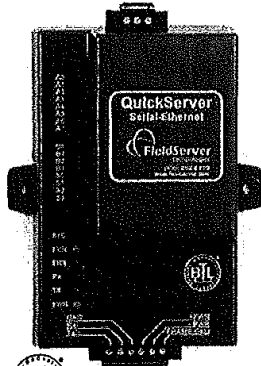


QuickServer



A Sierra Monitor Company

QuickServer Gateway



Serial/Ethernet

QuickServer is a high performance, fully configurable, cost effective building and industrial Automation gateway for Integrators to easily interface devices to networks in commercial buildings and industrial plants.

System Integrators world-wide have benefitted from the value of the powerful line of Interoperability gateways offered by FieldServer Technologies. Now, QuickServer adds to that value by running the same robust FieldServer protocol conversion software on a highly cost effective platform backed by the experience, engineering expertise and proven technical support that Integrators have come to expect from FieldServer.

QuickServer is available in two series. The FS-QS-10XX Series is preloaded with two BAS drivers (serial, Ethernet and/or LonWorks) from a choice of Modbus RTU, Modbus TCP, BACnet/IP®, BACnet MS/TP, LonWorks®, JCI Metasys® N2 and SNMP. Each QuickServer can handle up to 250 points.

The FS-QS-12XX Series QuickServer is available to use any Serial, Ethernet or LonWorks driver in the extensive FieldServer driver library. The FS-QS-12XX Series can handle up to 500 points and is available with a choice of RS-485, RS-232 or RS-422 serial ports, or KNX, in addition to Ethernet and LonWorks (optional).

Each QuickServer includes browser-based tools to make it easy to set-up QuickServer and perform diagnostics including determination of status, network settings, node information, map descriptors and more. The USB flash drive also includes the Discovery utility to determine what FieldServers are on a network.



LonWorks

QuickServer Key Features:

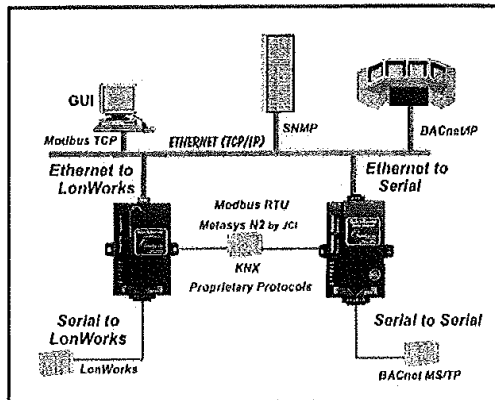
- ♦ Ability to interface up to 250 points (500 points on the FS-QS-12XX)
- ♦ Multi-configuration capability; specific configurations selectable via DIP switches or software
- ♦ Flat panel mount standard, DIN rail mount option
- ♦ DIP switches to select baud rate or node ID on the fly
- ♦ BACnet COV support for fast data communication while reducing the traffic over a BACnet network

FieldServer Offers:

- ♦ Largest protocol driver library in the industry, providing the solution to your integration needs
- ♦ Over 10 years of experience in design and manufacture of building automation gateways with thousands of installation, over 700 translation paths using over 100 protocol drivers
- ♦ Trusted, proven technical support before and after shipment
- ♦ FieldServer Technologies partners with BAS and Fire Alarm Panel manufacturers and trade associations to ensure that the drivers and hardware meet your highest industry expectations

Accessories:

- ♦ Optional Accessory Kit includes AC power supply, DIN mounting bracket assembly, Ethernet cable, mini-screwdriver and a USB flash drive with all data sheets, manuals, ENotes, Discovery tool and more.



LonWorks® is a trademark of Echelon Corporation
Metasys® is a trademark of Johnson Controls
BACnet® is a trademark of ASHRAE
KNX is a trademark of KNX Association

FieldServer Technologies, 1991 Tarob Court, Milpitas, California 95035 USA Web: www.fieldserver.com
Tel: 408-262-2299, FAX: 408-262-2269, Toll-Free: 888-509-1970 Email: sales@fieldserver.com

QuickServer



Specifications

Field Connections

	Interface Connections					
	RS-232 ¹	RS-485 ²	RS-422 ³	KNX ⁶	Ethernet ⁴	LonWorks ⁵
FS-QS-1010		2			1	
FS-QS-1011		1			1	1
FS-QS-1210		2			1	
FS-QS-1211		1			1	1
FS-QS-1220	1	1			1	
FS-QS-1221	1				1	1
FS-QS-1230		1	1		1	
FS-QS-1231			1		1	1
FS-QS-1240		1		1	1	
FS-QS-1241				1	1	1

1. TX/Rx/GND
2. +/-Frame Ground
3. See Manual
4. 10/100 Base T
5. FTT10
6. KNX/EIB TP1

Environment

- Operating temperature: -40 to 75°C (-40 to 167°F)
- Relative humidity: 5-90% RH non-condensing

Power Requirements

- 9-30 VDC or 12-24 VAC
- Current draw @ 12V
 - ◆ FS-QS-1010, FS-QS-12X0: 150 mA
 - ◆ FS-QS-1011, FS-QS-12X1: 279 mA

Physical Dimensions (HxWxD)

- 4.5 x 2.9 x 1.6 in. (11.6 x 7.4 x 4.1 cm)
- 0.4 lbs (0.2 Kg)

Other

- Configuration/Diagnostic utilities
- Capacity: 250 points FS-QS-11XX(500 points FS-QS-12XX)
- Table, Wall or DIN rail mount

Communication

- Baud: 4800, 9600, 19200, 38400, 57600, 115200
- Start Bit: 7, 8
- Stop Bit: 1, 2
- Parity: Even, Odd, None

Approvals

- TUV approved to UL 916 and CSA C22.2 standards
- BTL Mark
- LonMark Certified (FS-QS-1011 and FS-QS-12X1)
- RoHS Compliant
- GOST-R Certified
- CE and FCC

LonMark Certification on the QuickServer FS-QS-1XX1-XXX

- SPID: 80:00:96:46:00:84:04:01
- Profiles:
 - 0000 - Node object (1)
 - 0001 - Open Loop Sensor Object (5)
 - 0003 - Open Loop Actuator Object (5)



Ordering Information

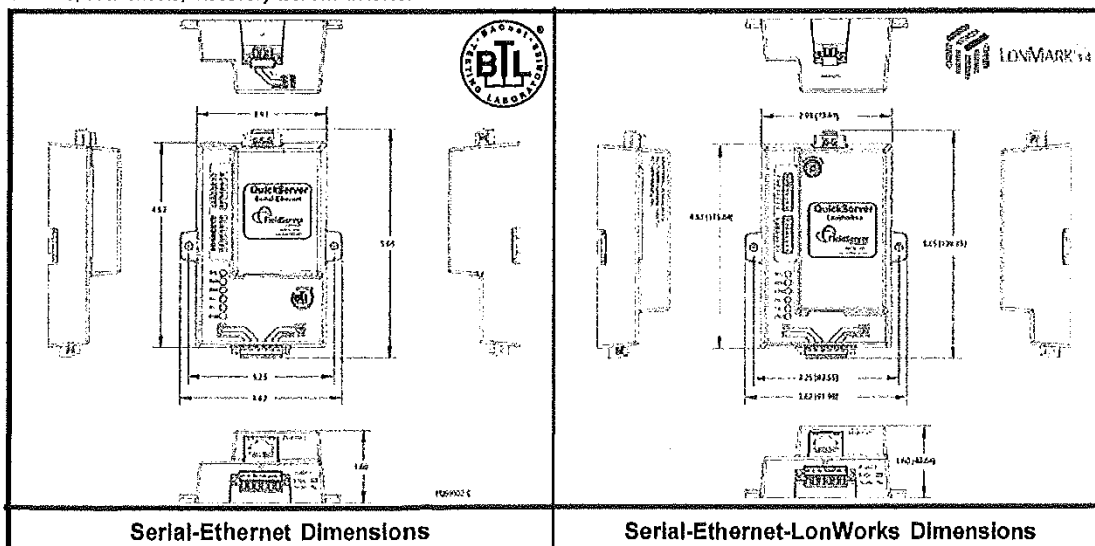
QuickServer is available in multiple driver configurations. Check the website (www.fieldserver.com/QuickServer/) for specific part numbers.

Model	- QuickServer	- Model	- 2 nd Serial Port*	- LonWorks	- Protocols
FS-QS	- 1 = QuickServer	- 0 = BAS	- 1 = RS-485	- 0 = None	- 4 digit protocol code
		- 2 = Enhanced	- 2 = RS-232	- 1 = LonWorks	
			- 3 = RS-422		
			- 4 = KNX		
			* RS-232/RS-422 / KNX FS-QS-12XX only		

Options

FS-8915-36-QS Accessory Kit, 110/220V

The Accessory Kit consists of a temporary power supply, Ethernet cable, Screwdriver, DIN Rail Mount, and USB flash drive of all manuals, data sheets, Discovery tool and ENotes.

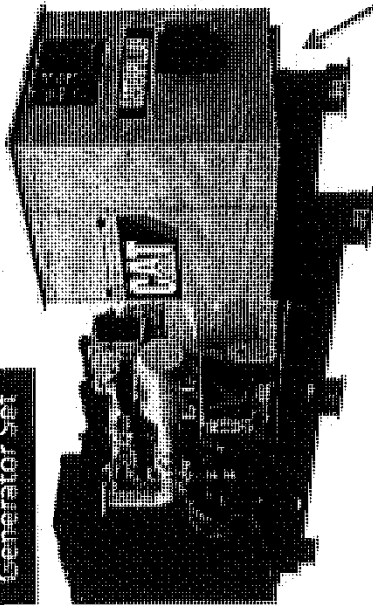


FieldServer Technologies, 1991 Tarob Court, Milpitas, California 95035 USA Web: www.fieldserver.com
Tel: 408-262-2299, FAX: 408-262-2269, Toll-Free: 888-509-1970 Email: sales@fieldserver.com



CALL (816) 753-5300

Generator Set

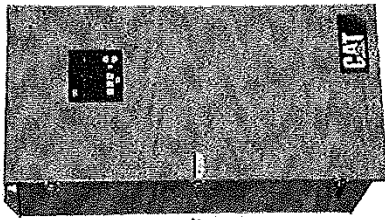


Transfer Switch Wiring

START WIRING – requires 2 each stranded #14AWG for 2-wire remote start signal from transfer switch to genset control panel.

AUX CONTACTS – require 2 each stranded #14AWG for transfer switch position signal from transfer switch to genset control panel

NETWORK CARD – Contact Foley Caterpillar for proper wiring solution.



Automatic Transfer Switch

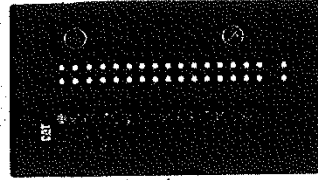
Annunciator Wiring to Genset Control Panel

EMCP 3 Controller – with CANBUS Require 2 each stranded #14AWG for battery power (red/black) and 1 each run of J1939 cable – (Northwire FJ19391192-001 or Raychem 2019D0301-U) shielded cable or equivalent.

EMCP 4 Controller – with RS485 Require 2 each stranded #14AWG for battery power (red/black) and 1 each run of BELDEN 83703 shielded cable or equivalent.

OLYMPIAN Controller – with RS485 Require 2 each stranded #14AWG for battery power (red/black) and 1 each run of BELDEN 3105A shielded cable or equivalent.

Remote Annunciator



Alarm Relay Wiring

Run Relay – requires 2 each stranded #14AWG from genset control panel to customer device.

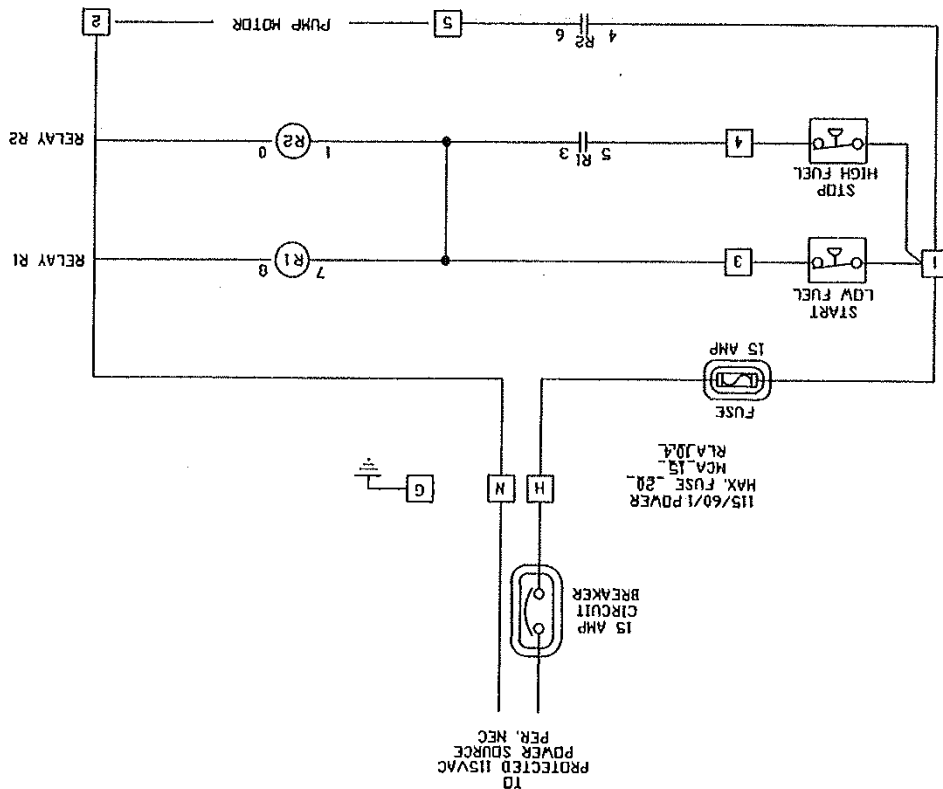
Common Alarm Relay – requires 2 each stranded #14AWG from genset control panel to customer device.

OLYMPIAN I/O module – requires 2 each stranded #14AWG from genset control panel to each of the customer I/O requirements. (consult Foley Power Solutions for assistance)

Alarm Relay's



DO NOT TERMINATE/LAND or ENERGIZE ANY CONDUCTORS – FOLEY'S STARTUP TECH WILL COMPLETE THE FINAL CONNECTION. WIRE SIZES ARE VALID FOR UP TO 800 FEET. CONSULT FOLEY FOR FURTHER DISTANCES



REVISIONS No. By Date		WEDLAKE FABRICATING INC. 6041 N. YORKTOWN TULSA, OK. 74130-1575 PHONE: (918) 428 - 1641 FAX: (918) 428 - 1620		TITLE: SINGLE PUMP CONTROL	
		SCALE: N/A DATE: 09/10/03 SUB-TITLE: ELECTRICAL SCHEMATIC		QUALITY CONTROL APPROVED BY:	
				DRAWN BY: 558-98	
				JOB: 6059	
				DRAWING NUMBER	
				PAGE 1 of 1	

LEGEND

NOTES:

Department of Administration

700 SW Harrison St Suite 300
Topeka KS 66603
United States

Vendor: 0000046224
FOLEY EQUIPMENT COMPANY
BILL MCGOVERN
1550 S WEST ST
WICHITA KS 67213-1668

Dispatch via E-Mail

Purchase Order	Date	Revision	Page
17300-0000012097	06/12/2013		1
Payment Terms	Freight Terms	Ship Via	
Due Now	FOB Dest Frght Prepaid Allow	Common	
Buyer	Phone		
Jerry M Clements	785/296-7251	jerry.clements@da.ks.gov	

Ship To: 173S04
Off Facilities & Procurement Mgmt-Ship
800 SW Jackson
Suite 600
Topeka KS 66612-1216
United States

Bill To: 700 SW Harrison St Suite 300
Topeka KS 66603
United States

Currency USD

Line-Sch	Item/Description	Mfg ID	Quantity UOM	PO Price	Extended Amt	Due Date
1- 1	CATERPILLAR 450 KW Diesel Generator Unit Per Your Response to Bid #EVT0002394 and Specifications Contained Therein.		1.00 EA	87,057.60	87,057.60	09/13/2013

Schedule Total 87,057.60

Item Total 87,057.60

Project Manager: George Steele - (785) 296-4693
Site Contact: Cliff Flowers - (785) 296-1318

Total PO Amount 87,057.60

This document represents a purchase order of the State of Kansas for the material or service described above. Please deliver the items or perform the service in accordance with the terms contained above. I certify that sufficient funds are available to cover this order. By acceptance of this purchase order, you agree to abide by the provisions of K.S.A. 44-1030. The items included on the purchase order are for the exclusive use of the State of Kansas and are exempt from Federal excise taxes under registration number 78-73-0167K and from Kansas sales tax under KSA 79-3606(b).

Authorized Signature

Kent E. Olson

Department of Administration
 700 SW Harrison St Suite 300
 Topeka KS 66603
 United States

Vendor: 0000043966
 KRIZ DAVIS CO
 PO BOX 125
 SAINT JOSEPH MO 64502-0125

CHANGE ORDER

Dispatch via E-Mail

Purchase Order	Date	Revision	Page
17300-0000012429	06/26/2013	1 - 06/27/2013	1
Payment Terms	Freight Terms	Ship Via	
Due Now	FOB Dest Frght Prepaid Allow	Common	
Buyer	Phone		
Ramona A Flower	7852968070	mona.flower@da.state.ks.us	

Ship To: 173S04
 Off Facilities & Procurement Mgmt-Ship
 800 SW Jackson
 Suite 600
 Topeka KS 66612-1216
 United States

Bill To: 700 SW Harrison St Suite 300
 Topeka KS 66603
 United States

Currency USD

Line-Sch	Item/Description	Mfg ID	Quantity UOM	PO Price	Extended Amt	Due Date
1- 1	generator switch board		1.00 LOT	46,596.00	46,596.00	06/26/2013
Schedule Total					<u>46,596.00</u>	
Contract ID: 12024		Contract Line: 0		Release: 349		
Item Total					<u>46,596.00</u>	
Total PO Amount					<u>46,596.00</u>	

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Authorized Signature

Kent E. Olson



Quotation

Q2C Number: 33099910

Quote Number: 2

Revision Number: 0

Project Name: STATE OF KS DOCKING GENERATOR SWB

Project Sub-Name:

Project Location: TOPEKA, KS

Quote Name: STATE OF KS DOCKING GEN AUTO TRANS

Through Addenda Number: 0

Bid Date: 05/09/2013

Consultant / Specifier:

Contractor / Installer:

Sales Representative: DAVID FARMER

Conditions of Sale

This Quotation is subject to Schneider Electric USA, Inc.'s published Conditions of Sale

Payment Terms: STANDARD

Billing Type(s):

Currency: US DOLLARS

Quote Markings

PRICE \$ 46,596.00
QUOTE # 33099910

PRICING IS BASED ON THIS BILL OF
MATERIAL AND QUANTITIES SHOWN.
ANY DEVIATIONS FROM THIS QUOTE WILL
AFFECT THE QUOTED PRICE. PRICES DO
NOT INCLUDE SALES TAXES. 6/24/13

