Sales and Service

RECORD ONLY SUBMITTAL
POWER GENERATION EQUIPMENT

PROJECT NAME: CSDG - 4024 - 022123
PROJECT: 399182

MODEL(s): C1500D6E

CUSTOMER: Central States Diesel Generators
REFERENCE PO #: Signed Quote

SUPPLIER: Cummins Sales and Service

DATE: 3/9/2023

Serving Cummins Customers
in the
Northern Region

NOTICE

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED, PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS POSSIBLE. PLEASE REVIEW IT CAREFULLY AND THOROUGHLY.

For questions or comments regarding this submittal, please contact your Cummins Sales Representative listed on the Cover Page.

To inquire about factory ship dates, arranging delivery and to schedule start-up of your Cummins Power Generation equipment, please contact the Project Manager listed on the Cover Page of this submittal.

**** Start-Ups must be Scheduled 2 Weeks in Advance ****

Sales and Service

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Cummins Sales and Service

Section I

Sales and Service

Bill of Material

Feature Code	Description	Qty
C1500D6E	C1500D6E, Diesel Genset, 60Hz, 1500kW	1
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
C1500D6E	C1500D6E, Diesel Genset, 60Hz, 1500kW	
L170-2	Emission Certification, EPA, Tier 2, NSPS CI Stationary Emergency	
L090-2	Listing - UL 2200	
L224-2	IBC Seismic Certification	
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	
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	
H536-2	Control Display Language - English	
H606-2	Analog Meters - AC Output	
H720-2	AmpSentryTM UL Listed Protective Relay	
KA08-2	Alarm - Audible, Engine Shutdown	
H678-2	LCD Control Display	
K020-2	Display, Running Time	
M683-2	Circuit Breaker or Entrance Box - Single	
M701-2	Manual Circuit Breaker - Left	
0431	CB dual breaker type_None	
0450	Circuit Breaker or Entrance Box - None - Right	
KB73-2	Left Side Breaker - Bottom Entry, Left Side	
KP83-2	Circuit Breaker - 2500A, 3P, 600 / 690V, UL / IEC, Left	
H667-2	Indication - Ground Fault, 4 - Pole Transfer Switch Left Side	
A333-2	Battery Charging Alternator	
C325-2	Fuel Filters - Engine, Single	
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	
L050-2	Literature - English	
L312-2	Standby 3 Year Warranty	
A358-2	Packing - None	
NSBOP01	FES Sound Attenuated Level II with 24 hour subbase fuel tank	1
NSBOP34	FES Spring Vibration Isolators	1
A048G602	Battery Charger-10Amp, 120/208/240VAC, 12/24V, 50/60Hz	1

NOTES:

1500kw is FOB Batavia, OH.
1000kw is FOB first US destination.
Third party vendor pricing for enclosure and fuel tank is an estimate based on current raw materials with 2025 estimated increases included. Enclosure manufacturer reserves the right to re-price project 6 months prior to shipment..
Proposal is for equipment only, offloading, rigging, and installation by others.

Fuel and permits, unless listed above, is not included.
Cummins Standard Batteries, Start-up and testing are not included. Additional tests, such as NETA testing, if required, is by others
Coordination Study not provided.

Cummins Sales and Service

Section II

Specification sheet

Centum™ SERIES GENERATORS

Diesel Generator set QSK38 engine series

1250 kW-1500 kW 60 Hz
EPA emissions

Description

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

Features

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

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

G3 Capable – Consult factory for related performance rating as per ISO8528-5

HVO Fuel Compatible – Approved for use with paraffinic fuels (EN15940), including Hydrotreated vegetable oil which has a very low life cycle carbon emission

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

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

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

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

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

Model	Standby rating 60 Hz kW (kVA)	Prime rating 60 Hz kW (kVA)	Data Center Continuous rating 60 Hz kW (kVA)	Emissions compliance EPA
C1250D6E	1250 (1563)	1136 (1420)	1136 (1420)	EPA Tier 2
C1500D6E	1500 (1875)	1364 (1705)	1364 (1705)	EPA Tier 2

Generator set specifications

Performance Class	ISO 8528-5 G3 Capable - refer to the factory for site and configuration specific transient performance classification
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 1%
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 FCC PART 15 subpart B; ICES-002

Engine specifications

Bore	159 mm (6.26 in.)
Stroke	159 mm (6.26 in.)
Displacement	37.8 litres (2307 in^3)
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
Fuel filter	Two stage spin-on fuel filter and water separator system. Stage 1 has a two element 5 micron filter and stage 2 has a two element 4 micron filter.
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient 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-Neutral/Line-Line

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

Note: Consult factory for other voltages.

Generator set options and accessories

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

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

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

Generator set options and accessories (continued)

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

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

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

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

PowerCommand 3.3 – control system

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

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

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

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

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

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

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

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

Multi-language support

Operator panel features

Operator/display functions

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

Paralleling control functions

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

Alternator data

- Line-to-Neutral and Line-to-Line AC volts
- 3-phase AC current
- Frequency
- kW, 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)

Other data

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

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

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

AmpSentry AC protection

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

Standard control functions (continued)-

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)

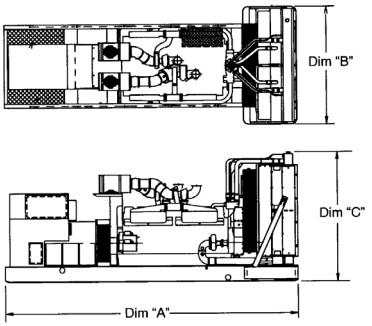
Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550

Prime Power (PRP):

Applicable for supplying power to varying electrical loads for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550



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

Do not use for installation design

Refer to drawings for specific weights & dimensions

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set weight* dry kg (lbs)	Set weight* wet kg (lbs)
C1250D6E	5085 (200)	2184(86)	2406(94.7)	9197 (20276)	9687 (21357)
C1500D6E	5085 (200)	2184(86)	2406(94.7)	~~9231 (20351)~~	~~9721 (21431)~~

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

Codes and standards

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

ISO 9001	This product was manufactured in a plant whose quality management system is registered as being in conformity with ISO 9001	UL LISTED	UL Listing to UL 2200, "Stationary Engine Generator Assemblies" is available for this genset model
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.	**U.S. EPA**	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
CSA	All genset models are available as CSA certified to CSA C22.2 No. 100	**International Building Code**	The generator set package is available certified for seismic application in accordance with International Building Code

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

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

Our energy working for you.™

Centum™ SERIES GENERATORS

Specification Sheet – (07/22)

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

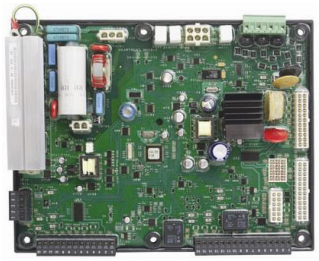
PowerCommand® Control 3300 is designed to meet the exacting demands of the harsh and diverse environments of today's typical power generation applications for Full Authority Electronic or Hydromechanical engine power generator sets.

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

PowerCommand® Generator Set Digital Control System PCC 3300



Introduction

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

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

Features

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

Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

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

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

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

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

Alternator data

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

For Lean Burn Natural Gas Engine applications:

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

Utility/AC bus data

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

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

Engine data

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

Lean Burn Natural Gas (LBNG) application parameters include:

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

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

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.

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

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

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

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

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

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

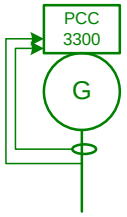
Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped.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

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

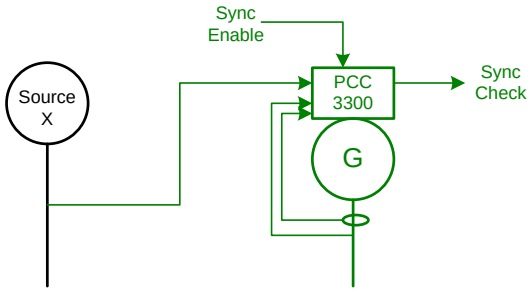
Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for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

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

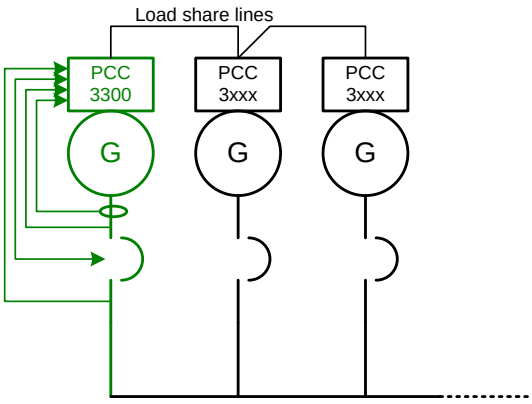
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



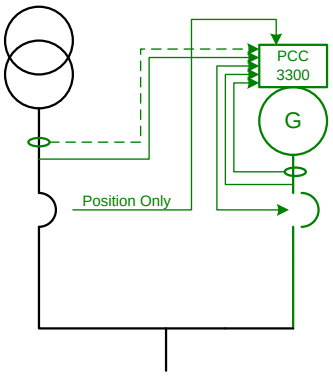
Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.



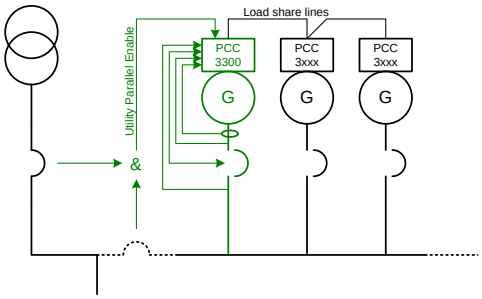
Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



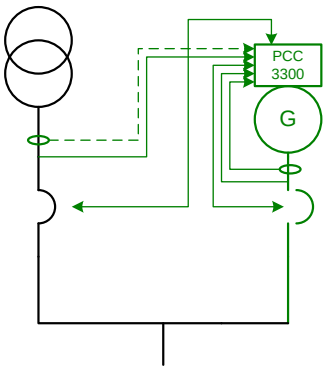
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



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

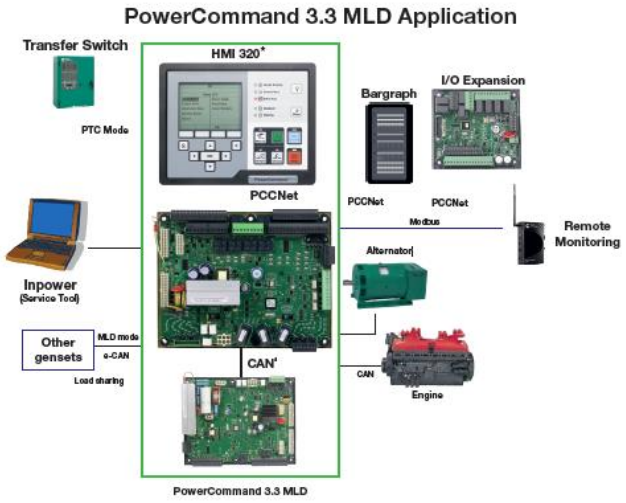


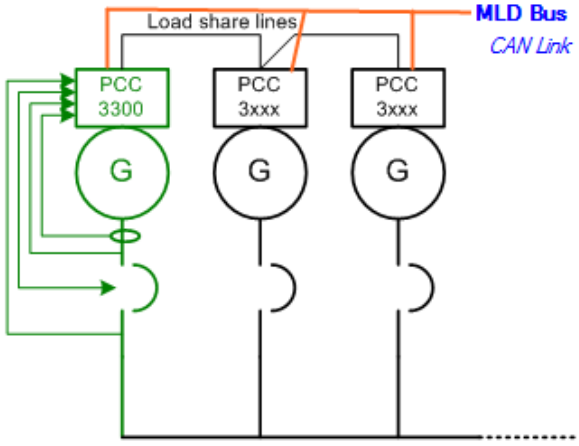
Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

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





PCC3300 External Voltage and Frequency Biasing Inputs

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

Protective Functions

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

Battle short mode

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

Derate

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

Configurable alarm and status inputs

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

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

Emergency stop

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

General prime mover protection

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

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

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

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

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

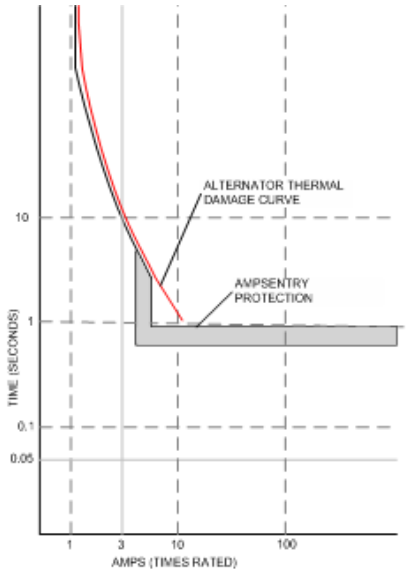
High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

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.

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.

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.

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

Output Signals for Lean Burn Natural Gas Engine applications:

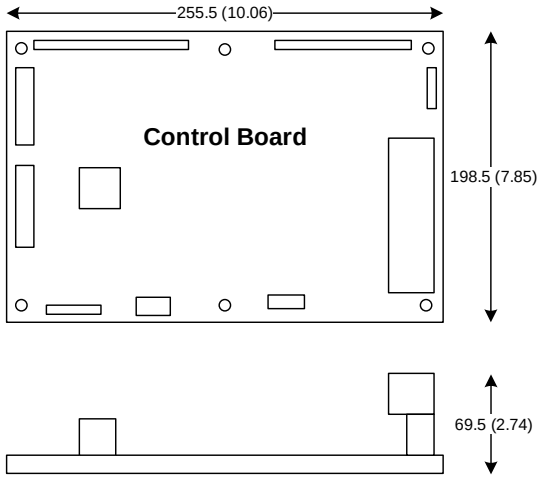
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

Communications connections include:

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

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

Mechanical Drawing



PowerCommand® Human Machine Interface HMI320

Description

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

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

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

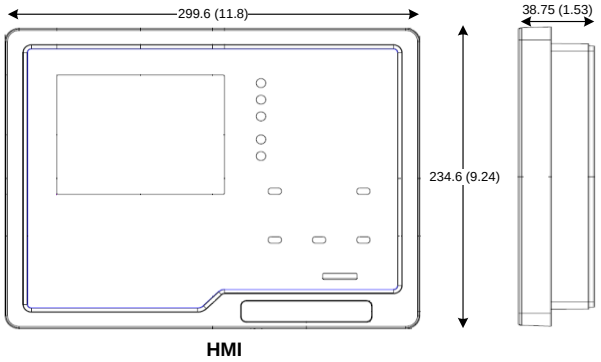
Features:

- LED indicating lamps
  - genset running
  - remote start
  - not in auto
  - shutdown
  - warning
  - auto
  - manual and stop
  - Circuit breaker open (if equipped)
  - Circuit breaker closed (if equipped)
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

Communications connections include:

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

Mechanical Drawing



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.

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 50081-1,2 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 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

Centum™ SERIES GENERATORS

Generator set data sheet

Model:	**C1500D6E**
Frequency:	**60 Hz**
Fuel type:	**Diesel**
kW rating:	**1500 Standby** ~~**1364 Prime**~~ ~~**1364 Data Center Continuous**~~
Emissions level:	**EPA NSPS Stationary Emergency Tier 2**

Exhaust emission data sheet:	**EDS-3088**
Exhaust emission compliance sheet:	**EPA-2066**
Sound performance data sheet:	**MSP-4122**
Cooling performance data sheet:	**MCP-2177**
Prototype test summary data sheet:	**PTS-717**
Standard set-mounted radiator cooling outline:	**A062V279**
Optional set-mounted radiator cooling outline:	**A062V279**

Fuel consumption

	Standby				~~Prime~~				~~Data Center Continuous~~			
Ratings	**kW (kVA)**				**kW (kVA)**				**kW (kVA)**			
	1500 (1875)				1364 (1705)				~~1364 (1705)~~			
Load	**1/4**	**1/2**	**3/4**	**Full**	**¼**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**
US gph	31.7	56.8	81.9	102.5	29.5	51.8	75.1	95.3	29.5	51.8	75.1	95.3
L/hr	120	215	310	388	112	196	285	361	112	196	285	361

Engine

	Standby rating	**Prime rating**	**Data Center Continuous rating**
Engine manufacturer	Cummins Inc.		
Engine model	QSK38-G18		
Configuration	Cast iron, V12 cylinder		
Aspiration	Turbocharged and low temperature after-cooled		
Gross engine power output, kWm (bhp)	1659(2225)	~~1500 (2011)~~	~~1500 (2011)~~
BMEP at set rated load, kPa (psi)	5853 (849)	~~5240 (760)~~	~~5240 (760)~~
Bore, mm (in.)	159 (6.26)		
Stroke, mm (in.)	159 (6.26)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	9.54 (1878)		
Compression ratio	14.7:1		
Lube oil capacity, L (gal)	117 (30.9)		
Overspeed limit, rpm	2070		
Regenerative power, kW	124		

Fuel flow

Maximum return fuel flow, L/hr (US gph)	397 (105)
Maximum fuel inlet restriction, kPa (in Hg)	25 (7.4)
Maximum fuel inlet temperature, °C (°F)	70 (158)

Air

	Standby rating	Prime rating	Data Center Continuous rating
Combustion air, m^3/min (cfm)	125 (4408)	~~122 (4303)~~	~~122 (4303)~~
Maximum air cleaner restriction, kPa (in H_2O)	3.7 (15)		
Alternator cooling air, m^3/min (cfm)	195 (6886)		

Exhaust

Exhaust flow at set rated load, ft^3/min (L/sec)	10631 (5017)	~~10235 (4830)~~	~~10235 (4830)~~
Exhaust temperature, °C (°F)	499 (930)	~~486 (908)~~	~~486 (908)~~
Maximum back pressure, kPa (in Hg)	10.1 (3)		

Standard set-mounted radiator cooling

Ambient design, °C (°F)	40.0 (104)		
Fan load, kW_m (HP)	66 (88.5)		
Coolant capacity (with radiator), L (US gal)	272 (72)		
Cooling system air flow, m^3/min (cfm)	994.5 (35121)		
Total heat rejection, MJ/min (Btu/min)	64.4(61041)	~~59.31 (56215)~~	~~59.31 (56215)~~
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	33.8 (10)		

Optional set-mounted radiator cooling

Ambient design, °C (°F)	50.0 (122)		
Fan load, kW_m (HP)	73.5 (98.6)		
Coolant capacity (with radiator), L (US gal)	272 (72)		
Cooling system air flow, m^3/min (acfm)	1377 (48615)		
Total heat rejection, MJ/min (Btu/min)	64.4(61041)	59.31 (56215)	59.31 (56215)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction, kPa (in Hg)	33.8 (10)		

Notes:

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

Derating factors

Standby -	Standard cooling system: Full genset power available up to 1463 m (4800 ft) and ambient temperatures up to 40 °C (104 °F). Above these conditions, derate of 8% per 304.8 m (1000 ft) and 33.7% per 10 °C (50 °F). Enhanced cooling system: Full genset power available up to 671 m (2200 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate of 11% per 304.8 m (1000 ft) and 33.7% per 10 °C (50 °F).
Prime For Standby -	Standard cooling system: Full genset power available up to 1706.9 m (5600 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate of 4% per 304.8 m (1000 ft) and 34.6% per 10 °C (50 °F). Enhanced cooling system: Full genset power available up to 853.4 m (2800 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate of 4% per 304.8 m (1000 ft) and 34.6% per 10 °C (50 °F).
Data Center Continuous -	Standard cooling system: Full genset power available up to 1706.9 m (5600 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate of 4% per 304.8 m (1000 ft) and 34.6% per 10 °C (50 °F). Enhanced cooling system: Full genset power available up to 853.4 m (2800 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate of 4% per 304.8 m (1000 ft) and 34.6% per 10 °C (50 °F).

Ratings definitions

Emergency Standby Power (ESP):	**Prime Power (PRP):**
Applicable for supplying power to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, 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 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, Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550

Formulas for calculating full load currents:

Three phase output

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

Single phase output

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

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

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

Centum™ SERIES GENERATORS

Our energy working for you.™

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)	440 (312)	480 (312)
163° C rise ratings	@ 27° C	kW	1620	1520	1556	1620
		kVA	2025	1900	1945	2025
150° C rise ratings	@ 40° C	kW	1580	1485	1515	1580
		kVA	1975	1856	1894	1975
125° C rise ratings	@ 40° C	kW	1515	1425	1455	1515
		kVA	1894	1781	1819	1894
105° C rise ratings	@ 40° C	kW	1410	1325	1355	1410
		kVA	1762	1656	1694	1762
80° C rise ratings	@ 40° C	kW	1300	1225	1255	1300
		kVA	1625	1531	1569	1625

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

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

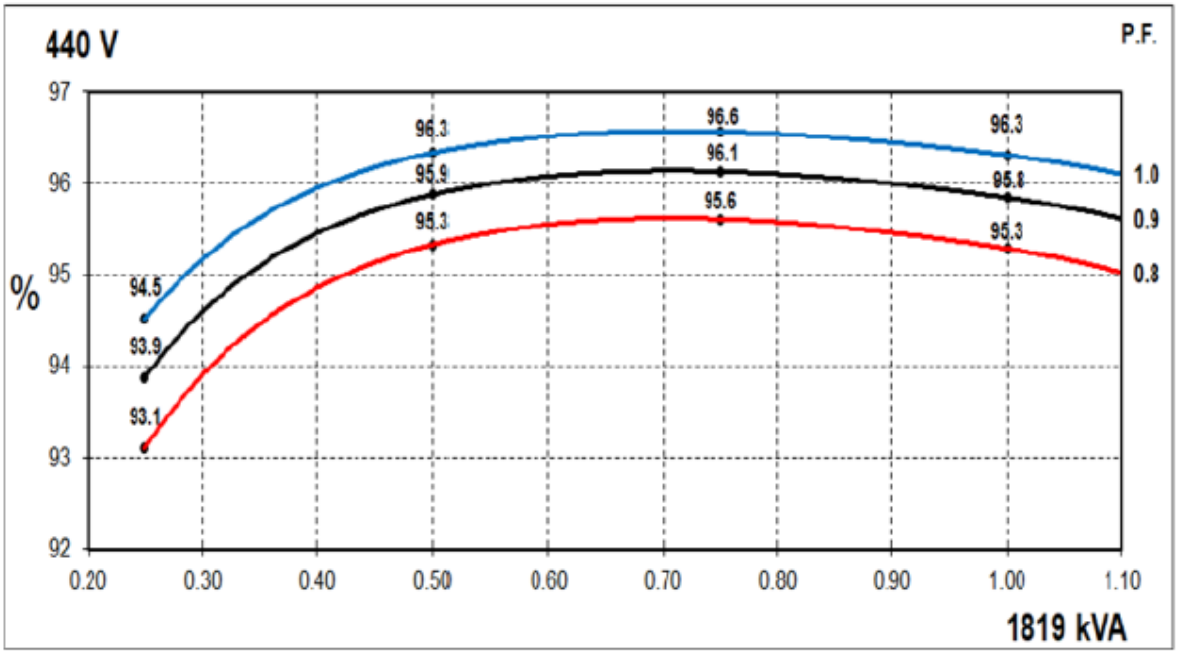
Time constants (sec)	600 (07)	380 (13)	440 (312)	480 (312)
Transient	0.167	0.164	0.155	0.155
Subtransient	0.018	0.019	0.0177	0.0177
Open circuit	4.17	3.93	4.05	4.05
DC	0.031	0.026	0.036	0.036

