Breaker or Entrance Box - Bottom Entry,Right Side	
KP82-2	Circuit Breaker - 2500A, Right, 3P, UL 600, IEC 415, UL Serv Ent, 100%	
0440	Circuit Breaker or Entrance Box - None - Left	
H668-2	Indication - Ground Fault, 4 - Pole, Transfer Switch and Circuit Breaker Right Side	
KR02-2	Circuit Breaker Lugs - Mechanical, Right Side	
A333-2	Battery Charging Alternator	
H756-2	Water in Fuel (WIF) sensor	
H545-2	Low fuel pressure sensor	
H389-2	Shutdown - Low Coolant Level	
H527-2	Warning - Low Coolant Level	
E166-2	Temperature independent coolant heater (208/240)	
D041-2	Engine Air Cleaner - Normal Duty	
DC02-2	Air Cleaner Restriction Indicator - Mechanical	
H607-2	Engine Oil Filters, Full Flow with Bypass	
H734-2	Oil Sampling Valve	
A334-2	Engine Starter - 24 Volt DC Motor	
C333-2	Fuel Hoses	
L312-2	Genset Warranty - 3 Years Base, 1000 hours	
A358-2	Packing - Standard. This is the standard packing for domestic over-the-road deliveries	
C325-2	Fuel Filters - Engine, Single	
A072H671-FRD	Battery Charger-10Amp, 120/208/240VAC, 12/24V, 50/60Hz	
0179-3513-02-FRD	INSTALLATION,CIRCUIT BREAKER ACCESSORIES	

A065D000-FRD A064H664-FRD	Installation, Duct Installation, Fuel System	
Enclosure	**GWE-G2-1500-2460 - GPC Weather House Level Reduction Two Sound Attenuated Enclosure**	**2**
Fuel tank	**SB2N-3356 - UL-142 Listed Sub Base Fuel Tank, 24 hr Usable Gallons**	**2**

NOTES:

Proposal is for equipment only, offloading, rigging, and installation by others.
Fuel and permits, unless listed above, is not included.
Cummins Standard Start-up and testing is included. Additional tests, such as NETA testing, if required, is by others
Coordination Study not provided.

SECTION 2

Generator Specifications

~~C1250D6E~~
C1500D6E

DIESEL GENERATOR SET SPECIFICATION SHEET

QSK38 ENGINE, 1250-1500 kWe, 60 Hz, EPA TIER 2 NSPS CERTIFIED (STATIONARY EMERGENCY)

DESCRIPTION

Cummins commercial generator sets are fully integrated power generation systems for stationary standby power and data center applications.
The Centum™ Series meets the demand for efficient and sustainable power with performance, flexibility, and commitment – for the next generation of power.



FEATURES

Cummins Heavy-Duty Engine: Rugged, four-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, fault clearing short-circuit capability and class H insulation.

ISO 8528-5 G3 Capable: Consult factory for site and configuration specific transient performance information.

HVO Fuel Compatible: Approved for use with paraffinic fuels (EN15940), including Hydrotreated Vegetable Oil (HVO), which has a very low life cycle carbon emission.

Data Center Continuous (DCC): Applicable for supplying power continuously to a constant or varying electrical load for unlimited hours in a data center application.

Uptime compliant: Meets the requirement of a Tier III and IV data center site by being rated to run for unlimited hours of operation when loaded to 'N' demand for the engine generator set.

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

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

Cooling System: High ambient (40 °C) and enhanced high ambient (50 °C), integral set-mounted radiator systems, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

NFPA: Capable of meeting NFPA 110 Type 10 for Level 1 Emergency or Standby Power Supply Systems (EPSSs) when installed and operated per Cummins and NFPA guidelines.

Warranty and Service: Backed by a standard three-year warranty and worldwide distributor network.

MODELS

	Emergency Standby Power (ESP) Rating[1] kWe (kVA)	Prime Power (PRP) Rating[1,2] kWe (kVA)	Data Center Continuous (DCC) Rating[1,2] kWe (kVA)	Data Sheet
C1250D6E	1250 (1563)	1136 (1420)	1136 (1420)	NAD-6630
C1500D6E	1500 (1875)	1364 (1705)	1364 (1705)	NAD-6631

[1] All ratings include radiator fan losses.
[2] Prime rating and DCC at standby power rating available subject to Cummins' site-specific assessment; contact your Cummins distributor.

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Centum™ SERIES GENERATORS

GENERATOR SET SPECIFICATIONS

Performance class	Genset models have been tested in accordance with ISO 8528-5. Consult factory for transient performance information
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Electromagnetic compatibility performance	Emissions to EN 61000-6-2:2005 Immunity to EN 61000-6-4:2007+A1:2011 Complies with FCC PART 15 subpart B and ICES-002

ENGINE SPECIFICATIONS

Bore	159 mm (6.26 in.)
Stroke	159 mm (6.26 in.)
Displacement	37.8 liters (2307 in3)
Configuration	Cast iron, V 12 cylinder
Battery capacity	1800 amps minimum at ambient temperature of -18 °C (0 °F)
Battery charging alternator	100A
Starting voltage	24 volts, negative ground
Fuel system	Cummins YZ Modular Common Rail System (MCRS)
Fuel filter	Two-stage, spin-on fuel filter and water separator system. Stage 1: remote mounted, 5 µm duplex filter with two priming pumps. Stage 2: engine mounted, 3 µm triple element filter
Air cleaner	Dry replaceable element
Lube oil filter	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient cooling system

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
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

AVAILABLE VOLTAGES (60 Hz LINE-TO-NEUTRAL / LINE-TO-LINE)[3]

220/380	225/440	2400/4160	3810/6600	6350/11000
277/480	347/600	3637/6300	3983/6900	

[3] Additional voltages may be available; contact your Cummins distributor

GENERATOR SET OPTIONS AND ACCESSORIES[4]

Generator Set
- Oil sampling valve
- 10A battery charger
- Set mounted circuit breakers up to 3200 Amps
- Circuit breaker aux and trip contacts
- Anti-vibration mounts
- Battery temperature sensor
- IBC Certification
- HCAI Certification

Engine
- 240V thermo-statically controlled coolant heater
- 120/240V 500W lube oil heaters
- Heavy duty air cleaner
- Remote duplex fuel filter
- Engine oil filters - full flow with bypass
- Automatic oil make up system and monitoring
- Engine toolkit

Control Panel
- Masterless load demand
- Multiple language support
- 120/240V 100W control anti- condensation heater
- Exhaust pyrometer
- Ground fault indication
- Paralleling relay package
- Shutdown alarm relay package
- Mechanical hour meter
- 6x user-configurable relays
- 8 additional I/O relays

Alternator
- ~~80°C/105°C~~ /125°C/~~150°C~~ rise
- Stator winding temp sensor 2 RTDs/phase
- Bearing temp sensor RTDs
- ~~1-hole or~~ 2-hole lug output terminal
- Cable entrance box set mounted top or bottom entry
- 120/240V 225W anti- condensation heater
- Generator Louvres

Exhaust System
- Industrial grade silencer
- Residential grade silencer
- Critical grade silencer

Cooling System
- Enhanced high ambient temperature (50 °C)
- Low coolant level warning
- Coolant heater

Data Center options
- Automatic oil make up system
- Closed crank ventilation system
- Oil sampling valve
- Propylene glycol coolant
- Customized testing

Miscellaneous
- Multilingual manuals
- 3-year extended warranty
- 5-year extended warranty
- 10-year extended warranty
- Witness testing
- Virtual witness test
- Tier 4 compliant aftertreatment kits shipped loose

[4] Some options may not be available on all models; contact your Cummins distributor.
Data Center options are available through RFQ with the Custom Applications Group and could result in additional lead-times. Please consult with the Custom Applications Group to understand feasibility.

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Centum™
SERIES GENERATORS

PowerCommand® 3.3

CONTROL SYSTEM DESCRIPTION

The PowerCommand® 3.3 is an integrated, microprocessor-based, generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

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

Power Management: Control function provides battery monitoring and testing features and smart starting control system.

Advanced Control Methodology: Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications Interface: Control comes standard with PCCNet and Modbus interface.

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

Easily Upgradeable: PowerCommand® controls are designed with common control interfaces.

Reliable Design: The control system is designed for reliable operation in harsh environment.

Multi-Language Support

OPERATOR PANEL FEATURES

Operating/Display Functions

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

Paralleling Control Functions

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

Alternator Data

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

Engine Data

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



OPERATOR PANEL FEATURES (CONT.)

Other Data

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

STANDARD CONTROL FEATURES

Digital Governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital Voltage Regulation

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

AmpSentry™ AC Protection

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

Engine Protection

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

Control Functions

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

Options

- Auxiliary output relays (2)

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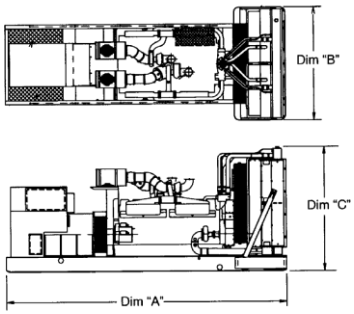
Centum™ SERIES GENERATORS

RATING DEFINITIONS

Emergency Standby Power (ESP)	Prime Power (PRP)	Data Center Continuous (DCC)
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. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.	Prime Power for Stationary Emergency ratings apply to installations served by a reliable utility source. 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 3046-1. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.	Applicable for supplying power continuously to a constant or varying electrical load for unlimited hours in a data center application. Designed to comply with Uptime Institute® Tier III and IV data center site requirements by being rated to run for unlimited hours of operation when loaded to 'N' demand for the engine generator set.

GENERATOR SET DIMENSIONS AND WEIGHTS[5]

See the enclosure/fuel tank outline drawing in Section 4 for total weights and dimensions.



Model Name	Dim. "A" mm (in)	Dim. "B" mm (in)	Dim. "C" mm (in)
C1250D6E	5085 (200)	2184(86)	2406(94.7)
C1500D6E			

Model Name	As Shipped Cooling System Weight (Dry) kg (lb)	Installed Set Weight (Wet) kg (lb)
C1250D6E	9197 (20276)	9687 (21357)
C1500D6E	9231 (20351)	9721 (21431)

[5] Do not use for installation design. Longest alternator (G-core) used for dimension "A". All weights are approximate and represent a generator set with standard features and heaviest alternator (low voltage G-core). "As Shipped Set Weight (No Cooling System)" includes weight from engine oil. "Installed Set Weight (Wet)" includes weight from engine oil and coolant. See respective model data sheet for specific model outline drawing number that contains weights of other configurations.

CODES AND STANDARDS[6]

ISO 9001 ISO 14001 ISO 45001	This product was manufactured in a facility whose quality management system is certified to ISO 9001 and its Health Safety Environmental Management Systems certified to ISO 14001 and ISO 45001.	UL LISTED	UL Listing to UL 2200, "Stationary Engine Generator Assemblies" is available for this genset model. The PowerCommand® control is listed to UL 508 – Category NITW7 for U.S. and Canadian usage.
PTS	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.	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards (NSPS), 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
CSA	All genset models are available as CSA certifiedto CSA C22.2 No. 100.	IBC INTERNATIONAL BUILDING CODE	The generator set package is available certified for seismic application in accordance with International Building Code.

[6] Codes or standards compliance may not be available with all model configurations; contact your Cummins distributor.

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C1500D6E

DIESEL GENERATOR SET DATA SHEET

MODEL: C1500D6E
FREQUENCY: 60 Hz
FUEL TYPE: DIESEL
RATING: 1500 kWe (1875 kVA) EMERGENCY STANDBY POWER (ESP)[1]
~~1364 kWe (1705 kVA) DATA CENTER CONTINUOUS (DCC)[1,2]~~
EMISSIONS CERTIFICATION: EPA NSPS STATIONARY EMERGENCY TIER 2

GENERATOR SET PUBLICATIONS

Exhaust emission data sheet	EDS-3087
Exhaust emission compliance statement	EPA-2066
Sound data sheet	MSP-4122
Cooling system data sheet	MCP-2177
Seismic certificate of compliance	VMA-53914-01C
Prototype test support data sheet	PTS-717 / PTS-718
Genset outline drawing	A062V279
Genset wiring schematic diagram	A065D445

ENGINE SPECIFICATIONS

		Emergency Standby Power (ESP)	Data Center Continuous (DCC)
Manufacturer		Cummins Inc.	
Model		QSK38-G18	
Configuration		Cast iron, V12 cylinder	
Aspiration		Turbocharged and Charge Air Cooled	
Gross engine power output	kWm (bhp)	1659 (2225)	1500 (2011)
Brake mean effective pressure at set rated load	kPa (psi)	5853 (849)	5240 (760)
Bore	mm (in)	159 (6.26)	
Stroke	mm (in)	159 (6.26)	
Displacement	L (in^3)	37.8 (2307)	
Rated speed	rpm	1800	
Piston speed at rated speed	m/s (ft/min)	9.54 (1878)	
Compression ratio		14.7:1	
Lube oil capacity	L (US gal)	117 (30.9)	
Overspeed limit	rpm	2070	
Regenerative power	kWm (hp)	124 (166)	

FUEL CONSUMPTION

Rating	kWe (kVA)	1500 (1875)				1364 (1705)			
Load		25%	50%	75%	100%	25%	50%	75%	100%
Fuel Consumption	US gph	31.7	56.8	81.9	102.5	29.5	51.8	75.1	95.3
Fuel Consumption	L/h	120	215	310	388	112	196	285	361

[1] Generator set ratings include radiator fan losses
[2] DCC at standby power available subject to Cummins' site-specific assessment; contact your Cummins distributor

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FUEL SYSTEM

		Emergency Standby Power (ESP)	Data Center Continuous (DCC)
Maximum fuel flow	L/h (US gph)	800 (211)	
Maximum fuel inlet restriction	kPa (inHg)	25 (7.4)	
Maximum fuel inlet temperature	°C (°F)	70 (158)	
Maximum fuel return temperature	°C (°F)	120 (248)	

AIR SYSTEM

Combustion air flow (at set rated load)	m^3/min (scfm)	125 (4408)	122 (4303)
Maximum air cleaner restriction (dirty filter)	kPa (inH2O)	3.7 (15)	
Alternator cooling air flow	m^3/min (scfm)	195 (6886)	

EXHAUST SYSTEM

Exhaust flow (at set rated load)	m^3/min (cfm)	301 (10631)	290 (10235)
Exhaust temperature (at set rated load)	°C (°F)	499 (930)	486 (908)
Maximum back pressure	kPa (inH_2O)	10.1 (40.6)	

COOLING SYSTEM (SET MOUNTED) – HIGH AMBIENT

Ambient design (limiting ambient temp.)	°C (°F)	40.0 (104)	
Fan load	kWm (hp)	66 (88.5)	
Coolant capacity (engine + radiator)	L (US gal)	272 (72)	
Cooling system air flow (at max. restriction)	m^3/min (acfm)	994.5 (35121)	
Total heat rejection to radiator	MJ/min (Btu/min)	64.4 (61041)	59.31 (56215)
Nominal air flow static restriction	kPa (inH_2O)	0.12 (0.5)	
Maximum fuel return line restriction	kPa (in Hg)	33.8 (10)	

COOLING SYSTEM (SET MOUNTED) – ENHANCED HIGH AMBIENT

Ambient design (limiting ambient temp.)	°C (°F)	50.0 (122)	
Fan load	kWm (hp)	73.5 (98.6)	
Coolant capacity (engine + radiator)	L (US gal)	272 (72)	
Cooling system air flow (at max. restriction)	m^3/min (acfm)	1377 (48615)	
Total heat rejection to radiator	MJ/min (Btu/min)	64.4 (61041)	59.31 (56215)
Nominal air flow static restriction	kPa (inH_2O)	0.12 (0.5)	
Maximum fuel return line restriction	kPa (in Hg)	33.8 (10)	

GENERATOR SET WEIGHTS[3]

		As Shipped Cooling System Weight (Dry)	Installed Set Weight (Wet)
C1500D6E	kg (lb)	9231 (20351)	9721 (21431)

[3] All weights are approximate and represent a generator set with standard features and heaviest alternator (low voltage G-core). “As Shipped Set Weight (No Cooling System)” includes weight from engine oil. “Installed Set Weight (Wet)” includes weight from engine oil and coolant. See respective model data sheet for specific model outline drawing number that contains weights of other configurations.

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GENERATOR SET DERATING FACTORS[4]

Emergency Standby Power (ESP)	**High Ambient Cooling System:** Full rated power available up to 1463 m (4800 ft) elevation at ambient temperatures up to 40 °C (104 °F). **Enhanced High Ambient Cooling System:** Full rated power available up to 671 m (2200 ft) elevation at ambient temperatures up to 50 °C (122 °F).
Data Center Continuous (DCC)	**High Ambient Cooling System:** Full rated power available up to 1707 m (5600 ft) elevation at ambient temperatures up to 40 °C (104 °F). **Enhanced High Ambient Cooling System:** Full rated power available up to 853 m (2800 ft) elevation at ambient temperatures up to 50 °C (122 °F).

[4] Note: Ambient operating temperature is defined as the air temperature measured at the room (or enclosure) inlet, assuming a temperature rise of 3 °C to the turbocharger compressor inlet.

RATING DEFINITIONS

Emergency Standby Power (ESP)	Data Center Continuous (DCC)
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. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.	Applicable for supplying power continuously to a constant or varying electrical load for unlimited hours in a data center application. Designed to comply with Tier III and IV data center site requirements by being rated to run for unlimited hours of operation when loaded to 'N' demand for the engine generator set.

FORMULAS

Calculating Power Factor	Calculating Full Load Current (Three Phase AC Output)	Calculating Full Load Current (Single Phase AC Output)
$\cos\theta = \frac{Active\ (True, Real)\ Power}{Apparent\ Power} = \frac{P_{(kW)}}{\lvert S\rvert_{(kVA)}}$ Power Factor = 0.8 (industry standard)	$I = \frac{\lvert S\rvert_{(kVA)}}{\sqrt{3} \times V} = \frac{1000 \times P_{(kW)}}{\sqrt{3} \times V \times \cos\theta}$	$I = \frac{\lvert S\rvert_{(kVA)}}{V} = \frac{1000 \times P_{(kW)}}{V \times \cos\theta}$

Bulletin NAD-6631 PD00001143 Produced in U.S.A. (Rev. 03/26)
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Specification Sheet

PowerCommand® 3.3 Generator Set Digital Integrated Control System



Bargraph Optional

Introduction

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

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

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

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

Benefits and Features

- 320 x 240 pixels graphical LED backlit LCD
- Multiple languages supported
- AmpSentry™ protection provides industry-leading generator overcurrent protection
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr control
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing is provided on applicable platforms
- Generator set monitoring (including metering) and protection with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- 12 V (DC) and 24 V (DC) battery operation
- RS-485 Modbus® interface for interconnecting to customer equipment
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA, and CE standards

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PowerCommand® Generator Set Digital Control System PCC 3300



Introduction

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

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

Features

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

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Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

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

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

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

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

Alternator data

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

For Lean Burn Natural Gas Engine applications:

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

Utility/AC bus data

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

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

Engine data

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

Lean Burn Natural Gas (LBNG) application parameters include:

- Safety shutoff valve status
- Valve proving status
- Downstream gas pressure
- Gas inlet pressure
- Gas mass flow rate
- Control valve position
- Gas outlet pressure
- Manifold pressure and temperature
- Throttle position
- Compressor outlet pressure
- Turbo speed
- Compressor bypass position
- Cylinder configuration (e.g., drive end and non-drive end configurations)
- Coolant pressure 1 and 2 as well as coolant temperature 1 and 2 for both HT/LT respectively
- Exhaust port temperature (up to 18 cylinders)
- Pre-filter oil pressure
- Exhaust back pressure
- Parent ECM internal temperature and isolated battery voltage
- Speed bias
- Child ECM internal temperature and isolated battery voltage
- Knock level, spark advance, and knock count (for up to 18 cylinders)
- Auxiliary supply 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 HMI320 includes provisions for adjustment and calibration of genset control functions. Adjustments are protected by a password. Functions include:

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

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Prime Mover Control

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

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

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

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

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

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

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

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

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

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

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

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

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

Lean Burn Natural Gas application specific parameters

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

Generator Control

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

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

Major features of generator control include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-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.

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

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

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

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

Paralleling Functions

First Start Sensor™ system – PowerCommand® provides a unique control function that positively prevents multiple gensets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between the gensets that allows the gensets to work together to determine which genset 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 hertz. The synchronizer function is configurable for slip frequency synchronizing for applications requiring a known direction of power flow at instant of breaker closure or for applications where phase synchronization performance is otherwise inadequate.

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

Load govern control– When PowerCommand® receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW values from 0-100% of standby rating, and 0.7-1.0 power factor (lagging). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAR load govern droop.

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

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

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

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

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

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

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

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

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

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

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

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

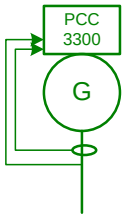
Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped.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

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

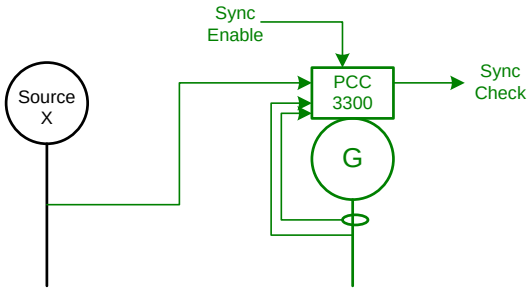
Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for either the genset metering point ("Base Load") or the utility metering point ("Peak Shave"). The control point for the reactive power (kVAR or Power Factor) can also be independently configured for either the genset metering point or the utility metering point. This flexibility would allow base kW load from the genset while maintaining the utility power factor at a reasonable value to avoid penalties due to low power factor. The System always operates within genset ratings. The control point can be changed while the system is in operation. Set points can be adjusted via hardwired analog input or adjusted through an operator panel display or service tool.

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

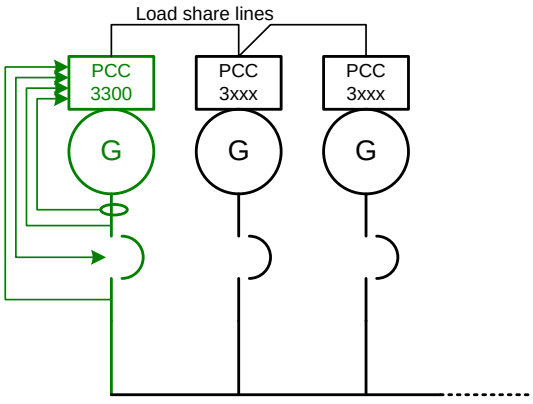
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



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

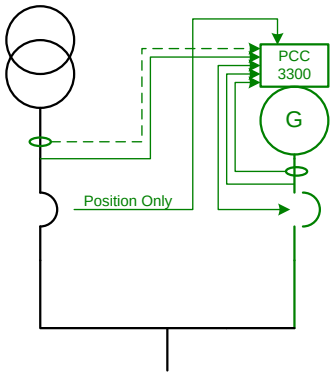


Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.

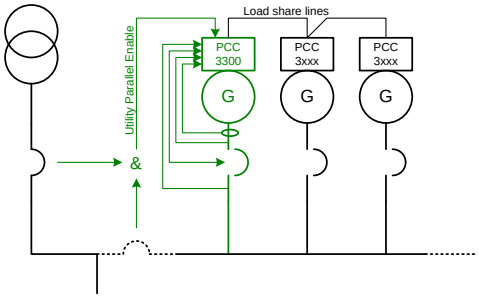


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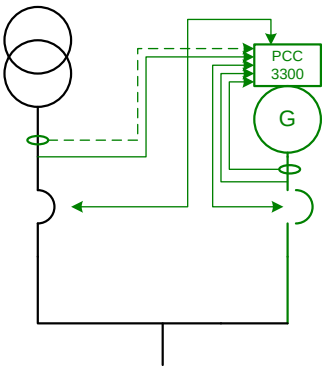
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



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

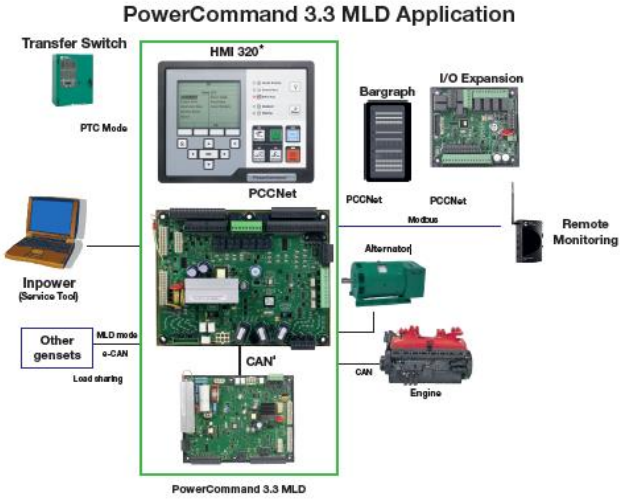


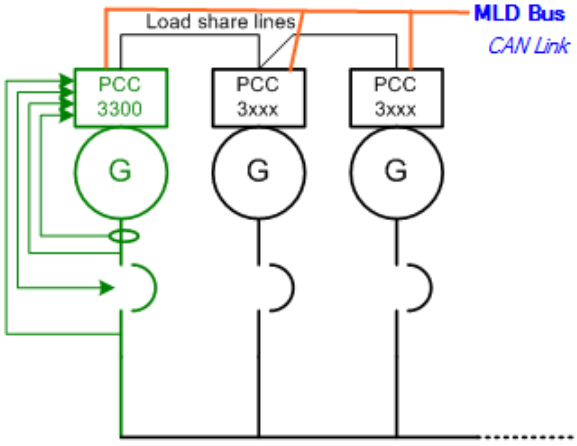
Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

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





PCC3300 External Voltage and Frequency Biasing Inputs

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

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Protective Functions

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

Battle short mode

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

Derate

The Derate function reduces output power of the genset in response to a fault condition. If a Derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or Modbus. If a Derate command occurs while in utility parallel mode, the control will actively reduce power by lowering the base load kW to the derated target kW.

Configurable alarm and status inputs

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

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

Emergency stop

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

General prime mover protection

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

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

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

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

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

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.

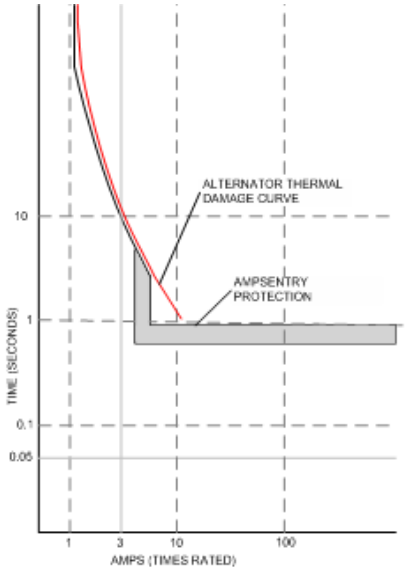
Full authority electronic engine protection:

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

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Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand® Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the genset or in the load. It also provides single and three phase fault current regulation (3x Current) so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3 phase short) or fixed timer (2sec for 1P short, 5sec for 2P short). See document R1053 for a full-size time over current curve. The control does not included protection required for interconnection to a utility (mains) service.



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

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

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

Under frequency shutdown (81 u) - Genset output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5-20 second time delay. Default: 6 Hz, 10 seconds. Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

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

Overcurrent warning/shutdown (51) - Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

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

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

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point. Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

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

Reverse Var shutdown (40) - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

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

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

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

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

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Paralleling Protection

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

Breaker fail to open warning: The control system monitors the operation of breakers that have been signaled to open. If the breaker does not open within 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

Input signals for Lean Burn Natural Gas Engine applications:

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

Output signals from the PowerCommand® control include:

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

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

Output Signals for Lean Burn Natural Gas Engine applications:

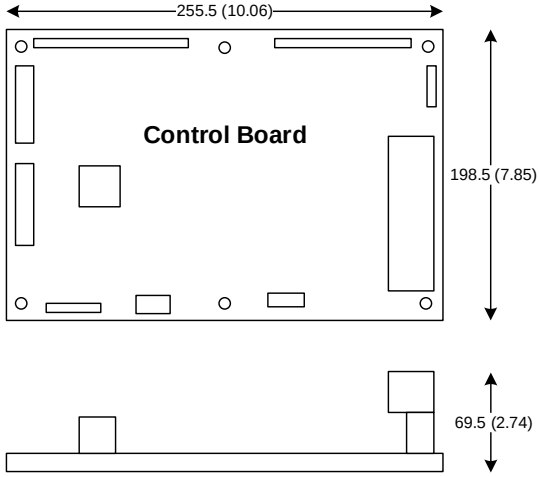
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

Communications connections include:

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

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins Power Generation products.

Mechanical Drawing



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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.

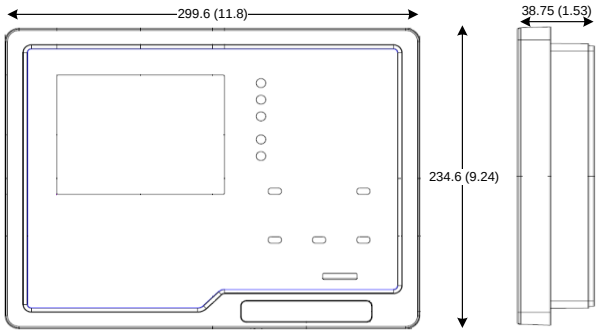
Features:

- 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., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

Communications connections include:

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

Mechanical Drawing



HMI

Dimensions: mm (inches)

Software

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

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Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC (-40 ºF) to +70º C (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 8528-4:2005 compliance, controls and switchgear (second edition)
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking- The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN 61000-6-3,4 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized, suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand® control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.
- ROHS (Restriction of Hazardous substance) complaint both for HMI 320 & PCC3300v2.

Reference Documents

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

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

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

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

Warranty

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

PCCNet COMPATIBLE

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GLOBAL POWER COMPONENTS®

Submittal Date: 10/08/2026

Project Name: L2 Enclosure

Company Name: Cummins

Job Number: 143924

Table of Contents:

Section 1: Bill of Materials

Section 2: Enclosure Components

Section 3: Tank components

Section 6: Enclosure Color Chart

Section 7: Warranty Statement

Bill of Materials

Section 1

EVERYTHING BUT THE GENERATOR™
• Genset Enclosures • Equipment Centers • Fuel Tanks • Trailers • Iso Containers •

PRODUCT DATA

Qty	Part #	Description
		GPC Enclosure Model
		GWE-G2-1500-2460
		130"H x 108"W x 324"L +73" Intake Hood
1	GWE-G2	GPC Weather House Enclosure Level 20-25 dba Reduction Two Sound Attenuated 14 Gauge Galvannealed Construction
7	6505	Hinged Door
7	6501	Stainless Steel Door Hardware (Pad-Lockable)
7	6507	Stainless Steel Door Restraint
1	6610	External Intake Hood
1	6615	Internal Vertical Discharge Plenum
1	6522	Insulated w/3" Insulation Board
1	6520	Perforated Interior Lining
1	Color	Paint Color Selection To Be Determined
		Options Included
4	6982	LED Fixture (4' Vapor Tight)
1	6914	100A LOAD CENTER (120/240V OR 120/208V, 1 PHASE)
1	6905	(2) 3 Way Light Switches
1	6916	GFCI Outlet (20A)
1	6918	GFCI PROTECTED OUTLET (20A)
1	6518E	Extend Fumes Disposal to Exterior of EnclosureExtend Oil & Coolant Drains to Exterior (Generator Set to be Supplied w/Valves)
1	6843	GPC Supplied Exhaust System (GPC Supplied Flex)
1	6855	Internally Mounted Silencer
1	6805	Rain Collar
1	6870	Vertical Silencer Discharge (Includes Elbow and Rain Cap - Ships Loose)

Qty	Part #	Description
		UL-142 Listed Sub Base Fuel Tank Model
		SB2N-3356 24 hr Usable Gallons
		24"H x 108"W x 324"L
		Exhaust System
1	DW-101	Double Wall Secondary Containment
1	4001	Notched Electrical Stub Up Area
1	8002	Removable Stub Up Access Panel
1	3660	1" Supply/Return Dip Tube Package (2" NPT)
1	1000	Low Level Alarm (2" NPT, Set at 50%)
1	3502	Basin Drain, 1/2" NPT
1	1003	Rochester Fuel Level Gauge (2" NPT, Swing Arm)
1	3005	Locking Manual Fill Cap (2" NPT)
1	3152	Standard Vent Cap (2" NPT)
4	3166	Emergency Vent (6" NPT)
4	8410	Flush Mount Lifting Plate (Minimum of 4)
1	9638	Paint Color Gloss Black
7	8303	6" I-Beam Generator Set Support
14	8425	Isolator Pad Support Channel (For Internal Stiffeners)
		Options Included
1	4300	Fuel in Basin Alarm (2" NPT, Top Mounted)
1	1010	High Level Alarm (2" NPT, Set at 90%)
2	700-1075	Spring Check Valve, 1" NPT On engine supply lines
2	3195	Extra Fitting w/Plug (2" NPT)
1	3520	Rain RUNOFF™ Option
1	3518	Vents Located at Radiator End/Fill Internal
2	3193	Extra Fitting w/Plug (1" NPT) for oil and coolant drains
1	3610	Additional 1" Dip Tube (2" NPT)
10	8426	GPC to Provide Isolators (Model MSS-1E)
1	Install Package	Mount Generator Set & Enclosure to Tank and Install Fuel Lines

Shipping Dimensions & Weights (Approximate)
Enclosure & Tank
160"H x 108"W (112"W w/ Handles) x 397" OAL including hood
Dry Weights: 44550# (Includes Generator Set Weight of 21501)

Enclosure Components

Section 2

Switches, Three Way
20A, 120-277V AC
Specification Grade Commercial Switch

HUBBELL

Features

- Thread cleaning captive mounting screw
- Abuse resistant nylon toggle
- Steel, zinc plated bridge is corrosion resistant



Ordering Information

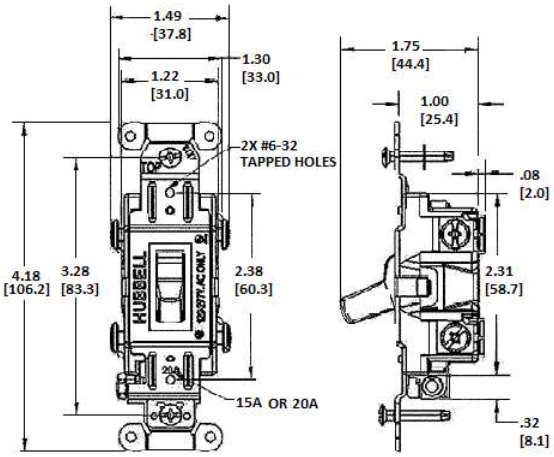
Description	Toggle Color	UPC	Catalog Number
Toggle, back and side wired	Ivory	783585154220	CSB320I

Listings

UL Listed
CSA Certified
Fed. Spec. W-S-896

Specifications

Top Material	Thermoplastic, Gray
Base Material	Thermoplastic, Black
Toggle Material	Nylon
Contacts	Silver Alloy
Terminal Screws	Brass
Auto Grounding Mounting Bridge	Zinc Plated Steel
Ground Screw	Brass (Green)



Performance

Electrical

Dielectric Voltage	Withstands 1500V AC minimum for 1 minute
Max. Continuous Current	20A
Max. Working Voltage	277V AC
Overload	Minimum 4.8 times rated current for 100 cycles
Temperature Rise	30°C maximum at rated current

Mechanical

Terminal Accommodations	#14 AWG min. - #10 AWG max. solid and stranded copper wire only

Environmental

Flammability	UL 94V-2
Operating Temperature	Max. continuous: 75°C; Min. continuous: -40°C without impact

Online Resources

Customer Use Drawing
eCatalog

Dimensions in Inches (mm)

HUBBELL® Wiring Device-Kellems

Straight Blade Devices
20A, 125V, 2 Pole, 3 Wire Grounding

Commercial Specification Grade Duplex Receptacles

HUBBELL

Features

- Easy access split circuit tab
- Nylon face and base
- Wrap-around galvanized steel strap
- Triple wipe contacts



Ordering Information

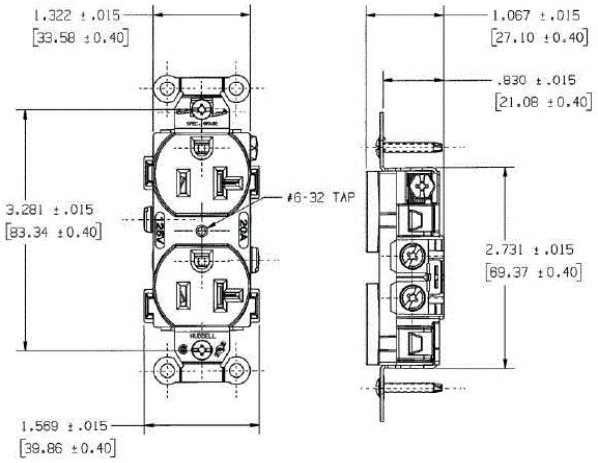
Description	Device Color	UPC	Catalog Number
Smooth face, back and side wired.	Ivory	783585834887	BR20I

Listings

UL Listed to UL498 File No. E2186
Certified to CSA 22.2, No. 42
Fed. Spec. W-C-596
NEMA® WD-6 Compliant

Specifications

Face	Nylon
Base	Nylon
Power Contacts	.030 in. (.8) Brass
Ground Contacts	Brass
Wire Clamp	.062 in. (1.6) Nickel plated steel
Terminal Screws	Plated steel
Mounting Strap	.040 in. (1) Galvanized steel
Automatic Self-grounding Staple	Stainless steel
Mounting Screws	Galvanized Steel



Performance

Electrical

Current Interrupting	Certified for current interrupting at full rated current
Dielectric Voltage	Withstands 2,000V minimum

Mechanical

Product Identification	Ratings are a permanent part of the device
Terminal Accommodation	#12-#10 AWG copper stranded or solid conductor only
Terminal Identification	Terminals identified in accordance with UL 498 and CSA

Environmental

Flammability	UL 94 V-2
Operating Temperatures	Maximum continuous 75°C; minimum -40°C (w/o impact)

Accessories

Wallplate or Weatherproof Cover Duplex Opening

Resources

Customer Use Drawing
eCatalog

Dimensions in Inches (mm)

HUBBELL® Wiring Device-Kellems

HUBBELL
Wiring Device-Kellems

Power Protection Devices, Receptacle, Self Test, GFCI, TRWR, Commercial Grade, 20A 125V, 2-Pole 3-Wire Grounding, 5-20R, Ivory



By Hubbell Wiring Device-Kellems
Catalog # GFRTW20I

Power Protection Devices, Receptacle, Self Test, GFCI, TRWR, Commercial Grade, 20A 125V, 2-Pole 3-Wire Grounding, 5-20R, Ivory.

Features

Single LED status indicator - green indicates power, red indicates a trip, flashing red indicates end of life

General

Catalog Number	GFRTW20I
Color	Ivory
EU RoHS Indicator	Contact Manufacturer
Series	Heavy Duty
Specifications	• Base - Nylon • Face - Nylon • Ground Contacts - Brass • Mounting Screws - Zinc plated steel • Mounting Strap - Zinc plated steel • Power Contacts - Brass
Style	Standard
Type	Tamper-Resistant, Weather Resistant
UPC	883778999383

Electrical Ratings

Current / Amperage Rating	20 A
Voltage Rating Description	125 V

Certifications And Compliance

Industry Standard(s)	Meets All NEC® Requirements
Nema Rating	5-20R

Logistics

Carton Quantity	10

Product Assets

Catalog Page - WDK K-7 Catalog Page
Catalogs - WDK Catalog Full 2024
Engineering Drawing - M-14627 AutoCAD Drawing
Engineering Drawing - GFRTW20I AutoCAD Drawing
Installation Manuals - PD2987
Literature - Commercial GFCI Receptacles
Literature - FREQUENTLY ASKED QUESTIONS Commercial GFCI Receptacles
Sales Drawings - M14627
Sell Sheets - Commercial GFCI- French
Sell Sheets - Commercial GFCI- English
Specifications - GFRTW20I
Specifications - WIRING_GFRTW20I_spec
Specifications - GFRTW20I Specification Sheet

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Product data sheet
Characteristics

QO120M100
LOAD Center QO MB 240V 100A 1PH 20SP

Product availability : Stock - Normally stocked in distribution facility



Main

Product or component type	Load Center
Range of product	QO
Load center type	Main breaker
Line Rated Current	100 A
Number of spaces	20
Short-circuit current	22 kA
Number of circuits	20
Number of tandem circuit breakers	0
Phase	1 phase
System Voltage	120/240 V AC

Complementary

AWG gauge	AWG 6...AWG 1 (aluminium/copper)
NEMA degree of protection	NEMA 1 indoor
Cover type	Order separately
Electrical connection	Lugs
Device composition	Grounding bar (ordered separately)
Electrical connection	Lugs
Wiring configuration	3-wire
Material	Tin plated copper busbar
Enclosure material	Welded sheet steel
Surface finish	Baked enamel grey
Box number	6
Product certifications	UL listed
Height	17.91 in (455 mm)
Width	14.25 in (362 mm)

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Ordering and shipping details

Category	00001 - QO 1PH LC,12-42 CKT,NEMA1
Discount Schedule	DE3A
GTIN	00785901847878
Nbr. of units in pkg.	1
Package weight(Lbs)	11.73
Returnability	Y
Country of origin	US

Offer Sustainability

RoHS (date code: YYWW)	Compliant - since 1248 - Schneider Electric declaration of conformity Schneider Electric declaration of conformity
REACh	Reference not containing SVHC above the threshold Reference not containing SVHC above the threshold
Product end of life instructions	Need no specific recycling operations
California proposition 65	WARNING: This product can expose you to chemicals including:
- - - - - - - Substance 1	Lead and lead compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm.
- - - - - - - More information	For more information go to www.p65warnings.ca.gov

Contractual warranty

Warranty period	18 months

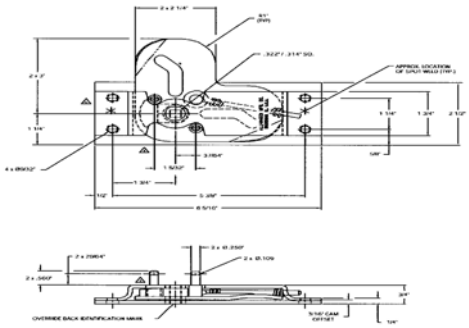
Allegis Product Detail

1-866-378-7550

Allegis Part Number: 107-50 ZN OR
Description: CENTER W/OVERRIDE FEATURE

Print





- Finish: Zinc plated
- 3-point center case
- With override feature

Tank Components

Section 3

ROCHESTER GAUGES, INC.

ISO 9001 AND QS-9000 REGISTERED

Magnetic Liquid-Level Gauges

6500 Series

Magnetic Liquid-Level Guages

Application

The 6500 Series Senior™ gauges are designed for use in low pressure tanks 0-25 psig [0-1,7Bar] containing diesel fuel, gasoline, fuel oil and lubricating oils.

Used in many applications such as construction equipment, stationary generators, boats, farm equipment and home heating.



General Information & Features

The 6500 Series Senior™ gauges are available in gear-action models for top, centerline or angle mounting. In lever-action models centerline mounting is only available.

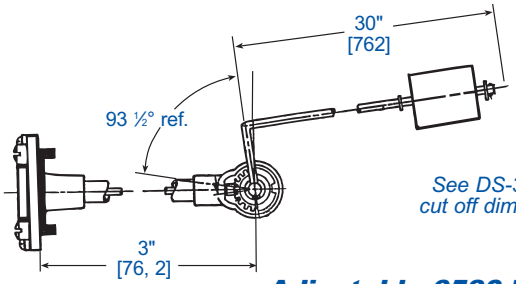
The standard float is nitrile rubber. Aluminum or stainless steel floats are available at extra cost. The gauge is mounted to a mating Senior™ flange 2 ½" bolt circle [63,5mm] using four ¼"-28 x 9⁄16" long screws. The gasket is Buna-N.