Monks
Dave

Q2C Number: 33099910

Quote Number: 2

Revision Number: 0

Project Name: STATE OF KS DOCKING GENERATOR SWB

Quote Name: STATE OF KS DOCKING GEN AUTO
TRANS

Item No.	Qty.	Catalog Number / Details
002-00	1	Designation: GENERATOR SWITCHBOARD SQUARE D CUSTOM QED SWITCHBOARD QED Switchboard Square D Custom Switchboard Designed and Tested in accordance with: UL 891/NATIONAL ELECTRIC CODE/NEMA PB-2 System Voltage - 208Y/120V 3Ph 4W 60Hz Source Description - Main-Generator System Ampacity - 1200A Bussing - Silver Plated Copper Neutral Bus - 100% Max Available Fault Current (RMS) - 42kA Enclosure - Type 1 Accessibility: Front Only Exterior Paint Color - ANSI 49 Ground Lug provided for each device Copper Ground Bus Lineup 1 BTU: 15984 Auto Throw-over System . Standard Main-Generator . Transition Delay - 2 (SEC) . Source Loss Delay - 3 (SEC) . Utility Stabilization Delay - 10 (SEC) . Generator Stabilization Delay - 10 (SEC) . Generator Cooldown Delay - 15 (MIN) . Generator Exercise Duration - 30 (MIN) . Generator Exercise with Load Switch . Transition Type - Closed . Automatic Retransfer Switch . Touchscreen HMI Dimensions 1 - 54" Wide Section(s) 2 - 36" Wide Section(s) 1 - 24" Wide Section(s) 4 - 36" Deep Enclosure(s) Dimensions: 150.00" W X 36" Max D X 91.5" H Approximate Weight: 3469.00 Incoming Requirements Suitable for Use As Service Entrance - Incoming One Entry Point: Section 3, Through the Top Connection Type: Cable Suitable for Use As Service Entrance - Incoming Two Entry Point: Section 2, Through the Top Connection Type: Cable Mains 1 - 1200AF/1200AT 100% 3 Pole Stored Energy, Fixed Mounted Circuit Breaker, UL: Type NW Device Associated to Incoming Two 1 - 1200AF/1200AT 100% 3 Pole Stored Energy, Fixed Mounted Circuit Breaker, UL: Type NW

Q2C Number: 33099910

Quote Number: 2

Revision Number: 0

Project Name: STATE OF KS DOCKING GENERATOR SWB

Quote Name: STATE OF KS DOCKING GEN AUTO
TRANS

Item No.	Qty.	Catalog Number / Details
		Device Associated to Incoming One Common Main Features: Ammeter Trip Unit, Long Time, Short Time, Instantaneous Auxiliary Switches 8A-8B Overcurrent Trip Switch 1A/1B Form C Contact (SDE) Second Shunt Trip without Communications - 120Vac Padlock Attachment Shunt Trip without Communications - 120Vac Contact Wear Indication - Visual Spring Charging Motor - 120Vac Shunt Close without Communications - 120Vac Feeders ----- Devices Associated to Main 1: 2 - 15AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type HG 1 - 35AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type HG 3 - 100AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type HG 4 - 200AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type JG 1 - 250AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type JG 1 - 300AT 208V 80% Rated 42 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type LA 1 - 175AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type JG 1 - 30AT 208V 80% Rated 65 kA 3 Pole UL, Group Mounted Thermal Magnetic Circuit Breaker: Type HG
003-00	1	AUTOTHROW Over Start-up

Department of Administration

700 SW Harrison St Suite 300
Topeka KS 66603
United States

Vendor: 0000043966
KRIZ DAVIS CO
PO BOX 125
SAINT JOSEPH MO 64502-0125

Dispatch via E-Mail

Purchase Order	Date	Revision	Page
17300-0000012430	06/26/2013		1
Payment Terms	Freight Terms	Ship Via	
Due Now	FOB Dest Frgt Prepaid Allow	Common	
Buyer	Phone		
Ramona A Flower	7852968070	mona.flower@da.state.ks.us	

Ship To: 173S04
Off Facilities & Procurement Mgmt-Ship
800 SW Jackson
Suite 600
Topeka KS 66612-1216
United States

Bill To: 700 SW Harrison St Suite 300
Topeka KS 66603
United States

Currency USD

Line-Sch	Item/Description	Mfg ID	Quantity UOM	PO Price	Extended Amt	Due Date
1- 1	circuit breaker		1.00 LOT	9,043.00	9,043.00	06/26/2013

Schedule Total 9,043.00

Contract ID: 12024

Contract Line: 0 **Release:** 350

Item Total 9,043.00

Total PO Amount 9,043.00

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Authorized Signature

Kent E. Olson



Quotation

Q2C Number: 29528680

Quote Number: 8

Change Order Rev Number: 26

Project Name: DOCKING STATE OFFICE BUILDING

Project Sub-Name: Budget Layout

Project Location: TOPEKA, KS

Bld Date: 05/16/2013

Contractor / Installer: STATE OF KANSAS DIV OF PURCHASES

Sales Representative: DAVID FARMER

\$ 9,043.00

Quote Markings

Quote Name: ADD 1200A BKR TO 480V SWBD

Q2C Number: 29528680

Quote Number: 8

Change Order Rev Number: 26

Project Name: DOCKING STATE OFFICE BUILDING

Quote Name: ADD 1200A BKR TO 480V SWBD

Item No.	Qty.	Catalog Number / Details
057-00	1	PLA34120U44AYP MOLDED CASE CIRCUIT BREAKER 480V 1200A PLA34120U44AYP UL/CSA Rated PowerPact P Frame 1 Line Standard Terminations 1200 Amp Capacity 3 Pole Device 480 Vac Rated 80% Rated - Standard rated Interrupting Rating 125kA @ 240Vac/100kA @ 480Vac Micrologic Ammeter Trip Unit - LSIG UL Rating Plug A ABC Phasing Handle padlock attachment - ON or OFF positions Revision - 5/14/2013 - (130402/130402) 5/15/2013 5:36:19 PM

Purchase Order

Number: PO30307
Blanket Order

Ref #: WO-254298
Date 08/21/2013

State of Kansas
D/A Facilities & Procurement

PAGE 1 OF 1

Vendor: K-0362

SHIP TO:

KRIZ-DAVIS CO. "Lighting Equip"
PO BOX 1573

TOPEKA, KS 666011573
Ph: 785-354-9532 Fax: 785-354-1129
Contact: 11444 6/2013

State of Kansas
Capitol Complex - Docking State Office Building
915 SW Harrison, Loading Dock, Rm B-93
Ph: 785-296-8024 Fax: 785-291-3017
Topeka, KS 66612
Ph: 785-296-2355 Fax: 785-291-3017

Comments : Contract

Project 1892
Dept 1730301000
Fund 1000
BU 8170
Prog 99010
Acct 542020

Ship Instr. :
Required :
Attention :
Requester : Flowers, Cliff 296-3027

Tracking # :
Project # :
Buyer : Ramona A Flower
Type : One Time Purchase

Line	Part Code	Part Description	OTP Code	Qty	Unit	Cost	Ext'd
1	OTP	Transformer and lug kits per attached Quote # 33601154	OTP	1.00		12,490.0000	12,490.00

Leadtime until delivery of order is _____ days.
If this is a quote, this quote is good for _____ days.
* Please send 1 copy of your invoice.
Order to be entered with prices, delivery, and specification shown above.

Subtotal: 12,490.00
Est Tax:
Est Freight:
Est Total: 12,490.00

Vendor's Signature: _____
Notify us immediately if you are unable to ship as specified.

Cliff E. Flower 08-21-13
Authorized By Date

Internal Quotation



Phone: ()- Fax: ()-

Project Name: FACILITIES TRANSFORMER Project Location: TOPEKA Customer Name: STATE OF KANSAS Q2C Number: 33601154 Quote Number: 1	Accessories Fuses NOT Included Overloads NOT Included Lamps NOT Included Lug Kits NOT Included
--	---

Initiator: MCGOUGH, DAVE

Contact:

Customer Net:

Distributor Net:

Quote Notes

Confidential Notes

PRICE \$ <u>12,490.00</u>
QUOTE # <u>33601154</u>
PRICING IS BASED ON THIS BILL OF MATERIAL AND QUANTITIES SHOWN. ANY DEVIATIONS FROM THIS QUOTE WILL AFFECT THE QUOTED PRICE. PRICES DO NOT INCLUDE SALES TAXES. 8/18/13

Thanks!
Dave

Internal Quotation



Phone: ()- Fax: ()-

Project Name: FACILITIES TRANSFORMER
Project Location: TOPEKA
Customer Name: STATE OF KANSAS
Q2C Number: 33601154
Quote Number: 1

Accessories

Fuses NOT Included
Overloads NOT Included
Lamps NOT Included
Lug Kits NOT Included

Item Number	Quantity	Catalog Number / Details	Unit Price	Extended Price
001-00	1	EE500T68HCU Transformer Dry Type 500kVA 480D208Y120		
002-00	1	DASKP1000 LUG KIT		
003-00	1	DASKS1200 LUG KIT		



New Enclosed Caterpillar 450 kW (C15)
Diesel Emergency Standby Generator Set

Submittal Documents

Docking Building – City of Topeka

June – 2013



Image shown is representative of genset.

1637 SW 42nd
Topeka, KS 66609
Ph: (785) 266-5770

5701 E. 87th Street
Kansas City, MO 64132
Ph: (816) 753-5300

3305 S. West Street
Wichita, KS 67213
Ph: (316) 943-4211

1600 E. Wyatt Earp Blvd.
Dodge City, KS 67801
Ph: (620) 225-4121



Equipment Submittal Contents

Standard Genset Spec Sheet

Generator Set Performance

Generator End Performance

Generator Thermal Damage Curve

Sound Attenuated Enclosure

Subbase Fuel Tank

EMCP 4.2 Data Sheet / Electrical Drawing

Remote Annunciator

ADEM 4 Data Sheet

Analog Voltage Regulator

Circuit Breaker

Jacket Water Heater

Battery Charger

Battery Charger & Jacket Water Heater Schematic

Batteries

Fuel Level Management System

Enclosure Drawing With Fuel Tank Drawings

Fuel Tank Drawing

Engine Drawings

Emissions Certificate

Limited Warranty



Image shown may not reflect actual package.

STANDBY

**450 kW 563 kVA
60 Hz 1800 rpm 208 Volts**

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

FEATURES

FUEL/EMISSIONS STRATEGY

- EPA Certified for Stationary Emergency Application (EPA Tier 3 emissions levels)

DESIGN CRITERIA

- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response.

UL 2200 / CSA - Optional

- UL 2200 listed packages
- CSA Certified
- Certain restrictions may apply. Consult with your Cat® Dealer.

FULL RANGE OF ATTACHMENTS

- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

SINGLE-SOURCE SUPPLIER

- Fully prototype tested with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT

- Cat dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- The Cat® S·O·SSM program cost effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by-products

CAT® C15 ATAAC DIESEL ENGINE

- Utilizes ACERT™ Technology
- Reliable, rugged, durable design
- Field-proven in thousands of applications worldwide
- Four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight
- Electronic engine control

CAT GENERATOR

- Matched to the performance and output characteristics of Cat engines
- Load adjustment module provides engine relief upon load impact and improves load acceptance and recovery time
- UL 1446 Recognized Class H insulation

CAT EMCP 4 CONTROL PANELS

- Simple user friendly interface and navigation
- Scalable system to meet a wide range of customer needs
- Integrated Control System and Communications Gateway

SEISMIC CERTIFICATION

- Seismic Certification available
- Anchoring details are site specific, and are dependent on many factors such as generator set size, weight, and concrete strength. IBC Certification requires that the anchoring system used is reviewed and approved by a Professional Engineer
- Seismic Certification per Applicable Building Codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007
- Pre-approved by OSHPD and carries an OSP-0084-10 for use in healthcare projects in California

STANDBY 450 kW 563 kVA

60 Hz 1800 rpm 208 Volts



FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

System	Standard	Optional
Air Inlet	• Air cleaner	
Cooling	• Package mounted radiator	
Exhaust	• Exhaust flange outlet	☐ Industrial ☐ Residential ☒ Critical Mufflers
Fuel	• Primary fuel filter with integral water separator • Secondary fuel filters • Fuel priming pump	
Generator	• Matched to the performance and output characteristics of Cat engines • Load adjustment module provides engine relief upon load impact and improves load acceptance and recovery time • IP23 protection	☐ Oversize and premium generators ☒ Permanent magnet excitation (PMG) ☐ Internal excited (IE) ☒ Anti-condensation space heaters
Power Termination	• Bus bar	☒ Circuit breakers, UL listed ☐ Circuit breakers, IEC compliant
Control Panel	• EMCP 4 Genset Controller	☒ EMCP 4.2 ☐ EMCP 4.3 ☐ EMCP 4.4 ☒ Local and remote annunciator modules ☐ Load share module ☐ Digital I/O module ☐ Remote monitoring software
Mounting	• Rubber vibration isolators	
Starting/Charging	• 24 volt starting motor • Batteries	☒ Battery chargers 10 ☐ Oversize batteries ☒ Jacket water heater ☐ Heavy duty starting system ☒ Charging alternator 45
General	• Paint - Caterpillar Yellow except rails and radiators gloss black	The following options are based on regional and product configuration: ☐ Seismic Certification per Applicable Building Codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007 ☒ UL 2200 package ☐ EU Certificate of Conformance (CE) ☐ CSA Certification ☐ EEC Declaration of Conformity ☐ Narrow, wide or skid base ☒ Sound attenuated, weather protective or high ambient weather protective enclosures ☐ Single or dual wall integral fuel tanks ☒ Single or dual wall sub-base fuel tanks ☐ Integral & sub-base UL listed dual wall fuel tanks ☐ Automatic transfer switches (ATS)

STANDBY 450 ekW 563 kVA

60 Hz 1800 rpm 208 Volts



SPECIFICATIONS

CAT GENERATOR

Frame size.....LC6124F
Excitation.....Internal Excitation
Pitch.....0.6667
Number of poles.....4
Number of bearings.....Single bearing
Number of Leads.....012
Insulation.....UL 1446 Recognized Class H with
tropicalization and antiabrasion
- Consult your Caterpillar dealer for available voltages
IP Rating.....Drip Proof IP23
Alignment.....Pilot Shaft
Overspeed capability.....125
Wave form Deviation (Line to Line).....2%
Voltage regulator.....Three phase sensing
Voltage regulation.....Less than +/- 1/2% (steady state)
Less than +/- 1/2% (w/ 3% speed change)

CAT DIESEL ENGINE

C15 ATAAC, I-6, 4-Stroke Water-cooled Diesel
Bore.....137.20 mm (5.4 in)
Stroke.....171.40 mm (6.75 in)
Displacement.....15.20 L (927.56 in³)
Compression Ratio.....16.1:1
Aspiration.....Air-to-Air Aftercooled
Fuel System.....MEUI
Governor Type.....Caterpillar ADEM control system

CAT EMCP 4 SERIES CONTROLS

EMCP 4 controls including:

- Run / Auto / Stop Control
- Speed and Voltage Adjust
- Engine Cycle Crank
- 24-volt DC operation
- Environmental sealed front face
- Text alarm/event descriptions

Digital indication for:

- RPM
- DC volts
- Operating hours
- Oil pressure (psi, kPa or bar)
- Coolant temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- ekW, kVA, kVAR, kW-hr, %kW, PF (4.2 only)

Warning/shutdown with common LED indication of:

- Low oil pressure
- High coolant temperature
- Overspeed
- Emergency stop
- Failure to start (overcrank)
- Low coolant temperature
- Low coolant level

Programmable protective relaying functions:

- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under Frequency (81 o/u)
- Reverse Power (kW) (32) (4.2 only)
- Reverse reactive power (kVAR) (32RV)
- Overcurrent (50/51)

Communications:

- Four digital inputs (4.1)
- Six digital inputs (4.2 only)
- Four relay outputs (Form A)
- Two relay outputs (Form C)
- Two digital outputs
- Customer data link (Modbus RTU) (4.2 only)
- Accessory module data link (4.2 only)
- Serial annunciator module data link (4.2 only)
- Emergency stop pushbutton

Compatible with the following:

- Digital I/O module
- Local Annunciator
- Remote CAN annunciator
- Remote serial annunciator

STANDBY 450 kW 563 kVA

60 Hz 1800 rpm 208 Volts



TECHNICAL DATA

Open Generator Set - - 1800 rpm/60 Hz/208 Volts	DM8153	
EPA Certified for Stationary Emergency Application (EPA Tier 3 emissions levels)		
Generator Set Package Performance Genset Power rating @ 0.8 pf Genset Power rating with fan	562.5 kVA 450 kW	
Fuel Consumption 100% load with fan 75% load with fan 50% load with fan	132.2 L/hr 106.4 L/hr 79.3 L/hr	34.9 Gal/hr 28.1 Gal/hr 20.9 Gal/hr
Cooling System¹ Air flow restriction (system) Air flow (max @ rated speed for radiator arrangement) Engine Coolant capacity with radiator/exp. tank Engine coolant capacity Radiator coolant capacity	0.12 kPa 720 m ³ /min 57.8 L 20.8 L 37.0 L	0.48 in. water 25427 cfm 15.3 gal 5.5 gal 9.8 gal
Inlet Air Combustion air inlet flow rate	41.8 m ³ /min	1476.2 cfm
Exhaust System Exhaust stack gas temperature Exhaust gas flow rate Exhaust flange size (internal diameter) Exhaust system backpressure (maximum allowable)	492.0 °C 111.9 m ³ /min 152.4 mm 10.0 kPa	917.6 °F 3951.7 cfm 6.0 in 40.2 in. water
Heat Rejection Heat rejection to coolant (total) Heat rejection to exhaust (total) Heat rejection to atmosphere from engine Heat rejection to atmosphere from generator	178 kW 505 kW 77 kW 27.7 kW	10123 Btu/min 28719 Btu/min 4379 Btu/min 1575.3 Btu/min
Alternator² Motor starting capability @ 30% voltage dip Frame Temperature Rise	1325 skVA LC6124F 130 °C	234 °F
Lube System Sump refill with filter	60.0 L	15.9 gal
Emissions (Nominal)³ NOx g/hp-hr CO g/hp-hr HC g/hp-hr PM g/hp-hr	3.7 g/hp-hr .26 g/hp-hr .03 g/hp-hr .025 g/hp-hr	

¹ For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

² Generator temperature rise is based on a 40° C (104° F) ambient per NEMA MG1-32. Some packages may have oversized generators with a different temperature rise and motor starting characteristics.

³ Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77°F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

STANDBY 450 ekW 563 kVA

60 Hz 1800 rpm 208 Volts



RATING DEFINITIONS AND CONDITIONS

Applicable Codes and Standards: AS1359, CSA C22.2 No 100-04, UL142, UL489, UL601, UL869, UL2200, NFPA 37, NFPA 70, NFPA 99, NFPA 110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, NEMA MG 1-33, 72/23/EEC, 98/37/EC, 2004/108/EC

Standby - Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Ratings are based on SAE J1349 standard conditions.

These ratings also apply at ISO3046 standard conditions.

Fuel Rates are based on fuel oil of 35° API (16° C or 60° F) gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.).

Additional Ratings may be available for specific customer requirements. Consult your Cat representative for details.

STANDBY 450 ekW 563 kVA

60 Hz 1800 rpm 208 Volts



DIMENSIONS

Package Dimensions	
Length	Information not available at this time.
Width	
Height	

NOTE: For reference only - do not use for installation design. Please contact your local dealer for exact weight and dimensions. (General Dimension Drawing #2781052).