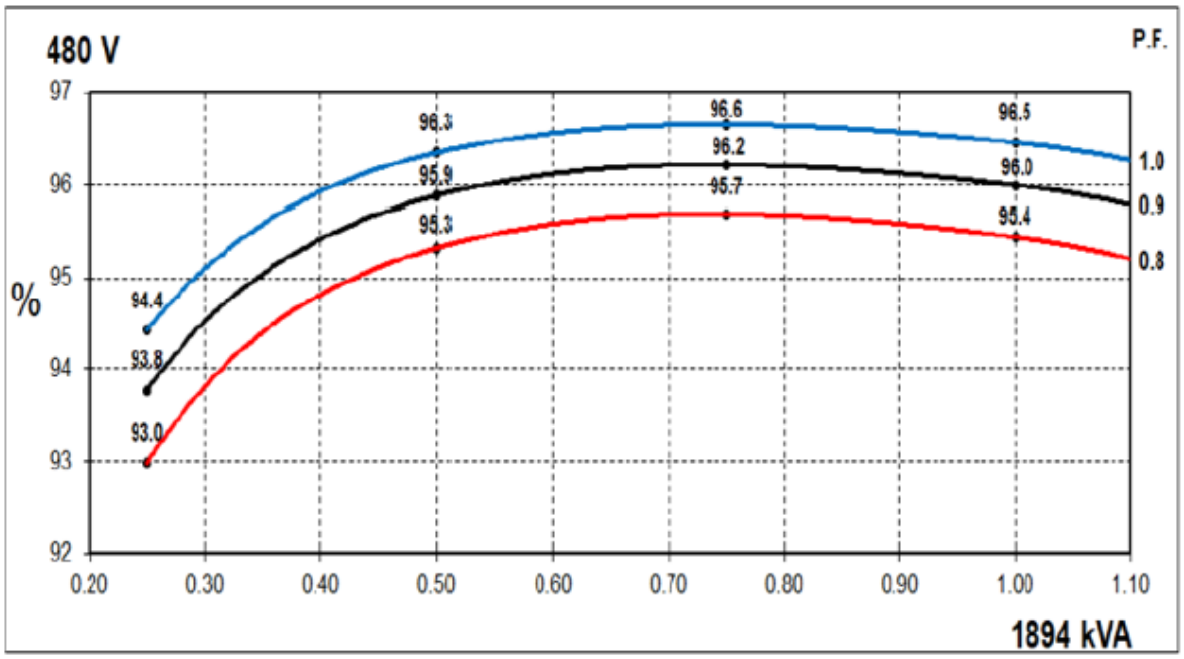
Windings (@22° C)		600 (07)	380 (13)	440 (312)	480 (312)
Stator resistance	(L-L Ohms)	0.0032	0.0014	0.0024	0.0024
Rotor resistance	(Ohms)	1.710	1.710	1.710	1.710
Number of leads		6	6	6	6

S7L1D-C4 Wdg.312

THREE PHASE EFFICIENCY CURVES

60Hz

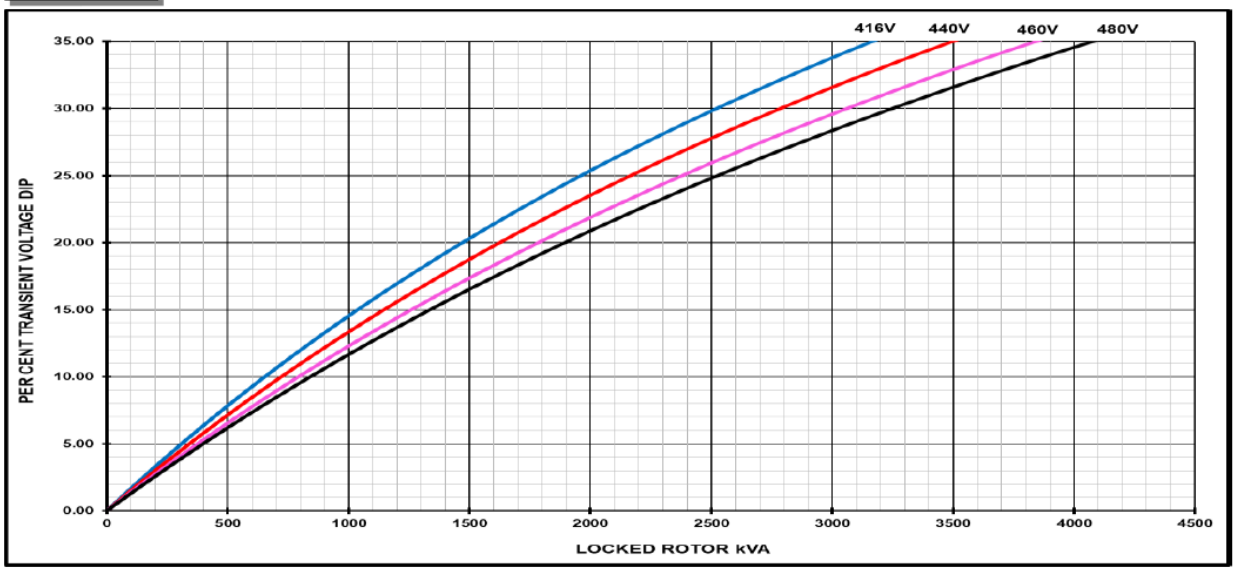




S7L1D-C4 Wdg.312

Locked Rotor Motor Starting Curves - Separately Excited

60Hz

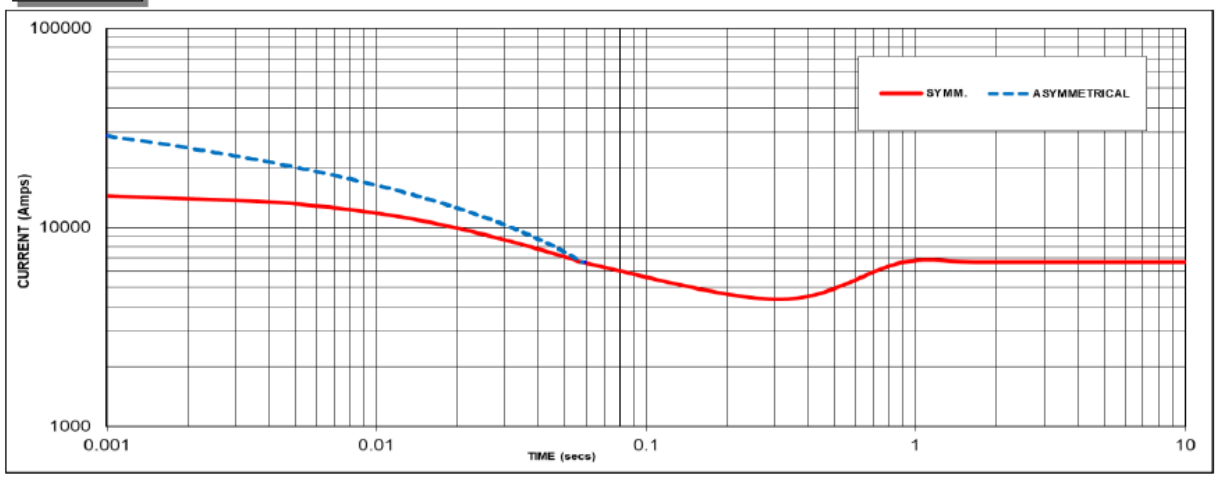


Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

S7L1D-C4 Wdg.312

Three-phase Short Circuit Decrement Curve - Separately Excited

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

Sound Data
C1500D6E
QSK38-G18 60Hz Diesel

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

See notes 2, 5 and 7-11 listed below

Configuration	Exhaust	Applied Load	Position (Note 2)								8 Position Average
			1	2	3	4	5	6	7	8	
Standard – Unhoused with 50°C Cooling Package	Infinite Exhaust	0% Prime	88.8	93.6	92.7	94.5	94.5	97.0	95.0	92.7	94.1
		75% Prime	89.5	94.4	93.9	95.1	93.6	96.6	95.3	93.4	94.4
		100% Prime	89.8	95.2	95.3	96.1	93.5	96.7	95.4	93.7	94.9
		100% Standby	90.2	95.5	95.2	96.3	93.8	96.8	95.8	94.0	95.1

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

See notes 1, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)										Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused with 50°C Cooling Package	Infinite Exhaust	0% Prime	N/A	55.5	65.2	91.8	91.5	96.6	96.3	94.3	91.6	84.0	76.3	102.1
		75% Prime	N/A	56.4	67.0	91.3	92.0	96.8	96.1	94.6	92.5	89.1	76.3	102.4
		100% Prime	N/A	55.8	67.1	91.2	92.6	96.9	96.2	94.8	93.1	90.7	77.4	102.7
		100% Standby	N/A	55.9	67.2	91.3	93.0	97.0	96.4	95.0	93.5	91.2	77.9	102.9

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

See notes 1, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)										Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused with 50°C Cooling Package	Infinite Exhaust	100% Prime	N/A	61.5	71.0	87.5	89.9	92.3	92.3	88.9	86.4	81.5	67.4	98.0
		100% Standby	N/A	61.6	70.6	87.7	90.7	92.6	92.8	89.4	87.1	82.4	68.3	98.5

A-weighted Sound Power Level, dB(A)

See notes 1, 3 and 6-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)										Overall Sound Power Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused with 50°C Cooling Package	Infinite Exhaust	0% Prime	N/A	75.8	85.5	112.1	111.8	117.0	116.6	114.7	111.9	104.3	93.6	122.4
		75% Prime	N/A	76.7	87.3	111.6	112.4	117.1	116.4	114.9	112.8	109.5	96.6	122.7
		100% Prime	N/A	76.2	87.4	111.5	113.0	117.2	116.5	115.1	113.4	111.0	97.7	123.0
		100% Standby	N/A	76.2	87.5	111.7	113.3	117.3	116.7	115.3	113.8	111.5	98.2	123.2

Exhaust Sound Power Level, dB(A)

See notes 4 and 6-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Open Exhaust (Unhoused with 50°C Cooling Package)	With Tail Pipe	0% Prime	N/A	48.9	98.1	107.2	108.9	108.4	106.4	109.3	100.4	93.8	82.7	115.4
		75% Prime	N/A	61.6	118.3	126.1	131.3	130.4	126.0	123.5	119.7	112.9	100.6	135.5
		100% Prime	N/A	60.4	112.6	127.7	132.7	131.6	128.6	125.8	122.6	116.6	103.7	137.2
		100% Standby	N/A	62.4	113.1	127.6	132.5	132.1	129.1	126.2	123.4	117.8	104.9	137.4

Global Notes:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter-clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements..
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa.
6. Reference Sound Power Level is 1 pW (10^{-12} Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Published sound levels are measured at CE certified test site and are subject to instrumentation, measurement, installation and manufacturing variability.
10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind.
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosures installed over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.
12. Published sound levels meet the requirements India's Central Pollution Control Board (Ministry of Environment & Forests),vide GSR 371 (E), which states the A-weighted sound level at1meter from any diesel generator set up to a power output rating of 1000kVA shall not exceed 75dB(A)
13. For updated noise pollution information for India see website: http://www.envfor.nic.in/legis/legis.html
14. Sound levels must meet India's Ambient Air Noise Quality Standards detailed for Daytime/Night-time operation in Noise Pollution (Regulation and Control) Rules, 2000
15. Operator Location is near genset control panel and is at 1 meter distance from genset control panel and at 1.6 meter height.

Data Sheet

Circuit Breakers

Description

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

Applicable Models

Engine	Models			
QSK23-G7	DQCA	DQCB	DQCC	
QST30-G5	DQFAA	DQFAB	DQFAC	DQFAD
QST30-G17	DQFAH			
QSK38-G17	C1250D6E			
QSK38-G18	C1250D6E	C1500D6E		
QSK50-G5	DQGAE	DQGAF		
QSK50-G4	DQGAA	DQGAB		
QSK50-G8	DQGAS			
QSK60-G6	DQKAA	DQKAB	DQKAD	DQKAE
QSK60-G14	DQKAF			
QSK60-G17	DQKAM			

Instructions

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

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

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

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

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

https://www.se.com/us/en/work/support/contacts.jsp

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

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

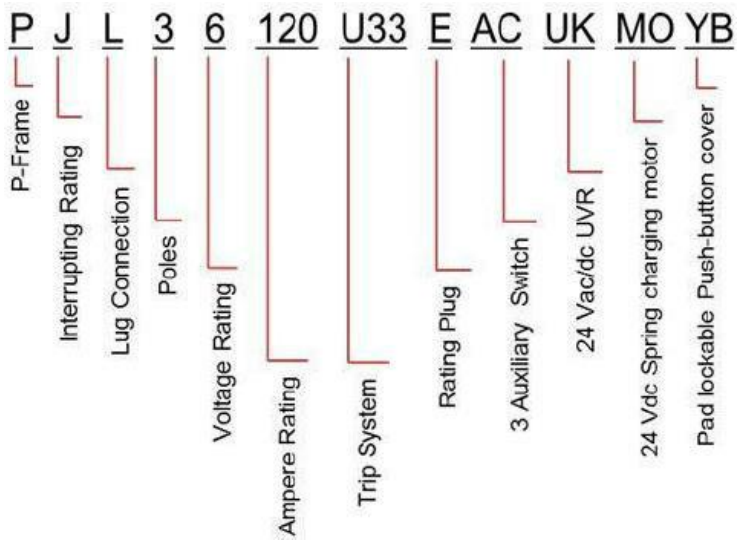
*If the first 3 letters are “PJP,” the search will not work. You will need to start with just “PJ” and use the description pages to obtain the information you are looking for on the “PJP.”

Example

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

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

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



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

Mechanically operated breakers							
Feature Code	Breaker box description	Cummins part #	Engine	Manufacturer	Breaker catalog number	Trip unit	Plug type
KP82-2	CB-2500, Right,3P, UL600, IEC 415, UL Serv Ent, 100%	0320-2164-01	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36250U31F	MicroLogic 3.0 LI	F
		A054K364	QSK19-G8, QSK23-G7, QSK38-G17, QSK38-G18		RLF36250U33F	MicroLogic 5.0 LSI	
KP83-2	CB-2500A, Left, 3P, 600, IEC 415, UL Serv Ent, 100%	0320-2164-01	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36250U31F	MicroLogic 3.0 LI	F
		A054K364	QSK19-G8, QSK23-G7, QSK38-G17, QSK38-G18		RLF36250U33F	MicroLogic 5.0 LSI	
KP84-2	CB-2000, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	0320-2164-02	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36200U31F	MicroLogic 3.0 LI	F
		A054K366	QSK19-G8, QSK23-G7, QSK38-G17, QSK38-G18		RLF36200U33F	MicroLogic 5.0 LSI	
KP85-2	CB-2000, Left,3P, UL 600, IEC 415, UL Serv Ent, 100%	0320-2164-02	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18	Schneider Electric	RLF36200U31F	MicroLogic 3.0 LI	F
		A054K366	QSK19-G8, QSK23-G7, QSK38-G17, QSK38-G18		RLF36200U33F	MicroLogic 5.0 LSI	
KP86-2	CB-1600A, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	A065A939	QSK38-G17, QSK38-G18	Schneider Electric	RJF3616OU33A	MicroLogic 5.0 LSI	F
		0320-2164-03	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, 50L, 60L, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		RLF36160U31F	MicroLogic 3.0 LI	
		A054K368	QSK19-G8, QSK23-G7		RLF36160U33F	MicroLogic 5.0 LSI	
KP87-2	CB-1600, Left,3P, UL 600, IEC 415, UL Serv Ent 100%	A065A939	QSK38-G17, QSK38-G18	Schneider Electric	RJF36160U33A	MicroLogic 5.0 LSI	F
		0320-2164-03	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		RLF36160U31F	MicroLogic 3.0 LI	
		A054K368	QSK19-G8, QSK23-G7		RLF36160U33F	MicroLogic 5.0 LSI	
KP88-2	CB-1200, Right, 3P, UL 600, IEC 415, UL Serv Ent, 100%	A065A772	QSK38-G17, QSK38-G18	Schneider Electric	PJF36120U33A	MicroLogic 5.0 LSI	E
		0320-2183	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		PJP36120U31E	MicroLogic 3.0 LI	
		A054K408	QSK19-G8, QSK23-G7		PJP36120U33F	MicroLogic 5.0 LSI	
KP89-2	CB-1200, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	A065A772	QSK38-G17, QSK38-G18	Schneider Electric	PJF36120U33A	MicroLogic 5.0 LSI	E
		0320-2183	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		PJP36120U31E	MicroLogic 3.0 LI	
		A054K408	QSK19-G8, QSK23-G7		PJP36120U33F	MicroLogic 5.0 LSI	
KP90-2	CB-800A, Right, 3P, UL 600, IEC 415, UL Serv Ent 100%	A065A767	QSK38-G17, QSK38-G18	Schneider Electric	PJF36080U33A	MicroLogic 5.0 LSI	F
		0320-2182	QST30-G5, 30L, QSK50-G4, QSK50-G5, QSK50-G7, QSK60-G6, QSK60-G11 QSK60-G14, QSK60-G18		PJP36080U31F	MicroLogic 3.0 LI	
		A054K405	QSK19-G8, QSK23-G7		PJP36080U33F	MicroLogic 5.0 LSI	
KP91-2	CB-800A, Left, 3P, UL 600, IEC 415, UL Serv Ent, 100%	A065A767	QSK38-G17, QSK38-G18	Schneider Electric	PJF36080U33A	MicroLogic 5.0 LSI	F

2023 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:	PCEXL050.AAD-033
Effective Date:	06/15/2022
Date Issued:	06/15/2022
EPA Diesel Engine Family:	PCEXL050.AAD

Engine Information:

Model:	QSK38-G18	Bore:	6.26 in. (159 mm)
Engine Nameplate HP:	1225	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.

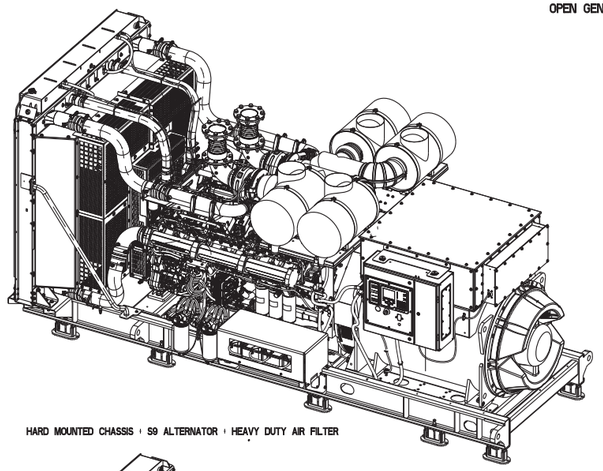
Diesel fuel specifications: 40-50 Cetane number, ASTM D975 No. 2-D, 300-500 ppm Sulfur

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.

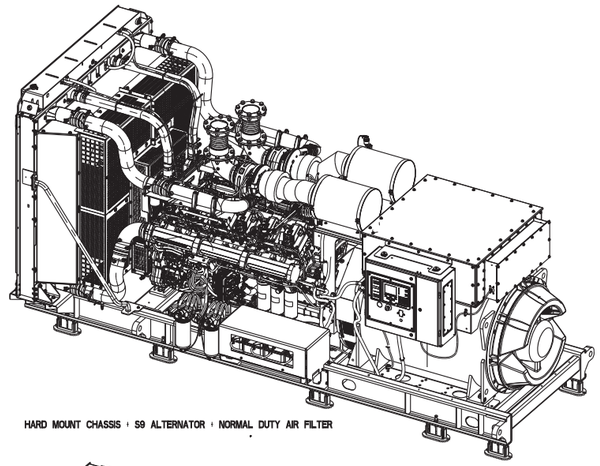
Cummins Sales and Service

Section III

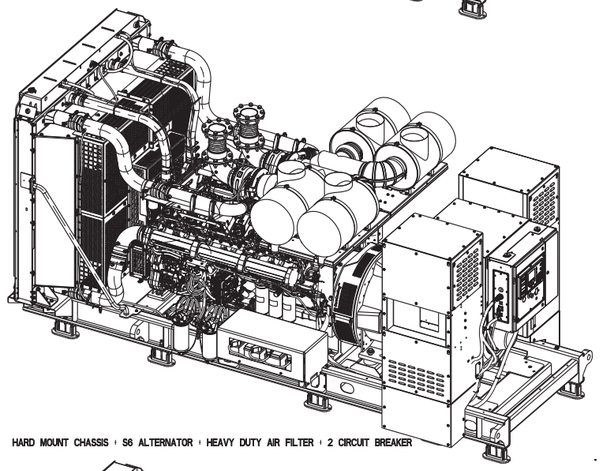


HARD MOUNTED CHASSIS + S9 ALTERNATOR + HEAVY DUTY AIR FILTER

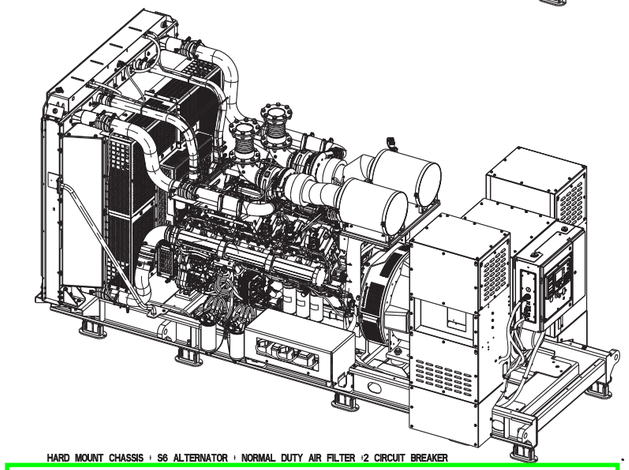
OPEN GENERATOR- EXTERNAL ISOLATORS
(ANTI VIBRATION MOUNTS
UNDER CHASSIS)



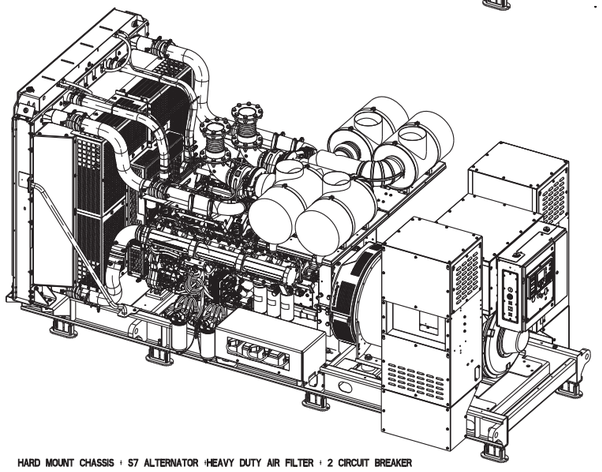
HARD MOUNT CHASSIS + S9 ALTERNATOR + NORMAL DUTY AIR FILTER



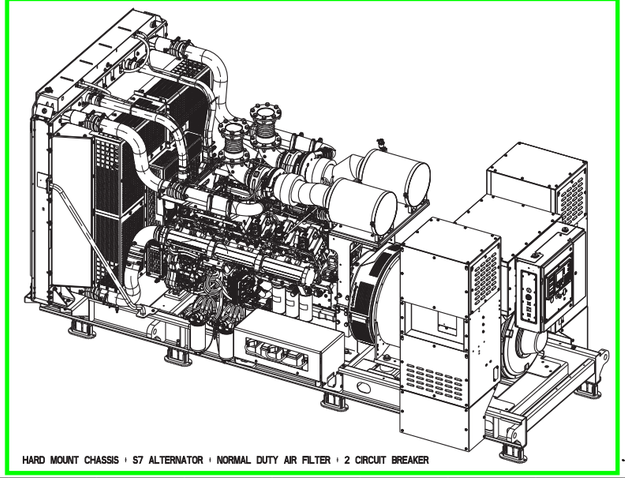
HARD MOUNT CHASSIS + S6 ALTERNATOR + HEAVY DUTY AIR FILTER + 2 CIRCUIT BREAKER



HARD MOUNT CHASSIS + S6 ALTERNATOR + NORMAL DUTY AIR FILTER +2 CIRCUIT BREAKER



HARD MOUNT CHASSIS + S7 ALTERNATOR +HEAVY DUTY AIR FILTER + 2 CIRCUIT BREAKER



HARD MOUNT CHASSIS + S7 ALTERNATOR + NORMAL DUTY AIR FILTER + 2 CIRCUIT BREAKER

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.

