

WARREN

CAT



Project Submittal

For

LSJE, LLC - ST. THOMAS

Two (2) Caterpillar Model D125 - 8
Engine Driven Generator Set

Warren Cat ID No.: M0114821, M0114822

Warren Cat EA No.: CE36505, CE36506

CATERPILLAR

LSJE, LLC - ST. THOMAS

6100 Red Hook Quarter B3
St. Thomas, VI 00802 - 1348

Project Submittal

125 kW Electric Generator Set
Little St. James
Two (2) Caterpillar Model D125 - 8

Customer Purchase Order No.: CBO
Warren Cat ID No.: M0114821, M0114822
Warren Cat EA No.: CE36505, CE36506

Warren CAT

15 North Meridian Avenue
Oklahoma City, Oklahoma 73127

19 July 2018



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Note: Images shown in this document may not reflect the actual configuration.



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SECTION I

SCOPE OF SUPPLY

The following is a listing of the equipment and services to be provided with each of two (2) sets:

Item 1 One (1) Caterpillar Model D125 - 8 diesel engine generator sets with the following configuration:

Configuration

EPA STATIONARY EMERGENCY
 PRIME POWER APPLICATION

Rating

114 ekW, 0.8 pf, 208 / 120 Volt, 3 Phase, 60 Hz, 1,800 rpm

Unit Consist

Diesel Engine: Model C7.1-ELEC
 Alternator: Frame LC3114J
 Single Bearing, Random Wound

Standard Consist for C7.1 PGABR

ENGINE PACKAGE DESCRIPTION

ENGINE

Electrical system, 12 VDC
 Coolant and lube drains piped to the edge of base
 D125-8 includes ADEM A4 electronic engine control
 with Speed Adjust thru EMCP
 Tier 3 EPA Approved Emissions Certified

INTEGRATED VOLTAGE REGULATOR (Digital):

EM10 Excitation Module
 Voltage within +/- 0.25% at steady state from no load to full load
 Provides fast recovery from transient load changes

CHARGING SYSTEM

CAT Premium High Output Battery with rack & cables
 Installed (wet); 1000 CCA; 90amp hr; 12V



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SECTION I

SCOPE OF SUPPLY (continued)

Standard Consist for C7.1 PGABR (continued)

CONTROL SYSTEM

CONTROL PANEL

- NEMA 1 enclosure with hinged door
- Wiring loom
- DC and AC wiring harness

EMCP 4.2 controls including:

- Run / Auto / Stop Control
- Speed Adjust
- Engine Cycle Crank
- Emergency Stop pushbutton

EMCP 4.2 controller features:

- 12-volt DC operation
- Environmental sealed front face
- Text alarm/event descriptions

Digital indication for:

- RPM
- DC Volts
- Operating Hours
- Oil Pressure (psi)
- Coolant Temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- Power Factor (per phase & average)
- kW (per phase, average & percent)
- kVA (per phase, average & percent)
- kVAr (per phase, average & percent)
- kW-hr (total)
- kVAr-hr (total)

Warning/shutdown with common LED indication of shutdowns for:

- Low Oil pressure
- Low Coolant temp alarm (detects jacket water heater failure)
- High Coolant temperature shutdown



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SECTION I

SCOPE OF SUPPLY (continued)

Standard Consist for C7.1 PGABR (continued)

CONTROL PANELS (continued)

Programmable protective relaying functions:

- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under Frequency (81 o/u)
- Reverse Power (KW) (32)
- Reverse Reactive Power (kVAr) (32RV)
- Overcurrent (50/51)

Communications

- Customer DATA link (Modbus RTU)
- RS485 Serial DATA link (terminals only)
- 8 programmable digital outputs available
- 2 relays pre-programmed
- 8 programmable digital inputs available
- 2 pre-programmed

CIRCUIT BREAKERS

- UL/CSA listed mainline breaker
- Single Breaker 100% Rated 3-pole with solid neutral
- NEMA 1 steel enclosure
- Electrical stub-up area directly below circuit breaker

COOLING SYSTEM

- Radiator and cooling fan complete with protective guards
- Standard ambient temperatures up to 50degC (122degF)
- 50% coolant antifreeze/corrosion inhibitor
- Coolant reservoir



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SECTION I

SCOPE OF SUPPLY (continued)

Standard Consist for C7.1 PGABR (continued)

GENERATORS

GENERATOR SET

Complete system designed and built at ISO 9001:2000 certified facilities
Factory tested to design specifications at full load conditions
and all protective devices and control functions simulated and checked

GENERATOR

Insulation system, class H
Drip proof generator air intake (NEMA 2,IP23)
Electrical design in accordance with BS5000 Part 99,EN61000-6,
IEC60034-1,NEMA MG-1.33

EQUIPMENT FINISH

All electroplated hardware
Anticorrosive paint protection
High gloss polyurethane paint for durability and scuff resistance

QUALITY STANDARDS

BS4999,BS5000,BS5514,EN61000-6,IEC60034,NEMA MG-1.33,
NFPA 110 (with optional equipment)

LITERATURE / DOCUMENTATION

Operation and maintenance manual pack and OMM Storage Compartment
Wiring diagrams included

MOUNTING SYSTEM

Heavy-duty fabricated steel base with lifting points
Anti-vibration pads to ensure vibration isolation
Complete OSHA guarding
Stub-up pipe ready for connection to silencer pipe work
Flexible fuel lines to base with NPT connections

GENERAL

Factory Test Report



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SECTION I

SCOPE OF SUPPLY (continued)

Item 1 One (1) Caterpillar Model D125 – 8 diesel engine generator set with the following:

Selected Caterpillar Options

208 / 120 v, 3 Phase
 60 Hz, 114 kW

UL 2200 Listed Package Gen Set
 EPA Stationary Emergency
 Prime Power

ENGINE

Air Inlet System
 Single element Air Filter – Light Duty

Cooling System
 Standard Radiator
 Coolant Heater
 TECHNICAL: On at 100 and off at 120 degree F
 Low Coolant Level Shutdown

GENERATOR

Generator
 Frame: LC3114J Attunement 4545283

Excitation
 Permanent Magnet Excitation

Main Breaker
 400 Amp First Breaker 100% Rated UL

ENCLOSURE

Enclosure
 Sound Attenuated Enclosure L2 (White)
 TECHNICAL: Foam enclosure with endbox Critical Silencer

Audible Alarm
 Panel Mounted Audible Alarm

Emergency Stop
 External Emergency Stop Button

STARTING SYSTEM

Battery
 Wet Battery

Battery Charger
 NFPA Batter Charger UL 10A 120 VAC



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SECTION I

SCOPE OF SUPPLY (continued)

Item 1 One (1) Caterpillar Model D125 – 8 diesel engine generator set with the following:

Selected Caterpillar Options (continued)

GROUND RELAY SYSTEM

Ground Fault Relay

TECHNICAL: GROUND FAULT INDICATION

CONTROL PANEL OPTIONS

Generator Control

EMCP 4.2 Generator Control Panel

Control Panel Options Box

Accessory Connections

NFPA 110 Bundle

Bundled option to include:

Low Coolant level shut down
Low Coolant temperature alarm
Panel mounted audible alarm
NFPA Battery Charger



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SECTION I

SCOPE OF SUPPLY (continued)

Documentation

Submittals	Electronic Copy	One (1)
Operation and Maintenance Manuals		One (1)
Parts Disc		One (1)

Start Up and Commissioning

By Others

Caterpillar Warranty

Standard Caterpillar Prime Power Warranty



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SECTION II

GENERATOR PACKAGE





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

Image shown may not reflect actual configuration

Specifications

Generator Set Specifications	
Rating	114 ekW (142.5 kVA)
Voltage	480 Volts
Frequency	60 Hz
Speed	1800 rpm

Generator Set Configurations	
Emissions/Fuel Strategy	U.S. EPA Certified for Stationary Emergency Use Only (Tier 3 Nonroad Equivalent Emission Standards)

Engine Specifications		
Engine Model	C7.1 In-line 6, 4-cycle diesel	
Bore	105 mm	4.13 in
Displacement	7.01 L	427.8 in ³
Stroke	135 mm	5.31 in
Compression Ratio	16.7:1	
Aspiration	Turbocharged Air-to-Air-Aftercooled	
Governor Type	Electronic	
Fuel System	Common Rail	

Package Dimensions*		
Length	3039mm	119.7 in
Width	1110 mm	43.7 in
Height	1476 mm	58.1 in
Weight [†]	1500 kg	3307 lb

*Note: For reference only – do not use for installation design. Please contact your local dealer for exact weight and dimensions.

[†]Weight includes: Oversize generator, skid base, circuit breaker, oil, and coolant.

Benefits & Features

Cat® Diesel Engine

- Reliable, rugged, durable design
- Four-stroke cycle diesel engine combines consistent performance and excellent fuel economy with minimum weight
- Electronic engine control

Generator

- Matched to the performance and output characteristics of Cat engines
- Industry-leading mechanical and electrical design
- Industry-leading motor starting capabilities
- High efficiency

Cat EMCP Control Panel

The EMCP controller features the reliability and durability you have come to expect from your Cat equipment. EMCP 4 is a scalable control platform designed to ensure reliable generator set operation, providing extensive information about power output and engine operation. EMCP 4 systems can be further customized to meet your needs through programming and expansion modules.

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 2006, IBC 2009, IBC 2012, IBC 2015

Design Criteria

- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response
- Cooling system designed to operate in 50°C/122°F ambient temperatures with an air flow restriction of 0.5 in. water

UL 2200/CSA – Optional

- UL 2200 Listed
- CSA Certified

Certain restrictions may apply. Consult with your Cat dealer.

Single-Source Supplier

Fully prototype tested with certified torsional vibration analysis.

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 Caterpillar S•O•SSM program cost-effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by-products.

Standard Equipment

Air Inlet

- Dry replaceable paper element type with restriction indicator

Cooling

- Radiator and cooling fan complete with protective guards
- Standard ambient temperatures up to 50°C (122°F)

Exhaust

- Exhaust flange outlet

Fuel

- Primary and secondary fuel filters
- Fuel priming pump
- Flexible fuel lines

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
- Integrated Voltage Regulation

Governor

- Electronic governor – ADEM™ A4

Control Panels

- EMCP 4.2 Series generator set controller

Mounting

- Rubber vibration isolators

Starting/Charging

- 12 volt starting motor
- Batteries with rack and cables

General

- Paint – Caterpillar Yellow except rails and radiators gloss black

Optional Equipment

Exhaust

- Industrial, residential, critical mufflers

Generator

- Excitation: Permanent Magnet Excited (PM) Internally Excited (IE)
- Anti-condensation heater
- Oversize and premium generators

Starting/Charging

- Battery charger – UL 10 amp
- Battery disconnect switch
- Jacket water heater

General

- UL 2200
- CSA Certification
- Enclosures: sound attenuated, weather protective
- Sub-base dual wall UL Listed fuel tanks
- Automatic transfer switches (ATS)

C7.1
114 ekW/ 142.5 kVA/ 60 Hz/ 1800 rpm/ 480V/ 0.8 Power Factor

Rating Type: PRIME

**Emissions: U.S. EPA Certified for Stationary Emergency Use Only
(Tier 3 Nonroad Equivalent Emission Standards)**



D125-8
114 ekW/ 142.5 kVA
60 Hz/ 1800 rpm/ 480V

Image shown may not reflect actual configuration

Package Performance	
Generator Set Power Rating with Fan @ 0.8 Power Factor	114 ekW
Generator Set Power Rating	142.5 kVA

Fuel Consumption		
100% Load With Fan	35.2 L/hr	9.3 g/hr
75% Load With Fan	28.2 L/hr	7.4 g/hr
50% Load With Fan	20.3 L/hr	5.4 g/hr

Cooling System ¹		
Engine Coolant Capacity	9.5 L	2.5 gal
Radiator Coolant Capacity	11.5 L	3.0 gal
Engine Coolant Capacity with Radiator/Exp Tank	21.0 L	5.5 gal
Air Flow Restriction (System)	0.12 kPa	0.48 in Water

Inlet Air		
Combustion Air Inlet Flow Rate	13.9 m ³ /min	490.9 cfm

Exhaust System		
Exhaust Stack Gas Temperature	439°C	822°F
Exhaust Gas Flow Rate	28.8 m ³ /min	1017 cfm
Exhaust System Backpressure (maximum allowable)	15.0 kPa	60.2 in water
Exhaust Flange Size (internal diameter)	89.0 mm	3.5 in

C7.1

114 ekW/ 142.5 kVA/ 60 Hz/ 1800 rpm/ 480V/ 0.8 Power Factor

Rating Type: PRIME

**Emissions: U.S. EPA Certified for Stationary Emergency Use Only
(Tier 3 Nonroad Equivalent Emission Standards)**

Heat Rejection		
Heat Rejection to Coolant (total)	69.0 kW	3924 Btu/min
Heat Rejection to Exhaust (total)	120.0 kW	6796 Btu/min
Heat Rejection to Aftercooler	30.0 kW	1689 Btu/min
Heat Rejection to Atmosphere from Engine	26.0 kW	1496 Btu/min
Heat Rejection to Atmosphere from Generator	8.8 kW	500.4 Btu/min

Alternator ²		
Motor Starting Capability @ 30% Voltage Dip	363 skVA	
Frame	LC3114G	
Temperature Rise	105°C	189°F
Excitation	Self Excited	

Lube System		
Sump Refill with Filter	17.5 L	4.6 gal

Emissions (Nominal) ³	
NOx + HC	4.0 g/kW-hr
CO	1.0 g/kW-hr
PM	0.2 g/kW-hr

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

² Generator temperature rise is based on a 40°C (104°F) ambient per NEMA MG1-32.

³ The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% Prime load. This information should not be used for permitting purposes and is subject to change without notice. Contact your Cat dealer for further details.

C7.1

114 ekW/ 142.5 kVA/ 60 Hz/ 1800 rpm/ 480V/ 0.8 Power Factor

Rating Type: **PRIME**

Emissions: **U.S. EPA Certified for Stationary Emergency Use Only
(Tier 3 Nonroad Equivalent Emission Standards)**

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.

PRIME: Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 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 to specification EPA 2D 89.330-96 with a density of 0.845 – 0.850 kg/L (7.052 – 7.094 lbs/U.S. gal.) @ 15°C (59°F) and fuel inlet temperature 40°C (104°F).

Additional ratings may be available for specific customer requirements, contact your Cat representative for details.

Performance No.: P4392C-00
Feature Code: NAC160P
Generator Arrangement: 4545273
Date: 09/13/2016
Source Country: U.S.

LEHE0889-01

www.Cat-ElectricPower.com

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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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SECTION III

ALTERNATOR DATA



GENERATOR DATA**JULY 18, 2018**For Help Desk Phone Numbers [Click here](#)**Selected Model**

Engine: C7.1 **Generator Frame:** LC3114J **Genset Rating (kW):** 114.0 **Line Voltage:** 208
Fuel: Diesel **Generator Arrangement:** 4545283 **Genset Rating (kVA):** 142.5 **Phase Voltage:** 120
Frequency: 60 **Excitation Type:** Self Excited **Pwr. Factor:** 0.8 **Rated Current:** 395.5
Duty: PRIME **Connection:** PARALLEL STAR **Application:** EPG **Status:** Current

Version: 41764 /41736 /42059 /633

Spec Information

Generator Specification		Generator Efficiency			
Frame: LC3114J	Type: LC	No. of Bearings: 1	Per Unit Load	kW	Efficiency %
Winding Type: RANDOM WOUND		Flywheel: 11.5	0.25	28.5	91.1
Connection: PARALLEL STAR		Housing: 3	0.5	57.0	93.5
Phases: 3		No. of Leads: 12	0.75	85.5	94.0
Poles: 4		Wires per Lead: 1	1.0	114.0	93.8
Sync Speed: 1800		Generator Pitch: 0.6667	1.1	125.4	93.6

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X'_d	0.0929	0.0282
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.1835	0.0557
TRANSIENT - SATURATED X'_d	0.1545	0.0469
SYNCHRONOUS - DIRECT AXIS X_d	3.2147	0.9760
SYNCHRONOUS - QUADRATURE AXIS X_q	1.9288	0.5856
NEGATIVE SEQUENCE X_2	0.1380	0.0419
ZERO SEQUENCE X_0	0.0033	0.0010

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	2.0791
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.1000
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_{d0}	0.0167
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_d	0.0100
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_{q0}	0.1052
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: 0.37

Stator Resistance = 0.0118 Ohms

Field Resistance = 3.29 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: +/-	1.0%	Excitation voltage:	5.82 Volts	28.27 Volts	Volts
Waveform deviation line - line, no load: less than	2.0%	Excitation current	0.45 Amps	1.8 Amps	Amps
Telephone influence factor: less than	50				

Selected Model

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Generator Mechanical Information

Center of Gravity		
Dimension X	0.0 mm	0.0 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 = 0 kg	* Rotor WT = 0 kg	* Stator WT = 0 kg
0.0 LB	0.0 LB	0.0 LB

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

Generator Torsional Data

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
0.0 LB IN. s ²	0.0 MLB IN./rad	0.0 IN.	0.0 LB IN. s ²	0.0 MLB IN./rad	0.0 IN.	0.0 LB IN. s ²
0.0 N m s ²	0.0 MN m/rad	0.0 mm	0.0 N m s ²	0.0 MN m/rad	0.0 mm	0.0 N m s ²
			Total J			
			0.0 LB IN. s ²			
			0.0 N m s ²			