Approximate Weight without fuel: 14,000

Performance No.: DM8153

Feature Code: C15DE8L

Gen. Arr. Number: 2351212

Source: U.S. Sourced

March 15 2013

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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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Performance Number: DM8153

Change Level: 03

SALES MODEL:	C15	COMBUSTION:	DI
ENGINE POWER (BHP):	691	ENGINE SPEED (RPM):	1,800
GEN POWER W/O FAN (EKW):	466.0	HERTZ:	60
GEN POWER WITH FAN (EKW):	450.0	FAN POWER (HP):	32.6
COMPRESSION RATIO:	16.1	ASPIRATION:	TA
APPLICATION:	PACKAGED GENSET	AFTERCOOLER TYPE:	ATAAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
SUB APPLICATION:	STANDARD	INLET MANIFOLD AIR TEMP (F):	120
PUMP QUANTITY:	1	JACKET WATER TEMP (F):	192.2
FUEL TYPE:	DIESEL	TURBO CONFIGURATION:	SINGLE
MANIFOLD TYPE:	DRY	TURBO QUANTITY:	1
GOVERNOR TYPE:	ELEC	TURBOCHARGER MODEL:	GTA5518BS-56T-1.58
CAMSHAFT TYPE:	STANDARD	CERTIFICATION YEAR:	2006
IGNITION TYPE:	CI	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,025.0
INJECTOR TYPE:	EUI		
REF EXH STACK DIAMETER (IN):	6		
MAX OPERATING ALTITUDE (FT):	4,921		

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
450.0	100	689	327	0.353	34.8	72.4	117.6	1,229.7	52.3	916.3
405.0	90	619	294	0.360	31.9	67.4	116.3	1,198.5	47.5	897.6
360.0	80	551	262	0.372	29.3	62.9	114.0	1,169.5	44.2	878.7
337.5	75	518	246	0.379	28.0	60.5	112.9	1,154.9	42.4	871.7
315.0	70	485	230	0.385	26.7	57.7	111.7	1,139.7	40.2	866.6
270.0	60	420	199	0.398	23.9	51.3	109.2	1,109.0	35.3	856.2
225.0	50	356	169	0.410	20.9	43.7	106.5	1,077.1	29.7	841.8
180.0	40	294	139	0.413	17.3	31.9	98.6	1,023.0	22.3	818.6
135.0	30	231	110	0.415	13.7	20.2	91.1	948.5	15.3	781.9
112.5	25	199	95	0.418	11.9	14.9	88.1	903.1	12.1	758.2
90.0	20	167	79	0.428	10.2	10.6	86.3	848.1	9.6	724.1
45.0	10	101	48	0.490	7.1	4.9	86.4	698.9	6.4	607.3

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
450.0	100	689	76	410.5	1,479.3	3,929.1	6,431.8	6,674.9	1,404.0	1,282.8
405.0	90	619	71	390.4	1,409.3	3,680.8	6,112.4	6,335.6	1,333.4	1,221.3
360.0	80	551	66	375.2	1,359.8	3,491.1	5,888.0	6,093.2	1,282.5	1,178.3
337.5	75	518	64	366.8	1,331.0	3,391.2	5,757.9	5,954.0	1,252.3	1,152.2
315.0	70	485	61	356.7	1,294.9	3,276.3	5,595.3	5,782.0	1,214.6	1,119.0
270.0	60	420	54	332.4	1,206.9	3,014.8	5,201.8	5,368.8	1,126.4	1,040.2
225.0	50	356	46	302.3	1,096.7	2,707.4	4,712.6	4,858.8	1,022.8	946.5
180.0	40	294	34	250.8	918.2	2,230.2	3,933.9	4,055.0	857.8	795.2
135.0	30	231	22	198.0	739.1	1,742.1	3,155.4	3,251.1	689.9	640.4
112.5	25	199	16	173.3	657.6	1,511.7	2,801.8	2,885.1	610.3	566.8
90.0	20	167	12	152.2	590.5	1,310.0	2,511.3	2,582.7	544.1	506.3
45.0	10	101	6	121.3	502.2	997.0	2,130.7	2,180.2	459.4	431.9

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
450.0	100	689	10,047	4,000	28,699	16,066	3,976	7,546	29,228	74,650	79,521
405.0	90	619	9,392	4,012	26,513	14,705	3,644	6,712	26,261	68,425	72,890
360.0	80	551	8,860	3,878	24,764	13,617	3,352	6,157	23,385	62,937	67,044
337.5	75	518	8,595	3,764	23,911	13,114	3,205	5,855	21,975	60,174	64,101
315.0	70	485	8,320	3,625	22,997	12,597	3,050	5,490	20,573	57,267	61,004
270.0	60	420	7,749	3,399	20,952	11,439	2,728	4,648	17,820	51,226	54,569
225.0	50	356	7,144	3,275	18,528	10,036	2,388	3,694	15,111	44,826	47,751
180.0	40	294	6,396	3,324	15,013	7,961	1,979	2,398	12,455	37,161	39,586
135.0	30	231	5,621	3,047	11,473	5,864	1,564	1,351	9,795	29,370	31,287
112.5	25	199	5,235	2,727	9,844	4,909	1,361	956	8,451	25,546	27,213
90.0	20	167	4,813	2,417	8,356	4,013	1,167	663	7,088	21,908	23,338
45.0	10	101	3,781	2,106	5,716	2,297	809	299	4,287	15,197	16,189

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	450.0	337.5	225.0	112.5	45.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	689	518	356	199	101
TOTAL NOX (AS NO2)	G/HR	2,719	1,306	707	659	428
TOTAL CO	G/HR	331	1,268	2,164	790	526
TOTAL HC	G/HR	34	68	97	55	93
PART MATTER	G/HR	34.4	32.5	27.0	63.6	57.7
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	1,841.1	1,079.6	794.6	1,336.9	1,348.2
TOTAL CO	(CORR 5% O2) MG/NM3	221.0	1,109.1	2,415.6	1,438.4	1,934.9
TOTAL HC	(CORR 5% O2) MG/NM3	20.0	50.0	94.1	104.3	300.8
PART MATTER	(CORR 5% O2) MG/NM3	19.4	22.9	26.4	111.4	166.1
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	897	526	387	651	657
TOTAL CO	(CORR 5% O2) PPM	177	887	1,932	1,151	1,548
TOTAL HC	(CORR 5% O2) PPM	37	93	176	195	562
TOTAL NOX (AS NO2)	G/HP-HR	3.98	2.54	2.00	3.32	4.24
TOTAL CO	G/HP-HR	0.48	2.46	6.11	3.98	5.22
TOTAL HC	G/HP-HR	0.05	0.13	0.27	0.28	0.92
PART MATTER	G/HP-HR	0.05	0.06	0.08	0.32	0.57
TOTAL NOX (AS NO2)	LB/HR	5.99	2.88	1.56	1.45	0.94
TOTAL CO	LB/HR	0.73	2.80	4.77	1.74	1.16
TOTAL HC	LB/HR	0.08	0.15	0.21	0.12	0.20
PART MATTER	LB/HR	0.08	0.07	0.06	0.14	0.13

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	450.0	337.5	225.0	112.5	45.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	689	518	356	199	101
TOTAL NOX (AS NO2)	G/HR	2,518	1,210	655	610	396
TOTAL CO	G/HR	177	678	1,157	423	281
TOTAL HC	G/HR	18	36	51	29	49
TOTAL CO2	KG/HR	344	275	205	115	67
PART MATTER	G/HR	17.7	16.6	13.9	32.6	29.6
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	1,704.7	999.6	735.7	1,237.9	1,248.3
TOTAL CO	(CORR 5% O2) MG/NM3	118.2	593.1	1,291.8	769.2	1,034.7
TOTAL HC	(CORR 5% O2) MG/NM3	10.6	26.4	49.8	55.2	159.2
PART MATTER	(CORR 5% O2) MG/NM3	9.9	11.8	13.5	57.1	85.2
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	830	487	358	603	608
TOTAL CO	(CORR 5% O2) PPM	95	474	1,033	615	828
TOTAL HC	(CORR 5% O2) PPM	20	49	93	103	297
TOTAL NOX (AS NO2)	G/HP-HR	3.68	2.35	1.85	3.07	3.93
TOTAL CO	G/HP-HR	0.26	1.32	3.27	2.13	2.79
TOTAL HC	G/HP-HR	0.03	0.07	0.14	0.15	0.49
PART MATTER	G/HP-HR	0.03	0.03	0.04	0.16	0.29
TOTAL NOX (AS NO2)	LB/HR	5.55	2.67	1.44	1.34	0.87
TOTAL CO	LB/HR	0.39	1.50	2.55	0.93	0.62
TOTAL HC	LB/HR	0.04	0.08	0.11	0.06	0.11
TOTAL CO2	LB/HR	758	606	451	254	149
PART MATTER	LB/HR	0.04	0.04	0.03	0.07	0.07
OXYGEN IN EXH	%	9.9	11.0	12.0	12.5	14.3
DRY SMOKE OPACITY	%	0.5	0.6	0.8	2.2	1.7
BOSCH SMOKE NUMBER		0.22	0.30	0.53	1.41	1.11

Regulatory Information

EPA TIER 3		2005 - 2010		
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20

EPA EMERGENCY STATIONARY		2011 - ----		
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS LIMIT VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 4.0 PM: 0.20

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	691	691	691	691	691	691	691	691	691	691	691	691	691
1,000	691	691	691	691	691	691	691	691	691	691	691	691	691
2,000	691	691	691	691	691	691	691	691	691	691	691	691	691
3,000	691	691	691	691	691	691	691	691	691	689	678	666	691
4,000	691	691	691	691	691	691	691	687	675	663	652	641	691
5,000	691	691	691	691	691	685	673	661	649	638	627	617	691
6,000	691	691	691	684	671	659	647	635	624	613	603	593	688
7,000	691	684	670	657	645	633	621	610	600	589	579	570	666
8,000	670	657	644	632	620	608	597	586	576	566	557	547	644
9,000	644	631	618	606	595	584	573	563	553	544	534	526	623
10,000	618	606	594	582	571	561	550	541	531	522	513	505	602
11,000	593	581	570	559	548	538	528	519	510	501	492	484	582
12,000	569	557	546	536	526	516	507	498	489	480	472	464	562
13,000	545	534	524	514	504	495	486	477	469	461	453	445	543
14,000	523	512	502	493	483	474	466	457	449	442	434	427	524
15,000	501	491	481	472	463	454	446	438	430	423	416	409	506

Cross Reference

Engine Arrangement			
Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2729743	FSE00001	GS282	-
2864922	FSE00001	GS282	-
2864922	FTE00001	GS282	-

Test Specification Data						
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K6280	PP5610	FSE00001	2729743	ELEC		
0K6280	PP5610	FTE00001	2864922	ELEC		

Performance Parameter Reference

Parameters Reference:DM9600-05 PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO90012000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-12002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power	+/- 3%
Torque	+/- 3%
Exhaust stack temperature	+/- 8%
Inlet airflow	+/- 5%
Intake manifold pressure-gage	+/- 10%
Exhaust flow	+/- 6%
Specific fuel consumption	+/- 3%
Fuel rate	+/- 5%
Heat rejection	+/- 5%
Heat rejection exhaust only	+/- 10%

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection	+/- 10%
Heat rejection to Atmosphere	+/- 50%
Heat rejection to Lube Oil	+/- 20%
Heat rejection to Aftercooler	+/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque	+/- 0.5%
Speed	+/- 0.2%
Fuel flow	+/- 1.0%
Temperature	+/- 2.0 C degrees
Intake manifold pressure	+/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25 (77) at 60% relative humidity.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25, 100 KPA 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

PERFORMANCE DATA[DM8153]

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 (84.2), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU Ft) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set. Standard temperature values versus altitude could be seen on TM2001.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001. Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative. Log on to the <https://pdgt.cat.com/cda/layout> Technology and Solutions Divisions (T&SD) web page (<https://pdgt.cat.com/cda/layout>) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:

Regulation watch covers regulations in effect and future regulation changes for world, federal, state and local. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

EMISSIONS DEFINITIONS:

Emissions : DM1176

PERFORMANCE DATA[DM8153]

June 24, 2013

SOUND DEFINITIONS:
Sound Power : DM8702

Sound Pressure : TM7080

RATING DEFINITIONS:
Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

Date Released : 11/23/11

GENERATOR DATA**JUNE 24, 2013**For Help Desk Phone Numbers [Click here](#)**Selected Model**

Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 2351207 **Genset Rating (kVA):** 563.0 **Phase Voltage:** 120
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1562.7
Duty: STANDBY **Connection:** PARALLEL STAR **Application:** EPG **Status:** Current

Version: 40059 /40001 /40151 /3107

Spec Information

Generator Specification			Generator Efficiency		
Frame: LC6134D	Type: LC	No. of Bearings: 1	Per Unit Load	kW	Efficiency %
Winding Type: RANDOM WOUND		Flywheel: 14.0	0.25	112.5	92.2
Connection: PARALLEL STAR		Housing: 1	0.5	225.0	93.9
Phases: 3		No. of Leads: 12	0.75	337.5	93.8
Poles: 4		Wires per Lead: 2	1.0	450.0	93.1
Sync Speed: 1800		Generator Pitch: 0.6667			

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X'_d	0.1846	0.0142
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.2470	0.0190
TRANSIENT - SATURATED X'_d	0.2639	0.0203
SYNCHRONOUS - DIRECT AXIS X_d	4.8951	0.3765
SYNCHRONOUS - QUADRATURE AXIS X_q	2.9371	0.2259
NEGATIVE SEQUENCE X_2	0.2158	0.0166
ZERO SEQUENCE X_0	0.0143	0.0011

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	1.8550
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.1000
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_{d0}	0.0130
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_d	0.0100
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_{q0}	0.1180
SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_q	0.0100
EXCITER TIME CONSTANT T_e	0.0300
ARMATURE SHORT CIRCUIT T_a	0.0150

Short Circuit Ratio: 0.22	Stator Resistance = 0.0032 Ohms	Field Resistance = 0.883 Ohms
---------------------------	---------------------------------	-------------------------------

Voltage Regulation		Generator Excitation		
Voltage level adjustment: +/-	5.0%	No Load	Full Load, (rated) pf	
Voltage regulation, steady state: +/-	0.5%		Series	Parallel
Voltage regulation with 3% speed change: +/-	0.5%	Excitation voltage:	7.04 Volts	49.97 Volts Volts
Waveform deviation line - line, no load: less than	2.0%	Excitation current	0.69 Amps	4.03 Amps Amps
Telephone influence factor: less than	50			

Selected Model

Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
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Generator Mechanical Information

Center of Gravity		
Dimension X	-465.0 mm	-18.3 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.

- "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details
- "Y" is measured vertically from rotor center line. Up is positive.
- "Z" is measured to left and right of rotor center line. To the right is positive.

Generator WT = 1133 kg	* Rotor WT = 442 kg	* Stator WT = 691 kg
2,498 LB	974 LB	1,523 LB

Rotor Balance = 0.0508 mm deflection PTP		
Overspeed Capacity = 125% of synchronous speed		

Generator Torsional Data

J1 = Coupling and Fan

J2 = Rotor

J3 = Exciter End

TOTAL J = J1 + J2 + J3

K1 = Shaft Stiffness between J1 + J2 (Diameter 1)

K2 = Shaft Stiffness between J2 + J3 (Diameter 2)

J1	K1	Min Shaft Dia 1	J2	K2	Min Shaft Dia 2	J3
17.1 LB IN. s ²	51.8 MLB IN./rad	4.5 IN.	43.4 LB IN. s ²	41.0 MLB IN./rad	4.3 IN.	1.5 LB IN. s ²
1.93 N m s ²	5.85 MN m/rad	115.0 mm	4.9 N m s ²	4.63 MN m/rad	110.0 mm	0.17 N m s ²
Total J						
62.0 LB IN. s ²						
7.0 N m s ²						

Caterpillar Generator Data

Selected Model

Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 2351207 **Genset Rating (kVA):** 563.0 **Phase Voltage:** 120
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Version: 40059 /40001 /40151 /3107

Generator Cooling Requirements - Temperature - Insulation Data

Cooling Requirements: **Temperature Data: (Ambient 40 °C)**
Heat Dissipated: 33.4 kW **Stator Rise:** 150.0 °C
Air Flow: 66.0 m³/min **Rotor Rise:** 150.0 °C
Insulation Class: H
Insulation Reg. as shipped: 100.0 MΩ minimum at 40 °C

Thermal Limits of Generator

Frequency: 60 Hz
Line to Line Voltage: 208 Volts
B BR 80/40 436.0 kVA
F BR -105/40 496.0 kVA
H BR - 125/40 545.0 kVA
F PR - 130/40 545.0 kVA
H PR - 150/40 578.0 kVA
H PR27 - 163/27 600.0 kVA

Caterpillar Generator Data

Selected Model

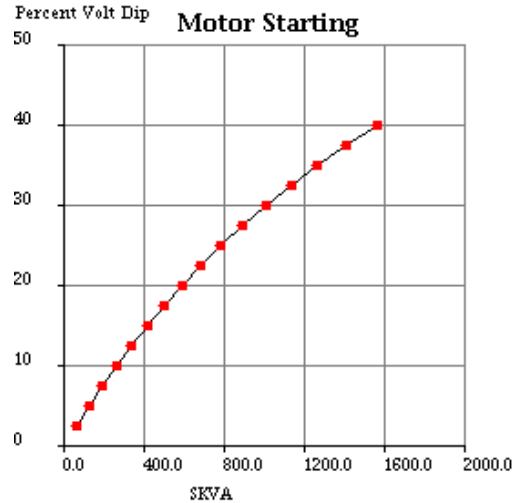
Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 2351207 **Genset Rating (kVA):** 563.0 **Phase Voltage:** 120
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Starting Capability & Current Decrement

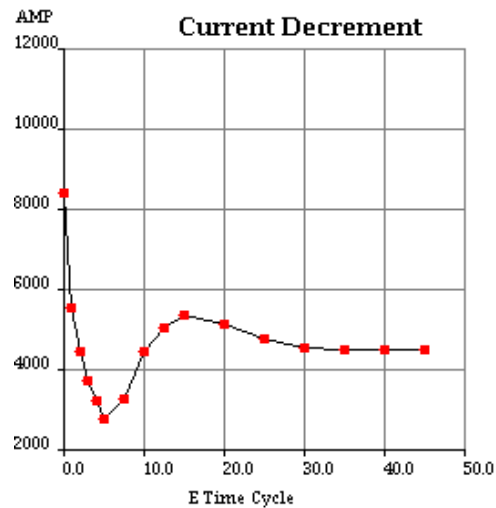
Motor Starting Capability (0.6 pf)

SKVA	Percent Volt Dip
60	2.5
124	5.0
191	7.5
261	10.0
336	12.5
415	15.0
499	17.5
588	20.0
683	22.5
784	25.0
892	27.5
1,008	30.0
1,133	32.5
1,267	35.0
1,412	37.5
1,568	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	8,412
1.0	5,550
2.0	4,436
3.0	3,747
4.0	3,213
5.0	2,770
7.5	3,286
10.0	4,458
12.5	5,057
15.0	5,343
20.0	5,141
25.0	4,761
30.0	4,567
35.0	4,500
40.0	4,490
45.0	4,498



Instantaneous 3 Phase Fault Current: 8412 Amps **Instantaneous Line - Line Fault Current:** 6712 Amps

Instantaneous Line - Neutral Fault Current: 11242 Amps

Selected Model

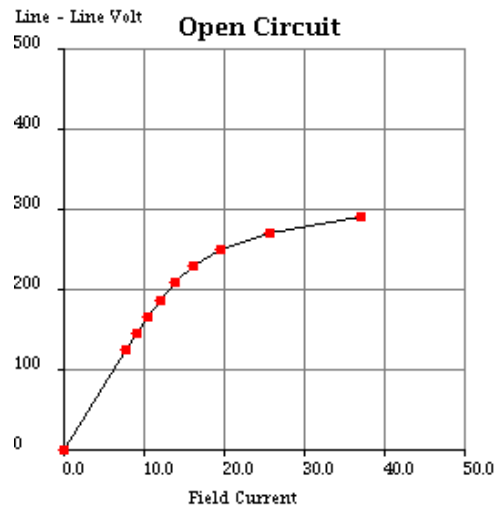
Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 2351207 **Genset Rating (kVA):** 563.0 **Phase Voltage:** 120
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1562.7
Duty: STANDBY **Connection:** PARALLEL STAR **Application:** EPG **Status:** Current

Version: 40059 /40001 /40151 /3107

Generator Output Characteristic Curves

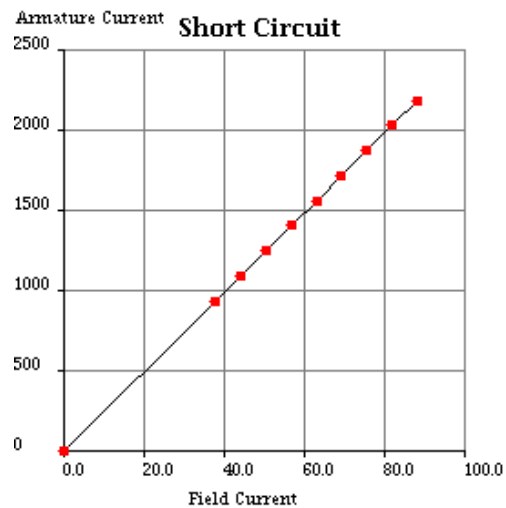
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
7.8	125
9.1	146
10.5	166
12.0	187
13.8	208
16.1	229
19.6	250
25.6	270
37.1	291



Short Circuit Curve

Field Current	Armature Current
0.0	0
37.8	937
44.1	1,093
50.4	1,249
56.7	1,405
63.0	1,561
69.3	1,717
75.6	1,874
81.9	2,030
88.2	2,186