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

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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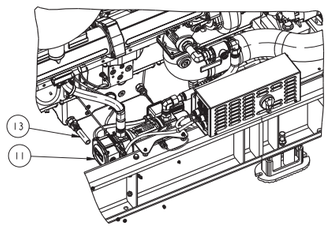
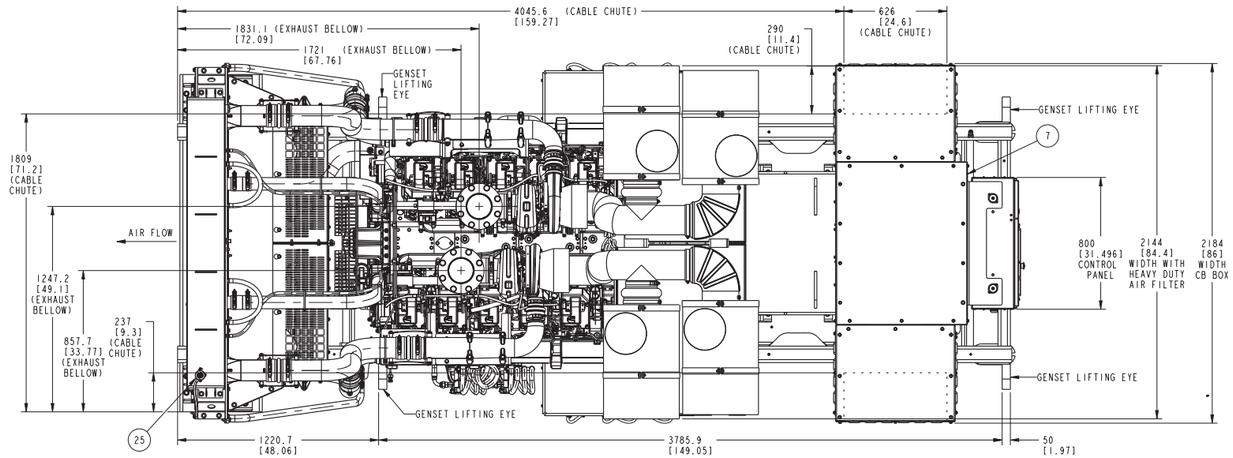
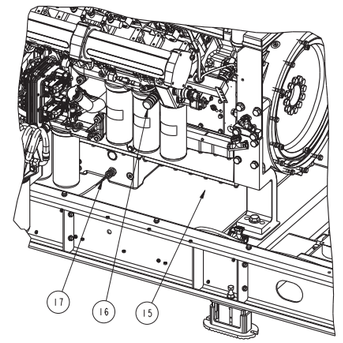


VIEW FROM **E**
SCALE 1/8





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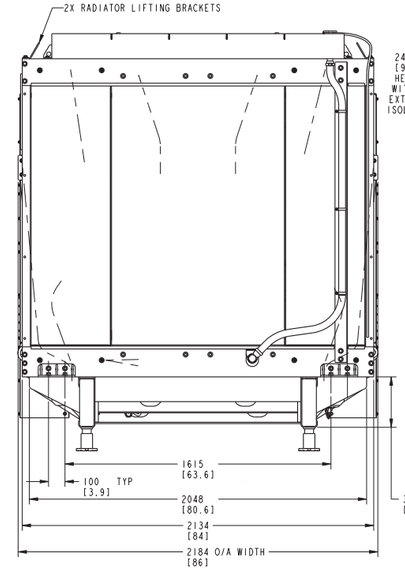
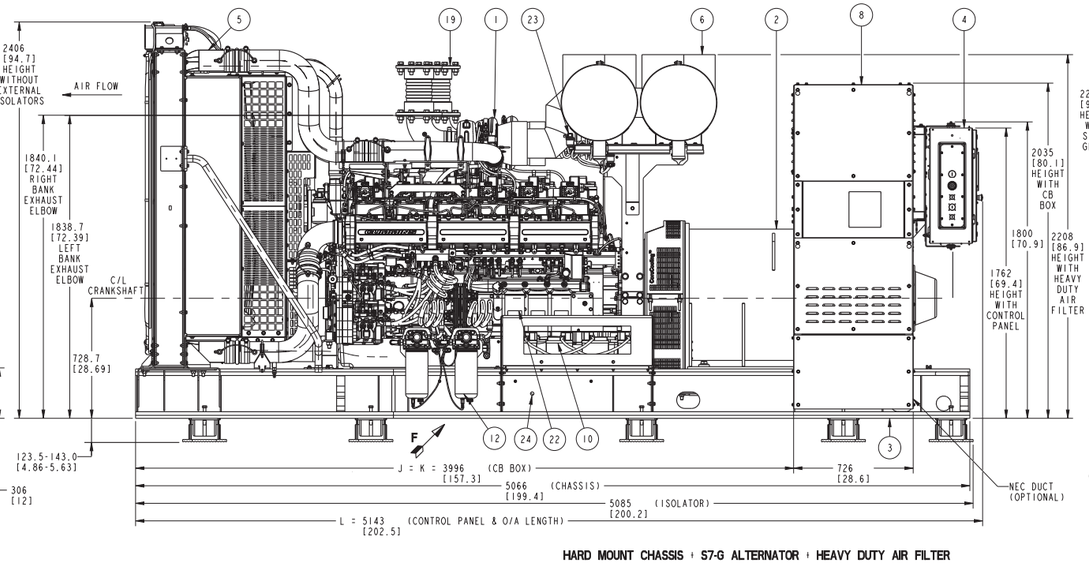
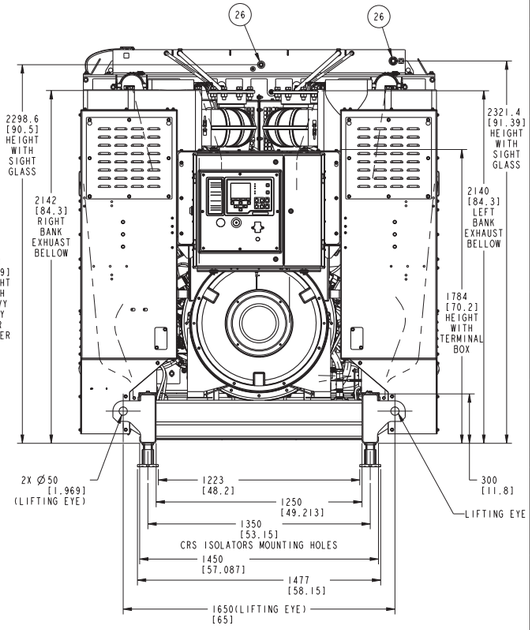
SCALE 1/8



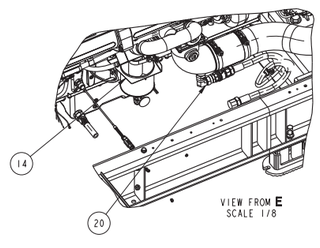
RADIATOR END VIEW



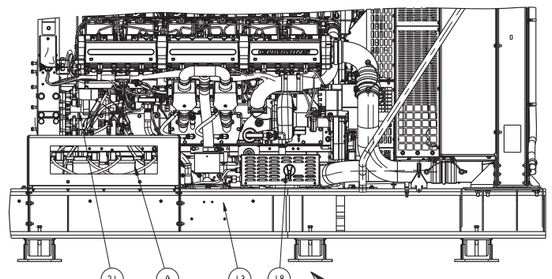
HARD MOUNT CHASSIS ı S7-G ALTERNATOR ı HEAVY DUTY AIR FILTER



CONTROL PANEL END VIEW



VIEW FROM **E**
SCALE 1/8



LEFT HAND SIDE GENSET VIEW

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

QTY	FIND NO.	DESCRIPTION
1	27	CRANK CASE VENTILATION
2	26	COOLANT LEVEL GAUGE
1	25	RADIATOR FILL POINT
1	24	LUBE OIL FILL POINT
1	23	AIR RESTRICTION INDICATOR
3	22	LUBE OIL FILTER
2	21	STARTER MOTOR
1	20	COOLANT DRAIN
2	19	EXHAUST BELLOWS
1	18	HEATER CONTROL BOX

QTY	FIND NO.	DESCRIPTION
1	17	OIL HEATER
1	16	OIL SAMPLING VALVE
1	15	ENGINE LUBE OIL LEVEL MAINTAINER
1	14	OIL DRIP CAN
1	13	OIL DRAIN VALVE
2	12	FUEL WATER SEPARATOR
1	11	COOLANT HEATER
4	10	REDUNDANT STARTER BATTER/TRAY OPTION
4	9	STANDARD STARTER BATTERY/TRAY OPTION
1	8	CIRCUIT BREAKER BOX
1	7	TERMINAL BOX
4	6	AIR FILTER
1	5	COOLING SYSTEM
1	4	CONTROL PANEL
1	3	BEDFRAME-HARD MOUNT
1	2	ALTERNATOR-S7H
1	1	ENGINE-QSK38 BUTTERFLY

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

Cummins Inc.

CAD SYSTEM PTC® Creo® Parametric

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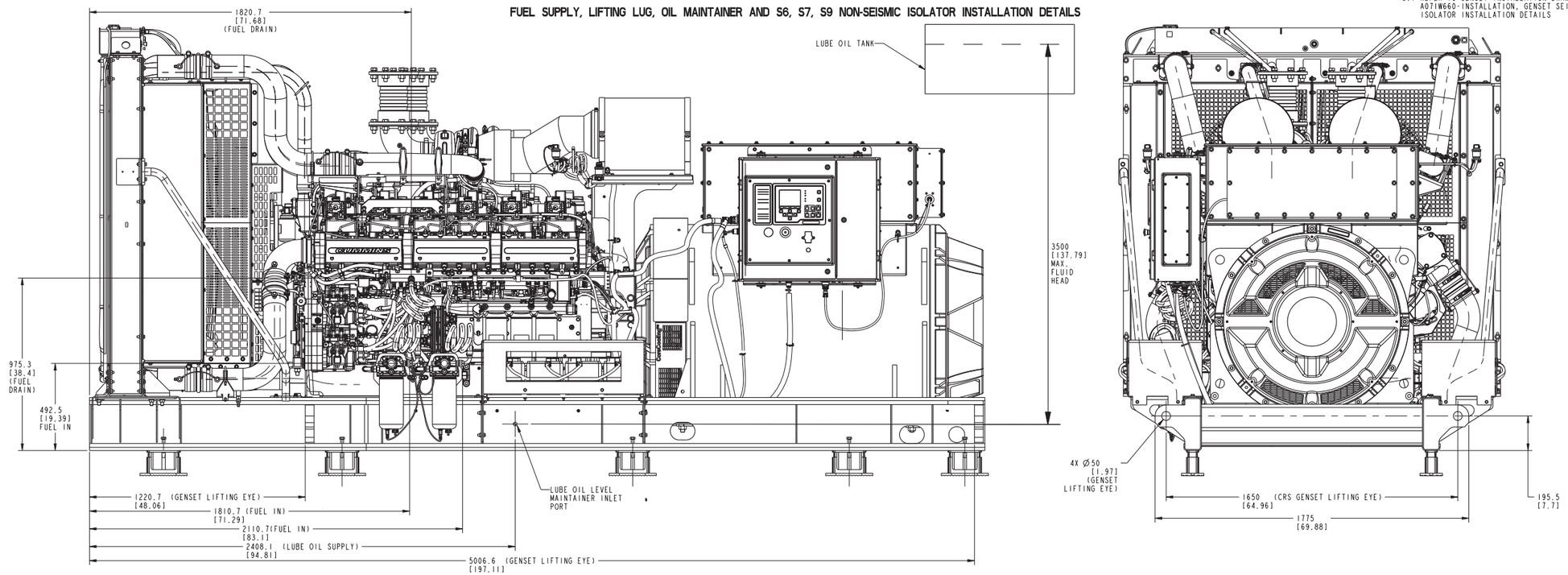
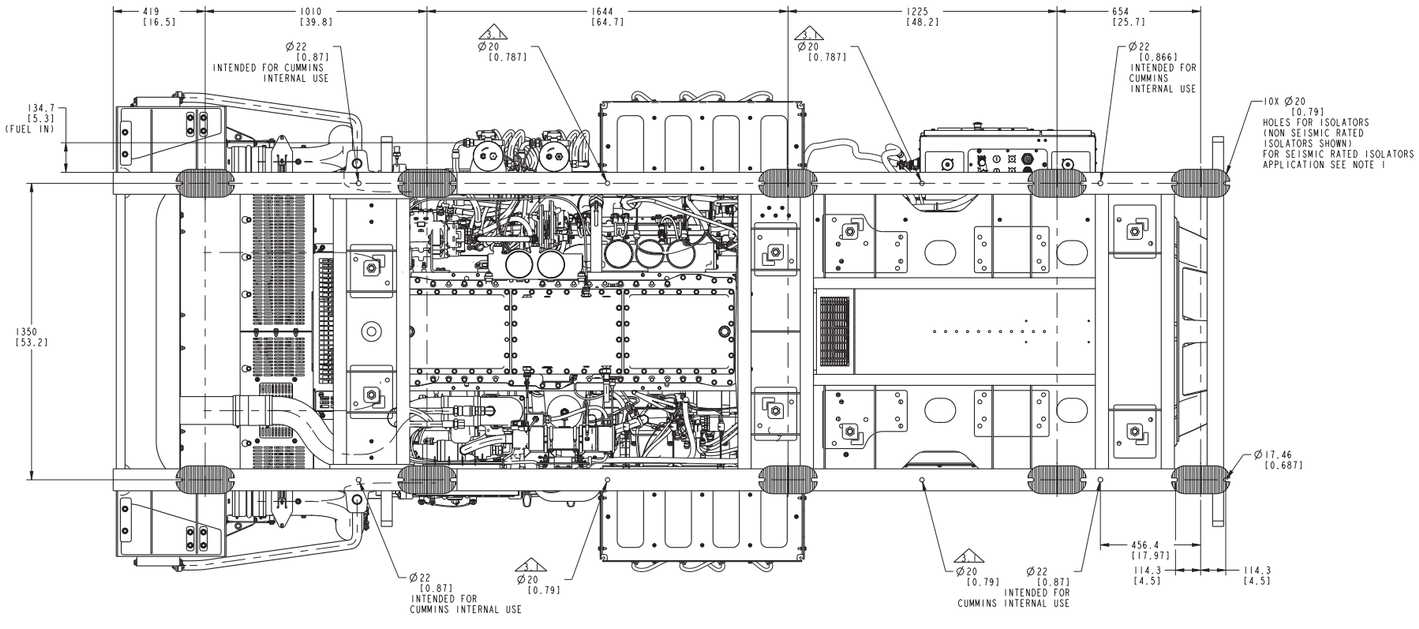
Part Number: **A062V279** Part Revision: **C**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released**

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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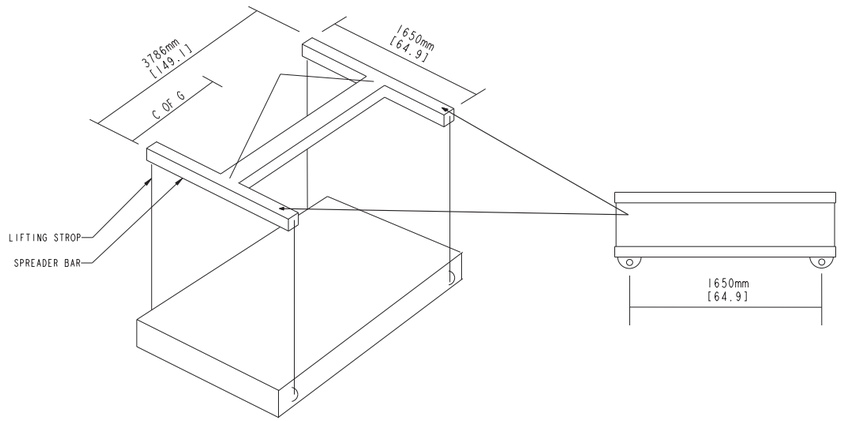
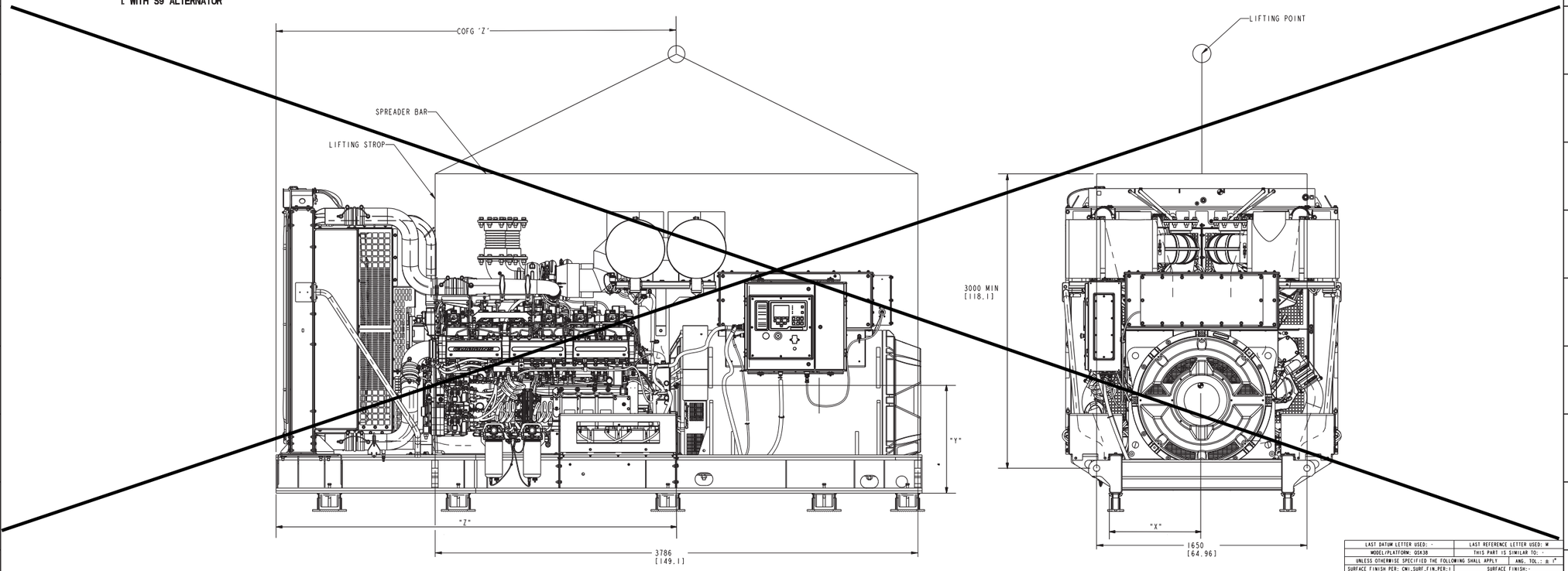
LIFTING ARRANGEMENT FOR GENSET

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 RAD1: -	FILLET RAD1:-
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.: +0.25/-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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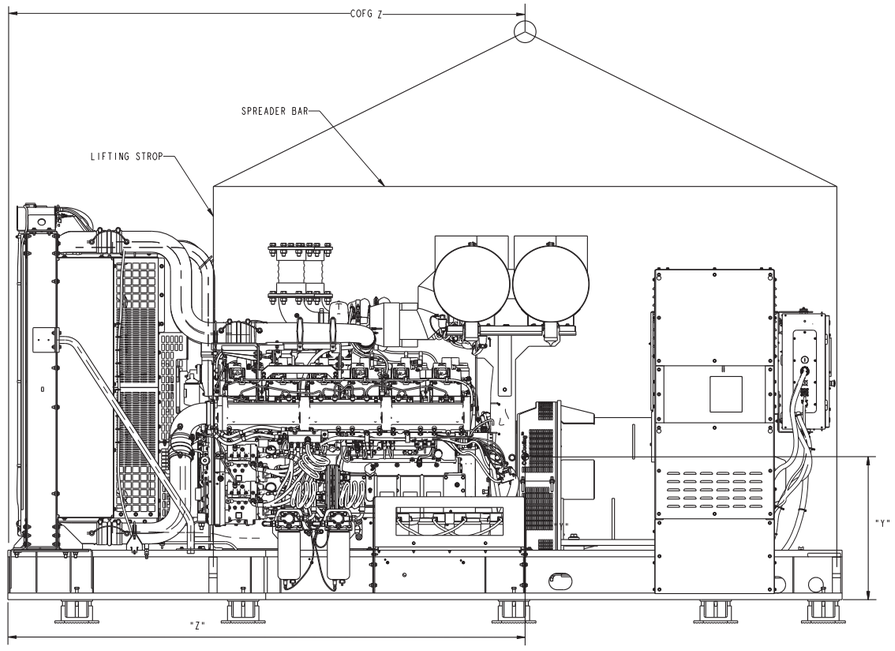
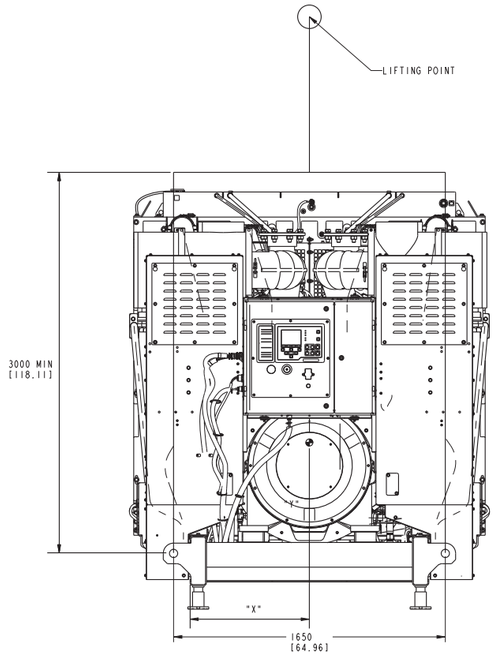
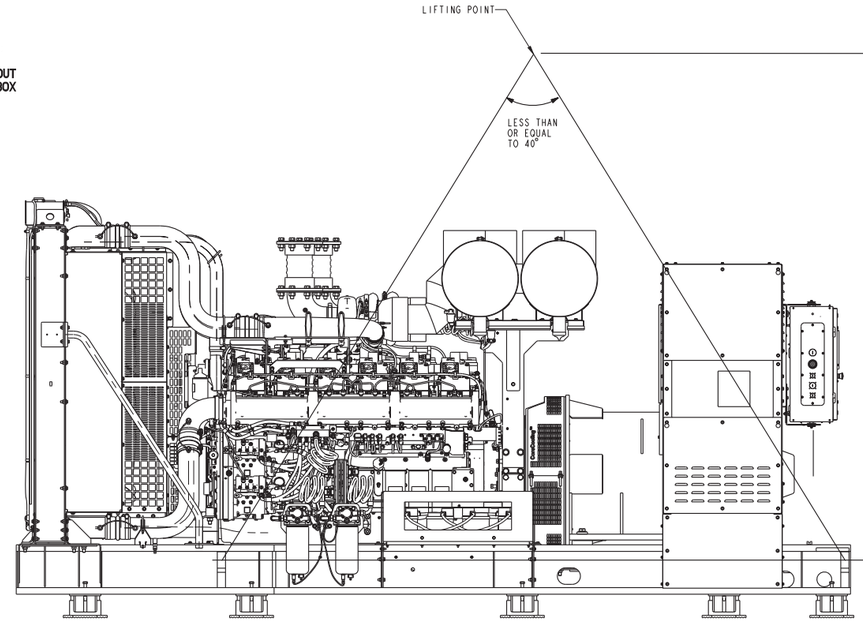
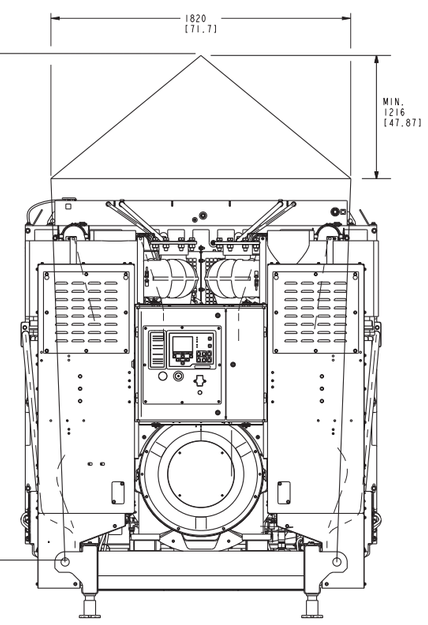
PARALLEL LIFT :
FOR S6 & S7
ALTERNATOR
CONFIGURATION





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

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

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 ISLOATORS)	X	Y	Z
QSK38	S6-H	NORMAL DUTY	2 CB	10243	22582	9753	21502	5085	2184	2406	724.26	853.11	2656.89
			1 CB	9965	21969	9475	20889				702.90	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	864.73	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	[illegible]	22056	9515	20976				694.58	856.66	2606.48
			NO CB	9636	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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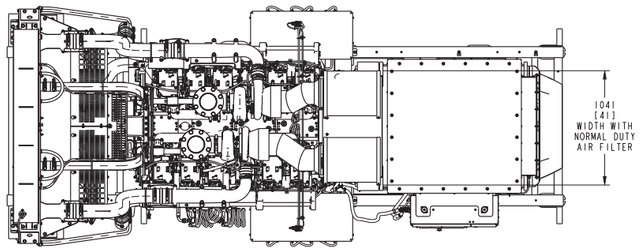
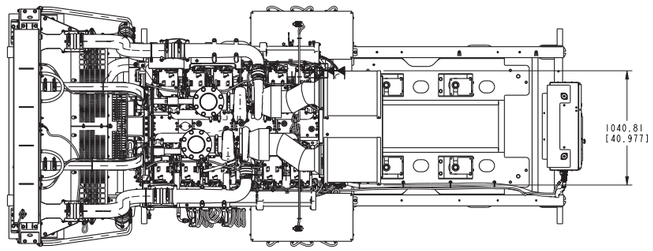
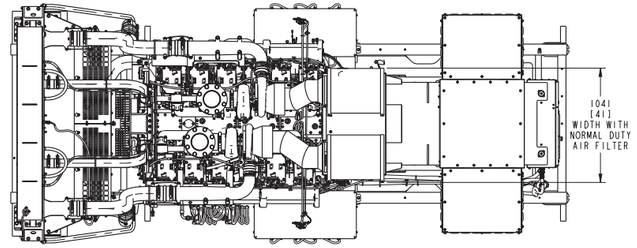
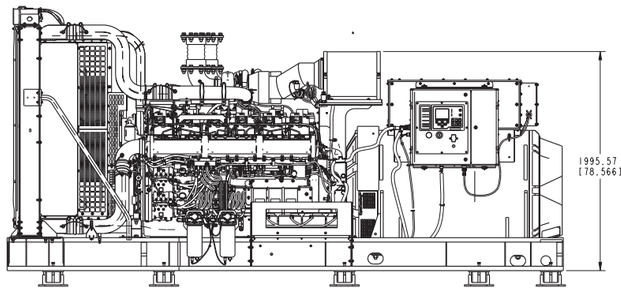


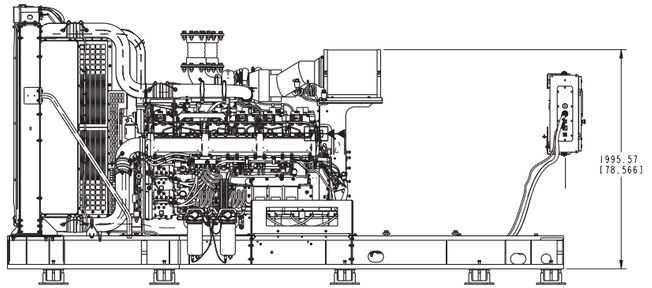


NOTES:
4.1.GENSET DRAGGING CHAIN ATTACHMENT FEATURE.THIS FEATURE CAN BE USED TO ASSIST IN THE EXTRACTION OF THE GENSET FROM AN ISO SHIPPING CONTAINER.FRICTION REDUCING SLIDER PUCKS MUST BE PRESENT AND INTACT BETWEEN THE CHASSIS AND CONTAINER FLOOR BEFORE AND DURING DRAGGING. MAXIMUM DRAGGING DISTANCE 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.