Selected Model

Engine: C7.1 **Generator Frame:** LC3114J **Genset Rating (kW):** 114.0 **Line Voltage:** 208
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Generator Cooling Requirements - Temperature - Insulation Data	
Cooling Requirements:	Temperature Data: (Ambient 40 °C)
Heat Dissipated: 7.5 kW	Stator Rise: 105.0 °C
Air Flow: 18.0 m ³ /min	Rotor Rise: 105.0 °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	141.5 kVA
F BR -105/40	161.0 kVA
H BR - 125/40	177.0 kVA
F PR - 130/40	177.0 kVA
H PR - 150/40	187.5 kVA
H PR27 - 163/27	194.5 kVA

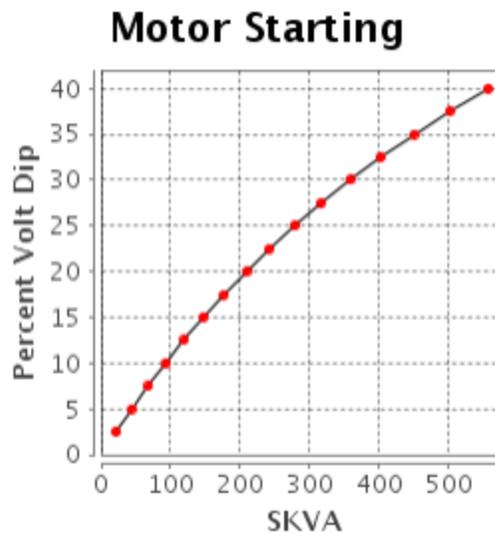
Selected Model

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**Starting Capability & Current Decrement
Motor Starting Capability (0.6 pf)**

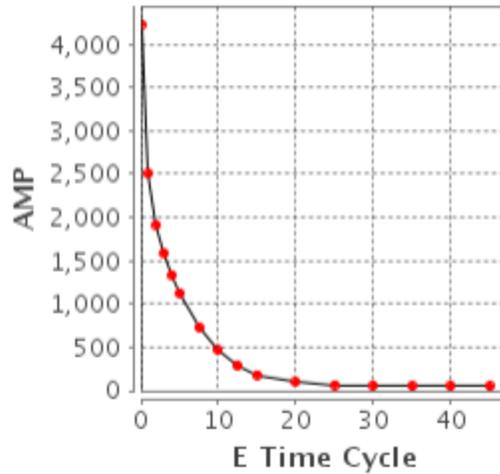
SKVA	Percent Volt Dip
21	2.5
44	5.0
68	7.5
93	10.0
119	12.5
147	15.0
177	17.5
209	20.0
242	22.5
278	25.0
317	27.5
358	30.0
402	32.5
450	35.0
501	37.5
557	40.0



Current Decrement Data

Current Decrement

E Time Cycle	AMP
0.0	4,232
1.0	2,505
2.0	1,918
3.0	1,587
4.0	1,336
5.0	1,126
7.5	729
10.0	463
12.5	286
15.0	185
20.0	98
25.0	69
30.0	57
35.0	53
40.0	51
45.0	50



Instantaneous 3 Phase Fault Current: 4232 Amps

Instantaneous Line - Line Fault Current: 2945 Amps

Instantaneous Line - Neutral Fault Current: 5033 Amps

Selected Model

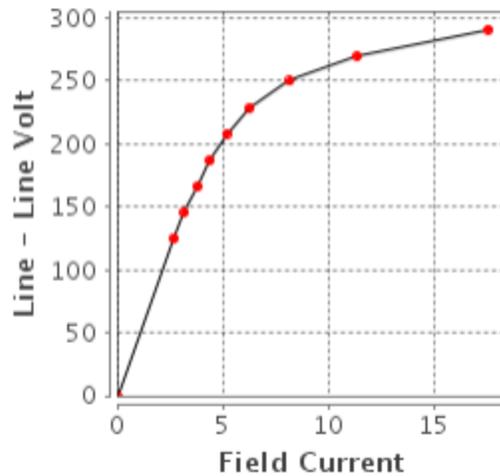
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Generator Output Characteristic Curves
Open Circuit Curve

Open Circuit

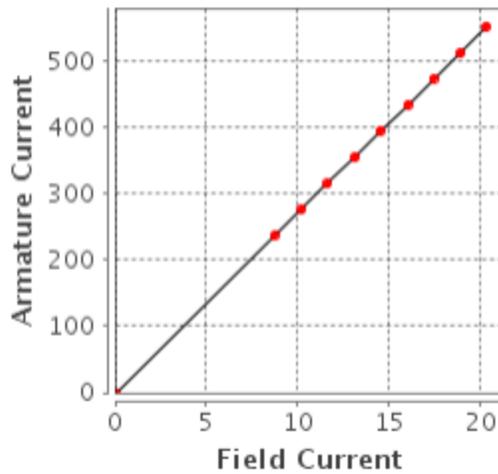
Field Current	Line - Line Volt
0.0	0
2.7	125
3.2	146
3.8	166
4.4	187
5.2	208
6.3	229
8.2	250
11.4	270
17.6	291



Short Circuit Curve

Short Circuit

Field Current	Armature Current
0.0	0
8.7	237
10.2	277
11.6	316
13.1	356
14.5	396
16.0	435
17.4	475
18.9	514
20.3	554



Selected Model

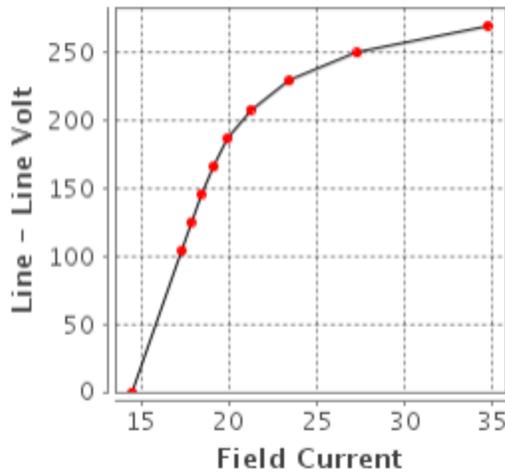
Engine: C7.1	Generator Frame: LC3114J	Genset Rating (kW): 114.0	Line Voltage: 208
Fuel: Diesel	Generator Arrangement: 4545283	Genset Rating (kVA): 142.5	Phase Voltage: 120
Frequency: 60	Excitation Type: Self Excited	Pwr. Factor: 0.8	Rated Current: 395.5
Duty: PRIME	Connection: PARALLEL STAR	Application: EPG	Status: Current

Version: 41764 /41736 /42059 /633

Generator Output Characteristic Curves
Zero Power Factor Curve

Zero Power

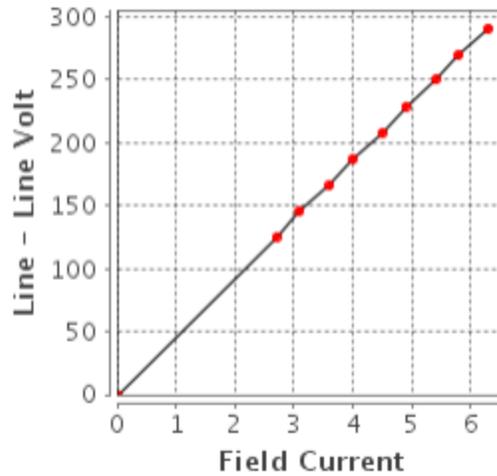
Field Current	Line - Line Volt
14.5	0
17.3	104
17.8	125
18.4	146
19.1	166
19.9	187
21.2	208
23.4	229
27.3	250
34.7	270



Air Gap Curve

Air Gap

Field Current	Line - Line Volt
0.0	0
2.7	125
3.1	146
3.6	166
4.0	187
4.5	208
4.9	229
5.4	250
5.8	270
6.3	291



Selected Model

Engine: C7.1	Generator Frame: LC3114J	Genset Rating (kW): 114.0	Line Voltage: 208
Fuel: Diesel	Generator Arrangement: 4545283	Genset Rating (kVA): 142.5	Phase Voltage: 120
Frequency: 60	Excitation Type: Self Excited	Pwr. Factor: 0.8	Rated Current: 395.5
Duty: PRIME	Connection: PARALLEL STAR	Application: EPG	Status: Current

Version: 41764 /41736 /42059 /633

Reactive Capability Curve

[Click to view Chart](#)

Selected Model

Engine: C7.1	Generator Frame: LC3114J	Genset Rating (kW): 114.0	Line Voltage: 208
Fuel: Diesel	Generator Arrangement: 4545283	Genset Rating (kVA): 142.5	Phase Voltage: 120
Frequency: 60	Excitation Type: Self Excited	Pwr. Factor: 0.8	Rated Current: 395.5
Duty: PRIME	Connection: PARALLEL STAR	Application: EPG	Status: Current

Version: 41764 /41736 /42059 /633

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.

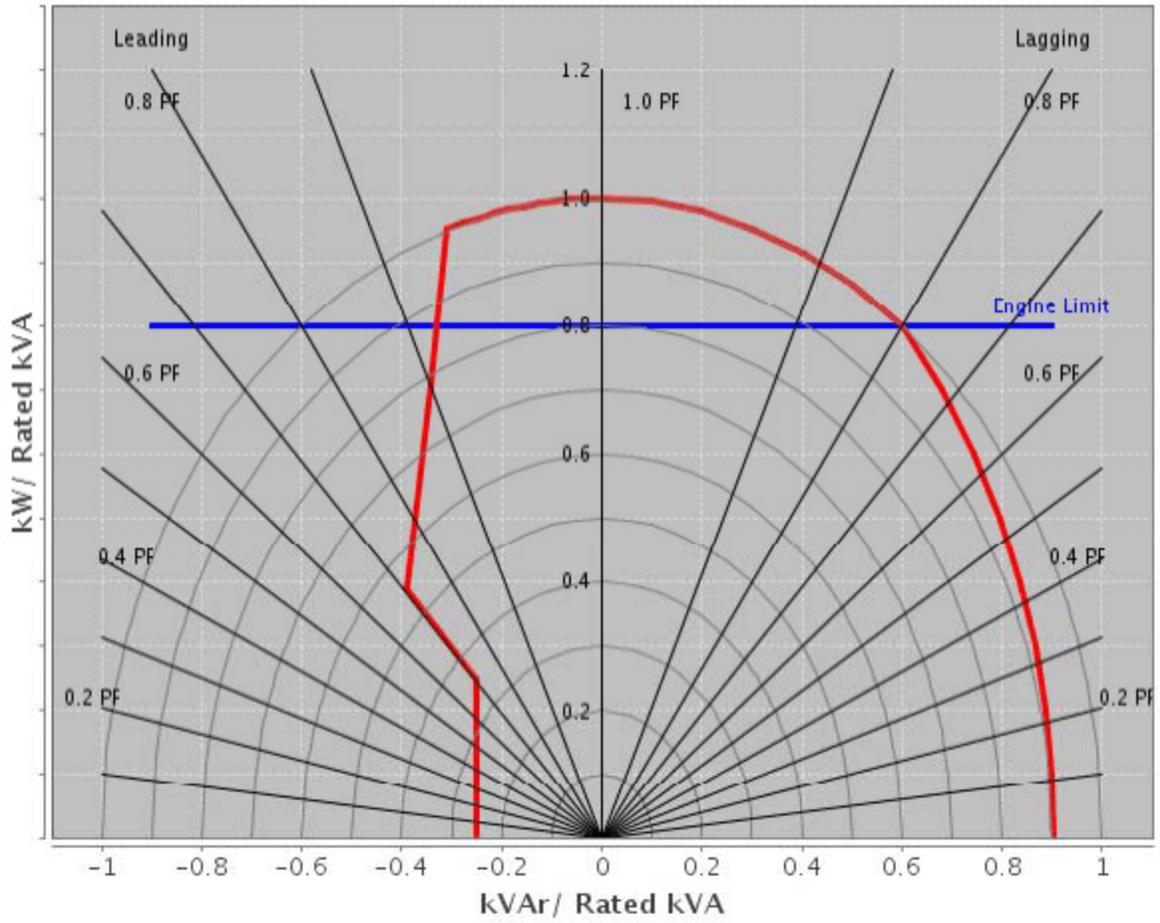
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Operating Chart





Warren CAT
 15 North Meridian Avenue
 Oklahoma City, Oklahoma 73127

SECTION IV

TECHNICAL DATA (Cut Sheets)





Picture shown may not reflect actual configuration

Weather Protective and Sound Attenuated Enclosures

D40-6 to D200-2

D40-6S to D100-8S

Features

Highly Corrosion Resistant construction

- Stainless steel flush fitting latches and hinges tested and proven to withstand extreme conditions of corrosion
- Zinc plated or stainless steel fastener

Excellent Access

- Single side access for service and controls
- All non-service sides have removable doors and/or panels
- Radiator fill access
- Lube oil and coolant drains piped to the exterior of the enclosure base
- Large cable entry area for installation ease
- Double doors on both sides
- Vertically hinged doors with solid bar door stays to hold doors in place when open

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, and battery can only be reached via lockable access
- Stub-up area is rodent proof

Transportability

- These enclosures are of extremely rugged construction to withstand outdoor exposure and rough handling common on many construction sites. The sound deadening material is of a self-extinguishing design
- This range of enclosures are designed on modular principles with many interchangeable components permitting on site repair

Options

- Weather Protective - constructed with 16 gauge steel; industrial silencer mounted within the main enclosure body
- Sound Attenuated Level 1 - constructed with 16 gauge steel; weather protective with critical silencer - silencer mounted in separate upward discharging radiator hood
- Sound Attenuated Level 2 - constructed with 16 gauge steel; weather protective with critical silencer and 100% lined with sound deadening material – silencer mounted in separate upward discharging radiator hood
- Sound Attenuated Aluminum constructed with 14 gauge Aluminum 5052 grade. Weather protective with critical silencer and 100% lined with sound deadening material – silencer mounted in separate upward discharging radiator hood
- Caterpillar Yellow* or white paint
- UL Listed sub base tanks
- Externally mounted emergency stop button
- Seismic certification per applicable building codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, IBC 2012, CBC 2007, CBC 2010
- IBC certification for 180 mph wind loading

*Not available with Aluminium enclosures

Enclosure Sound Pressure Levels (SPL) at 100%

Weather Protective Enclosure		Cooling Air Flow Rate		SPL @7m (23ft)
Model	Standby eKW	m ³ /s	cfm	dBA
D40-6	40	1.6	3475	72
D50-6	50	1.6	3475	72
D60-6	60	1.9	3920	75
D80-8	80	3.2	6696	79
D100-8	100	3.6	7564	81
D125-8	125	4.6	9676	78
D150-10	150	4.6	9676	79
D175-4	175	5.9	12431	84
D200-2	200	5.9	12431	89

SA Level 1 Enclosure		Cooling Air Flow Rate		SPL @7m (23ft)
Model	Standby eKW	m ³ /s	cfm	dBA
D40-6	40	1.7	3602	66
D50-6	50	1.7	3602	66
D60-6	60	1.8	3899	71
D80-8	80	3.2	6696	78
D100-8	100	3.2	6696	79
D125-8	125	4.2	8899	74
D150-10	150	4.2	8899	74
D175-4	175	5.6	11830	78
D200-2	200	5.5	11654	81

SA Level 2 Enclosure		Cooling Air Flow Rate		SPL @7m (23ft)
Model	Standby eKW	m ³ /s	cfm	dBA
D40-6	40	1.7	3602	65
D50-6	50	1.7	3602	66
D60-6	60	1.8	3899	69
D80-8	80	3.2	6696	75
D100-8	100	3.2	6696	76
D125-8	125	4.2	8899	74
D150-10	150	4.2	8899	74
D175-4	175	5.2	11018	74
D200-2	200	5.1	10806	75

SA Aluminum Enclosure		Cooling Air Flow Rate		SPL @7m (23ft)
Model	Standby eKW	m ³ /s	cfm	dBA
D40-6	40	1.7	3602	68
D50-6	50	1.7	3602	69
D60-6	60	1.8	3899	70
D80-8	80	3.2	6696	73
D100-8	100	3.2	6696	74
D125-8	125	4.2	8899	74
D150-10	150	4.2	8899	75
D175-4	175	5.2	11018	75
D200-2	200	5.1	10806	75

The sound pressure level data shown above is quoted as free field and is for guidance only. Actual levels produced may vary according to site conditions.