Caterpillar Generator Data

Selected Model

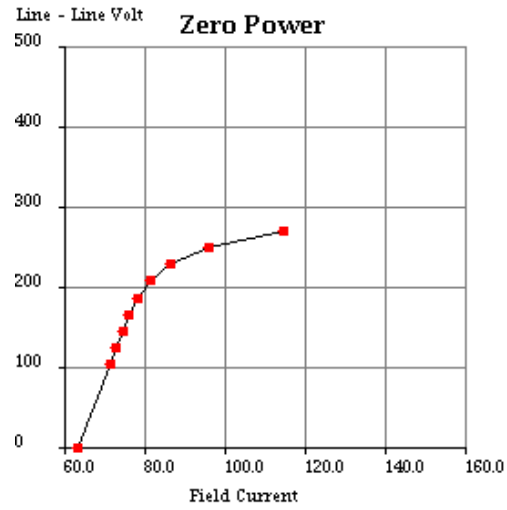
Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 2351207 **Genset Rating (kVA):** 563.0 **Phase Voltage:** 120
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1562.7
Duty: STANDBY **Connection:** PARALLEL STAR **Application:** EPG **Status:** Current

Version: 40059 /40001 /40151 /3107

Generator Output Characteristic Curves

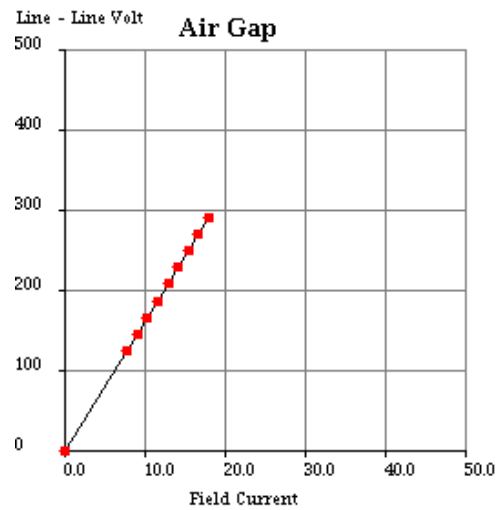
Zero Power Factor Curve

Field Current	Line - Line Volt
63.0	0
71.5	104
72.9	125
74.4	146
76.0	166
78.2	187
81.3	208
86.4	229
95.8	250
114.7	270



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
7.7	125
9.0	146
10.3	166
11.6	187
12.9	208
14.1	229
15.4	250
16.7	270
18.0	291



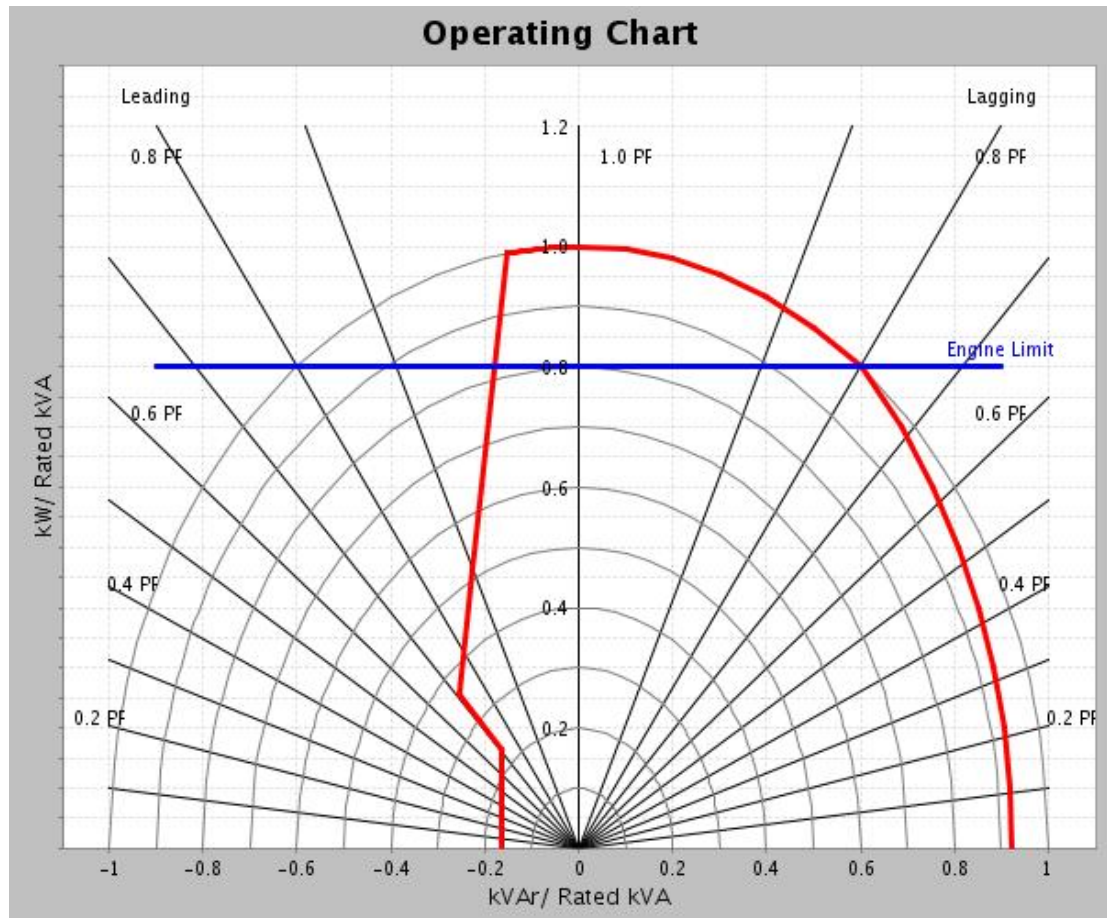
Caterpillar Generator Data

Selected Model

Engine: C15	Generator Frame: LC6134D	Genset Rating (kW): 450.0	Line Voltage: 208
Fuel: Diesel	Generator Arrangement: 2351207	Genset Rating (kVA): 563.0	Phase Voltage: 120
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1562.7
Duty: STANDBY	Connection: PARALLEL STAR	Application: EPG	Status: Current

Version: 40059 /40001 /40151 /3107

Reactive Capability Curve



Selected Model

Engine: C15 **Generator Frame:** LC6134D **Genset Rating (kW):** 450.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 2351207 **Genset Rating (kVA):** 563.0 **Phase Voltage:** 120
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1562.7
Duty: STANDBY **Connection:** PARALLEL STAR **Application:** EPG **Status:** Current

Version: 40059 /40001 /40151 /3107

General Information

GENERATOR INFORMATION (DM7900)

1.Motor Starting

Motor starting curves are obtained in accordance with IEC60034, and are displayed at 0.6 power factor.

2.Voltage Dip

Prediction of the generator synchronous voltage dip can be made by consulting the plot for the voltage dip value that corresponds to the desired motor starting kVA value.

3.Definitions

A)Generator Keys

Frame: abbreviation of generator frame size

Freq: frequency in hertz.

PP/SB: prime/standby duty respectively

Volts: line - line terminal voltage

kW: rating in electrical kilo watts

Model: engine sales model

B)Generator Temperature Rise

The indicated temperature rises are the IEC/NEMA limits for standby or prime power applications. The quoted rise figures are maximum limits only and are not necessarily indicative of the actual temperature rise of a given machine winding.

C)Centre of Gravity

The specified centre of gravity is for the generator only. For single bearing, and two bearing close coupled generators, the center of gravity is measured from the generator/engine flywheel-housing interface and from the centreline of the rotor Shaft.

For two bearing, standalone generators, the center of gravity is measured from the end of the rotor shaft and from the centerline of the rotor shaft.

D)Generator Current Decrement Curves

The generator current decrement curve indicates the generator armature current arising from a symmetrical three-phase fault at the generator terminals. Generators equipped with AREP or PMG excitation systems will sustain 300% of rated armature current for 10 seconds.

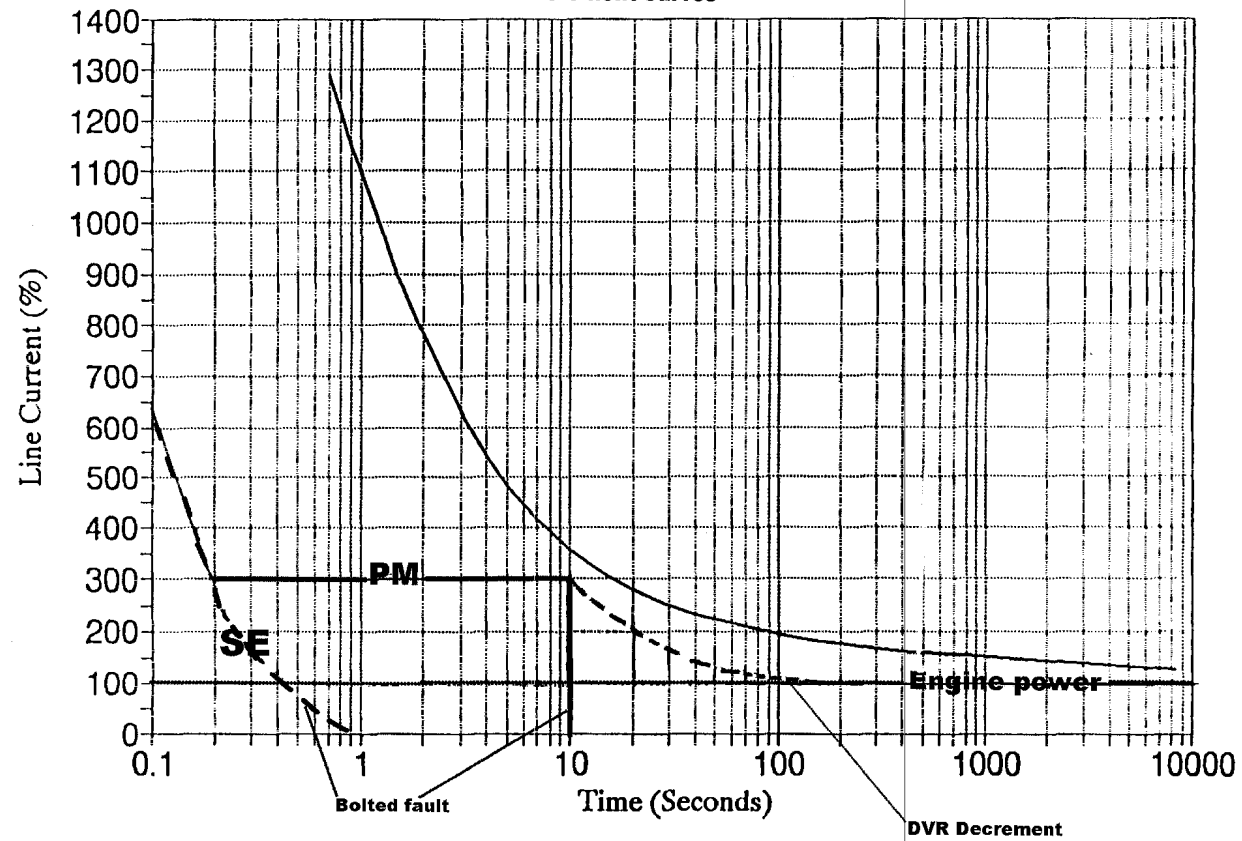
E)Generator Efficiency Curves

The efficiency curve is displayed for the generator only under the given conditions of rating, voltage, frequency and power factor. This is not the overall generating set efficiency curve.

CATERPILLAR®

Generator Withstand Curve

With decrement curves



T.P. Allen



Picture shown may not reflect actual package.

C15 SOUND ATTENUATED ENCLOSURES

Griffin 50 Hz/60 Hz

These sound attenuated, factory installed enclosures incorporate internally mounted super critical level silencers, designed for safety and aesthetic value on integral fuel tank bases or optional fabricated steel bases. These enclosures are of extremely rugged construction to withstand exposure to the elements of weather, and provides weather protection.

FEATURES

ROBUST/HIGHLY CORROSION RESISTANT CONSTRUCTION

- Factory installed
- Environmentally friendly, polyester powder baked paint
- 14 gauge steel
- Zinc plated or stainless steel fasteners
- Internally mounted super critical exhaust silencing system
- Approved for use with both UL 2200 listed generator set packages

EXCELLENT ACCESS

- Large cable entry area for installation ease
- Accommodates rear mounted breaker
- Double doors on both sides
- Vertically hinged doors allow 180° opening rotation
- Lube oil and coolant drains pipes to exterior of enclosure and terminated drain valves
- Radiator fill cover

SECURITY AND SAFETY

- Lockable access doors which give full access to control panel and breaker
- Cooling fan and battery charging alternator fully guarded
- Fuel fill, oil fill, coolant and battery can only be reached via lockable access
- Externally mounted emergency stop button
- Designed for spreader-bar lifting to ensure safety
- Control panel viewing window

OPTIONS

- Yellow, white, beige or ASA61 gray paint
- Interior lighting system
- Skid base with dragging and fork pockets
- UL listed integral fuel tank
- UL listed sub-base fuel tank
- Dual breakers (60 Hz only) (second breaker mounted right hand side)
- Seismic Certification per Applicable Building Codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007
- Tested and Analyzed in Accordance with: ASCE 7-98, ASCE 7-02, ASCE 7-05, ICC-ES AC-156
- Special Seismic Certification OSHPD Pre-Approval OSP-0084-10
- IBC certifiable for 90 mph wind loading
- Anchoring details are site specific, and are dependent on many factors such as generator set size, weight, and concrete strength. IBC Certification requires that the anchoring system used is reviewed and approved by a Professional Engineer.

ENCLOSURES



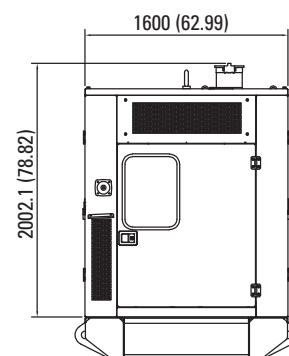
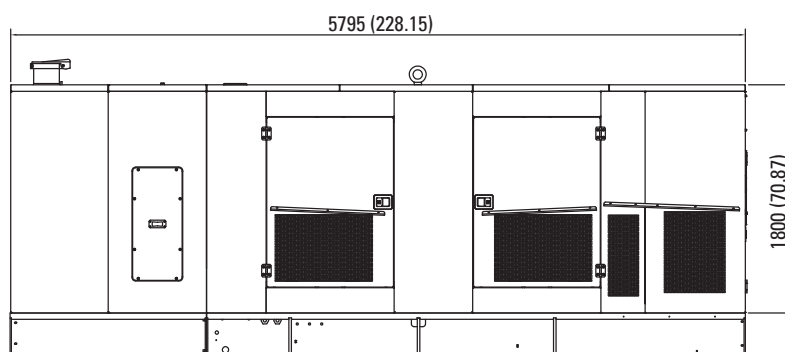
SOUND ATTENUATED ENCLOSURE OPERATING CHARACTERISTICS

60 Hz SA Enclosure 1 Breaker			Ambient Capability*		Airflow Rate		Sound Pressure Levels dBA @ Full Load			Exhaust Back Pressure	
ekW	kVA	PP/SB	°C	°F	m³/s	Cfm	1 m	7 m	15 m	in/H ₂ O	kPa
550	687.5	SB	42	108	11.9	25,215	87.7	76.7	70.7	18.0	4.5
500	625.0	SB	46	115	11.9	25,215	87.0	75.8	69.8	16.0	4.0
455	568.8	PP	44	111	11.9	25,215	86.4	75.2	69.2	14.3	3.6
450	562.5	SB	47	117	9.9	20,978	84.6	74.6	68.6	14.1	3.5
410	512.5	PP	44	111	9.9	20,978	84.2	74.0	68.0	12.5	3.1
400	500.0	SB	50	122	9.9	20,978	84.1	73.9	67.9	12.2	3.0
365	456.3	PP	47	117	9.9	20,978	83.8	73.4	67.4	10.9	2.7
350	437.5	SB	54	129	9.9	20,978	83.7	73.2	67.2	10.4	2.6
320	400.0	PP	50	122	9.9	20,978	83.5	72.9	66.9	9.3	2.3

*Ambient measured with Cat® Extended Life Coolant

50 Hz SA Enclosure (Low Emissions)			Ambient Capability*		Airflow Rate		Sound Pressure Levels dBA @ Full Load			Exhaust Back Pressure	
kVA	ekW	PP/SB	°C	°F	m³/s	Cfm	1 m	7 m	15 m	in/H ₂ O	kPa
550	440	SB	45	113	7.7	16,315	81.3	70.8	64.8	12.4	3.08
500	400	PP	43	109	7.7	16,315	80.7	70.0	64.0	10.9	2.71
500	400	SB	48	118	7.7	16,315	80.7	70.0	64.0	10.9	2.71
455	364	PP	46	115	7.7	16,315	80.1	69.4	63.4	9.5	2.35
450	360	SB	52	126	7.7	16,315	80.1	69.3	63.3	9.3	2.31
410	328	PP	50	122	7.7	16,315	79.6	68.8	62.8	7.9	1.98
400	320	SB	56	133	7.7	16,315	79.5	68.6	62.6	7.6	1.89
365	292	PP	53	127	7.7	16,315	79.2	68.2	62.2	6.4	1.60

*Ambient measured with Cat Extended Life Coolant



Approximate weight of enclosure package: 4984 kg (10,988 lb). Exact weight is dependent on options. Enclosure weight includes: sound attenuated enclosure, exhaust system, extended base and generator set. Caterpillar is pleased to offer these additional generator set enclosure colors: white, beige, and ASA 61 gray. (Caterpillar yellow is standard color.)

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C15 SUB-BASE FUEL TANK BASE Griffin

Diesel Generator Set
365-550 kVA 50 Hz
320-550 kW 60 Hz

FEATURES

- UL listed for United States (UL 142) and Canada (ULC S601)
- Compliant with NFPA 30, 37 & 110 and CSA C282-09 & B139-09 standards.
- Tank design provides capacity for thermal expansion of fuel
- Direct reading fuel level gauge
- Fuel supply dip tube is positioned so as not to pick up fuel sediment
- Fuel return and supply dip tubes are separated by an internal baffle to prevent recirculation of heated return fuel
- Fuel fill – 4 in, lockable flip top cap
- Primary tank level detection switch in containment basin
- Primary and secondary tanks are leak tested at 20.7 kPa (3 psi) minimum
- Welded steel containment basin (minimum of 110% of primary tank capacity)
- Interior tank surfaces coated with a solvent based thin-film rust preventative
- Heavy gauge steel gussets suitable for lifting package
- Gloss black polyester alkyd acrylic enamel exterior paint over epoxy based primer
- Primary tanks are equipped with customer connections for remote fuel transfer, return and vent

DESCRIPTION

- Dual wall, secondary containment
- Heavy gauge steel construction
- Rear and right side stub-up access
- Emergency vents on primary and secondary tanks are sized in accordance with NFPA 30
- Leak detection switch
- Compatible with enclosures (weather protective and sound attenuated)
- The sub-base fuel tank mounts below the generator set wide base

OPTIONS

- Manual fuel transfer pump
- Low fuel level switch (alarm and shutdown)

C15 FUEL TANK BASE (SUB-BASE) USEABLE CAPACITIES

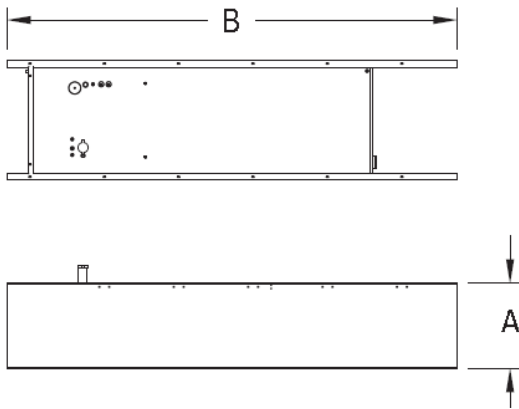
DUAL WALL SUB-BASE - WIDTH 1140 mm (44.9 in)
OPEN SET & WEATHER PROTECTIVE ENCLOSURE

Liter	Gallon	Feature Code	Type	TANK ONLY						TANK AND PACKAGE			
				Weight		Height 'A'		Length 'B'		Open PGS Height		Enc. PGS Height**	
				kg	lb	mm	in	mm	in	mm	in	mm	in
1140	300	FTBDW95	Sub-Base	751	1656	550	21.7	4250	167.3	2641	104.0	3085	121.5
2500	660	FTBDW96	Sub-Base	1108	2442	970	38.2	4250	167.3	3061	120.5	3505	138.0
2800	740	FTBDW97	Sub-Base	1147	2528	1100	43.3	4250	167.3	3191	125.6	3635	143.1

* Enclosure Package Height includes muffler

DUAL WALL SUB-BASE - WIDTH 1140 mm (44.9 in)
SOUND ATTENUATED ENCLOSURE

Liter	Gallon	Feature Code	Type	TANK ONLY						TANK AND PACKAGE			
				Weight		Height 'A'		Length 'B'		Open PGS Height		Enc. PGS Height	
				kg	lb	mm	in	mm	in	mm	in	mm	in
1140	300	FTBDW1G	Sub-Base	870	1918	430	16.9	5800	228.3	NA	NA	2430	95.7
2500	660	FTBDW1H	Sub-Base	1222	2694	810	31.9	5800	228.3	NA	NA	2810	110.6
2930	775	FTBDW1J	Sub-Base	1261	2780	810	31.9	5800	228.3	NA	NA	2810	110.6



The heights listed above do not include lumber used during manufacturing and shipping.
Tanks with RH/LH stub-up include stub-up area directly below the circuit breaker or power terminal strips.