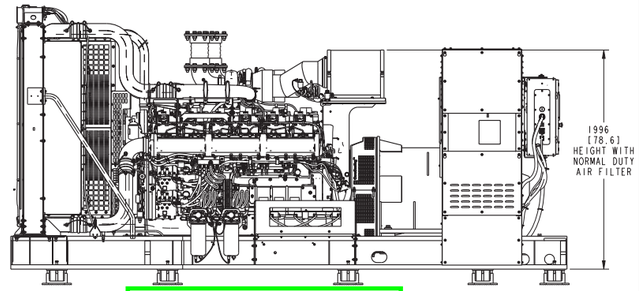




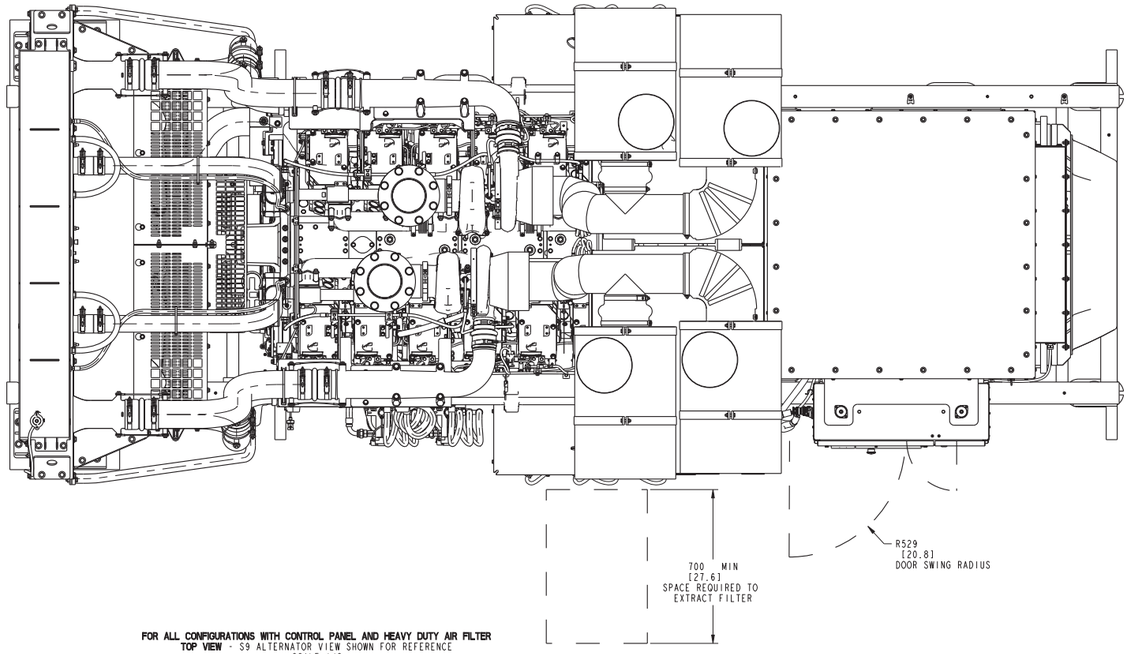
S9 ALTERNATOR + NORMAL DUTY AIR FILTER



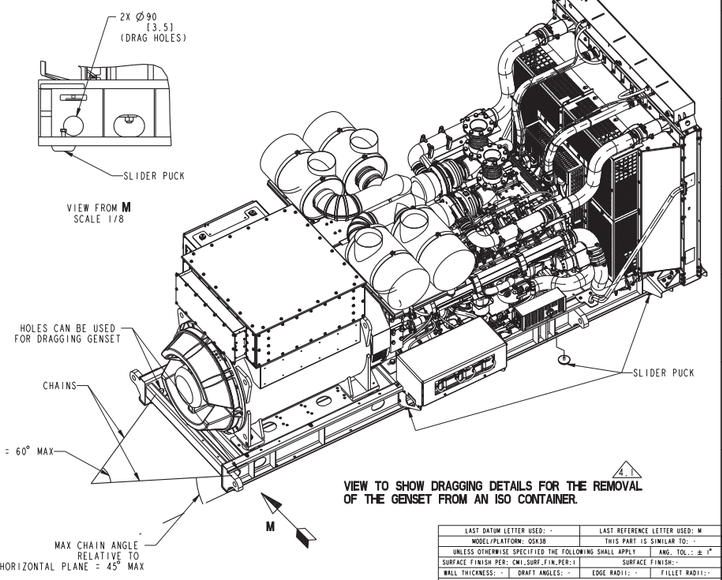
S6-H ALTERNATOR + NORMAL DUTY AIR FILTER



S7-H 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



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

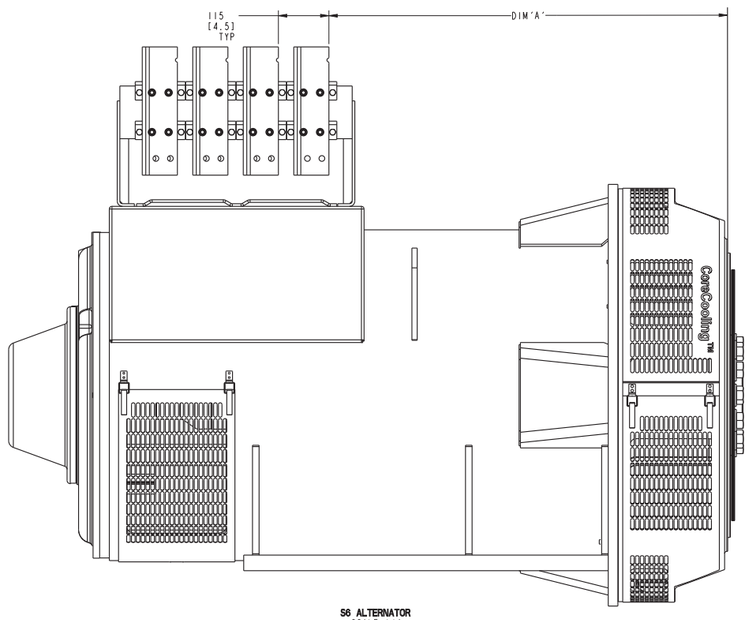
LAST DATUM LETTER USED: -	LAST REFERENCE LETTER USED: M
MODEL/PLATFORM: QSK38	THIS PART IS SIMILAR TO: -
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY	ANG. TOL.: ± 1°
SURFACE FINISH PER: CMI.SURF.FIN.PER.:	SURFACE FINISH: -
WALL THICKNESS: - DRAFT ANGLES: -	EDGE RADII: - FILLET RADII: -
DIMENSIONAL 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.

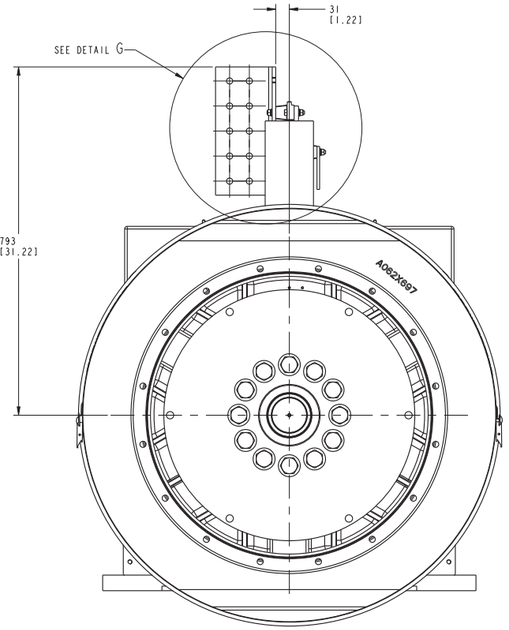
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES
SIZE: A0 SCALE: 1:16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM PTC® Creo® Parametric

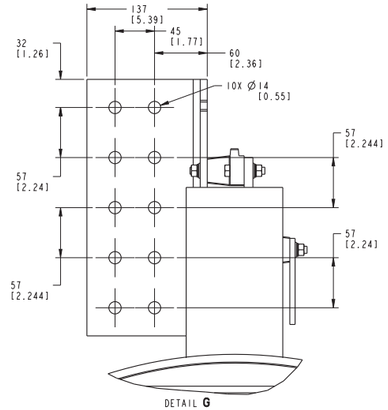
Document Generated: **04AUG2022 10:30 GMT**

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



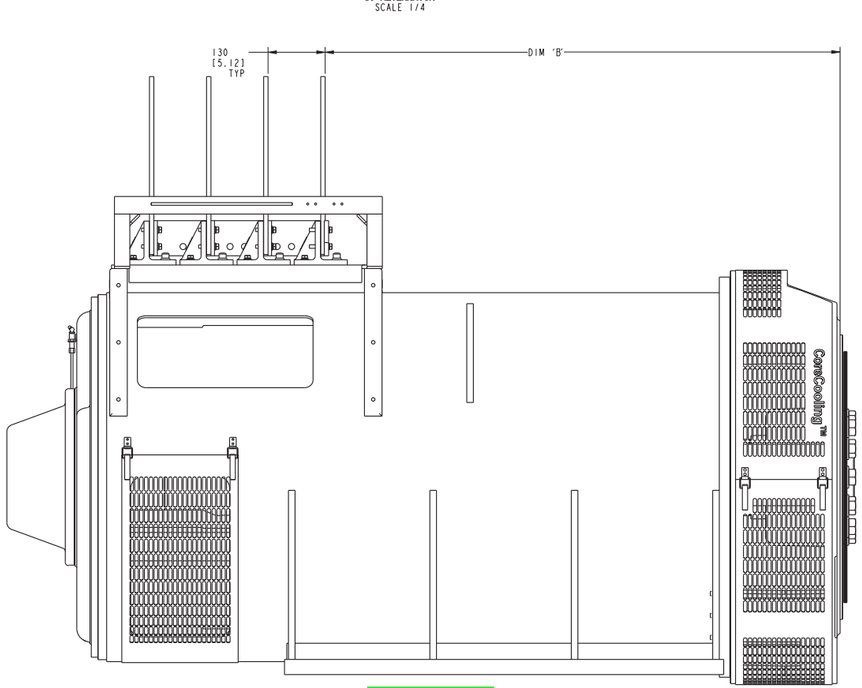
S6 ALTERNATOR
SCALE 1/4



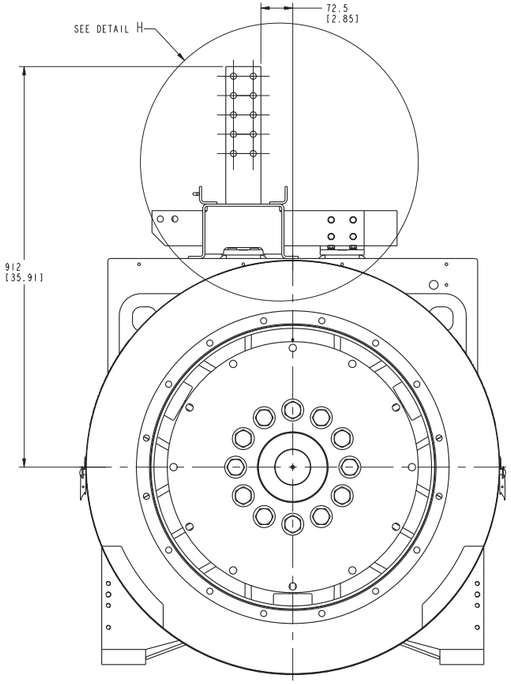


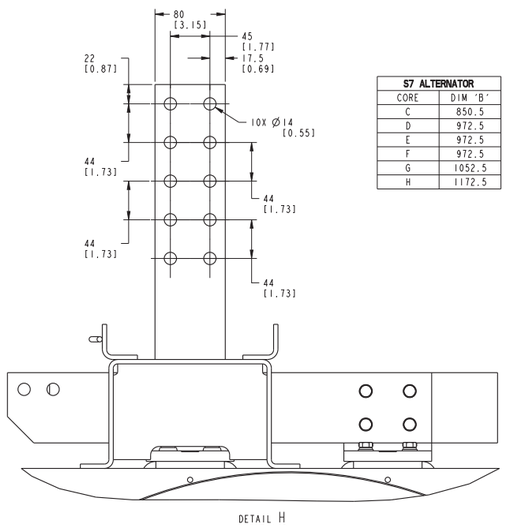
DETAIL G
SCALE 1/2

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



S7 ALTERNATOR
SCALE 1/4





DETAIL H
SCALE 1/2

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

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

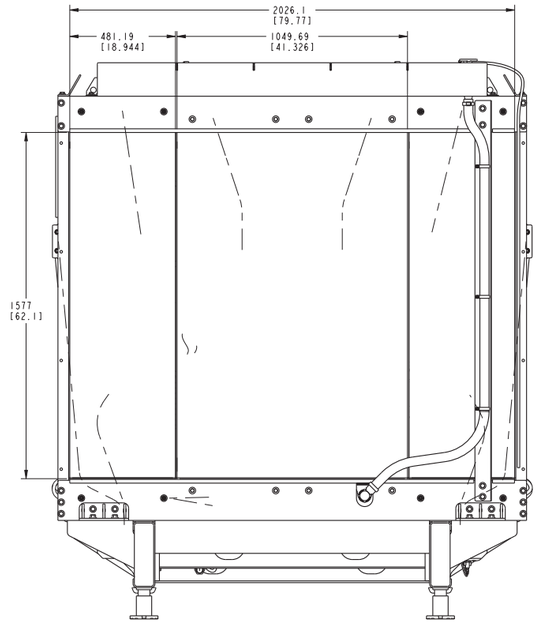
Document Generated: **04AUG2022 10:30 GMT**

Part Number: **A062V279** Part Revision: **C**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Outline** State: **Released** Sheet **10** of **13**

NOTES

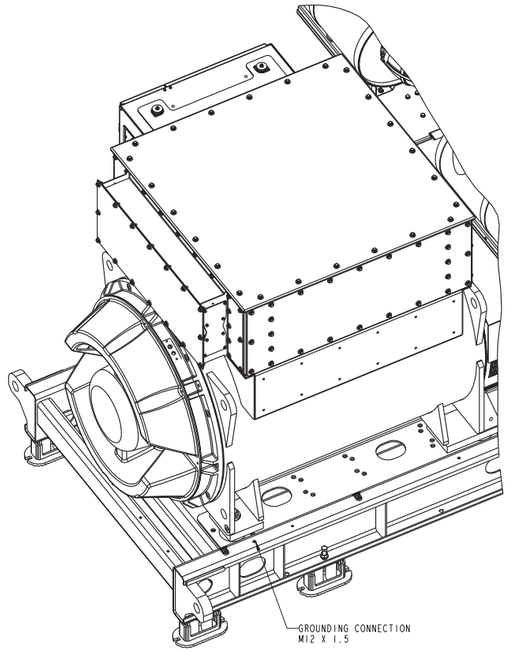
1. FOR CUSTOMER ELECTRICAL INTERFACE FOR CONTROL PANEL REFER DRAWING NO. A064G590 AND FOR WIRING DRAWING REFER A065D445.
2. FOR CUTOMER ELECTRICAL INTERFACE FOR HEATER DISTRIBUTION BOX REFER DRAWING NO. A065L523 AND FOR WIRING DRAWING REFER A065K535.

CORE DETAILS FOR DUCTING



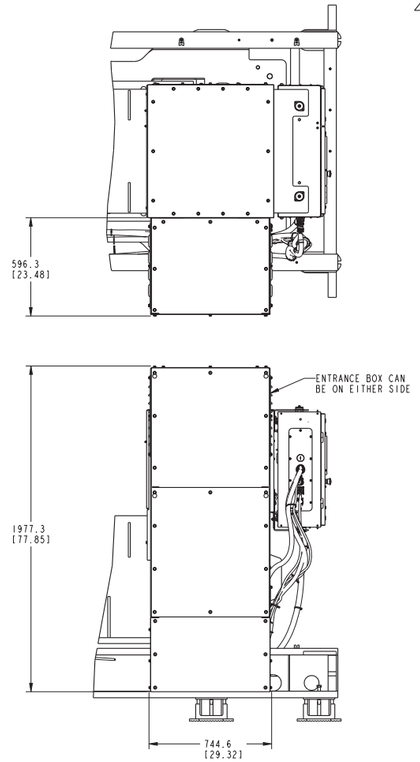
REAR VIEW
SCALE 1/8

GROUNDING CONNECTION DETAILS



SCALE 1/8

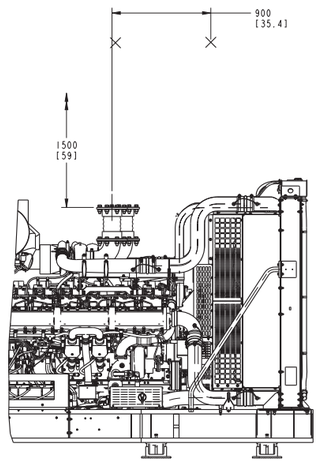
ENTRANCE BOX DETAILS



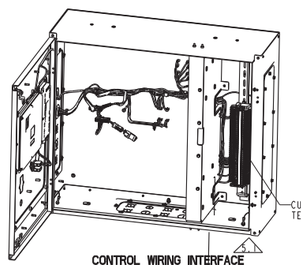
GENSET LEFT SIDE VIEW
SCALE 3/32

DETAILS FOR EXHAUST SYSTEM UNSUPPORTED LENGTH

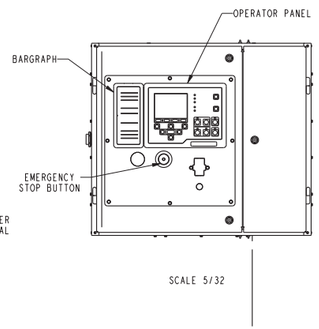
1. UNSUPPORTED LENGTH NOT TO BE MORE THAN 1500MM IN AXIAL DIRECTION AND 900MM IN LATERAL DIRECTION
2. MAXIMUM ALLOWABLE STATIC BENDING MOMENT AT EXHAUST OUTLET FLANGE = 168 N-m(124lbft)



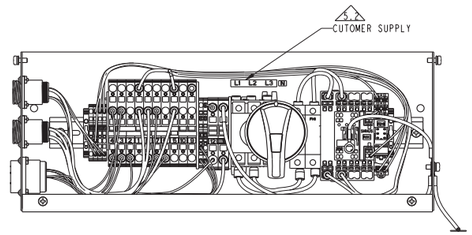
CONTROLS CUSTOMER INTERFACE



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: CM1,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

GENERATOR DATA:

MODEL:	C1500D6e
DIMS INCHES:	200.2L X 86W X 94.7T
WET WEIGHT Lbs:	21,431
FUEL CONSUMPTION GPH @ 100% LOAD:	102.5
COMBUSTION AND COOLING CFM:	39,529
GEN DRAWING:	A062V279

GENERAL DESCRIPTION:

SUB BASE FUEL SUPPLY TANK
- UL 142 LISTED DOUBLE WALL
- NORMAL & EMERGENCY VENTS
- LOW LEVEL, HIGH LEVEL, CRITICAL HIGH LEVEL, & LEAK DETECTION FLOAT SWITCHES
- LOCKABLE FILL WITH 7.5 GALLON SPILL CONTAINER
- ROCHESTER 6540 FUEL LEVEL GAUGE

LEVEL 2 SOUND ATTENUATED ENCLOSURE
- 14GA GALVANEAL CONSTRUCTION
- FIXED VANE INTAKE SOUND LOUVERS
- GRAVITY EXHAUST DAMPERS IN A SOUND DIRECTIONAL EXHAUST PLENUM
- ACCESS DOOR OPENINGS:
  - 72" X 36" TYP. SINGLE DOOR
  - 72" X 72" TYP. DOUBLE DOOR

ELECTRICAL PACKAGE
- 3Ø 120/208 200A M.L.O. LOAD CENTER WITH 100A M.C.B.
  (2) GFCI DUPLEX OUTLETS INCLUDING (1) GFCI PER CIRCUIT, (4) INTERIOR LIGHTS, BATTERY CHARGER & BLOCK HEATER(S) WIRED IN STEEL EMT WITH COMPRESSION FITTINGS & LIQUIDTIGHT FLEXIBLE CONDUIT
- AP-4 TANK STATUS ALARM PANEL

ACCESSORIES
- INTERIOR MOUNTED SILENCER, FLEX CONNECTION, TAILPIPE WITH RAIN LID & RAIN CAP ASSEMBLY
- SUPPLY & INSTALL SPRING ISOLATORS (CE4-1D-7140)
- OIL & COOLANT DRAINS PIPED TO EXTERIOR WITH VALVES

** INTERIOR & EXTERIOR EQUIPMENT MOUNTING MAY VARY IN LOCATION DUE TO MANUFACTURING DESIGN REQUIREMENTS

PAINT COLORS:

ENCLOSURE COLOR: ..... CUMMINS GREEN

FUEL TANK COLOR: ..... BLACK

ESTIMATED WEIGHTS: (lbs)

ENCLOSURE WEIGHT: 10,996

TOTAL SHIPPING WEIGHT: 45,540

TOTAL SYSTEM WET WEIGHT: 66,472

TANK DATA & NOTES:

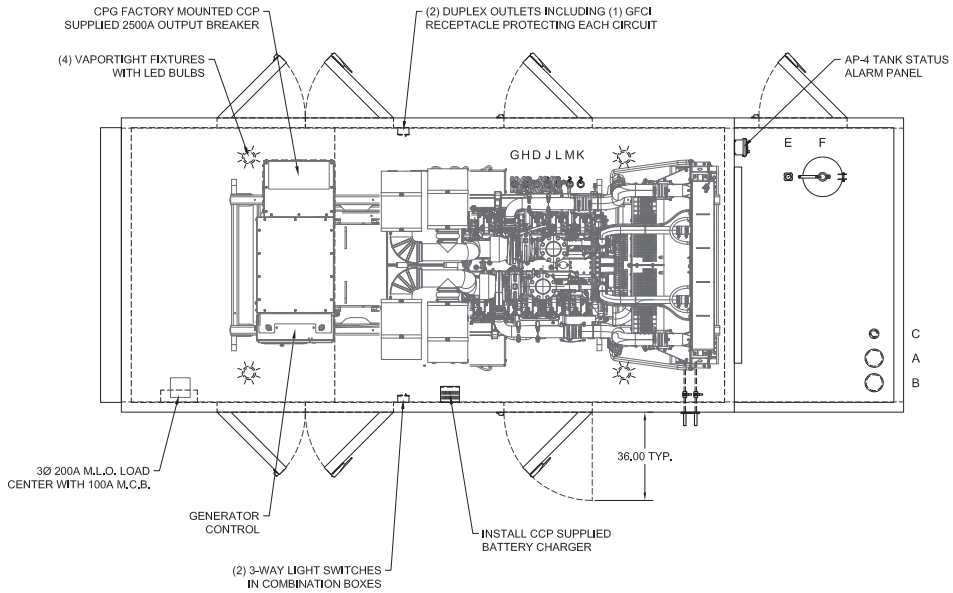
CAPACITY GALLONS:	2,800
GALLONS PER IN OF DEPTH:	108.7
RUN TIME @FULL LOAD Hrs:	26.1
TANK WEIGHT DRY lbs:	12,489
TANK WEIGHT WET: lbs:	32,424
CONDUIT STUB AREA:	TYPE A (STRAIGHT)

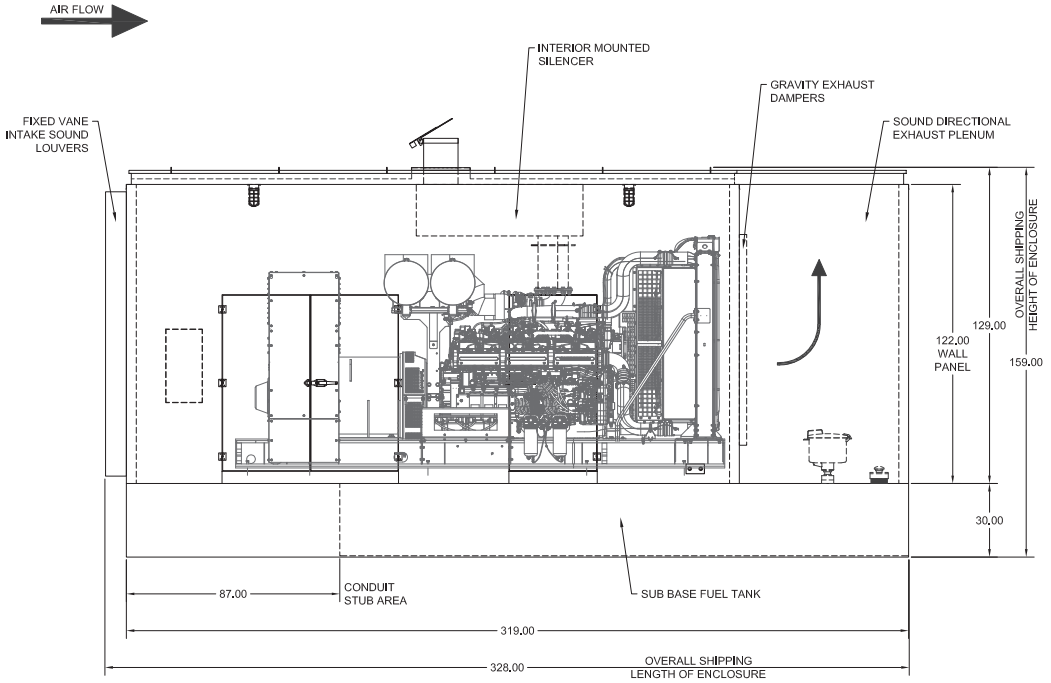
1. EMERGENCY VENT SIZING BASED ON UL142 TABLE 8.1
2. PORTS PER UL 142 SECTION 10
3. NORMAL VENTING PER UL 142 SECTION 8.11, TABLE 8.2
4. WELDS & JOINTS PER UL SECTION 6 FIGURE 6.1, 6.2

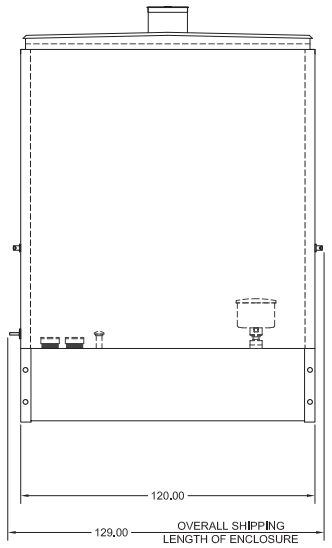
TANK PORTS** :

A = 6" EMERGENCY TANK VENT
B = 6" EMERGENCY BASIN VENT
C = 2" NORMAL TANK VENT
D = 2" TANK SPARE PORT (FNPT)
E = ROCHESTER 6540 FUEL LEVEL GAUGE
F = LOCKABLE FILL WITH 7.5 GALLON SPILL CONTAINER
G = ENGINE SUPPLY
H = ENGINE RETURN
J = LOW LEVEL FLOAT SWITCH
K = LEAK FLOAT SWITCH
L = HIGH LEVEL FLOAT SWITCH
M= CRITICAL HIGH LEVEL FLOAT SWITCH

** TANK PORTS MAY VARY IN LOCATION DUE TO INNER CONSTRUCTION OF FUEL TANK & LOCATION(S) OF EQUIPMENT







REV	DESCRIPTION	BY	DATE
0	ORIGINAL SUBMISSION RELEASE	AW	02/23/23

UL SPEC	DESCRIPTION	CLASS	FILE #
UL 142	SECONDARY CONTAINMENT DOUBLE WALL TANK	EVFT	MH47836
N/A			
N/A			

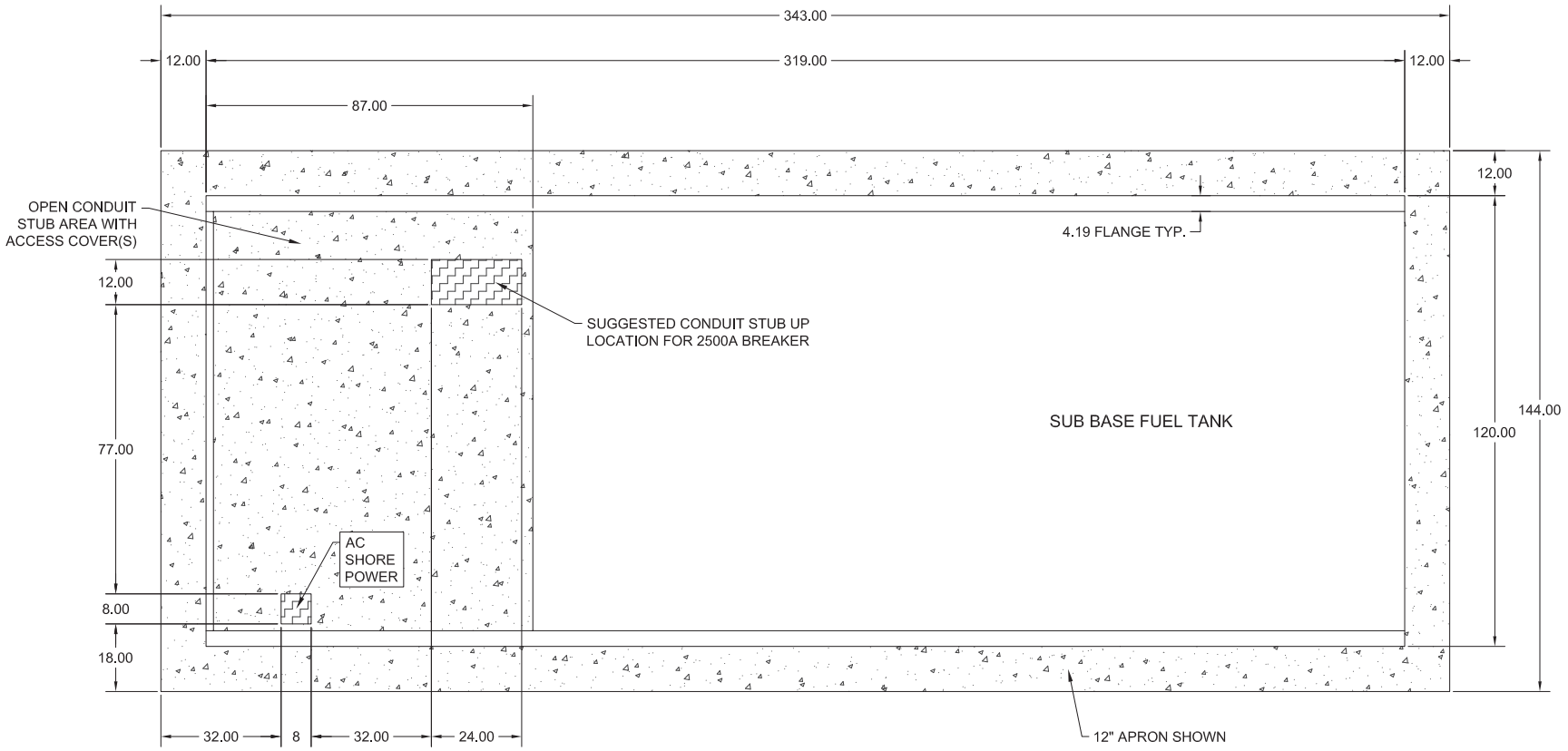
CSDG 2025

Quote Reference	Edition
28564 R1	0

Drawing Number: S385154 GA

Designed by	Salesperson	Date	Scale	Sheet #
AW	ST	02/23/23	N.T.S.	1/1

FREEMAN ENCLOSURE SYSTEMS



REV	DESCRIPTION	BY	DATE
0	ORIGINAL SUBMISSION RELEASE	AW	02/23/23

PAD LAYOUT

GENERAL NOTES:

1. A MINIMUM OF (4) 7/8" MOUNT HOLES WILL BE PROVIDED IN THE BOTTOM FLANGE FOR MOUNTING PURPOSES
2. ANCHOR BOLTS ARE NOT PROVIDED BY TANK MANUFACTURER
3. DRILL PAD FOR ANCHORS AFTER INSTALLATION OF TANK & ACCESSORIES
4. POUR PAD FLAT & LEVEL

PAD DIMENSIONS ARE PROVIDED ONLY AS A SUGGESTION. CONSULT AN ENGINEER FOR DESIGN ASSISTANCE

TOTAL SYSTEM WET WEIGHT: ..... 66,472 (lbs)

ALL DIMENSIONS ARE IN INCHES UNLESS SPECIFIED.

CSDG 2025

Quote Reference	Edition
28564 R1	0

Drawing Number: S385154 PL

Designed by	Salesperson	Date	Scale	Sheet #
AW	ST	02/23/23	N.T.S.	1/1

FREEMAN ENCLOSURE SYSTEMS

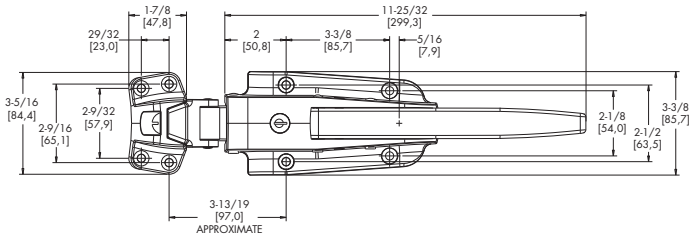
ITEM # 778

NSF COMPONENT

778 STAINLESS STEEL SAFEGUARD® LATCH

CORROSION RESISTANT SAFETY LATCH

- New radial tongue makes for effortless door closure when combined with Kason door closers.
- The walk-in latch unsurpassed for reliability, is now available for the most challenging applications.
- No. 778 features unequalled strength and corrosion-resistance.
- Tamper-resistant locking mechanism and mounting are built in.
- Patented, adjustable roller strike assures precise adjustment.
- Padlocking provision standard on all models.
- Accepts Kason inside release lever to prevent accidental entrapment in locked walk-ins. Inside lever releases cylinder locked or padlocked door.



Model No.	Description
0778CL6020	Cylinder Latch Body, Light Spring
0778L06020	Padlocking Latch Body, Light Spring
0778006002	Strike, -1/8" to 3/4" (-3 - 19mm)
0778006003	Strike, 3/4" to 1-5/8" (19 - 41mm)
PACKAGING	6 per Carton

SPECIFICATIONS

MATERIAL:
Satin Finish, #316 stainless steel body and strike housing with #304 stainless steel roller.

MOUNTING:
Holes drilled and countersunk for 1/4" (6mm) screws.

INSIDE RELEASE:
Accepts No. 481SC, shown below. Order separately.

481SC STAINLESS STEEL INSIDE RELEASE

Opens padlocked or cylinder locked No. 778 latch from inside of walk-in. Clearly visible Safety-Glow™ knob for added safety.

ITEM # 481SC

NSF COMPONENT

SPECIFICATIONS

MATERIAL:
Stainless steel rod and flange, glow-in-the-dark plastic knob.

MOUNTING:
Holes drilled for No. 10 (5mm) screws.

Model No.	Description
0481SC0400	Inside Release for 4" (102mm) Thick Door
0481SC0600	Inside Release for 6" (152mm) Thick Door*
PACKAGING	24 per Carton

*Available special order.

EM-30 Series

Vertical Mount/Horizontal Airflow Extruded Backdraft Damper

Application and Design

The EM-30 series is a vertical mounted backdraft damper that is designed to allow horizontal airflow and prevent reverse airflow. The damper is opened by air pressure differential and closed by gravity.

Ratings (See page 2 for specific limitations)

Pressure: Up to 10.0 in. wg (2.5 kPa) differential pressure. For pressures over 10 in. wg, (2.5 kPa), consult factory

Velocity: 2,500 to 3,500 fpm (13 m/s - 18 m/s)

Temperature: 180°F (82°C)

*W & H dimensions furnished approximately ¼ in. (6mm) under size.

	Standard
Frame Material	6063T5 Extruded Aluminum
Frame Thickness	.125 in. (3.2mm)
Blade Material	6063T5 Extruded Aluminum
Blade Thickness	.070 in. (1.8mm)
Axle Linkage	⅛ in. (3mm) plated steel
Bearings	Synthetic (acetal) sleeve type
Blade Seals	Vinyl

W x H	Minimum Size		Maximum Single Section Size	Maximum Multi Section Size
	With Weights	Without Weights		
Inches	8 x 11	8 x 8	48 x 74	144 x 148
mm	203 x 279	203 x 203	1219 x 1880	3657 x 3759

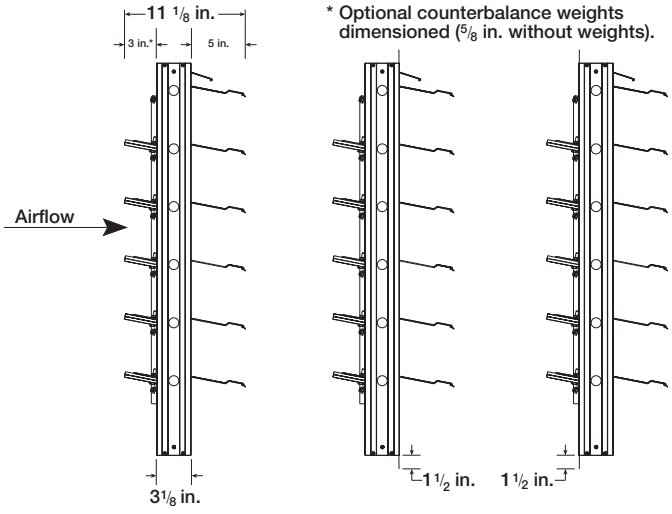
Sizes larger than maximum shown will be supplied as two or more equal size smaller dampers required to make up the size specified. These larger multiple damper assemblies require field assembly and may require additional reinforcement (not supplied by factory) to support the assembly.

- Counterbalance Weights
- 1½ in. (38mm) flange on discharge: EM-31
- 1½ in. (38mm) flange on intake: EM-32
- Sleeves

APC (Adjustable Pressure Controller)

Allows field setting of relief pressure on all EM dampers. Use one per panel. Maximum recommended pressure set limitations are as follows:

Area ft² (m²)	Maximum Set Pressure in. wg (Pa)
4 (.37)	.75 (187)
6 (.56)	.50 (125)
8 (100)	.40 (100)
10 (.93)	.30 (75)
15 (1.39)	.20 (50)
20 (1.86)	.15 (37)
24 (2.23)	.125 (31)



EM-30 No Flange

EM-31 Flange On Discharge

EM-32 Flange On Intake

Counterbalance weights may require field adjustment. Instructions are available at www. greenheck.com.

Performance Data EM-30 Series

Greenheck Fan Corporation certifies that the models EM-30, EM-31 and EM-32 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Leakage and Air Performance Ratings.

Test Information

- Air leakage is based on operation between 32°F and 120°F (0°C and 48°C)
- Tests for air leakage were conducted in accordance with ANSI/AMCA Standard 500-D Figure 5.5, in the intake direction
- Air performance testing conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.5

Air Leakage

Model EM-30 series dampers with a width and height 24 in. (610mm) or greater leak a maximum of:

- 8.9 cfm/ft^2 or less at 1.0 inches w.g.

Model EM-30 series dampers with a width or height less than 24 in. (610mm) leak a maximum of:

- 35 cfm/ft^2 or less at 1.0 inches w.g.

*Note: This model complies with the International Energy Conservation Code (IECC) and ASHRAE 90.1 leakage requirements for non-motorized dampers.

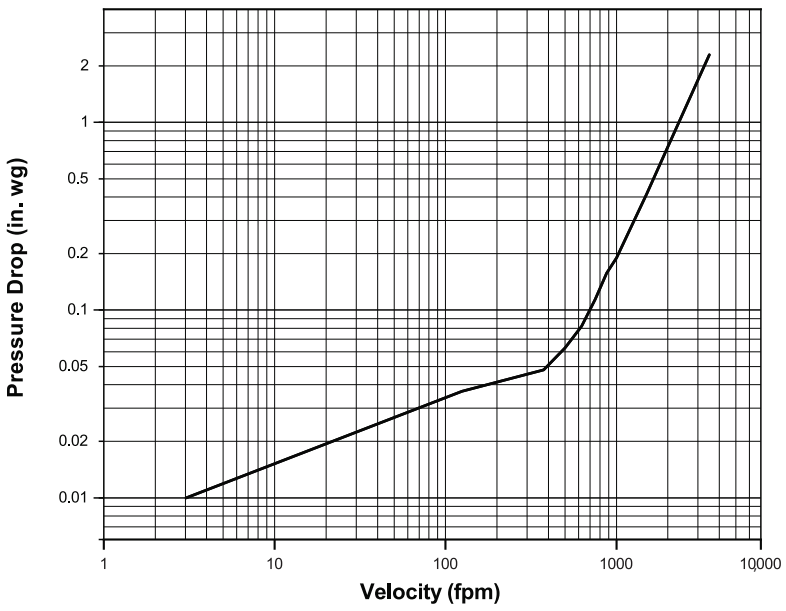
Air Performance

Performance data results from testing a 24 in. x 24 in. damper in accordance with AMCA Standard 500-D using Figure 5.5. All data has been corrected to represent standard air at 0.075 lb/ft^3 (1.201 kg/m^3).

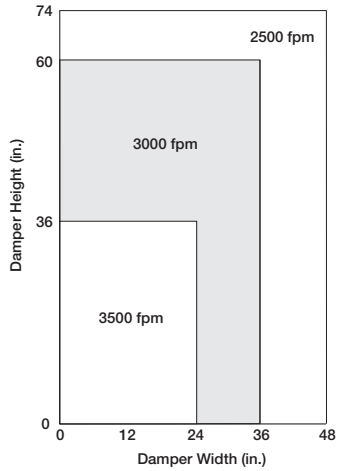
Pressure Drop

24 in. x 24 in. Damper
(610mm x 610mm)

VELOCITY VS. PRESSURE DROP



Velocity Limitations



Operational Data (AMCA Figure 5.3)	ΔP in. wg (Pa)	
	Without Weights	With Weights
Blades Start to Open	0.03 (7.5)	0.01 (2.5)
Blades Fully Open	0.25 (62)	0.055 (13.7)

Operational Data (AMCA Figure 5.5)	ΔP in. wg (Pa)	
	Without Weights	With Weights
Blades Start to Open	0.025 (6.2)	0.01 (3)
Blades Fully Open	0.32 (8)	0.08 (20)

Specifications

Backdraft dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules.

Dampers shall consist of: heavy gauge 6063T5 extruded aluminum channel frame (0.125 in. [3.2mm] thick) with 3⅛ in. (79mm) depth; blades from 0.070 in. (1.8mm) 6063T5 extruded aluminum; synthetic acetal axle bearings; damper shall be equipped with extruded vinyl blade seals; and internal ⅛ in. (3mm) plated steel blade-to-blade linkage. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 10 in. wg (2.5 kPa), velocities to 3500 fpm (18 m/s) and temperatures to 180°F (82°C). Testing and ratings to be in accordance with AMCA Standard 500-D.

Basis of design is model EM-30.