Enclosure Dimensions and Weights

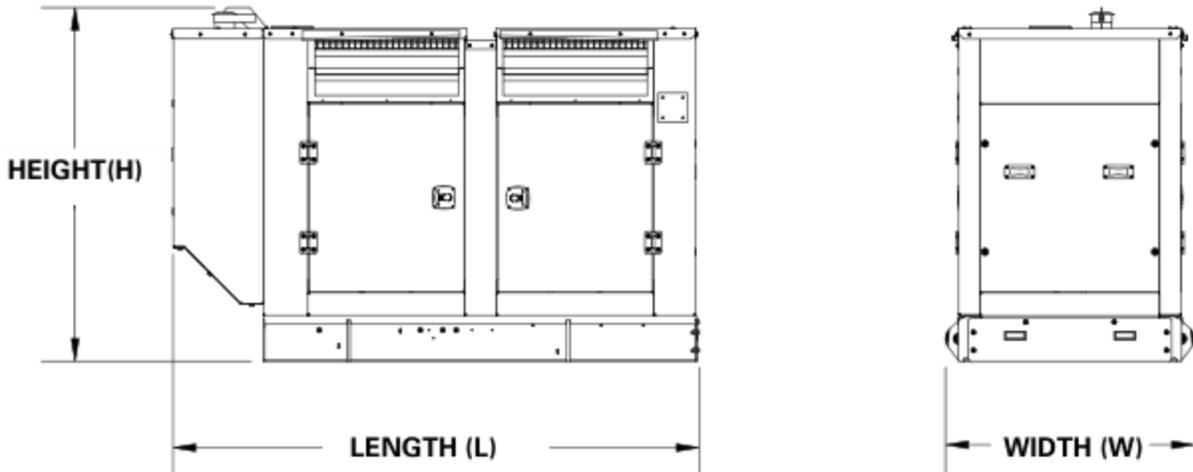


Image represents SA Level 1, SA Level 2 and SA Aluminum enclosures on skid base only

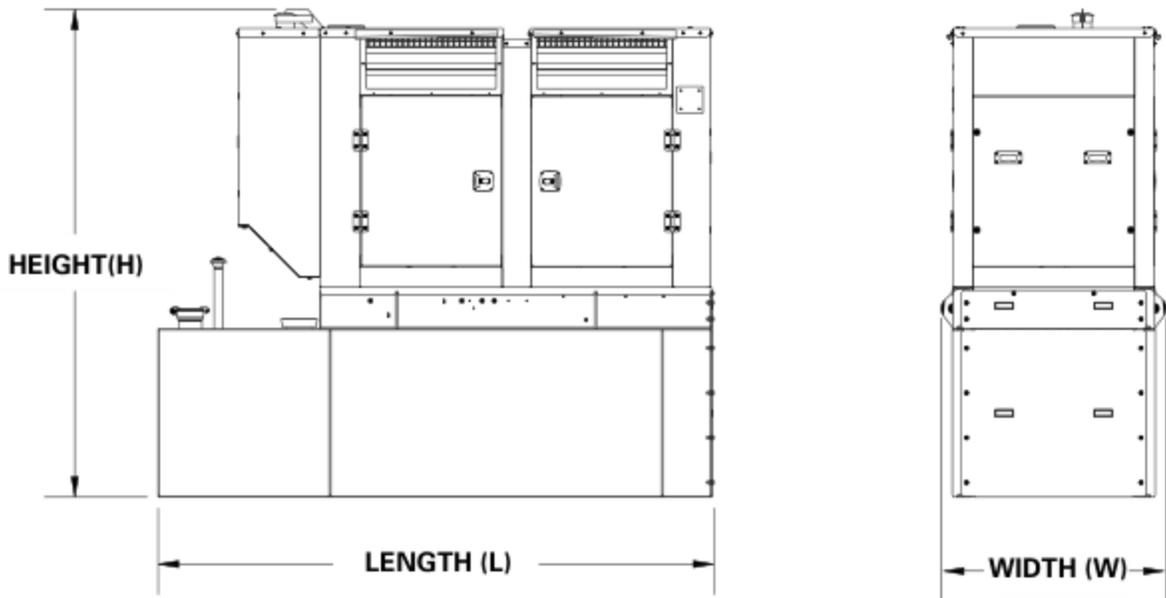


Image represents SA Level 1, SA Level 2 and SA Aluminum enclosures mounted on optional UL listed sub base tank

Model	Standby eKW	WP Industrial		SA Level 1		SA Level 2		SA Aluminum	
		kg	lb	kg	lb	kg	lb	kg	lb
D40-6	40	220	484	272	599	278	612	117	258
D50-6	50								
D60-6	60								
D80-8	80	263	580	313	690	321	708	142	312
D100-8	100								
D125-8	125								
D150-10	150								
D175-4	175	348	768	393	867	406	896	176	387
D200-2	200								

Enclosure weights (includes muffler)

Enclosure Dimensions Skid Bases

Engine Model	Generator Set Rating kW	Enclosure	Width 'W'		Length 'L'		Height 'H'	
			mm	in	mm	in	mm	in
C4.4	40	WP	1110	43.7	2055	80.9	1590	62.6
	50							
	60							
	40	SA Level 1, SA Level 2 and SA Aluminum	1110	43.7	2335	91.9	1570	61.8
	50							
	60							
C4.4	80	WP	1110	43.7	2523	99.3	1773	69.8
	100							
	80	SA Level 1, SA Level 2 and SA Aluminum	1110	43.7	2891	113.8	1852	72.9
	100							
C7.1	125	WP	1110	43.7	3204	126.1	1773	69.8
	150							
	175							
	200							
	125	SA Level 1, SA Level 2 and SA Aluminum	1110	43.7	3659	144.1	1852	72.9
	150							
	175							
	200							

Enclosure Dimensions on UL Listed Sub Base Tanks

Engine Model	Generator Set Rating kW	Enclosure	146 Gallon Sub Base Tank				271 Gallon Sub Base Tank			
			Length 'L'		Height 'H'		Length 'L'		Height 'H'	
			mm	in	mm	in	mm	in	mm	in
C4.4	40	WP	2726	107.3	2087	82.1	2726	107.3	2417	95.1
	50									
	60									
	40	SA Level 1, SA Level 2 and SA Aluminum	2726	107.3	2067	81.4	2726	107.3	2397	94.4
	50									
	60									

Engine Model	Generator Set Rating kW	Enclosure	209 Gallon Sub Base Tank				394 Gallon Sub Base Tank			
			Length 'L'		Height 'H'		Length 'L'		Height 'H'	
			mm	in	mm	in	mm	in	mm	in
C4.4	80	WP	3447	135.7	2258	88.9	3447	135.7	2608	102.7
	100									
	80	SA Level 1, SA Level 2 and SA Aluminum	3447	135.7	2337	92.0	3447	135.7	2687	105.8
	100									

Engine Model	Generator Set Rating kW	Enclosure	402 Gallon Sub Base Tank				777 Gallon Sub Base Tank			
			Length 'L'		Height 'H'		Length 'L'		Height 'H'	
			mm	in	mm	in	mm	in	mm	in
C7.1	125	WP	4035	158.9	2420	95.3	5035	198.2	2706	106.5
	150									
	175									
	200									
	125	SA Level 1, SA Level 2 and SA Aluminum	4035	158.9	2499	98.4	5035	198.2	2785	106.5
	150									
	175									
	200									

Note: Weight includes oil and coolant but not fuel

Ref: WPIA, WPIB, WPIC, SATCBA, SATCBB, SAT, CBC, SATFBA, SATFBB, SATFBC, ENCAL02, ENCAL03, ENCAL04.

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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 provides a higher degree of control over a large number of combustion variables. 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.

SIMPLE SERVICING

Each ADEM A4 system works in combination with the Cat® 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

- Enhanced performance from fuel injection timing and limiting
- Adjustable monitoring of vital engine parameters
- Programmable speed acceleration ramp rate
- Data link interfaces

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 and speed reference.

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 via a dedicated communication network.

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, oil filter pressure differential, fuel filter pressure differential, air filter pressure differential and crankcase pressure.

SPECIFICATIONS

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

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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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 • Low Oil Pressure
Control	<ul style="list-style-type: none"> • Run / Auto / Stop control • Speed and voltage adjust • Local and remote emergency stop • Remote start/stop • Cycle crank
Inputs & Outputs	<ul style="list-style-type: none"> • Two dedicated digital inputs • Six programmable digital inputs • Six programmable form A dry contacts • Two programmable form C dry contacts • Two digital outputs
Communications	<ul style="list-style-type: none"> • Primary and accessory CAN data links • RS-485 annunciator data link • Modbus RTU (RS-485 Half duplex)
Language Support	<p>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</p>
Environmental	<ul style="list-style-type: none"> • 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

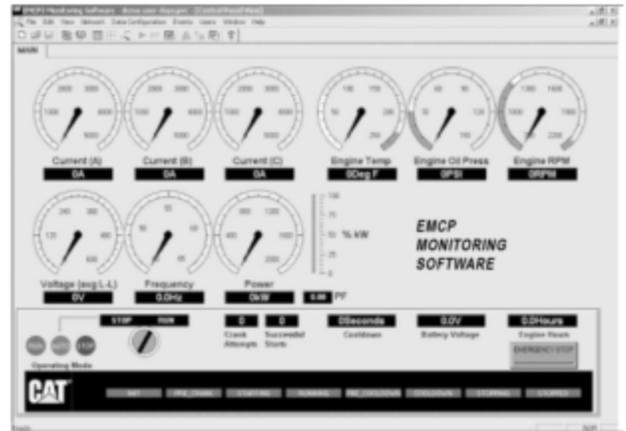


CAN ANNUNCIATOR

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.

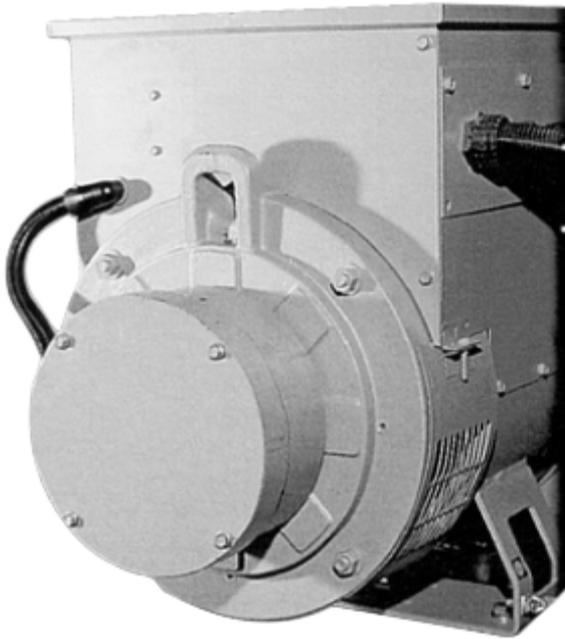
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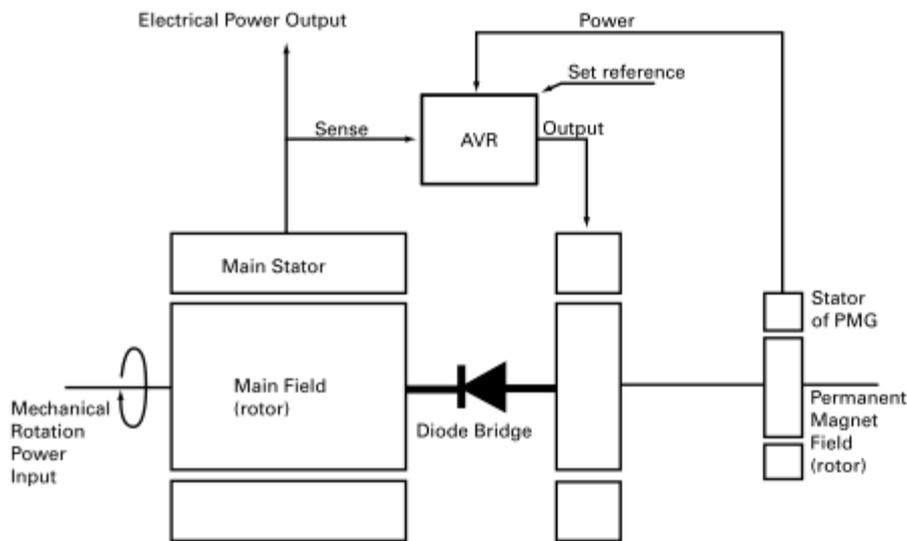
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AVR12 – PERMANENT MAGNET GENERATOR

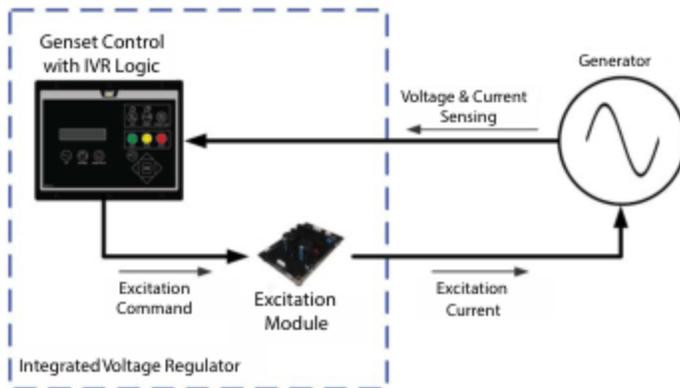


The permanent magnet generator (PMG) option upgrades the excitation system of the generator from the standard self-excited system to a separately-excited system. The PMG couples to the non-drive end of the generator and provides an independent source of excitation power that ensures initial voltage build-up. The PMG improves the voltage response of the generator during transient load application, such as motor starting, and provides a sustained short-circuit current for the operation of protective devices. Isolation of the excitation power ensures that regulation is not affected by non-linear distorting loads.



BLOCK DIAGRAM OF PMG

INTEGRATED VOLTAGE REGULATOR



INTEGRATED VOLTAGE REGULATOR

The Integrated Voltage Regulator (IVR) is designed to provide robust, precise closed-loop control of the generator voltage, optimized transient performance and industry leading feature specification.

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

FEATURES

When used with an Excitation Module, EMCP 4.3/4.4 and IVR-compatible EMCP 4.1/4.2 controllers offer:

- Automatic Voltage Regulation (AVR)
- Programmable stability settings
- Soft start control with an adjustable time setting in AVR control mode
- Dual Slope, Configurable Under Frequency (Volts/Hz) regulation
- Three-phase or single-phase generator voltage (RMS) sensing/regulation in AVR mode
- Setpoint adjustment from the EMCP display or Cat ET ServiceTool
- IVR Operating Status and Voltage Bias Overview screens to provide an enhanced level of user interface
- Integrated Voltage Regulator event monitoring

EMCP 4.3/4.4 and IVR-compatible EMCP 4.2 controllers also offer:

- Power Factor Regulation (PF)
- Reactive Droop compensation
- Line drop compensation

WORLDWIDE PRODUCT SUPPORT

- Worldwide parts availability through the Cat dealer network
- Over 1,800 dealer branch stores operating in 200 countries
- The best product support record in the industry
- Cat dealers provide extensive post sale support including maintenance and repair agreements

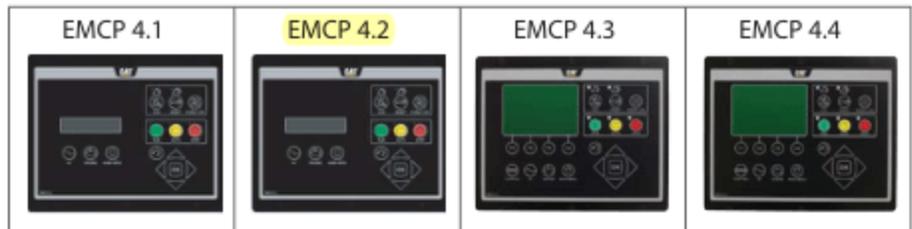
COMPLETE SYSTEM INTEGRATION

Fully designed and factory tested to work seamlessly with Cat generators using Self Excitation (SE), Internal Excitation (IE) or Permanent Magnet (PMG) excitation systems and EMCP controls.

INTEGRATED VOLTAGE REGULATOR



INTEGRATED VOLTAGE REGULATOR FEATURE SPECIFICATION



SPECIFICATIONS				
No Load to Full Load Regulation	±0.5%	±0.25%	±0.25%	±0.25%
Configurable Volts / Hz Characteristic	•	•	•	•
Configurable Knee Frequency	•	•	•	•
Regulator Response Time	10 ms	10 ms	5 ms	5 ms
Single and Three Phase Sensing	•	•	•	•
Voltage Adjustment Range (Configurable up to)	± 30%	± 30%	± 30%	± 30%
CONTROL				
Dual Slope Configurable Volts / Hz Characteristic	•	•	•	•
Excitation Enable / Disable Selection	•	•	•	•
Line Loss (I ² R) Compensation	–	•	•	•
Reactive Droop Compensation	–	•	•	•
Power Factor Control Mode	–	•	•	•
PROTECTION / ALARMS				
Generator Overvoltage	•	•	•	•
Generator Undervoltage	•	•	•	•
Over Excitation	•	•	•	•
Loss of Sensing	•	•	•	•
Generator Reverse VARs	–	•	•	•
Event Log	•	•	•	•
METERING				
EMCP AC Metering	•	•	•	•
EMCP Power Metering	–	•	•	•
Excitation Command Percentage	•	•	•	•
Operating Mode Status Indication	•	•	•	•

INTEGRATED VOLTAGE REGULATOR



INTEGRATED VOLTAGE REGULATOR FEATURE SPECIFICATION (continued)

EMCP 4.1	EMCP 4.2	EMCP 4.3	EMCP 4.4
			

VOLTAGE ADJUSTMENT				
EMCP 4 Display Voltage Bias	•	•	•	•
Digital Input (Raise / Lower) Voltage Bias ¹	•	•	•	•
Potentiometer Voltage Bias ¹	•	•	•	•
Analog Voltage Bias – Voltage Range ¹	0V to 5V	0V to 5V	-10V to +10V	-10V to +10V
Analog Voltage Bias – Current Range ¹	–	–	0mA to 20mA	0mA to 20mA
Analog Voltage Bias – PWM Range ¹	–	–	0% to 100%	0% to 100%
SCADA (Modbus) Voltage Bias	–	•	•	•

¹Requires an available input on the EMCP 4.

INTEGRATED VOLTAGE REGULATOR

EXCITATION MODULE SPECIFICATION



The Integrated Voltage Regulator consists of an EMCP 4 interfacing with an Excitation Module. There are a range of Excitation Modules available to match Cat generator sets.



Figure 1:
EM10 Excitation Module



Figure 2:
EM15 Excitation Module

EXCITATION MODULE TECHNICAL SPECIFICATION

	EM10	EM15
Compatible Generator Excitation Types	Self Excitation (SE) Internal Excitation (IE) Permanent Magnet (PMG)	
Nominal Field Current Output	6 Amps	7 Amps
Maximum (forcing) Field Current Output	10 Amps	15 Amps
Maximum AC Voltage Input	180 Vrms	240 Vrms

For more information on the Excitation Module refer to the component spec sheet.