Dimensions do not include weather-protective enclosure exhaust system.
Weight is for tank only. Does not include additions or removals required by price list.
All fuel tanks are shipped "Installed". If fuel tank base is to be shipped loose, please select appropriate option.
Dual wall sub-base tanks are UL listed and constructed in accordance with Underwriters Laboratories Standard UL142 "Steel Aboveground Tanks for Flammable and Combustible Liquids" and Canada ULC S601 "Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids."

Fuel tanks comply with the following United States NFPA Codes:

- NFPA 30 – Flammable and Combustible Liquids Code
- NFPA 37 – Standard for Installation and Use of Stationary Combustible Engine
- NFPA 110 – Standard for Emergency and Standby Power Systems

Fuel tanks comply with the following Canadian Codes:

- CSA C282-09 – Emergency Electrical Power Supply for Buildings
- CSA B139-09 – Installation Code for Oil-Burning Equipment

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Image shown may not reflect actual package

EMCP 4.2 GENERATOR SET CONTROLLER

Caterpillar is leading the power generation market place with power solutions engineered to deliver unmatched performance, reliability, durability and cost-effectiveness.

FEATURES

GENERAL DESCRIPTION

The Cat® EMCP 4.2 offers fully featured power metering, protective relaying and engine and generator control and monitoring. Engine and generator controls, diagnostics, and operating information are accessible via the control panel keypads; diagnostics from the EMCP 4 optional modules can be viewed and reset through the EMCP 4.2.

FULL RANGE OF ATTACHMENTS

- Wide range of system expansion attachments, designed specifically to work with the EMCP 4.
- Flexible packaging options for easy and cost effective installation.

WORLD WIDE PRODUCT SUPPORT

- Cat dealers provide extensive pre and post sale support.
- Cat dealers have over 1,600 dealer branch stores operating in 200 countries.

FEATURES

- A 33 x 132 pixel, 3.8 inch, graphical display denotes text alarm/event descriptions, set points, engine and generator monitoring, and is visible in all lighting conditions.
- Textual display with support for 28 languages, including character languages such as Arabic, Chinese, and Japanese.
- Advanced engine monitoring is available on systems with an electronic engine control module.
- Integration with the Cat Digital Voltage Regulator (CDVR) provides enhanced system performance.
- Fully featured power metering, protective relaying, engine and generator parameter viewing, and expanded AC metering are all integrated into this controller.

- Real-time clock allows for date and time stamping of diagnostics and events in the control's logs as well as service maintenance reminders based on engine operating hours or calendar days.
- Up to 40 diagnostic events are stored in the non-volatile memory.
- Ability to view and reset diagnostics on EMCP 4 optional modules via the control panel removes the need for a separate service tool for troubleshooting.
- Set points and software stored in non-volatile memory, preventing loss during a power outage.
- Reduced power mode offers a low power state to minimize battery power requirements.
- Three levels of security allow for configurable operator privileges.
- Selectable units
 - Temperature: °C or °F
 - Pressure: psi, kPa, bar
 - Fuel Consumption: Gal/hr or Liter/hr

STANDARDS

- UL Recognized
- CSA C22.2 No.100,14, 94
- Complies with all necessary standards for CE Certification
 - 98/37/EC Machinery Directive
 - BS EN 60204-1 Safety of Machinery
 - 89/336/EEC EMC Directive
 - BS EN 50081-1 Emissions Standard
 - BS EN 50082-2 Immunity Standard
 - 73/23/EEC Low Voltage Directive
 - EN 50178 LVD Standard
- IEC529, IEC60034-5, IEC61131-3
- MIL STND 461

EMCP 4.2 GENERATOR SET CONTROLLER

STANDARD FEATURES

Generator Monitoring	• Voltage (L-L, L-N) • Current (Phase) • Average Volt, Amp, Frequency • kW, kVA, kVA (Average, Phase, %) • Power Factor (Average, Phase) • kW-hr, kVA-hr (total) • Excitation voltage and current (with CDVR) • Generator stator and bearing temp (with optional module)
Generator Protection	• Generator phase sequence • Over/Under voltage (27/59) • Over/Under frequency (81 O/U) • Reverse Power (kW) (32) • Reverse Reactive Power (kVA) (32RV) • Overcurrent (50/51)
Engine Monitoring	• Coolant temperature • Oil pressure • Engine speed (RPM) • Battery voltage • Run hours • Crank attempt and successful start counter • Enhanced engine monitoring (with electronic engines)
Engine Protection	• Control switch not in auto (alarm) • High coolant temp (alarm and shutdown) • Low coolant temp (alarm) • Low coolant level (alarm) • High engine oil temp (alarm and shutdown) • Low, high, and weak battery voltage • Overspeed • Overcrank
Control	• Run / Auto / Stop control • Speed and voltage adjust • Local and remote emergency stop • Remote start/stop • Cycle crank
Inputs & Outputs	• Two dedicated digital inputs • Six programmable digital inputs • Six programmable form A dry contacts • Two programmable form C dry contacts • Two digital outputs
Communications	• Primary and accessory CAN data links • RS-485 annunciator data link • Modbus RTU (RS-485 Half duplex)
Language Support	Arabic, Bulgarian, Chinese, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Icelandic, Italian, Latvian, Lithuanian, Japanese, Norwegian, Polish, Portuguese, Romanian, Russian, Slovak, Slovene, Spanish, Swedish, Turkish
Environmental	• Control module operating temperature: -40°C to 70°C • Display operating temperature: -20°C to 70°C • Humidity: 100% condensing 30°C to 60°C • Storage temperature: -40°C to 85°C • Vibration: Random profile, 24-1000 Hz, 4.3G rms

EMCP 4.2 GENERATOR SET CONTROLLER

OPTIONAL MODULES

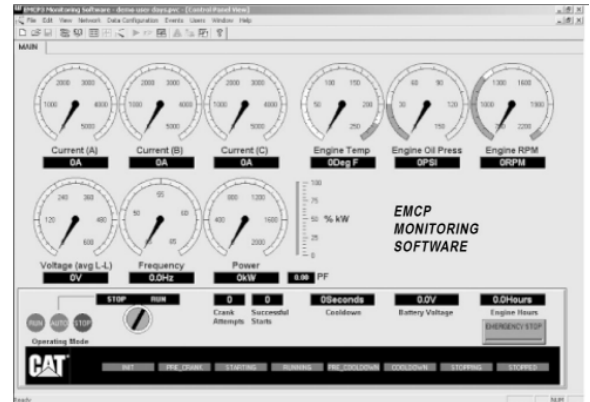


CAN ANNUNCIATOR

The EMCP 4 CAN Annunciator serves to display genset system alarm conditions and status indications. The annunciator has been designed for use on the accessory communication network and may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of three annunciators may be used with a single EMCP 4.2.

RS-485 ANNUNCIATOR

The EMCP 4 RS-485 Annunciator serves to display genset system alarm conditions and status indications. The annunciator has been designed for use on the long distance annunciator datalink and is used for remote (up to 4000 feet) application.

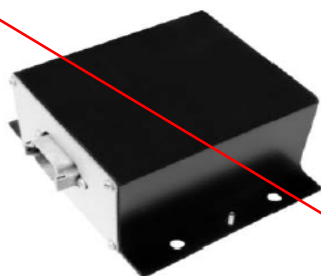


REMOTE MONITORING SOFTWARE

The EMCP 4 remote monitoring software package is a PC based program which allows the user to monitor and control a generator set, and is capable of running on a Windows based operating system. The remote monitoring software allows the user to configure data monitoring and data acquisition processes for monitoring, graphing, and logging of genset data.

EMCP 4.2 GENERATOR SET CONTROLLER

OPTIONAL MODULES



DIGITAL INPUT/OUTPUT MODULE

The Digital Input/Output (DI/O) module serves to provide expandable Input and Output capability of the EMCP 4 and is capable of reading 12 digital inputs and setting 8 relay outputs. The DI/O module has been designed for use on the accessory Communication Network and may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of four DI/O modules may be used with a single EMCP 4.2.

RTD MODULE

The RTD module serves to provide expandable generator temperature monitoring capability of the EMCP 4 and is capable of reading up to eight type 2-wire, 3-wire and 4-wire RTD inputs. The RTD Module has been designed for use on the Accessory Communication Network and may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of one RTD Module may be used with a single EMCP 4.2.

THERMOCOUPLE MODULE

The thermocouple module serves to provide expandable engine and generator temperature monitoring capability of the EMCP 4 and is capable of reading up to twenty Type J or K thermocouple inputs. The thermocouple module has been designed for use on the accessory communication Network and may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of one thermocouple modules may be used with a single EMCP 4.2 on each datalink.

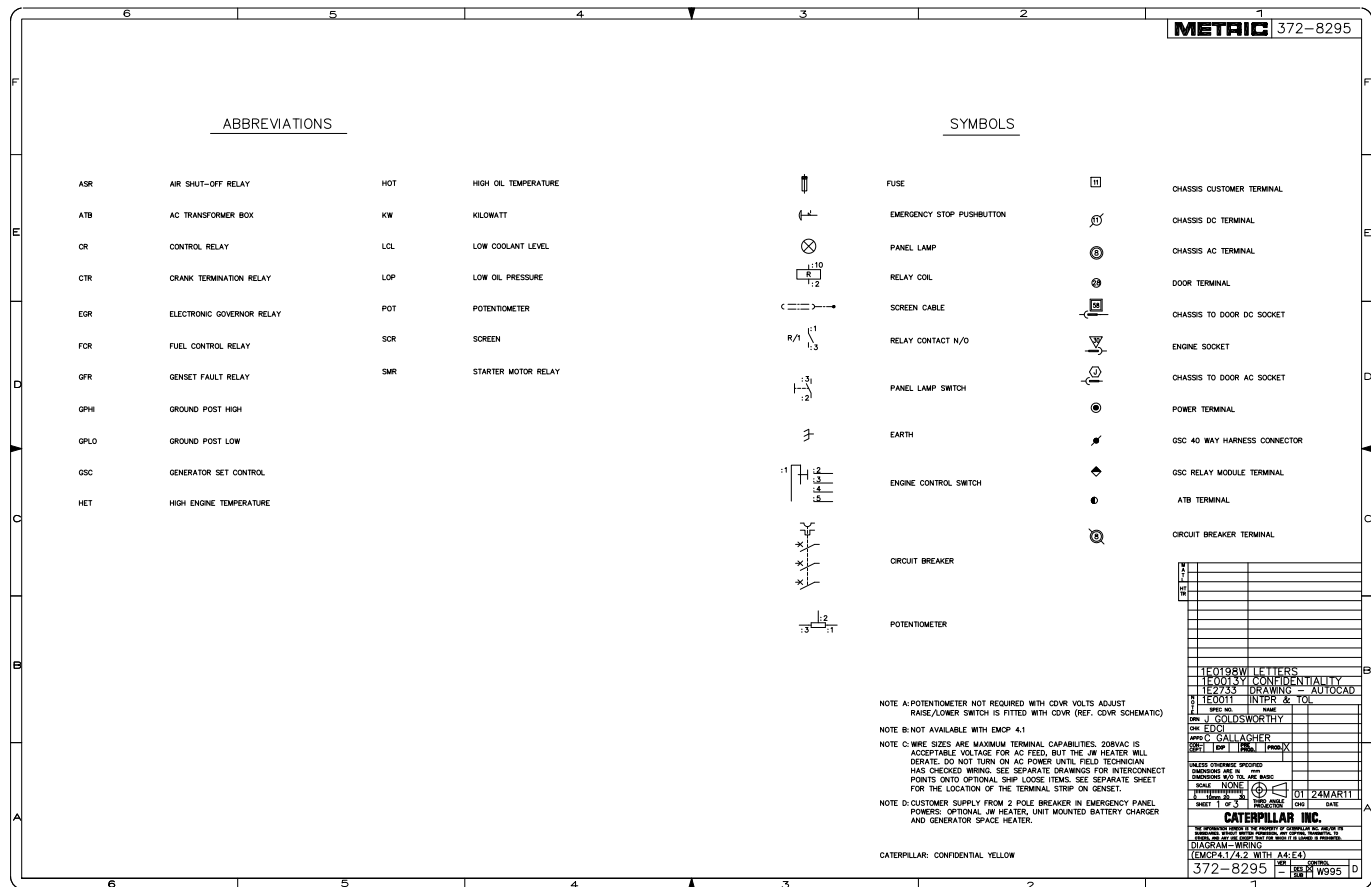
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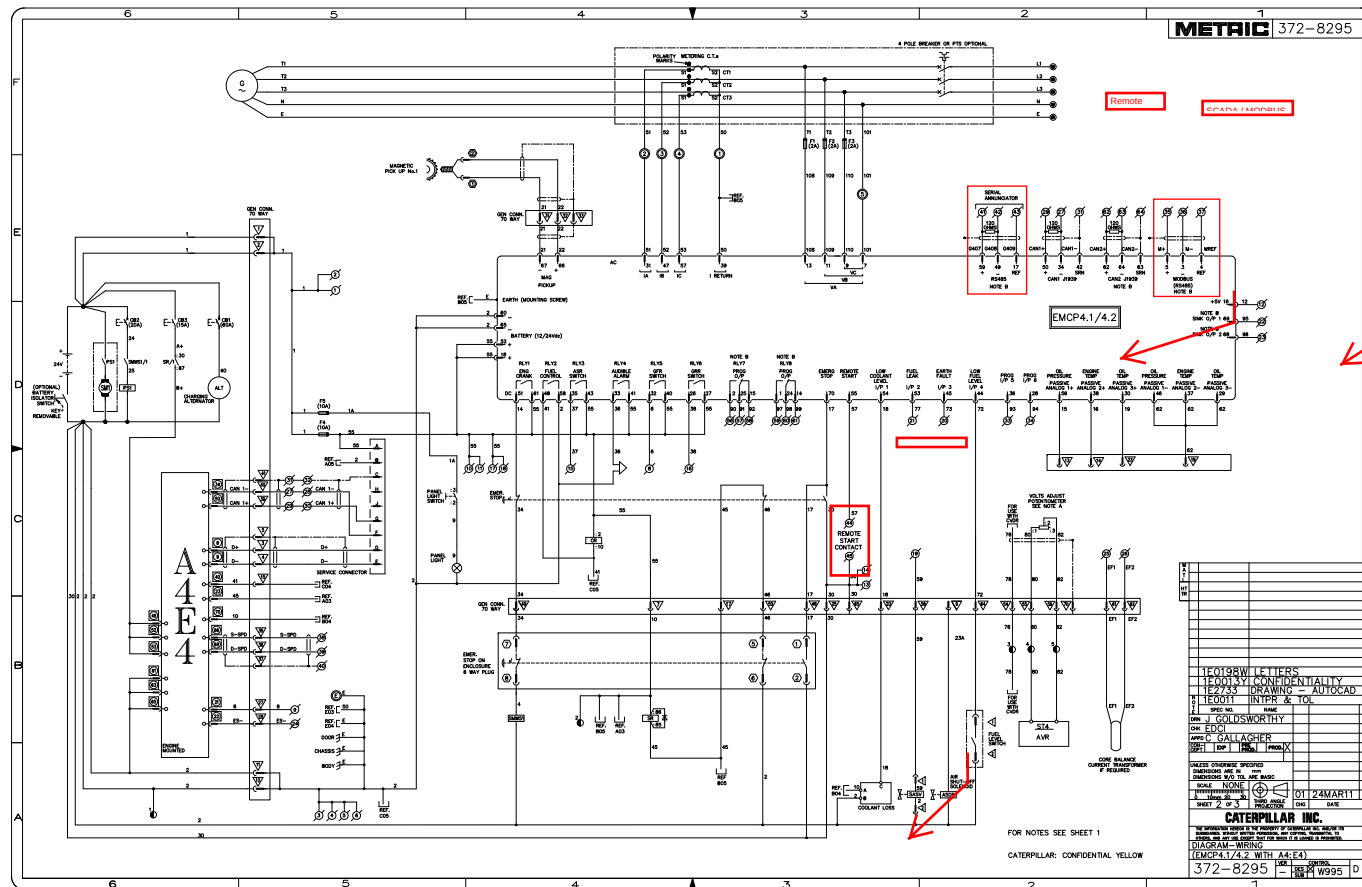
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EMCP 4 RS-485 ANNUNCIATOR

The EMCP 4 RS-485 annunciator serves to display generator set system alarm conditions and status indications. The annunciator has been designed for use on the EMCP 4 RS-485 annunciator data link for remote applications, providing customers with enhanced site flexibility.

The EMCP 4 annunciator is configurable to the standards of NFPA 99/110 for emergency standby generator systems.



FEATURES

- The EMCP 4 annunciator provides sixteen (16) individual points of annunciation, with two (2) LED's included for each point.
- An additional pair of LED's provides status indication of the RS-485 communication network.
- Includes alarm horn with lamp test and alarm acknowledge pushbuttons.
- Configurable to NFPA 99/110 requirements for local and remote annunciation on emergency standby generator systems.
- Provides custom label kit including software for customer's specific alarms and arrangement
- Designed and tested to meet stringent impulse shock and operating vibration requirements
- Uses high quality shielded twisted-triad cable for robust remote communications
- Graphic symbols are provided next to each pair to indicate various alarms and events
- The annunciator can be mounted remotely up to 1200 m (4,000 ft).
- Provides superior visibility of the LED's in direct sunlight

SPECIFICATIONS

Technical Data

Electrical

Battery Voltage Functional Range: 9 to 32 VDC

Power Consumption

Maximum: $\approx$ 12 watt at 24 VDC

Standby: $\approx$ 5 watt at 24 VDC

Control Power: 12-24 VDC

Communication: RS-485

Single, 8-pin Connector

Alarm

Sound Level 80 db

PHYSICAL

Weight

2.5 lb or $\approx$ 1.13 kg

ENVIRONMENTAL

Operating Temperature

-40° C to 70° C

-40° F to 158° F

Storage Temperature

-50° C to 70° C

-58° F to 158° F

Relative Humidity

90%

CERTIFICATIONS

UL Recognized



LED COLOR SCHEME

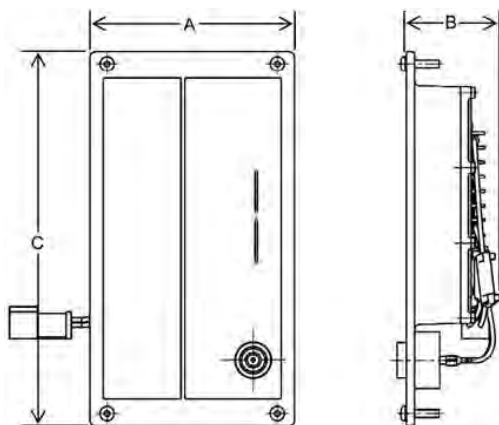
Each pair of LED's on the annunciator consists of two of three colors: green, yellow and red, which allows for custom configuration of status, warning and shutdown conditions.