Model #	Action	Mounting	Dial, Sender or Switch Data
6540	Gear	Top	Senior™ TwinSite™ Sender in choice of 0-30, 0-90, or 240-30 Ohm ranges. #5002S00062 direct-reading dials may also be used.
6543		C/L or Angle	
L6543	Lever	C/L	
6550	Gear	Top	Standard switch #5023S00778 S.P.S.T., 150 VAC/50 VDC ½ Amp. Please furnish tank drawings and switch points so proper gauge and calibration can be supplied. Other switches available, see DS-364.
6553		C/L or Angle	
L6553	Lever	C/L	
6560	Gear	Top	#5025S00570 Senior™ side-reading fractional
6580			#5002S00062 Senior™ direct-reading fractional
6583		C/L or Angle	
L6583	Lever	C/L	#5002S00547 Senior™ direct-reading fractional
6583-00093	Gear	Top	#5002S00062 direct-reading fractional

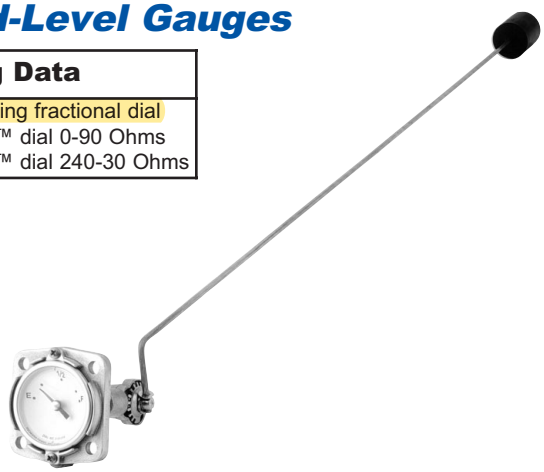
Top Mounting Adjustable Liquid-Level Gauges

Model #	Mounting	Dial or Sending Data
6580-0151	Top	• #5002S01379 Senior direct-reading fractional dial • #P5880S02547 Senior TwinSite™ dial 0-90 Ohms • #P5648S02547 Senior TwinSite™ dial 240-30 Ohms

** Also available with 0-90 or 240-30 ohm sender.*



See DS-337 for cut off dimensions



Adjustable 6580 Top Mount Gauge

10/14/04

See reverse side for dimensional data, materials of construction, performance, and advice on how to order.

The Measure of Excellence

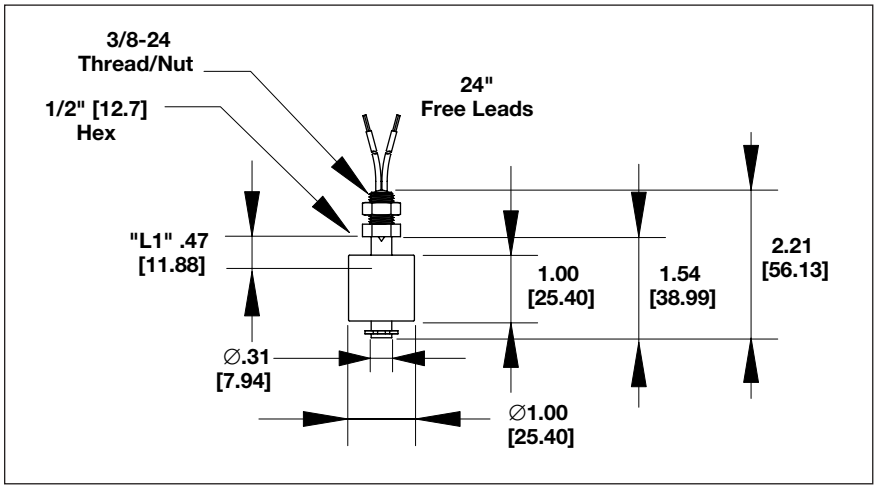
L003 Series

Compact, Low-Cost Switches – Ideal for High Volume Use

Key Features:

- Ideal for shallow tanks
- Broad media compatibility
- Selectable to Normally-Open or Normally-Closed operation by inverting the float
- 50 VA switch (standard)

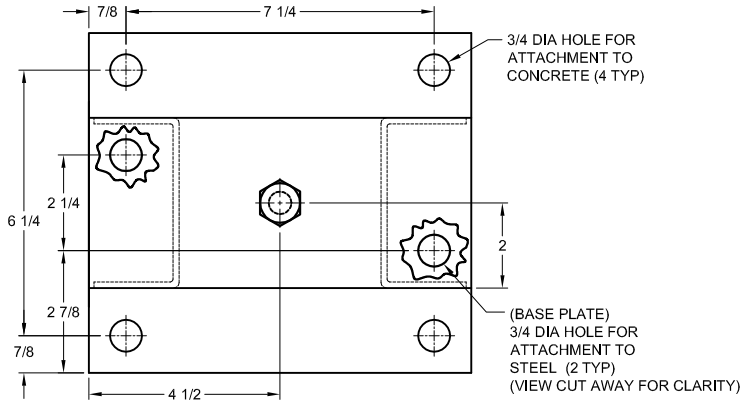


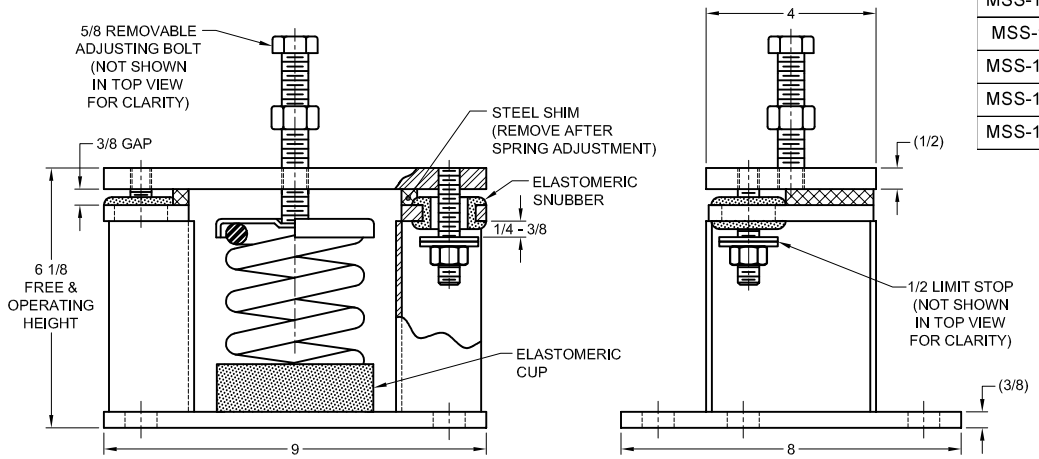


Series	Mounting	Stem/Float Materials	SG	Temperature	Pressure	P/N
L003 **Compact, Low-Cost Switches**	⅛" NPT	Solid/PP	.90	-40° to +150° F	150 PSIG	L003-0102-0303
	⅜"-24	Solid/PP	.90	-40° to +150° F	150 PSIG	L003-1802-0303
	⅛" NPT	Hollow/PP	.70	-40° to +150° F	50 PSIG	L003-0102-0203
	⅜"-24	Hollow/PP	.70	-40° to +150° F	50 PSIG	L003-1802-0203
	⅛" NPT	PVC/PVC	.90	-40° to +140° F	50 PSIG	L003-0105-0503
	⅜"-24	PVC/PVC	.90	-40° to +140° F	50 PSIG	L003-1805-0503
	⅛" NPT	PVDF/PVDF	1.0	-40° to +150° F	50 PSIG	L003-0104-0403
	⅜"-24	PVDF/PVDF	1.0	-40° to +150° F	50 PSIG	L003-1804-0403
	⅛" NPT	Nylon/Buna	.80	-40° to +150° F	150 PSIG	L003-0118-2003
	⅜"-24	Nylon/Buna	.80	-40° to +150° F	150 PSIG	L003-1818-2003

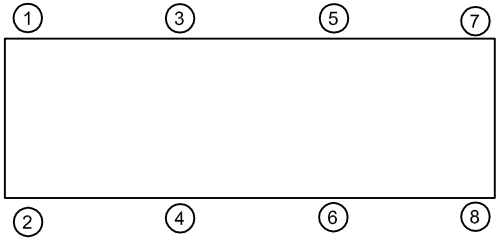
172R–101077 | REV.: 8

REV.	DESCRIPTION	DATE	BY





MODEL MSS-1E SEISMICALLY RESTRAINED VIBRATION ISOLATOR FOR 1" DEFLECTION				
SEISMIC MOUNT SIZE	RATED LOAD (LBS)	RATED DEFLECTION (IN)	SPRING RATE (LBS/IN)	COLOR CODE
MSS-1E-400	400	1.32	303	BLACK
MSS-1E-530N	530	1.17	453	BLACK/DK BLUE
MSS-1E-650	650	1.05	619	RED
MSS-1E-825N	825	1.07	769	RED/DK BLUE
MSS-1E-1000	1000	1.00	1000	TAN
MSS-1E-1200N	1200	1.04	1150	TAN/DK BLUE
MSS-1E-1400	1400	1.00	1400	PINK
MSS-1E-1700N	1700	1.10	1550	PINK/DK BLUE
MSS-1E-2000	2000	1.11	1800	WHITE
MSS-1E-2575N	2575	1.11	2313	WHITE/DK PURPLE
MSS-1E-2990N	2990	1.11	2682	WHITE/DK GREEN
MSS-1E-3250N	3250	1.04	3125	WHITE/GRAY



ISOLATOR SELECTIONS	
LOC 1:	LOC 2:
LOC 3:	LOC 4:
LOC 5:	LOC 6:
LOC 7:	LOC 8:
CUSTOMER EQP'T. TAG:	

NOTE: MATERIAL SHOWN IS FOR (1) SET.

NOTES:
1. ALL DIMENSIONS ARE IN INCHES, INTERPRET PER ANSI Y14.
2. STANDARD FINISH: HOUSING - POWDER COAT (COLOR:BLACK), SPRING - POWDER COAT (COLOR: SEE TABLE), HARDWARE ZINC-ELECTROPLATE.
3. EQUIPMENT MUST BE BOLTED OR WELDED TO THE TOP PLATE TO MEET ALLOWABLE SEISMIC RATINGS.
4. ISOLATOR BASE PLATE MUST BE ANCHORED TO CONCRETE WITH (4) 11/16 DIA ANCHORS.
5. ALL SPRINGS ARE DESIGNED FOR 50% OVERLOAD CAPACITY.
6. REFER TO SHEET 2 OF 2 FOR INSTALLATION INSTRUCTIONS.
7. RATED DEFLECTIONS ARE WITHIN 25% OF NOMINAL. HIGHER DEFLECTIONS ARE ALLOWED IF THEY MEET SPECIFICATIONS.

OTHER MATERIALS, COMPOUNDS, OR FINISHES WITH EQUAL OR SUPERIOR PROPERTIES MAY BE SUBSTITUTED AS THEY BECOME AVAILABLE.

CERTIFIED FOR:

JOB NAME: _____

CUSTOMER : _____

CUSTOMER P.O.: _____

SALES ORDER: _____

MODEL MSS-1E 400-3250 LBS. VIBRATION ISOLATOR WITH INTEGRAL SEISMIC RESTRAINT AND EXTERNAL ADJUSTMENT 1 INCH DEFLECTION

THE VMC GROUP
The Power of Together
Bloomingdale, NJ 07403
Houston, TX 77041

SCALE : NONE

SHEET: 1 OF 2

DRAWING NO.:

REVISION

Member VISCMA

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250 lb WWP Bronze Ring Check® Valves

Fire Protection Valve •Inline Lift Type • Rubber Discs • Spring Actuated

Dezincification Resistant

250 PSI/17.2 Bar Non-Shock Cold Working Pressure[u]

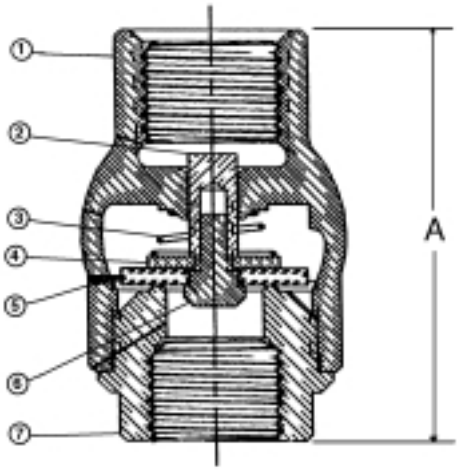


T-480
Threaded

CONFORMS TO MSS SP-80

MATERIAL LIST

PART		SPECIFICATION
1.	Body	Bronze ASTM B 584 Alloy C84400
2.	Stem	Stainless Steel ASTM A 582 Alloy C30300
3.	Spring	316 Stainless Steel
4.	Disc Holder	Stainless Steel Type 301
5.	Disc	Water, Oil or Gas (Buna-N)
6.	Seat Screw	Stainless Steel ASTM A 276 Alloy S43000
7.	Body End	Bronze ASTM B 584 Alloy C84400



T-480
NPT x NPT

DIMENSIONS—WEIGHTS—QUANTITIES

Size		Dimensions A		B		C		T-480		Master
In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Ctn. Qty.
⅜	10	2.00	51	1.38	35	1.44	37	0.41	0.19	100
½	15	2.06	52	1.38	35	1.19	30	0.36	0.16	100
¾	20	2.25	57	1.63	41	1.31	33	0.48	0.22	100
1	25	2.63	67	2.00	51	1.50	38	0.77	0.35	50
1 ¼	32	2.94	75	2.38	60	1.69	43	1.14	0.51	30
1 ½	40	3.31	84	2.75	70	2.00	51	1.63	0.74	30
2	50	3.69	94	3.38	86	2.31	59	2.27	1.03	10

Ordering: The T-480 has standard Buna-N Discs.
Also available with TFE (Y) Discs; specify T-480-Y.
⅜" thru 2" require ½ pound pressure to open.

NIBCO check valves may be installed in both horizontal and vertical lines with upward flow or in any intermediate position.

WARNING - Valve must be installed downstream of receiver tank if used in line with reciprocating air compressor.

Do Not Use as a Footvalve.

Warning – Do Not Use For Reciprocating Air Compressor Service.

Emergency Vents

Model 100



c UL US LISTED

PART #	SIZE	UL LISTED FLOW CAPACITY AT 2.5 PSIG (CFH)
1002	2"	24,058
1003	3"	63,633
1004	4"	125,343
1005	5"	195,347
1006	6"	284,968
1008	8"	541,014
10010*	10"	807,803

*Non UL

- Improved design with increased airflow
- Spring loaded – pressure relief set at .5 PSI, full open by 2.5 PSI
- Buna-N-Gasket provides a vapor-tight seal
- Black painted steel construction – custom colors available
- Private labeling available
- NPT connections standard – all thread type connections available
- Male NPT: 2", 3", 4", 5", 6", 8"
- Female NPT: 3", 4", 5", 6", 8"

Warning: Emergency Vents are designed for "Emergency Venting" and must be used in conjunction with other venting devices. Emergency vents must be sized per UL requirements.

Emergency Vents comply with UL Codes UL-2583, UL-142, UL-2085, UL-2244.

Enclosure Color Chart

Section 6

GLOBAL POWER COMPONENTS™

COLOR SELECTOR



Signal White

Eggshell

Cream

Yellow

Green

Forest Green

Gray

ANSI 61 Gray

Gloss Black

PPG We protect and beautify the world®

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Warranty Statement

Section 7

WARRANTY

All sales by BHP Inc. d/b/a Global Power Components (GPC) are subject to the following terms and conditions.

GPC warrants that its products are sold in accordance with GPC's published specifications, and further warrants these products against defects in GPC's workmanship and materials under normal use and service, in conformance with the manufacturer's recommended installation, for a period of **twelve (12) months** from the date of sale as determined by the invoice date of the sale item.

All liability and obligations under this warranty are limited to repair or replacement, at the option of GPC, of the product, F.O.B. GPC's plant in Milwaukee, Wisconsin. All return shipping charges must be prepaid by the warranty claimant. If at the warranty claimant's request, GPC agrees to conduct any warranty service away from GPC's Milwaukee, Wisconsin plant ("field repair"), and the defect is not covered under this warranty, then all expenses relating to said field repair service call will be billed to the warranty claimant.

GPC makes no claim of merchantability other than for the specifications approved or provided in writing by GPC.

GPC shall not be liable for special, incidental, or consequential damages of any kind, including but not limited to, re-installation labor, installation charges, transportation charges, loss of use, time or revenue, or rental equipment.

GPC shall not be liable for claims arising from:

1. Failure or addition of OEM or other component parts not manufactured by GPC, (including but not limited to pumps, tires, wheels, brakes, bearings, axles, couplers, switches, motors, batteries, etc.). All such claims must be directed to the OEM manufacturer of such parts for consideration. GPC makes no warranty with regard to any such OEM or component parts manufactured by others.
2. Charges for labor and/or materials for any field repair unless expressly authorized in writing by an officer of GPC prior to the commencement of the work.
3. Negligence, normal wear, accident, misuse, abuse, improper installation, lack of maintenance or negligent maintenance, unauthorized modifications, improper storage or handling, improper or contaminated fuel, fluids or lubrication, use of parts that do not meet GPC specifications.
4. Rust, oxidation or other surface damage caused by paint or finish failure due to improper repair of surface damage incurred during use or maintenance.
5. Any damage occurring or resulting from transportation. Premature failure of any protective finishes will not be covered if due to damage occurring during transportation or installation.

GPC makes no other express warranty. Any other implied or statutory warranty is excluded or expressly limited to the duration of this warranty to the extent permitted by law. No person is authorized to make any other warranties or assume any liabilities on behalf of GPC unless made or assumed in writing by an officer of GPC.

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Alternator Data Sheet
Frame Size: S7L1D-C4

Characteristics

	No of Bearings:	1-bearing		2-bearing	
Weights:	Stator assembly:	2835 lb	1286 kg	2835 lb	1286 kg
	Rotor assembly:	2542 lb	1153 kg	2440 lb	1107 kg
	Complete assembly:	6415 lb	2910 kg	6358 lb	2884 kg
Maximum speed:		2250 rpm			
Excitation current:	Full load:	Wdg 07: 2.6, Wdg 13: 2.5, Wdg 312: 2.8			
	No load:	Wdg 07: 0.93, Wdg 13: 1.1, Wdg 312: 0.61-0.58			
Insulation system:	Class H throughout				

3 Ø Ratings (0.8 power factor)			**60 Hz** (winding no)						
			600 (07)	380 (13)	400 (13)	416 (13)	416 (312)	440 (312)	480 (312)
163° C rise ratings	@ 27° C	kW	1620	1520	1520	1520	1456	1556	1620
		kVA	2025	1900	1900	1900	1820	1945	2025
150° C rise ratings	@ 40° C	kW	1580	1485	1485	1485	1420	1515	1580
		kVA	1975	1856	1856	1856	1775	1894	1975
125° C rise ratings	@ 40° C	kW	1515	1425	1425	1425	1365	1455	1515
		kVA	1894	1781	1781	1781	1706	1819	1894
105° C rise ratings	@ 40° C	kW	1410	1325	1325	1325	1275	1355	1410
		kVA	1762	1656	1656	1656	1594	1694	1762
80° C rise ratings	@ 40° C	kW	1300	1225	1225	1225	1175	1255	1300
		kVA	1625	1531	1531	1531	1469	1569	1625

3 Ø Reactances (Based on full load at 125° C rise rating)	600 (07)	380 (13)	400 (13)	416 (13)	416 (312)	440 (312)	480 (312)
Synchronous	2.01	1.80	1.62	1.50	3.35	3.19	2.79
Transient	0.19	0.20	0.18	0.16	0.26	0.24	0.21
Subtransient	0.12	0.14	0.13	0.12	0.16	0.16	0.14
Negative sequence	0.16	0.17	0.15	0.14	0.23	0.22	0.19
Zero sequence	0.02	0.02	0.02	0.02	0.03	0.03	0.03

3 Ø Motor starting	600 (07)	380 (13)	400 (13)	416 (13)	416 (312)	440 (312)	480 (312)
Maximum kVA (90% sustained voltage)	6075	5700	4700	5100	6075	6075	6075

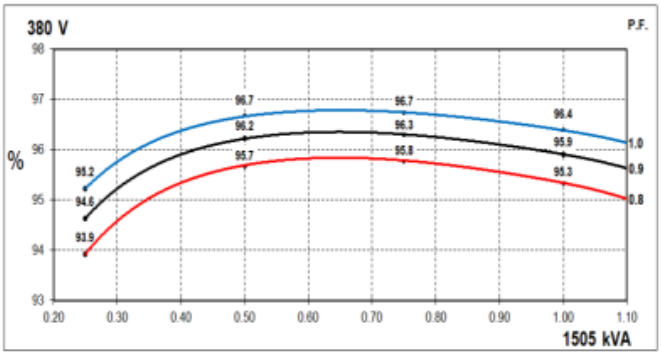
Time constants (sec)	600 (07)	380 (13)	400 (13)	416 (13)	416 (312)	440 (312)	480 (312)
Transient	0.167	0.164	0.164	0.164	0.155	0.155	0.155
Subtransient	0.018	0.019	0.019	0.019	0.0177	0.0177	0.0177
Open circuit	4.17	3.93	3.93	3.93	4.05	4.05	4.05
DC	0.031	0.026	0.026	0.026	0.036	0.036	0.036

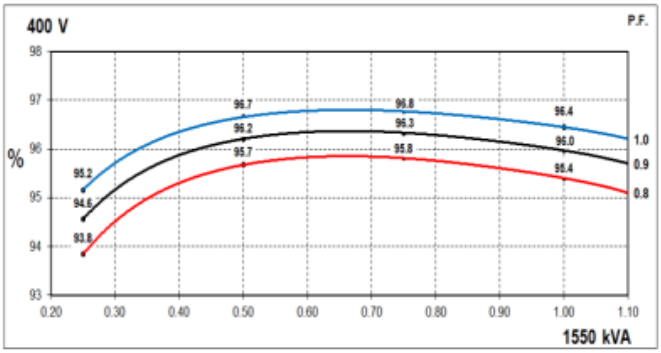
Windings (@22° C)		600 (07)	380 (13)	400 (13)	416 (13)	416 (312)	440 (312)	480 (312)
Stator resistance	(L-L Ohms)	0.0032	0.0014	0.0014	0.0014	0.0024	0.0024	0.0024
Rotor resistance	(Ohms)	1.710	1.710	1.710	1.710	1.710	1.710	1.710
Number of leads		6	6	6	6	6	6	6

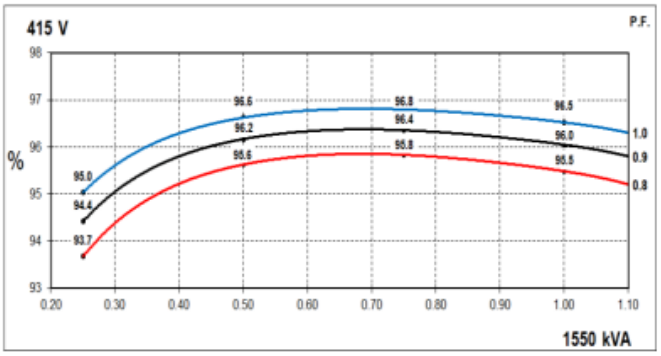
S7L1D-C4 Wdg.312

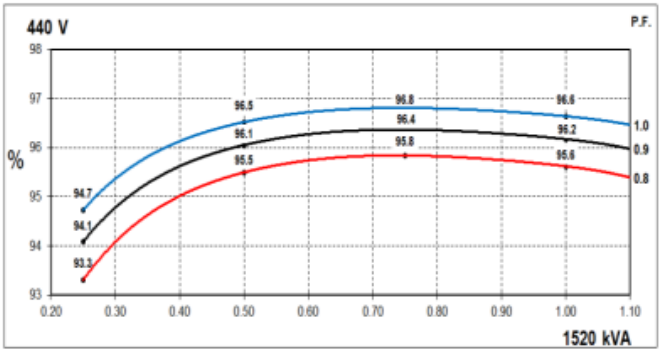
THREE PHASE EFFICIENCY CURVES

50Hz

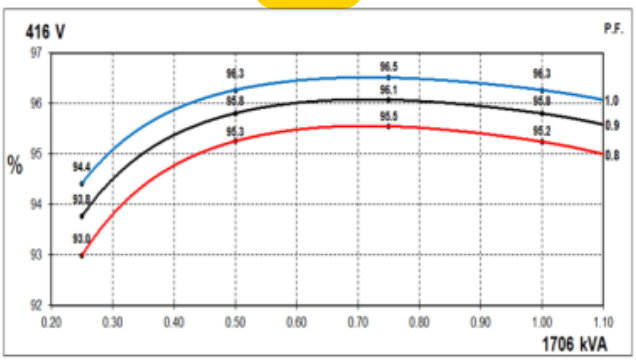


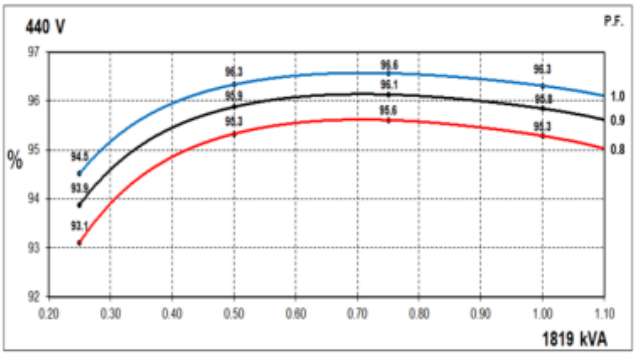


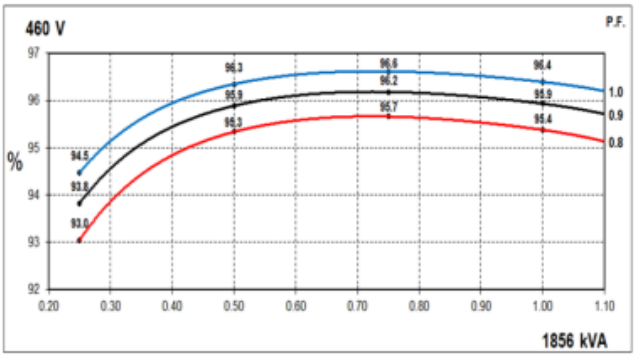


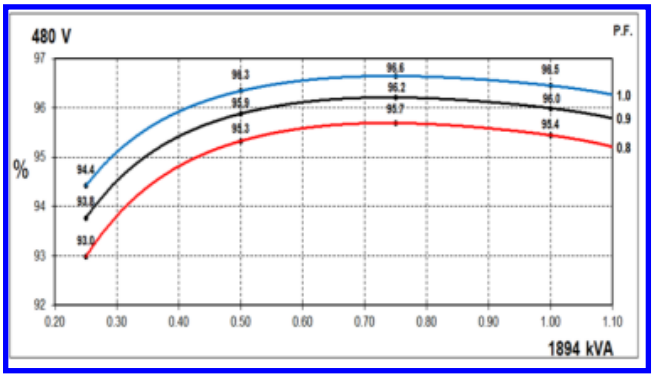


60Hz





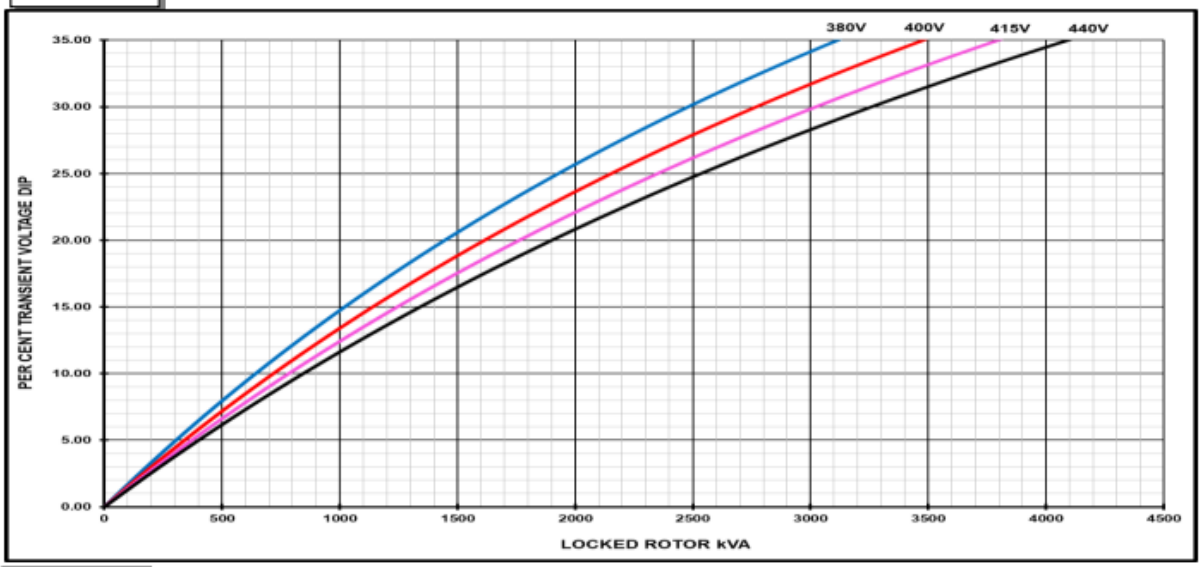




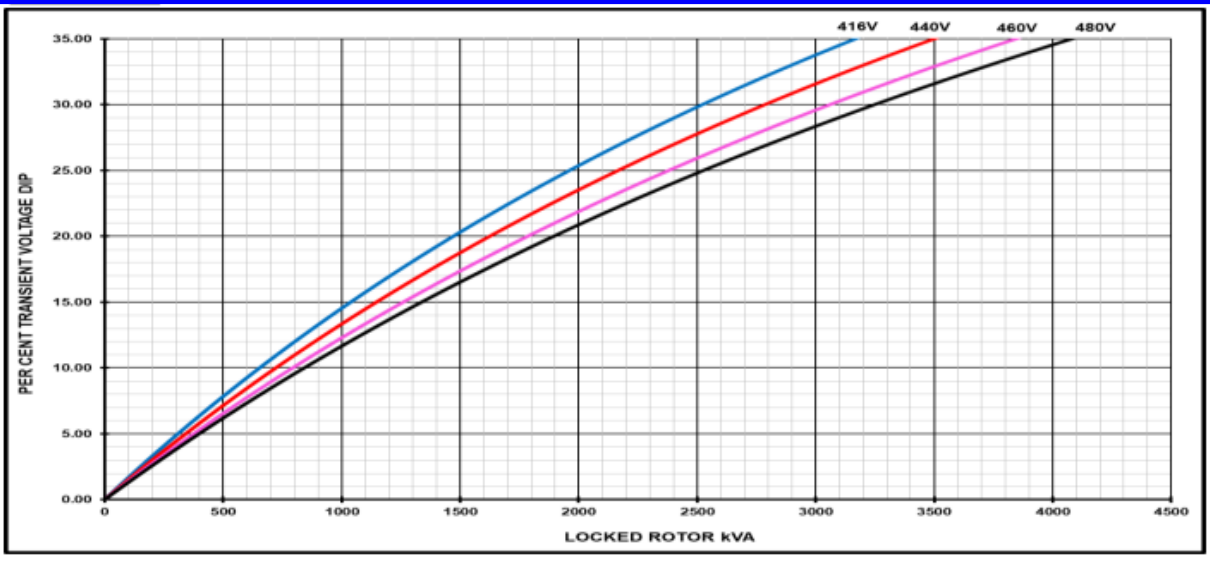
S7L1D-C4 Wdg.312

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



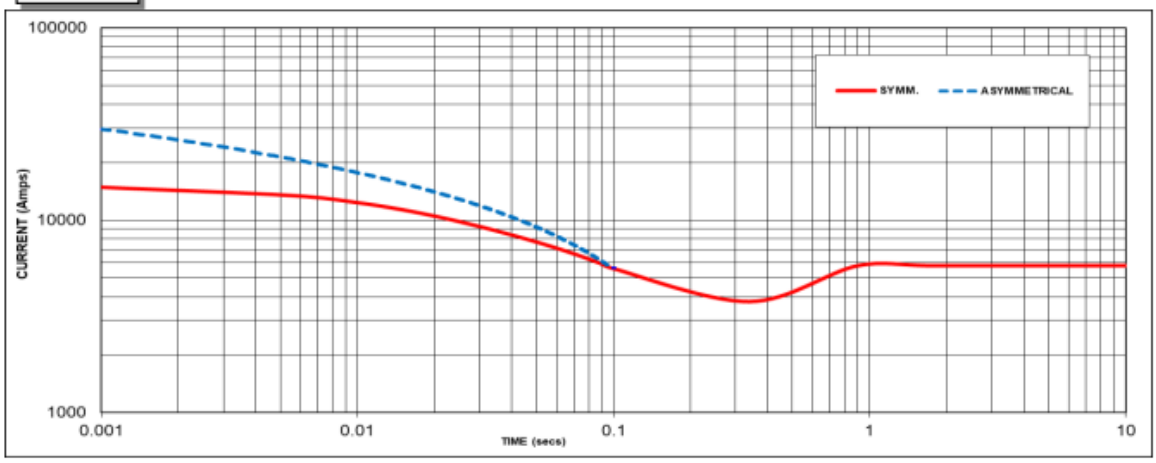
Transient Voltage Dip Scaling Factor	
PF	Factor
< 0.5	1
0.5	0.97
0.6	0.93
0.7	0.9
0.8	0.85
0.9	0.83

Transient Voltage Rise Scaling Factor
For voltage rise multiply voltage dip by 1.25

S7L1D-C4 Wdg.312

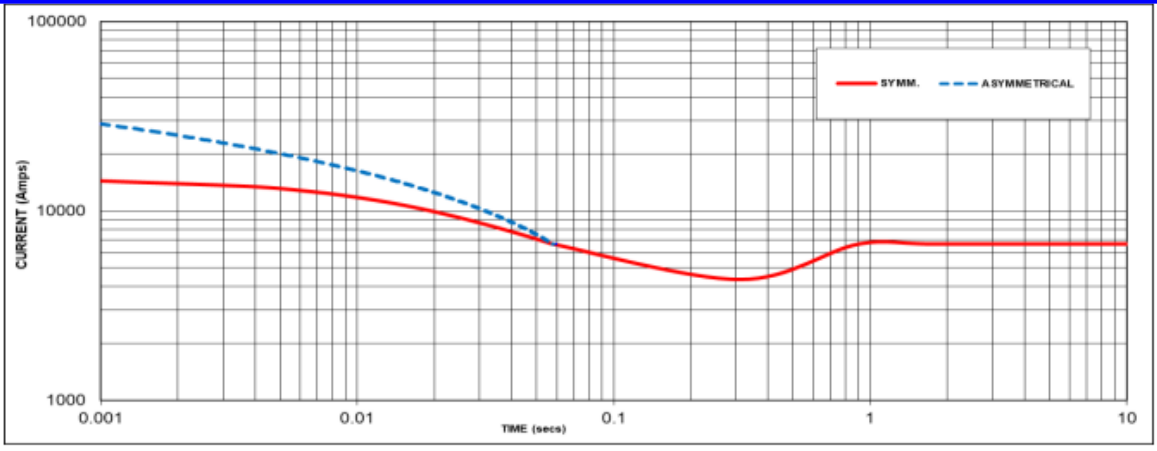
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 5820 Amps

60Hz



Sustained Short Circuit = 6704 Amps

Note 1
The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

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

The sustained current value is constant irrespective of voltage level

Note 2
The sustained current values are for MX341 AVR. For MX322 and Digital AVR 1.2 factor to be applied to the sustained short circuit

Note 3
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

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

All other times are unchanged

Note 4
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

Cooling System Data
C1500D6E
QSK38-G18

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 level 1	Sound level 2
	Fuel Type	Duty	Rating (kW)	Maximum allowable ambient temperature, degree C							
60 Hz	Diesel	Standby	1500	42.5	40.4	39.5	39.2	38.5	N/A	N/A	N/A
				Airflow (m^3/s) – Actual @ Fan							
				17.97	17.27	16.58	16.29	16.09	N/A	N/A	N/A

Enhanced 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 level 1	Sound level 2
	Fuel Type	Duty	Rating (kW)	Maximum allowable ambient temperature, degree C							
60 Hz	Diesel	Standby	1500	52.0	51.0	50.0	47.0	45.0	N/A	N/A	N/A
				Airflow (m^3/s) – Actual @ Fan							
				24.12	23.52	23.00	22.45	22.00	N/A	N/A	N/A

Notes:

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

Exhaust Emission Data Sheet
C1500D6E
60 Hz Diesel Generator Set
EPA NSPS Stationary Emergency Tier 2

Engine Information:

Model:	Cummins Inc. QSK38-G18	Bore:	6.26 in. (159 mm)
Type:	4 Cycle, VEE, 12-cylinder diesel	Stroke:	6.26 in. (159 mm)
Aspiration:	Turbocharged and Charge Air-Cooled	Displacement:	2307 cu. in. (38 liters)
Compression Ratio:	14.7:1		
Emission Control Device:	Turbocharged and Charge Air-Cooled		
Emission Level:	Stationary Emergency		

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full DCC
Engine BHP @ 1800 RPM (60 Hz)	556	1113	1669	2225	2011
Fuel Consumption (US Gal/Hr)	32	56.3	82.9	102.5	95.1
Exhaust Gas Flow (CFM)	4548	6983	9573	10631	10267
Exhaust Gas Temperature (°F)	754	829	877	930	909
Exhaust Emission Data					
HC (Total Unburned Hydrocarbons)	0.15	0.05	0.04	0.04	0.04
NOx (Oxides of Nitrogen as NO_2)	3.04	3.76	4.10	7.08	5.52
CO (Carbon Monoxide)	1.07	0.73	0.49	0.24	0.32
PM (Particulate Matter)	0.08	0.10	0.05	0.01	0.02
SO_2 (Sulfur Dioxide)	0.126	0.111	0.109	0.101	0.103
Smoke (FSN)	0.49	0.78	0.43	0.11	0.20

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

Test Conditions

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

Fuel Specification:	ASTM D975 No. 2-D S15 diesel fuel with 0.0015 Wt.% Sulfur content, 40-50 Cetane Number
Air Inlet Temperature	25 °C (77 °F)
Fuel Inlet Temperature:	40 °C (104 °F)
Barometric Pressure:	100 kPa (29.53 in Hg)
Humidity:	NOx measurement corrected to 10.7 g/kg (75 grains H_2O/lb) of dry air
Intake Restriction:	Set to 18 in of H_2O as measured from compressor inlet
Exhaust Back Pressure:	Set to 1.5 in Hg

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

2026 EPA Tier 2 Exhaust Emission Compliance Statement C1500D6E Stationary Emergency

60 Hz Diesel generator set

Compliance Information:

The engine used in this generator set complies with the Tier 2 emissions limits of U.S EPA New source performance standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	TCEXL050.AAD-040
Effective Date:	11/14/2025
Date Issued:	11/14/2025
EPA Diesel Engine Family:	TCEXL050.AAD

Engine Information:

Model:	QSK38-G18	Bore:	6.26 in. (159 mm)
Engine Nameplate HP:	2225	Stroke:	6.26 in. (159 mm)
Type:	4 Cycle, Vee, 12-cylinder diesel	Displacement:	2307 cu. in. (38 liters)
Aspiration:	Turbocharged and Charge Air-Cooled	Compression ratio:	14.7:1
Emission Control Device:	Turbocharged and Charge Air-Cooled		

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions	Grams per BHP-hr			Grams per kWm-hr		
	NOx NMHC	CO	PM	NOx NMHC	CO	PM
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

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

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

Reference conditions: Air inlet temperature: 25 °C (77 °F), Fuel inlet temperature: 40 °C (104 °F).
Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H_2O/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.

Prototype Test Support (PTS)
60 Hz test summary

Generator set models	Representative prototype	
C1500D6E	Model:	C1500D6E
C1250D6E	Engine:	QSK38-G18
	Alternator:	S7L1D-G4

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: 1510 kW

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

Maximum motor starting: N/A

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

Alternator temperature rise:

The highest rated temperature rise (125 °C) test result are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with rated voltages. Only the highest temperatures are reported.

Location	Maximum Rise (°C)
Alternator Stator:	125
Alternator Rotor:	125
Exciter Stator:	125
Exciter Rotor:	125

Torsional analysis and testing:

The generator set on S7L1D-G4 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 1530 to 2070 RPM.

Cooling system: 50 °C ambient
0.5 in H2O restriction

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

Durability:

The generator set was subjected to a minimum 500 hour endurance test operating at variable load 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. It was within the specified maximum limits.

Voltage regulation:	± 0.5%
Random voltage variation:	± 1.0%
Frequency regulation:	Isochronous
Random frequency variation:	± 0.25%

Transient performance:

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

Full load acceptance:

Voltage dip:	42.7%
Recovery time:	4.2 seconds
Frequency dip:	12.2%
Recovery time:	6.1 seconds

Full load rejection:

Voltage rise:	16.4%
Recovery time:	1.3 seconds
Frequency rise:	5.6%
Recovery time:	3.2 seconds

All data based on 0.8 power factor:

Harmonic analysis:

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

	Line to Line		Line to Neutral	
Harmonic	No load	Full load	No load	Full load
3	0.24	0.6	0.08	0.25
5	0.05	0.19	0.03	0.11
7	0.03	0.07	0.03	0.04
9	0.03	0.07	0.02	0.05
11	0.04	0.04	0.03	0.09
13	0.05	0.05	0.05	0.12
15	0.14	0.07	0.13	0.14

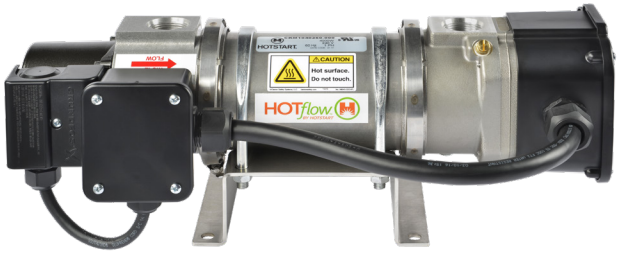
SECTION 3

Generator Accessories

Hotstart
THERMAL MANAGEMENT

HOTflow® Heating System

CKM



Hotstart's CKM HOTflow® heating system is a coolant preheater, developed to maintain optimal temperatures for diesel and gas engines in stationary land power, marine, construction equipment and truck applications.

INTEGRATED DESIGN

The CKM's mechanically-driven pump is integrated directly into the stainless steel heating tank using a custom designed volute – maximizing coolant flow while minimizing the heater's footprint.

ENERGY EFFICIENT

Like all HOTflow® heaters, the CKM is an energy efficient alternative to legacy convection-based heaters for common genset and heavy equipment engine size applications. Pump-driven forced circulation allows for even, consistent heating while lowering overall operating costs.

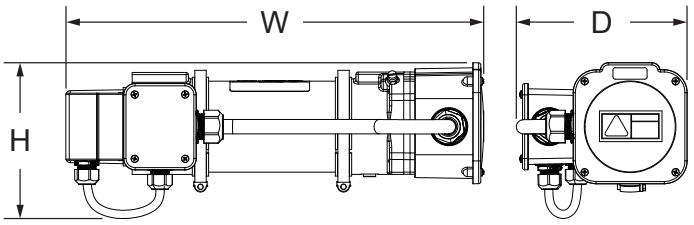
USER FRIENDLY

With the technician in mind, the CKM is constructed to provide easy access to all major components. A built in bleed screw allows installers to flush air from the heater before operation and an integrated high-limit thermostat can be manually reset without the need for expensive maintenance.

SIMPLE UPGRADE OPTION

Combined with its ability to be installed horizontally or vertically, the CKM's compact configuration makes it an easy drop-in replacement for traditional convection-based systems.