INTEGRATED VOLTAGE REGULATOR



EMCP 4 DISPLAY

EXAMPLE SCREENS – EMCP 4.1/4.2

VOLTS / Hz	
TARGET VOLT	480 V
EXCITATION CMD	4.5 %

Figure 3: IVR Overview Screen

VOLTAGE BIAS OVERVIEW	
MANUAL	10.0%
ANALOG	2.0%

DROOP	-2.0%
TOTAL	10.0%

Figure 4: Voltage Bias Overview Screens

EXAMPLE SCREENS – EMCP 4.3/4.4

IVR OVERVIEW			
OPERATING MODE:			
VOLTS / Hz			
TARGET VOLTAGE	480 V		
EXCITATION COMMAND	4.5 %		
COMPENSATION	DROOP		
GENSET			PAGE DOWN

Figure 5: IVR Overview Screen

VOLTAGE BIAS OVERVIEW			
ACTIVE VOLTAGE BIASING:			
MANUAL	10.0%		
ANALOG INPUT	2.0%		
DROOP	-2.0%		
TOTAL BIAS	10.0%		
GENSET		PAGE UP	

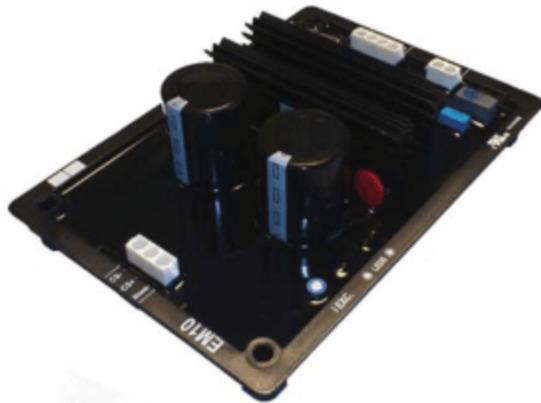
Figure 6: Voltage Bias Overview Screen

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EXCITATION MODULE



EM10

The EM10 Excitation Module is a power electronics component designed to provide excitation current to the generator that is controlled by the Integrated Voltage Regulator (IVR) feature in the EMCP 4 controls.

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

FEATURES

- Over-excitation protection – limit can be adjusted via a potentiometer (IEXC.)
- Green status LED indicating unit is powered on
- Red status LED indicating excitation current limiting (flashing) or shutdown (solid)

When used with EMCP 4.3/4.4 and IVR-compatible EMCP 4.1/4.2 controllers, the Integrated Voltage Regulator system offers:

- Automatic Voltage Regulation (AVR)
- Programmable stability settings
- Soft start control with an adjustable time setting in AVR control mode
- Dual Slope Under Frequency (Volts / Hz) regulation
- Three-phase or single-phase generator voltage (RMS) sensing/regulation in AVR mode

EMCP 4.3/4.4 and IVR-compatible EMCP 4.2 controllers also offer:

- Power Factor Regulation (PF)
- Generator paralleling with reactive droop compensation
- Line drop compensation

WORLDWIDE PRODUCT SUPPORT

- Worldwide parts availability through the Cat® dealer network
- Over 1,800 dealer branch stores operating in 200 countries
- The best product support record in the industry
- Cat dealers provide extensive post sale support including maintenance and repair agreements

COMPLETE SYSTEM INTEGRATION

Fully designed and factory tested to work seamlessly with Cat generators using Self Excitation (SE), Internal Excitation (IE) or Permanent Magnet (PMG) excitation systems and EMCP controls.

EXCITATION MODULE – EM10



SPECIFICATIONS

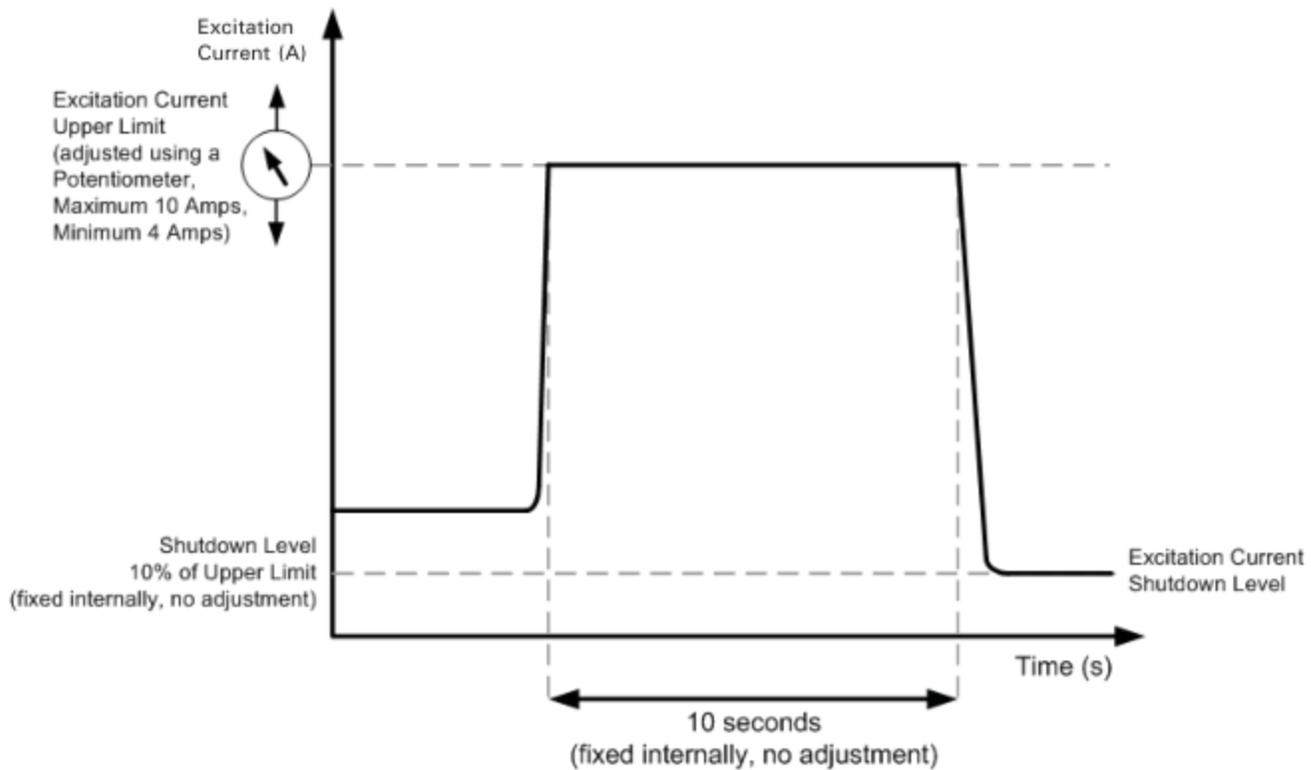
ELECTRICAL	
Generator Excitation Types	Self Excitation / Internal Excitation / Permanent Magnet (PMG)
Max. Continuous Field Current Output	6 Amps
Max. Forcing Field Current Output	10 Amps
Max. AC Voltage Input (X1:X2, Z1:Z2)	180Vrms
ENVIRONMENTAL	
Operating Temperature Range	-40 °C (-40 °F) to +70 °C (+158 °F)
Storage Temperature Range	-40 °C (-40 °F) to +85 °C (+185 °F)
Relative Humidity Tolerance	95% non-condensing humidity
Salt Spray	5% salt (NaCl) solution for 120 hrs
Vibration	4.5 G-rms, 24-2000 Hz in 3 orthogonal planes
Electromagnetic Compatibility	RF Immunity (Radiated & Conducted) RF Emissions (Radiated & Conducted) Electrical Transients
Weight	770 g ± 30 g
Power Consumption (at Max. Continuous Rating)	<450 VA
CONFORMITY	
UL	UL Recognized (U.S. and Canada) File No. E334232
CE Integration Certificate	In conformity with the applicable requirements of the following Standards: EN 50178 EN 60204-1 EN 61000-6-2 EN 61000-6-4

EXCITATION MODULE – EM10



OVER-EXCITATION PROTECTION

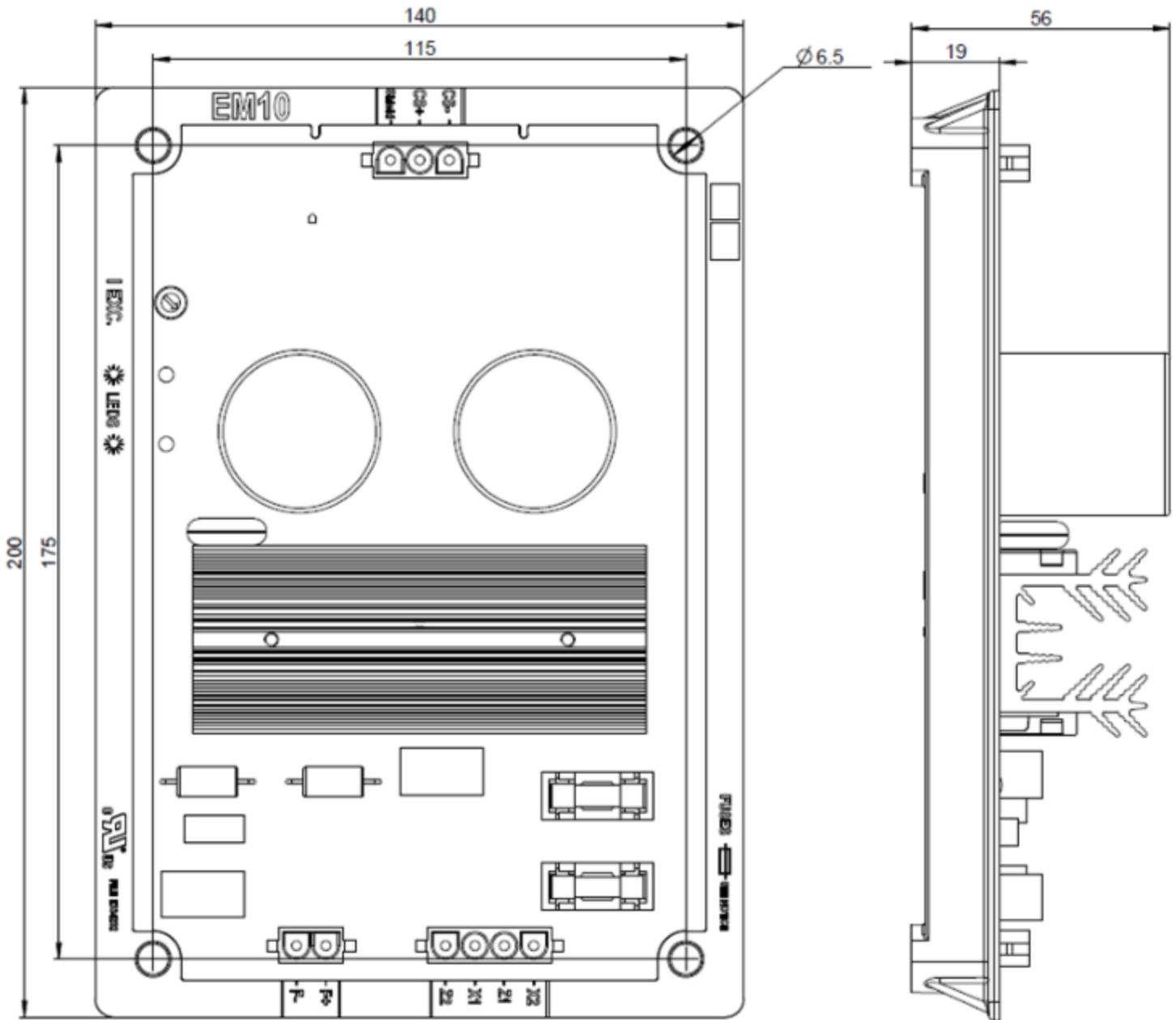
- If a short-circuit fault occurs at the generator terminals, the EM10 will allow the excitation current to rise to the upper limit value set by the adjustment potentiometer (max. 10 Amps).
- The excitation current will be clamped at the upper limit value for 10 seconds (fixed internally).
- After 10 seconds, the excitation current is reduced to a value of 10% of the potentiometer setting.



EXCITATION MODULE – EM10



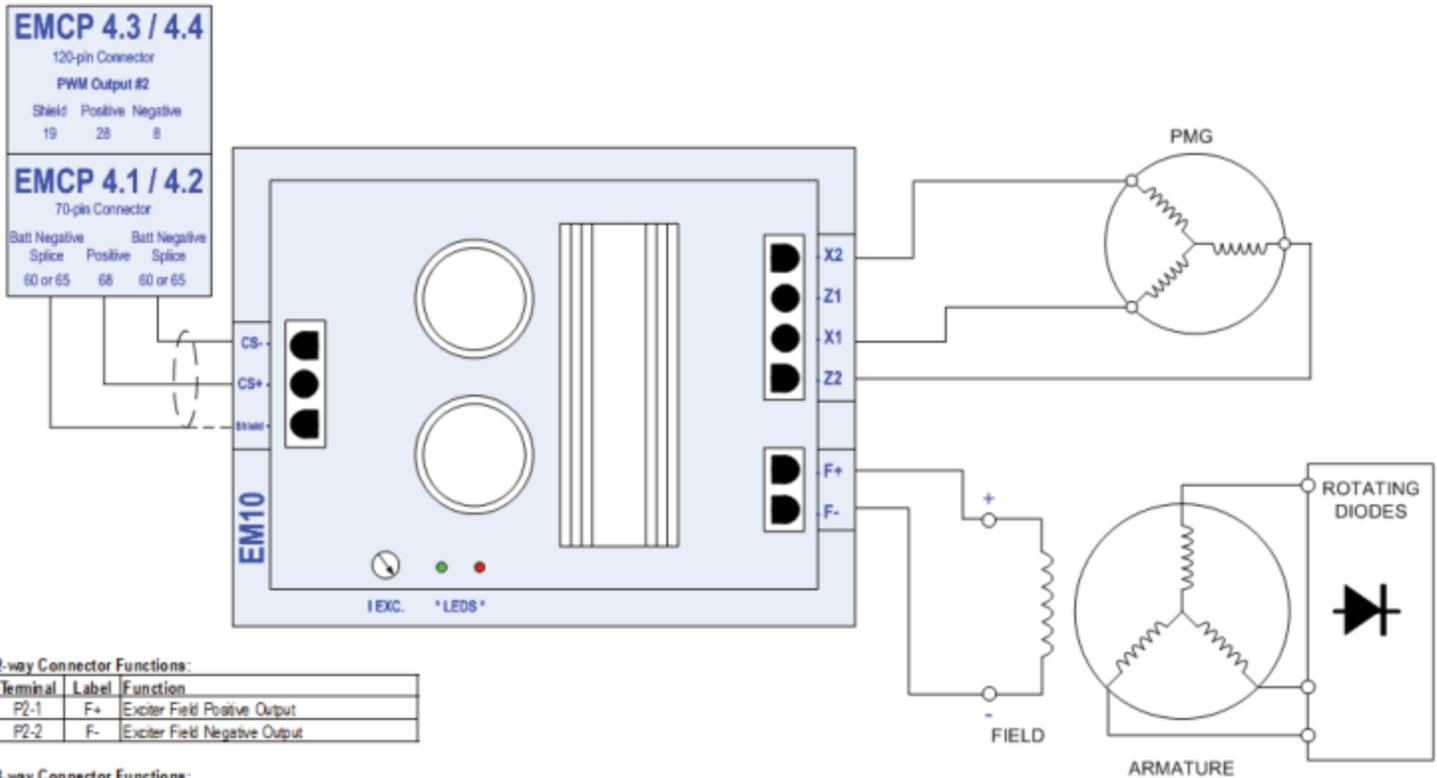
OUTLINE DRAWING (Dimensions in mm)



EXCITATION MODULE – EM10



EXAMPLE CONNECTION DIAGRAM (Permanent Magnet Excitation)



2-way Connector Functions:

Terminal	Label	Function
P2-1	F+	Exciter Field Positive Output
P2-2	F-	Exciter Field Negative Output

3-way Connector Functions:

Terminal	Label	Function
P3-1	Shield	Excitation Command Shield
P3-2	CS+	Excitation Command Positive Input
P3-3	CS-	Excitation Command Negative Input

4-way Connector Functions (PMG Excitation):

Terminal	Label	Function
P4-1	X2	Excitation Power Supply Input (PMG Phase B)
P4-2	Z1	Not Connected
P4-3	X1	Excitation Power Supply Input (PMG Phase A)
P4-4	Z2	Excitation Power Supply Input (PMG Phase C)

4-way Connector Functions (Self-Excitation):

Terminal	Label	Function
P4-1	X2	Excitation Power Supply Input (single-phase)
P4-2	Z1	Not Connected
P4-3	X1	Excitation Power Supply Input (single-phase)
P4-4	Z2	Not Connected

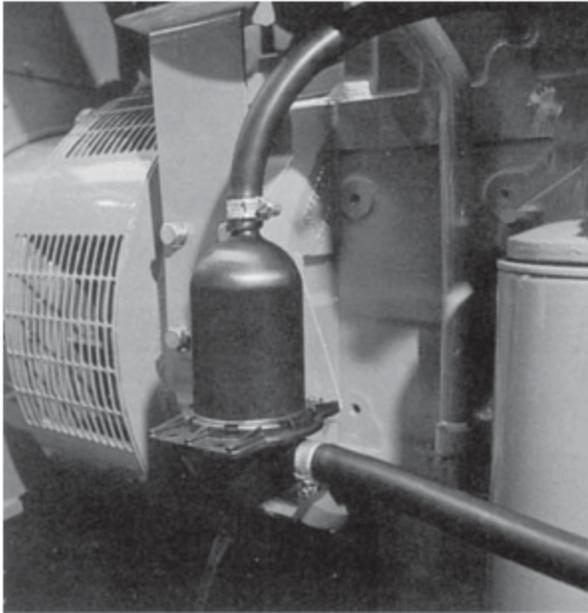
4-way Connector Functions (Internal Excitation):

Terminal	Label	Function
P4-1	X2	Excitation Power Supply Input (Aux Winding 1 - Positive)
P4-2	Z1	Excitation Power Supply Input (Aux Winding 2 - Positive)
P4-3	X1	Excitation Power Supply Input (Aux Winding 1 - Negative)
P4-4	Z2	Excitation Power Supply Input (Aux Winding 2 - Negative)

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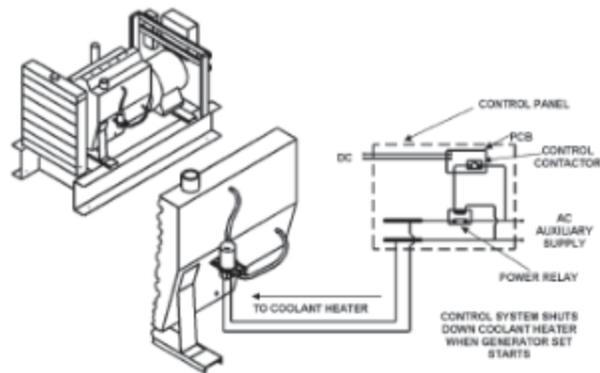
Coolant Heater (WHH)

Appropriate when the generator set is to be sited in a low ambient environment, the heater maintains the engine coolant at a temperature [typically 38°C (100°F)] which facilitates rapid starting and load acceptance. The heater assembly uses UL compliant components (to UL1030) and has CSA certification which is to both CSA and UL Standards.