The available colors and combinations are:

Row	LED 1	LED 2
1	Red	Yellow
2	Red	Yellow
3	Red	Yellow
4	Red	Yellow
5	Red	Yellow
6	Red	Green
7	Red	Yellow
8	Red	Yellow
9	Red	Yellow
10	Red	Yellow
11	Red	Yellow
12	Red	Yellow
13	Green	Yellow
14	Green	Yellow
15	Red	Green
16	Red	Yellow

STANDARD LED CONFIGURATION

- Emergency stop shutdown
- Overcrank shutdown
- Low coolant temperature warning
- High coolant temperature warning/shutdown
- Low oil pressure warning/shutdown
- Overspeed warning/shutdown
- Low coolant level warning/shutdown
- Low fuel level warning/shutdown
- EPS supplying load status
- Control switch not in auto warning
- High battery voltage warning/shutdown
- Low battery voltage warning/shutdown
- BATT charger AC failure warning/shutdown
- Low cranking voltage
- Engine running
- Tier 4 SCR



Annunciator Dimensions		
A	158 mm	6.22 in
B	60 mm	2.37 in
C	288 mm	11.34 in

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ADEM™ A4 Engine Controller

The ADEM™ A4 is the main Electronic Control Module (ECM) used on select diesel engines. The ADEM A4 is an integral part of the innovative ACERT® Technology that provides higher degree of control over a large number of combustion variables than ever before. The ADEM A4 is designed to control/interface Electronic Unit Injector (EUI) equipped engines. The ADEM A4 engine system is composed of the ADEM A4 ECM, control software, sensors, actuators, fuel injectors, and interface to the generator system. The prime benefit of an ADEM A4 engine system is to better control and maintain the particulate emissions, both steady state and transient, while improving engine performance.



FEATURES

RELIABLE, DURABLE

All ADEM A4 controllers are designed to survive the harshest environments.

- Environmentally sealed, die-cast aluminum housing isolates and protects electronic components from moisture and dirt contamination.
- Rigorous vibration testing ensures product reliability and durability.
- Accuracy maintained from -40° C to 85° C
- Electrical noise immunity to 100 volts/meter
- Internal circuits are designed to withstand shorts to +battery and -battery.
- Atmosphere cooled

SIMPLE SERVICING

Each ADEM A4 system works in combination with the Caterpillar® ET service tool software to keep the engine operating at peak performance.

- Displays measured parameters
- Retrieves active and logged event code documenting abnormal system operation
- Performs calibrations and diagnostic tests
- Supports flash programming of new software into the ADEM A4 ECM

SELF DIAGNOSTICS

Each ADEM A4 ECM has a full compliment of diagnostics. The ECM can detect faults in the electrical system and report those faults to the service technician for quick repair.

- Self-diagnostic capability pinpoints operational problems in need of attention.

ADVANCED FEATURES

- Isochronous or droop speed control
- Enhanced performance from fuel injection timing and limiting
- Adjustable monitoring of vital engine parameters
- Idle/rated speed setting
- Programmable speed acceleration ramp rate
- Adjustable cooldown duration
- Data link interfaces
- Cat Data link
- CAN J1939

OPTIONAL FEATURES

- Ether control system support
- Remote monitoring and control support

DESCRIPTION

The ECM is housed in an environmentally sealed casting. All wiring connections to the ECM are made using two sealed connectors: a single seventy-pin connector and a single one hundred twenty-pin connector.

ENGINE SPEED GOVERNING

Desired engine speed is calculated by the ECM and held within ± 0.2 Hz for isochronous and droop mode. The ECM accounts for droop that is requested. The proper amount of fuel is sent to the injectors due to these calculations. The ECM also employs cooldown/shutdown strategies, acceleration delays on startup, acceleration ramp times, speed reference and a low/high idle switch is also available via communications to the EMCP 3.

FUEL LIMITING

Warm and cold fuel-air ratio control limits are controlled by the ECM. Electronic monitoring system derates, torque limit, and cranking limit, programmable torque scaling, and cold cylinder cutout mode are standard features.

FUEL INJECTION TIMING

Master timing for injection is controlled by the ECM control. Temperature dependencies are accounted for in the fuel injection calculations.

ELECTRONIC MONITORING

Electronic monitoring of vital engine parameters can be programmed. Warning, derate, and shutdown event conditions may be customized by the user.

INFORMATION MANAGEMENT

The ECM stores information to assist with electronic troubleshooting. Active and logged diagnostic codes, active events, logged events, fuel consumption, engine hours, and instantaneous totals aid service technicians when diagnosing electronic faults and scheduling preventive maintenance.

CALIBRATIONS

Engine performance is optimized through injection timing. Auto/manual sensor calibrations are standard features.

ON-BOARD SYSTEM TESTS

System tests are available to assist in electronic troubleshooting. These tests include: injector activation, injector cutout, and override of control outputs.

DATA LINK INTERFACES

The ADEM A4 communicates with the EMCP 3 via the J1939 Communication network. Additionally, the ADEM A4 can communicate with the Cat ET electronic service tool and the PL1000E, PL1000T.

ELECTRONIC SENSING

The following sensing is available on the ADEM A4: oil pressure, fuel pressure, fuel temperature, atmospheric pressure, air inlet temperature, turbo outlet pressure, engine coolant temperature, engine speed, throttle, position, exhaust temperature, engine control switch position, oil filter pressure differential, fuel filter pressure differential, air filter pressure differential, crankcase pressure, and remote e-stop switch position.

SPECIFICATIONS

Humidity tolerance

0 to 90% relative humidity over operating temperature range

Impervious to:

salt spray, fuel, oil and oil additives, coolant, spray cleaners, chlorinated solvents, hydrogen sulfide and methane gas, and dust

Input and output protection

all inputs and outputs are protected against short circuits to +battery and -battery

Input voltage range (24 VDC nominal)

18 to 32 VDC

Mounting

engine mounted

Reverse polarity protected

Shock, withstands 20 g

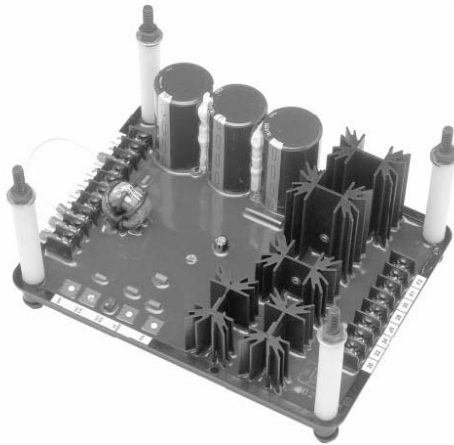
Temperature range

Operating: -40° C to 85° C (-40° F to 185° F)

Storage: -50° C to 120° C (-58° F to 248° F)

Vibration

withstands 8.0 g @ 24 to 2 kHz



AUTOMATIC VOLTAGE REGULATOR VR6-B

FEATURES

- For use with Self-Excited (SE), Internal Excited (IE) and Permanent Magnet Excited (PM) generators
- Regulation better than $\pm 1.0\%$
- V/Hz and 2 V/Hz frequency compensation
- Over excitation shutdown
- Solid state voltage buildup
- Three phase or single phase sensing — standard
- Compact package size
- Moisture proof assembly
- Mechanically rugged
- Fast response time
- Adjustable knee frequency (45 Hz to 65 Hz)
- Stability adjustment
- Complete line of accessories available

SPECIFICATIONS

- Regulation
Less than $\pm 1\%$ no load to full load
- Regulator drift
Less than $\pm 1/2\%$ steady state
- Temperature drift
Less than $\pm 1\%$ for any 40°C change over the operating temperature range
- Regulator response
Less than 4 milliseconds
- Regulator sensing
Three phase or single phase available on SE, IE and PM generators

- Regulator stability
Regulator responds to the fundamental component of the sensed voltage and remains stable for total harmonic distortion of the generator output voltage waveform up to 20%
- Regulator filtering
Telephone Influence Factor (TIF) less than 50. Optional filtering packages available to comply with MIL STD 461B Part 9 and VDE 85 level N
- Harmonic tolerance
The AVR will maintain precise control of the generator output with up to 20% harmonic distortion in the generator output voltage
- Voltage adjust range
 -25% to 10% of nominal
- Regulator build-up voltage
Regulator will build up with the generator output voltage as low as 6 VAC when used with SE generators. No minimum requirement when used with IE and PM generators
- Regulator start-up voltage
Voltage overshoot at full throttle engine starting will not exceed 5% of rated value.
- Frequency compensation
For 1% voltage change per 1% frequency change or 2% voltage change per 1% frequency change
Knee frequency is adjustable from 45 Hz to 65 Hz. This provides matched engine/generator performance for improved block load performance.
- Optional reactive droop adjustment
Adjustable from 0% to 10% at rated input current (1A or 5A)

AUTOMATIC VOLTAGE REGULATOR VR6-B

SPECIFICATIONS (continued)

- Over excitation protection
Shuts off generator output when excitation exceeds the nominal values:

Shutoff Value	Shutoff Time
90 VDC	90 seconds
125 VDC	10 seconds

- Ambient operating temperature: -40°C to $+70^{\circ}\text{C}$
- Storage temperature range: -40°C to $+85^{\circ}\text{C}$
- Power dissipation: 50 watt (max)
- Shock: Withstands up to 20 g's
- Vibration: Withstands 0.5 g's at frequencies between 18 and 2000 Hz in three mutually perpendicular planes
- Weight: 1.8 kg

SUMMARY OF OPERATING PARAMETERS

- Voltage rating: 240 VAC (480V and 120V sensing transformer kits available)
- Generator excitation: SE, IE or PM
- Power input
SE & IE: 180-264 VAC, single or three phase, 50/60 Hz
PM: 63-105 VAC, three phase, PMG 3125 VA maximum
- Output rating: 12 ADC @ 65 VDC maximum continuous 25 ADC @ 125 VDC forcing for 10 seconds
- Reactive droop input: 1A or 5A. At maximum rated current droop is adjustable up to 10%. Maximum droop is proportional to current. Proper droop current transformer sizing is essential to correct operation of this feature.
- Exciter field resistance: 3 to 13.5 Ω

STANDARD ACCESSORIES AVAILABLE

- Series boost
Able to sustain the generator output at 300% rated current for a minimum of ten seconds. Not required for PM.
- The voltage regulator can be used with an external device (KVAR/PF controller) to control either the generator output KVAR or PF.
- Remote voltage adjust
Controls voltage level with a 10 k Ω , 1 watt remotely mounted rheostat
- Manual voltage control
Permits manual regulation of the generator output in the event of a regulator failure
- Paralleling
A reactive droop network consisting of a current transformer, and wiring harness allows generator to be paralleled with other generators either in reactive droop or cross current compensation (zero droop) modes
- Stability adjustment
Adjustment allows the quickest response time to block loading while maintaining steady state stability
- UL508A: Recognized
- CSA Certified
- CE Conformity: See "Physical Specifications"

PHYSICAL SPECIFICATIONS

CE CONFORMITY

Conforms to: Radiated emissionsEN50081-2
 Radiated Immunity:
 Electric field.....EN61000-4-3 (10 v/m)
 Conducted.....EN61000-4-6 (10 VRMS)
 Conducted emissions..... EN50081-2 (EN55011, Class A)
 ESD immunity EN50082-2 (4 KV contact, 8 KV air)
 EFT immunity EN50082-2 (2 KV coupling clamp)
 Magnetic immunity..... EN50082-2 (30ARMS, 50 Hz)
 Safety..... EH61010-1

Technical drawing of the 3000 Series Rack Mountable Power Supply, showing front, side, and rear views with dimensions and specifications.

Dimensions (mm):

- Front View: 150.8 (top left), 139.7 (top left), 11.1 (top right), 11.1 (top right), 190.5 (bottom right), 201.6 (bottom right).
- Side View: 87.4 (top right), 11.1 (top right), 190.5 (bottom right), 201.6 (bottom right).
- Rear View: 150.8 (top left), 139.7 (top left), 11.1 (top right), 11.1 (top right), 190.5 (bottom right), 201.6 (bottom right).

Specifications:

- Model: 3000-0000
- Power: 1000W
- Input: 100-240V AC, 50/60Hz
- Output: 12V, 8.3A, 100W
- Efficiency: 80%
- MTBF: 100,000 hours
- Operating Temperature: 0°C to 40°C
- Storage Temperature: -20°C to 60°C
- Humidity: 5% to 95% RH

Assembly Instructions:

- TIGHTEN TO $3.3 \pm 0.1 \text{ N}\cdot\text{m}$

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MOLDED CASE CIRCUIT BREAKERS 500A – 1250A

**P-Frame
NS630
NS1250**

One (1) 1200 Amp Circuit Breaker

FEATURES

- Moisture and fungus protection
- Clear indication of breaker status
- Reinforced insulation
- Shunt trip
- Auxiliary contacts
- Load side extension bars
- 80% Rated – P-Frame (UL)
Upgradeable to 100%
- 100% Rated – NS630/NS1250 (IEC)
- Maintenance-free operation
- Exceptional characteristics under short-circuit conditions
- Adjustable trip settings

CONFORMITY WITH INTERNATIONAL STANDARDS

The P-Frame and NS630/NS1250 Circuit Breakers have been designed to comply with the international standard IEC 947-2 as well as with these other major standards:

P-FRAME

UL 489
CSA 22.2 No 5.1
Federal Specification W-C-375B/GEN
NEMA AB1
NMX J-266
UTE, VDE, BS, CEI, UNE

NS630/NS1250

Federal Specification W-C-375B/GEN
NEMA AB1
UTE, VDE, BS, CEI, UNE

Additionally, the P-Frame and NS630/NS1250 Circuit Breakers have been approved for marine application by American Bureau of Shipping, Bureau Veritas, Lloyd's Register of Shipping, Registro Italiano Navale, Germanischer Lloyd, and Det Norske Veritas.

RATINGS

UL-CSA

- **P-Frame** Rating: 1200 Amps (max)

IEC

- NS630 Rating: 630 Amps (max)
- NS1250 Rating: 1250 Amps (max)

SHUNT TRIP

The shunt trip provides a means of tripping the circuit breaker electronically. Shunt trip ratings are as follows:

Voltage: 24 VDC
Coil Burden (Holding/Inrush): 4.5/200 VA
Power Consumption: 4.5 VA

AUXILIARY CONTACTS

The auxiliary contacts provide a means of remote circuit breaker position indication and consist of one (1) Form C Contact (1 Normally open and 1 Normally closed contact) with the following Current Ratings:

6A @ 240-480 VAC, 50/60 Hz

TRIP UNITS

All circuit breakers come equipped with **True RMS Current Sensing**. The trip units for each of the circuit breaker ratings sample the current waveform to provide true RMS protection through the 15th harmonic. This true RMS sensing gives accurate values for the magnitude of a nonsinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated.

The trip system comes equipped with a set of current transformers (CTs) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker. Additionally, each trip unit comes equipped with Active Thermal Imaging which is active 20 minutes before and after tripping.

The **P-Frame** circuit breaker comes equipped with a MICROLOGIC 3.0 basic trip unit (LI), which includes the following features:

- Long-Time setting – adjustable dial settings from 0.4 – 1.0 x sensor rating (In)
- Long-Time Delay – adjustable
- Instantaneous setting – adjustable
Dial settings from 1.5 – 12 x sensor rating (In)
- Neutral protection (four-pole breakers)
- Type A Rating Plug

The **NS630 and NS1250** circuit breakers come equipped with a MICROLOGIC 2.0 trip unit (LSO), which includes the following features:

- Long-Time setting – adjustable
Dial settings from 0.4 – 1.0 x sensor rating (In)
- Long-Time Delay – adjustable
- Short-Time protection
Adjustable short-time pickup
Fixed time delay at zero
- Type R Rating Plug

CUSTOMER CABLE CONNECTIONS

The P-Frame, NS630 and NS1250 circuit breakers are equipped with mechanical lugs as standard, on both ends of the package-mounted circuit breaker. These lugs are standard for use with copper or aluminum wire.

Frame	Current Size	# of Cables	Cable Size
P-Frame	< 800A	1 to 3	3/0-500 kcmil (95-250 mm ²)
NS630 NS1250	> 800A	1 to 4	3/0-500 kcmil (95-250 mm ²)

CIRCUIT BREAKER CHARACTERISTICS

UL-IEC/CSA Breakers		P-Frame
Number of Poles		3
Rated Current (Amps)		1200
Voltage Rating (VAC)		600
Interrupting Rating (60 Hz) – kA RMS	240 V	65
	480 V	35
	600 V	18
IEC 60947-2 Rating (50/60 Hz) – kA RMS	I _{cu}	240 V 50
		380/415 V 35
	I _{cs}	240 V 25
		380/415 V 20

IEC 947-2 Breakers (50/60 Hz)		NS630/ NS1250
Number of Poles		3/4
Rated Current (Amps)		630/1250
Voltage Rating (VAC)		690
Breaking Capacities (kA RMS)	I _{cu}	220/240 V 50
		380/415 V 50
		440 V 50
		500/525 V 40
		660/690 V 30
Breaking Capacities	I _{cs}	220/240 V 75% I _{cu}
		380/415 V 75% I _{cu}
		440 V 75% I _{cu}
		500/525 V 75% I _{cu}
		660/690 V 75% I _{cu}

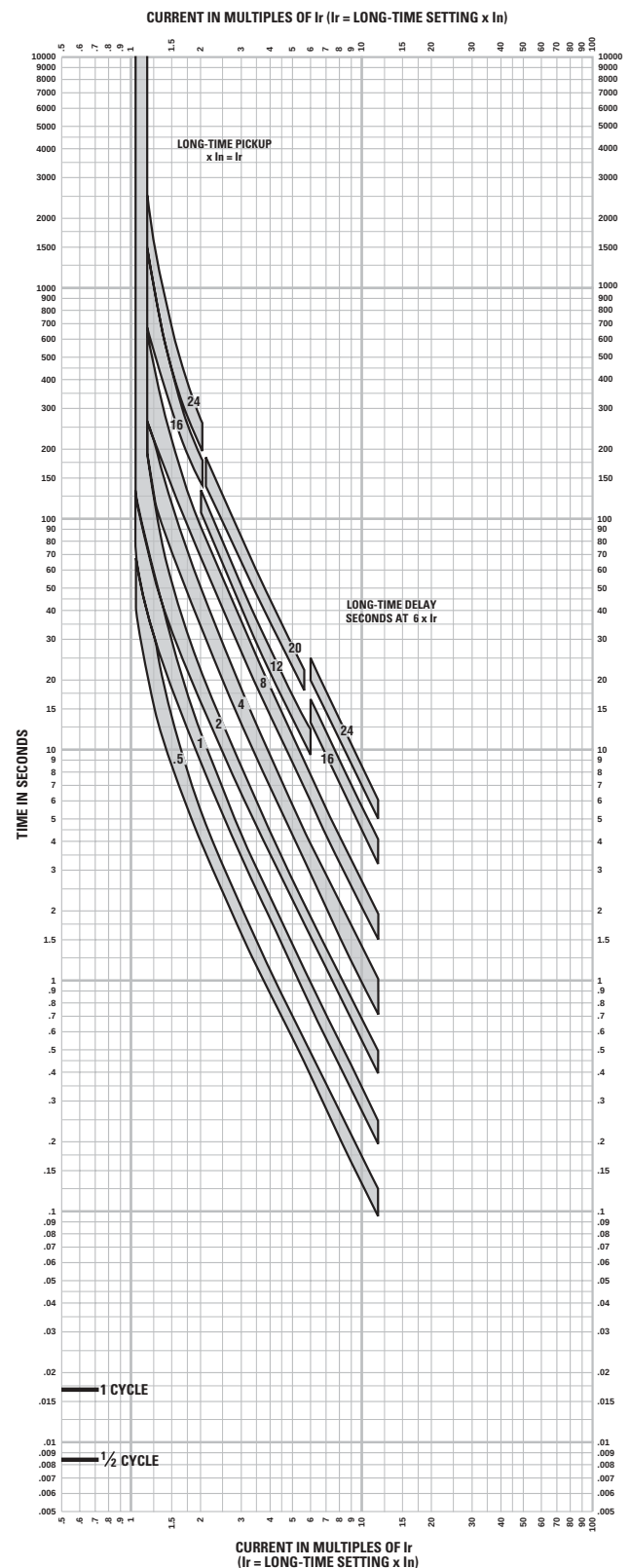
TRIP CURVES

P-FRAME

Long-time Pickup and Delay

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the instantaneous setting.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
4. The time-current curve information is to be used for application and coordination purposes only.
5. Curves apply from -30°C to 60°C (-86°F to 140°F) ambient temperature.