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Height (H)	Width (W)	Depth (D)	Weight
6.9"	18.4"	8.5"	13.2 lbs
175 mm	467 mm	216 mm	6.0 kg

System	
Phase	single-phase (1 Ø)
Voltage (60 Hz)	120V | 240V
Voltage (50 Hz)	230V
Terminal Box Ingress	IPX6
Motor Ingress (UL-recognized)	NEMA 2
Motor Ingress (CE-compliant)	IP44
Min./Max. Ambient Temp	-40°F / 104°F (-40°C / 40°C)
Vibration Specification	Meets IEC 60068-2-64
Shock Specification	Meets IEC 60068-2-27
Max Pressure	125 psi (860 kPa)
Certification	UL/C-US recognized models available (E250789) CE-compliant models available

Coolant				
Fluid Type	Water | Coolant mix (50% water/50% glycol)			
Heat Power	3 kW	4 kW	5 kW	6 kW
Temp. Control	Fixed, 100 – 120 °F (38–49°C)			
Temp. High Limit	205 °F (96°C)			
Pump Power	70 W (50 Hz) / 97 W (60 Hz)			
Flow	9 gpm @ 10 ft H_2O (34.1 L/min @ 3 m H_2O			
Inlet/Outlet	SAE J1926/1:1 5/16-12 (SAE #16 STOR)			

Ordering Information

CKM

Engine Displacement	Power Supply V	Power Supply Hz	Heating System kW	Heating System Amps	Heating System Model Number
1000–1500 CID 15–23 L	120	60	3	25.0	CKM1030160-000
	230	50	3	13.0	*CKM1030250-000
	240	60	3	13.0	CKM1030260-000
1500–2000 CID 23–30 L	230	50	4	13.0	*CKM1040250-000
	240	60	4	16.7	CKM1040260-000
2000–2500 CID 30–38 L	230	50	5	21.7	*CKM1050250-000
	240	60	5	20.8	CKM1050260-000
2500–3000 CID 38–50 L	230	50	6	26.1	*CKM1060250-000
	240	60	6	25.0	CKM1060260-000

* – CE-compliant
(All other models – UL/C-US recognized)

Optional Inlet/Outlet Adapter Fittings (CKM Models only)			
From	To	Part Number	Part Description
SAE #16 STOR	0.75" hose barb	HB-16STORX3/4HB	#16 STOR to ¾" hose barb adapter. Installs in #16 STOR female inlet or outlet of heater.
SAE #16 STOR	1.0" hose barb	HB-16STORX1HB	#16 STOR to 1" hose barb adapter. Installs in #16 STOR female inlet or outlet of heater.

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Product data sheet

Specifications



Circuit breaker, PowerPacT R, 2500A, 3 pole, 600VAC, 50kA, busbar, Micrologic 5.0

RLF36250U33F

Main

Range	PowerPact
Product Name	PowerPact R
Product Or Component Type	Circuit breaker
Device Application	Distribution

Complementary

Line Rated Current	2500 A
Number Of Poles	3P
Control Type	Operating handle
Breaking Capacity Code	L
Breaking Capacity	AIR 125 kA 240 V AC 50/60 Hz UL 489 AIR 100 kA 480 V AC 50/60 Hz UL 489 AIR 50 kA 600 V AC 50/60 Hz UL 489 Icu 125 kA 240 V AC 50/60 Hz IEC 60947-2 Icu 85 kA 380/415 V AC 50/60 Hz IEC 60947-2
[Ue] Rated Operational Voltage	600 V AC 50/60 Hz UL 489
Network Frequency	50/60 Hz
[Ics] Rated Service Breaking Capacity	65 kA 240 V AC 50/60 Hz IEC 60947-2 45 kA 380/415 V AC 50/60 Hz IEC 60947-2
[Uimp] Rated Impulse Withstand Voltage	8 kV IEC 60947-2
Trip Unit Technology	Electronic, standard, MicroLogic 5.0, LSI
[Ui] Rated Insulation Voltage	750 V IEC 60947-2
Trip Unit Name	MicroLogic 5.0
Suitability For Isolation	Yes IEC 60947-2
Utilisation Category	Category A
Awg Gauge	AWG 3/0...750 kcmil aluminium/copper
Local Signalling	Alarm 1 LED yellow)long-time pick up)
Mounting Mode	Unit mount busbar)
Mounting Support	Busbar
Electrical Connection	Busbar connection, line Busbar connection, load

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Terminal Identifier	AL2500RK
Tightening Torque	601.85 lbf.in (68 N.m) 0.08…0.62 in² (50…400 mm²) (AWG 1/0...750 kcmil) 601.85 lbf.in (68 N.m) 0.08…0.23 in² (50…150 mm²) (2 x AWG 1/0...2 x 300 kcmil)
Number Of Slots	2 auxiliary switch OF plug-in) 1 alarm switch SD plug-in) 1 voltage release MN or MX plug-in)
Power Wire Stripping Length	1.38 in (35 mm)
Height	16.24 in (412.50 mm)
Width	16.54 in (420.12 mm)
Depth	14.49 in (368.05 mm)
Net Weight	52 lb(US) (23.59 kg)
Quantity Per Set	1
Circuit Breaker Application	HACR rated

Environment

Quality Labels	CE
Standards	UL CSA NEMA NMX J-266 IEC 60947-2
Product Certifications	UL CSA NOM
Ip Degree Of Protection	IP40
Pollution Degree	3 IEC 60947-1
Ambient Air Temperature For Operation	-13…158 °F (-25…70 °C)
Ambient Air Temperature For Storage	-58…185 °F (-50…85 °C)
Operating Altitude	< 6561.68 ft (2000 m) without derating 13123.36 ft (4000 m) with derating

Ordering and shipping details

Category	US10DE201245
Discount Schedule	0DE2
Returnability	Yes
Country Of Origin	US

Packing Units

Unit Type Of Package 1	PCE
Number Of Units In Package 1	1

Contractual warranty

Warranty	18 months

Sustainability

Green Premium^{TM} label is Schneider Electric's commitment to delivering products with best-in-class environmental performance. Green Premium promises compliance with the latest regulations, transparency on environmental impacts, as well as circular and low-CO_2 products.

Guide to assessing product sustainability is a white paper that clarifies global eco-label standards and how to interpret environmental declarations.

Learn more about Green Premium >

Guide to assess a product's sustainability >



Transparency



RoHS/REACh

Well-being performance

Mercury Free	
Rohs Exemption Information	Yes
Pvc Free	
Halogen Free Plastic Parts Product	

Certifications & Standards

Reach Regulation	REACh Declaration
Eu Rohs Directive	Compliant with Exemptions
China Rohs Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
California Proposition 65	WARNING: This product can expose you to chemicals including: DINP, which is known to the State of California to cause cancer, and DIDP, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Micrologic™ 5.0 Electronic Trip Unit

ENGLISH

Instruction Bulletin

48049-207-05
Rev. 01, 07/2012

Retain for future use.



Schneider Electric™

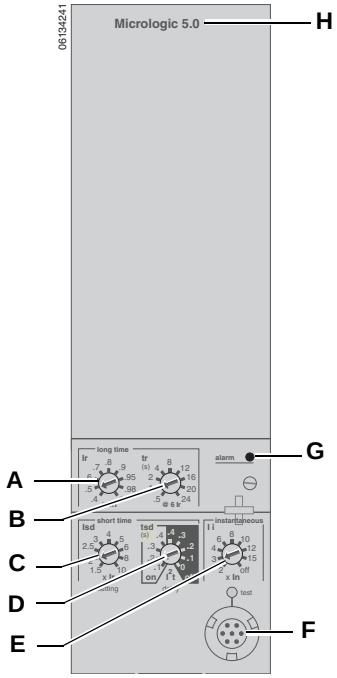
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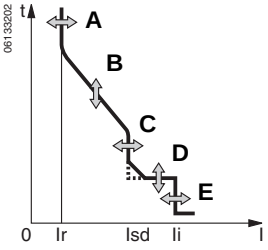
Micrologic 5.0 Trip Unit

The Micrologic 5.0 trip unit provides selective (LSI) protection.

A. Long-time pickup (Ir) switch
B. Long-time delay (tr) switch
C. Short-time pickup (Isd) switch
D. Short-time delay (tsd) switch
E. Instantaneous pickup (Ii) switch
F. Test plug receptacle
G. Overload indicator light
H. Trip unit name

Figure 4: Micrologic 5.0 Trip Unit





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Trip Unit Switches

Long-Time Protection

Long-time protection protects equipment against overloads.

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

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

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

Figure 5: Long-Time Protection Switches

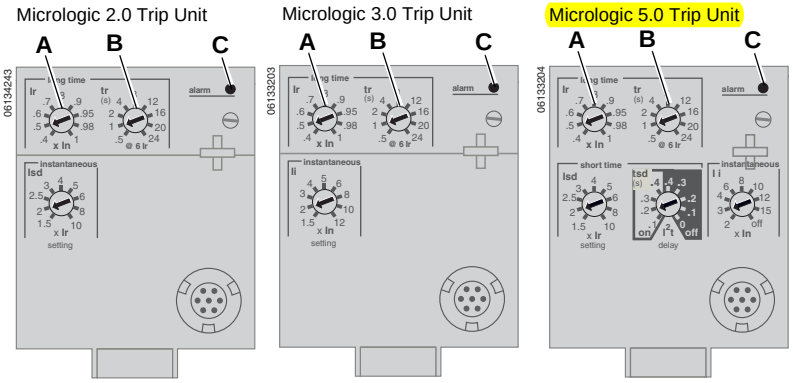


Table 1: Micrologic Trip Unit Long-Time Delay Values

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

[1]In = sensor rating. Ir = In x long-time pickup. Trip threshold between 1.05 and 1.20 Ir.
[2]Time-delay accuracy +0/-20%
[3]For Micrologic 5.0 trip units, when tsd is set to 0.4 off or 0.4 on, then tr = 0.5 instead of 0.34.

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Short-Time Protection

Short-time protection protects equipment against short circuits.

- Short-time protection is standard on 2.0 and 5.0 trip units. It is not available on 3.0 trip units.
- Short-time protection is based on the long-time pickup (Ir)
- The short-time pickup (Isd) (A) sets the current level (below instantaneous trip level) where the circuit breaker will trip after the preset time delay.
- The short-time delay (tsd) (B) sets the length of time that the circuit breaker will carry an overcurrent above the short-time pickup current level before tripping. It is adjustable on the 5.0 trip unit and factory set to zero on the 2.0 trip unit.
- The I^2t on/I^2t off option provides improved selectivity with downstream protective devices:
- With I^2t off selected, fixed time delay is provided.
  - — With I^2t on selected, inverse time I^2t protection is provided up to 10 x Ir. Above 10 x Ir, a fixed time delay is provided.
  - — Intermittent currents in the short-time tripping range which do not last sufficiently long to trigger a trip are accumulated and shorten the trip delay appropriately.
- Setting tsd to the 0 setting turns off time-delay features.
- Short-time protection uses true RMS measurement.
- Short-time delay can be adjusted to provide selectivity with a downstream circuit breaker.

Figure 6: Short-Time Protection Switches

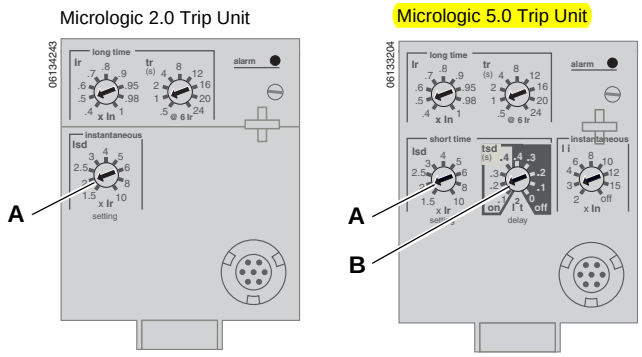


Table 2: Micrologic Trip Unit Short-Time Delay Values

Setting	Short-Time Delay				
I^2t off (Isd at 10 Ir) (seconds)	0	0.1	0.2	0.3	0.4
I^2t on (Isd at 10 Ir) (seconds)	–	0.1	0.2	0.3	0.4
tsd (min. trip) (milliseconds)	20	80	140	230	350
tsd (max. trip) (milliseconds)	80	140	200	320	500

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Instantaneous Protection

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

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

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

Figure 7: Instantaneous Protection Switches

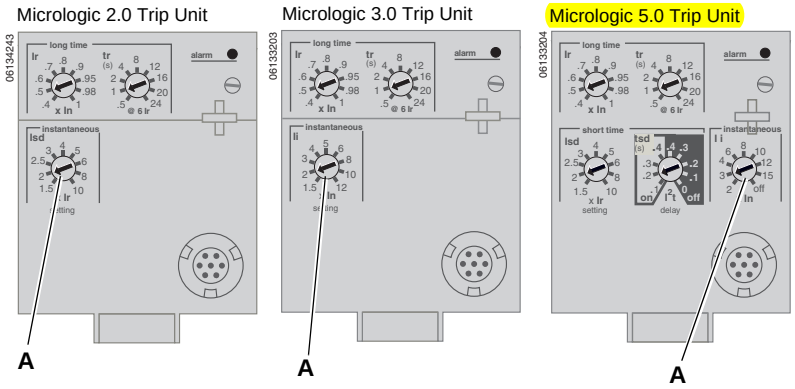


Table 3: Micrologic Instantaneous Values

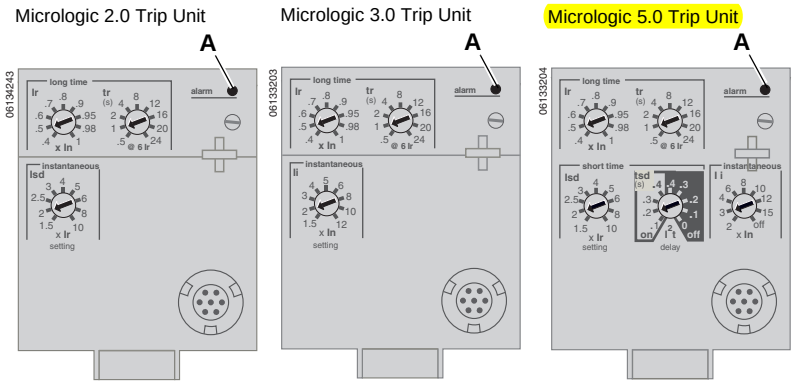
Setting	Interruption Current								
2.0 Isd (= Ir x..)	1.5	2	2.5	3	4	5	6	8	10
3.0 Ii (= In x..)	1.5	2	3	4	5	6	8	10	12
5.0 Ii (= In x..)	2	3	4	6	8	10	12	15	off

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

Overload Indicator Light

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

Figure 8: Overload Indicator Lights



Trip Unit Testing

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

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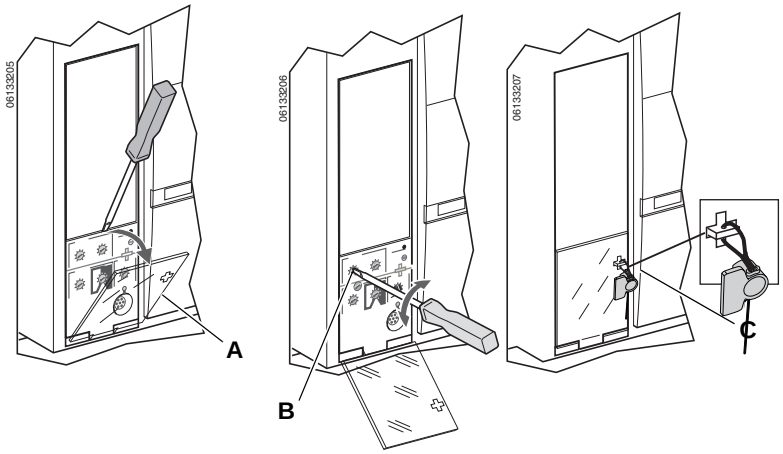
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Section 2—Operation

Switch Adjustment

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

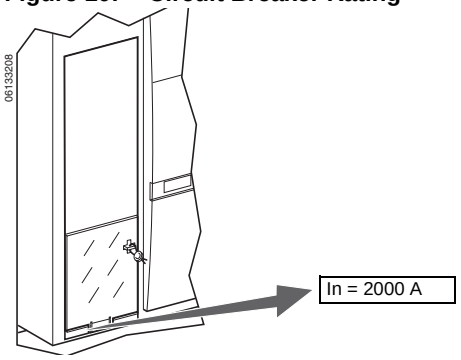
Figure 9: Adjust Switch Settings



Examples

Circuit breaker is rated 2000 A.

Figure 10: Circuit Breaker Rating



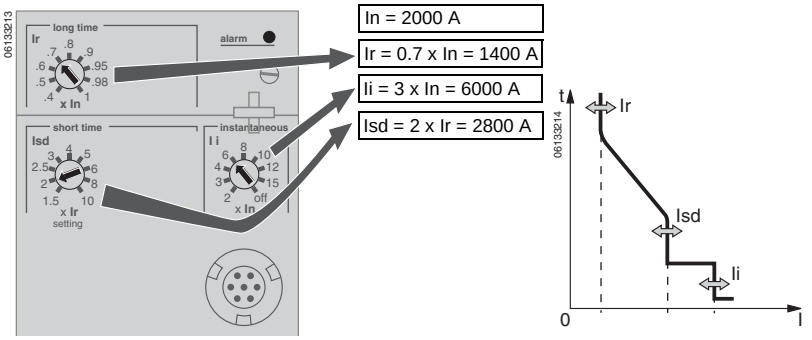
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ENGLISH

Micrologic 5.0 Trip Unit

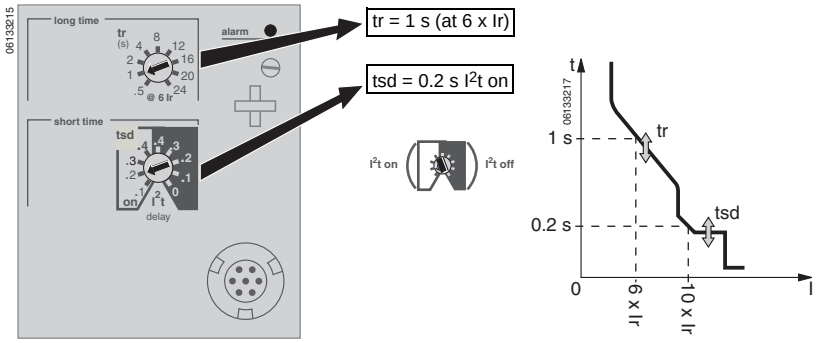
1. Set pickup levels.

Figure 15: Set Pickup Levels



2. Set time delay.

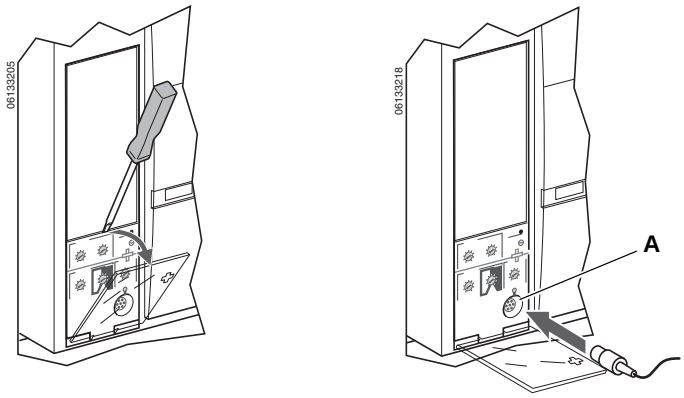
Figure 16: Set Time Delay



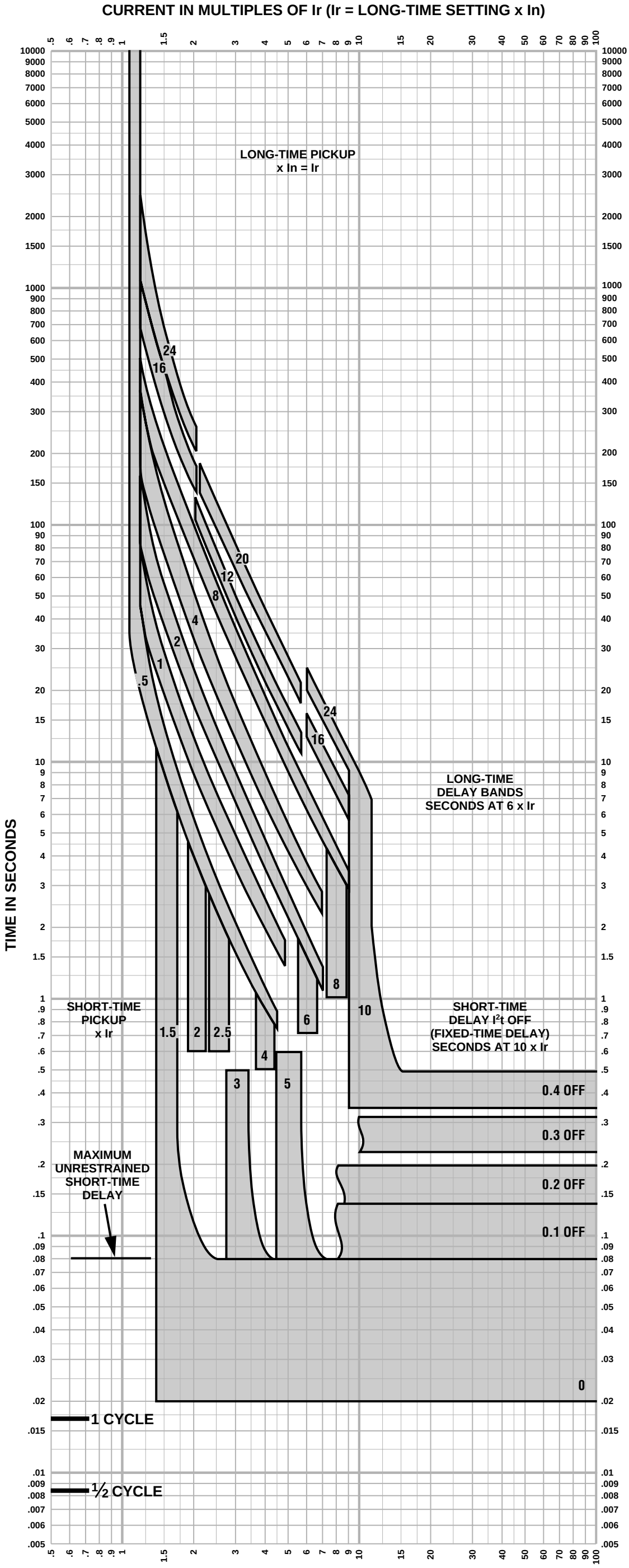
Trip Unit Operation Verification

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

Figure 17: Verify Trip Unit Operation



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MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

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

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

Notes:

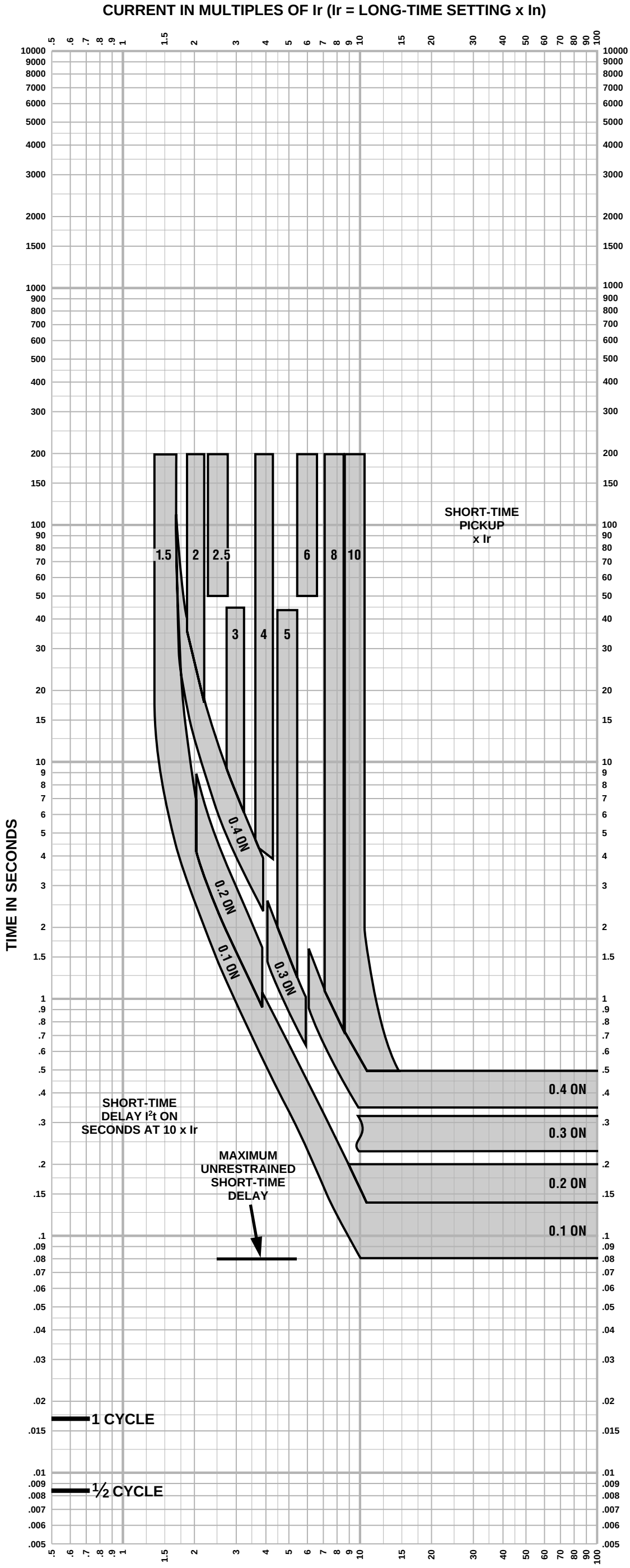
1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

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Modicon
Square D
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Federal Pioneer
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Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-5

Short-time Pickup and I^2t ON Delay

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

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

Notes:

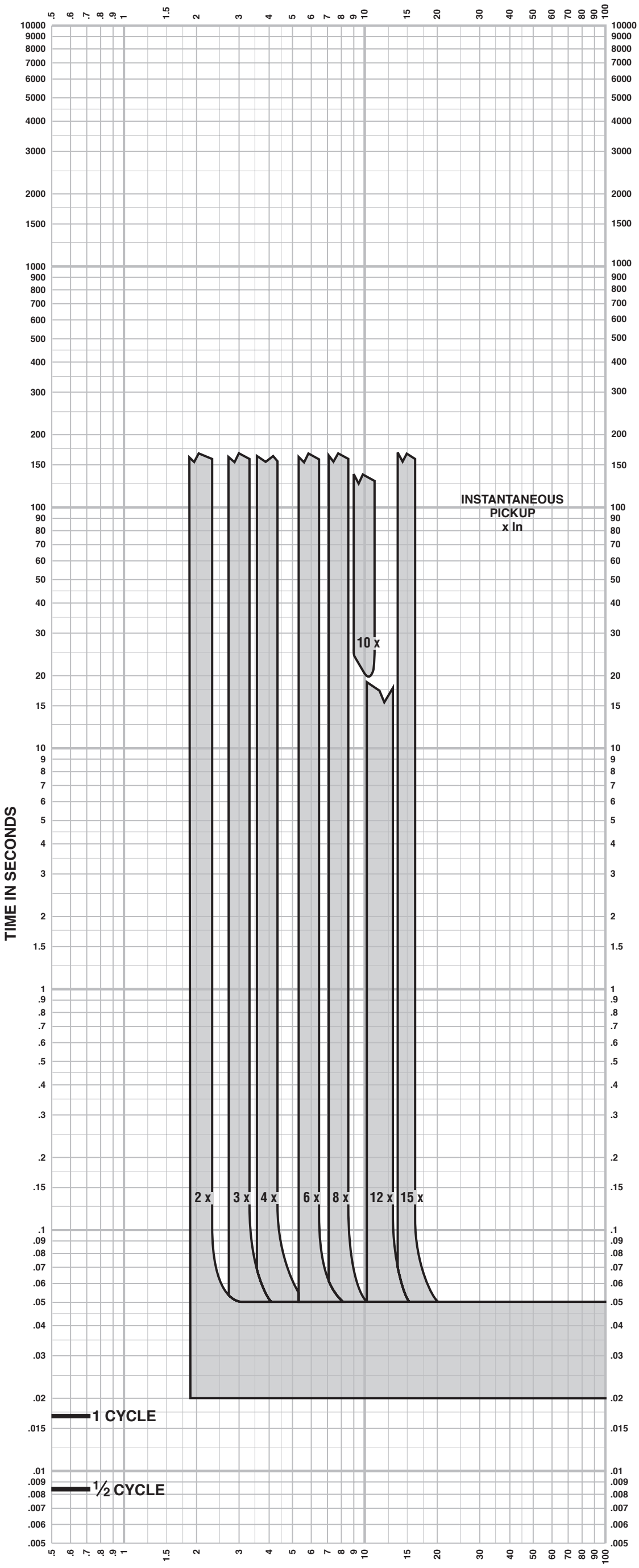
1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. See 613-4 for long-time pickup and delay trip curve.

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Curve No. 0613TC0005
December 2000
Drawing No. B48095-613-05



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup
2x–15x and OFF

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

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

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
5. See 613-4 and 613-5 for long-time pickup, long-time delay, short-time pickup, and short-time delay trip curves.

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Curve No. 0613TC0807
January 2008
Drawing No. 48095-0613-07
(Replaces 0613TC0007)

INSTANTANEOUS OVERRIDE VALUES NO. 613-10

MASTERPACT NW/NT

ANSI CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N1 ★	24
NW08N1	None
NW16N1	None
NW08H1 ★	24
NW08H1	None
NW16H1	None
NW20H1	None
NW32H1	None
NW08H2 ★	24
NW08H2	None
NW16H2	None
NW20H2	None
NW32H2	None
NW40H2	None
NW50H2	None
NW08H3 ★	24
NW08H3	85
NW16H3	85
NW20H3	85
NW32H3	85
NW40H3	85
NW50H3	85
NW08L1 ★	24
NW08L1	35
NW08L1F	24
NW16L1	35
NW16L1F	24
NW20L1	35
NW20L1F	24
NW32L1	117
NW40L1	117
NW50L1	117
NW08HA	None
NW16HA	None
NW20HA	None
NW32HA	None
NW40HA	None
NW50HA	None
NW08HF	85
NW16HF	85
NW20HF	85
NW32HF	85
NW40HF	85
NW50HF	85
NW08HC	35
NW16HC	35
NW20HC	35
NW32HC	117
NW40HC	117
NW50HC	117
NT08N1 ★	24
NT08N1	None
NT08H1 ★	24
NT08H1	None
NT08L1F	10
NT08NA	None

MASTERPACT NW/NT

UL CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N ★	24
NW08N	40
NW12N	40
NW16N	40
NW20N	40
NW08H ★	24
NW08H	40
NW12H	40
NW16H	40
NW20H	40
NW25H	65
NW30H	65
NW40H	75
NW50H	75
NW60H	75
NW08L ★	24
NW08L	35
NW08LF	24
NW12L	35
NW12LF	24
NW16L	35
NW16LF	24
NW20L	65
NW20LF	24
NW25L	65
NW30L	65
NW40L	75
NW50L	75
NW60L	75
NW08HF	40
NW12HF	40
NW16HF	40
NW20HF	40
NW25HF	65
NW30HF	65
NW40HF	75
NW50HF	75
NW60HF	75
NW08HB	35
NW12HB	35
NW16HB	35
NW20HB	65
NW25HB	65
NW30HB	65
NW40HB	75
NW50HB	75
NW60HB	75
NT08N ★	24
NT08N	40
NT12N	40
NT16N	40
NT08H ★	24
NT08H	40
NT12H	40
NT16H	40
NT08L1	10
NT12L1	10
NT16L1	10
NT08L	10
NT08LF	10
NT12L	10
NT16L	10
NT12LF	10
NT08HF	40
NT12HF	40

★ Maximum sensor plug 250 A

MASTERPACT NW/NT

IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
NW08N1	None
NW10N1	None
NW12N1	None
NW16N1	None
NW08H1	None
NW10H1	None
NW12H1	None
NW16H1	None
NW20H1	None
NW25H1	None
NW32H1	None
NW40H1	None
NW50H1	None
NW63H1	None
NW08H2 ★	24
NW08H2	85
NW10H2	85
NW16H2	85
NW20H2	85
NW25H2	85
NW32H2	85
NW40H2	85
NW50H2	117
NW63H2	117
NW20H3	65
NW25H3	65
NW32H3	65
NW40H3	65
NW08L1 ★	24
NW08L1	35
NW10L1	35
NW12L1	35
NW16L1	35
NW20L1	35
NW08H10	None
NW10H10	None
NW12H10	None
NW16H10	None
NW20H10	None
NW25H10	None
NW32H10	None
NW40H10	None
NW08NA	None
NW10NA	None
NW16NA	None
NW08HA	None
NW10HA	None
NW12HA	None
NW16HA	None
NW20HA	None
NW25HA	None
NW32HA	None
NW40HA	None
NW50HA	None
NW63HA	None
NW08HF	85
NW10HF	85
NW12HF	85
NW16HF	85
NW20HF	85
NW25HF	85
NW32HF	85
NW40HF	85
NW08HA10	None
NW10HA10	None
NW12HA10	None
NW16HA10	None
NW20HA10	None
NW25HA10	None
NW32HA10	None
NW40HA10	None
NT08H1	None
NT10H1	None
NT12H1	None
NT16H1	None
NT08L1	10
NT08H10	None
NT10H10	None
NT12H10	None
NT16H10	None
NT08HA	None
NT10HA	None
NT12HA	None
NT16HA	None
NT08HA10	None
NT10HA10	None
NT12HA10	None
NT16HA10	None

POWERPACT / HORIZON / SELECT / COMPACT

UL/IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
RG 600	57
RG 800	57
RG 1000	57
RG 1200	57
RG 1600	57
RG 2000	57
RG 2500	57
RJ 600	48▲
RJ 800	48▲
RJ 1000	48▲
RJ 1200	48▲
RJ 1600	48▲
RJ 2000	48▲
RJ 2500	48▲
RK 600	57
RK 800	57
RK 1000	57
RK 1200	57
RK 1600	57
RK 2000	57
RK 2500	57
RL 600	48▲
RL 800	48▲
RL 1000	48▲
RL 1200	48▲
RL 1600	48▲
RL 2000	48▲
RL 2500	48▲
PG 250	24
PG 400	24
PG 600	24
PG 800	24
PG 1000	24
PG 1200	24
PJ 250	7
PJ 400	10
PJ 600	10
PJ 800	10
PJ 1000	10
PJ 1200	10
PK 250	24
PK 400	24
PK 600	24
PK 800	24
PK 1000	24
PK 1200	24
PL 250	7
PL 400	10
PL 600	10
PL 800	10
PL 1000	10
PL 1200	10
MG 300	12▲
MG 350	12▲
MG 400	12▲
MG 450	12▲
MG 500	12▲
MG 600	12▲
MG 700	12▲
MG 800	12▲
MJ 300	12▲
MJ 350	12▲
MJ 400	12▲
MJ 450	12▲
MJ 500	12▲
MJ 600	12▲
MJ 700	12▲
MJ 800	12▲

IEC CB Model No.	Inst. Override (kA RMS) +/- 10%
NS 800b N	57
NS 1000b N	57
NS 1250b N	57
NS 1600b N	57
NS 2000 N	57
NS 2500 N	57
NS 3200 N	57
NS 800b H	48▲
NS 1000b H	48▲
NS 1250b H	48▲
NS 1600b H	48▲
NS 2000 H	48▲
NS 2500 H	48▲
NS 3200 H	48▲
NS 630b N	24
NS 800 N	24
NS 1000 N	24
NS 1250 N	24
NS 1600 N	24
NS 630b H	24
NS 800 H	24
NS 1000 H	24
NS 1250 H	24
NS 1600 H	24
NS 630b L	24
NS 800 L	24
NS 1000 L	24
NS 1250 L	24
NS 1600 L	24

▲ Tolerance +/- 15%

Note:

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

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

Specification Sheet

Ground Fault Indication Relay – H668



Code requirements

NFPA 70, the U.S. National Electrical Code (NEC) requires that services of 1000 amps and larger in capacity which operate at more than 150 volts from Line-to-Neutral must be provided with ground fault equipment. Generator sets rated at 1000 amps and larger which serve as emergency power must be provided with ground fault indication equipment. Health care facilities that utilize ground fault protection equipment must be provided with a coordinated multi-level ground fault system.

Cummins ground fault indication equipment is designed for use in Emergency/Standby power systems, for indication of ground fault conditions during generator set operation.

Features

Suitable for indicating a ground fault condition on a generator set which is either locally or remotely grounded.

Supply voltage - Operates on 24 VDC (nominal) control power - fully functional at voltages from 18-30 VDC.

Direct connection - Suitable for direct connection to generator sets operating at voltages up to 600 VAC (Line to Line).

Ground fault current settings - 100-1200 A, in 10 discrete settings: 100, 150, 200, 250, 300, 450, 600, 750, 800, 1200 A.

Monitoring - Provides continuous monitoring of neutral-to-ground with LED indication for open connection.

Factory mounted controls - Available factory mounted and interconnected to Cummins Detector™ series PowerCommand® controls.

Link reconnection - For use with either 3-pole (solid neutral) or 4-pole (switched neutral) transfer switches.

Indicating lamps - For relay on (green), ground fault current over setting (red), loss of ground connection (red).

Time delay settings – Adjustable 0-10 seconds.

Circuit board - One-piece molded case fully potted.

Contacts - One set of form C output, 8A at 250 VAC, 8A at 30 VDC.

“Test” - Push-button.

“Reset” - Push-button.

Percent full scale metering output - 0-1 mA full scale.

Bonding jumper - Sized per NEC requirements.

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Construction

The relay is provided in a non-conducting phenolic case, with provisions for panel mounting or mounting to a standard DIN rail (panel mounting is recommended for mounting on a generator set). Relay components are fully potted with epoxy resin for vibration resistance and durability.

The relay includes an integral terminal block assembly, which accepts wires up to 12-gauge.

Relay function selection link (auto/hand reset).

Environmental range - Operating -10 °C to +60 °C, storage -20 °C to 70 °C.

DC supply burden - 2.5 W.

Transfer switch type selection link - (3-pole or 4-pole).

System operation

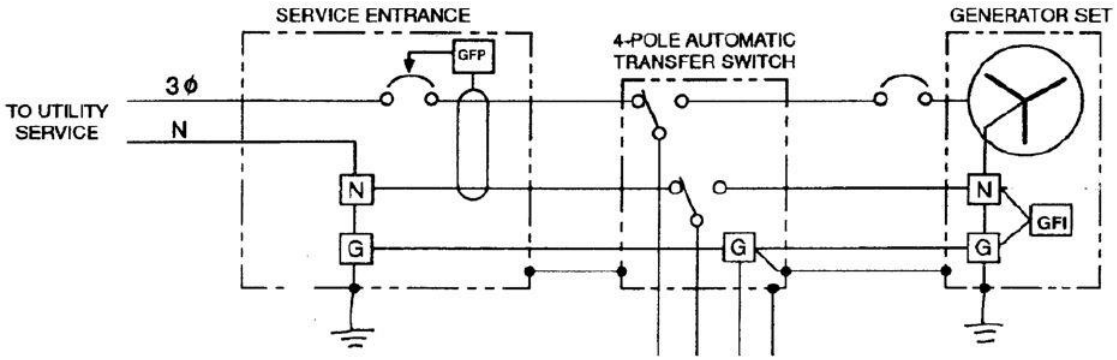
The ground fault relay continuously monitors the voltage across the neutral-to-ground bonding jumper and lights the ground fault alarm lamp on the generator set control when the connection is broken.

When the generator set is running, the relay continuously monitors the neutral-to-ground generator set connection and lights the ground fault alarm lamp on the generator set control when a ground fault condition is sensed.

Alarm condition can be cleared by pushing the reset switch on the generator set control panel. Actual ground fault current level can be monitored with a 0-1 mA meter, directly from the relay. A push button test switch is provided to simulate ground fault conditions and operate the relay and indication circuitry. Addition of the auto-reset link activates automatic reset of the relay after the ground fault condition has cleared.

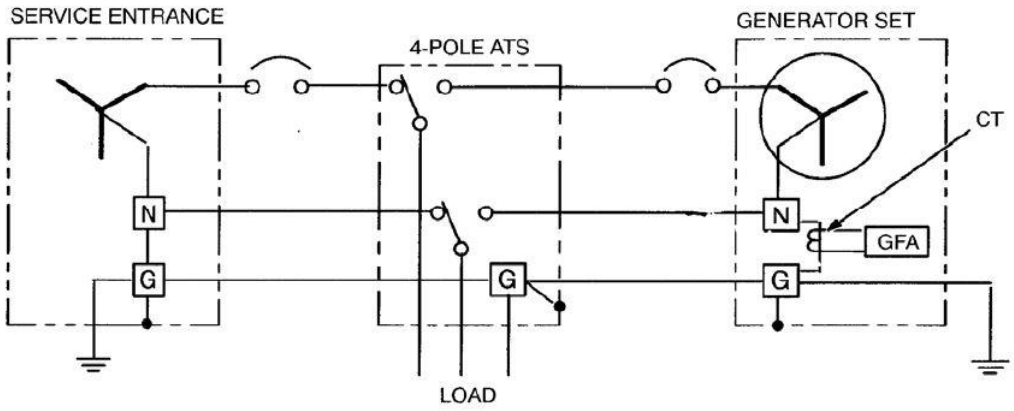
System schematic

Separately derived system connections (local grounding connection).



Neutral-to-ground bonding jumper must be sized per code requirements. For non-separately derived systems (3-phase/4-wire systems with 3-pole transfer switch), the ground connection and the neutral-to ground bonding jumper on the generator set are removed, and the 3-pole ATS link is added to the ground fault relay. For non-separately derived systems a label must be applied to the service entrance switchboard, indicating that removal of the equipment-bonding jumper can cause hazardous operating conditions.