The heater itself is powered by a 110/120 volt (VAC 120) AC auxiliary supply protected by a safeguard breaker inside the main control panel. A thermostatic controller is included to regulate the output temperature to within safe limits. 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.

Features

- Molded from Polyphenylene Sulphide
- Rust free, corrosion resistant with exceptional tensile strength
- Vibration and shock tested to extreme limits to ensure durability
- Compatible with all coolant additives
- Incoloy element for longer service life



VAC 120

Diesel Generator Set Engine Models	Nominal Coolant Heater Power Consumption (Watts)
C2.2, C4.4, C4.4 ACERT™	1000
C7.1 ACERT	1800
Gas Generator Set Models	Nominal Coolant Heater Power Consumption (Watts)
DG30-2, DG50-2, DG60-2, DG80-2	1000
DG100-2, DG125-2, DG150-2	1800

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Manually Operated Circuit Breakers for 40 – 200 ekW Diesel Generator Sets

Current (A)	Frame	Number of Poles	Interrupting Ratings (kA rms)			Trip Units	Lugs		Auxiliary Options	
			240V	480V	600V		Size	# per phase		
30	T1N	3	50	22	10	Thermal Magnet	14 AWG-1/0	1	1 Form C + 1 Bell Alarm Shunt Trip 12VDC	
40	T1N	3	50	22	10					
50	T1N	3	50	22	10					
60	T1N	3	50	22	10					
70	T1N	3	50	22	10					
80	T1N	3	50	22	10					
90	T1N	3	50	22	10					
100	T1N	3	50	22	10					
125	T3N	3	50	25	10		4 AWG - 300 kcmil	1		
150	T3N	3	50	25	10					
175	T3N	3	50	25	10					
200	T3N	3	50	25	10					
225	T3N	3	50	25	10					
250	T4N	3	65	25	18	Electronic LS/I (S or I)			6 AWG 350 kcmil	1
400	T5N	3	65	25	18		3/0 – 250 kcmil	2		
600	T6N	3	65	35	20		2/0 – 400 kcmil	3	Shunt Trip 12VDC	
800	T6N	3	65	35	20		2/0 – 400 kcmil	3		

D40 – D200 Range (C4.4 & C7.1)

First Breaker	Second Breaker
Circuit Breaker Size (A)	Circuit Breaker Size (A)
50 100% UL	30 100% UL
60 100% UL	40 100% UL
70 100% UL	50 100% UL
80 100% UL	60 100% UL
90 100% UL	70 100% UL
100 100% UL	80 100% UL
125 100% UL	90 100% UL
150 100% UL	100 100% UL
175 100% UL	125 100% UL
200 100% UL	150 100% UL
225 100% UL	175 100% UL
250 100% UL	200 100% UL
400 100% UL	225 100% UL
600 100% UL	250 100% UL
800 100% UL	

Available Breaker Configurations			
First Circuit Breaker	Second Circuit Breaker		
T1	T1	T3	T4
T3	T1	T3	T4
T4	T1	T3	T4
T5	T1	T3	T4
T6	T1	T3	T4

D40 – D60 LC Range (C4.4 LC)

First Breaker	Second Breaker	Third Breaker
Circuit Breaker Size (A)	Circuit Breaker Size (A)	Circuit Breaker Size (A)
50 A	50 A	50 A
100 A	100 A	100 A
150 A	150 A	
225 A		
250 A		

Available Breaker Configurations		
First Circuit Breaker	Second Circuit Breaker	Third Circuit Breaker
T1	-	-
T1	T1	-
T1	T1	T1
T3	-	-
T3	T1	-
T3	-	-
T3	T1	T1
T4	-	-
T4	T1	-
T4	T1	T1

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Picture shown may not represent actual package

Molded Case Circuit Breakers: 30A – 1200A

40 kW – 600 kW Gensets

Features

- 100% UL Listing
- Thermal Magnetic Trip Units (Frames T1N and T3N)
- Electronic Trip Units (Frames T4N, T5N, T6N & T7S/T7M-S)
- Double insulation
- Clear indication of breaker status
- Can be used in normal operation in an ambient of -25°C and $+70^{\circ}\text{C}$
- Auxiliary contacts available
- Insulating case constructed from fiberglass reinforced synthetic resin
- Anti-corrosion treatment on all metal parts
- Optional Dual Circuit Breakers

Conformity with International Standards

The T1N through T6N and T7S/T7M-S Frame Circuit Breakers have been designed to comply with these major standards:

- UL 489
- CSA22.2 No.5
- IEC 60947-2

Manually Operated Circuit Breakers

Current (A)	Frame	Number of Poles	Interrupting Ratings (kA rms)			Trip Units
			240V	480V	600V	
30	T1N	3	50	22	10	Thermal Magnetic
40	T1N	3	50	22	10	
50	T1N	3	50	22	10	
60	T1N	3	50	22	10	
70	T1N	3	50	22	10	
80	T1N	3	50	22	10	
90	T1N	3	50	22	10	
100	T1N	3	50	22	10	
125	T3N	3	50	25	10	
150	T3N	3	50	25	10	
175	T3N	3	50	25	10	
200	T3N	3	50	25	10	
225	T3N	3	50	25	10	
250	T4N	3	65	25	18	
400	T5N	3	65	25	18	Electronic LS/I (S or I) or LSI
600	T6N	3	65	35	20	
800	T6N	3	65	35	20	
1200	T7S	3	65	50	25	

Electrically Operated Circuit Breakers

Current (A)	Frame	Number of Poles	Interrupting Ratings (kA rms)			Trip Units
			240V	480V	600V	
800	T7M-S	3	65	50	25	Electronic LSI
1200	T7M-S	3	65	50	25	

Electronic LS/I Trip Units offer LS or LI Protection

L-I Mode

- Long Time / Overload Protection, "L" has an adjustable trip threshold and adjustable time delay
- Instantaneous Short Circuit Protection, "I" has an adjustable short circuit trip threshold and once exceeded will cause the circuit breaker to trip instantaneously

L-S Mode

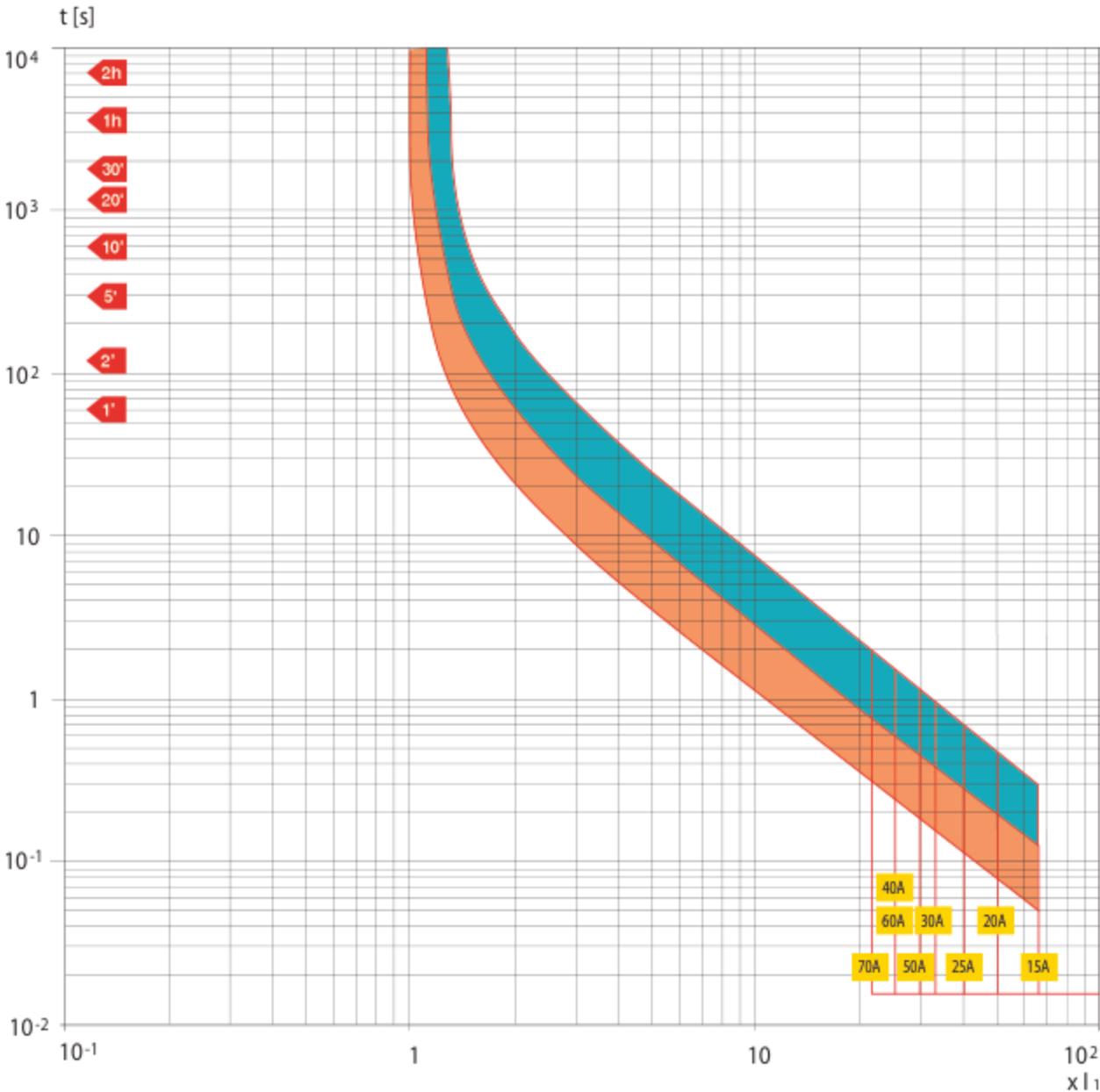
- Long Time / Overload Protection, "L" has an adjustable trip threshold and adjustable time delay
- Short Circuit Protection, "S" has an adjustable short circuit trip threshold and adjustable time delay if necessary for coordinating with downstream loads
- Instantaneous Short Circuit Protection, "I" is still included, but the threshold level is not adjustable and exists at a predetermined level

Electronic L-S-I Trip Units

- Long Time / Overload Protection, "L" has an adjustable trip threshold and adjustable time delay
- Short Circuit Protection, "S" has an adjustable short circuit trip threshold and adjustable time delay if necessary for coordinating with downstream loads
- Instantaneous Short Circuit Protection, "I" has an adjustable short circuit trip threshold and once exceeded will cause the circuit breaker to trip instantaneously