GREENHECK
P.O. Box 410 • Schofield, WI 54476-0410 • 715.359.6171 • greenheck.com

PANEL SCHEDULE CSDG 2025 - #28564 R1

200 AMP, 120/208 VOLT, THREE PHASE, FOUR WIRE, M.L.O., 10000 AMPS MINIMUM A.I.C. BRACING, SURFACE MOUNTED, TYPE NEMA 3R ENCLOSURE

##	BKR.	WIRE AND CONDUIT					LOAD DESCRIPTION	NEUT.	LINE A	LINE B	LINE C	LOAD DESCRIPTION	WIRE AND CONDUIT					BKR.	##
		COND.	NEUTRAL	GND	C.	KEYS							KEYS	C.	GND	NEUTRAL	COND.		
1								0	0	------	------								
								0	2413	------	------								2
3	100/3					CTAL	MAIN CIRCUIT BREAKER	0	------	0	------	BLOCK HEATER	CTAL	1/2	#10	---	#10	30/2	
								0	------	2413	------								4
5								0	------	------	0								
								0	------	------	2413								6
7	20/1	#12	#12	#12	1/2	CTAL	(2) GFCI DUPLEX OUTLETS	720	720	------	------	BLOCK HEATER	CTAL	1/2	#10	---	#10	30/2	
								0	2413	------	------								8
9	15/1	#14	#14	#14	1/2	CTAL	(4) INTERIOR LIGHTS	80	------	80	------								
								0	------	0	------	SPACE							10
11	15/1	#14	#14	#14	1/2	CTAL	BATTERY CHARGER	800	------	------	800								
								0	------	------	0	SPACE							12
13							SPACE	0	0	------	------								
								0	0	------	------	SPACE							14
15							SPACE	0	------	0	------								
								0	------	0	------	SPACE							16
17							SPACE	0	------	------	0								
								0	------	------	0	SPACE							18
19							SPACE	0	0	------	------								
								0	0	------	------	SPACE							20
21							SPACE	0	------	0	------								
								0	------	0	------	SPACE							22
23							SPACE	0	------	------	0								
								0	------	------	0	SPACE							24
25							SPACE	0	0	------	------								
								0	0	------	------	SPACE							26
27							SPACE	0	------	0	------								
								0	------	0	------	SPACE							28
29							SPACE	0	------	------	0								
								0	------	------	0	SPACE							30

WIRE/CONDUIT KEY	WIRING TYPE	INSULATION	CONDUIT TYPE	TEMP RATING	5546	2493	3213	PEAK PHASE (C) UNBALANCED NEUTRAL LOAD AMPS = 6.7 AMPS
1234	C-CU WIRE	T-THHN	A-EMT	L-78-86 Deg. F.	11,244			NON DIVERSIFIED LOAD AT 208 VOLT, THREE PHASE = 31.2 AMPS

1 TEMP RATING
2 CONDUIT TYPE
3 INSULATION
4 WIRING TYPE

PRINTED ON PANELS PROGRAM SERIAL NUMBER 2001.4083
REGISTERED TO - DALE FREEMAN

PANEL CSDG - # DIVERSIFICATION CALCULATIONS

RECEPTACLES (4) - 720 VA TOTAL	
FIRST 10 KVA AT 100% -	720
LIGHTING - 72 X 125% -	90
MISC NON-CONTINUOUS LOADS AT 100% -	10450
TOTAL DIVERSIFIED PANEL LOAD -	11260
LOAD AT 120/208V/3-PHASE/4-WIRE -	31.3A

REV	DESCRIPTION	BY	DATE
0	ORIGINAL SUBMISSION RELEASE	AW	02/23/23

PANEL SCHEDULE

CSDG 2025

Quote Reference	Edition
28564 R1	0

Drawing Number: S385154 PS

Designed by	Salesperson	Date	Scale	Sheet #
AW	ST	02/23/23	N.T.S.	1/1

FREEMAN ENCLOSURE SYSTEMS

Product data sheet
Characteristics

QO330L200GRB
LOAD Center QO MLO 240V 200A 3PH 30SP

Product availability : Stock - Normally stocked in distribution facility

Main

Product or component type	Load Center
Range of product	QO
Load center type	Main lugs
Line Rated Current	200 A
Number of spaces	30
Short-circuit current	65 kA
Number of circuits	30
Number of tandem circuit breakers	0
Phase	3 phases
System Voltage	208Y/120 V AC 240/120 V delta AC 240 V delta AC

Complementary

AWG gauge	AWG 6...300 kcmil (aluminium/copper)
NEMA degree of protection	NEMA 3R outdoor
Cover type	Surface cover
Electrical connection	Lugs
Device composition	Grounding bar included (not installed)
Electrical connection	Lugs
Wiring configuration	3-wire 4-wire
Material	Tin plated copper busbar
Enclosure material	Welded galvannealed steel
Surface finish	Baked enamel grey
Box number	6R
Product certifications	UL listed
Height	29.84 in (758 mm)

Width	14.76 in (375 mm)

Ordering and shipping details

Category	00017 - QO 3PH LOAD CENTER,OUTDOOR
Discount Schedule	DE3
GTIN	00785901295525
Nbr. of units in pkg.	1
Package weight(Lbs)	32.5
Returnability	Y
Country of origin	US

Offer Sustainability

Sustainable offer status	Not Green Premium product
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

Contractual warranty

Warranty period	18 months

Product data sheet
Characteristics

QO3100
MINIATURE CIRCUIT BREAKER 240V 100A

Product availability : Stock - Normally stocked in distribution facility

Main

Product or component type	Miniature circuit-breaker
Range of product	QO
Line Rated Current	100 A
System Voltage	240 V AC
Mounting mode	Plug-in
Poles description	3P
Circuit breaker type	Standard
Circuit breaker application	HACR rated
Electrical connection	Box lugs
Accessory / separate part type	None,

Complementary

Breaking capacity	10 kA at: 120/240 V AC
Number of spaces required	3
AWG gauge	AWG 4...AWG 2/0 (copper or aluminium)
Height	3.5 in
Depth	2.91 in
Width	2.25 in

Environment

Product certifications	CSA UL listed
Ambient air temperature for operation	104 °F (40 °C)

Ordering and shipping details

Category	00012 - QO 3 POLE CIRCUIT BREAKER
Discount Schedule	DE2A

GTIN	00785901004417
Nbr. of units in pkg.	1
Package weight(Lbs)	1.0700000000000001
Returnability	Y
Country of origin	MX

Offer Sustainability

Sustainable offer status	Green Premium product
RoHS (date code: YYWW)	Compliant - since 1323 - 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 environmental profile	Available
Product end of life instructions	Need no specific recycling operations

Contractual warranty

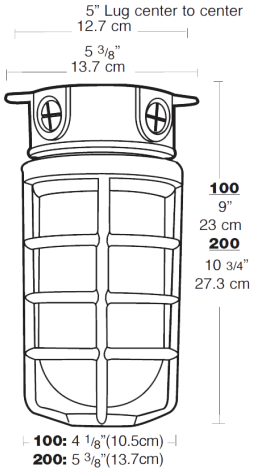
Warranty period	18 months

VX100DG

Box mount, die cast aluminum with built-in junction box and sturdy mounting lugs. Medium base socket, 1/2" or 3/4" NPS hub size and a variety of globes. incandescent lamp A21 for 100 Series, PS25 for 200 Series. Lamp not supplied. CFL: 13 & 22 watt lamp supplied.

Color: Natural

Weight: 2.8 lbs



Lamp Info

Type:	A19
Watts:	150W
Shape/Size:	N/A
Base:	N/A
ANSI:	N/A
Hours:	0
Lamp Lumens:	0
Efficacy:	N/A

Ballast Info

Type:	0
120V:	N/A
208V:	0
240V:	N/A
277V:	N/A
Input Watts:	0W
Efficiency:	N/A

Technical Specifications

UL Listing:
Suitable for wet locations. Suitable for use in dwellings. Suitable for use with 90°C supply wiring. Complies with UL Standard 1598. For non-hazardous locations where the lamp, socket and wiring require protection from rain, corrosive fumes, non-combustible dusts, moisture, non-explosive vapors and gases. For lamp base up installation only when outdoors.

Globes:
Supplied with clear thermal shock resistant soda lime glass unless otherwise stated. Colored and white glass globes available. Unbreakable Permaglobes available in clear and in color.

Die Cast Guard:
Supplied with one piece die cast guard with set screw

Maximum Watts:
150 watts

Colored Globe Maximum Watts:
100 watts

Patents:
RAB sensor and fixture designs are protected under U.S. and International Intellectual Property laws.

Country of Origin:
Designed by RAB in New Jersey and assembled in Taiwan

Trade Agreements Act Compliant:
This product is a product of Taiwan and a "designated country" end product that complies with the Trade Agreements Act.

GSA Schedule:
Suitable in accordance with FAR Subpart 25.4

TCP

LED A-Lamps

OMNI-DIRECTIONAL • ALL-PURPOSE • 3-WAY

TCP's LED A-lamps provide the lighting you need at a cost you will love. Advanced factory techniques and rigorous testing ensure each lamp is perfect from day one. Install a LED A-lamp wherever you would a traditional lamp and see the improvement.

LIMITLESS OPTIONS FOR THE FOLLOWING APPLICATIONS

- General lighting
- Table lamps
- Floor lamps
- Sconces
- Ceiling fixtures

FEATURES	BENEFITS
Up to 85% less energy than halogen alternatives	Instant energy savings
Long life	Minimizes replacement and maintenance costs
Very low heat generation	Perfect for sensitive display lighting such as art galleries
Excellent color consistency and CRI	Enhances colors of focal point while maintaining uniformity throughout lighting installation from lamp to lamp
UL approved for damp location	Can be used outdoors when protected from elements—withstands humidity indoors/outdoors
Durable plastic housing	Lower the risk of injury and breakage
ANSI construction compliant	Fits all A-lamp installations

Dims to ≤ 10% of full light level when applicable

SPECIFICATIONS

Input Line Voltage ..... 120 VAC
Input Line Frequency..... 50/60HZ
Lamp Life (Rated) ..... 10,000, 15,000, 20,000 or 25,000 hour options
Minimum Starting Temp ..... -30°C
Maximum Operating Temp..... 40°C
CRI..... 80
Suitable for use in totally enclosed fixtures.
(Vapor tight or jelly jar applications may reduce life)

c UL us LISTED

1 YEAR WARRANTY * 10,000 HOUR LAMPS
3 YEAR WARRANTY* 15,000 HOUR LAMPS
5 YEAR WARRANTY* 25,000 HOUR LAMPS

*Based on 12 hours use per day

Do not use more than 2 bulbs in an enclosed fixture.
If fixture is manufactured for incandescent bulbs, use no higher than the LED equivalent wattage, as shown on this spec sheet.

40W NON DIMMABLE | 40W DIMMABLE | 60W NON DIMMABLE | 60 & 75W DIMMABLE | 60W GU24 DIMMABLE | 100W NON DIMMABLE | 100W DIMMABLE | 40/60/100W DIMMABLE 3-WAY | 60W DIMMABLE WET LOCATION

ENERGY STAR PARTNER

LED A-Lamps

OMNI-DIRECTIONAL • ALL-PURPOSE • 3-WAY

ITEM #	DESCRIPTION	ENERGY STAR	VOLTAGE	WATTS	INCANDESENT WATTS	LPW	LUMENS	CCT	HOURS	CRI	MOL (inches)	DIA (inches)	BASE	WARRANTY YEARS	CASE QUANTITY
LED 75W Equivalent Options															
13.5W A19 A-Lamp • Non-Dimmable • 15,000 Hour															
L11A19N1527K	LED 13.5W A19 ND 2700K	★	120	13.5	75	81.5	1100	2700K	15,000	80	4.4	2.4	E26	3	12
L11A19N1530K	LED 13.5W A19 ND 3000K	★	120	13.5	75	81.5	1100	3000K	15,000	80	4.4	2.4	E26	3	12
L11A19N1541K	LED 13.5W A19 ND 4100K	★	120	13.5	75	81.5	1100	4100K	15,000	80	4.4	2.4	E26	3	12
L11A19N1550K	LED 13.5W A19 ND 5000K	★	120	13.5	75	81.5	1100	5000K	15,000	80	4.4	2.4	E26	3	12
13.5W A19 A-Lamp • Dimmable • 25,000 Hour															
L11A19D2527K	LED 13.5W A19 DIM 2700K	★	120	13.5	75	81.5	1100	2700K	25,000	80	4.4	2.4	E26	5	12
L11A19D2530K	LED 13.5W A19 DIM 3000K	★	120	13.5	75	81.5	1100	3000K	25,000	80	4.4	2.4	E26	5	12
L11A19D2541K	LED 13.5W A19 DIM 4100K	★	120	13.5	75	81.5	1100	4100K	25,000	80	4.4	2.4	E26	5	12
L11A19D2550K	LED 13.5W A19 DIM 5000K	★	120	13.5	75	81.5	1100	5000K	25,000	80	4.4	2.4	E26	5	12
LED 100W Equivalent Options															
14W A19 A-Lamp • Non-Dimmable • 10,000 Hour															
L16A19N1027K4	LED 14W A19 ND 2700K 4PK		120	14	100	107.1	1500	2700K	10,000	80	4.7	2.6	E26	1	12
L16A19N1041K4	LED 14W A19 ND 4100K 4PK		120	14	100	107.1	1500	4100K	10,000	80	4.7	2.6	E26	1	12
15.5W A19 A-Lamp • Non-Dimmable • 15,000 Hour															
L16A19N1527K	LED 15.5W A19 ND 2700K	★	120	15.5	100	103.2	1600	2700K	15,000	80	4.7	2.6	E26	3	12
L16A19N1530K	LED 15.5W A19 ND 3000K	★	120	15.5	100	103.2	1600	3000K	15,000	80	4.7	2.6	E26	3	12
L16A19N1541K	LED 15.5W A19 ND 4100K	★	120	15.5	100	103.2	1600	4100K	15,000	80	4.7	2.6	E26	3	12
L16A19N1550K	LED 15.5W A19 ND 5000K	★	120	15.5	100	103.2	1600	5000K	15,000	80	4.7	2.6	E26	3	12
15W A19 A-Lamp • Dimmable • 15,000 Hour															
L15A21D1527K	LED 15W A19 DIM 2700K	★	120	15	100	106.7	1600	2700K	15,000	80	4.7	2.6	E26	3	12
L15A21D1530K	LED 15W A19 DIM 3000K	★	120	15	100	106.7	1600	3000K	15,000	80	4.7	2.6	E26	3	12
L15A21D1541K	LED 15W A19 DIM 4100K	★	120	15	100	106.7	1600	4100K	15,000	80	4.7	2.6	E26	3	12
L15A21D1550K	LED 15W A19 DIM 5000K	★	120	15	100	106.7	1600	5000K	15,000	80	4.7	2.6	E26	3	12
15W A19 A-Lamp • Dimmable • 25,000 Hour															
L15A19D2527K	LED 15W A19 DIM 2700K	★	120	15	100	106.7	1600	2700K	25,000	80	4.7	2.6	E26	5	12
L15A19D2530K	LED 15W A19 DIM 3000K	★	120	15	100	106.7	1600	3000K	25,000	80	4.7	2.6	E26	5	12
L15A19D2541K	LED 15W A19 DIM 4100K	★	120	15	100	106.7	1600	4100K	25,000	80	4.7	2.6	E26	5	12
L15A19D2550K	LED 15W A19 DIM 5000K	★	120	15	100	106.7	1600	5000K	25,000	80	4.7	2.6	E26	5	12
LED 40/60/100 3-Way Equivalent Options															
4/8/16W A21 3-Way A-Lamp • Dimmable • 25,000 Hour															
LED16A21D3WAY27K	LED 16W A21 DIM 2700K 3WAY	★	120	4/8/16	40/60/100	120/100/100	480/800/1600	2700K	25,000	80	4.9	2.6	E26	5	12
LED16A21D3WAY30K	LED 16W A21 DIM 3000K 3WAY	★	120	4/8/16	40/60/100	120/100/100	480/800/1600	3000K	25,000	80	4.9	2.6	E26	5	12
LED16A21D3WAY41K	LED 16W A21 DIM 4100K 3WAY	★	120	4/8/16	40/60/100	120/100/100	480/800/1600	4100K	25,000	80	4.9	2.6	E26	5	12
LED16A21D3WAY50K	LED 16W A21 DIM 5000K 3WAY	★	120	4/8/16	40/60/100	120/100/100	480/800/1600	5000K	25,000	80	4.9	2.6	E26	5	12
LED 60W Wet Location Equivalent Options															
9.5W A19 Omni-Directional Wet Location A-Lamp • Dimmable • 25,000 Hour															
LED10A19DOD27KW	LED 9.5W A19 DIM OMNI 27K WET	★	120	9.5	60	84.2	800	2700K	25,000	80	4.6	2.5	E26	5	12
LED10A19DOD30KW	LED 9.5W A19 DIM OMNI 30K WET	★	120	9.5	60	86.8	825	3000K	25,000	80	4.6	2.5	E26	5	12
LED10A19DOD41KW	LED 9.5W A19 DIM OMNI 41K WET	★	120	9.5	60	89.5	850	4100K	25,000	80	4.6	2.5	E26	5	12
LED10A19DOD50KW	LED 9.5W A19 DIM OMNI 50K WET	★	120	9.5	60	89.5	850	5000K	25,000	80	4.6	2.5	E26	5	12

For the most up-to-date specs, please visit www.tcpi.com

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

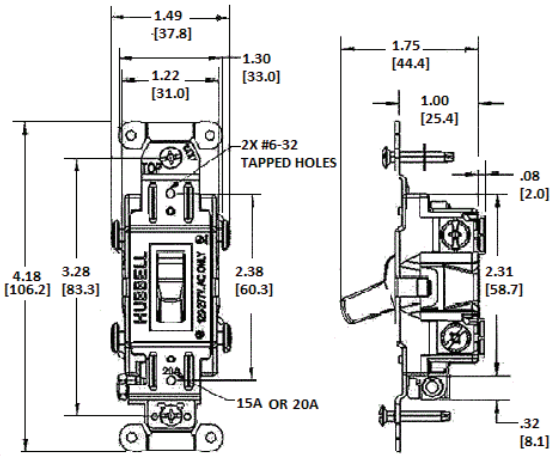
Description	Toggle Color	UPC	Catalog Number
Toggle, back and side wired	Ivory	783585154220	CSB320I

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

Ground Fault Products
Commercial Standard GFCI Receptacles

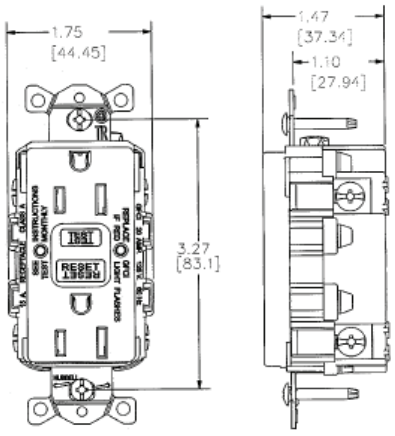
HUBBELL

Features

- Patented AUTOGUARD® self test technology
- Internal back wiring clamp and guide for quick and secure termination
- Triple wipe construction

Ordering Information

Description	Color	UPC	Catalog Number
20A, 125V, Style Line®, AUTOGUARD® self test GFCI receptacle, flush face, back and side wired, multiple drive screws	Ivory	883778122118	GFRST20I



Listings

UL Listed - Canadian and U.S.
Meets ADA Standards
Meets all NEC® requirements
CSA Certified
NEMA® WD-6 Compliant

Specifications

Face	Nylon
Base	Nylon
Power Contacts	Brass
Ground Contacts	Brass
Mounting Strap	Zinc plated steel
Mounting Screws	Zinc plated steel

Online Resources

Customer Use Drawing
eCatalog
Installation Instructions

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

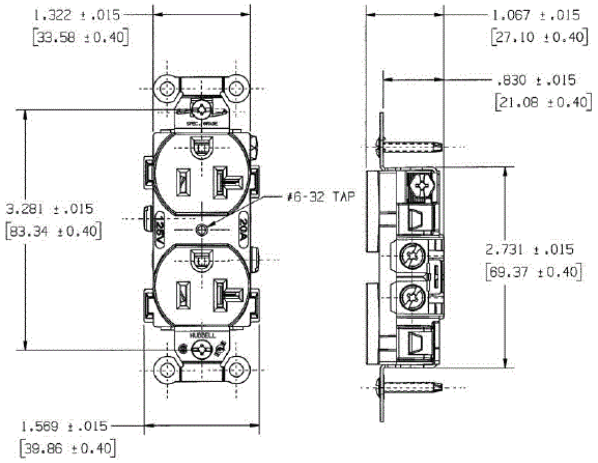
- Easy access split circuit tab
- Nylon face and base
- Wrap-around galvanized steel strap
- Triple wipe contacts

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 Incorporated (Delaware) • 40 Waterview Drive • Shelton, CT 06484
Phone (800) 288-6000 • Fax (800) 255-1031 • Specifications subject to change without notice.

HUBBELL® Wiring Device-Kellems

Galvanized Mushroom Vent Caps

Corrosion resistant vent caps are constructed of ultra durable rust resistant galvanized cast iron. Vent caps are designed with a 30 mesh screen, to prevent debris from entering the vent pipe.

- Popular style is used in the majority of installations in the United States, Alaska, and Canada
- Rust-resistant zinc-plated cast iron design is available in female NPT sizes from ¾ to 4
- Each cap is designed with a 30 mesh screen, to prevent debris from entering the vent pipe

SMP #	SIZE	OD
02-075M	¾	2-3/16
02-100M	½	2-5/8
02-125M	1-1/4	2-3/4
02-150M	1-1/2	3-1/8
02-200M	2	3-15/16
02-300M	3	5-1/8
02-400M	4	6-1/2

GLOBALTANK COMPONENTS

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.

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

3765 Creamery Road, Bldg. 96 #5, DePere, WI 54115

Phone: 920.264.8457 • Fax: 847.239.7776
Email: sales@globaltankcomponents.net
www.globaltankcomponents.net

Madison®

M Series

Suspendible/Submersible Leak Detection Switch

Madison Company offers a standard model M3782 liquid level switch that can be fully submerged with 20' of 22 AWG HALAR® jacketed 2-conductor wire. This model is weighted for suspension in non-magnetic tanks and can be used in conjunction with a still pipe. Its materials are suitable for water, hydrocarbons and certain chemicals. Contact Madison Company to check on material compatibility.

This low-cost switch is ideally suited for sumps, dispenser pans, monitoring wells and double-wall tanks where monitoring for leaks is required. The depth of the vertical mount can be easily adjusted by cutting the cable length as required.

This standard model can also be customized to meet your specific application needs. Simply complete the M Series Specification Worksheet and send it to Madison Company for a quotation.

Features

- Affordable
- Easy installation; compact size
- Highly reliable; long service life
- No calibration required
- Suitable for water and hydrocarbons

HALAR® is a registered trademark of Ausimont USA, Inc.

Madison Company • (203) 488-4477 • (800) 466-5383 • Fax (203) 481-5036 • info@madisonco.com • www.madisonco.com

Specifications

Materials

Stem and Extension – Brass

Float – Buna-N

Slosh Shield – PBT

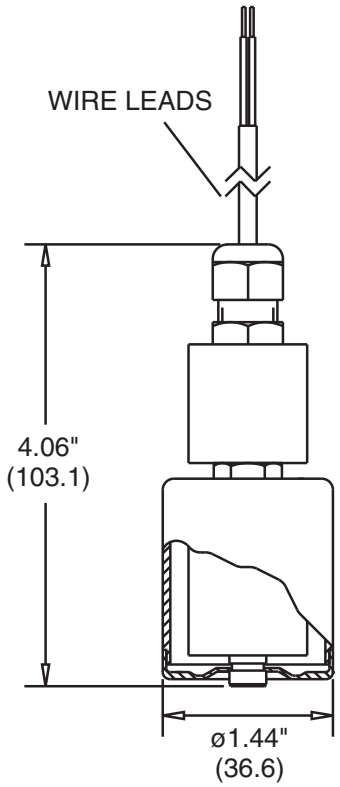
Cable – 20’ 22 AWG, HALAR jacketed

Operation

Normally Closed (NC), open on liquid rising

Options

– Wire lengths
– Wetted materials



M3782

Current and Voltage Ratings

Current Amps (Resistive)	Voltage
0.14	220 AC
0.28	110 AC
0.07	120 DC
0.28	24 DC

All specifications are subject to change without notice.