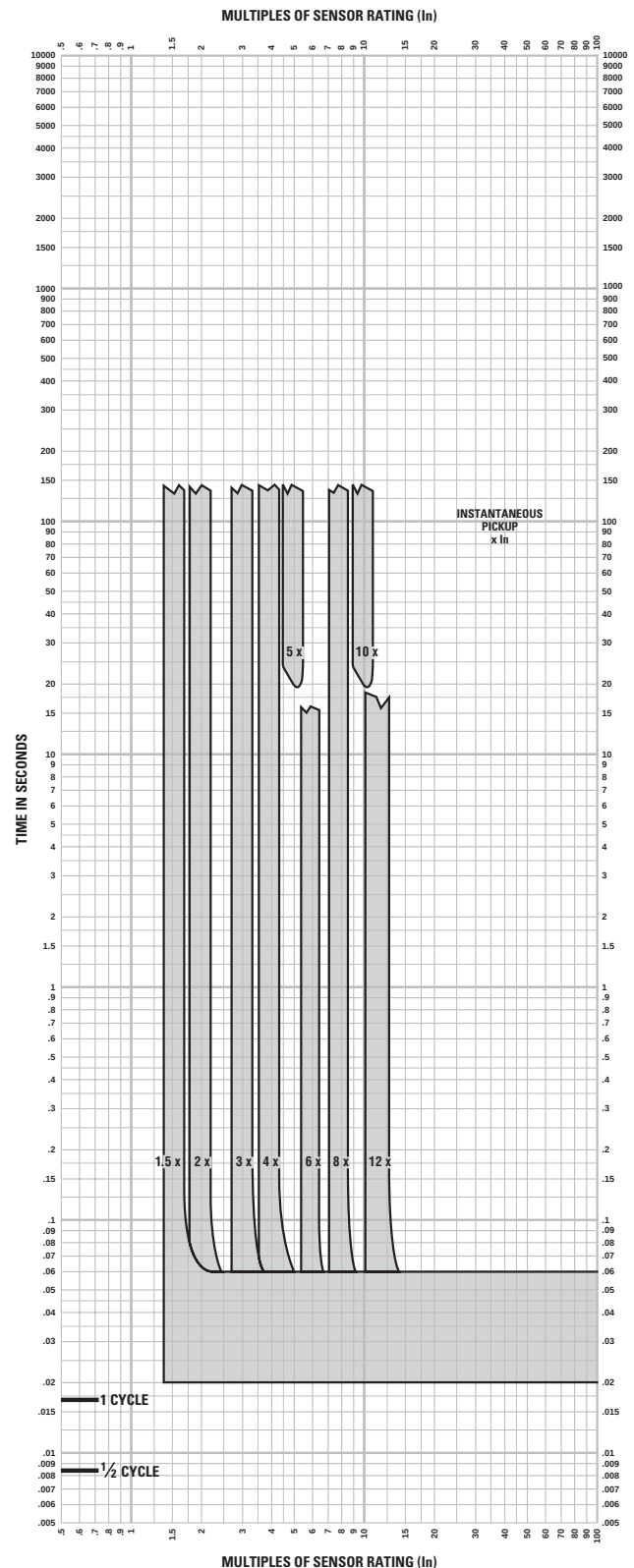


P-FRAME

Instantaneous Pickup
1.5 x – 12 x

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated.
4. The time-current curve information is to be used for application and coordination purposes only.
5. Curves apply from -30°C to 60°C (-86°F to 140°F) ambient temperature.
6. Instantaneous override value:
24 kA RMS $\pm 10\%$.





Reference illustration

C15 and ~~C18~~ Jacket Water Heater

Factory installed jacket water heater for increased cold-starting capability. The system includes a tank-style metal heater with an integral high limit thermostat and a remote engine mounted control thermostat, durable silicone hoses and heater control relay wired to a common connection point in the control panel. The heater and thermostat location is optimized for maximum coolant flow and heating power efficiency.

FEATURES

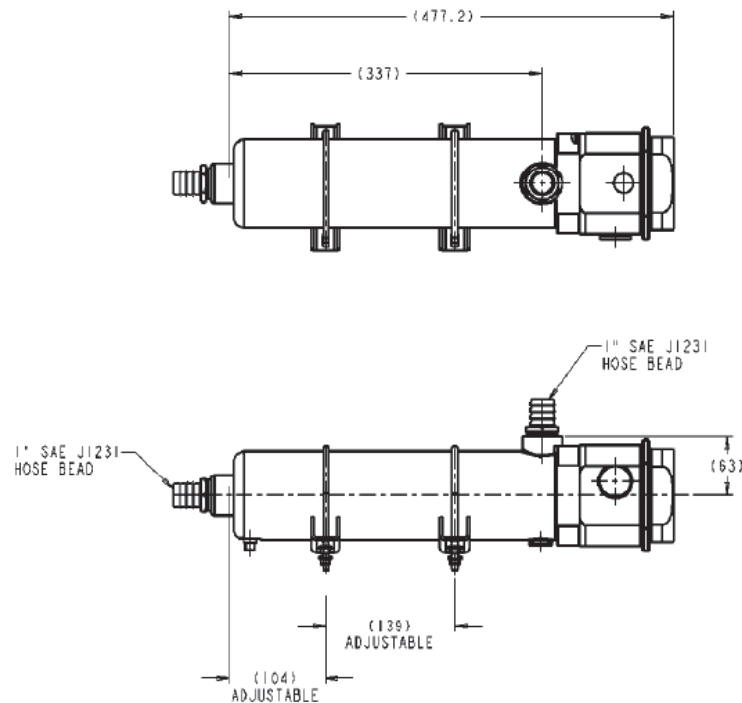
FACTORY INSTALLED

- Complete with silicone hoses
- Isolated tank heater vibration and shock tested to extreme limits to guarantee durability
- Optimized location of the heater on the genset base for maximum coolant flow
- Remote pilot thermostat located on the engine for optimized power cycle efficiency is factory set to 100° F (37.8°C)
- Automatically disconnected when engine is running via a dedicated heater relay located in the control panel.
- Supplied with UL recognized components
- Compatible with Cat® ELC and all chemicals
- All parts are serviceable and field replaceable
- Incoloy heater element for longer service life

SPECIFICATIONS

Unit Specifications			
	Design Voltage		
	208	220	240
Rating	2250	2520	3000
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Phase	1	1	1
Amps	10.82	11.45	12.5
Feature Code	JWH0058 JWH0059 JWHD032		

HEATER DETAIL



HEATER OPERATION

The heater uses compliant components to UL and CSA, and is both CSA and UL approved.

When the generator set is not running, the heater is automatically connected to the AC supply through a power relay mounted in the control panel. Upon receiving a start signal, the AC supply is automatically disconnected by the power relay and automatically reconnected when the start signal is removed and the engine has stopped.

Pilot thermostat located on the engine precisely monitors and controls the engine coolant temperature and is wired to energize and de-energize heater power cycles.

A high-limit thermostat is built into the heater to regulate the output temperature to within safe limits.

Materials and specifications are subject to change without notice.
 CAT, CATERPILLAR, their respective logos, "Caterpillar Yellow," the "Power Edge" trade dress as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.

www.Cat-ElectricPower.com

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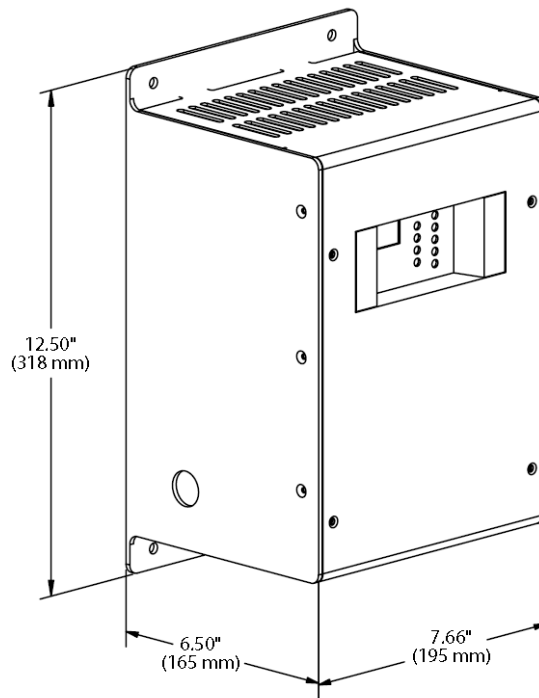


Image Shown may not Reflect Actual Package

UL 10 AMP BATTERY CHARGER

This battery charger offers accurate, automatic charging of lead-acid and nickel cadmium batteries. The output voltage automatically adjusts to changing input, load, battery and ambient conditions. This prevents battery over-charging and consequent loss of battery electrolyte.

Standard features include AC line compensation, precision voltage regulation, current limiting, automatic 2-rate charging, voltmeter and ammeter, temperature compensation and UL Listing.

The user interface is easy to understand with digital metering, NFPA 110 alarms and a battery fault alarm.

SPECIFICATION

Input Supply	110-120 V 208-240 V
AC and DC Fuses	2 input and 2 output)
Output voltage	24V
Frequency	50/60 Hz
Operating temperature	-20°C (-4°F) to +60°C (140°F)

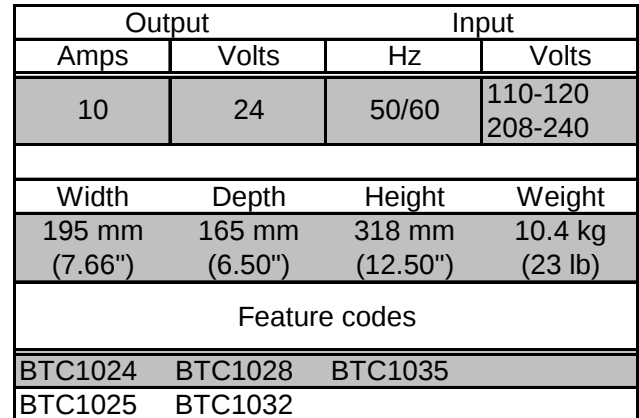
Housing constructed of rustproof anodized aluminum.

STANDARDS

- C-UL listed to UL 1236
- NFPA 70, NFPA 110
- CSA 22.2 No 107 certified
- UL 1564
- CE DOC to EN 60335
- IBC Seismic Certification

FEATURES

- Electronically current limited at 105% of rated output
- Alarm system
- Digital Display
- Lightning and voltage transient protection
- Protection of connected equipment against load dump protection
- Constant voltage, current limited, 4-rate automatic equalization
- IP 20 housing
- AC isolated from DC
- Temperature Compensation
 - On board temperature sensor with remote port
- Auto AC line compensation
- Output regulated by sensed battery voltage



▪ AC on	Green led (indication)
▪ AC fail	Red led and form C contact (2A)
▪ Float mode	LED
▪ Fast charge	LED
▪ Temp comp active	LED
▪ Low battery volts	Red led and Form C contact
▪ High Battery Volts	Red led and Form C contact
▪ Charger fail	Red led and Form C contact
▪ Battery fault	Red led and Form C contact
- Battery disconnected	
- Battery polarity reversed	
- Mismatched charger battery voltage	
- Open or high resistance charger to battery connection	
- Open battery cell or excessive internal resistance	

JCSBC
2-2-2016
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World's Toughest Batteries



Premium High Output – Maximum Vibration Resistance

- Vibration Resistance...five times the Industry Standard
- Exclusive “flat top” BCI group 4D & 8D batteries are Maintenance Free and have the industries highest cold cranking amps (CCA)
- Popular BCI group 31 Maintenance Free batteries with industry leading cold cranking amps...up to 1000 (CCA), for electric power, machine or on-highway truck and bus applications. Deep cycle models available for truck, marine or recreational usage

Specifications for Cat Premium High Output Batteries – Available Worldwide

BCI Group Size	Part No.	Cold Cranking Amps"	Reserve Capacity Minutes'	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction	Add Water Maintenance Check Hours	BCI Overall Dimensions			Nominal Weight		
								Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)	Dry Lb (kg)	Nominal Acid to Fill Qt (liter)
8D	153-5720	1500	465	12	210	C	MF	20.47 (520)	10.8 (275)	9.76 (248)	132 (60)	–	–
8D	101-4000	1400	400	12	190	LAC+	1000	20.7 (526.5)	10.96 (278)	9.76 (248)	132 (60)	86 (39)	18.0 (17.0)
4D	153-5710	1400	425	12	200	C	MF	20.47 (520)	8.58 (218)	9.76 (248)	119 (54)	–	–
4D	153-5700	1125	305	12	145	C	MF	20.47 (520)	8.58 (218)	9.76 (248)	101 (46)	–	–
4D	9X-9730	1300	400	12	190	LAC+	1000	20.75 (527)	8.58 (218)	9.76 (248)	119 (54)	81 (37)	14.8 (14.0)
4D	9X-9720	1000	275	12	140	LAC+	1000	20.75 (527)	8.58 (218)	9.76 (248)	101 (46)	59 (27)	15.9 (15.0)
31	175-4390	1000	180	12	90	C/S	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	175-4370	825	190	12	100	C/S**	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	175-4360	710	185	12	100	C/S***	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	250-0480	710	185	12	100	C/SDT***	MF	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	115-2422	1000	170	12	90	C SAE	MFA	12.9 (328.4)	6.74 (171.2)	9.46 (240.3)	60 (27)	–	–
2X 31	115-2421	950	170	12	90	C SAE +	MFA	12.9 (328.4)	6.74 (171.2)	9.46 (240.3)	60 (27)	44 (20)	6.6 (6.2)
31	9X-3404	950	165	12	100	C SAE	MF	13 (330.2)	6.77 (172)	9.46 (240.3)	58 (26)	–	–
31	3T-5760	750	165	12	100	C SAE	MF	13 (330.2)	6.77 (172)	9.46 (240.3)	55 (25)	–	–
24	153-5656	650	110	12	52	SC	MF	10.98 (278.9)	6.85 (174)	9.0 (229.1)	39 (18)	–	–
65	230-6368	880	140	12	80	SC	MF	11.9 (303.4)	7.5 (190.8)	7.5 (191.4)	45.5 (21)	–	–
74	153-5660	650	110	12	52	SC*	MF	10.98 (278.9)	7.0 (178.2)	8.15 (206.9)	39 (18)	–	–
58	175-4280	500	70	12	35	SC	MF	9.96 (253.1)	7.2 (182.5)	6.9 (176)	31 (14)	–	–
2	153-5690	765	210	6	90	LAC+	1000	10.24 (260)	6.8 (173)	8.72 (221.6)	37 (17)	22 (10)	4.8 (4.5)

Construction Notes:

LAC = Low Maintenance, Hybrid Construction

C = Calcium Lead Alloy Grid Design

MF = Maintenance Free

MFA = Maintenance Free with Accessible Vent Caps

S = Stud Terminals

+ = Shipped Dry Only

* = Side Terminals

** = Starting and Deep Cycle Battery

*** = Deep Cycle and Starting Battery

" = For 30 seconds at 0° F (-18° C)

' = Minimum of 25 amp output at 80° F (27° C)

SAE = Uses SAE Posts

SDT = Dual, Top mounted Terminals, Stud and SAE Post,

Marine Deep Cycle/Starting Battery

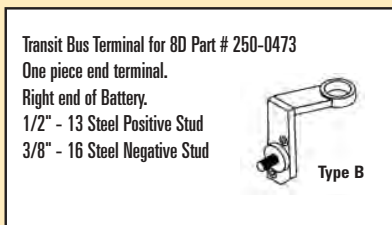
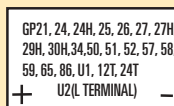
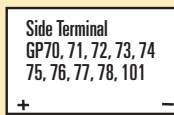
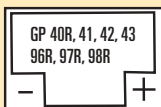
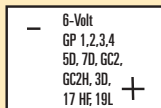
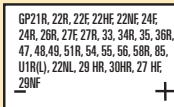
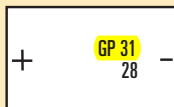
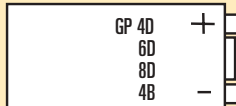
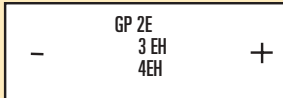
SC = Silver (Ag) Calcium Alloy Grids for resistance to high underhood temperatures

Rugged Design – Built Tough – Reliable Starting

- Positive and Negative plates are anchored to container bottom and locked at the top of cell element for maximum vibration resistance.
- Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage.
- Hefty full-frame grids, no sharp edges, optimum acid/paste combination provides better charge acceptance after deep discharge.
- Manifold vented cover with built-in Flame Arrestor...a safety feature that directs corrosive gases away from the battery and hold-downs.
- Thick, robust container resists rugged treatment typical of heavy-duty commercial use. Embossed part number & descriptors for easy serviceability.

Battery Information

BCI Terminal Locations



Cat Premium High Output Batteries – Built Tough to Exceed Demanding Performance Test Requirements:

100 hour Vibration Testing – Five Times the Industry Standard

- Battery must be able to withstand vibration forces without suffering mechanical damage, loss of capacity, loss of electrolyte or without developing internal/external leaks
- Battery must pass a high rate discharge test after the vibration testing

Five 72-hour Deep Discharge/Recharge Test Cycles

- Battery must recover to 25 charging amps within 20 minutes and meet Industry Electrical Performance Standards

30 Day Complete Discharge Test

- Battery must recover to 25 charging amps within 60 minutes and meet Industry Electrical Performance Standards after recharging

SAE J2185 Life Cycle Test

- Battery subject to deeper discharge and charge cycles at extreme temperatures not normally encountered in starting a machine or vehicle

Cold Soak Test

- Battery cold soaked at sub-freezing temperatures and then tested by starting an equally cold engine



Battery Accessories

Group 31 – Charging Posts for Stud Terminals – Part # 4C-5637

Screw-in Charging Posts for Side Terminals – Part # 4C-5638

Wing Nut – Part # 2B-9498 for Part #'s 175-4390/175-4370/175-4360/8C-3628

Wing Nut – Part # 3B-0723 for Part #'s 8C-3638 and 8C-3639

Digital Battery Analyzer – Part # 177-2330

Battery Voltmeter – Part # 4C-6600

Battery Load Tester – Part # 4C-4911

Booster Cable 12' (3.66 m) – Part # 4C-4933

Booster Cable 20' (6.00 m) – Part # 4C-4937

Heavy Duty Commercial Fast Charger (110V) – Part # 4C-4921

Heavy Duty Commercial Fast Charger (220V) – Part # 4C-4910

Extra Vent Caps (6) for Dry Batteries – Part # 7N-0060

Note: Ratings and Part Numbers are subject to change without notice.



Recycle all scrap batteries.
We accept lead-acid batteries
for recycling.