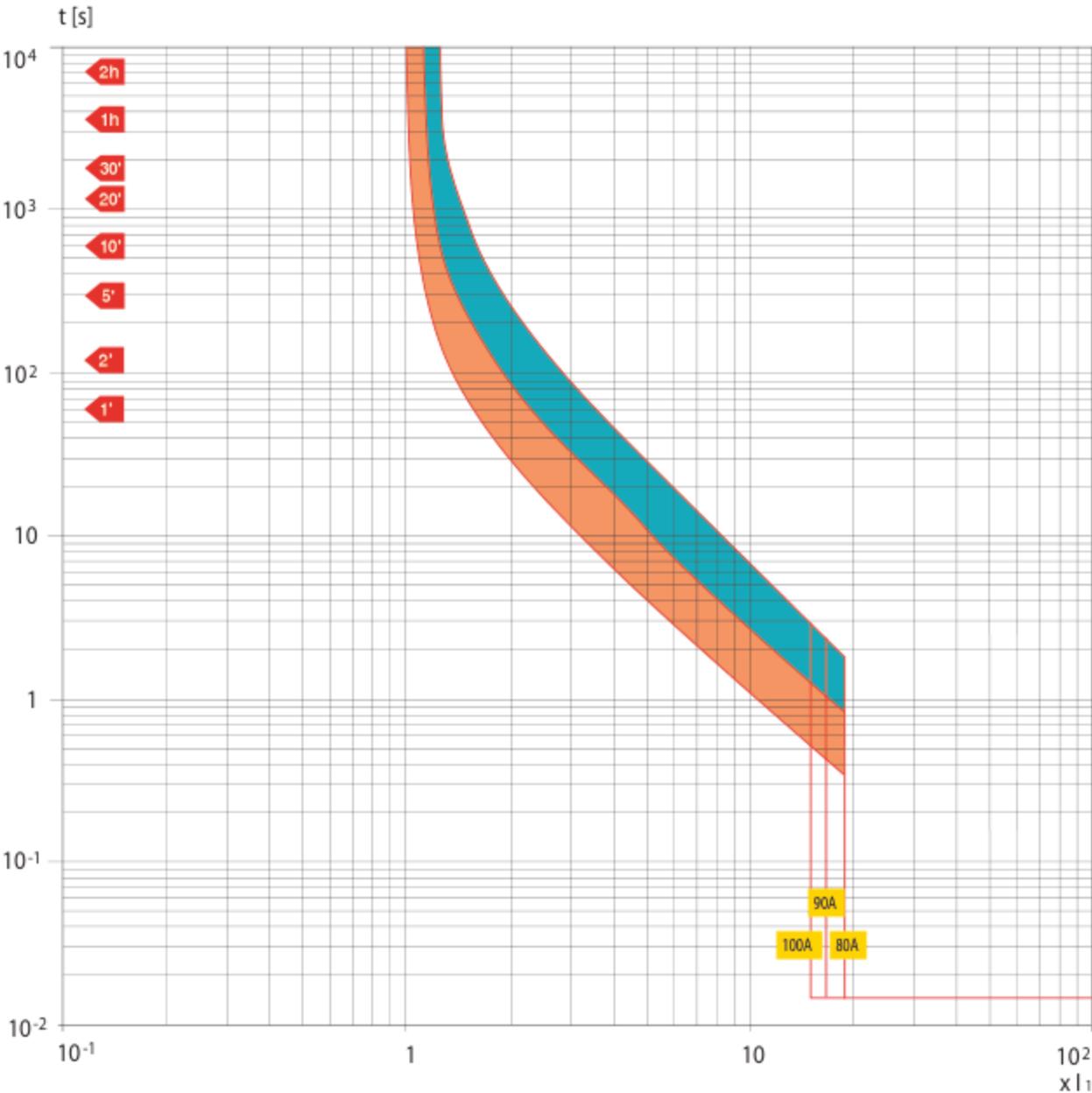
T1 100 - TMF

$I_n = 15 \text{ } \square \square \square 70 \text{ A}$



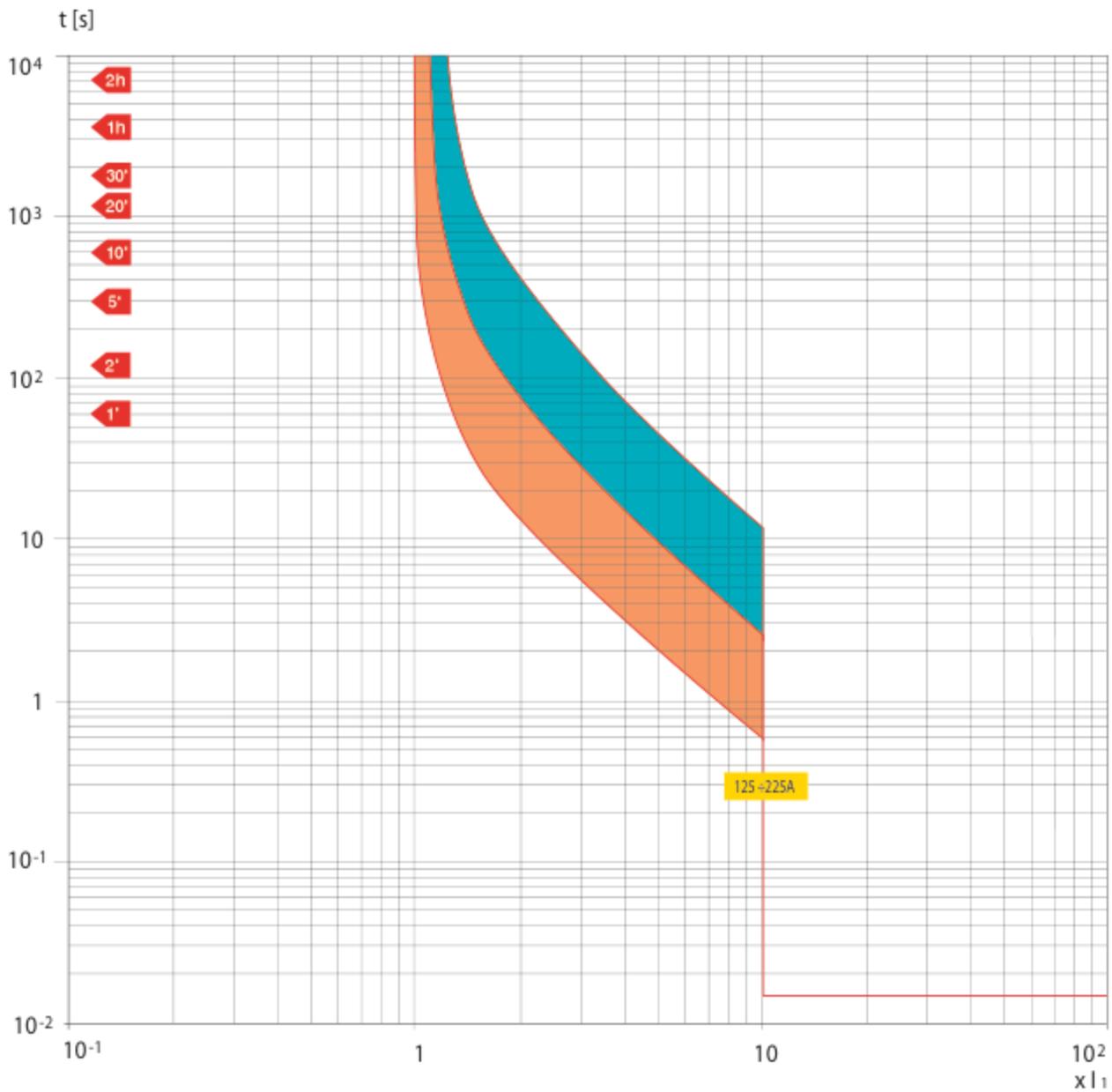
T1 100 - TMF

$I_n = 80 \text{ } \square \square \square \square \square 100 \text{ A}$



T3 225 – TMF

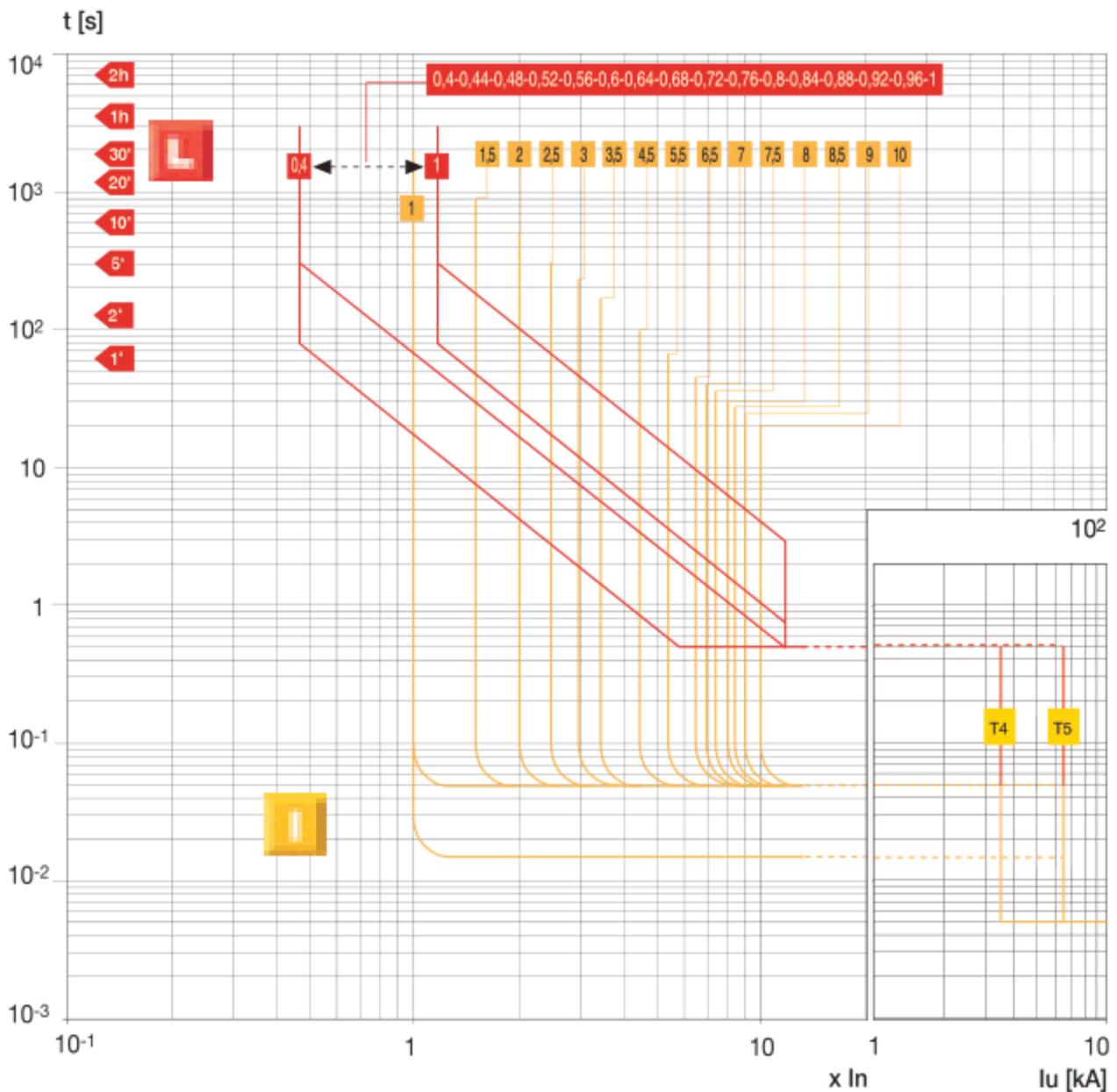
In = 125 225 A



T4 250 / T5 400 - PR221DS

L-I Functions

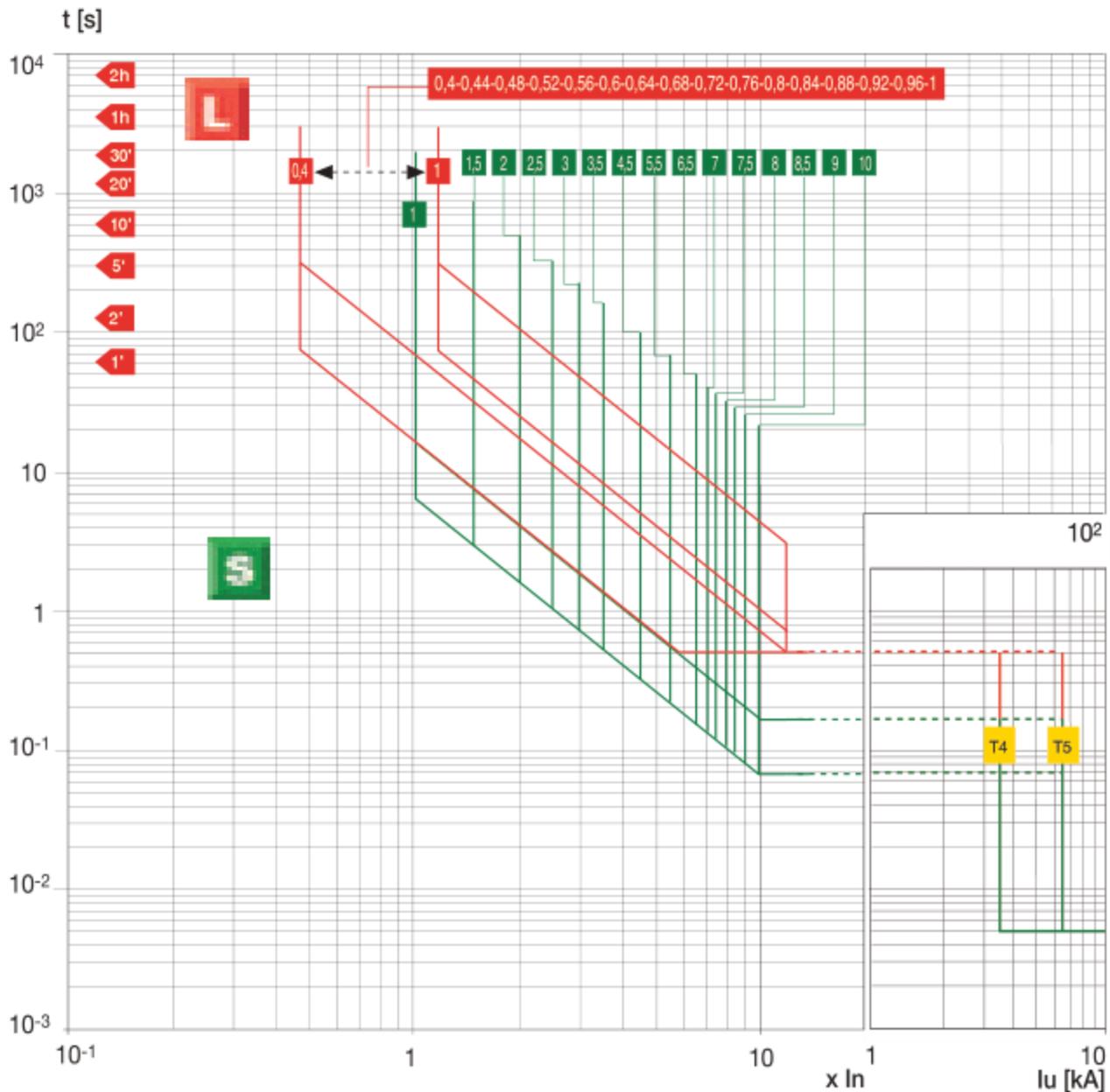
Note: For T5 $I_n = 600\text{ A}$ ☒ $I_{3\text{max}} = 9.5 \times I_n$