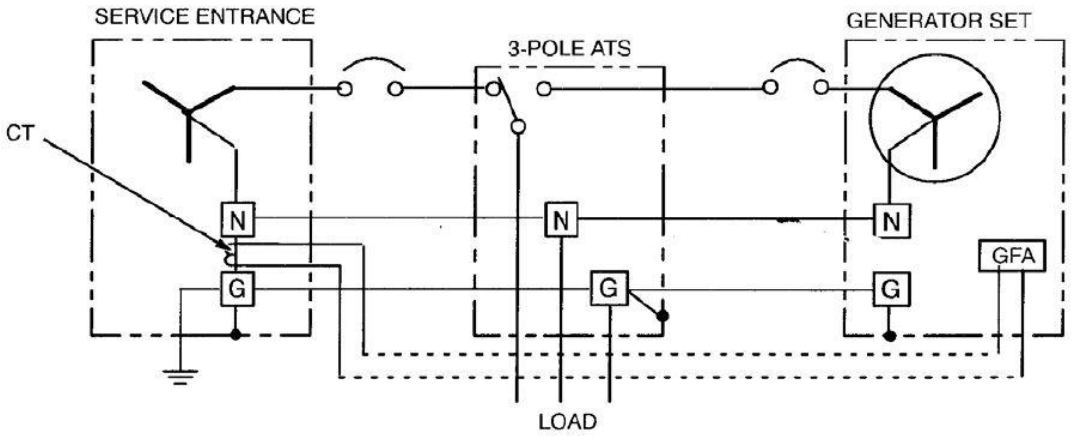
0179-3509 – TYPE A



THREE-PHASE, FOUR-WIRE UTILITY, 4-POLE ATS

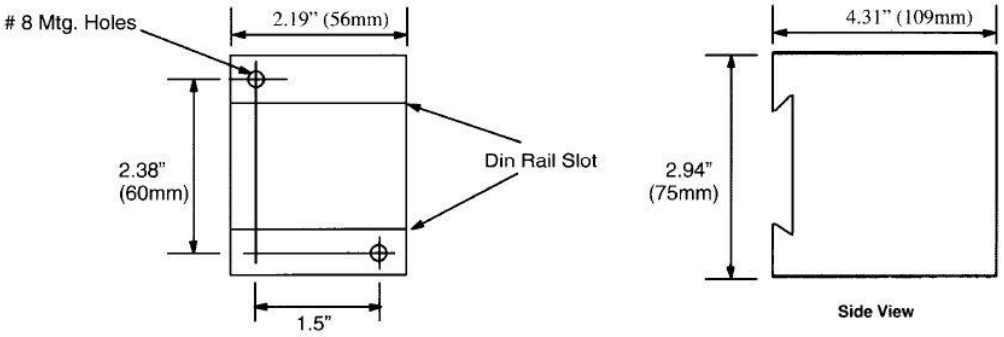
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0179-3509 – TYPE B



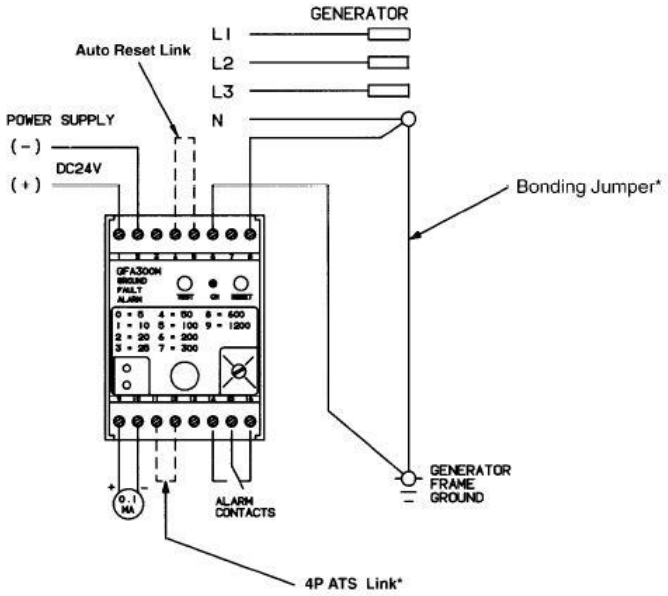
THREE-PHASE, FOUR-WIRE UTILITY, 3-POLE ATS

Outline detail



Weight: 19 oz (540 grams)

Interconnection detail



* Required only with separately derived systems. Bonding jumper is included in kit.

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Field installation kits

Accessory kit #	Corresponding production part #	Critical component	Used with alt frame size 4 or 5	Used with alt frame size 6 or 7	Feature code	Miscellaneous	Instruction sheet
0179-3244-05	0179-3244-03	0307-3003-01	X		H550	For use with PCC2100	C645
0179-3244-06	0179-3244-07	0307-3003-01		X	H550	For use with PCC2100	C645
0179-3244-09	0179-3244-08	0307-3003-01	X			For use with PCC2100	C645
0179-3428-02	0179-3428-01	0307-3003-01	X		H550	For use with PCC3200, PCC3201	C706
0179-3509-03	0179-3509-01	0307-3003-01		X	H667/ H668	Ground Fault Kit – PCC2100/3100, 4 pole. Separately derived transfer switch (SDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-04	0179-3509-02	0307-3003-01		X	H666	Ground Fault Kit – PCC3200, 3-pole NSDTS (H666) NON-separately derived transfer switch (NSDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-07	0179-3509-05	0307-3003-01		X	H667/ H668	Ground Fault Kit – PCC3200, 4-pole. Separately derived transfer switch (SDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-08	0179-3509-06	0307-3003-01		X	H666	Ground Fault Kit – PCC3200, 3-pole. NON-separately derived transfer switch (NSDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0300-4582-05	0300-4582-03	0307-3003-01	X		H550	For use with PCC3100	C646

Feature descriptions

H550-2 = The unit is equipped with an adjustable sensor to detect a ground fault condition on the main alternator output. A fault condition illuminates an indicating lamp on the genset control panel. Sensor features include: -0 to 1.0 second adjustable time delay. Ground fault pickup settings: 100, 150, 200, 250, 300, 450, 600, 750, 800, 1200 Amps – “Test” and “Reset” buttons and functional condition indicating lights. Suitable for operating voltages up to 600 VAC.

H666-2 = The generator set is equipped with a current transformer and a ground fault indication relay for use with or without a set mounted circuit breaker. The CT and the relay supplied with the LV Genset will work only when the system has the single Genset and the CT is placed on the N-G bond. For a separately derived system with multiple Gensets, the current in the N-G bonds of the each Genset must be summed and then wired to the protective relay. For a non-separately derived system the CT should be placed in the N-G bond. In most of the cases this bond will be the part of the switchgear where a service entrance utility breaker is installed. Limitation of this design would be number of CTs which could be placed on the N-G bond and the number of the auxiliary contacts available on the protective relay.

H667-2 = The generator set is equipped with a current transformer and ground fault indication relay for use with a 4-pole, separately derived transfer switch and set mounted circuit breaker. The CT is mounted in the circuit breaker box mounted on the left side of the genset as viewed from the generator end. The genset neutral and ground are bonded.

H668-2 = The generator set is equipped with a current transformer and ground fault indication relay for use with a 4-pole, separately derived transfer switch and set mounted circuit breaker. The CT is mounted in the circuit breaker box mounted on the right side of the genset as viewed from the generator end. The genset neutral and ground are bonded.

Certification

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

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SENS®

Cummins **Battery Charger-10Amp, 120/208/240VAC, 12/24V, 50/60Hz**
PN A072H671

MicroGenius®2

Intelligent Battery Charger



Model	Power	12V Output	24V Output
MicroGenius 180	180 watts	10 amps	6 amps
MicroGenius 300	300 watts	12 amps	10 amps
MicroGenius 450	450 watts	15 amps	15 amps

Small. Powerful. Rugged.

Patented Dynamic Boost™ Charge - safely recharges batteries faster than competing products

HELIX™ technology - significantly increases battery life and cuts risk of sudden battery failure

Field selectable 12/24 volt output - simplifies inventory management & field service

Hardened switchmode powertrain - delivers first-class abuse resistance & state-of-the-art energy efficiency

Small, lightweight, water resistant package - allows installation in nearly any location

Standard J-1939 and Modbus communications - easily enable genset, workboat & building integration

SENS®
STORED ENERGY SYSTEMS



MicroGenius 2 Intelligent Battery Charger

MicroGenius 2 Charger Combines Breakthrough Technologies With Robust Reliability

Designed for mission-critical applications, **MicroGenius 2** battery chargers pack advanced technology charging into a small, lightweight and rainproof package. **MicroGenius 2** is the only charger that delivers high performance charging while prolonging useful life of batteries and significantly reducing risk of sudden battery failure.

Designed and assembled in Colorado, SENS employs rigorous worst-case analysis design processes and extensive abuse testing to ensure reliable operation in adverse environments. State-of-the-art automation in assembly, test and burn-in processes provide unmatched levels of consistency and quality for years of trouble-free service.

Four unique technologies that together make **MicroGenius 2** the most advanced battery charger available include:

Patented Dynamic Boost™ Charge safely recharges batteries faster than competing products

HELIX™ technology significantly increases genset battery life and cuts risk of sudden battery failure

Class-leading energy efficiency that saves money and exceeds energy efficiency regulation requirements

Cool-running, water & corrosion-resistant design that is rainproof UL® listed, ABS type approved

MicroGenius 2 Chargers Deliver Significant Benefits to Mission-Critical Users

- Longer-lasting batteries cut risk of end user application downtime
- Lower chance of catastrophic battery failure cuts safety risks for personnel and facilities
- Energy efficiency savings can more than pay for the charger over its lifetime
- Engineered-in reliability reduces service cost and risk of charger failure



Emergency Generator Battery Charging



Reliable Switchgear Power



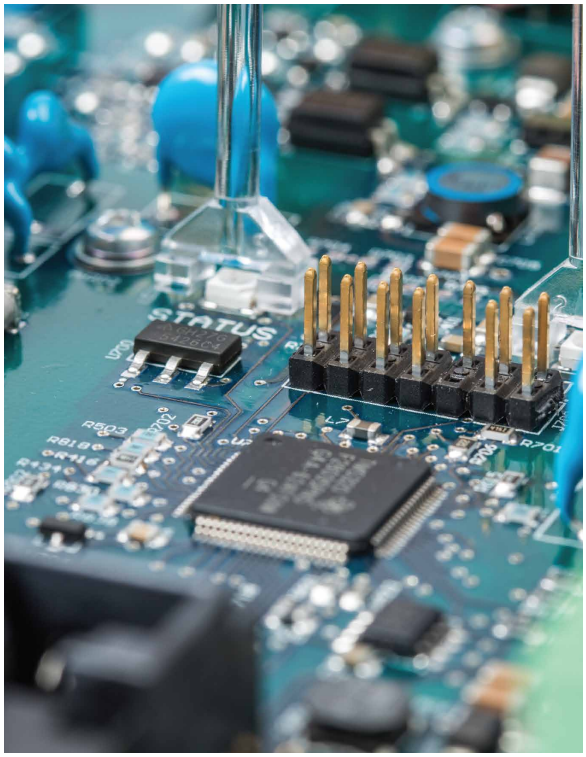
Stationary Battery Charging & DC Power



Marine Battery Charging & DC Power

SENS® STORED ENERGY SYSTEMS

What's Inside? Advanced Battery Charging Technologies

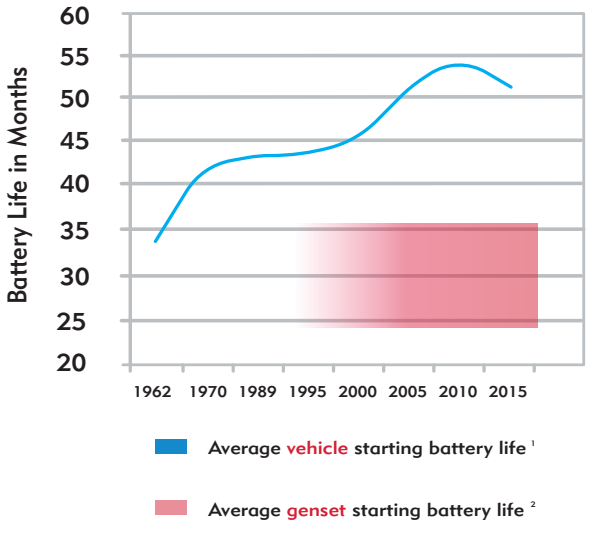


Dynamic Boost™ enables fast recharging while minimizing risk of overcharge.

It is well understood that boost charging at elevated voltage is the fastest way to charge batteries. When the battery nears full charge, however, voltage must be reduced to prevent overcharge. The right time to make this transition varies with depth of discharge, fixed DC loads, battery health, and the relationship of battery to charger size. Until SENS created Dynamic Boost, no charger was able to determine the correct time to spend at boost voltage.

Patented Dynamic Boost™ charging technology automatically determines, for each discharge cycle, the optimal time to shift from boost to float charging mode. Dynamic Boost enables **MicroGenius 2** to charge batteries faster and more completely than similarly rated conventional chargers, but with significantly lower risk of overcharge.

Average Starting Battery Life, in Months



1. BCI Technical Subcommittee Report on Battery Failure Modes, May 2015

2. LIfe range from 24 to 36 months, based on typical PM service replacement

HELIX™ charging technology saves batteries and energy.

Lead-acid starting batteries used in gensets are replaced nearly twice as often (every 2-3 years) as identical batteries used for vehicle starting (~ every 4-5 years). And in genset applications these batteries too often fail catastrophically, instead of gradually as they do in vehicle applications.

By enabling genset batteries to last as long as vehicle batteries, revolutionary HELIX (High Efficiency, LIfe-eXtending) technology from SENS reduces risk of early battery failure. HELIX also cuts risk of catastrophic battery failure at end of life. These improvements deliver significantly better genset starting reliability and user safety.

SENS®
STORED ENERGY SYSTEMS

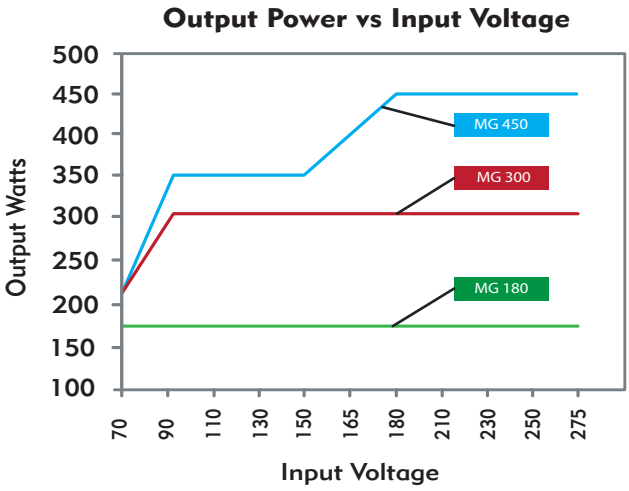
What's inside? Class-leading Energy Efficiency & Advanced Thermal Management

Class-leading energy efficiency & sustainability

Running 24/7, other battery chargers waste a lot of energy. Energy efficiency standards from the California Energy Commission mandate high efficiency operation of all single-phase input chargers as of January 1, 2017.
Achieving outstanding power conversion efficiency of up to 93%, **MicroGenius 2** consumes less than 3 watts in Eco-float. The most efficient charger in its class, MicroGenius with HELIX technology surpasses all known efficiency standards.



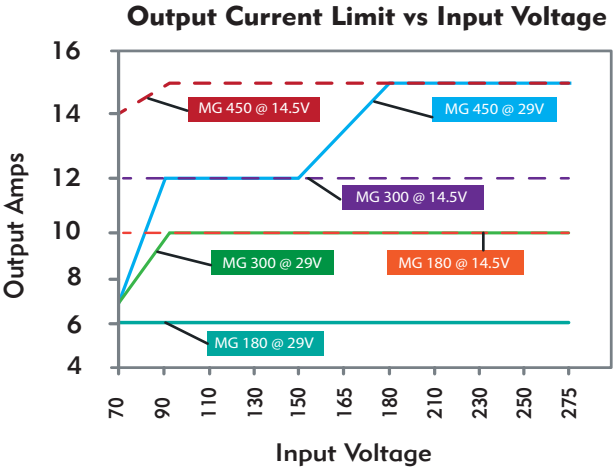
Large heat sink ensures cool running



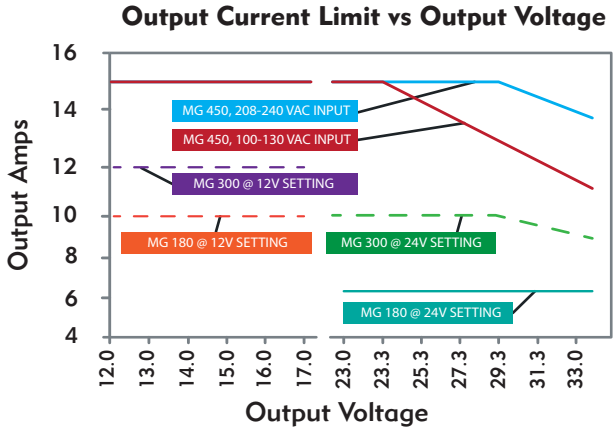
Cool running, water and corrosion-resistant package

Other chargers in hot, damp genset and marine environments rely on failure-prone fans or generous open venting that allows water onto charger components.

The **MicroGenius 2** heat sink delivers such effective convection cooling that only small side vents are required for operation in the hottest environments. Conformal coating on all electronics provides additional corrosion protection. **MicroGenius 2** is rated "rainproof" by UL, and conforms to ABS and Coast Guard marine requirements without the need for a drip shield.







SENS
STORED ENERGY SYSTEMS

MicroGenius2 Specifications

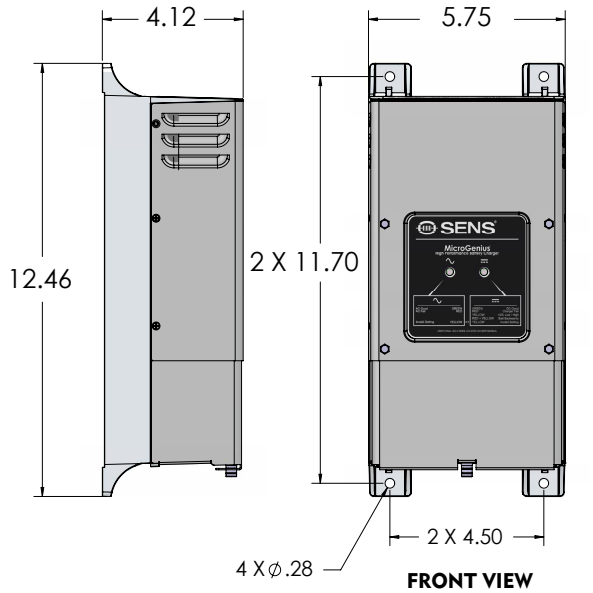
AC Input	VAC, Hz	90-265 [1] VAC, 47-63 Hz
	Protection	Supplementary overcurrent protection fuse, transient protected to EN61000-4-5 level 4
	Efficiency	Up to 93%; meets CA Energy Commission Title 20 Appliance Efficiency Regulations; standby AC draw < 3W
	Power factor	>.95 typical
DC output	Voltage	12/24 V nominal, field selectable, adjustable from 0-34V using computer to charger cable [2]
	MicroGenius 180	Selectable 12/24 volt nom., 10/6 amps. 180W max.
	MicroGenius 300	Selectable 12/24 volt nom., 12/10 amps. 300W max.
	MicroGenius 450	Selectable 12/24 volt nom., 15/15* amps, 450W max. (*24V, 12A max below 170 VAC input voltage)
	Charging modes	Float voltage, boost voltage. Two additional HELIX charging voltages in flooded lead-acid battery program
	DC power supply operation	Delivers fast-responding, stable, well-filtered DC without battery
	Current limit	100% current capability subject to temperature limits shown on charts (previous page). Field adjustable
	Charging characteristic	Constant voltage, current limited; patented Dynamic Boost control
	Line & load regulation	±0.5%
	Output ripple	< 100 mV wideband
	Battery temp. compensation	Standard. Optional remote battery temperature probe [3]
	Output protection	Current limit, supplementary overcurrent protection fuse, transient protected
	Overvoltage protection	Self-resetting and selective (shutdown only operates if charger causes the overvoltage condition)
	Dead battery charge	Starts into, and recharges zero volt battery without user intervention
	Parallel operation	Two or more chargers operate with all modes synchronized for increased current or fault tolerance [4]
Adjustment & Controls	Charge mode control	Fully automatic patented Dynamic Boost system
	Internal adjustments	12 or 24-volt; Battery type program; fine voltage setting
	Battery type programs	Flooded lead-acid, AGM or Ni-Cd for engine starting; VRLA for reserve power; ultracapacitor
	Factory adjustment	All charger adjustments factory set to customer specifications. Field reconfigurable
	Field voltage adjustment	3 manually selectable voltage settings. Infinite adjustment using computer to charger cable [2]
	Computer adjustment	Change or customize settings from computer using computer to charger cable [2]
	Keypad adjustment	Enable or change all settings from front panel [5]
Status Display	LEDs	Two multi-color front panel status LEDs
	Digital metering	Voltmeter accurate to ±2%; ammeter to ±5% [6]
	Status messages	20-character display of status & alarm messages
Alarms	Alarms	Factory set and field reconfigurable. Standard genset configuration includes summary; AC fail; charger fail; high DC volts, low DC volts, low cranking volts. Other alarm conditions [7] are available to replace, or be summed with the standard values. Contact SENS to request different factory alarm profile.
	Alarm: Output via network	All alarms available via either J-1939 or Modbus ports
	Alarms: Form C contacts	Two Form C contacts, each rated 30V, 2A resistive, assignable [8]
	Alarm: Output via network	Five Form C contacts, each rated 30V, 2A resistive, assignable [9]
Networking	J-1939 communications	CAN 2.0 extended ID on RJ-45 port
	Modbus communications	Modbus RS-485 on RJ-45 port
	SENSbus	Proprietary bus for connection of paralleled chargers and future SENS accessories
Environmental	Operating temp: 180	-40C to +70C; meets full specification from -40C to +60C, natural convection cooled [10]
	Operating temp: 300	-40C to +70C; meets full specification from -40C to +50C, natural convection cooled
	Operating temp: 450	-40C to +70C; meets full specification from -40C to +40C, natural convection cooled
	Storage temperature	-40C to +85C
	Humidity	5% to 95%, non-condensing
	Water ingress	IP 22; NEMA 3R
	Vibration	Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 primary axes. Random: 20-500Hz, .01G^2/Hz
	Shock	EN 60068-2-27 (15G)
	Electrical transient	ANSI/IEEE C62.41 & EN 61000-4-12 on power terminals
Abuse Protection	Reverse polarity	Charger self-protects without fuse clearing. Indication via LED & optional LCD
	Wrong voltage battery	Charger-battery voltage mismatch shuts down charger. Indication via LED & optional LCD
	Overtemp protection	Gradual output power reduction if heatsink temperature becomes excessive
Regulatory Compliance	North America	C-UL Listed for US & Canada: UL 1236 categories BBGQ, BBHH, BBJY and QWIR [11]; CSA 22.2, No. 107.2
		Certified to UL 1236 supplements SB (marine), SC (fire pump) and SE (emergency generator)
		NFPA-70, NFPA-110 [12]
		FCC Part 15, Class B
		Seismic: Rigid & non-structure wall mount; max S_{DS} of 2.5G. IBC 2000-2012, Calif. BC 2007-2010
		American Bureau of Shipping, type approved
	European Union (CE)	EMC: 2014/30/EU (EN 61000-6-2 & EN 61000-6-4)
		LVD: 2014/35/EU (EN 60335-1 & EN 60335-2-29)
		RoHS 2: 2011/65/EU (EN 50581)
Construction	Housing/configuration	Die-cast aluminum heatsink base with stainless steel covers & fasteners
	Dimensions & Weight	See drawings, dimensions & weight section on last page
	Weight	6.0 lbs; 2.7 Kg
	Connections	AC & DC terminal blocks: 14 to 10 AWG. J-1939 and Modbus-485: RJ-45. Form C alarms: 28 to 16 AWG

1 Output power derates below 100 VAC input; full 15A output of 450W available only above 170 VAC input 2 Requires optional computer to charger adapter SENS p/n 209254 plus free SENS software available at www.sens-usa.com 3 Remote battery temp sensor is optional. Order SENS p/n 209481 4 Requires standard RJ-45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) 5 Requires that digit 12 of the model number be F 6 Requires that digit 12 of the model number be D, E, or F 7 Overvoltage shutdown, reverse polarity battery, incompatible battery, invalid settings, I/O bus inactive, thermal fold back, no temperature probe, current limiting, ground fault, low current 8 Models with E or G as digit 12 of the model number include 2 ea. Form C alarm contacts 9 Models with D or F as digit 12 of the model number include 5 ea. Form C alarm contacts 10 At 65 deg. C and above the LCD display may be unreadable and display life will be reduced 11 Except 180W unit in 24V configuration, which is not listed to QWIR 12 All chargers equipped with an alarm / display board meet NFPA-110 requirements. For chargers without an alarm / display board to meet NFPA-110, charger performance and alarm data available on the J-1939 port must be annunciated by the genset control panel.

MicroGenius2

Dimensions & Weight

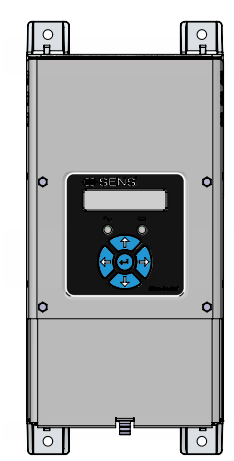
All unit dimensions are identical.
All units weigh 6.0 lbs. (2.8 KG).
All dimensions are in inches.



FRONT VIEW NO DISPLAY



FRONT VIEW WITH OPTIONAL DISPLAY

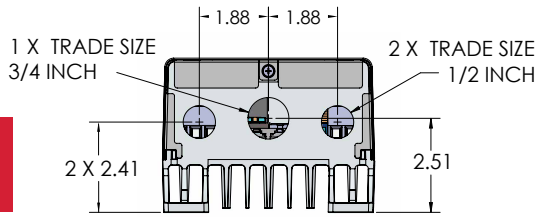


FRONT VIEW WITH OPTIONAL DISPLAY AND OPTIONAL KEYPAD

How To Order

Use the Model Number Breakout below to configure your charger:





Power
1= 180w
3= 300w
4= 450w

Output Voltage
22 = 12/24V

Output Current
1006 = 10A @ 12V; 6A @ 24V (180 only)
1210 = 12A @ 12V; 10A @ 24V (300 only)
1515 = 15A @ 12V; 15A @ 24V (450 only)

Alarm & Communication Options
A = base model; includes J-1939 & Modbus communications
D = base model + LCD display + 5 ea. Form C alarm relays
E = base model + LCD display + 2 ea. Form C alarm relays
F = base model + LCD display + 5 ea. Form C alarm relays + keypad control

Example: M3-22-1210-F

The most rugged, advanced technology industrial charger available

Contact SENS or your local sales representative for additional specification and installation information, or visit our website for latest available data.
Specification subject to change without notice.

SENS, Stored Energy Systems, the battery/rectifier logo, Dynamic Boost, HELIX, and MicroGenius are trademarks of Stored Energy Systems LLC.
Patented US 9,270,140; 9,385,556; 9,413,186; 9,509,164. Other patents pending.

Contact Information

Sales 1.866.736.7872 • 303.678.7500 • Fax 303.678.7504 • www.sens-usa.com • info@sens-usa.com
Stored Energy Systems, LLC 1840 Industrial Circle, Longmont, CO 80501 USA
111066 B

Specification Sheet

Battery and Accessories



Battery Specifications

Battery Part Number	Group Size	CCA	Reserve Capacity	Battery	Voltage	Length	Width	Height	Ship Weight lbs.	Quarts Electrolyte
0416-1330	24XL	810	146	Wet	12	10.3	9.0	6.6	43	5.9
0416-1051	26	530	80	Wet	12	8.2	6.8	8.1	31	3.7
0416-0796	31	725	150	Wet	12	12.7	6.0	9.3	62	4.2
0416-0980	31	1000	185	Wet	12	13.0	6.8	9.5	59	4.2
A045P632	34	850	NA	Wet	12	10.3	6.6	8.0	NA	NA
0416-1291	34	800	100	Sealed	12	10.0	6.9	7.9	38	4.0
A030Y976	4D	1050	290	Wet	12	20.7	8.7	10.0	100	NA
0416-0439	8D	1400	430	Dry	12	20.8	10.7	9.5	110	16.0
0416-1105	8D	1400	430	Wet	12	20.8	10.8	9.5	125	16.0
A062X621	24	800	135	Wet	12	10.1	6.8	8.7	42	N/A
A062X622	34	800	120	Wet	12	10.2	6.9	7.9	38	N/A

Note: Proposed battery selection subject to change.

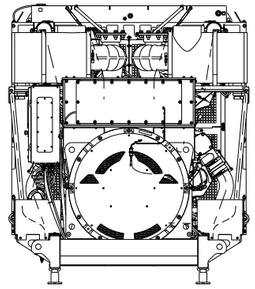
©2022 Cummins Inc. AC-150 PDAC-150 (05/23)

SECTION 4

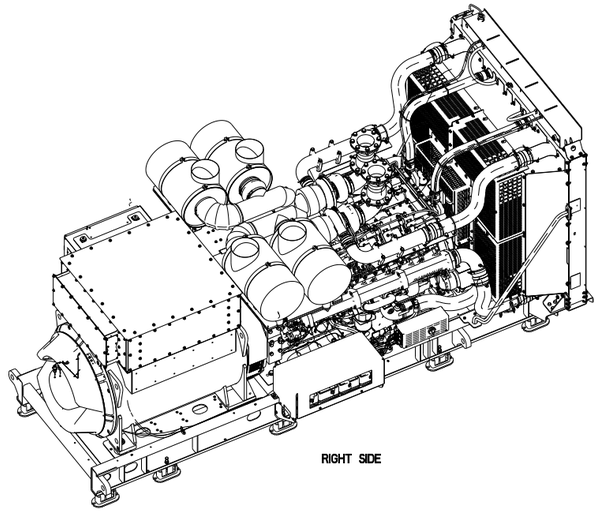
Generator Drawings

NOTES:

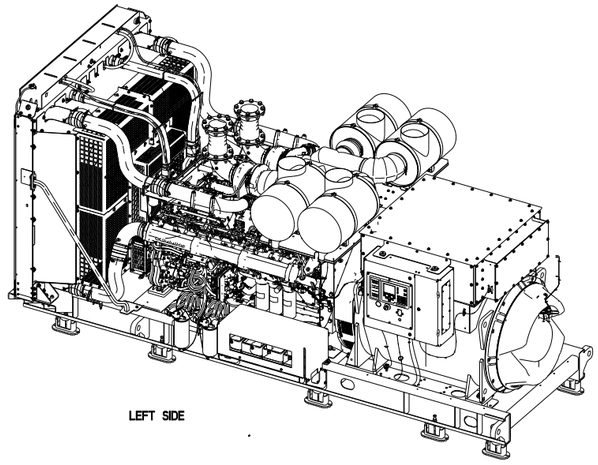
1. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.
2. TOTAL COOLANT CAPACITY = 186.24 L
3. SEE NOTES ON SHEET 5.
4. SEE NOTES ON SHEET 9
5. SEE NOTES ON SHEET 12.



FRONT



RIGHT SIDE



LEFT SIDE

GENSET MODEL	ALTERNATOR	AIR CLEANER	CB
C1250D6E	S6-F	NORMAL DUTY HEAVY DUTY	2CB 1CB ENTRANCE BOX ONLY (NO CB)
	S6-G	NORMAL DUTY EAVY DUTY	2CB 1CB ENTRANCE BOX ONLY (NO CB)
	S6-H	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-C	NORMAL DUTY HEAVY DUTY	2CB 1CB ENTRANCE BOX ONLY (NO CB)
	S7-D	NORMAL DURY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-E	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S9-B	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
C1500D6E	S6-H	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-C	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-D	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-E	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-F	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S7-G	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)
	S9-B	NORMAL DUTY HEAVY DUTY	2 CB 1 CB ENTRANCE BOX ONLY (NO CB)

OTHER AVAILABLE OPTIONS	
1	COOLANT HEATER
2	OIL DRAIN VALVE
3	OIL HEATER
4	ALTERNATOR HEATER
6	BATTERY HEATER
7	OIL MAKE UP
8	OIL SAMPLING VALVE
9	FUEL IN AND DRAIN HOSES
10	EXHAUST BELLOWS
11	MUFFLER
12	REDUNDANT STARTER/BATTERY SYSTEM
13	AIR RESTRICTION INDICATORS
14	SEISMIC-ANTI-VIBRATION ISOLATORS
15	BATTERY CHARGER

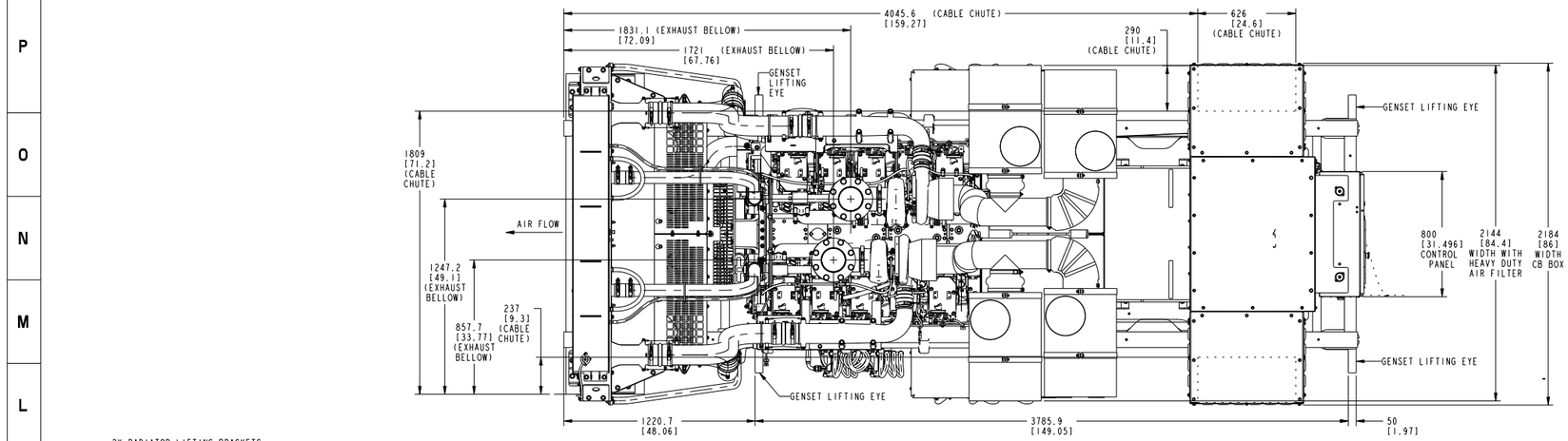
HARD MOUNTED CHASSIS + S9 ALTERNATOR + HEAVY DUTY AIR FILTER

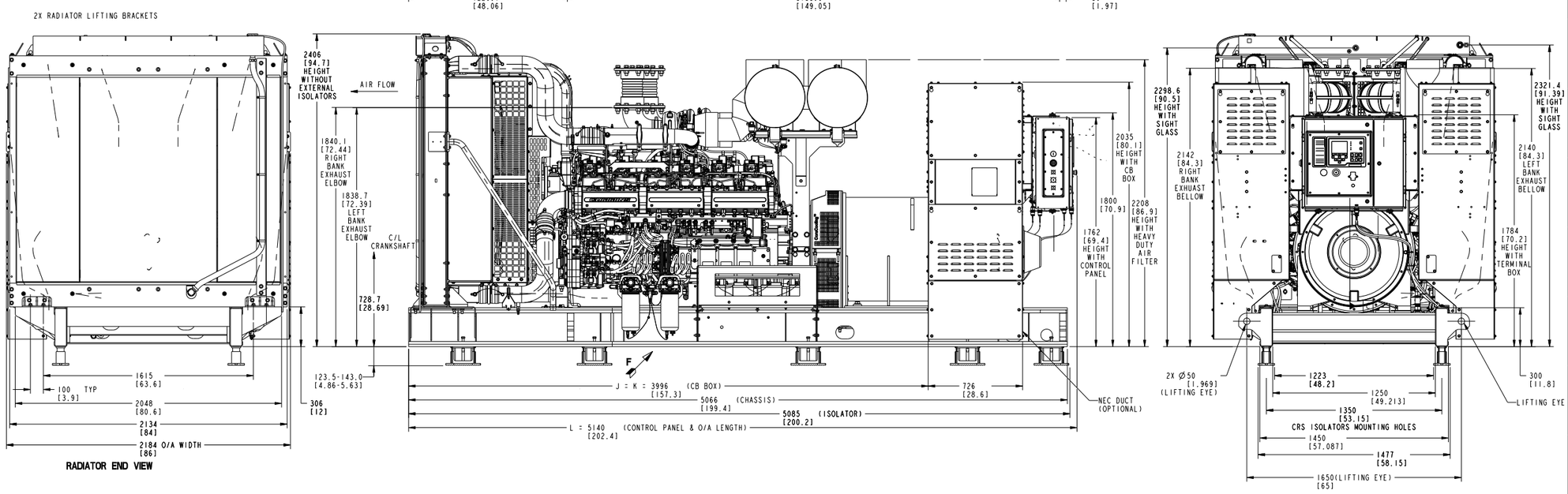
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MODEL/PLATFORM: QSK38	THIS PART IS SIMILAR TO: -
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY	ANG. TOL.: ± 1°
SURFACE FINISH PER: CMI_SURF_FIN_PER:1	SURFACE FINISH:-
WALL THICKNESS: - DRAFT ANGLES: -	EDGE RADII: - FILLET RADII:-
DIMENSIONAL TOLERANCES: X ± 3	.X ± 1 .XX ± 0.5
HOLE SIZE 0.00-4.99 TOL.: +0.15/-0.00 / HOLE SIZE 5.00-9.99 TOL.: +0.20/-0.10 / HOLE SIZE 10.00-17.49 TOL.: +0.25/-0.13 / HOLE SIZE 17.50-24.99 TOL.: +0.30/-0.13	
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0 SCALE:1/16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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ALTERNATOR	J	K	L
S7-C	3796	3796	4943
S7-D	3916	3916	5063
S7-E	3916	3916	5063
S7-F	3916	3916	5063
S7-G	3996	3996	5143

LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: M	
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SURFACE FINISH PER: CMI_SURF_FIN_PER.1		SURFACE FINISH: -	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII: -
DIMENSIONAL TOLERANCES:	X ± 3	.X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL: +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL: +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL: +0.30/-0.13
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0	SCALE: 1:16	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric	

HARD MOUNT CHASSIS + S7-G ALTERNATOR + HEAVY DUTY AIR FILTER
(Normal duty filter provided)

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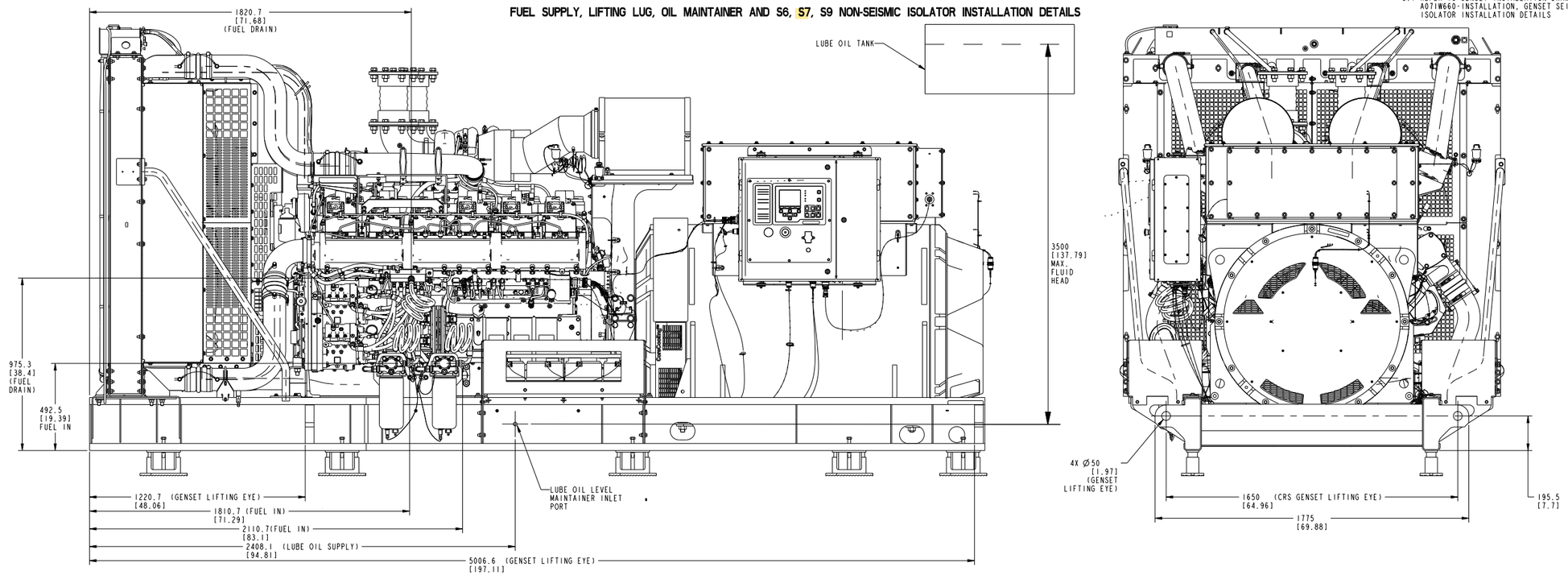
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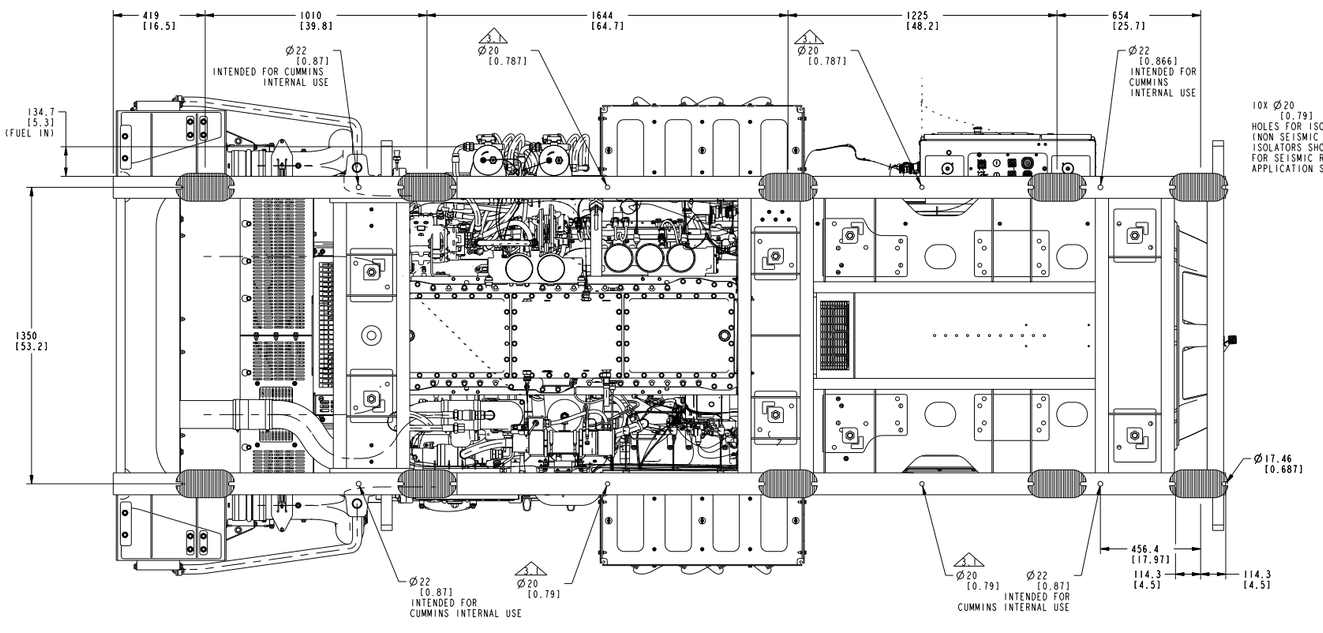
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Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released**

FUEL SUPPLY, LIFTING LUG, OIL MAINTAINER AND S6, S7, S9 NON-SEISMIC ISOLATOR INSTALLATION DETAILS

NOTES:
3.1 REFER TO GENSET INSTALLATION DRAWING A07IW660-INSTALLATION, GENSET SEISMIC ISOLATOR INSTALLATION DETAILS



SCALE 1/8



FUEL SYSTEM CONNECTOR DETAILS			
DESCRIPTION	ON FILTER	HOSE	
		FILTER SIDE	CUSTOMER SIDE
FUEL IN	1-1/16-12_UN JIC SWIVEL 37° FLARE	1-1/16-12 90° ELBOW JIC SWIVEL 37°	3/4 NPTF MALE PIPE

FUEL SYSTEM CONNECTOR DETAILS			
DESCRIPTION	ON ENGINE	HOSE	
		ENGINE SIDE	CUSTOMER SIDE
FUEL DRAIN	1-1/16-12 UN-2A 37° FLARE	1-1/16-12 STRAIGHT JIC SWIVEL FEMALE 37° FLARE	3/4 NPTF MALE PIPE

OIL MAINTAINER SYSTEM CONNECTOR DETAILS		
LUBE OIL SUPPLY	3/4"(THREAD)	JIC 37°(SAE J514)

LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: M	
MODEL/PLATFORM: QSK38		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY		ANG. TOL.: ± 1°	
SURFACE FINISH PER: CMI.SURF.FIN.PER:1		SURFACE FINISH:-	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 3	.X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL. +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL. +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL. +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL. +0.30/-0.13
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0	SCALE: 1/16	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric

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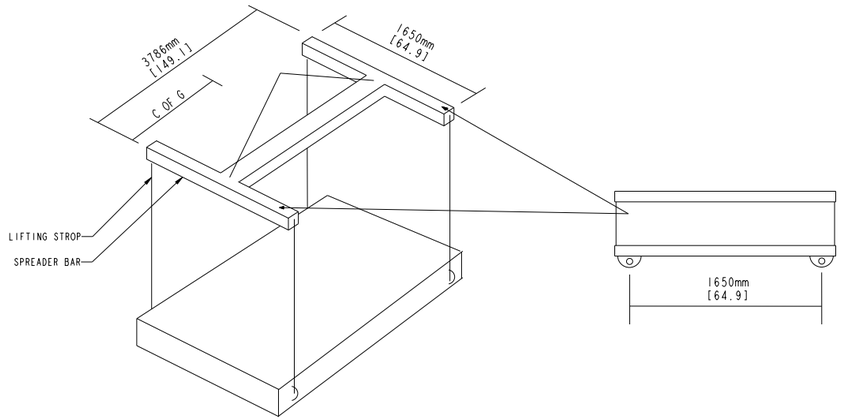
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Part Number: **A062V279** Part Revision: **D**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released**

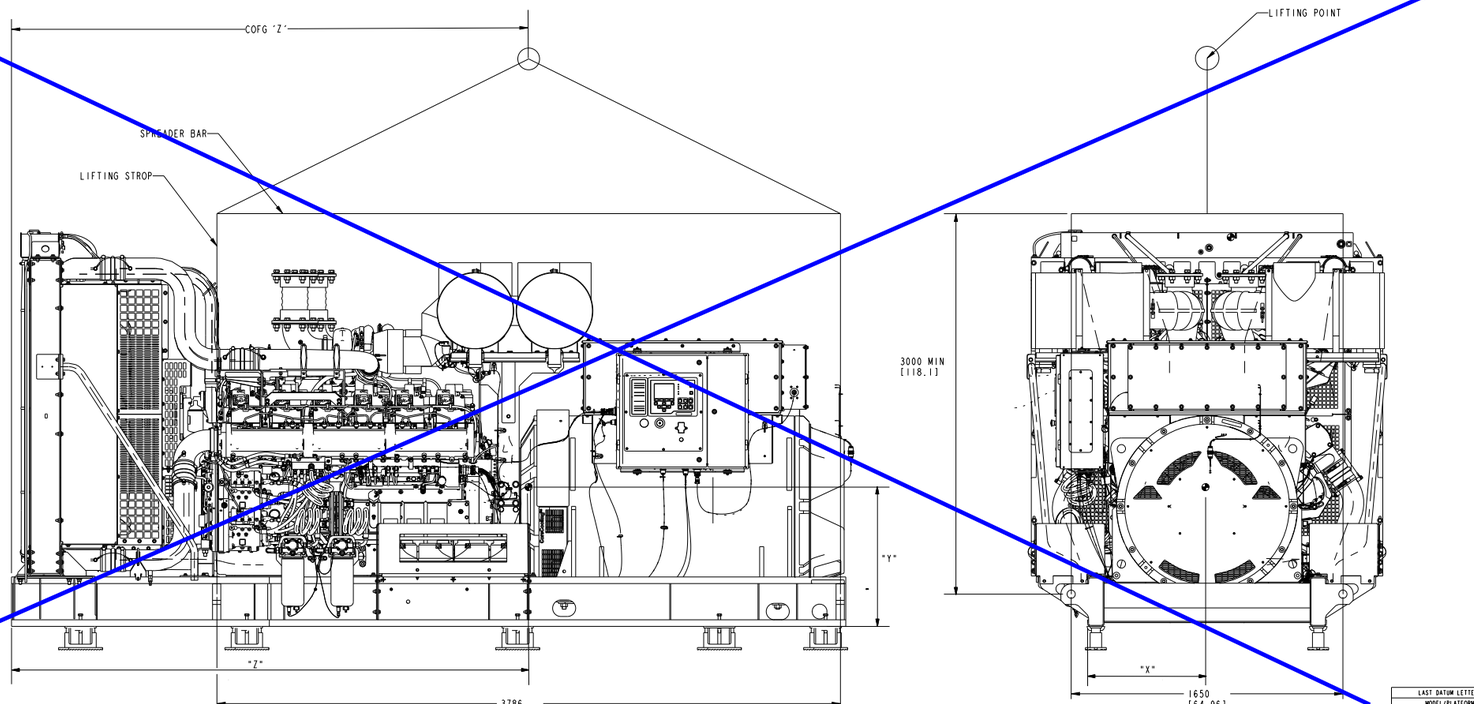
LIFTING ARRANGEMENT FOR GENSET

IDEAL LIFTING FRMAE AND STROPS

FOR C OF G VALUES REFER TO
SHEET 2 : FOR S9 ALTERNATOR WITH HD AND ND AIR FILTER
SHEET 3 : FOR S6(ALL CORE) ALTERNATOR WITH HD AND ND AIR FILTER
SHEET 4 : FOR S7(ALL CORE) ALTERNATOR WITH HD AND ND AIR FILTER



1. WITH S9 ALTERNATOR



LAST DATUM LETTER USED: -				LAST REFERENCE LETTER USED: M	
MODEL/PLATFORM: QSK38				THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY				ANG. TOL.: ± 1°	
SURFACE FINISH PER: CMI_SURF_FIN_PER:1				SURFACE FINISH:-	
WALL THICKNESS: -	DRAFT ANGLES: -			EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 3			X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL: +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL: +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL: +0.30/-0.13		
Cummins Inc.					
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES		SIZE: A0	SCALE:1/16		
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009		THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric	

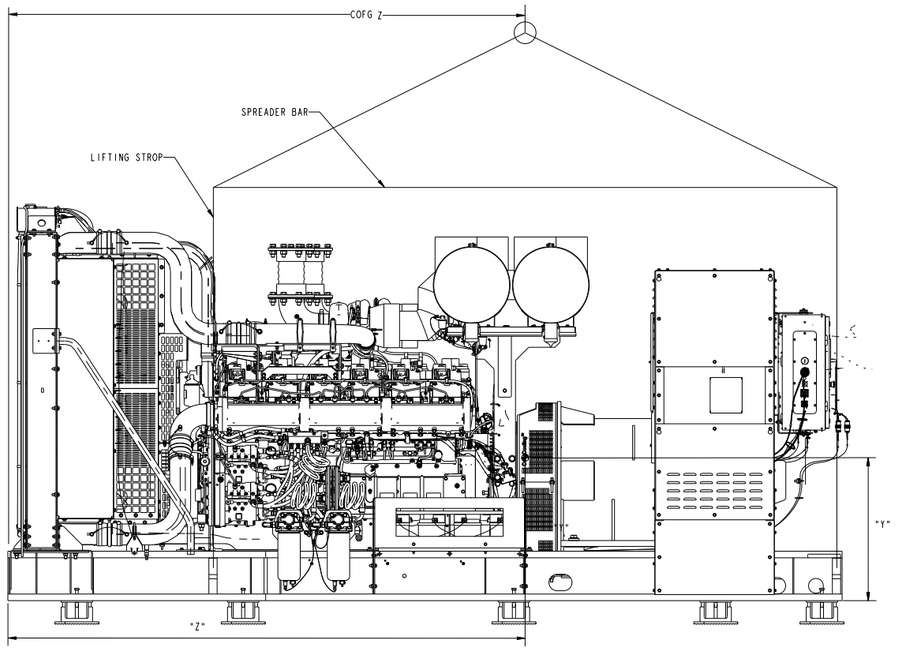
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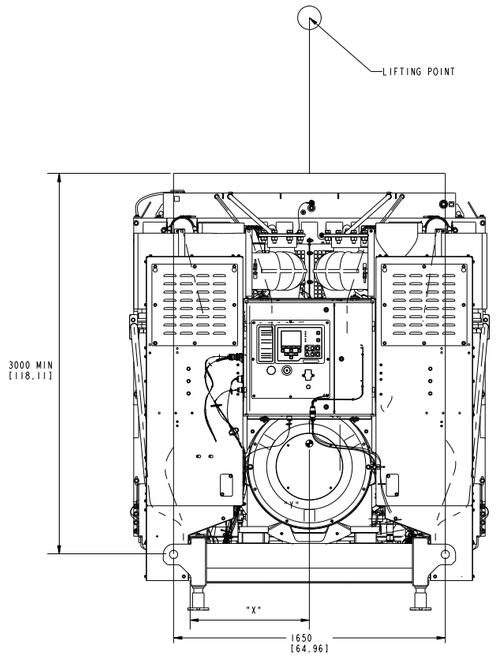
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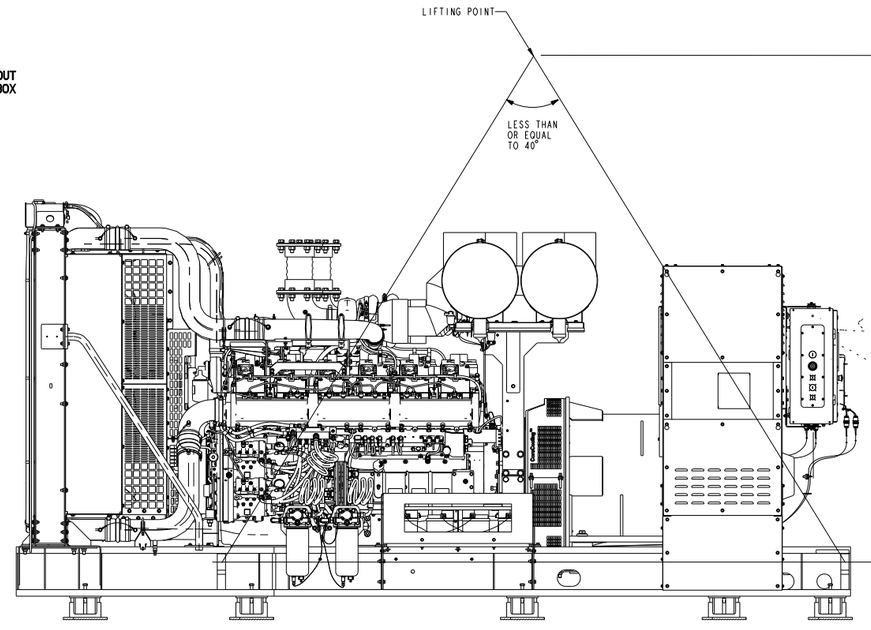
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Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released**

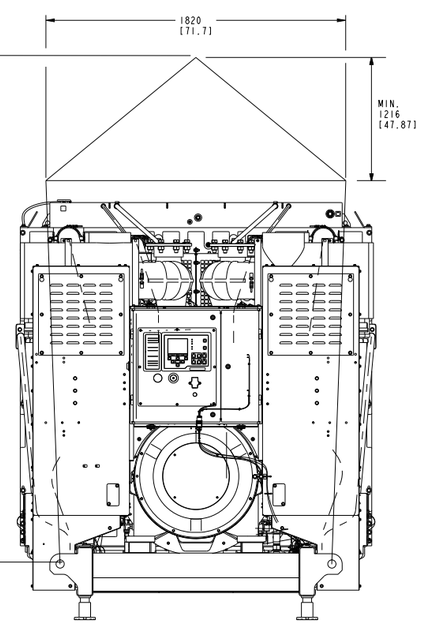
PARALLEL LIFT :
FOR S6 & S7
ALTERNATOR
CONFIGURATION





SINGLE POINT LIFT:
FOR S6 & S7
ALTERNATOR WITHOUT
CIRCUIT BREAKER BOX





LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: M	
MODEL/PLATFORM: QSK38		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY		ANG. TOL.: ± 1°	
SURFACE FINISH PER: CMI_SURF_FIN_PER:1		SURFACE FINISH:-	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 3	.X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL.: +0.15/-0.00	HOLE SIZE 5.00-9.99 TOL.: +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL.: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL.: +0.30/-0.13
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0	SCALE:1/16	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric

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OVERALL DINEMSIONS AND COFG DATA FOR ALL CONFIGURATIONS

REFER SHEET 2 FOR DRAWING VIEW AND SHEET 6 FOR COFG

ENGINE	ALTERNATOR	AIR CLEANER	CB OPTION	GENSET WET WEIGHT(KG)	GENSET WET WEIGHT(LBS)	GENSET DRY WEIGHT(KG)	GENSET DRY WEIGHT(LBS)	OVERALL DIMENSIONS			COFG		
								LENGTH	WIDTH	HEIGHT (WITHOUT EXTERNAL ISOLATORS)	X	Y	Z
QSK38	S9-B	NORMAL DUTY	NO CB	11711	25817	11221	24737	5085	2184	2406	723.19	834.46	2843.22
		HEAVY DUTY		11833	26087	11343	25007	5085	2184	2406	722.71	844.83	2845.04

REFER SHEET 3 FOR DRAWING VIEW AND SHEET 7 FOR COFG

ENGINE	ALTERNATOR	AIR CLEANER	CB OPTION	GENSET WET WEIGHT(KG)	GENSET WET WEIGHT(LBS)	GENSET DRY WEIGHT(KG)	GENSET DRY WEIGHT(LBS)	OVERALL DIMENSIONS			COFG		
								LENGTH	WIDTH	HEIGHT (WITHOUT EXTERNAL ISOLATORS)	X	Y	Z
QSK38	S6-W	NORMAL DUTY	2 CB	10243	22582	9753	21502	5085	2184	2406	724.26	853.11	2656.89
			1 CB	9965	21969	9475	20889				724.00	845.34	2611.36
			NO CB	9687	21357	9197	20276				724.17	837.50	2563.54
		HEAVY DUTY	2 CB	10365	22852	9875	21772				723.69	864.33	2661.18
			1 CB	10087	22239	9597	21159				702.58	857.37	2616.37
			NO CB	9809	21626	9319	20546				723.58	849.97	2569.24

REFER SHEET 4 FOR DRAWING VIEW AND SHEET 7 FOR COFG

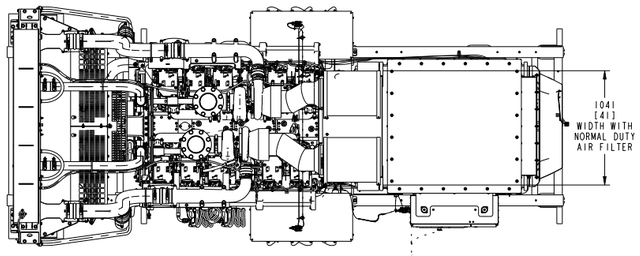
ENGINE	ALTER-NATOR	AIR CLEANER	CB OPTION	GENSET WET WEIGHT(KG)	GENSET WET WEIGHT(LBS)	GENSET DRY WEIGHT(KG)	GENSET DRY WEIGHT(LBS)	OVERALL DIMENSIONS			COFG		
								LENGTH	WIDTH	HEIGHT (WITTHOUT EXTERNAL ISOLATORS)	X	Y	Z
QSK38	S7-C	NORMAL DUTY	2 CB	10354	22826	9864	21745	5085	2184	2406	724.18	872.61	2658.77
			1 CB	10005	22056	9515	20976				694.58	856.66	2606.48
			NO CB	9656	21287	9166	20207				724.13	839.74	2550.86
		HEAVY DUTY	2 CB	10476	23095	9986	22015				723.62	883.87	2662.99
			1 CB	10127	22326	9637	21246				694.36	868.50	2611.48
			NO CB	9778	21557	9288	20476				723.54	852.22	2556.73
	S7-D	NORMAL DUTY	2 CB	10581	23328	10092	22248	5085	2184	2406	724.20	869.50	2704.23
			1 CB	10233	22559	9743	21479				685.14	853.80	2650.56
			NO CB	9884	21790	9394	20709				724.15	837.17	2593.53
		HEAVY DUTY	2 CB	10704	23598	10214	22518				723.65	880.56	2707.84
			1 CB	10355	22829	9865	21748				685.04	865.41	2654.92
			NO CB	10006	22059	9516	20979				723.57	849.40	2598.75
	S7-E	NORMAL DUTY	2 CB	10812	23835	10322	22755	5085	2184	2406	724.21	866.50	2738.52
			1 CB	10463	23066	9973	21986				686.02	851.04	2687.18
			NO CB	10114	22297	9624	21216				724.17	834.80	2632.72
		HEAVY DUTY	2 CB	10934	24105	10444	23025				723.68	877.36	2741.67
			1 CB	10585	23336	10095	22255				685.91	862.44	2691.02
			NO CB	10236	22566	9746	21486				723.60	846.68	2637.35
	S7-F	NORMAL DUTY	2 CB	10812	23835	10322	22755	5085	2184	2406	724.21	866.50	2738.52
			1 CB	10463	23066	9973	21986				686.02	851.04	2687.18
			NO CB	10114	22297	9624	21216				724.17	834.80	2632.72
		HEAVY DUTY	2 CB	10934	24105	10444	23025				723.68	877.36	2741.67
			1 CB	10585	23336	10095	22255				685.91	862.44	2691.02
			NO CB	10236	22566	9746	21486				723.60	846.68	2637.35
	S7-G	NORMAL DUTY	2 CB	11123	24523	10634	23443	5131	2184	2406	724.23	862.62	2788.90
			1 CB	10775	23754	10285	22674				696.76	847.49	2738.09
			NO CB	10426	22984	9936	21904				724.19	831.52	2684.29
		HEAVY DUTY	2 CB	11246	24793	10756	23713				723.72	873.22	2791.41
			1 CB	10897	24024	10407	22943				696.93	858.60	2741.25
			NO CB	10548	23254	10058	22174				723.64	843.18	2688.18

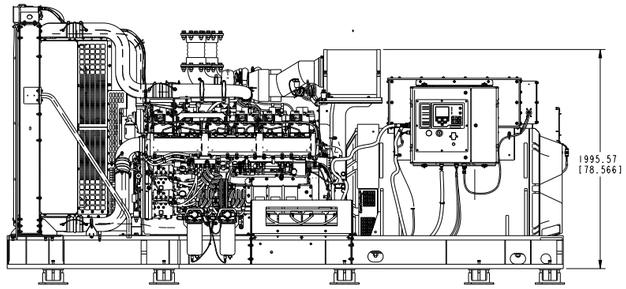
LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: M	
MODEL/PLATFORM: QSK38		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY		ANG. TOL.: ± 1°	
SURFACE FINISH PER: CMI.SURF_FIN.PER:1		SURFACE FINISH:-	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 3	.X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL: +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL: +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL: +0.30/-0.13
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0	SCALE: 1:16	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM: PTC® Creo® Parametric	

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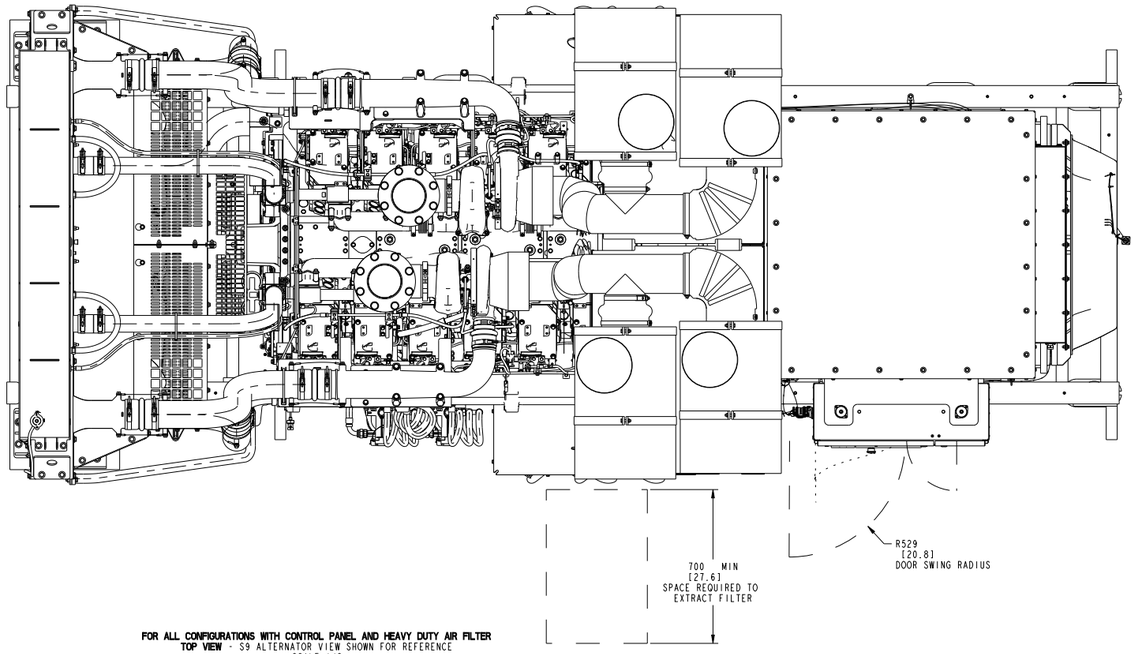
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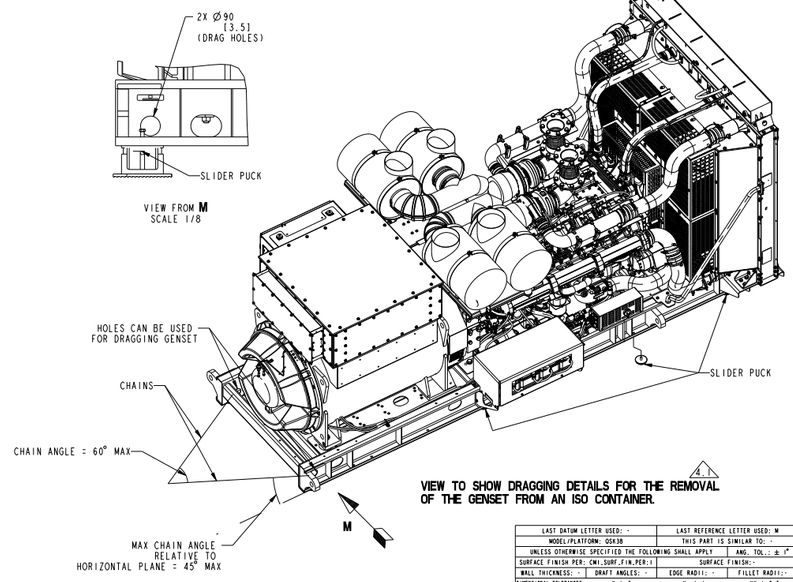


S9 ALTERNATOR + NORMAL DUTY AIR FILTER



FOR ALL CONFIGURATIONS WITH CONTROL PANEL AND HEAVY DUTY AIR FILTER
TOP VIEW - S9 ALTERNATOR VIEW SHOWN FOR REFERENCE
SCALE 1/8

NOTES:
4.1.GENSET DRAGGING CHAIN ATTACHMENT FEATURE.THIS FEATURE CAN BE USED TO ASSIST IN THE EXTRACTION OF THE GENSET FROM AN ISO SHIPPING CONTAINER.FRICTION REDUCING SLIDER PUCKS MUST BE PRESENT AND INTACT BETWEEN THE CHASSIS AND CONTAINER FLOOR BEFORE AND DURING DRAGGING. MAXIMUM DRAGGING DISTANCE MUST NOT EXCEED THE LENGTH OF THE CONTAINER PLUS 1 METER.CONTAINER MUST BE ON LEVEL GROUND.GROUND SURFACE TO CONSIST OF SMOOTH CONCRETE, STEEL OR WOOD.WINCHING OPERATION TO BE DONE SMOOTHLY AT LOW SPEED.ADHERE TO CHAIN ANGLE LIMITS SHOWN IN THIS DRAWING.



4.1
VIEW TO SHOW DRAGGING DETAILS FOR THE REMOVAL OF THE GENSET FROM AN ISO CONTAINER.

LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: M	
MODEL/PLATFORM: QSK38		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY		ANG. TOL.: ± 1°	
SURFACE FINISH PER: CMI_SURF_FIN_PER:1		SURFACE FINISH:-	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII:: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 3	.X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL: +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL: +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL: +0.30/-0.13

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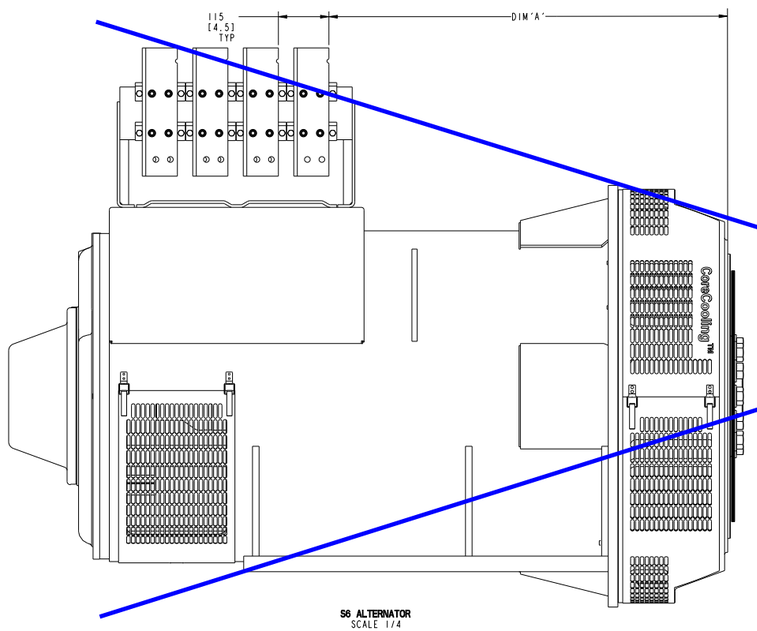
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DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

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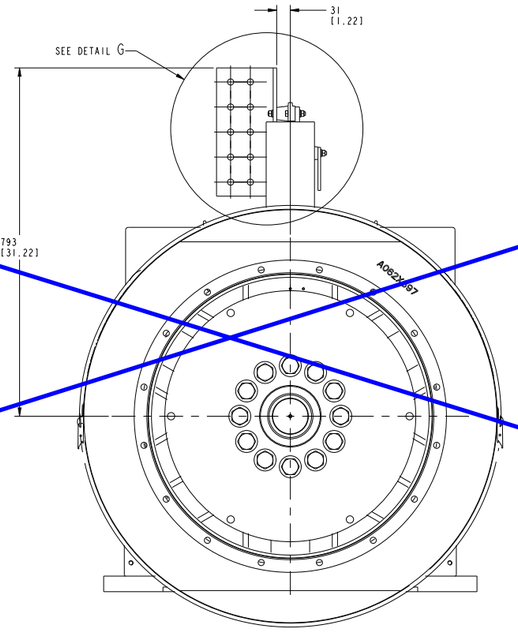
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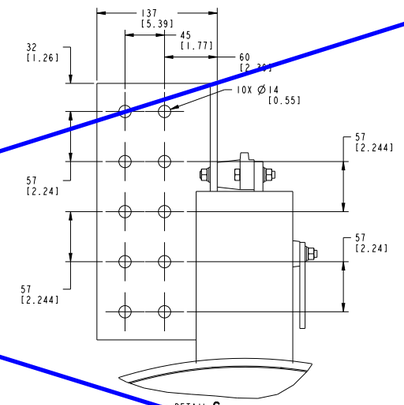
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Part Number: **A062V279** Part Revision: **D**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released**



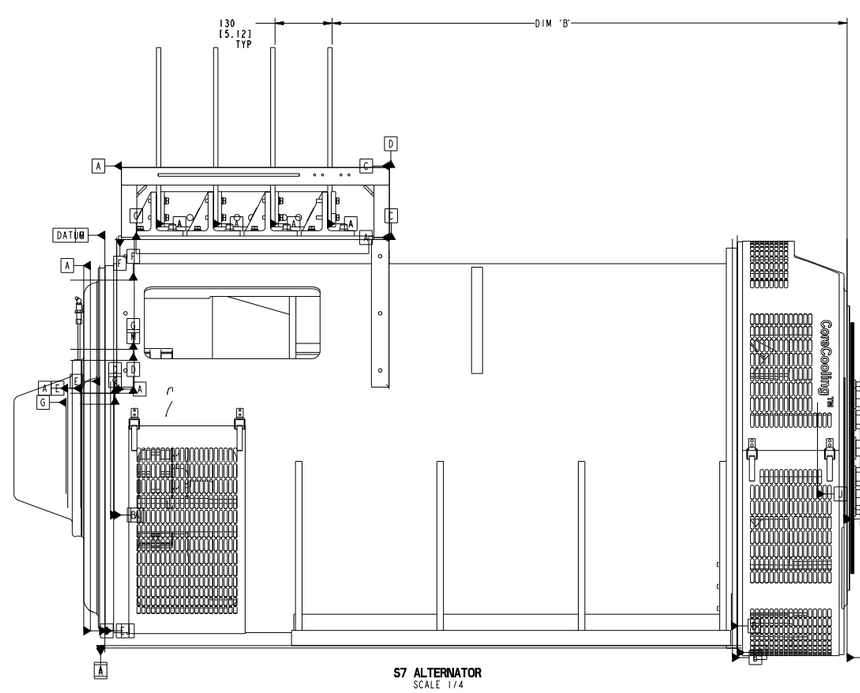
S6 ALTERNATOR
SCALE 1/4



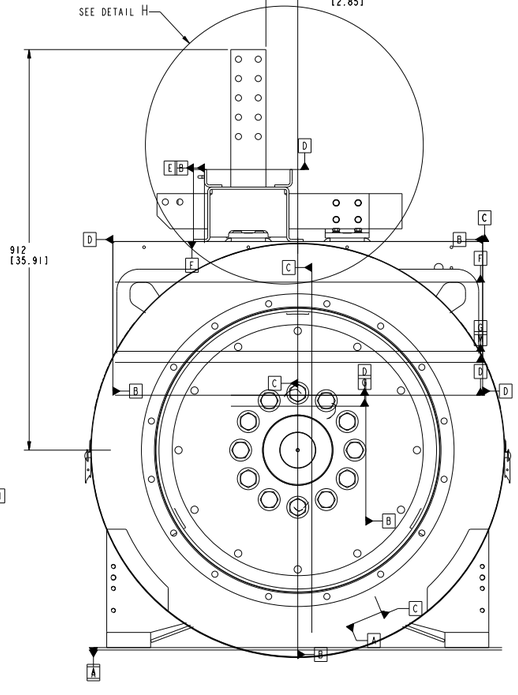


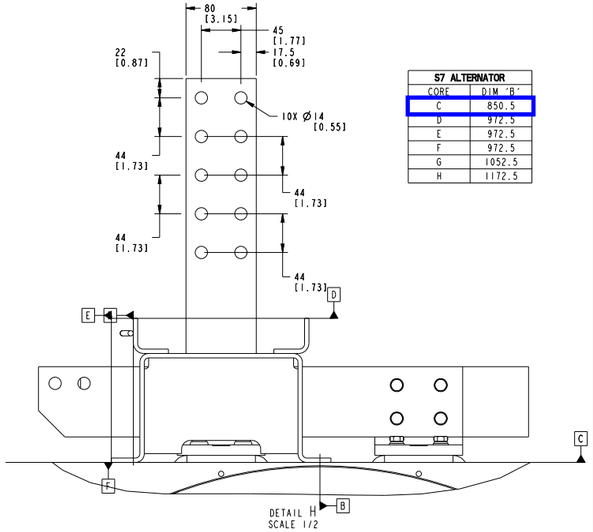
DETAIL G
SCALE 1/2

S6 ALTERNATOR	
CORE	DIM 'A'
E	813
F	813
G	906
H	908



S7 ALTERNATOR
SCALE 1/4





S7 ALTERNATOR	
CORE	DIM 'B'
C	850.5
D	972.5
E	972.5
F	972.5
G	1052.5
H	1172.5

DETAIL H
SCALE 1/2

LAST DATUM LETTER USED: -	LAST REFERENCE LETTER USED: M
MODEL/PLATFORM: QSK38	THIS PART IS SIMILAR TO: -
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY	ANG. TOL.: ± 1°
SURFACE FINISH PER: CNI_SURF_FIN_PER:1	SURFACE FINISH: -
WALL THICKNESS: - DRAFT ANGLES: -	EDGE RAD!: - FILLET RAD!!: -
DIMENSIONAL TOLERANCES: X ± 3	.X ± 1 .XX ± 0.5
HOLE SIZE 0.00-4.99 TOL.: +0.15/-0.00	HOLE SIZE 5.00-9.99 TOL.: +0.25/-0.13
HOLE SIZE 10.00-17.49 TOL.: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL.: +0.30/-0.13
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0 SCALE: 1/16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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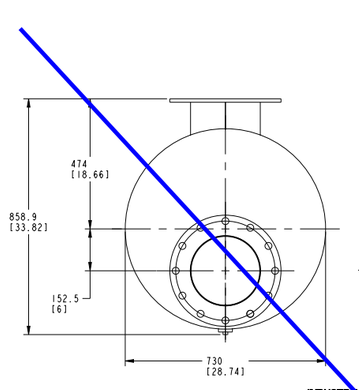
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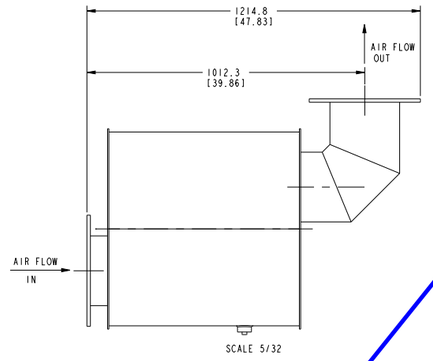
Part Number: **A062V279** Part Revision: **D**

Part Name: **OUTLINE,GENSET**

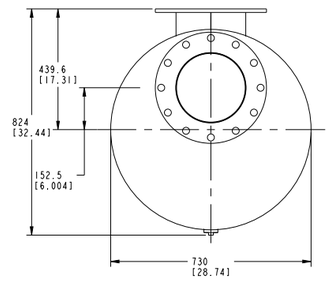
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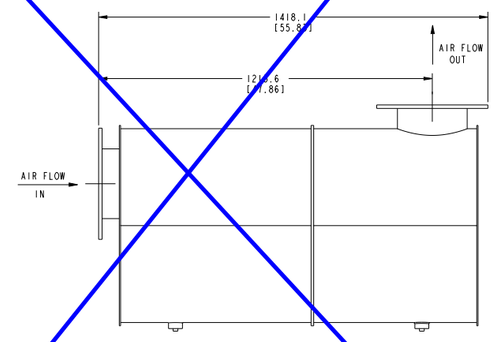
EXHAUST SYSTEM DETAILS - MUFFLER AND BELLOWS



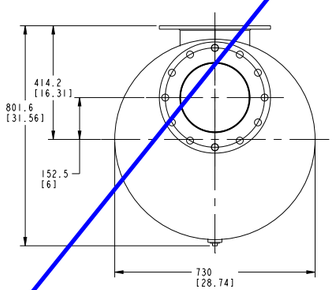


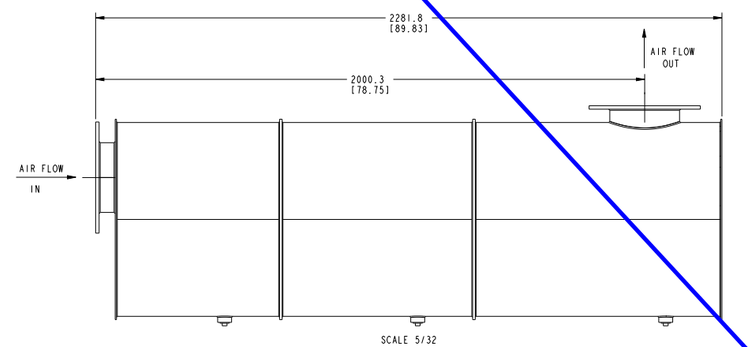
INDUSTRIAL GRADE MUFFLER





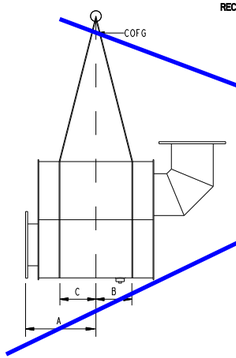
RESIDENTIAL GRADE MUFFLER





CRITICAL GRADE MUFFLER

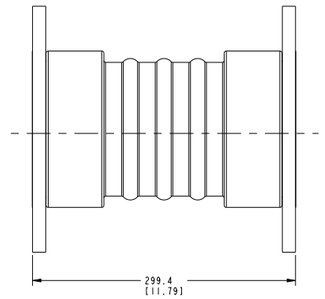
RECOMMENDED LIFTING ARRANGEMENTS FOR MUFFLER USING STROPS



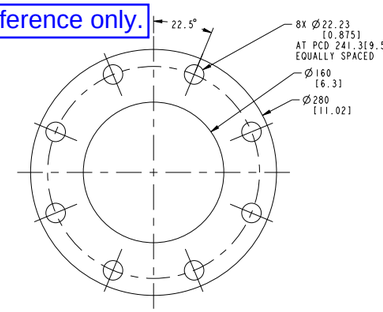
SCALE 3/32

MUFFLER	DIM A		DIM B		DIM C	
	MM	INCH	MM	INCH	MM	INCH
INDUSTRIAL	433.2	17.05	609.6	24	304.8	12
RESIDENTIAL	833.0	32.79	304.8	12	304.8	12
CRITICAL	1383.0	54.45	457.2	18	457.2	18

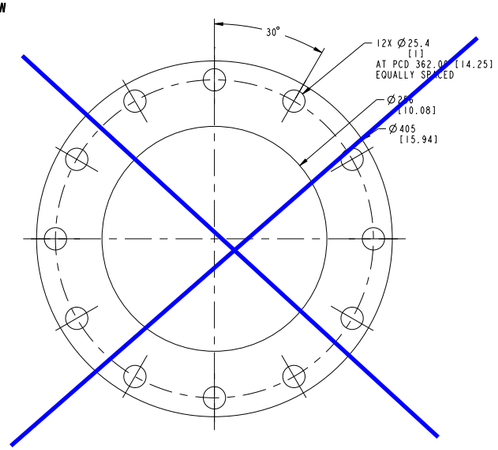
Not provided. Shown for sizing reference only.



EXHAUST BELLOW



EXHAUST BELLOW FLANGE
SCALE 1/2



MUFFLER FLANGE DETAILS
SCALE 1/2

LAST DATUM LETTER USED: -	LAST REFERENCE LETTER USED: M
MODEL/PLATFORM: QSK38	THIS PART IS SIMILAR TO: -
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY	ANG. TOL.: ± 1°
SURFACE FINISH PER: CMI_SURF_FIN_PER:1	SURFACE FINISH:-
WALL THICKNESS: - DRAFT ANGLES: -	EDGE RAD1: - FILLET RAD1:-
DIMENSIONAL TOLERANCES: X ± 3	X ± 1 XX ± 0.5
HOLE SIZE 0.00-4.99 TOL: +0.15/-0.00	HOLE SIZE 5.00-9.99 TOL: +0.20/-0.10
HOLE SIZE 10.00-17.49 TOL: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL: +0.30/-0.13
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE: 3/32
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

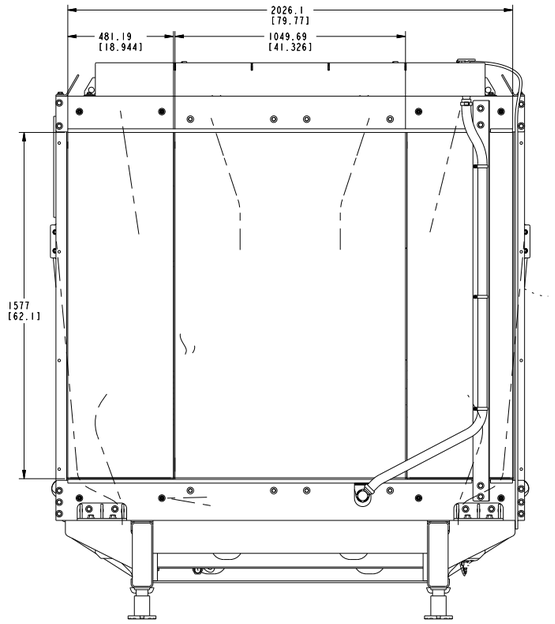
Document Generated: **11SEP2023 20:57 GMT**

Cummins Data Classification:
Cummins Confidential

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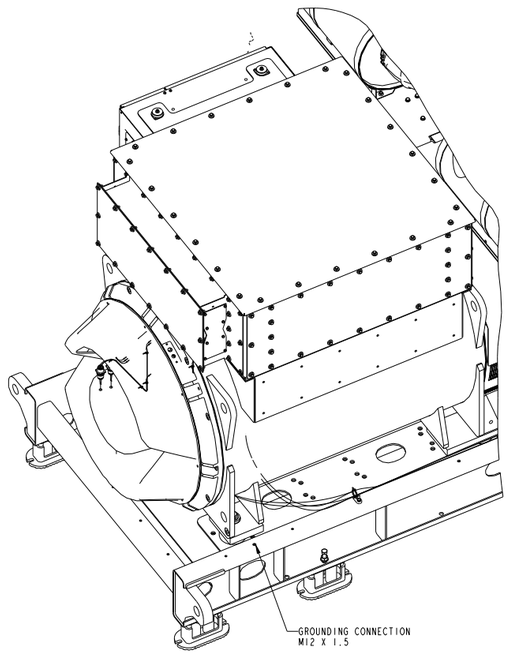
Part Number: **A062V279** Part Revision: **D**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released**

CORE DETAILS FOR DUCTING



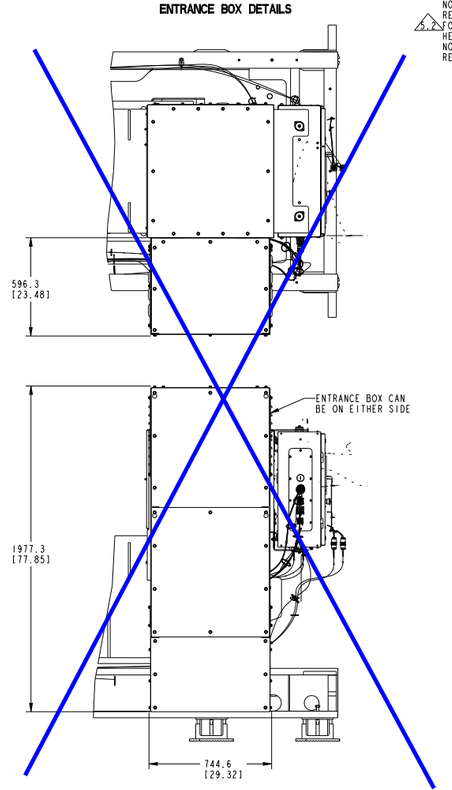
REAR VIEW
SCALE 1/8

GROUNDING CONNECTION DETAILS



SCALE 1/8

ENTRANCE BOX DETAILS

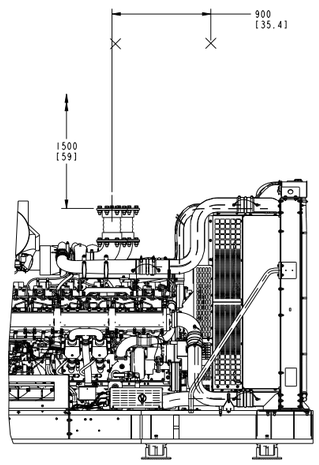


NOTES
1. FOR CUSTOMER ELECTRICAL INTERFACE FOR CONTROL PANEL REFER DRAWING NO. A064G590 AND FOR WIRING DRAWING REFER A065D445.
2. FOR CUTOMER ELECTRICAL INTERFACE FOR HEATER DISTRIBUTION BOX REFER DRAWING NO. A065L523 AND FOR WIRING DRAWING REFER A065K535.