Madison®

Sensor solutions for today and the future™

CERTIFIED ISO 9001:2000

Madison Company 800-466-5383 www.madisonco.com

27 Business Park Drive, Branford, CT 06405 • 203-488-4477 • Fax: 203-481-5036 • E-mail: info@madisonco.com
Madison Europe – Phone: + 31 (0) 548 659 034 • Fax: + 31 (0) 548 659 010 • E-mail: madison@eurodev.com

FREEMAN
ENCLOSURE SYSTEMS
4160 HALF ACRE RD.
BATAVIA, OH 45103
513-488-8600

FUEL TANK LEVEL INDICATING SYSTEM
STANDARD MODEL- 4LAP3_24VDC

CONTROLLER DESCRIPTION:

ENCLOSURE: FIBERGLASS 6" X 6" X 4"
POWER 24VDC
4 PILOT LIGHTS
3 RELAYS
ALARM HORN
ALARM SILENCE SWITCH
PUSH TO TEST FUNCTION
TERMINALS FOR ALL FIELD CONNECTIONS

TANK LEVELS

TANK LEAK
33% LOW LEVEL
90% HIGH LEVEL
95% CRITICAL HIGH LEVEL (WITH ALARM HORN)

RELAYS ARE DPDT FORM C
WITH DRY ISOLATED OUTPUTS FOR
GENERATOR CONTROL & CUSTOMER CONNECTION

DRAWING & REVISION HISTORY

DATE	INITIALS	REV No.	DESCRIPTION
02/06/20	SK	0	DRAWING CONSTRUCTION SET

4LAP3-24					Drawing Number: E752956	REV Number: 0
Description: COVER SHEET						
Equipment: LAP ALARM PANEL	Designed by: SK	Aprvd By: MP	Date: 02/06/20	Sheet: 1 OF 3	FREEMAN ENCLOSURE SYSTEMS	

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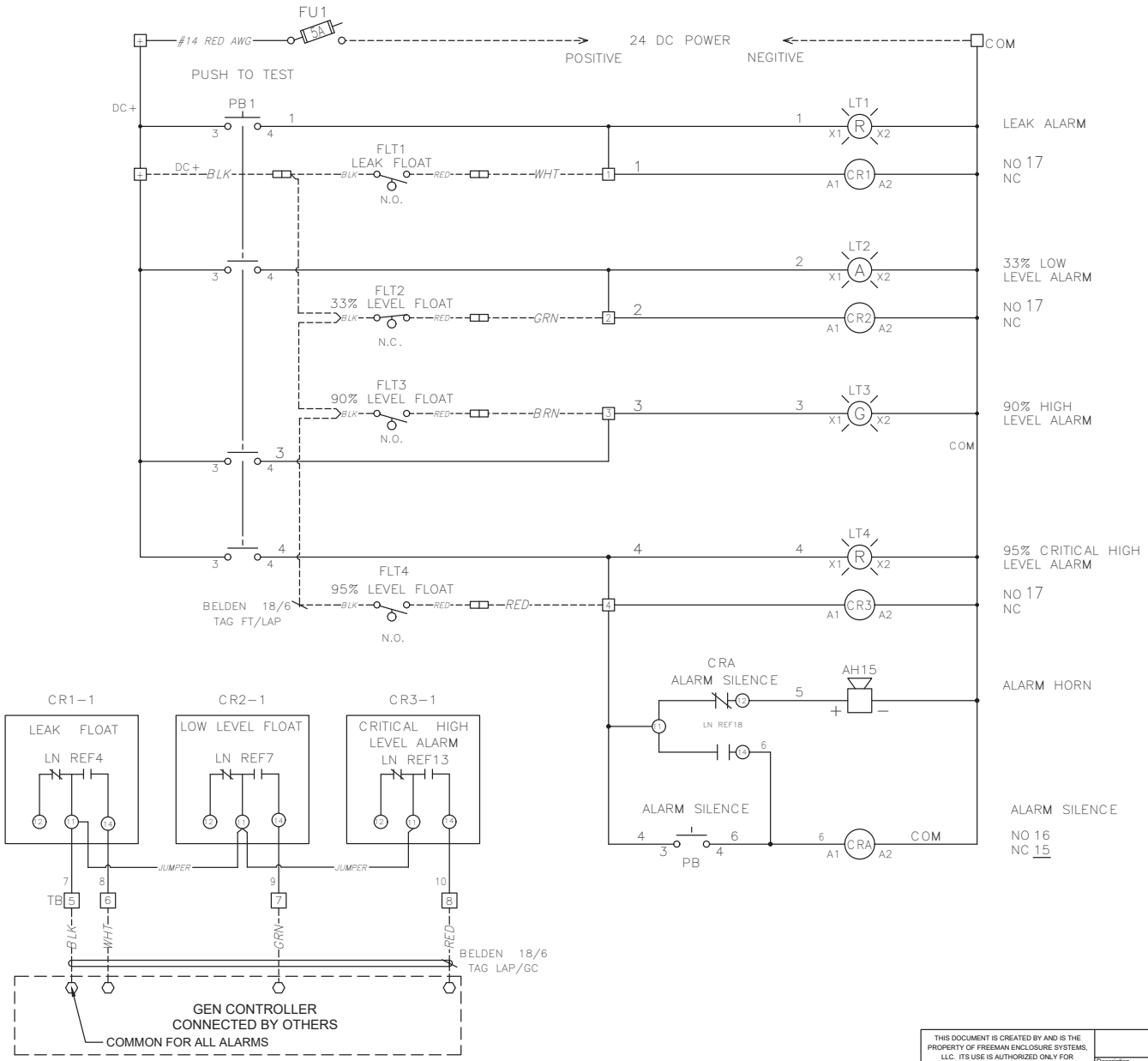


NOTE WIRE COLORS
FOR WIRES NOT TAGGED
IN THIS SCHEMATIC
POSITIVE BLUE #18
NEGATIVE BLUE/W #18

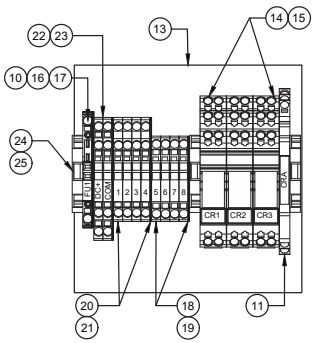
ALL FLOATS
P/N EL-FLSWT-HI-LOW-LEAK M3782

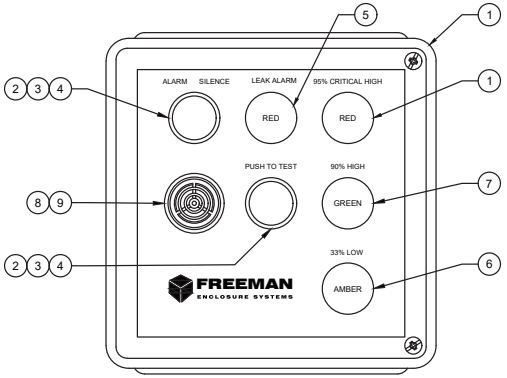
4LAP3-24					Drawing Number E752956	REV Number 0
Description SCHEMATIC						
Equipment LAP ALARM PANEL	Designed by SK	Aprvd By MP	Date 02/06/20	Sheet 2 OF 3	FREEMAN ENCLOSURE SYSTEMS	

2/6/2020 1:54:37 PM, PDF PRINT DATE

4LAP3 24 ENCLOSURE & BACK PLATE LAYOUT

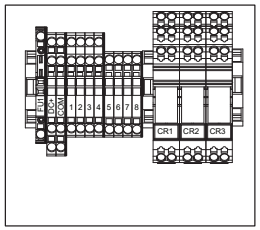
4LAP3- 24 VDC BOM					
ITEM #	QTY	DESCRIPTION	PART #	MFG	SUPPLIER
1	1	ENCLOSURE 6X6X4	EL-LAB-HOFF-6X6X4 FG SCRCVR 4R	HOFFMANN	KENDALL
2	2	PUSH BUTTON MOMENTARY RED	EL-LAB-SQD ZB5AA4	SCHNEIDER	KENDALL
3	2	MOUNTING COLLAR	EL-LAB-SQD ZB5AZ009	SCHNEIDER	KENDALL
4	5	CONTACT BLOCK NO	EL-LAB-SQD ZBE101	SCHNEIDER	KENDALL
5	2	PILOT LIGHT RED	EL-LAB-IDEC HW1P-2FQD-R-24V	IDEC	KENDALL
6	1	PILOT LIGHT AMBER	EL-LAB-IDEC HW1P-2FQD-A-24V	IDEC	KENDALL
7	1	PILOT LIGHT GREEN	EL-LAB-IDEC HW1P-2FQD-G-24V	IDEC	KENDALL
8	1	HORN	EL-LAB-MALLORY SC628NR	SONALERT	KENDALL
9	1	HORN GASKET	EL-LAB-MALLORY ACC03	SONALERT	KENDALL
10	1	FUSE 5A	EL-LAB-WAGO 51220026	WAGO	KENDALL
11	1	RELAY SPST 24VDC	EL-LAB-WAGO 857-304	WAGO	KENDALL
12	1	BACK PLATE ASSEMBLY	EL-LAB-WAGO 51220029	WAGO	KENDALL





(12) BACK PLATE ASSEMBLY KIT P/N EL-LAB-WAGO 60251174

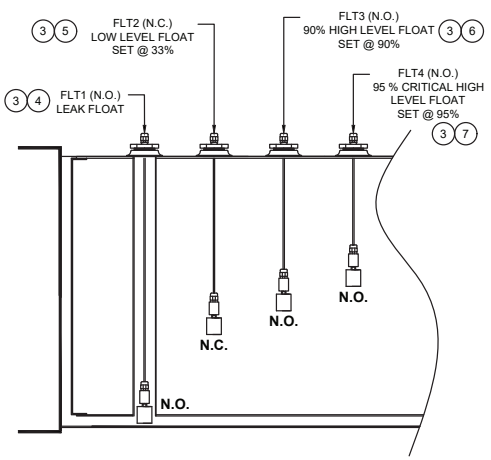
BACK PLATE ASSEMBLY KIT BOM (FOR REFERENCE ONLY)					
ITEM #	QTY	DESCRIPTION	PART #	MFG	SUPPLIER
13	1	ENCLOSURE BACK PLATE	EL-LAB-HOFFMAN 6X6 PANEL	HOFFMANN	KENDALL
14	3	RELAY DPDT 24VDC	EL-LAB-WAGO 788-312	WAGO	KENDALL
15	3	RELAY 788 JUMPER BAR	EL-LAB-WAGO 788-113	WAGO	KENDALL
16	1	FUSE TERMINAL BLOCK	EL-LAB-WAGO 2002-1681	WAGO	KENDALL
17	1	FUSE BLOCK END PLATE	EL-LAB-WAGO 2002-1692	WAGO	KENDALL
18	4	TERMINAL 2 POLE 22-12 AWG	EL-LAB-WAGO 2002-1201	WAGO	KENDALL
19	1	TERMINAL END PLATE 2 POLE 22-12 AWG	EL-LAB-WAGO 2002-1292	WAGO	KENDALL
20	4	TERMINAL 3 POLE 22-12 AWG	EL-LAB-WAGO 2002-1301	WAGO	KENDALL
21	1	TERMINAL END PLATE 3 POLE 22-12 AWG	EL-LAB-WAGO 2002-1392	WAGO	KENDALL
22	2	TERMINAL 4 POLE 22-12 AWG	EL-LAB-WAGO 2002-1401	WAGO	KENDALL
23	1	TERMINAL END PLATE 4POLE 22-12 AWG	EL-LAB-WAGO 2002-1492	WAGO	KENDALL
24	2	DIN RAIL CLAMPS	EL-LAB-WAGO 249-116	WAGO	KENDALL
25	5"	DIN RAIL	EL-LAB-WAGO 210-112	WAGO	KENDALL



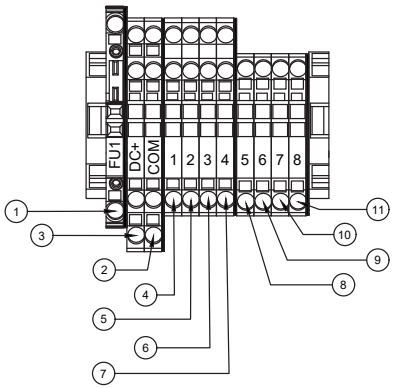
FUEL TANK FLOATS

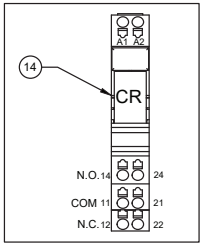
ALL FLOATS
P/N EL-FLSWT-HI-LOW-LEAK M3782

4LAP3-24 CONNECTIONS: POWER INPUT / TANK FLOATS TO LAP / LAP ALARMS TO GEN CONTROLLER				
ITEM #	TERMINALS	DESCRIPTION	WIRE COLOR	CABLE TYPE
24 VDC POWER INPUT AND DISTRIBUTION				
1	FU1	POWER INPUT 24 VDC POSITIVE	RED	16/2 RED/BLACK CABLE
2	TB COM	POWER INPUT 24 VDC NEGATIVE & POWER DISTRIBUTION	BLACK	
3	TB DC+	24 VDC POSITIVE POWER DISTRIBUTION		
	FUEL TANK FLOATS TO ALARM ENCLOSURE			
	TB DC+	24 VDC POSITIVE SUPPLY TO FLOATS	BLACK	BELDEN 18/6 CABLE TAG: FT/LAP
4	TB 1	FLOAT FLT1 TANK LEAK INPUT	WHITE	
5	TB 2	FLOAT FLT2 LOW LEVEL INPUT 33%	GREEN	
6	TB 3	FLOAT FLT3 HIGH LEVEL INPUT 90%	BROWN	
7	TB 4	FLOAT FLT4 CRITICAL HIGH LEVEL INPUT 95%	RED	
TANK LEVEL ALARMS TO GEN ENCLOSURE				
8	TB 5	ALARM COMMON INPUT TO GEN CONTROL	BLACK	BELDEN 18/6 CABLE TAG: LAP/GC
9	TB 6	TANK LEAK ALARM INPUT TO GEN CONTROL	WHITE	
10	TB 7	LOW LEVEL ALARM INPUT TO GEN CONTROL	GREEN	
11	TB 8	CRITICAL HIGH LEVEL ALARM INPUT TO GEN CONTROL	RED	



CONTROL RELAY DPDT @ 8 AMPS MAX





4LAP3-24					Drawing Number E752956	REV Number 0
Description: ENCLOSURE LAYOUT/BOM						
Equipment: LAP ALARM PANEL	Designed by: SK	Aprvd By: MP	Date: 02/06/20	Sheet: 3 OF 3	FREEMAN ENCLOSURE SYSTEMS	

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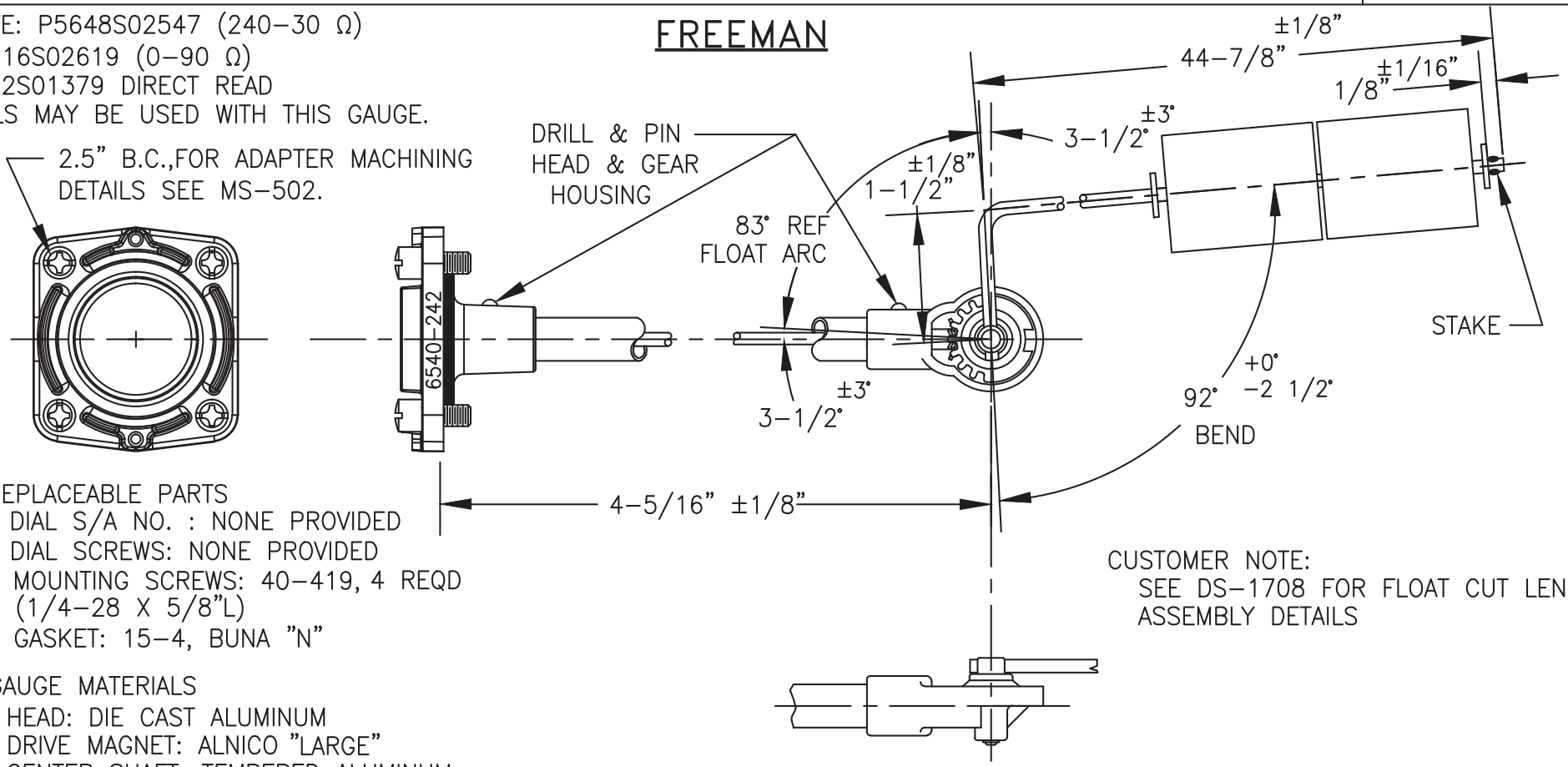
MATERIAL

DRAWING NUMBER 6540-00242

NOTE: P5648S02547 (240-30 Ω)
P5816S02619 (0-90 Ω)
5002S01379 DIRECT READ
DIALS MAY BE USED WITH THIS GAUGE.

FREEMAN



REPLACEABLE PARTS
DIAL S/A NO. : NONE PROVIDED
DIAL SCREWS: NONE PROVIDED
MOUNTING SCREWS: 40-419, 4 REQD (1/4-28 X 5/8"L)
GASKET: 15-4, BUNA "N"

GAUGE MATERIALS
HEAD: DIE CAST ALUMINUM
DRIVE MAGNET: ALNICO "LARGE"
CENTER SHAFT: TEMPERED ALUMINUM
SUPPORT TUBE: TEMPERED ALUMINUM
GEARS: STAINLESS STEEL
CROSS STUD: STAINLESS STEEL
GEAR HOUSING: DIE CAST ZINC
BEARINGS: ALL STAINLESS STEEL
FLOAT: NITRILE RUBBER
FLOAT ROD: TEMPERED ALUMINUM

CUSTOMER NOTE:
SEE DS-1708 FOR FLOAT CUT LENGTH & ASSEMBLY DETAILS

PRODUCTION NOTES:
1. USE 0085S00069 GEAR S/A (UNIVERSAL).
2. USE DW6213S44879 FLOAT S/A WITH TWO 0006-0539 SHIPPED LOOSE. BEND FLOAT ROD AS SHOWN AND INSTALL BACKWARDS IN CROSS STUD.
3. USE 5002S01379 FOR CALIBRATION.

LET	REVISIONS	E.R.#	DATE	LET	REVISIONS	E.R.#	DATE	LET	REVISIONS	E.R.#	DATE
A	44-7/8" WAS 48"	30059A	9/4 13	B	4-5/16 WAS 3; DS-1708 WAS DS-337	30059B	10/14 13				

TOLERANCES NOT SHOWN	DEC. ± .010	FRAC. ±1/64"	ANGLES ± 3°	MAT'L:COMMERCIAL TOLERANCES	DO NOT SCALE DRAWING	SUPERSEDES NEW	DRAWN JW	CHK.	E.R.# 30059	USED ON

ROCHESTER GAUGES, INC., OF TEXAS DALLAS,TEXAS,U.S.A.	SCALE NONE	DATE 8/28/13	PART NAME TM ADJUSTABLE GAUGE	DRAWING NUMBER 6540-00242

Model 518 Series 7½ Gallon AST Spill Container

SPECIFICATION SHEET

Application

Tank top spill containers are designed to contain small spills that occur at the fill point on aboveground storage tanks.

518 (4")

Features and Details

- 7½ gallon (28.39 liters) capacity
- Hinged cover lockable with a padlock
- Space saving offset design
- **518** has female threaded offset connection
- **518CC** has female threaded centered connection
- **518M** has male threaded offset connection

Materials of Construction

- Body... 12 gauge spun steel, powder coated white
- Cover... 14 gauge steel, powder coated white
- Drain valve... brass
- Drain o-ring... Viton®

Code Compliance

- Florida DEP EQ 345, meets the new and revised requirements for CAN-ULC-S663-11 (effective September 25, 2015)

Item Number	A	B	C	D	E	F	G	H	I	J
518---0100 AC	7½	F	O	4″	Y	N	15⅞″	$19^{19}/_{64}$″	26.0	$15^{3}/_{32}$″
518CC-0100 AC	7½	F	C	4″	Y	N	15⅞″	$19^{19}/_{64}$″	26.0	$15^{3}/_{32}$″
518M--0100 AC	7½	M	O	4″	Y	N	$17^{13}/_{64}$″	$19^{19}/_{64}$″	26.0	$15^{3}/_{32}$″
518M--0200 AC	7½	M	O	2″	Y	N	$16^{13}/_{32}$″	$19^{19}/_{64}$″	20.0	$15^{3}/_{32}$″

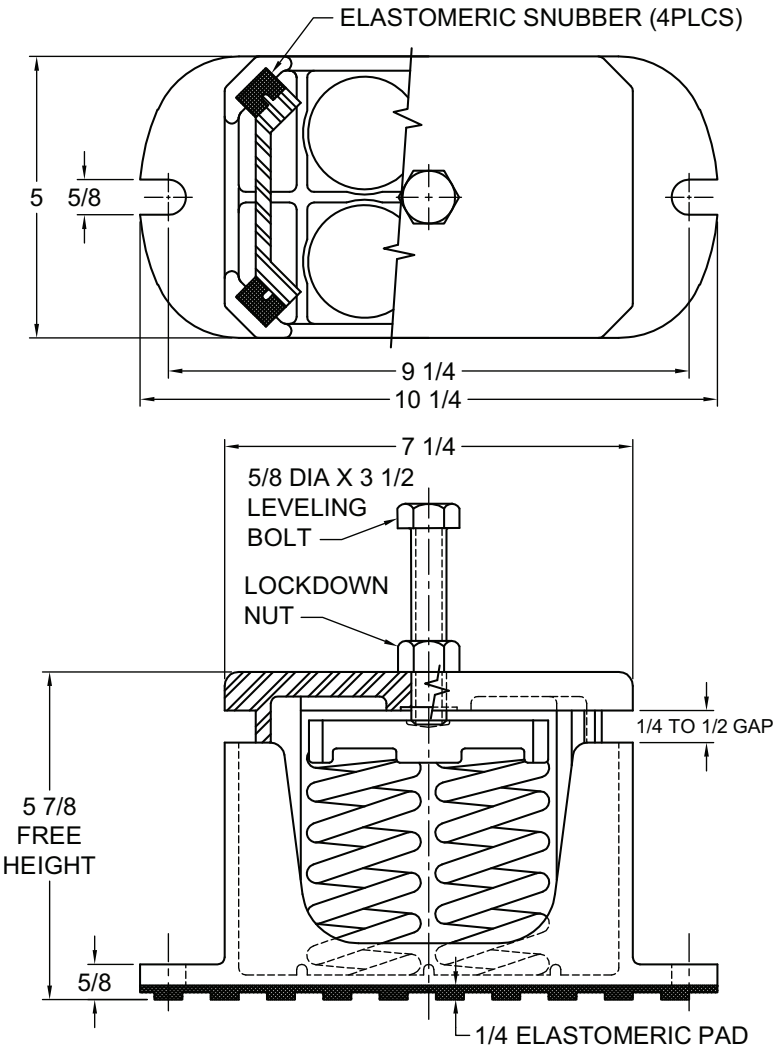
SPECIFICATION OPTIONS:

A—Capacity: Gallons
B—Mounting connection: Male (M), Female (F)
C—Mounting location: Center (C)
D—Size: NPT threads
E—Drain: Yes/No
F—Screen: Yes/No
G—Height: (inches)
H—Width: (inches)
I—Shipping weight: (lbs)
J—Body diameter (inches)

MORRISON BROS. CO.

570 E. 7th Street, P.O. Box 238 | Dubuque, IA 52004-0238
t. 563.583.5701 | 800.553.4840 | f. 563.583.5028
www.morbros.com

REV.	DESCRIPTION	DATE	BY

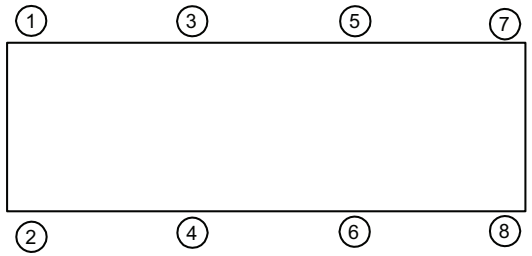


NOTES:
1. ALL DIMENSIONS ARE IN INCHES, INTERPRET PER ANSI Y14.
2. FINISH: HOUSINGS CAST IRON- ONE COAT BLACK PAINT, SPRINGS-POWER COAT, HARDWARE: ZINC-ELECTROPLATE.
3. REFER TO SHEET 2 OF 2 FOR INSTALLATION INSTRUCTIONS.
4. INNER SPRING (WHEN USED) NOT SHOWN.
5. ALL SPRINGS ARE DESIGNED WITH 50% OVER TRAVEL.