T4 250 / T5 400 - PR221DS

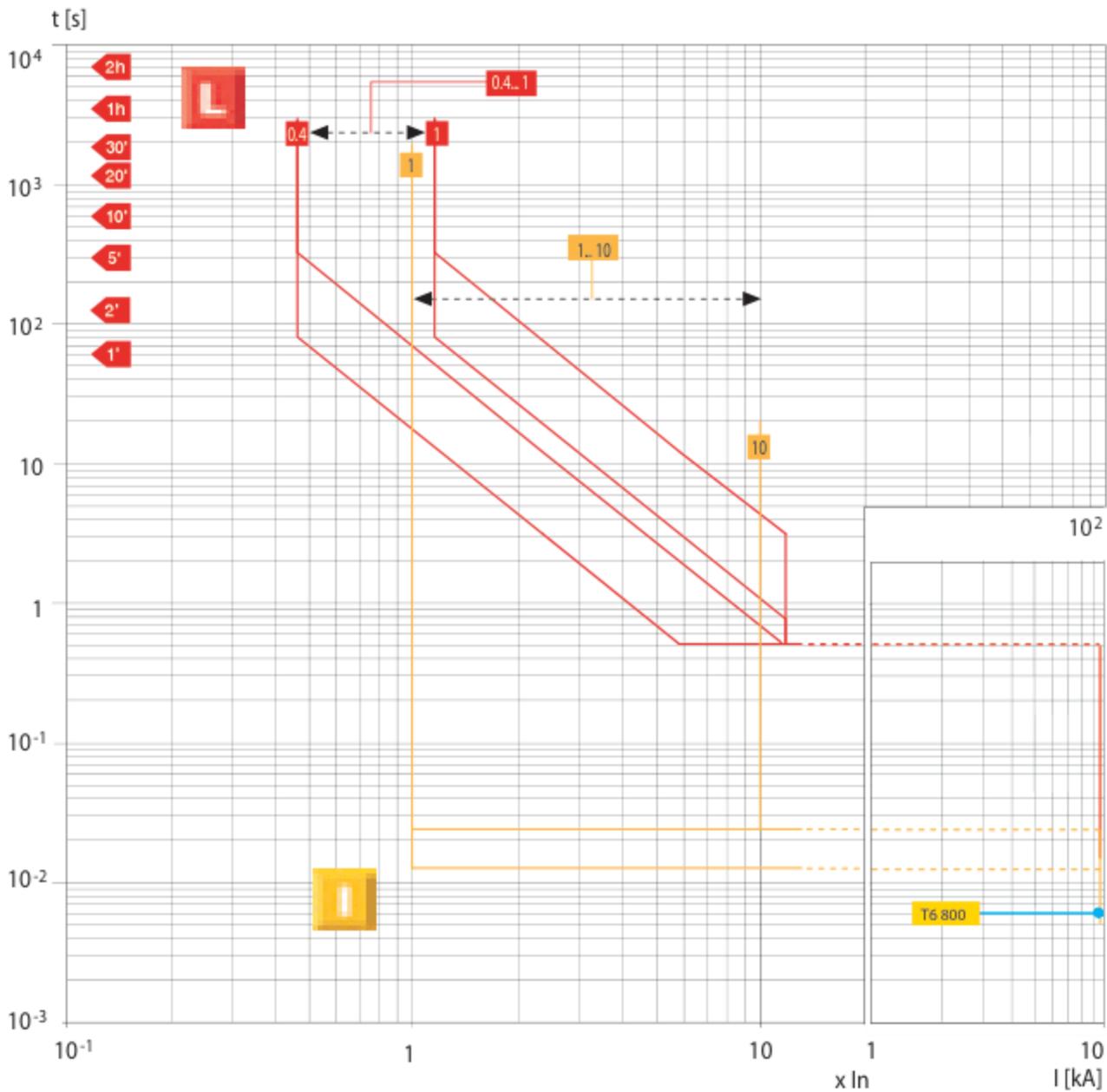
L-S Functions

Note: For T5 $I_n = 600\text{ A}$ ☒ $I_{2\text{max}} = 9.5 \times I_n$



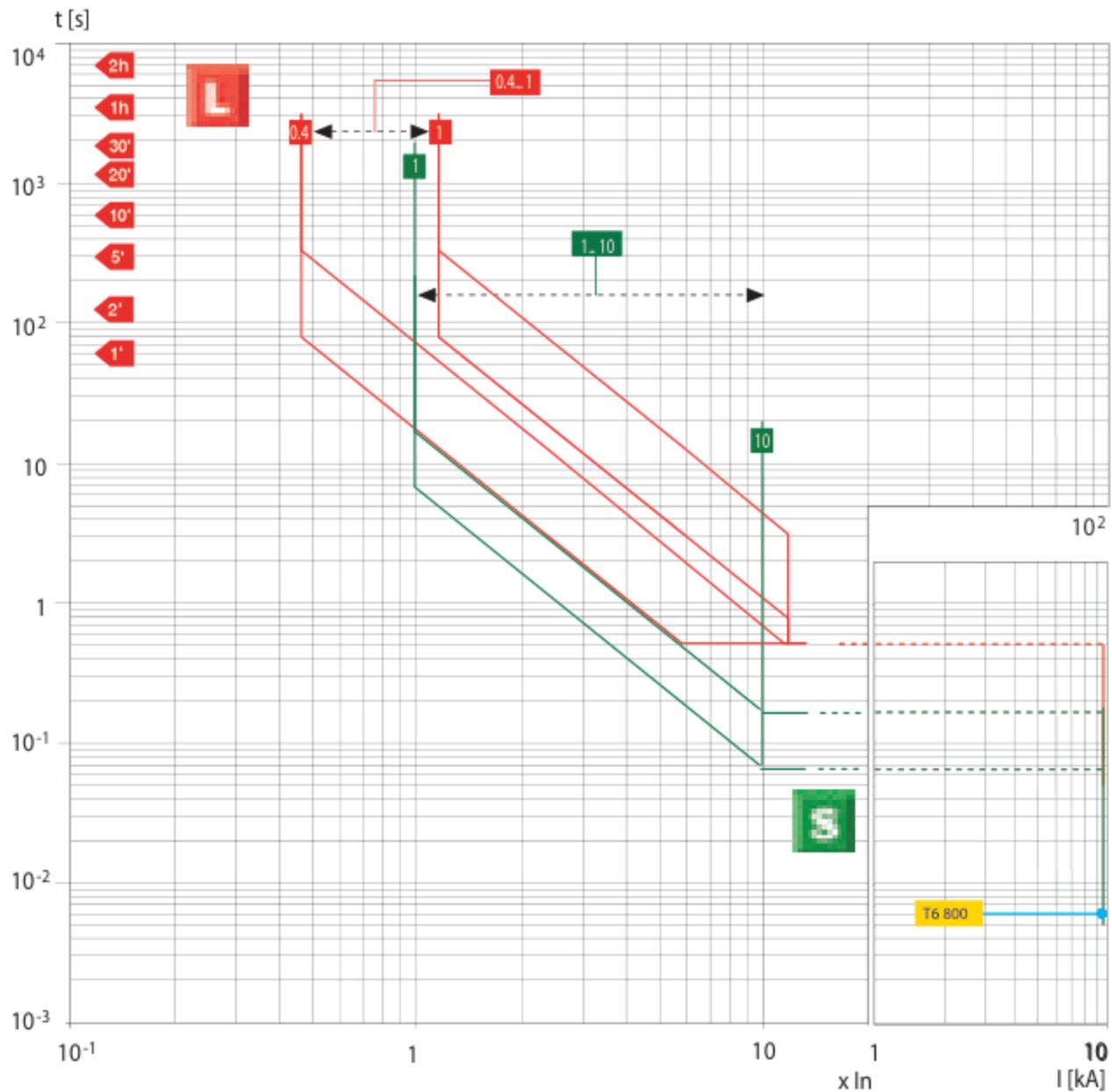
T6 600 / 800 – PR221DS

L-I Functions

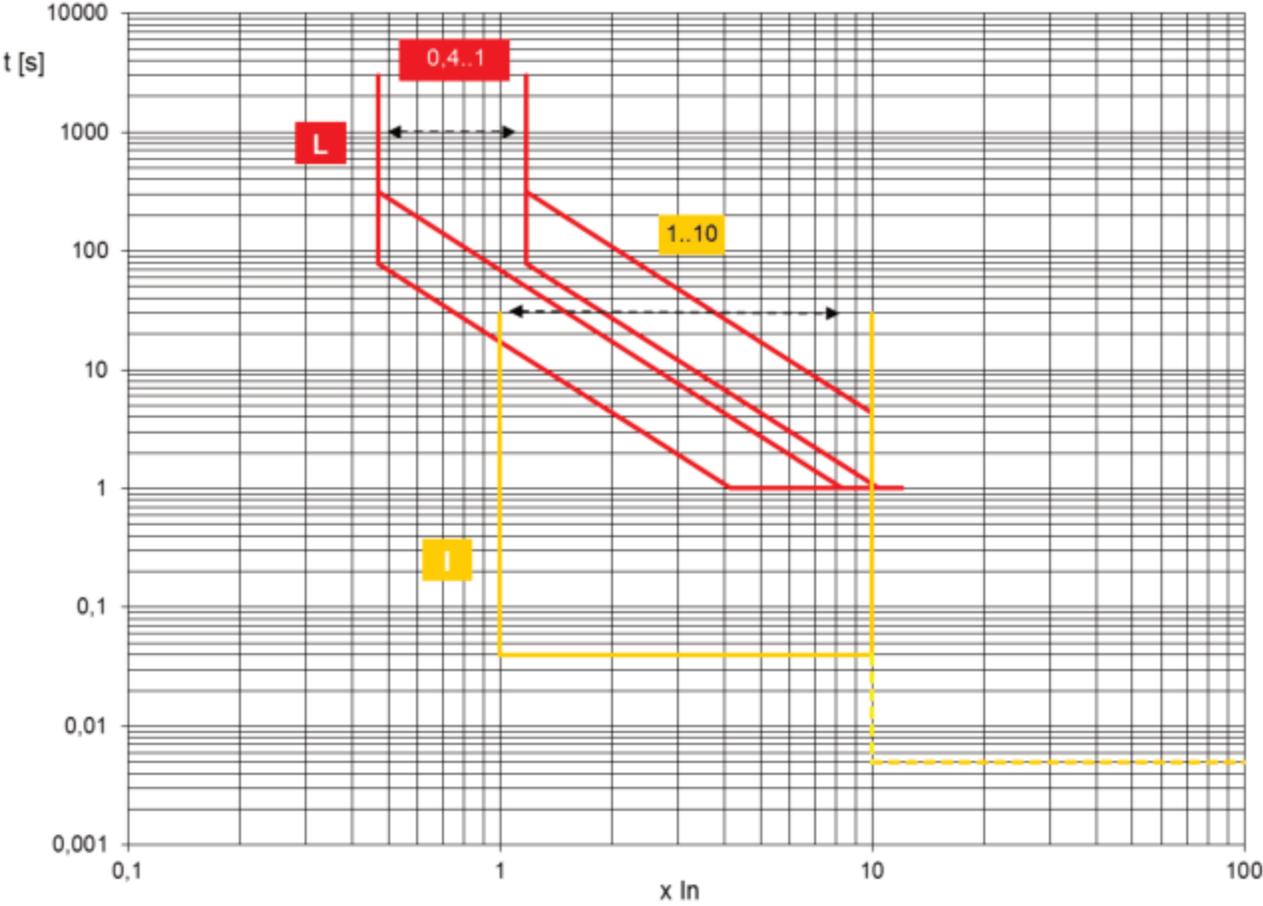


T6 600 / 800 – PR221DS

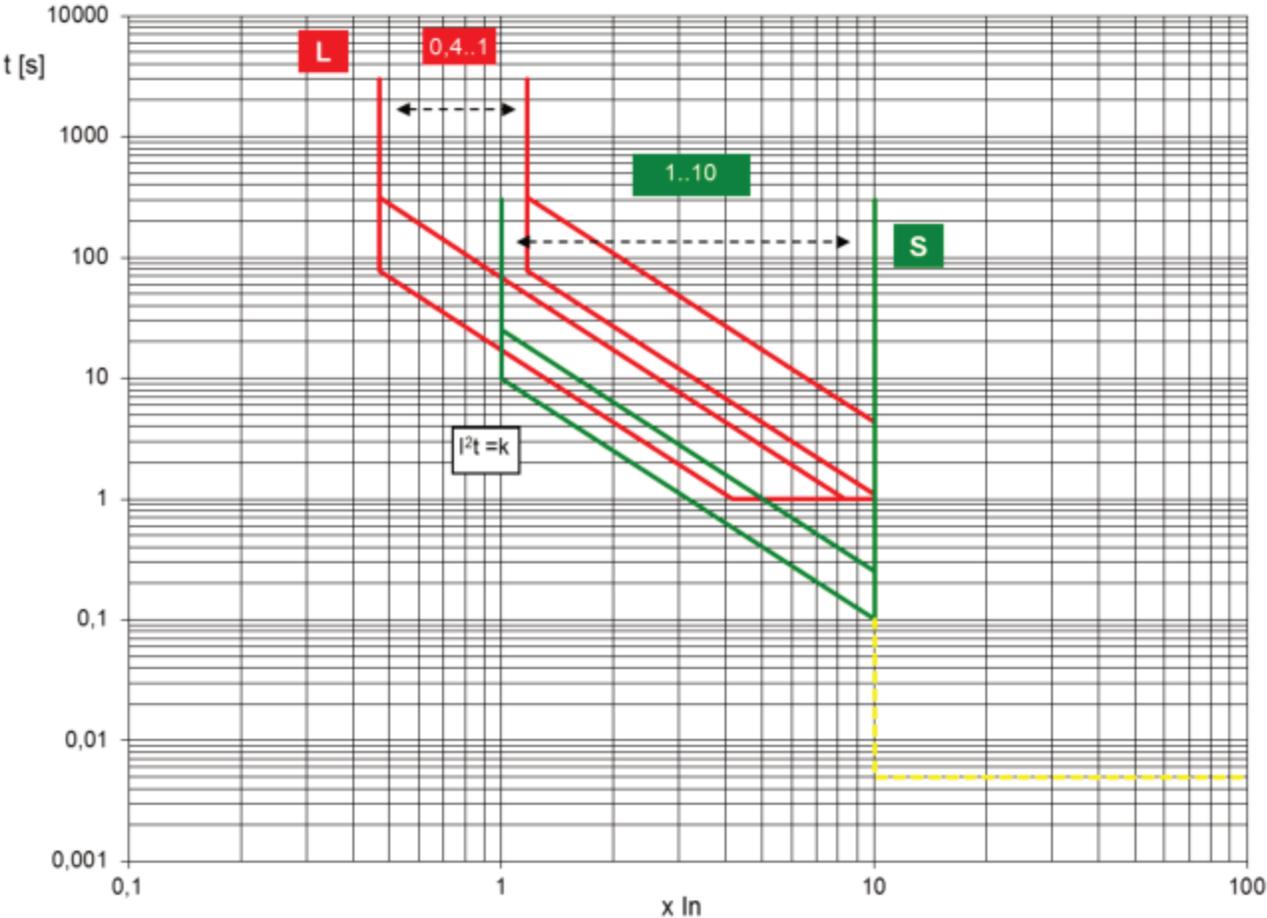
L-S Functions



Tmax T7 PR231/P Functions L-I Trip curves



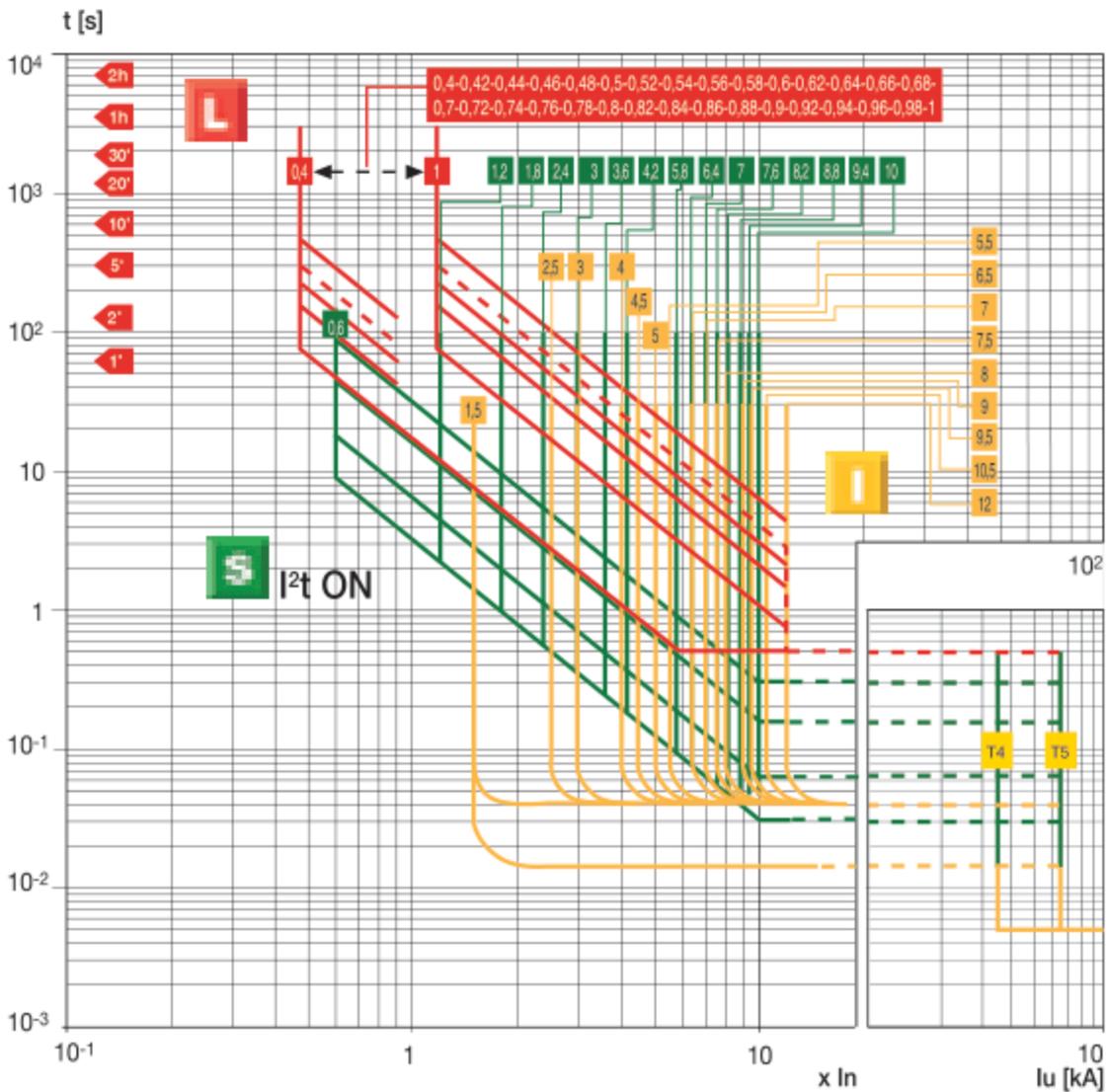
Tmax T7 PR231/P Functions L-S Trip curves



T4 250 / T5 400/600 PR22DS/P and PR22DS/PD-A

L-S-I Functions (I^2t const = ON)

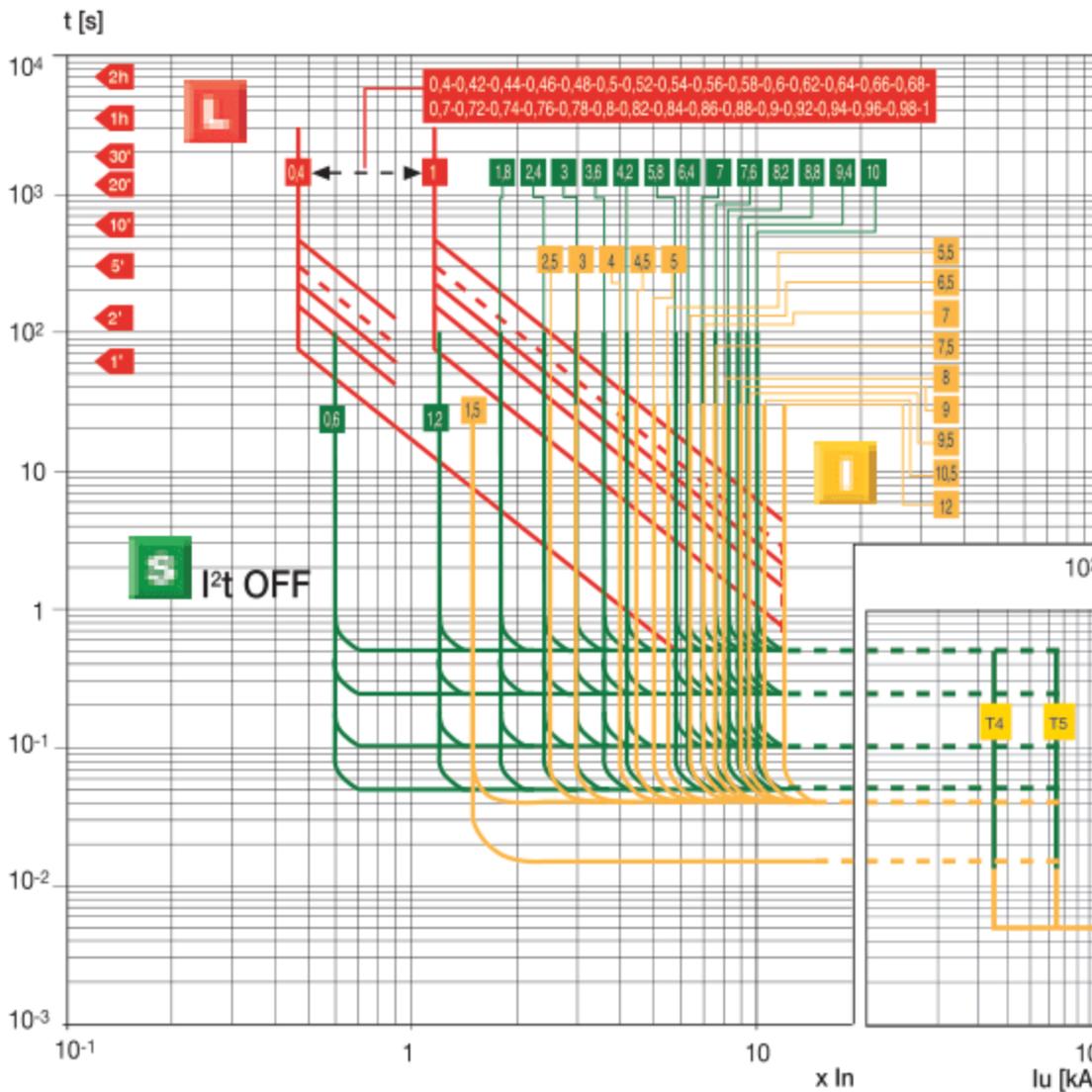
Note: For T5 $I_n = 600$ A $\Rightarrow I_{2max} = 9.5 \times I_n, I_{3max} = 9.5 \times I_n$