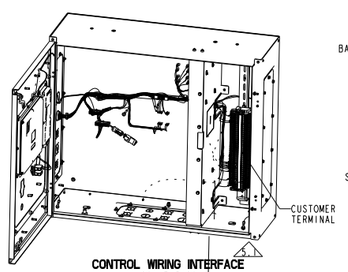
GENSET LEFT SIDE VIEW
SCALE 3/32

DETAILS FOR EXHAUST SYSTEM UNSUPPORTED LENGTH

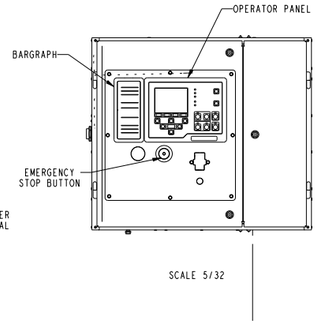
1. UNSUPPORTED LENGTH NOT TO BE MORE THAN 1500MM IN AXIAL DIRECTION AND 900MM IN LATERAL DIRECTION
2. MAXIMUM ALLOWABLE STATIC BENDING MOMENT AT EXHAUST OUTLET FLANGE = 168 N-m(124lbft)



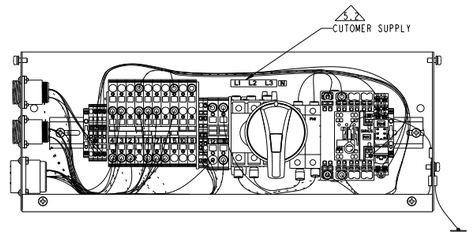
CONTROLS CUSTOMER INTERFACE



CONTROL WIRING INTERFACE
SCALE 5/32



SCALE 5/32



DISTRIBUTION BOX

LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: M	
MODEL/PLATFORM: QSK38		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY		ANG. TOL.: ± 1°	
SURFACE FINISH PER: CMI_SURF_FIN_PER:1		SURFACE FINISH:-	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 3	.X ± 1	.XX ± 0.5
HOLE SIZE 0.00-4.99 TOL: +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL: +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL: +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL: +0.30/-0.13

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES	SIZE: A0	SCALE:1/16	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric	

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Cummins Data Classification:
Cummins Confidential

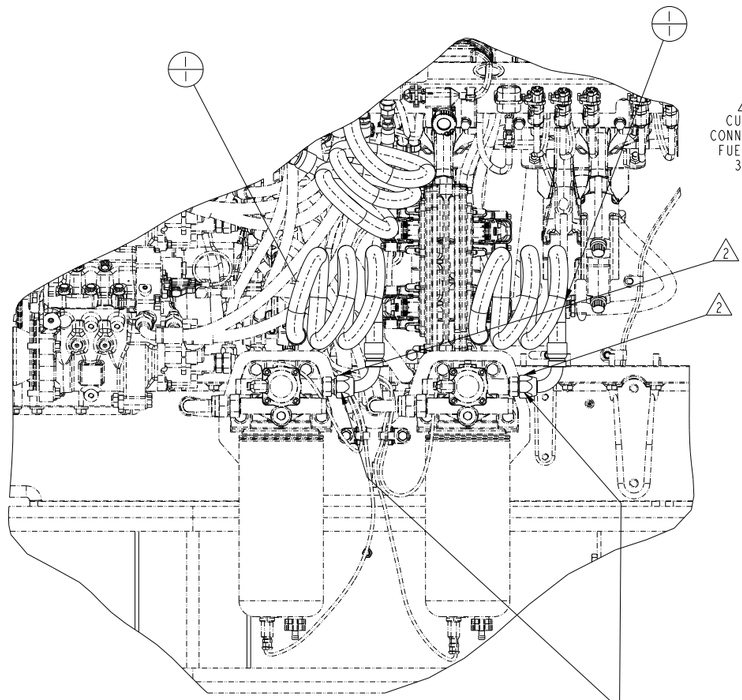
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NOTES:

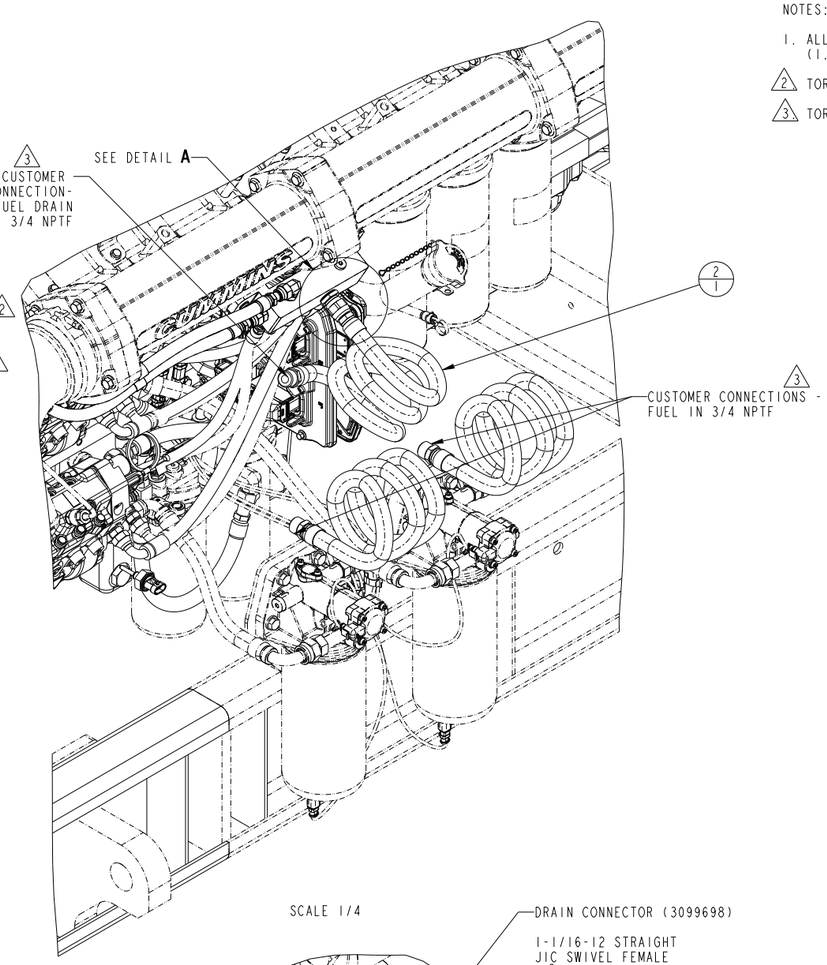
1. ALL PARTS TO BE SENT SHIPPED LOOSE AS INDIVIDUAL ITEMS (I.E. INSTALLATION NOT ASSEMBLED BEFORE SHIPPING)

△2 TORQUE TO 113.5±10% Nm

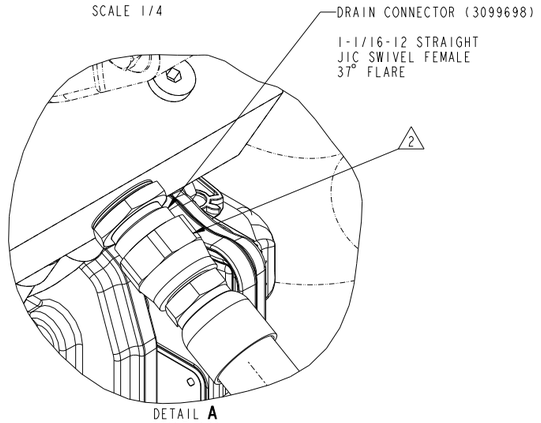
△3 TORQUE TO 71.5±10% Nm.



SCALE 1/4



SCALE 1/4



CONNECTOR DETAILS			
DESCRIPTION	ON FILTER	HOSE	
		FILTER SIDE	CUSTOMER SIDE
FUEL IN (FN 1)	1-1/16-12 UN JIC SWIVEL 37° FLARE	1-1/16-12 90° ELBOW JIC SWIVEL 37°	3/4 NPTF MALE PIPE

CONNECTOR DETAILS			
DESCRIPTION	ON ENGINE	HOSE	
		ENGINE SIDE	CUSTOMER SIDE
FUEL DRAIN (FN 2)	1-1/16-12 UN-2A 37° FLARE	1-1/16-12 STRAIGHT JIC SWIVEL FEMALE 37° FLARE	3/4 NPTF MALE PIPE

VIEWS SHOWN FOR QSK38

LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: B	
MODEL/PLATFORM: QSK38		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY			ANG. TOL.: ± 0.5°
SURFACE FINISH PER: -		SURFACE FINISH: -	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 1	.X ± 0.8	.XX ± 0.38
HOLE SIZE 0.00- 4.99 TOL. +0.15/-0.08	HOLE SIZE 5.00- 9.99 TOL. +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL. +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL. +0.30/-0.13
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A1	SCALE:1/8	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric

Document Generated: **27FEB2025 18:11 GMT**

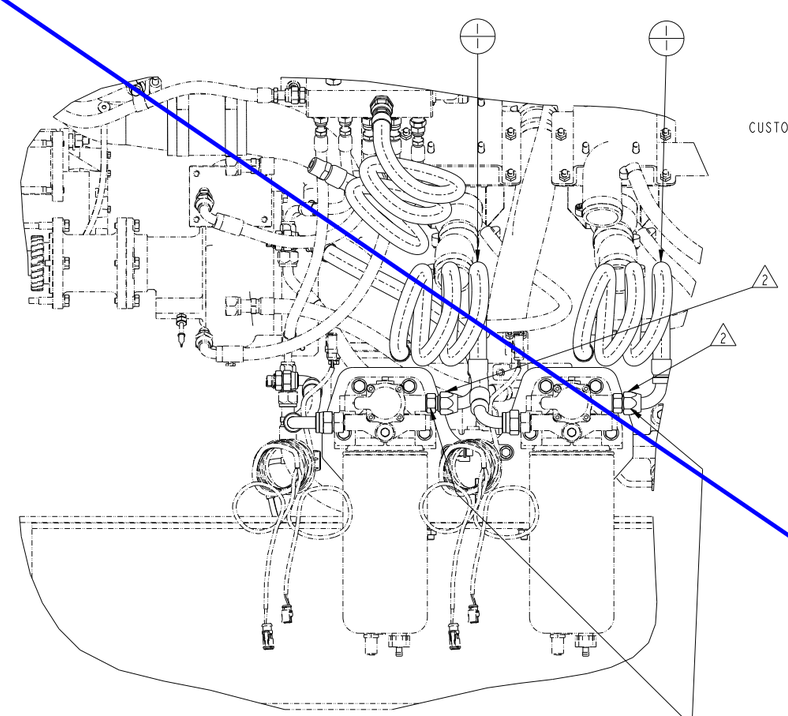
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Part Number: **A064H664** Part Revision: **G**

Part Name: **INSTALLATION,FUEL SYSTEM**

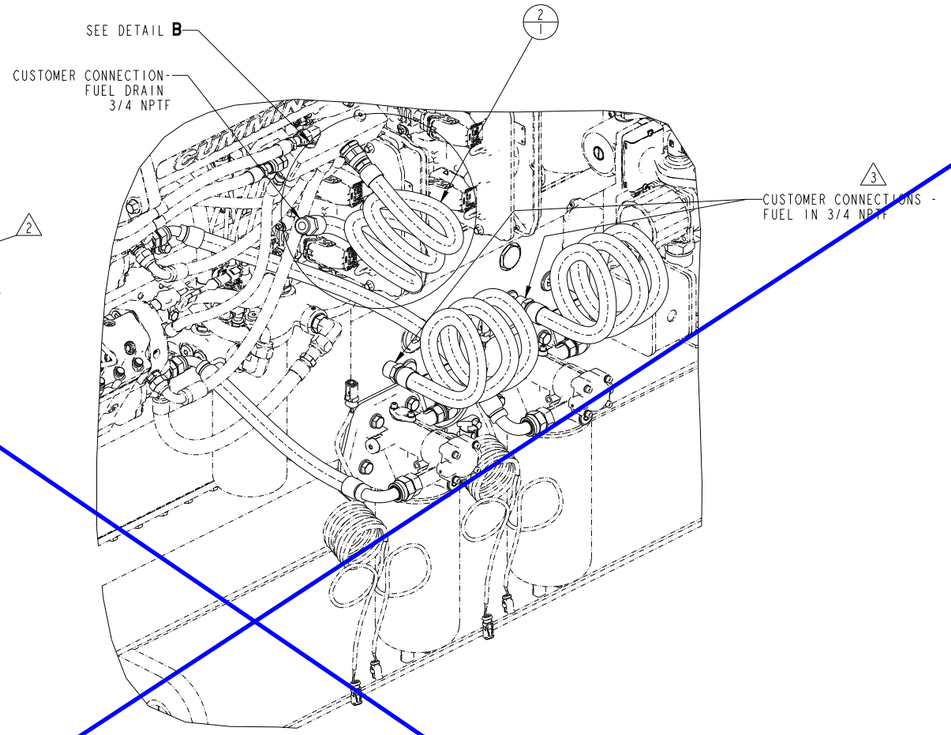
Drawing Category: **Detail** State: **Released**



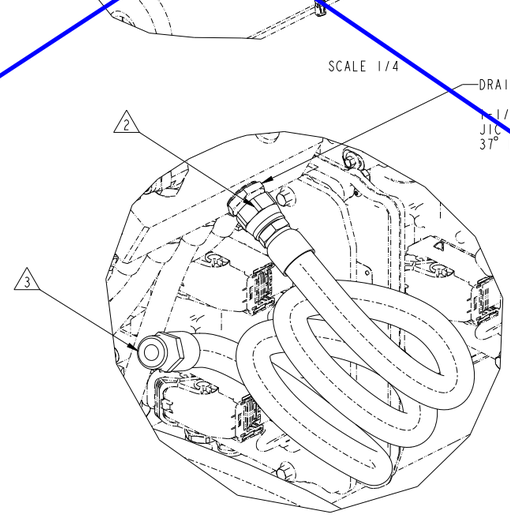
CONNECTOR (3425413)
1-1/16 UN(-12) JIC SWIVEL 37° FLARE

CONNECTOR TO BE INSTALLED ON SAME SIDES

SCALE 1/4



SCALE 1/4



DETAIL B
SCALE 1/2

CONNECTOR DETAILS			
DESCRIPTION	ON FILTER	HOSE	
		FILTER SIDE	CUSTOMER SIDE
FUEL IN (FN 1)	1-1/16-12 UN JIC SWIVEL 37° FLARE	1-1/16-12 90° ELBOW JIC SWIVEL 37	3/4 NPTF MALE PIPE

CONNECTOR DETAILS			
DESCRIPTION	ON ENGINE	HOSE	
		ENGINE SIDE	CUSTOMER SIDE
FUEL DRAIN (FN 2)	1-1/16-12 UN-2A 37° FLARE	1-1/16-12 STRAIGHT JIC SWIVEL FEMALE 37° FLARE	3/4 NPTF MALE PIPE

VIEWS SHOWN FOR QSK50

LAST DATUM LETTER USED: -		LAST REFERENCE LETTER USED: B	
MODEL/PLATFORM: QSK50		THIS PART IS SIMILAR TO: -	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY			ANG. TOL.: ± 0.5°
SURFACE FINISH PER: -		SURFACE FINISH: -	
WALL THICKNESS: -	DRAFT ANGLES: -	EDGE RADII: -	FILLET RADII:-
DIMENSIONAL TOLERANCES:	X ± 1	.X ± 0.8	.XX ± 0.38
HOLE SIZE 0.00- 4.99 TOL. +0.15/-0.08	HOLE SIZE 5.00- 9.99 TOL. +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL. +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL. +0.30/-0.13
Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A1	SCALE:1/8	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric	

Document Generated: **27FEB2025 18:11 GMT**

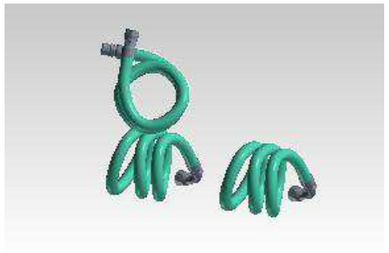
Cummins Data Classification:
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Part Number: **A064H664** Part Revision: **G**
Part Name: **INSTALLATION,FUEL SYSTEM**
Drawing Category: **Detail** State: **Released**

Part Number: A064H664

Change Notice	CN00170988	Alternates	
Manufacturer Part (MEP)	No	Usage	Accessory Only
Release Phase Code	Production (P)	Drawing Specification	Number: A064H664_DET
External Regulations	No External Regulation		Revision: G



3D image provided when available for visual reference only.

Engineering Bill Of Material

Find No.	Number	Name	Quantity	Unit of Measure	Method of Use
1	A064G489	HOSE,FUEL	2	Each (ea)	Standard
2	A064G490	HOSE,FUEL	1	Each (ea)	Standard

Method of Use Definitions
- Standard: The exact quantity provided shall be utilized for the items specified
- As Required: The quantity of the specified items may be updated per manufacturing requirements if needed
- Reference: The specified items are reference only for assembly and traceability purposes.

Associated Specifications

Number	Title	Type	Category	Sub-Category
10903	Substances,Prohibited and Restricted	Engineering Specification	Administrative Specification	Source Control

Drawing Revision Information

Description of Change(s)
Note: Change information is provided for reference only and does not supersede the drawing's primary content.

SEE CHANGE NOTICE.

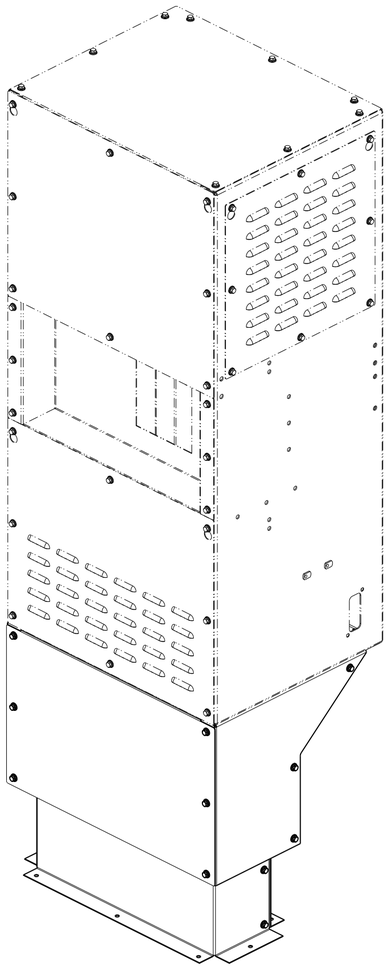
1. PART ATTRIBUTE: USAGE: "ACCESSORY ONLY" WAS "PRODUCTION ONLY"
2. PART ATTRIBUTE: USER ITEM TYPE: "ACCESSORY ITEM - MAKE" WAS "UNASSIGNED"

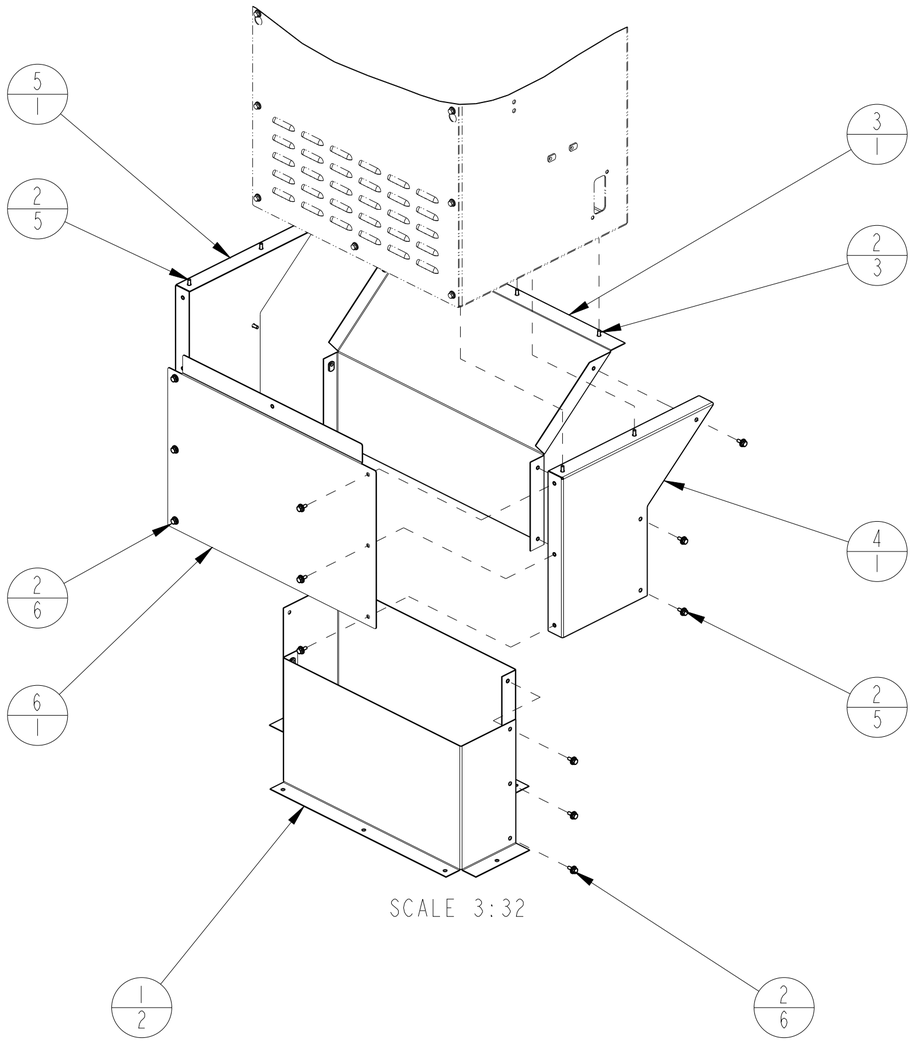
Drawing Authorization

Drafter	Somnath B Naikwadi	Date	27FEB2025
Checker	Kiran Anandrao More	Date	27FEB2025
Approver	Muhammad Maher Hasan	Date	27FEB2025

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SCALE 3:32

NOTES:

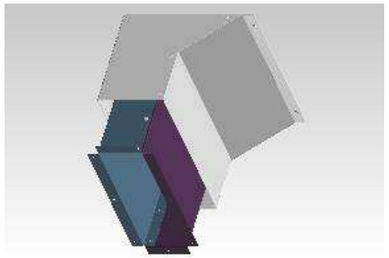
1. REMOVE ALL BURRS AND SHARP EDGES, FOR SAFE HANDLING.
2. SURFACE AREA TO BE FREE OF WELD AND WELD SPATTER.
3. NOMINAL WEIGHT BASED ON CAD MODEL: (3.09 KG)
   NOT FOR INSPECTION.

MODEL/PLATFORM: QSK50		THIS PART IS SIMILAR TO: .	
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY			ANG. TOL.: ± 1.0°
DIMENSIONAL TOLERANCES:	X ± 1	.X ± 0.8	.XX ± 0.38
HOLE SIZE 0.00-4.99 TOL. +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL. +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL. +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL. +0.30/-0.13

PART NUMBER: A065D000	PART REVISION: E	Cummins Inc.	
PART NAME: INSTALLATION,DUCT			
DRAWING CATEGORY: DETAIL			
STATE: RELEASED	SHEET: 1 OF 2	DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A2 SCALE:3:32
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL		DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
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Part Number: A065D000

Change Notice	CN00171156	Alternates	
Manufacturer Part (MEP)	No	Usage	Accessory Only
Release Phase Code	Production (P)	Drawing Specification	Number: A065D000_DET
External Regulations	No External Regulation		Revision: E



3D image provided when available for visual reference only.

Engineering Bill Of Material

Find No.	Number	Name	Quantity	Unit of Measure	Method of Use
1	A061T343	COVER,OUTPUT BOX	2	Each (ea)	Standard
2	0821-6003-01	SCREW,HEX HEAD	25	Each (ea)	Standard
3	A061P610	COVER,OUTPUT BOX	1	Each (ea)	Standard
4	A062A503	COVER,OUTPUT BOX	1	Each (ea)	Standard
5	A062A507	COVER,OUTPUT BOX	1	Each (ea)	Standard
6	A061P614	COVER,OUTPUT BOX	1	Each (ea)	Standard

Method of Use Definitions
- Standard: The exact quantity provided shall be utilized for the items specified
- As Required: The quantity of the specified items may be updated per manufacturing requirements if needed
- Reference: The specified items are reference only for assembly and traceability purposes.

Associated Specifications

Number	Title	Type	Category	Sub-Category
10903	Substances,Prohibited and Restricted	Engineering Specification	Administrative Specification	Source Control

Drawing Revision Information

Description of Change(s)
Note: Change information is provided for reference only and does not supersede the drawing's primary content.

SEE CHANGE NOTICE.

1. PART ATTRIBUTE: USER ITEM TYPE: "ACCESSORY ITEM - MAKE" WAS "PHANTOM ITEM"
2. PART ATTRIBUTE: USAGE: "ACCESSORY ONLY" WAS "PRODUCTION ONLY"
3. PART ATTRIBUTE: CUMMINS DATA CLASSIFICATION: "CUMMINS CONFIDENTIAL" WAS "CUMMINS INTERNAL USE ONLY"

Drawing Authorization

Drafter	Somnath B Naikwadi	Date	19FEB2025
Checker	Kiran Anandrao More	Date	19FEB2025
Approver	Muhammad Maher Hasan	Date	19FEB2025

Cummins Data Classification:
Cummins Confidential

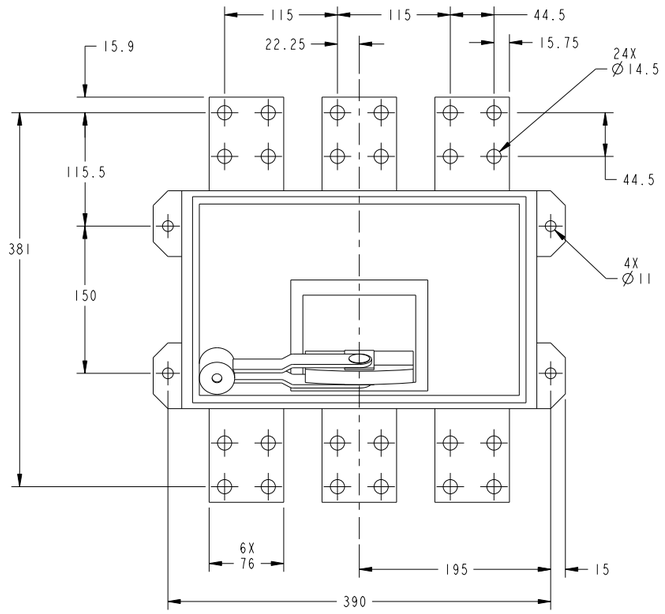
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Part Number: **A065D000** Part Revision: **E**
Part Name: **INSTALLATION,DUCT**
Drawing Category: **Detail** State: **Released** Sheet **2** of **2**

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PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-158118	A	1	PRODUCTION_RELEASE	MJZ	KK	K.KISHORE	18DEC15



BREAKER SIZE	TERMINAL THICKNESS "A"
1600 A	12.8
2000 A	16.0
2500 A	20.0

NOTES:

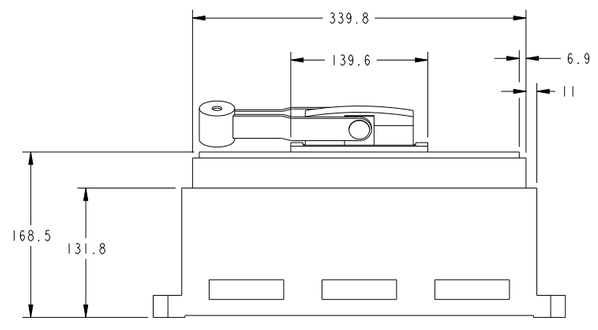
1. THIS PART IS MANUFACTURER SOURCE CONTROLLED.
2. ELECTRONIC TRIP CIRCUIT BREAKER. STANDARD MICROLOGIC 5.0 TRIP UNIT. (LSI)
3. BREAKERS TO BE SUPPLIED WITH TYPE F PLUG.

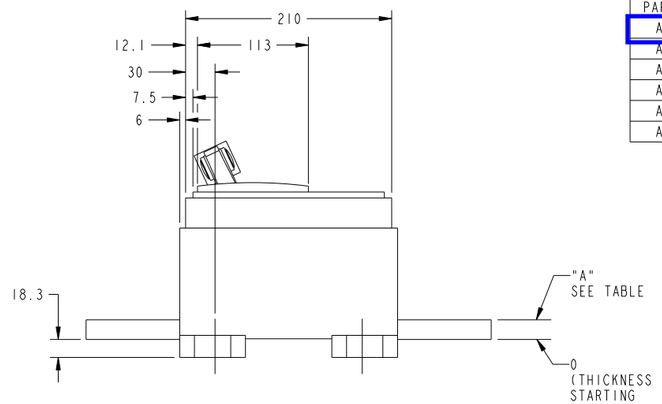
TYPE F PLUG AMPERAGE SETTINGS									
TYPE F	84%	86%	88%	90%	92%	94%	96%	98%	100%
A054K364	2100	2150	2200	2250	2300	2350	2400	2450	2500
A054K366	1680	1720	1760	1800	1840	1880	1920	1960	2000
A054K368	1344	1376	1408	1440	1472	1504	1536	1568	1600

4. BREAKERS TO BE SUPPLIED WITH NO LUGS (AS SHOWN).
5. AGENCIES: 3 POLE UL LISTED
   IEC
6. INTERRUPTING RATING

CIRCUIT BREAKER	UL/CSA RATING (60 Hz)			IEC 60947-2 RATING (50/60 Hz)			
				240 Vac		380/415 Vac	
	240 Vac	480 Vac	600 Vac	Icu	Ics	Icu	Ics
RL	125 kA	100 kA	50 kA	125 kA	65 kA	85 kA	45 kA

7. LEVEL OF OPERATION ABOVE 80% CONTINUOUS LOAD REQUIRES SPECIAL TESTING, INSTALLATION AND APPLICATION REQUIREMENTS PER VENDOR LITERATURE.





TABULATION

PART NUMBER	CURRENT_ER	APPLICATION	BREAKER	POLES	RATINGS
A054K364	ECO-158118	PRODUCTION & SERVICE	RL2500	3	SEE NOTE 6
A054K366	ECO-158118	PRODUCTION & SERVICE	RL2000	3	SEE NOTE 6
A054K368	ECO-158118	PRODUCTION & SERVICE	RL1600	3	SEE NOTE 6
A054K369	ECO-158118	ACCESSORY	INFORMATION DRIVEN BY BOM ITEM		
A054K370	ECO-158118	ACCESSORY			
A054K371	ECO-158118	ACCESSORY			

-THIS IS A CONTROLLED ITEM-
PER POLICY-PROCEDURE PGG 1-01-01-116

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 CIA ROLE STATIONARY GENSET CIA
RESPONSIBLE CIA ROLE
RESPONSIBLE CIA ROLE

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 3/8
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SIM TO 0320-2164
DO NOT SCALE PRINT
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009
FIRST USED ON HC6/HC7

DRN M_ZAMARRIPA
CKD K_KISHORE
APVD K_KISHORE
DATE 18DEC15

Cummins®
SITE CODE PGF

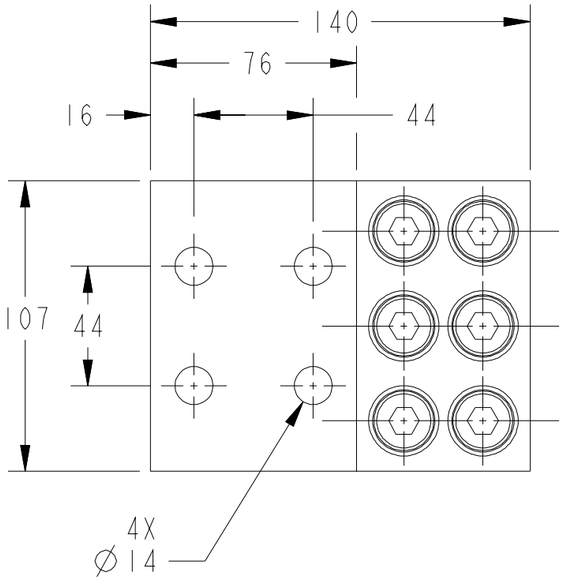
CUMMINS POWER GENERATION

BREAKER,CIRCUIT
-

DWG SIZE D
A054K365
CAD SHEET 1 OF 1

0332_3949	B	Pro/ENGINEER	METRIC DWG

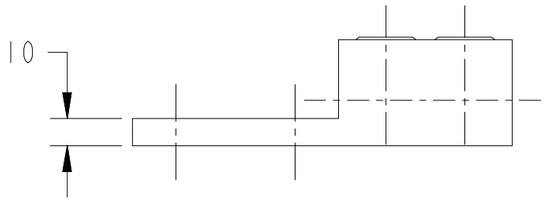
REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
FRD16141	A	1	PRODUCTION_RELEASE	-	DC	EC	EC	03-24-03

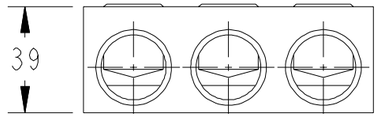


Note: The unit is equipped with two mechanical lugs per phase plus neutral (eight lugs total) and mounting hardware for the load side of an R-frame circuit breaker. Each lug is capable of handling up to three 600 KCMIL wires.

NOTES:

1. THIS PART IS VENDOR SOURCE CONTROLLED. SEE APPROVED PRODUCT VENDOR LIST.
2. TYPE L3D4-600 ELECTRO TIN PLATED.
3. WIRE SIZE #2 TO 600 MCM.
4. MATERIAL 6061-T6 ALUMINUM.
5. CSA / UL 90°C RATING 486B LISTED.





USE FOR INTERNAL CONTROL ONLY

THIS DOCUMENT IS CONTROLLED TO MAINTAIN COMPLIANCE WITH CODES AND STANDARDS:

☒ UL ☒ CSA ☐ US TESTING ☐ OTHER _____

AND/OR TO RETAIN DESIGN RESPONSIBILITY. ☐

ANY CHANGES OR DEVIATIONS TO THIS DOCUMENT MUST BE APPROVED BY THE COORDINATOR LISTED.

FACILITY _____ DATE _____

SIGNATURE _____

FACILITY _____ DATE _____

SIGNATURE _____

DO NOT SCALE PRINT

ANG TOL ± 1.0 °

DRAWN TO SCALE OF 1/2

TOLERANCE UNLESS OTHERWISE SPECIFIED			SIM TO .	.
mm		Inch	COPIED FROM .	.
DIM	X ± 1 .X ± 0.8 .XX± 0.38	.X ± .XX ± .XXX±	THIRD ANGLE PROJECTION	
HOLE	0.09- 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	THIS DOCUMENT IS THE PROPERTY OF CUMMINS POWER GENERATION. IT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH MUST NOT BE DUPLICATED, USED OR DISCLOSED OTHER THAN EXPRESSLY AUTHORIZED BY CUMMINS POWER GENERATION OR IT'S REPRESENTATIVE	

ITEM	PART NO	DWG SIZE	DESCRIPTION OR MATERIAL	REF DES

	NAME	DATE
DR	D_CRANE	03-24-03
CHKR ☒ MFG ☐	E_CZECHOWSKI	03-24-03
APPROVED	E_CZECHOWSKI	03-24-03

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

MODEL FIRST USED ON: HC6/HC7 CB

SITE CODE: PGA

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

TITLE: LUG-CABLE (SOLDERLESS)

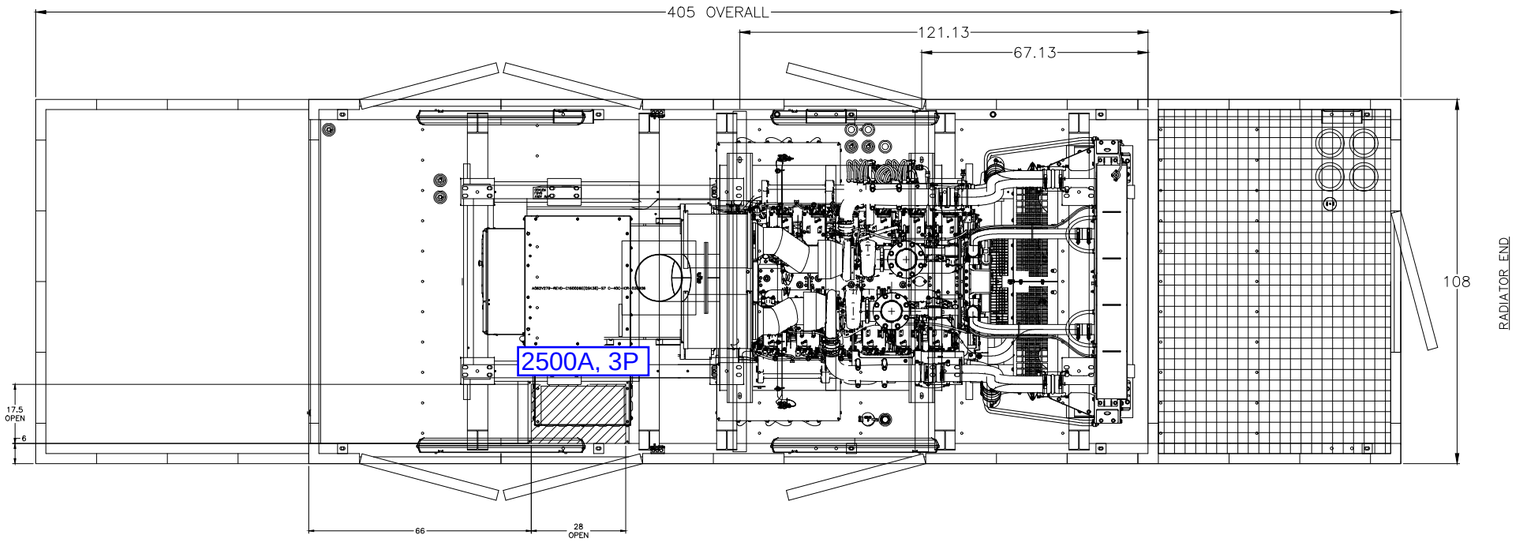
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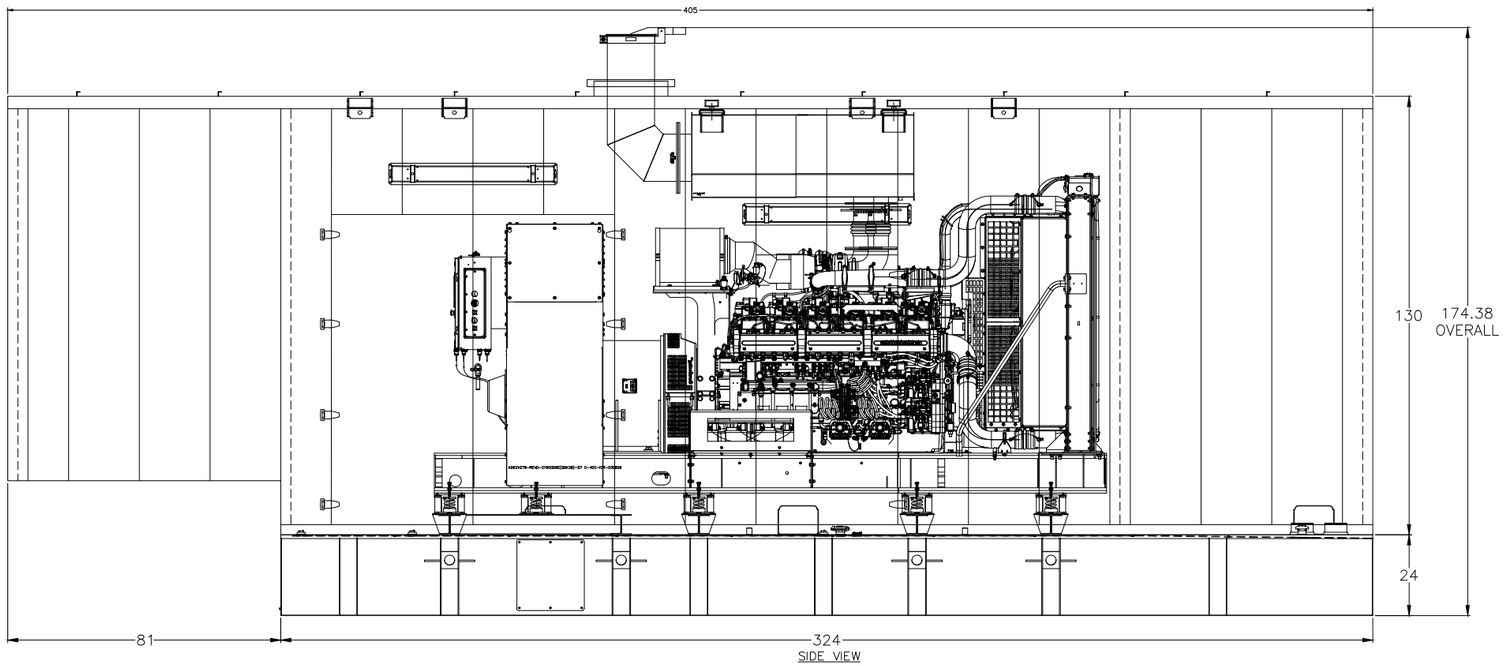
SHEET: 1 OF 1

DWG SIZE: B

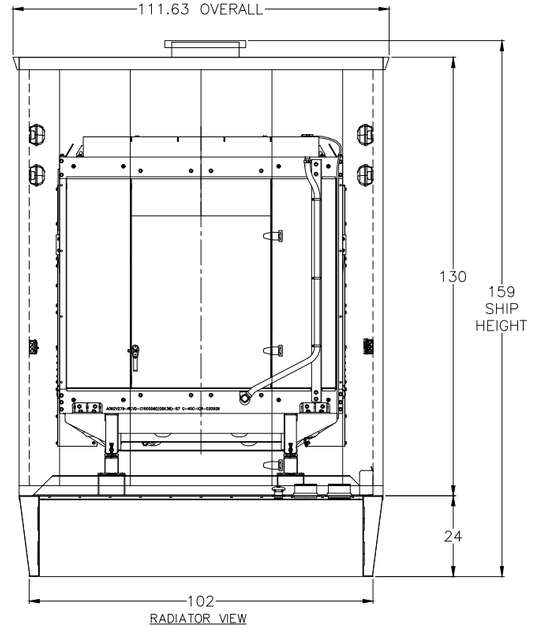
APPROVAL BY	APPR. DATE	GENSET MODEL	TANK CAPACITY	USEABLE CAPACITY
		C1500D6E S7L1D-C4-60	2581 GAL	2460 GAL

GALVANNEALED CONSTRUCTION





SIDE VIEW



RADIATOR VIEW

BILL OF MATERIAL		
PART #	DESCRIPTION	QTY
GWE-G2	14 GA GALVANNEALED CONSTRUCTION	1
6505	ACCESS DOOR	7
6501	STAINLESS STEEL DOOR HARDWARE	7
6507	DOOR RESTRAINT	7
6508	PANIC HARDWARE	7
6610	EXTERNAL VERTICAL INTAKE HOOD	1
6615	INTERNAL VERTICAL DISCHARGE PLENUM	1
6520	PERFORATED INTERIOR LINING	1
6522	3" INSULATION BOARD	1
6805	RAIN COLLAR	1
6843	GPC SUPPLIED EXHAUST SYSTEM	1
6855	INTERNALLY MOUNTED SILENCER	1
	SIL: E-C-I2-14-2270	1
	FLEX: BLWA-6-1175-2700	2
6870	VERTICAL SILENCER DISCHARGE	1
	ELBOW: 1001291	1
	RAIN CAP: PF-55-03-14	1
6902	WIRE BLOCK HEATER	1
6904	MOUNT & WIRE BATTERY CHARGER	1
6518E	EXTEND FUMES/DRAINS IF VALVE PRESENT	1
6982	LED COMPACT FIXTURE(4' VAPOR TIGHT)	4
6905	3-WAY LIGHT SWITCH	2
6916	GFCI OUTLET (20A)	1
6918	GFCI PROTECTED OUTLET (20A)	1
6914	100A PANEL BOARD (1PH, 120/240V)	1
SPECIAL	INSTALL CUSTOMER FLEET GUARD FILTERS	1
XXXX	PAINT COLOR TO BE DETERMINED	