Fuel Level Management

A. FPC-1000R Tank Level Management System

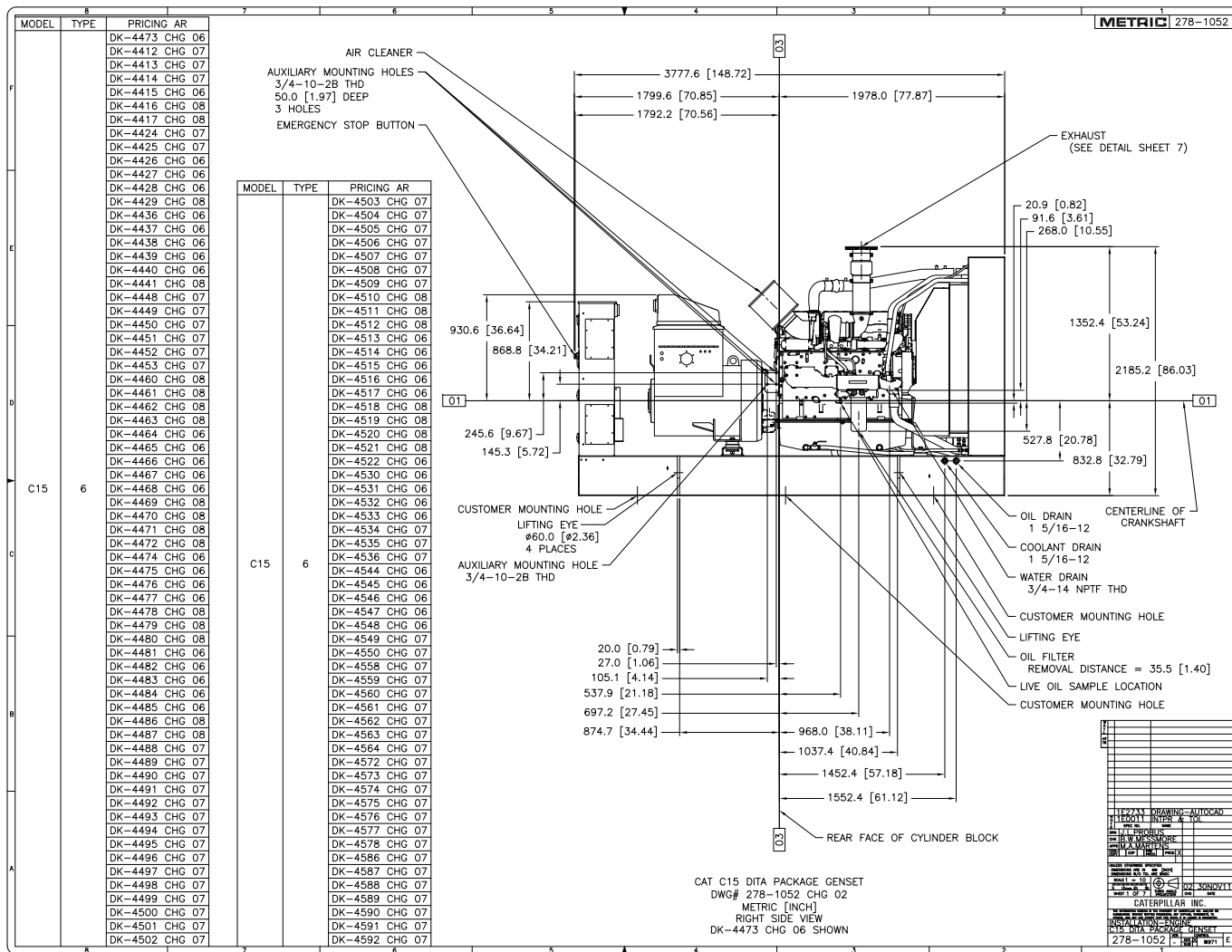
An automatic Microprocessor based fuel level management system shall be provided complete with a single 5.4gpm fuel return pump. The system shall operate off a single 120vac power supply. Controller to be supplied by Wedlake Fabricating, Inc. of Tulsa, Oklahoma 918-428-1641, or approved equal and be equipped with a LCD status display screen, NEMA 4X Enclosure as well as the following features.

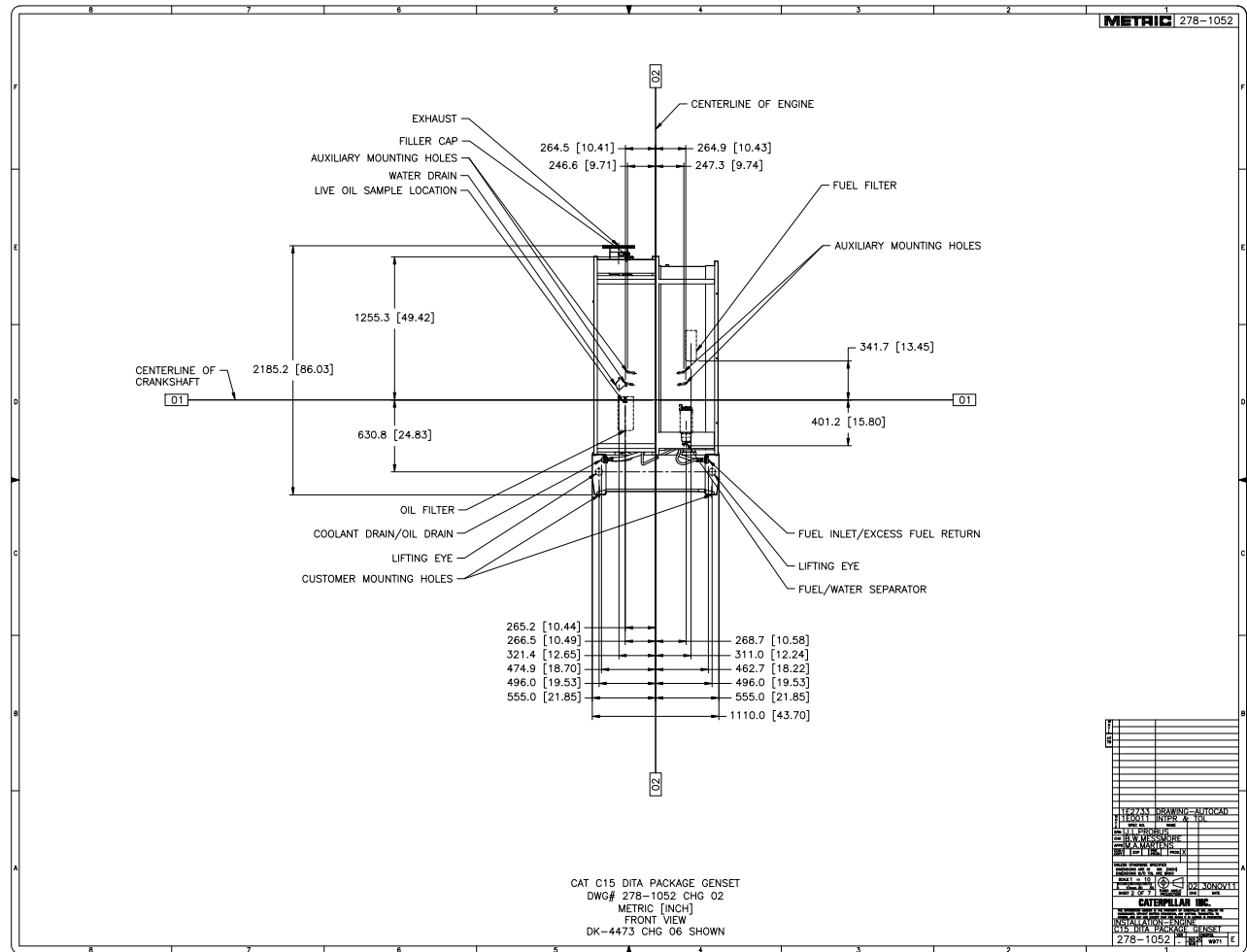
A.1. Package features

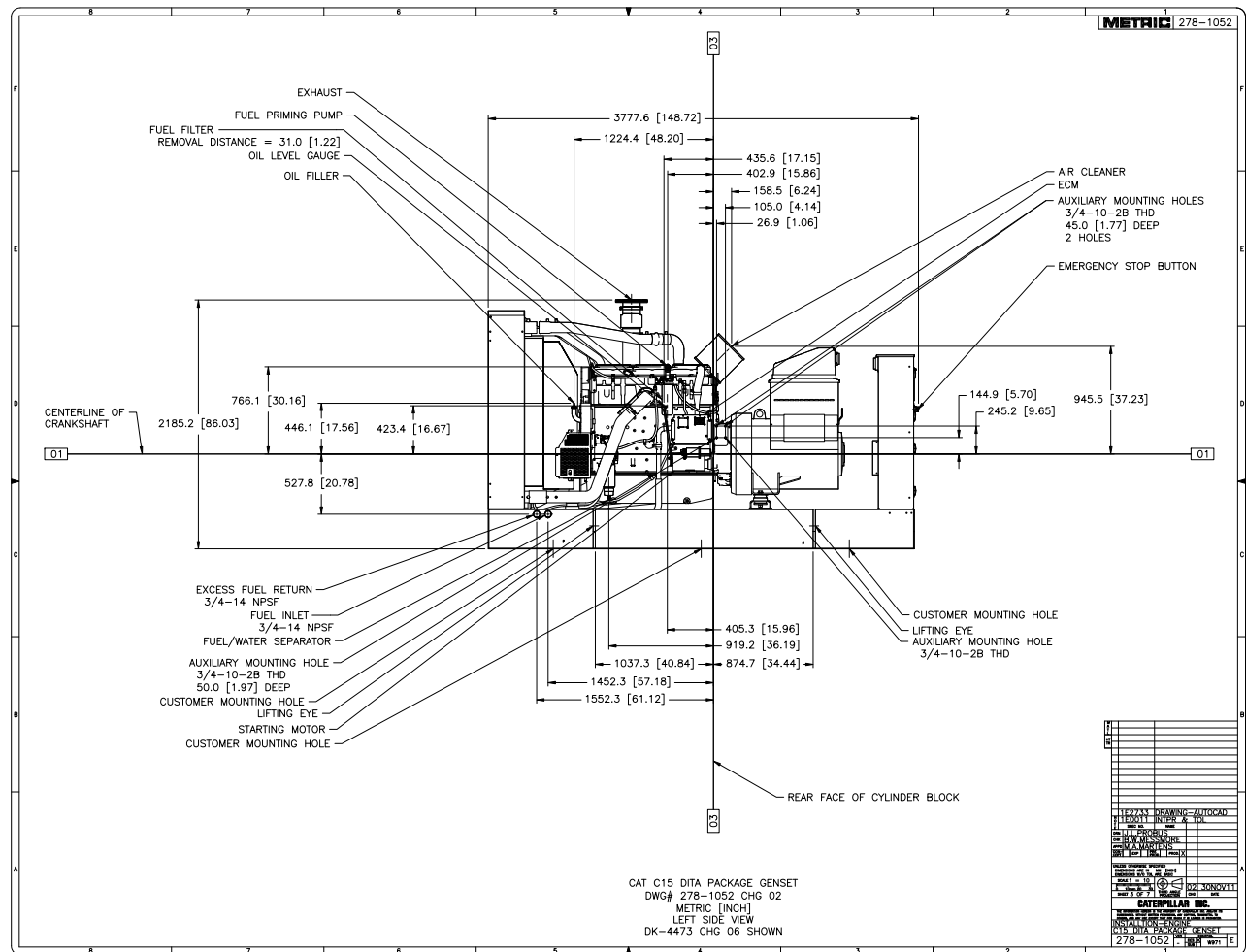
1. 120vac TEFC 1/2hp motor.
2. 5.4gpm positive displacement self-priming gear driven fuel return pump.
3. Fuel level capacitance sending unit.
4. Fuel pick up and return dip tubes.
5. Return fuel-Auto-Off selector switch.
6. Manual push to test button.

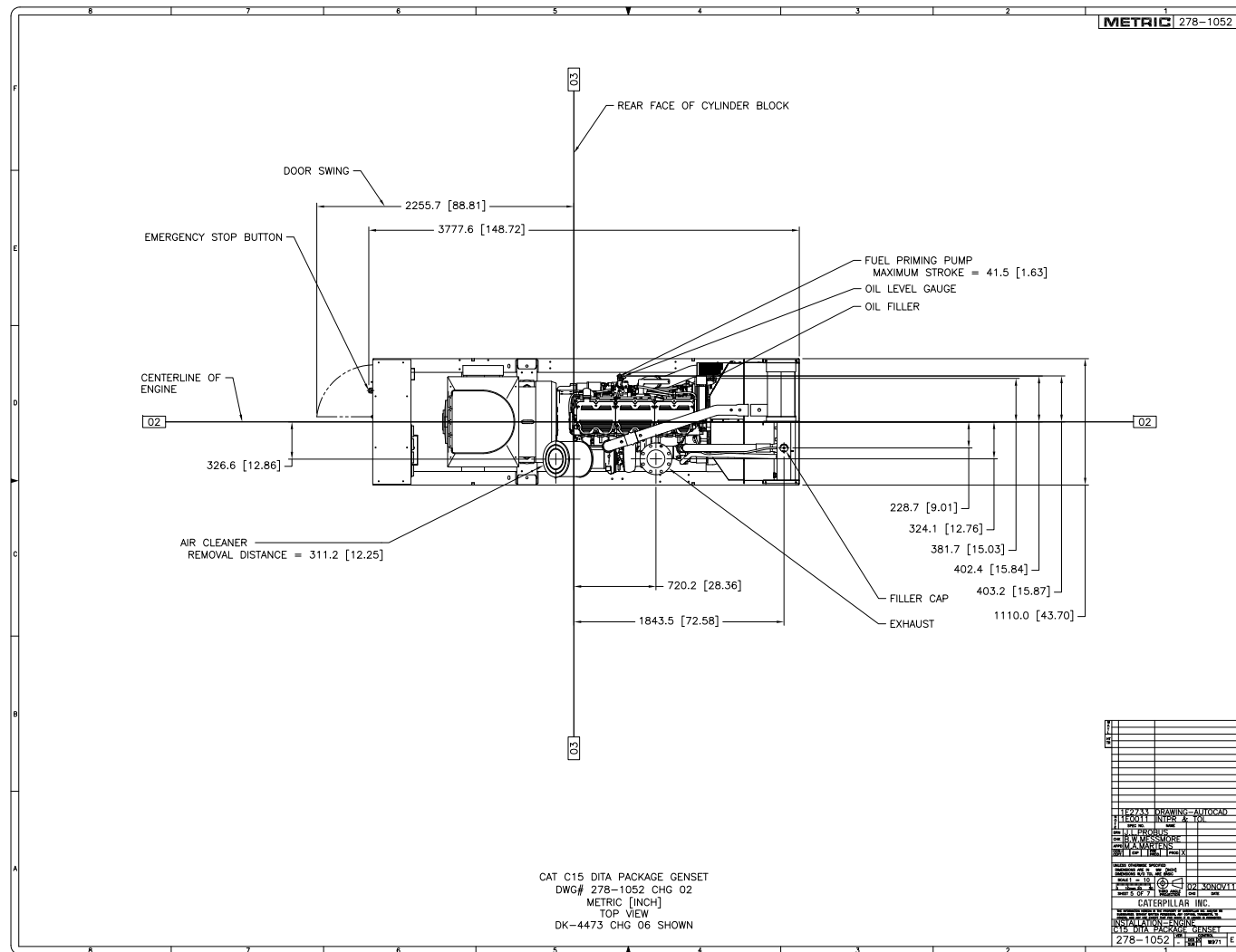
A.2. Functions of the controller to include

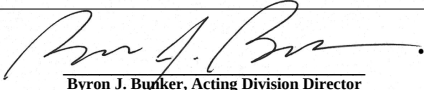
1. Day tank fuel level display.
2. Main tank fuel level display (requires optional sending unit in main tank).
3. Low day tank level alarm @ 30%.
4. High day tank level alarm @ 85%.
5. High day tank level fault @ 95%.
6. Day tank rupture alarm.
7. Main tank rupture alarm (requires a leak sensor in main tank).









	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 2013 MODEL YEAR CERTIFICATE OF CONFORMITY WITH THE CLEAN AIR ACT OF 1990	OFFICE OF TRANSPORTATION AND AIR QUALITY ANN ARBOR, MICHIGAN 48105	
Certificate Issued To: Caterpillar Inc. (U.S. Manufacturer or Importer) Certificate Number: DCPXL15.2NYS-023	Effective Date: 10/05/2012 Expiration Date: 12/31/2013	 Byron J. Bunker, Acting Division Director Compliance Division	Issue Date: 10/05/2012 Revision Date: N/A
Model Year: 2013 Manufacturer Type: Original Engine Manufacturer Engine Family: DCPXL15.2NYS		Mobile/Stationary Indicator: Stationary Emissions Power Category: 450<=kW<=560 Fuel Type: Diesel After Treatment Devices: No After Treatment Devices Installed Non-after Treatment Devices: Engine Design Modification, Electronic Control	
Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year. This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void <i>ab initio</i> for other reasons specified in 40 CFR Part 60. This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.			

Effective with sales to the first user on or after June 1, 2012

CATERPILLAR LIMITED WARRANTY

Industrial, Petroleum, Locomotive, and Agriculture Engine Products and Electric Power Generation Products Worldwide

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new and remanufactured engines and electric power generation products sold by it (including any products of other manufacturers packaged and sold by Caterpillar), to be free from defects in material and workmanship.

This warranty does not apply engines sold for use in on-highway vehicle or marine applications; engines in machines manufactured by or for Caterpillar; C175, 3500 and 3600 series engines used in locomotive applications; 3000 Family engines, C0.5 through C4.4 and ACERT (C6.6, C7, C7.1, C9, C9.3, C11, C13, C15, C18, C27, and C32) engines used in industrial, mobile agriculture and locomotive applications; or Cat batteries. These products are covered by other Caterpillar warranties.

This warranty is subject to the following:

Warranty Period

- For new industrial engines, engines in a petroleum applications or Petroleum Power Systems (excluding petroleum fire pump application), or engines in a Locomotive application, or Uninterruptible Power Supply (UPS) systems, the warranty period is 12 months after date of delivery to the first user.
- For new engines used in petroleum fire pump and mobile agriculture applications the warranty period is 24 months after date of delivery to the first user.
- For controls only (EPIC), configurable and custom switchgear products, and automatic transfer switch products, the warranty period is 24 months after date of delivery to the first user.
- For CG132, CG170 and CG260 series power generation products the warranty period is 24 months/16,000 hours, whichever comes first, after date of delivery to first user.
- For electric power generation products other than CG132, CG170 and CG260 series in prime or continuous applications the warranty period is 12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.
- For all Remanufactured Generator (GenEnds) products in prime or continuous applications the warranty period is

12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.

- For all Remanufactured engines, the warranty period is 6 months (12 months for mobile agricultural and standby electric power generation applications) after date of delivery to the first user.
- For all other applications the warranty period is 12 months after date of delivery to the first user.

Caterpillar Responsibilities

If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Cat dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, Remanufactured, or Caterpillar approved repaired parts or assembled components needed to correct the defect.

Note: New, remanufactured, or Caterpillar approved repaired parts or assembled components provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the product in which installed as if such parts were original components of that product. Items replaced under this warranty become the property of Caterpillar.

- Replace lubricating oil, filters, coolant, and other service items made unusable by the defect.
- Provide reasonable and customary labor needed to correct the defect, including labor to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems, if required.

For new 3114, 3116, and 3126 engines and electric power generation products (including any new products of other manufacturers packaged and sold by Caterpillar):

- Provide travel labor, up to four hours round trip, if in the opinion of Caterpillar, the product cannot reasonably be transported to a place of business of a Cat dealer or other source approved by Caterpillar (travel labor in excess of four hours round trip, and any meals, mileage, lodging, etc. is the user's responsibility).

For all other products:

- Provide reasonable travel expenses for authorized mechanics, including meals, mileage, and lodging, when Caterpillar chooses to make the repair on-site.

User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the first user.
- Labor costs, except as stated under "Caterpillar Responsibilities," including costs beyond those required to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems.
- Travel or transporting costs, except as stated under "Caterpillar Responsibilities."
- Premium or overtime labor costs.
- Parts shipping charges in excess of those that are usual and customary.
- Local taxes, if applicable.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.
- Performance of the required maintenance (including use of proper fuel, oil, lubricants, and coolant) and items replaced due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

Limitations

Caterpillar is not responsible for:

- Failures resulting from any use or installation that Caterpillar judges improper.
- Failures resulting from attachments, accessory items, and parts not sold or approved by Caterpillar.
- Failures resulting from abuse, neglect, and/or improper repair.

(continue on the reverse side.....)

SELF5526

- Failures resulting from user's delay in making the product available after being notified of a potential product problem.
- Failures resulting from unauthorized repairs or adjustments, and unauthorized fuel setting changes.
- Damage to parts, fixtures, housings, attachments, and accessory items that are not part of the engine or electric power generation product (including any products of other manufacturers packaged and sold by Caterpillar).
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In USA and Canada: Caterpillar Inc., Engine Division, P. O. Box 610, Mossville, IL 61552-0610, Attention: Customer Service Manager, Telephone (800) 447-4986. Outside the USA and Canada: Contact your Cat dealer.

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