TYPE C4E-1D CAST IRON SPRING-FLEX MOUNTINGS WITH EXTERNAL ADJUSTMENT

MODEL	MAX LOAD (LBS)	DEFLECTION (IN)	SPRING RATE (LB/IN)	SPRING COLOR CODE
C4E-1D-1360	1360	1.13	1200	RED
C4E-1D-2040	2040	1.02	2000	BLACK
C4E-1D-2700	2700	1.32	2052	DK PURPLE
C4E-1D-3600	3600	1.02	3524	DK GREEN
C4E-1D-4800	4800	0.90	5308	GRAY
C4E-1D-5440	5440	0.77	7032	WHITE
C4E-1D-6000[1]	6000	0.70	8580	GOLD
C4E-1D-7140N[2]	7140	0.88	8116	GRAY/ RED

NOTES:
1. FREE HEIGHT IS 1/2" HIGHER FOR THIS SPRING
2. TWO NESTED SPRINGS YIELD THIS LOAD. THE COLOR CODE IS FOR OUTER SPRING/ INNER SPRING



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.

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: _____

SERIES C4E-1D
CAST IRON SPRING-FLEX MOUNTINGS WITH EXTERNAL ADJUSTMENT
1" NOMINAL DEFLECTION

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

SCALE : NONE

SHEET: 1 OF 2

member VISCMA

DRAWING NO.:

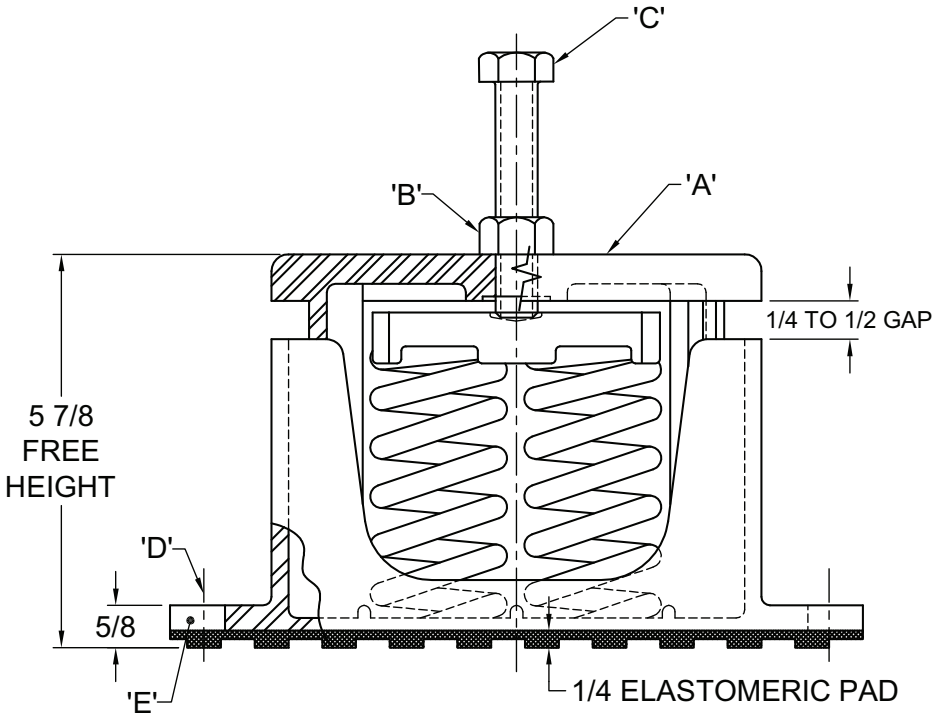
REVISION

120R–101656	REV.: 5

REV.	DESCRIPTION	DATE	BY

INSTALLATION INSTRUCTION

1. ISOLATORS ARE SHIPPED FULLY ASSEMBLED AND ARE TO BE SPACED AND ARRANGED IN ACCORDANCE WITH INSTALLATION DRAWINGS OR AS OTHERWISE RECOMMENDED.
2. SET ISOLATORS ON FLOOR OR SUB-BASE, ENSURING THAT ALL ISOLATOR CENTERLINES MATCH THE EQUIPMENT MOUNTING HOLES. SHIM OR GROUT AS REQUIRED LEVELING ALL ISOLATOR BASE PLATES "E" AT THE SAME ELEVATION (1/4" MAXIMUM DIFFERENCE IN ELEVATION CAN BE TOLERATED). ISOLATOR BASE PLATES MUST REST ON A FLAT SURFACE.
3. UNLESS SPECIFIED, MOUNTINGS NEED NOT BE FASTENED TO FLOOR IN ANY WAY. IF REQUIRED, BOLT MOUNTINGS TO FLOOR THROUGH SLOTS "D".
4. REMOVE ADJUSTING BOLT "C" WITH NUT "B" FROM TOP HOUSING "A". (DO NOT DISCARD.)
5. PLACE MACHINE OR EQUIPMENT ONTO TOP PLATE "A" OF ISOLATOR. THE WEIGHT OF THE MACHINE WILL CAUSE THE UPPER HOUSING OF THE MOUNT TO GO DOWN, POSSIBLY RESTING ON THE LOWER HOUSING.
6. ALIGN EQUIPMENT MOUNTING HOLE TO TOP HOUSING TAPPED HOLE.
7. TURN NUTS "B" UP ON LEVELING BOLTS SO THAT THEY WILL NOT INTERFERE WITH THE LEVELING PROCEDURE. INSERT BOLTS "C" THROUGH THE HOLES IN MACHINE BASE AND SCREW INTO THE TAPPED HOLE IN THE UPPER HOUSING OF THE MOUNTING BY HAND AS FAR AS THEY WILL GO.
8. ADJUST EACH ISOLATOR IN SEQUENCE; SCREW DOWN ONE COMPLETE TURN ON THE ADJUSTING BOLT OF EACH MOUNTING. ADJUST UNTIL 1/4" GAP IS OBTAINED ON ALL MOUNTS.
9. TURN NUT ON ADJUSTING BOLT "C" DOWN AGAINST MACHINE LEG AND LOCK IN PLACE WITH WRENCH TO COMPLETE ADJUSTMENTS.
10. INSTALLATION IS COMPLETE.



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: _____

SERIES C4E-1D
CAST IRON SPRING-FLEX MOUNTINGS WITH EXTERNAL ADJUSTMENT INSTALLATION INSTRUCTIONS

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

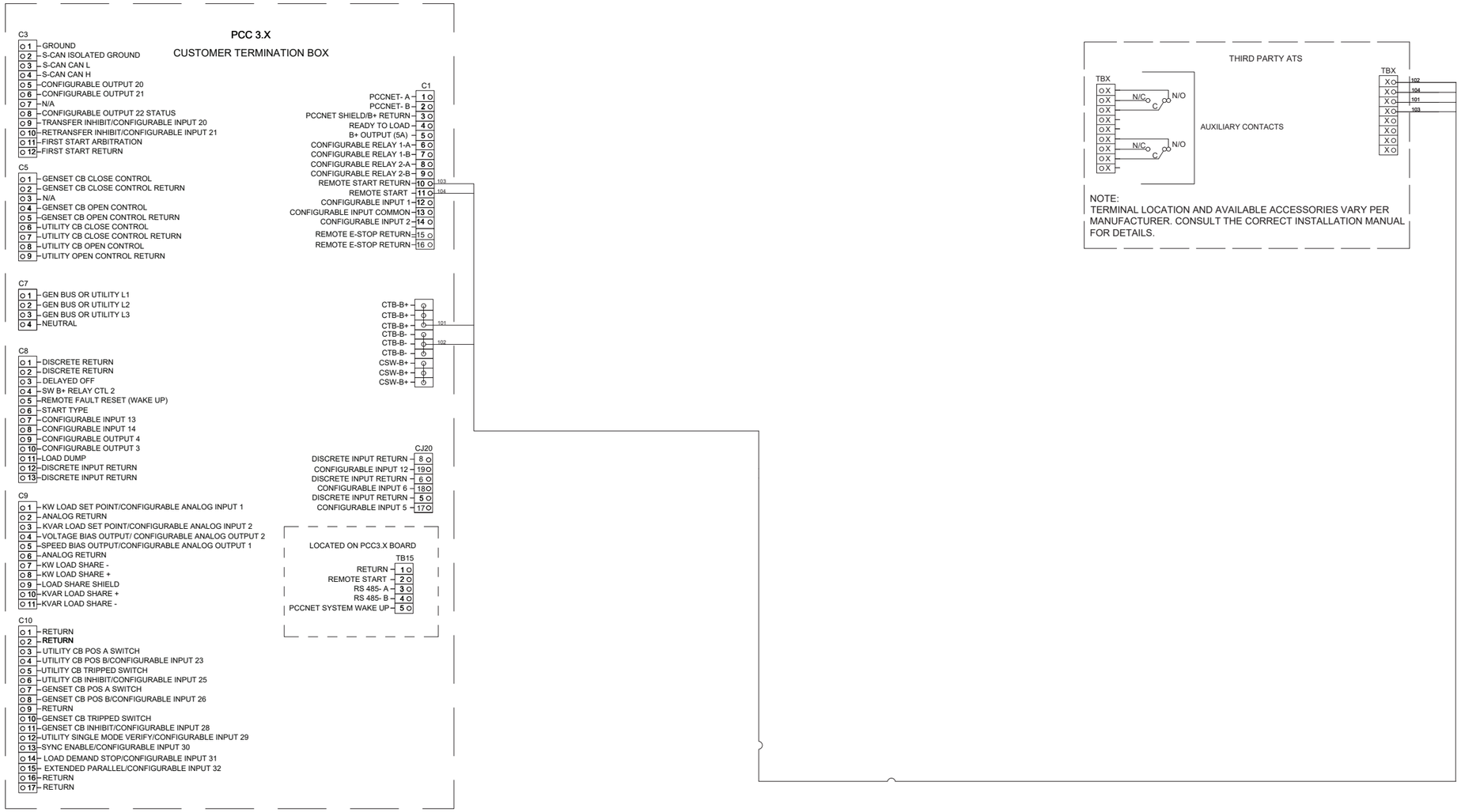
SCALE : NONE

SHEET: 2 OF 2

DRAWING NO.:

REVISION

member VISCMA



NOTES:

1.) LONWORKS RECOMMEND CABLE TYPE: BELDEN 8471 UNSHIELDED TWISTED PAIR
2.) PCCNET AND RS485 RECOMMENDED CABLE TYPE: BELDEN 9729 SHIELDED TWISTED PAIR
3.) MODLON GATEWAY TO PC500-550 CONNECTION CABLE CPG PN: A040T087
4.) USB HOST IS USED TO ATTACH AN EXTERNAL USB DRIVE TO EXTEND THE PC 500-550 MEMORY
5.) SD CARD SLOT IS USED TO EXTEND THE PC 500-550 MEMORY
6.) EITHER USB HOST OR SD CARD CAN BE USED AT A TIME, NOT BOTH
7.) USB DEVICE IS USED BY A PC TO SETUP THE PC 500-550
8.) PULL 20% MORE CONDUCTORS FOR SPARES

CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR:	DATE:
D.BAUER	10MARCH2021
DRAWING NAME:	PAGE:
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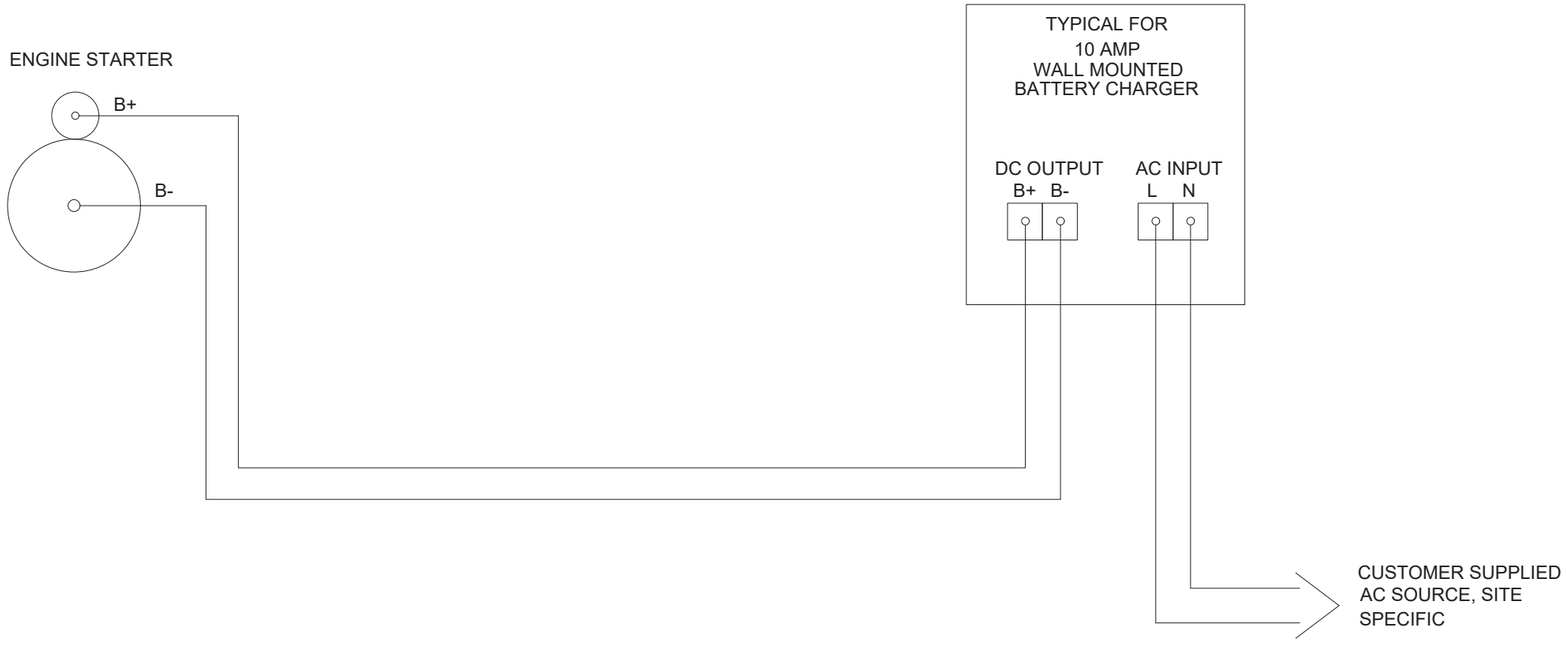


WIRE SIZE (AWG)	DISTANCE IN FEET (ONE WAY)									
	A	B		C		D		E	
	CONTROL WIRING	2/ 3.5 AMP BATT CHG		10 AMP BATT CHG		12/15 AMP BATT CHG		20 AMP BATT CHG	
		24V	12V	24V	12V	24V	12V	24V	12V
16	1000	90	50	-	-	-	-	-	-
14	1600	150	80	20	5	20	5	-	-
12	2400	225	125	30	10	30	10	-	-
10	4000	350	200	50	15	50	15	30	15
8	-	600	300	80	25	80	25	50	25
6	-	1000	500	125	40	125	40	80	40

CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR:	DATE:
D.BAUER	10MARCH2021
DRAWING NAME: TYP BATT CHARGER 9011	PAGE:

Cummins Sales and Service

Section IV

Specification Sheet

Battery Charger

A048G602 10 A 50/60 Hz
A051H785 20 A 50/60 Hz

Description

Cummins® fully automatic battery chargers are constant voltage/constant current chargers incorporating a 4-stage charging algorithm. Designed for use in applications where battery life and reliability are important; these chargers, complete with built-in equalize charge capability, are ideal for stationary or portable starting battery charging service.

To achieve optimum battery life, a 4-stage charging cycle is implemented. The four charging stages are constant current, high-rate taper charge, finishing charge, and maintaining charge. During the constant current cycle the charger operates at maximum possible output in the fast charge mode. During the high-rate taper charge cycle the charger stays at fast charge voltage level until battery current acceptance falls to a portion of the chargers rated output. During the finishing charge cycle the charger operates at the float voltage and completes the battery charge. During the maintaining charge cycle the charger supplies only a few milliamps required by the battery to stay at peak capability.

An optional temperature sensor (A043D534) may be used to adjust charging voltage based on temperature of the battery. Use of a battery temperature sensor helps to increase battery life by preventing over or under charging. The battery temperature sensor also protects the battery from overheating. Temperature compensation sensor is required for all applications when battery charger and battery are located in different temperature or battery heater is being used.

Battery chargers are field-configurable for charging either 12 or 24 VDC battery systems at 50/60 Hz operation. Simple jumper selectors enable selection of output voltage and battery type.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Easy Installation – Clearly marked terminal blocks and panel knockouts provide convenient connections of input and output leads.

User Display – Output voltage and current, fault information and status are indicated on the front panel. Includes precision ammeter and voltmeter.

Monitoring – Status LED indicators are provided to show the condition of the charger. LED's on the right side of the monitor indicate operational functions for Temperature Compensation active (Green), AC on (Green), Float (Green) or Boost (Amber) mode, as well as Battery Fault (Red). LED's on the left side of the monitor illuminate (in Red) when Charger fail, High or Low VDC or AC fail occur.

Adjustable Float Voltage – Float voltage can be set, using easy to understand jumpers, for optimum battery performance and life.

Construction – NEMA-1 (IP20) corrosion resistant aluminium enclosure designed for wall mounting.

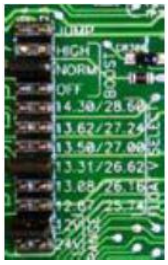
Faults – The charger senses and annunciates the following fault conditions: AC power loss, battery overvoltage, battery under voltage, battery fault conditions and charger failure. Includes an individual 30 volt/2 amp isolated contact for each alarm.

Vibration Resistant Design – complies with UL991 class B vibration resistance requirements.

Listed – C-UL listed to UL 1236 CSA standard 22.2 No 107.2-M89. Suited for flooded and AGM lead acid and NiCd batteries in generator set installations.

Warranty – 5 year CPG warranty.

Status and Fault LED



Field Selectable Jumper

Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12VDC* or 24VDC
	Float voltage – 12VDC batteries	12.87, 13.08, 13.31, 13.50*, 13.62, 14.30
	Float voltage – 24VDC batteries	25.74, 26.16, 26.62, 27.00*, 27.24, 28.60
	Equalize-voltage	6.5% above float voltage sensing
	Output voltage regulation	±0.5% (1/2%) line and load regulation
	Maximum output current	10 or 20 amps nominal
	Equalize charging	Battery interactive auto-boost
Input:	Voltage AC	120, 208, 240 ±10%
	Frequency	60/50 Hz +5%
Approximate net weight:		10A: 25 lbs. (11.36 Kg) 20A: 50 lbs. (22.68 Kg)
Approximate dimensions: height x width x depth-in		10A: 12.50" x 7.66" x 6.50"(318 x 195 x 165 mm) 20A: 13.06" x 13.95" x 6.83"(332 x 354 x1 73 mm)
Ambient temperature operation: At full rated output -		- 4 ℉ to 104 ℉ (-20 ℃ to 45 ℃)

Note:

1. Battery charger comes with default settings of 12VDC and 13.50/27.00VDC float voltage and can be changed to the battery manufacture recommendations. Replacement printed circuit board and f uses are identified in the Owner's Manual (10A: A050S537 and 20A: A051X126) which resides in Quick Serve On-Line. Service parts can be purchased through the Memphis Distribution Center. The PC board replacement instruction sheet (10A: A052N073, 20A: A053W929) and service manual (A050D829) is also available.
2. Installation and application must comply with "section 4.5.3 batteries and battery charger" of application guide T-030 (Liquid Cooled Generator Set Application Manual A040S369).

Caution:

1. Higher input voltages (i.e. 480VAC or 600VAC) can be applied if a transformer with a 120VAC-240VAC output is installed. Higher input voltages (i.e. 480VAC or 600VAC) can be applied if a transformer with a 120VAC-240VAC output is installed. For voltages higher than 240 VAC, stepdown transformer must be used. Review the respective Owner/Installation manual A050S537 for 10Amp and A051X126 20A chargers for supplier recommended stepdown transformer requirements.
2. 10Amp battery charger is recommended for genset applications with 1 or 2 factory provided batteries. 20Amp battery charger is recommended for Cummins Genset applications with 3 or 4 factory provided batteries. Please consider the auxiliary DC loads connected to the genset batteries and size this charger as per the T-030 application guide to prevent misapplication issues.
3. Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.
4. For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.
5. Use this charger for charging LEAD-ACID or LIQUID ELECTROLYTE NICKEL-CADMIUM batteries only. Do not use this battery charger for charging dry cells, alkaline, lithium, nickel-metal hydride, or sealed nickel-cadmium batteries that are commonly used with home appliances. These batteries may burst and cause injuries to persons and damage to property.
6. Do not parallel these battery chargers with any other charging system.

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

Our energy working for you.™

NAAC-5602-EN (03/19) A059Y464

Cummins Sales and Service

Section V

Warranty Statement

CENTUM™ Series Generator Set

C1250D6E, C1500D6E

English
Original Instructions

8-2022

A072R157 (Issue 1)

Limited Warranty

CENTUM™ Series Generator Set

This limited warranty applies to all Cummins Inc. branded CENTUM™ Series generator sets including C1250D6E and C1500D6E 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.

- 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

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

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:_____

REQUIREMENTS FOR GENERATOR STARTUP

IMPORTANT MESSAGE: ***(This document must be completed, signed and returned prior to the scheduled startup)***

The following must be completed by the individual responsible for the installation of the Generator at the JobSite. All Systems must be installed in accordance with Cummins Power Generation published installation recommendations and Project Specific Drawings

Diesel Generators

☐ There is sufficient fuel (winterized fuel if applicable) in the sub-base tank for start-up and testing.
Note: The Owner/Contractor is responsible for supplying fuel: "#2 Diesel, low-sulfur/ultra-low sulfur" is required

LPG or Natural Gas Generators

☐ Gas pressure meets Cummins specifications – please refer to the submittal documents for proper fuel pressure & volume
☐ The Gas Company has turned on the gas and there is fuel to the generator.
☐ ***If required by local authority***, a signed Natural Gas/Propane/LPG Fuel System Certificate indicating compliance to all applicable authorities rules and regulations pertaining to the location of the equipment.

General Requirements *(check all that apply)*

Are the following correctly installed, mounted, wired, connected, wrapped, insulated, and operating (as applicable)?

☐ Exhaust system
☐ Room lighting
☐ Louver motors and cooling fans
☐ Transfer Switch(es)
☐ Battery Charger connected to building AC power
☐ Engine Heater AC but not energized
☐ Fuel solenoid valve, strainer and PRV
☐ Exercise Clock ready to be programmed
☐ All Alarms
☐ Carburetor Heater & Outlet
☐ DC control wiring & AC feeds in separate conduit between Genset & ATS
☐ Radiator Exhaust Ducting: Air In/Out Openings meet specs & are clear of debris
☐ All required inspections have been completed (EG: Local Authorities, Natural Gas, Plumbing, Electrical, etc.)
☐ All interconnect wiring between generator, transfer switch and remote annunciator
Note: Service Technician will not pull wires or run conduit for the annunciator (if applicable)

Miscellaneous

1) How close can our Technician get a vehicle and trailer to the generator for Load Bank testing? _____ **Ft/Yds**
2) Does the Genset have a remote radiator? ☐ Yes ☐ No (if **Yes**, please attach details of location)
3) Is the Genset: ☐ on roof ☐ inside ☐ outside ☐ in the grounds of the property
4) Is the Room/Site swept and free of all debris? ☐ Yes
5) Will Contractor/Owner personnel be available for instruction? ☐ Yes
6) Accessibility to elevators, if required? ☐ Yes
7) **Is equipment connected to normal utility power?** ☐ Yes
8) **Can transfer switch be tested at time of generator startup?** **(Note: There will be a power interruption)** ☐ Yes

****

Please note (1): Always refer to manuals shipped with the equipment for proper installation information.

Please note (2): The Cummins Sales and Service Technician will supply lube, oil, anti-freeze and starting battery.

Please note (3): Adjustments after the initial Start-Up are not included in the Start-Up and are not covered by Warranty.

Please note (4): The Contractor/Owner understands that the above items must be completed prior to start up. Should additional trips be needed resulting from Contractor/Owner not completing the above requirements, or if our Service Technician assists in completing any of the tie-ins, the Contractor/Owner will be responsible for the additional labor and mileage incurred. Load Bank Tests will not be conducted during inclement weather. Additional trips will be at contractor/owners' expense.

****