REVISION TABLE				
REV.	DESCRIPTION	DATE	DRAWN	APPROVED
A	INITIAL RELEASE	10/6/2026	LAR	

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ISO 9001:2015

TOLERANCES:
ONE PLACE (.X) ± .1
TWO PLACE (.XX) ± .06
HOLE DIA. ± .005
ANGLE ± 2°
STRUCTURAL LENGTH +.03 -.12

THIRD ANGLE PROJECTION

CUSTOMER: CUMMINS NORTH

SALES ORDER REFERENCE: L2 ENCLOSURE 24 HR TANK

DRAWING REF: 886773-00

ASSEMBLY WEIGHT: 41,300 LBS

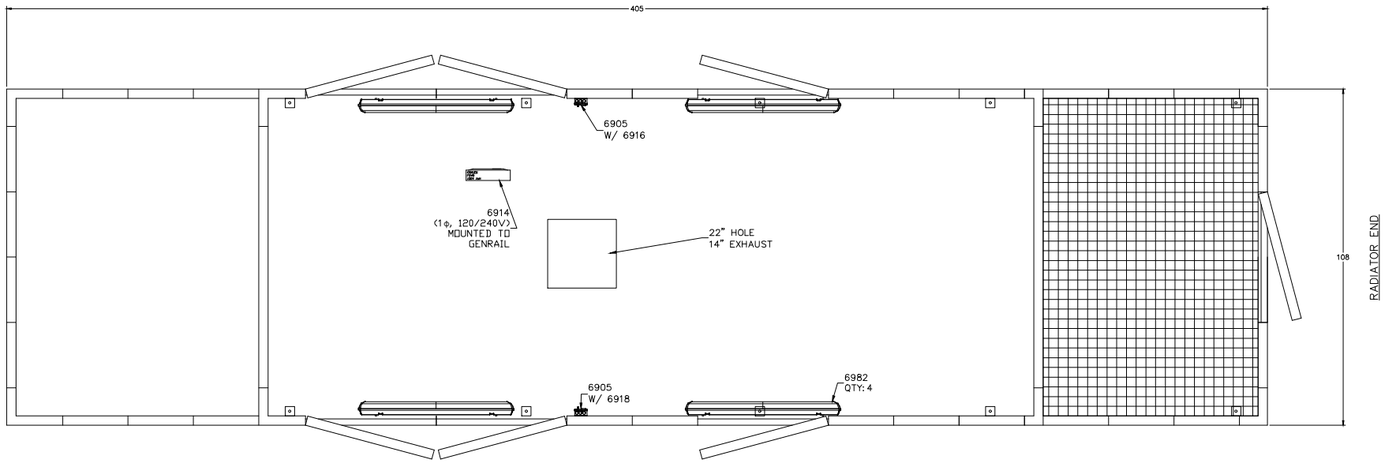
DESCRIPTION: TOP LEVEL ASSEMBLY

SIZE B | DWG. NO. 143924-0001 SUBMITTAL | REV. A

DO NOT SCALE | DRAWN BY: LAR | DATE: 09/11/26 | SHEET 1 OF 1

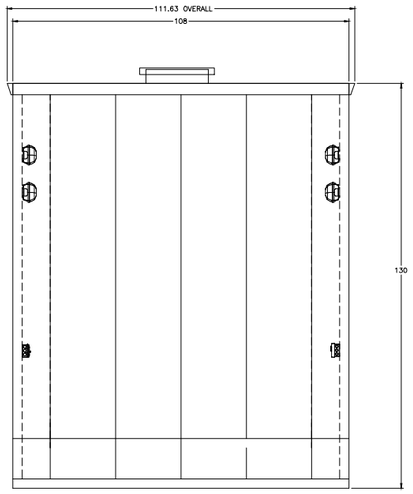
APPROVAL BY	APPR. DATE	GENSET MODEL
		C1500D6E S7L1D-C4-60

GALVANNEALED CONSTRUCTION

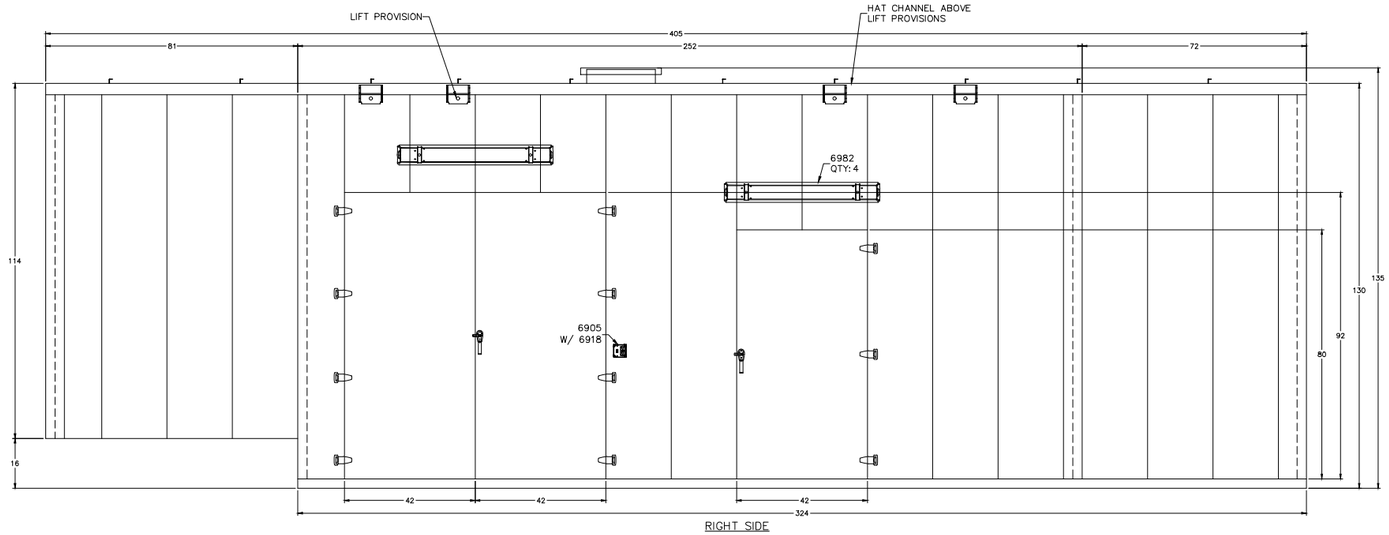


TOP VIEW

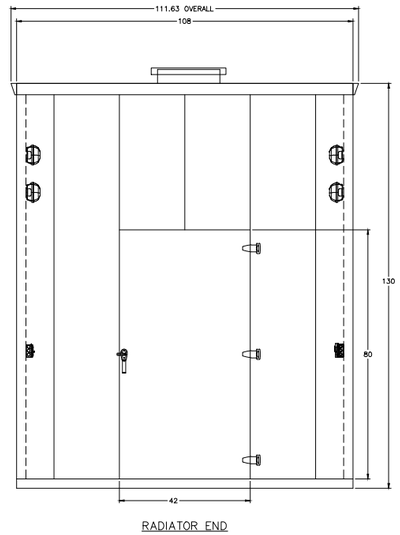
BILL OF MATERIAL		
PART #	DESCRIPTION	QTY
GWE-G2	14 GA GALVANNEALED CONSTRUCTION	1
6505	ACCESS DOOR	7
6501	STAINLESS STEEL DOOR HARDWARE	7
6507	DOOR RESTRAINT	7
6508	PANIC HARDWARE	7
6610	EXTERNAL VERTICAL INTAKE HOOD	1
6615	INTERNAL VERTICAL DISCHARGE PLENUM	1
6520	PERFORATED INTERIOR LINING	1
6522	3" INSULATION BOARD	1
6805	RAIN COLLAR	1
6843	GPC SUPPLIED EXHAUST SYSTEM	1
6855	INTERNALLY MOUNTED SILENCER	1
	SIL: E-C-I2-14-2270	1
	FLEX: BLWA-6-1175-2700	2
6870	VERTICAL SILENCER DISCHARGE	1
	ELBOW: 1001291	1
	RAIN CAP: PF-55-03-14	1
6902	WIRE BLOCK HEATER	1
6904	MOUNT & WIRE BATTERY CHARGER	1
6518E	EXTEND FUMES/DRAINS IF VALVE PRESENT	1
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6916	GFCI OUTLET (20A)	1
6918	GFCI PROTECTED OUTLET (20A)	1
6914	100A PANEL BOARD (1PH, 120/240V)	1
SPECIAL	INSTALL CUSTOMER FLEET GUARD FILTERS	1
XXXX	PAINT COLOR TO BE DETERMINED	



GENERATOR END



RIGHT SIDE



RADIATOR END

REVISION TABLE				
REV.	DESCRIPTION	DATE	DRAWN	APPROVED
A	INITIAL RELEASE	10/6/2026	LAR	

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ISO 9001:2015

TOLERANCES:

ONE PLACE	(.X)	± .1
TWO PLACE	(.XX)	± .06
HOLE DIA.		± .005
ANGLE		± 2°
STRUCTURAL LENGTH		+.03 -.12

THIRD ANGLE PROJECTION

CUSTOMER: CUMMINS NORTH

SALES ORDER REFERENCE: L2 ENCLOSURE 24 HR TANK

DRAWING REF: 886773-00

ENCLOSURE WEIGHT: 10,850 LBS

DESCRIPTION: ENCLOSURE ASSEMBLY

SIZE: B | DWG. NO.: 143924-3000 SUBMITTAL | REV.: A

DO NOT SCALE | DRAWN BY: LAR | DATE: 09/11/26 | SHEET 1 OF 1

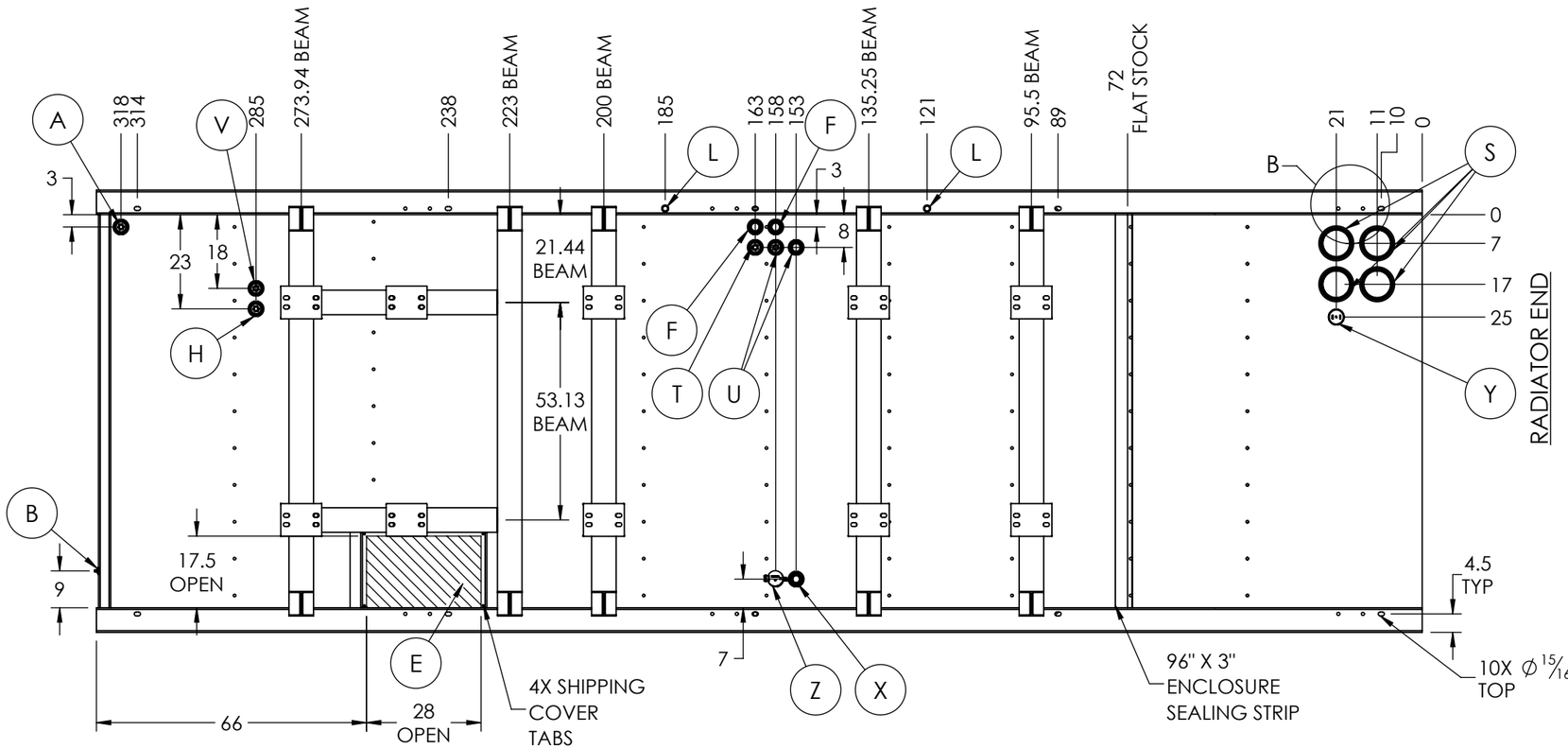
S.O. #	TANK CAPACITY ACTUAL	TANK CAPACITY USEABLE	TANK WEIGHT	GENSET MODEL	GENSET FOOTPRINT
143924	2581 GAL	2460 GAL	8150.00 LBS	C1500D6E S7L1D-C4-60	199.44" X 57.13"

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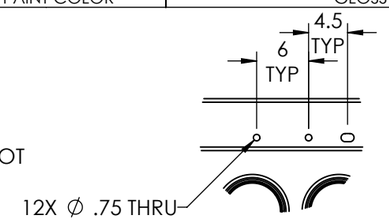
APPROVED BY: **DATE:**

BILL OF MATERIALS

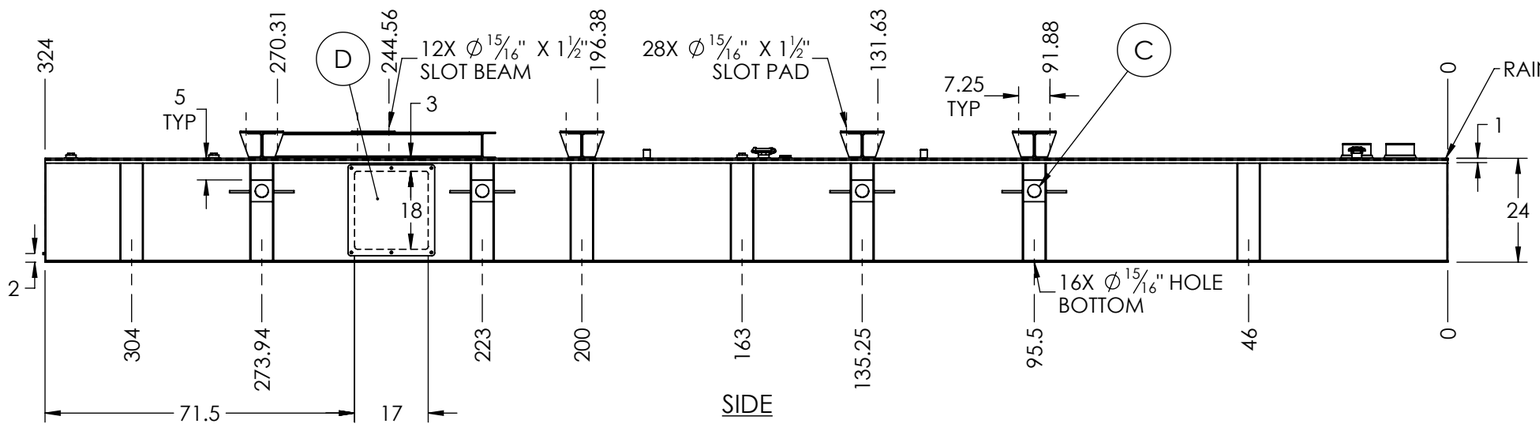
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
S	3166	FLANGE, 6", EMERGENCY VENT	4
T	3660R	FLANGE, 2", FUEL RETURN W/ 1" DIP TUBE	1
U	3660S	FLANGE, 2" FUEL SUPPLY W/ 1" DIP TUBE	2
	700-1075	1" SPRING CHECK VALVE	2
V	1000	FLANGE, 2", LOW LEVEL ALARM (SET AT 12")	1
	1020	CRIT. HIGH ALARM (SET AT 1-3/4")	1
X	1003	FLANGE, 2" FUEL LEVEL GAUGE (SET AT 21-1/2")	1
Y	3152	FLANGE, 2", STANDARD VENT CAP	1
Z	3005	FLANGE, 2", LOCKING FILL PORT	1
A	4300	FLANGE, 2", FUEL IN BASIN ALARM	1
B	3502	FLANGE, 1/2", BASIN DRAIN	1
C	8410	1/2" FLUSH MOUNT LIFTING PLATE	8
D	8002	REMOVABLE STUB UP ACCESS PANEL	1
E	4001	NOTCHED ELECTRICAL STUB UP AREA	1
	4005	STUB UP COVER	1
F	3195	FLANGE, 2", EXTRA FITTING W/ PLUG	2
H	1010	FLANGE, 2", HIGH LEVEL ALARM (SET AT 3")	1
L	3193	F. COUPLING, 1", EXTRA FITTING W/PLUG	2
	8303	W6 X 15 I-BEAM GENSET SUPPORT	7
	1000181	ISO PLATE, 10.00" x 8.00" x 0.25" THK, (7.25" x 2.25", 4x 0.94" x 1.50")	10
	1000106	IISO GUSSET, 4.87" x 5.67" x 0.25" THK, (W6 x 15 x 10.00")	28
	MSS-1E-2000	GPC ISOLATORS	10
	3520	RAIN RUNOFF® OPTION	1
DW-101		DOUBLE WALL SECONDARY CONTAINMENT	1
PAINT COLOR		GLOSS BLACK (9638)	



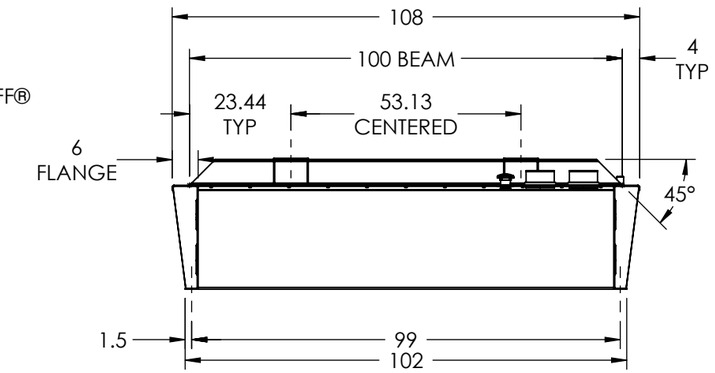
TOP



DETAIL B



SIDE



END

REVISIONS			
REV.	DESCRIPTION	DATE	BY
A	INITIAL RELEASE	10/6/26	LAR

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MH18481
FILE NO. MH46743
MH25279

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THE TOLERANCES ARE:
ONE PLACE X ± 1
TWO PLACE .XX ± .06
ANGLE ± 2°
HOLE DIA. ± .005

THIRD ANGLE PROJECTION

CUSTOMER NAME: CUMMINS NORTH
JOB REFERENCE: L2 ENCLOSURE 24 HR TANK
DRAWING REFERENCE: 886773-00

DATE: 10/6/2026
DRAWN BY: LAR

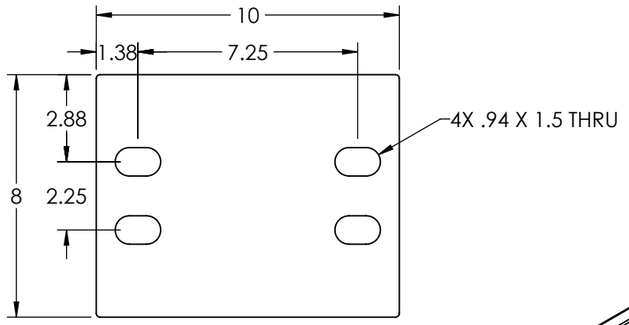
DESCRIPTION: **SUBBASE TANK WITH RUPTURE BASIN & STUB UP**
SIZE: B
DWG. NO.: 143924-1000
REV.: A
SCALE: 1:35
SHEET 2 OF 6

S.O. #
143924

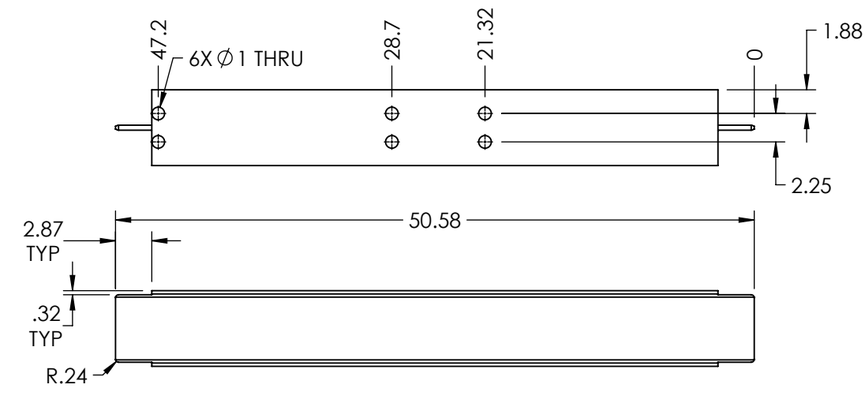
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APPROVED BY:

DATE:



1000181
ISOLATOR PAD SUPPORT
QTY:10



H-BEAM - W6X15
QTY: 2

ISO VIEW

Gallons Per Inch Chart	
Inches	Gallons
1	115.07
2	230.14
3	345.21
4	460.28
5	575.35
6	690.42
7	805.48
8	920.55
9	1035.62
10	1150.69
11	1265.76
12	1380.83
13	1495.90
14	1610.97
15	1726.04
16	1841.11
17	1956.18
18	2071.25
19	2186.32
20	2301.38
21	2416.45
21.4375	2466.80
22	2531.52
22.4375	2581.87

USABLE CAPACITY

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MH18481
FILE NO. MH46743
MH25279

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THE TOLERANCES ARE:
ONE PLACE .X ± .1
TWO PLACE .XX ± .06
ANGLE ± 2°
HOLE DIA. ± .005

THIRD ANGLE PROJECTION

CUSTOMER NAME: CUMMINS NORTH
JOB REFERENCE: L2 ENCLOSURE 24 HR TANK
DRAWING REFERENCE: 886773-00

DATE: 10/6/2026
DRAWN BY: LAR

DESCRIPTION: **ISO VIEW**

SIZE: **B**
SCALE: 1:25
DWG. NO. **143924-1000**
REV. A
SHEET 3 OF 6

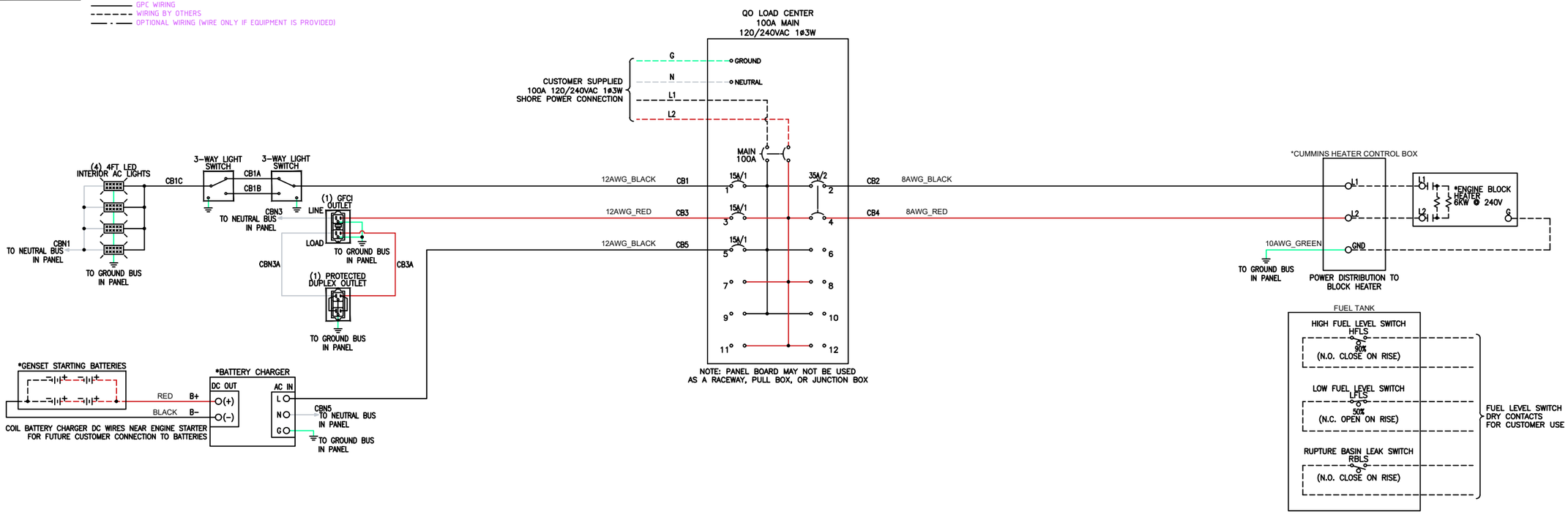
JOB #

143924

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NOTES:
- MINIMUM 12AWG THHN STRANDED WIRING TO BE USED FOR DISTRIBUTION PANEL FEEDER CIRCUITS UNLESS OTHERWISE NOTED
- ALL CIRCUITS TO BE WIRED IN EMT CONDUIT
- * - PROVIDED BY OTHERS

——— GPC WIRING
- - - - - - WIRING BY OTHERS
—·— OPTIONAL WIRING (WIRE ONLY IF EQUIPMENT IS PROVIDED)



BILL OF MATERIAL

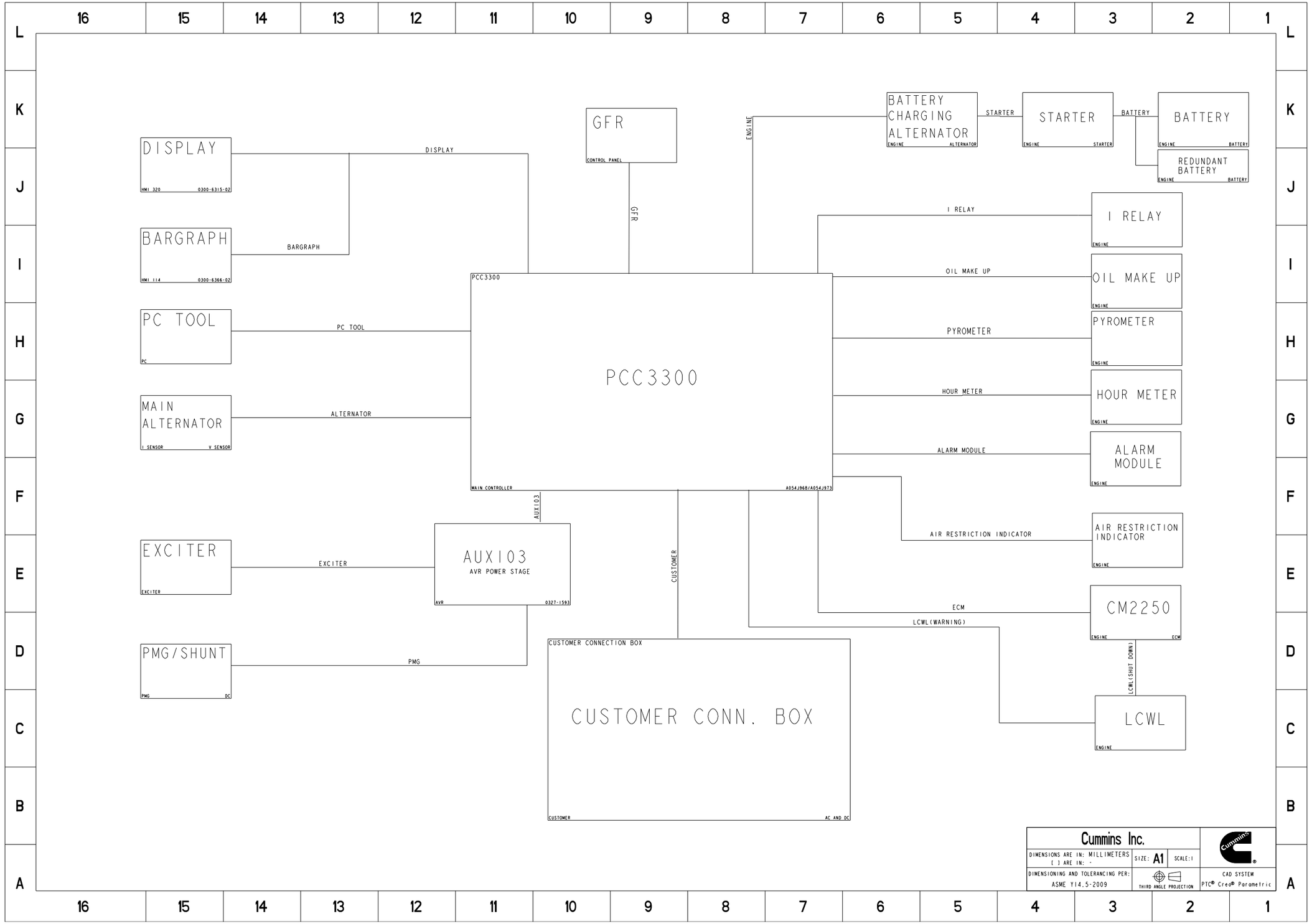
QTY	DESCRIPTION	MANUFACTURER	PART NO.
1	QO LOAD CENTER, 100A, 120/240V 1Ø3W	SQUARE D	QO112M100P
1	LOAD CENTER TRIM	SQUARE D	QOC12US
1	GROUND BAR (FOR LOAD CENTER)	SQUARE D	PK9GTA
1	CIRCUIT BREAKER, 35A, 2P, 10KAIC, PLUG-ON	SQUARE D	QO235
2	CIRCUIT BREAKER, 20A, 1P, 10KAIC, PLUG-ON	SQUARE D	QO120
2	CIRCUIT BREAKER, 15A, 1P, 10KAIC, PLUG-ON	SQUARE D	QO115
1	GFCI OUTLET	HUBBELL	GFRTW20I
1	DUPLEX OUTLET	HUBBELL	BR20I
4	4FT LED LIGHTS	SYLVANIA	VAPOR3A/S050UNH D8SC7/48/GR
2	3-WAY SWITCHES	HUBBELL	CSB320I

GWE-G2-1500-2460-ELECTRICAL

CUSTOMER/ID: CUMMINS NORTH
JOB REF: L2 ENCLOSURE 24 HR TANK
DRAWING REF: X
DWG #: 45-143924 1-PHASE
DATE: 09/29/26 DRAWN BY: ANL

GLOBAL POWER COMPONENTS

REV: N/A	DATE: N/A	DECRIPTIONS	BY: N/A
REVISIONS		WIRING	



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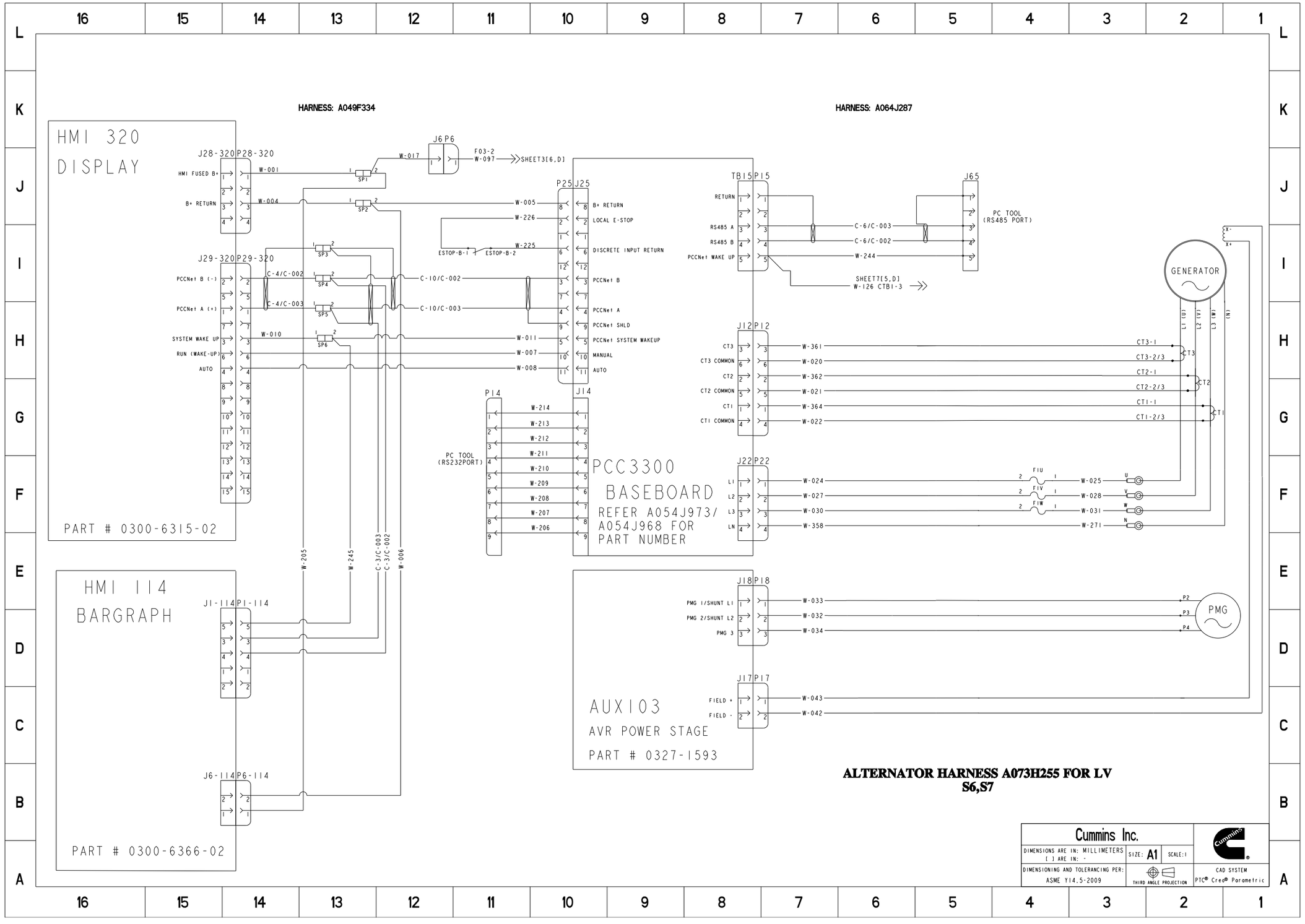
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Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

Drawing Category: **Detail** State: **Released**



Document Generated: **09JUN2026 17:22 GMT**

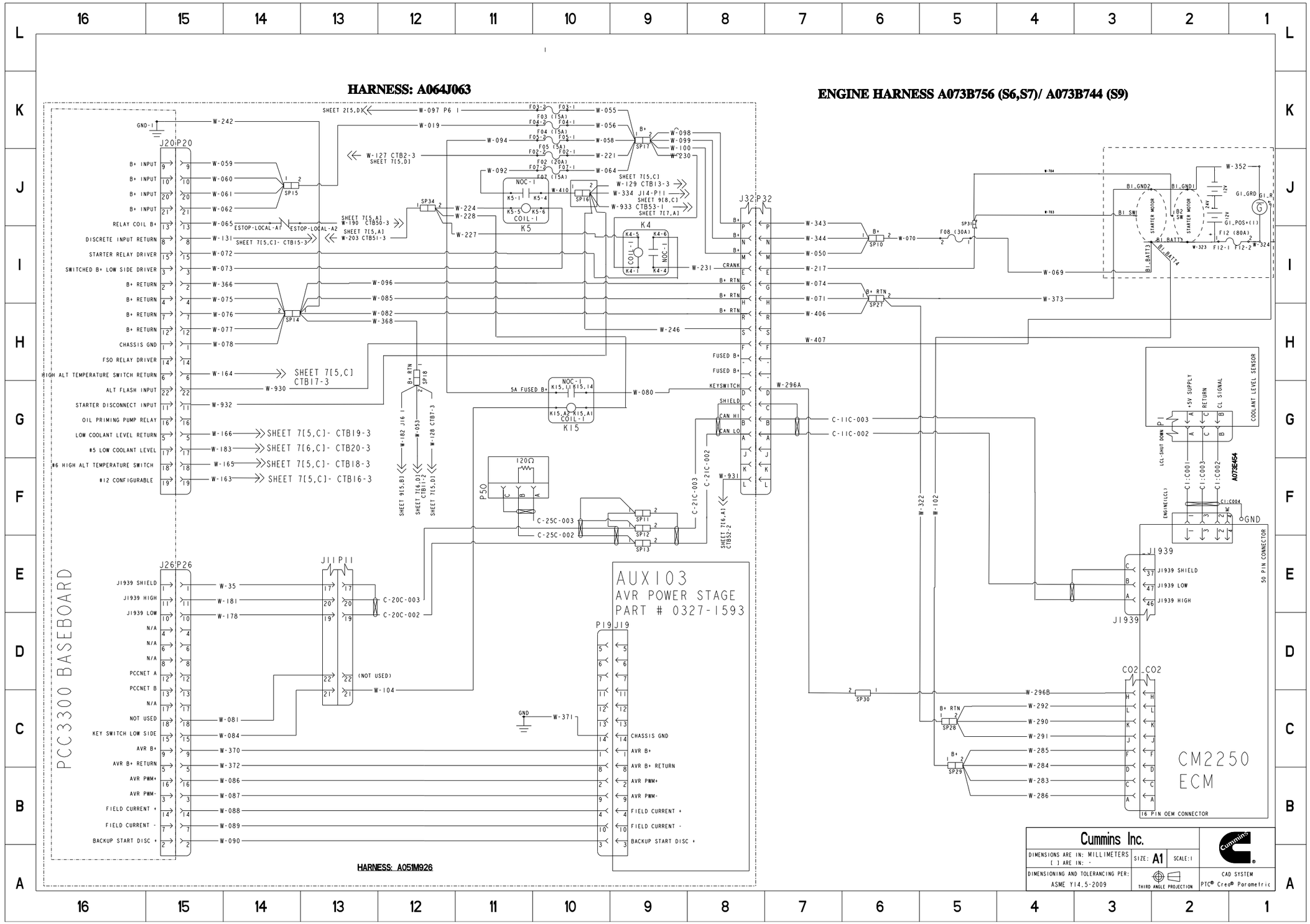
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Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

Drawing Category: **Detail** State: **Released** Sheet **2** of **19**



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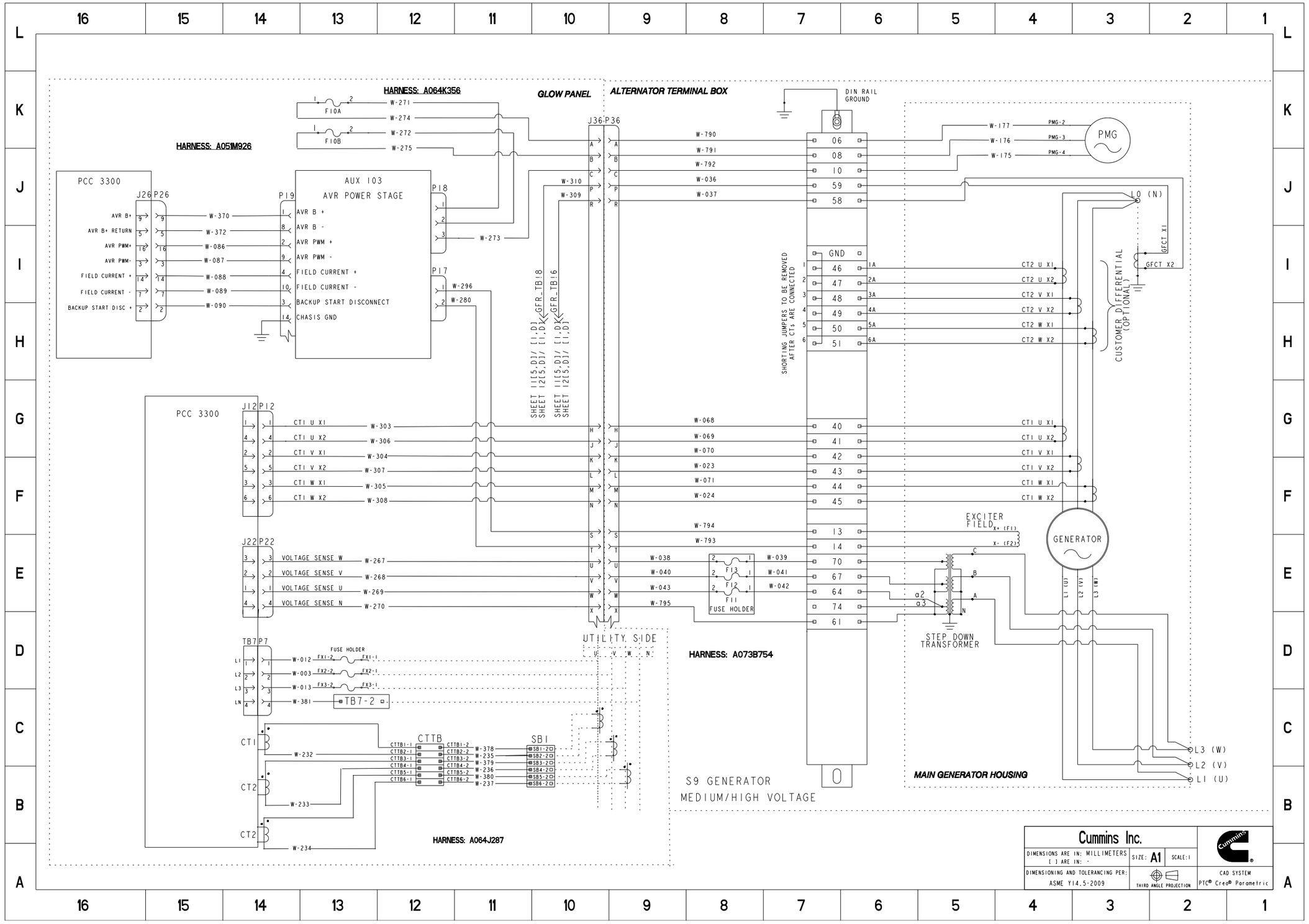
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Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

Drawing Category: **Detail** State: **Released** Sheet **3** of **19**



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Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

Drawing Category: **Detail** State: **Released**

DESIGN PROTECTED FOR DOUBLE BEARING ALTERNATORS

HARNESS: A064J285

HARNESS: A050R646

HARNESS: A051G439

MAIN GENERATOR TERMINAL BOX (S9)

HARNESS: A051G461

SHEET 7[4,D] P39!A CTB2-4 B+
SHEET 7[4,C] P39!B CTB1-4 B-
SHEET 3[5,B] P50!A P50 J1939-A
SHEET 3[5,B] P50!B J1939-B
SHIELD
SHEET 7[4,C] P39!C CTB1-4 WAKE UP
J39 P39
120Ω

AUX 101 BOARD(3) PART # A029P569
AUX 101 BOARD (4) PART # A029P569

P14(3): B+(IN), B-(IN)
P10(3): CAN-H, CAN-L
P1(3): B+(OUT), B-(OUT), WAKE UP
P14(4): B+(IN), B-(IN)
P1(4): WAKE UP
P10(4): CAN-H, CAN-L, GND, GND
P11(4): INPUT 1-, INPUT 2-, INPUT 5-, INPUT 6-, INPUT 1+, INPUT 2+, INPUT 5+, INPUT 6+
P10(3): CS1, CS2, CS3, GND, GND, GND
P11(3): INPUT 3+, INPUT 3-, INPUT 4+, INPUT 4-, INPUT 5+, INPUT 5-, INPUT 8-, INPUT 7-, INPUT 8+, INPUT 7+

SP-55, SP-56, SP-51, SP-45, SP-49, SP-48, SP-47, SP-46, SP-50

U1 R 16 U1 Temp
U1 R 17
U1 W 18 PHASE U
V1 R 19 V1 Temp
V1 R 20
V1 W 21 PHASE V
W1 R 22 W1 Temp
W1 R 23
W1 W 24 PHASE W
DE R 34 DE Temp
DE R 35
DE W 36 DRIVE END
NDE R 37 NDE Temp
NDE R 38
NDE W 39 NON-DRIVE END
STATOR RTDs
BEARING RTDs
NOT IN BUTTERFLY SCOPE
TERMINAL BLOCK

NOTE: SPARE STATOR RTDs ARE INLCUDED AS U2, V2, W2.

U1 V1 W1 U2 V2 W2
H1 H3 H2 H4
HEATERS 100-138 VOLTS 1062-2022 WATTS
HEATERS 200-277 VOLTS 1058-2029 WATTS
16 18 20 22 24 26 28 30 32 34 36 38
17 19 21 23 25 27 29 31 33 35 37 39
STATOR RTDs - 2/PHASE
WIRE RTD: R = RED & W = WHITE
IT IS RECOMMENDED THAT THE RTD MONITOR SYSTEM IS EARTHED

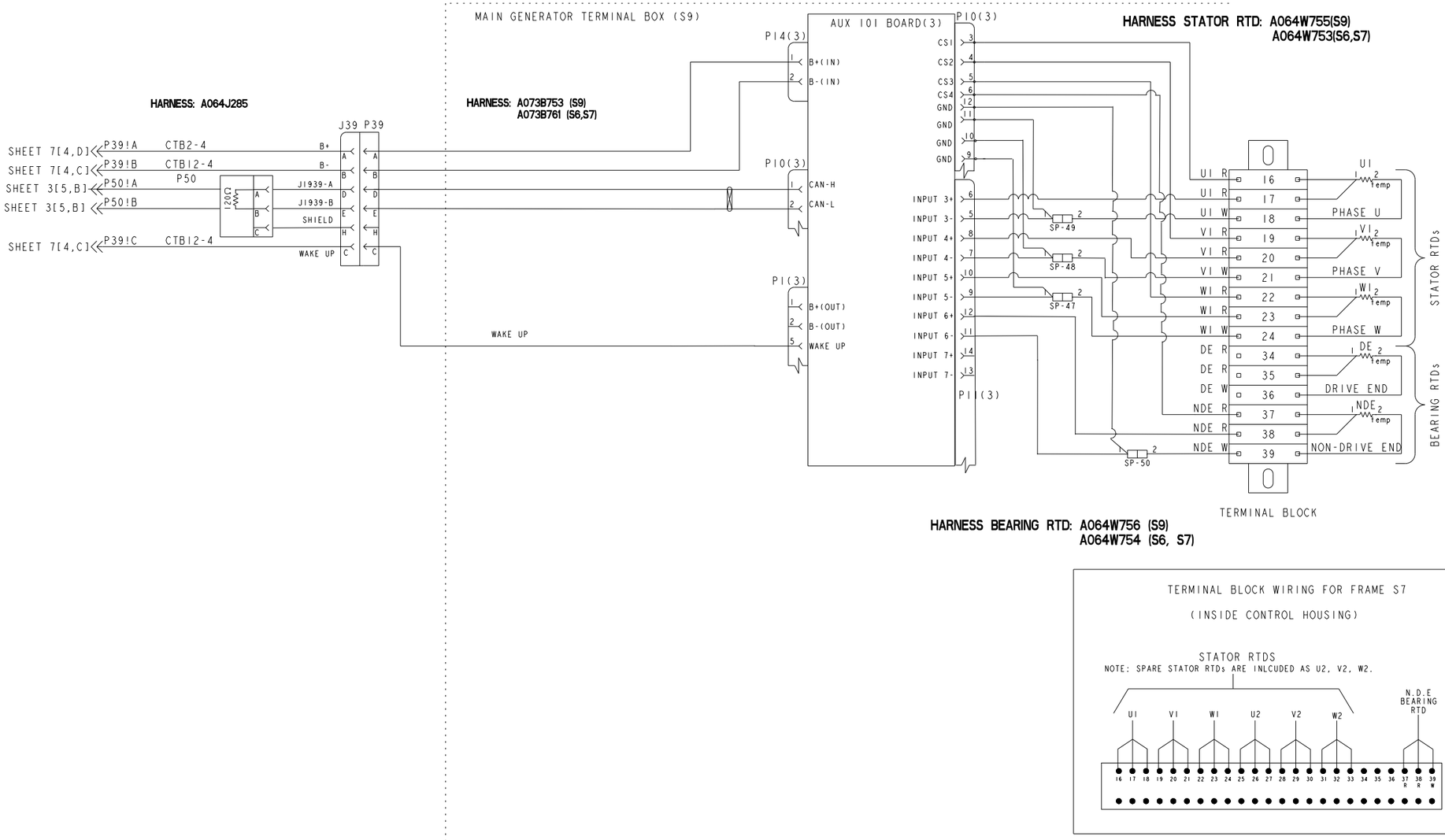
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A1 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

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OPTION FOR SINGLE BEARING ALTERNATORS (S6, S7 AND S9)

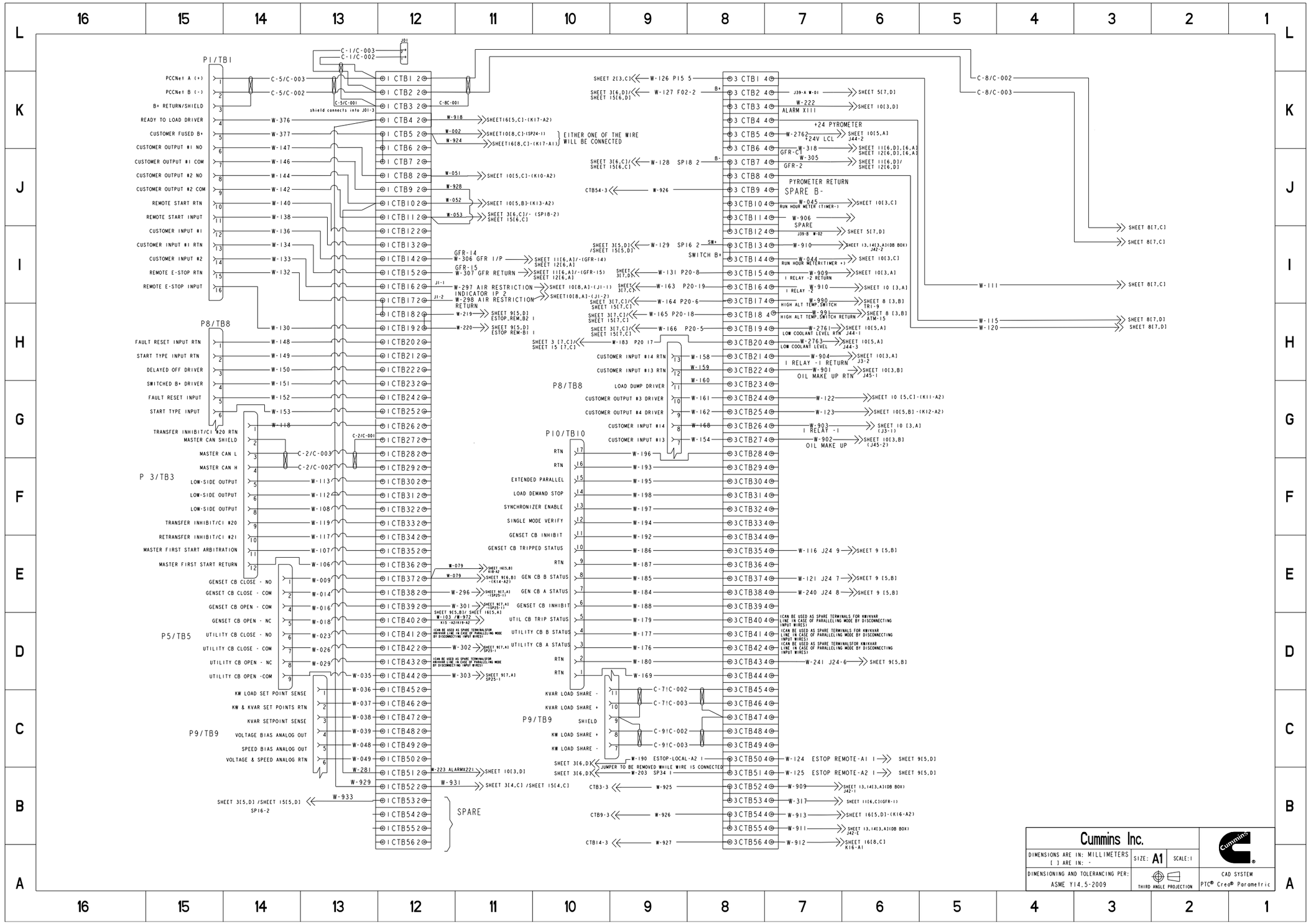


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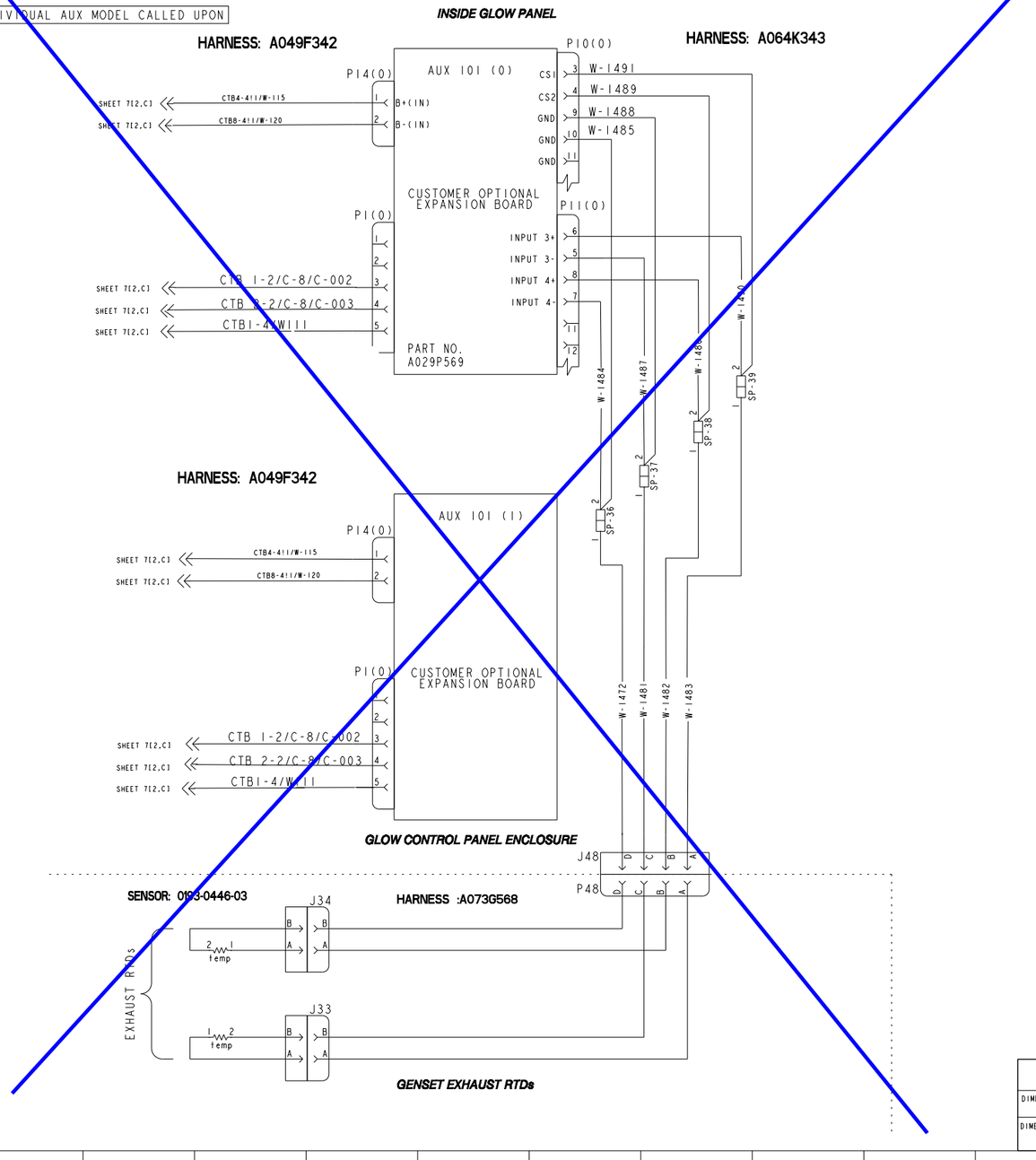
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Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

Drawing Category: **Detail** State: **Released** Sheet **7** of **19**

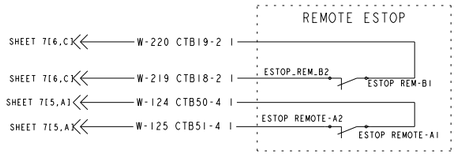
USE A049F342 ONLY WHEN INDIVIDUAL PYROMETER OR INDIVIDUAL AUX MODEL CALLED UPON



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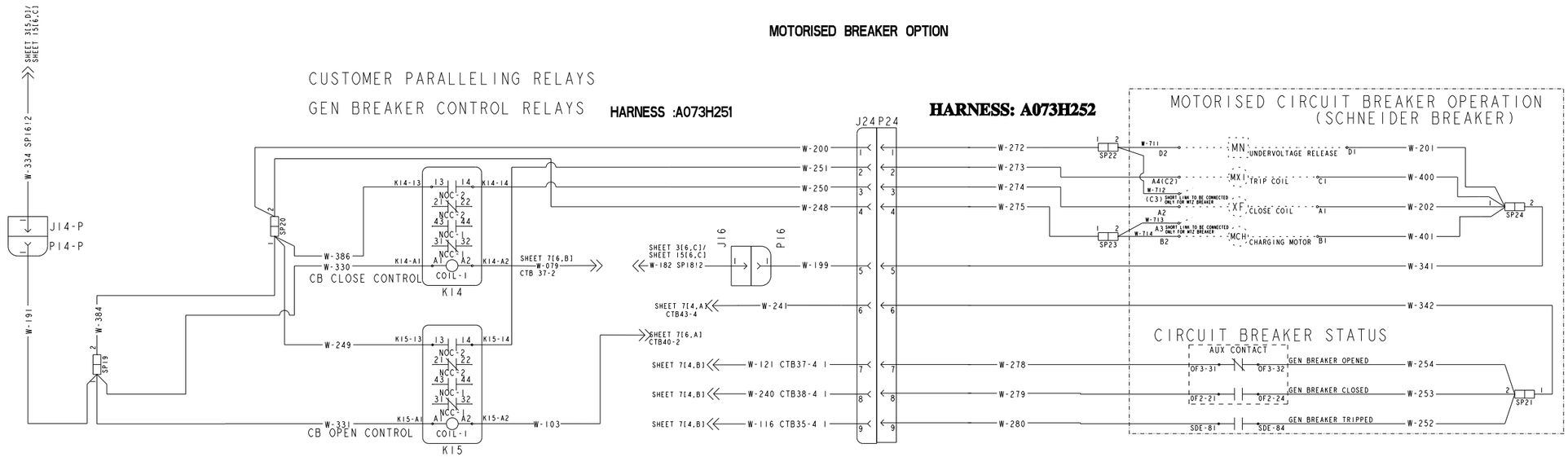


MOTORISED BREAKER OPTION

CUSTOMER PARALLELING RELAYS
GEN BREAKER CONTROL RELAYS

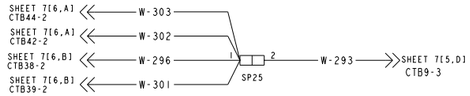
HARNESS :A073H251

HARNESS: A073H252



	Schneider
UNDERVOLTAGE RELEASE	CB-D1/CB-D2
TRIP COIL	CB-A4/CB-A1
CLOSE COIL	CB-A2/CB-A1
CHARGING MOTOR	CB-B4/CB-A1
GEN BREAKER OPENED	CB-31/CB-32
GEN BREAKER CLOSED	CB-21/CB-24
GEN BREAKER TRIPPED	CB-81/CB-84

CUSTOMER PARALLELING RELAYS
UTILITY BREAKER CONTROL RELAYS



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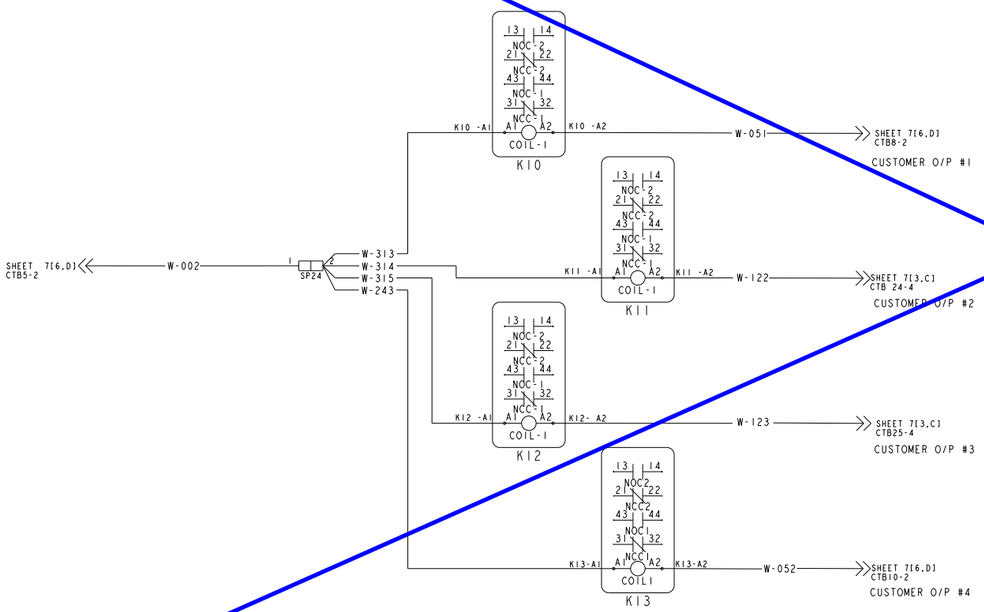
Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

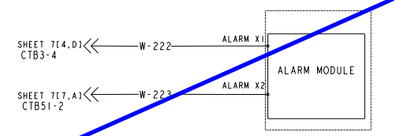
Drawing Category: **Detail** State: **Released** Sheet **9** of **19**

HARNESS: A064J284

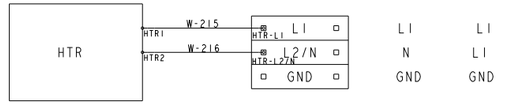
OPTIONAL CUSTOMER CONFIGURABLE RELAYS



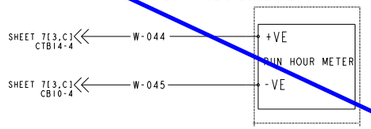
OPTIONAL ALARM ON CONTROL PANEL DOOR HARNESS-**A064R323**



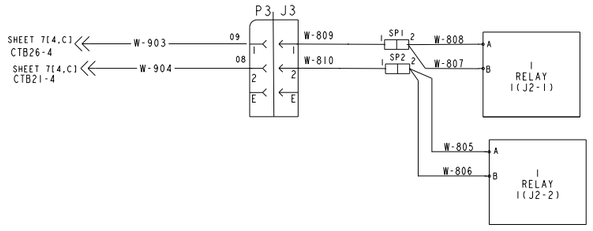
CONTROL HEATER INSIDE CONTROL PANEL HARNESS -**A065Y059**



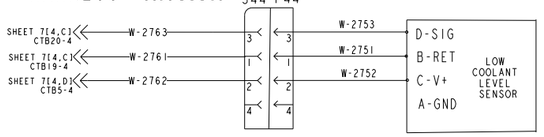
RUN HOUR METER INSIDE CONTROL PANEL HARNESS -**A073N945**



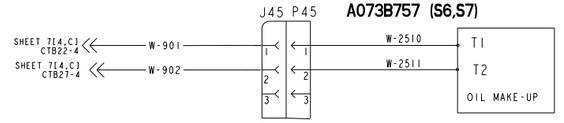
I RELAY HARNESS -**A065J367**(S6,S7) **A065K191** (S9)



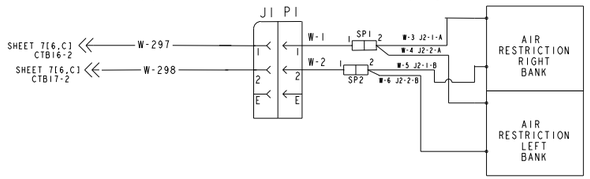
LOW COOLANT LEVEL HARNESS -**A073J301** **A073B758**(S6,S7) **A073B746**(S9)



OIL MAKE UP HARNESS -**A064Y704** **A073B745** (S9) **A073B757** (S6,S7)



AIR RESTRICTION INDICATOR HARNESS -**A064Y740** **A073B760** (S6,S7) **A073B748** (S9)



IF REQUIRED FOR THOR OPTIONS, B+, B- AND SWITCH B+ ARE AVAILABLE ON CUSTOMER CONNECTIONS ON SHEET 6

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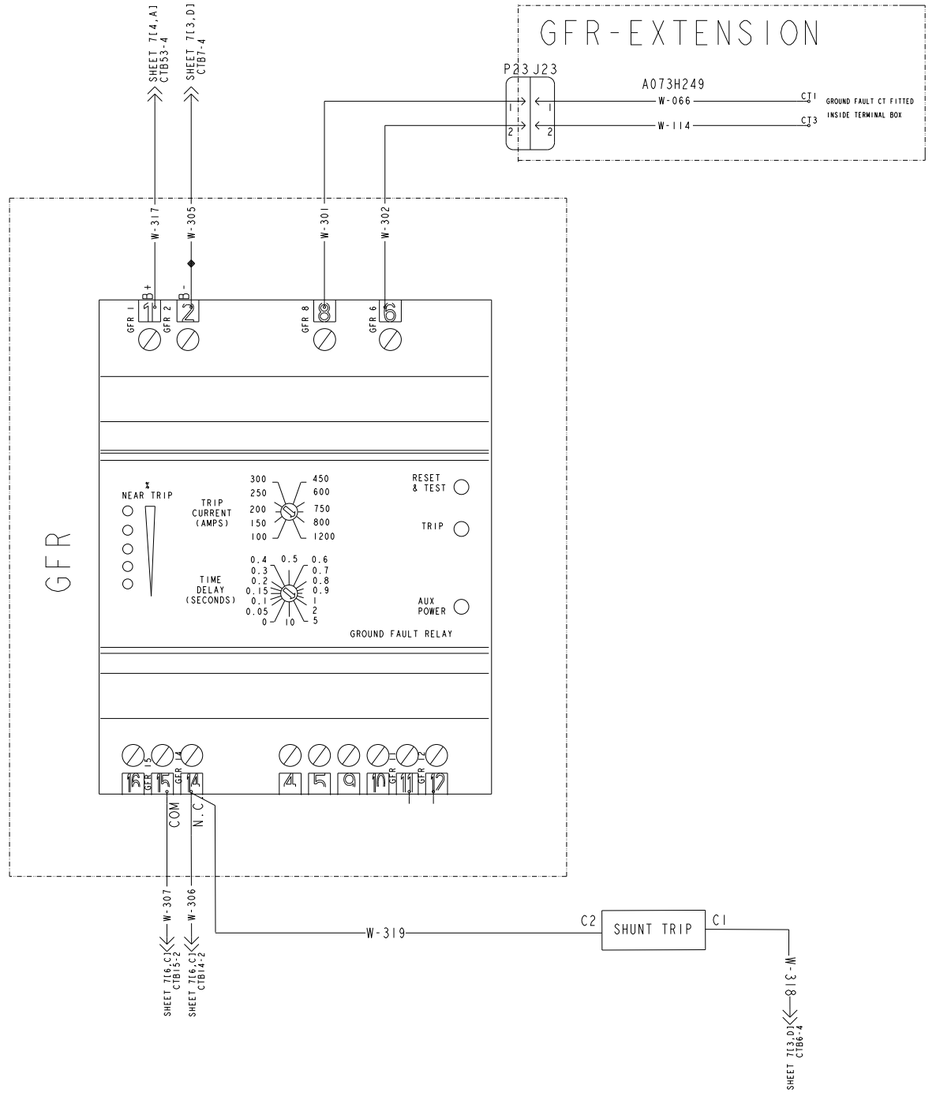
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MANUAL BREAKER GFR WIRING

GROUND FAULT RELAY (UL)- HARNESS: A075J686
A073H249

GROUND FAULT CURRENT TRANSFORMER
(PLACEMENT BASED ON GROUND FAULT
FOR S6 AND S7 EARTH FAULT CT MOUNTED INSIDE
TERMINAL BOX AND CONNECTED THROUGH **A073N682**
INSTALLATION DRAWING)



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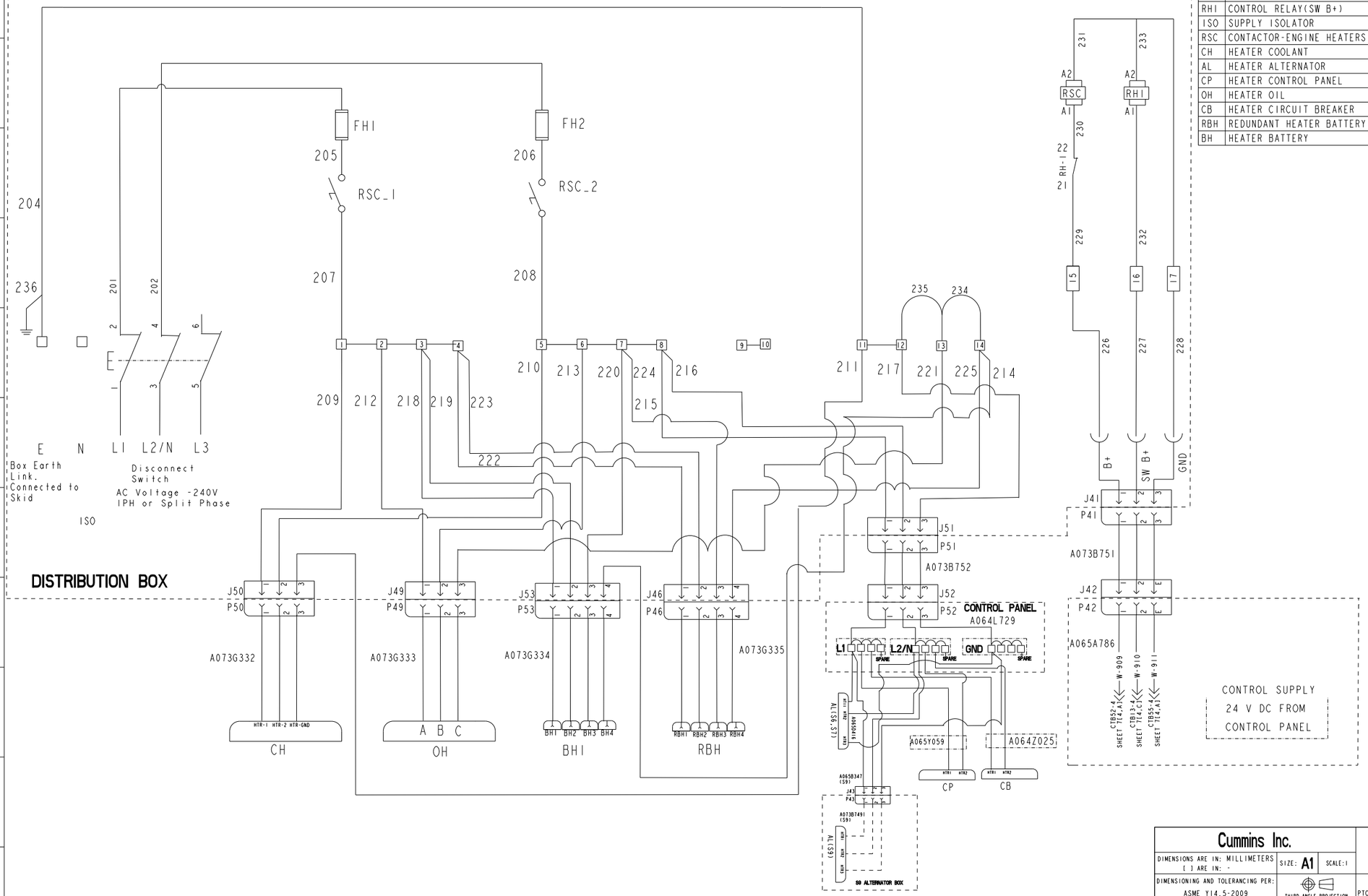
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Part Number: **A065D445** Part Revision: **J**
Part Name: **DIAGRAM,GENSET WIRING**
Drawing Category: **Detail** State: **Released** Sheet **11** of **19**

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DISTIRUBUTION WIRING FOR 240 V CUSTOMER SUPPLY (UL)-A065K535

REF	DESCRIPTION
FH1	FUSE 30A
FH2	FUSE 30A
RH1	CONTROL RELAY(SW B+)
ISO	SUPPLY ISOLATOR
RSC	CONTACTOR-ENGINE HEATERS,CONTROL
CH	HEATER COOLANT
AL	HEATER ALTERNATOR
CP	HEATER CONTROL PANEL
OH	HEATER OIL
CB	HEATER CIRCUIT BREAKER
RBH	REDUNDANT HEATER BATTERY
BH	HEATER BATTERY



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Part Number: **A065D445** Part Revision: **J**
Part Name: **DIAGRAM,GENSET WIRING**
Drawing Category: **Detail** State: **Released** Sheet **13** of **19**

HARNESS: A064J063

REDUNDANT ENGINE HARNESS A073B755(S6,S7) A073B743(S9)

CIRCUIT SHOWN ONLY FOR REDUNDANT BATTERY ONLY

J20:P20

B+ INPUT
B+ INPUT
B+ INPUT
B+ INPUT
RELAY COIL B+
DISCRETE INPUT RETURN
STARTER RELAY DRIVER
SWITCHED B+ LOW SIDE DRIVER
B+ RETURN
B+ RETURN
B+ RETURN
B+ RETURN
CHASSIS GND
FSO RELAY DRIVER
OIL MAKE UP SYSTEM RETURN
ALT FLASH INPUT
STARTER DISCONNECT INPUT
OIL PRIMING PUMP RELAY
LOW COOLANT LEVEL RETURN
#5 LOW COOLANT LEVEL
#6 OIL MAKE UP
#12 CONFIGURABLE

J32:P32

CRANK
FUSED B+
KEYSWITCH
SHIELD
CAN HI
CAN LO

PCC3300 BASEBOARD

J26:P26

J1939 SHIELD
J1939 HIGH
J1939 LOW
PCCNet SHIELD
N/A
B+ RETURN
PCCNET A
PCCNET B
N/A
KEY SWITCH B+
KEY SWITCH LOW SIDE
AVR B+
AVR B+ RETURN
AVR PWM+
AVR PWM-
FIELD CURRENT +
FIELD CURRENT -
BACKUP START DISC +

J11:P11

(NOT USED)

AUX103
AVR POWER STAGE
PART # 0327-1593

P19:J19

CHASSIS GND
AVR B+
AVR B+ RETURN
AVR PWM+
AVR PWM-
FIELD CURRENT +
FIELD CURRENT -
BACKUP START DISC +

HARNESS: A051M926

CM2250
ECM

16 PIN OEM CONNECTOR

50 PIN CONNECTOR

COOLANT LEVEL SENSOR

J1939

J1939 SHIELD
J1939 LOW
J1939 HIGH

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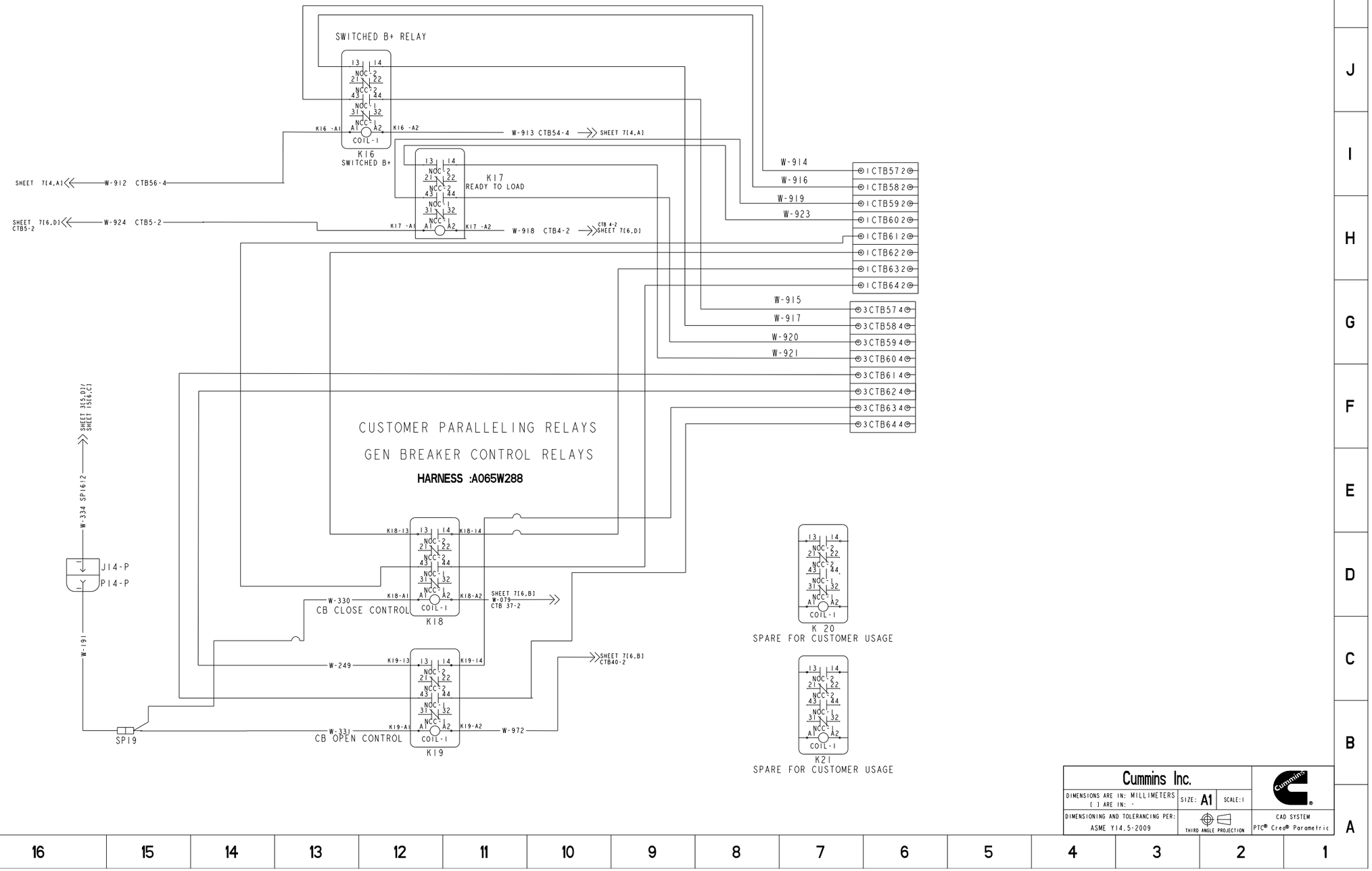
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DESIGN PROTECTED FOR CHINA DOMESTIC PARALLELING RELAY OPTION

PARALLELING RELAY AND SWITCHED B+ CONFIGURATION (WITH NO CB OPTION)- HARNESS: A065W288



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	CAD SYSTEM PTC® Creo® Parametric

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Part Number: **A065D445** Part Revision: **J**

Part Name: **DIAGRAM,GENSET WIRING**

Drawing Category: **Detail** State: **Released** Sheet **16** of **19**

USE A072X616 ONLY WHEN EXHAUST AND AUX I01 CALLED TOGETHER

INSIDE GLOW PANEL

HARNESS: A072X616

HARNESS: A064K343

CTB4-4/W115 — SHEET 7[2,C]
CTB8-4/W120 — SHEET 7[2,C]
SP40
SP41
SP40-2/W502
SP41-2/W503

AUX I01 (0)
P14(0)
B+(IN)
B-(IN)
P10(0)
CS1 — W-1491
CS2 — W-1489
GND — W-1488
GND — W-1485
GND

CUSTOMER OPTIONAL EXPANSION BOARD
PART NO. A029P569
P1(0)
P11(0)
INPUT 3+
INPUT 3-
INPUT 4+
INPUT 4-

CTB 1-2/C-8/C-002 — SHEET 7[2,C1]
CTB 2-2/C-8/C-003 — SHEET 7[2,C1]
CTB1-4/W111 — SHEET 7[2,C1]
SP42
SP43
SP44
SP42-2/C-8/C-004
SP43-2/C-8/C-005
SP44-2/W501

W-1490 — SP-39
W-1486 — SP-38
W-1487 — SP-37
W-1488 — SP-36

AUX I01 (1)
P14(1)
SP40-2/W505
SP41-2/W506

CUSTOMER OPTIONAL EXPANSION BOARD
P1(1)
SP42-2/C-8/C-006
SP43-2/C-8/C-007
SP44-2/W504

W-1472
W-1481
W-1482
W-1483

GLOW CONTROL PANEL ENCLOSURE

J48
P48

SENSOR: 0193-0446-03

HARNESS :A073G568

J34
J33
temp
EXHAUST RTDs

GENSET EXHAUST RTDs

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SECTION 5

Startup & Warranty

Sales and Service

Cummins Sales and Service

Customer / Contractor Pre Commissioning Inspection Form

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

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

Project Name/End User: _____

Contractor: _____

Contact Name: _____

Business Phone:_____ Cell Phone:_____

Address: _____

City: _____ State/Prov: _____Zip/Postal Code_____

Email: _____

REQUIRED ON SITE INFORMATION:

On-Site Contact Name:_____

Phone: _____Email: _____

Time Requested Onsite_____ Are the starting batteries at site? Yes ☐ No ☐

Address: _____

City: _____ State/Prov: _____Zip/Postal Code_____

Location of Generator (Roof, basement, floor, outside): _____

Access: Does the facility have: Loading Dock ☐ Elevator ☐ Stairs ☐

Distance from vehicle parking to generator: _____

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

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

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

If yes when is the inspector scheduled for: _____

Do prevailing wages apply to the commissioning services for this project? Yes ☐ No ☐

Sales and Service

ON SITE INFORMATION CONTINUED

YES	NA	NO
☐	☐	☐
☐	☐	☐
☐	☐	☐

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

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

Will customer representative be on site for operator training?

On site contact for operator training: _____

MECHANICAL LOCATION AND PLACEMENT OF THE GENERATOR SET

YES	NA	NO
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Generator is properly secured to pad or vibration isolators

Generator Enclosure and/or Room is free of all debris

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

Room is designed for adequate inlet and outlet airflow

GASEOUS FUEL Natural Gas/LP Vapor/LP Liquid

YES	NA	NO
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

Natural gas and/or LPG fuel supply is connected.

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

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

Fuel pressure after service regulator is:_____inches of H2O

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

_____ _____

Contractor "requestor" Signature ***Date***

Sales and Service

DIESEL FUELED GENERATORS

YES	NA	NO	
☐	☐	☐	Flexible fuel connections, (supply and return) are connected to generator and piping.
☐	☐	☐	Day tank installed, wired and plumbed (lines free of obstruction) to genset and main fuel tank if applicable. Only black iron pipe for fuel lines, never use copper or galvanized pipe.
☐	☐	☐	All tanks filled with enough fuel to perform startup and testing.
☐	☐	☐	A return line from engine to day tank and day tank to main tank should be in place

EXHAUST SYSTEM

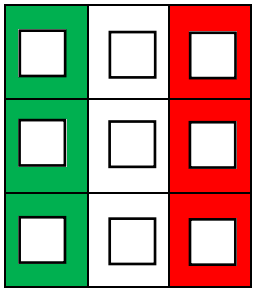
YES	NA	NO	
☐	☐	☐	Exhaust wrapped or isolated to prevent accidental activation of fire protection devices and sprinklers.
☐	☐	☐	Exhaust flex-pipe is installed at engine exhaust outlet (The silencer and flex-pipe are supplied with the generator set).
☐	☐	☐	Silencer is installed with appropriate supports (no weight should be placed on the exhaust outlet of the genset).
☐	☐	☐	Exhaust system has proper expansion joints and wall thimbles (Thimbles are required for wall or roof penetration).

GENERATOR ELECTRICAL CONNECTIONS

YES	NA	NO	
☐	☐	☐	Load conductors connected to breakers
☐	☐	☐	Flexible connections used on all conduit connections to the generator set output box
☐	☐	☐	Remote start interconnection **stranded** wiring is installed between the generator set and the automatic transfer switch(s) and annunciator.
☐	☐	☐	AC Power conductors in dedicated conduit separate from any DC control or network wiring
☐	☐	☐	Ground fault connected/functioning on generator, if supplied
☐	☐	☐	AC power wired to the coolant heaters (Do NOT energize)
☐	☐	☐	Check for AC oil pan heater, control heater or generator winding heater (Needing AC wiring)
☐	☐	☐	Generator is grounded in compliance with local codes
☐	☐	☐	If applicable, louver motors are operational and connected to generator controls

GENERATOR ELECTRICAL CONNECTIONS CONTINUED

YES NA NO



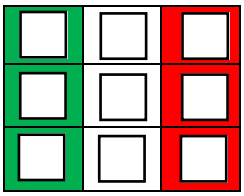
Annunciator mounted in a location where someone can observe a fault of the remote generator system
Where is annunciator located? _____

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

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

TRANSFER SWITCH ELECTRICAL CONNECTIONS

YES NA NO



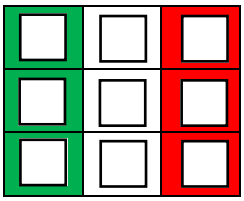
Conductors connected for Utility, Load and Emergency

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

Four Pole Transfer Switch: Is generator neutral grounded? ☐

DAY OF STARTUP

YES NA NO



Training of facility personnel will be done on the same day as start up. Additional trips for operational training will be an additional charge.
Can transfer switch be tested at time of generator startup? (There will be a power interruption) ***Note: After hours testing could result in additional charges.***
If the associated switchgear and/or ATS(s) are not Onan/Cummins, will the manufacturer's representative be on site?

Exercise with or without load? ☐

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

_____ _____

Contractor "requestor" Signature ***Printed Name***

Date: _____

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

Power Generation

Warranty Statement

CENTUM™ Series Generator Set

English
Original Instructions

5-2025

A072R157 (Issue 3)

Limited Warranty

CENTUM™ Series Generator Set

This limited warranty applies to all Cummins Inc. branded CENTUM™ Series generator 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 3 years or 1,000 hours, whichever occurs first. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

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

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

Base Warranty Coverage Duration (Whichever occurs first)

Rating	Months	Max. Hours
COP	12	Unlimited
PRP	12	Unlimited
LTP	12	500 hrs
ESP	36	1000 hrs
EPA-SE	24	Unlimited
DCC	24	Unlimited

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

Cummins Inc. Responsibilities:

In the event of a failure of the Product during the warranty period due to defects in material or workmanship, Cummins Inc. 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 Inc., its distributors or dealers within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Inc.'s published policies and guidelines.
- Providing evidence for date of commissioning.

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- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Inappropriate use of an EPA-SE application generator set relative to EPA's standards.
- Normal wear and tear.
- Improper and/or unauthorized installation.
- Negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Inc. 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 Inc.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited warranty does not cover costs resulting from:

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

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

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

Please contact your local Cummins Inc. Distributor for clarification concerning these limitations.

CUMMINS INC. RIGHT TO FAILED COMPONENTS:

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

Extended Warranty:

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

power.cummins.com

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IN NO EVENT IS CUMMINS INC. LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited warranty shall be enforced to the maximum extent permitted by applicable law. In the United States, some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state or jurisdiction to jurisdiction.

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

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