T4 250 / T5 400/600 PR22DS/P and PR22DS/PD-A

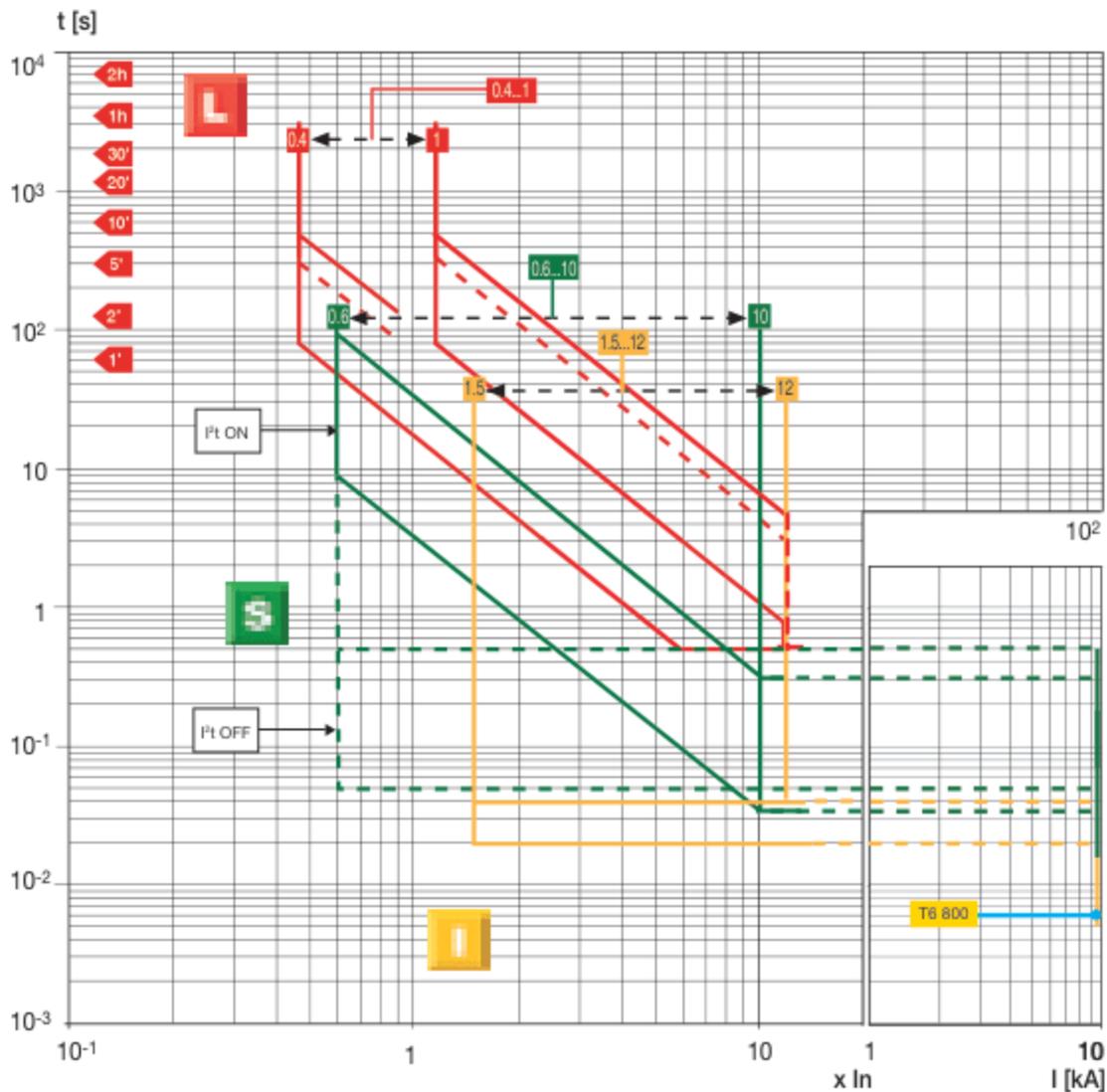
L-S-I Functions (I^2t const = OFF)

Note: For T5 $I_n = 600$ A $\Rightarrow I_{2,max} = 9.5 \times I_n, I_{3,max} = 9.5 \times I_n$



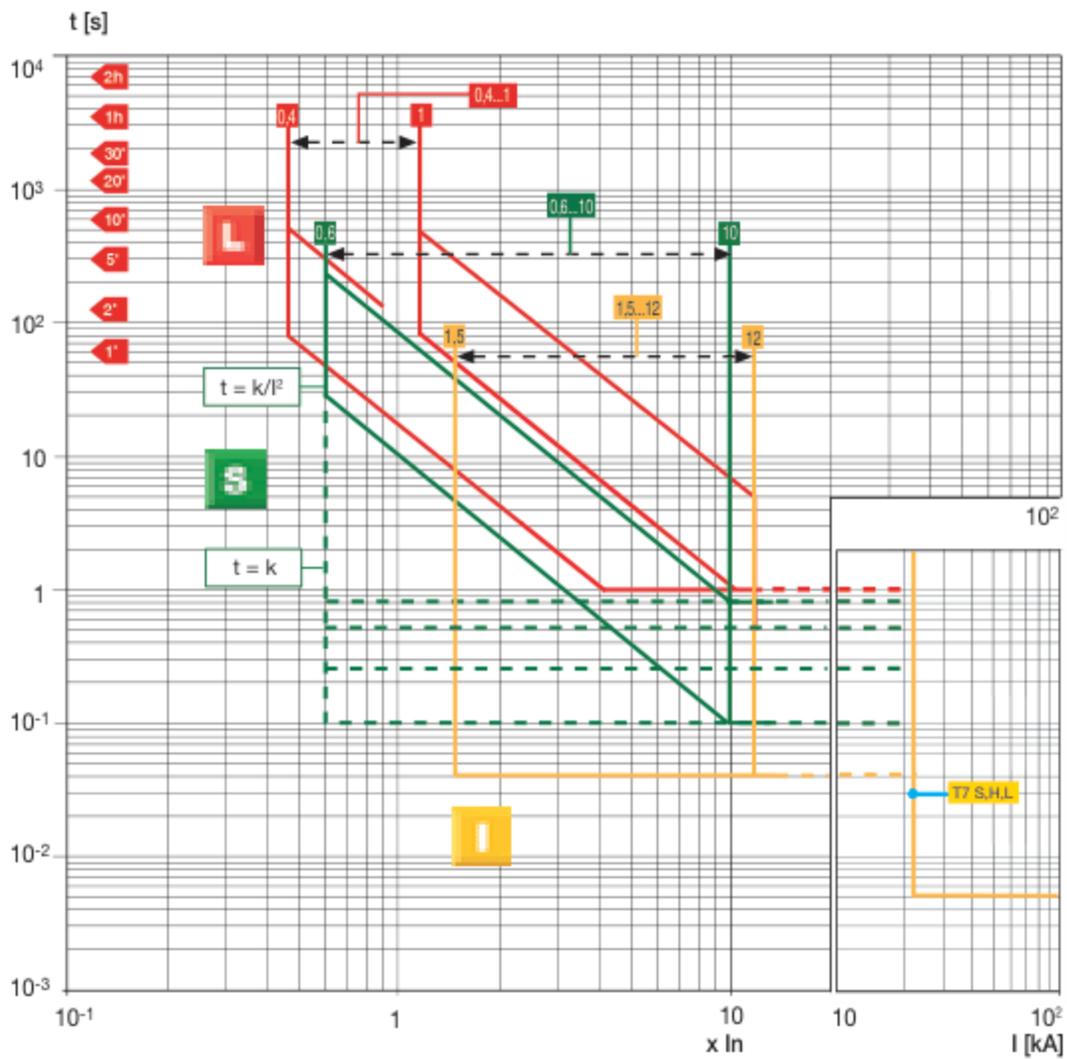
T6 800 – PR22DS and PR22DS/PD-A

L-S-I Functions

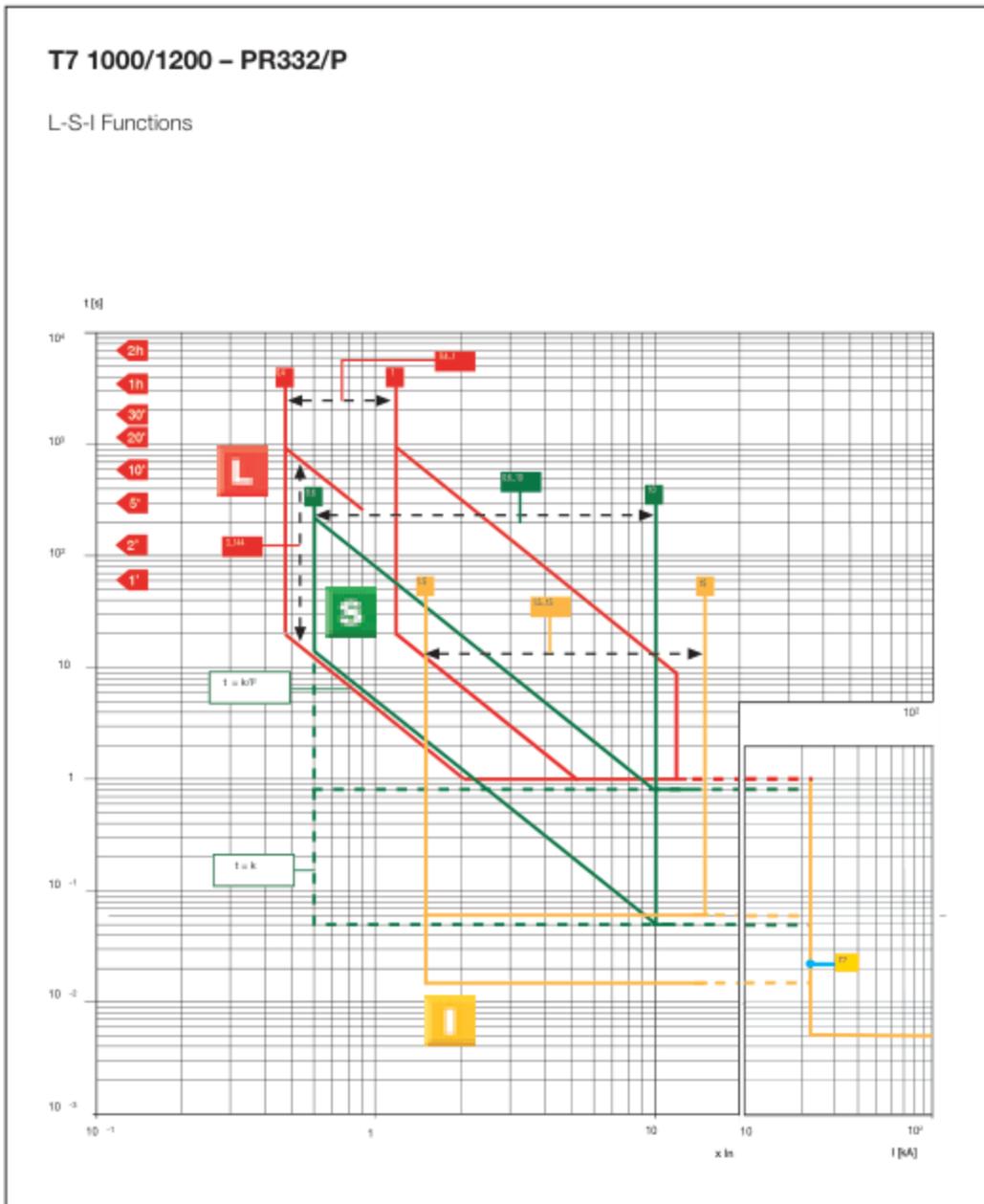


T7 1000/1200 – PR232/P

L-S-I Functions



Electrically Operated Circuit Breakers



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GROUND FAULT RELAY (GFR)

Picture shown may not reflect actual configuration

GENERAL DESCRIPTION

GFR is a microprocessor-based ground-fault relay for resistance- and solidly-grounded systems. In addition to common systems, it is uniquely suited for use on systems with significant harmonic content. GFR can provide main-plant protection, feeder-level protection, or individual-load protection. Proper current transformer selection provides the desired pickup range. The output contacts can be connected for use in protective tripping circuits or in alarm indication circuits. The analog output can be used with a PLC or a meter.

FEATURES & BENEFITS

Benefits

- Trip setting based on input CT primary, allows use with any CT. Minimum 50 mA with EFCT Series.
- Adjustable trip delay allows quick protection and system coordination
- Form A and Form B ground-fault output contacts for operation of separate annunciation and trip circuits
- Alarms when CT is not connected
- Compatible with variable-speed drives
- Eliminates nuisance tripping
- Retains trip state while de-energized to simplify troubleshooting
- No calibration required, saves on maintenance cost
- Allows operation in application where one side of PT is faulted, provides flexibility for numerous applications

Features

- Adjustable pickup (1-99%)
- Adjustable time delay (50 ms - 2.5 s)
- Output contacts
- Analog output (0 - 5 V)
- CT-Loop monitoring
- Selectable DFT or peak detection filtering
- Harmonic filtering
- Non-volatile trip memory
- Microprocessor based
- Universal power supply

FRONT-PANEL CONTROLS

Ground-fault trip level

The % CT PRIMARY selector switches are used to set the ground-fault trip level as a percentage of the CT-primary rating. In tripping systems, a ground-fault trip level of 10 to 20% of the prospective ground-fault current is often used. In alarm-only systems, a value of 50% of the prospective ground-fault current is often used. To avoid sympathetic tripping, the trip level must be above the charging current of the protected feeder. A 0% selection provides protection at 1%.

Ground-fault trip time

GFR has a definite-time trip characteristic. The TIME (s) selector switch is used to set the ground-fault trip delay time for coordination with upstream and downstream ground-fault devices. Coordination requires the same trip level for all ground-fault devices in a system and the trip time to progressively increase upstream. The amount of equipment removed from the system will be a minimum if the first ground-fault device to operate is the one immediately upstream from the fault.

Reset

If the Reset Mode switch is in the LATCHING position, a trip remains latched until the RESET button is pressed or the remote-reset terminals are momentarily connected. In the non-fail-safe mode, cycling the supply voltage will also reset the GFR.

If the Reset Mode switch is in the AUTORESET position, a trip will reset when the fault is removed. The reset circuit responds only to a momentary closure so that a jammed or shorted button will not prevent a trip. The front-panel RESET button is inoperative when the remote-reset terminals (6 and 7) are connected

Test

The TEST button is used to test the ground-fault circuit, the indication, and the output relay. When the TEST button is pressed for one second, a test signal is applied to the ground-fault-detection circuit, the circuit will trip, the TRIP LED will light, and the output relay will operate. If high-current inhibit has been selected, the INHB LED will light.

Front-panel indication

- **Power**
The green LED labelled PWR indicates the presence of supply voltage.
- **Trip**
The red LED labelled TRIP indicates a trip. A solid red LED indicates a ground-fault trip. A flashing LED indicates a trip initiated by a CT fault. Two fast flashes indicate a diagnostic trip.

Self diagnostics

A diagnostic trip is indicated by two fast flashes of the TRIP LED. It can be caused by a diagnostic problem detected by the watchdog timer or from an incorrect reading from non-volatile memory. Press RESET or cycle supply voltage.

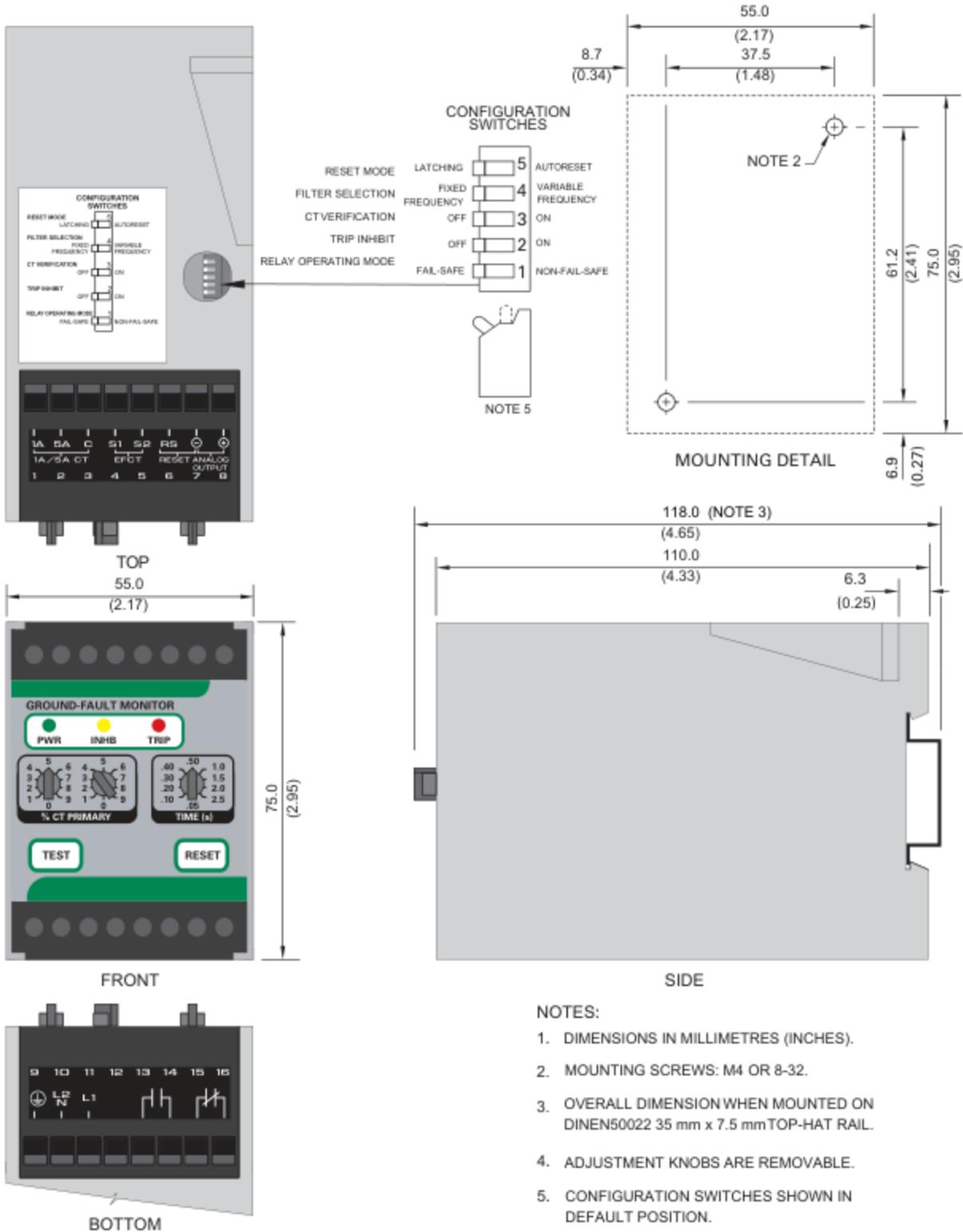
- **Trip inhibit**

The yellow LED labelled INHB indicates that output relay operation was inhibited during a high-current ground fault. When a ground-fault trip occurs during a high-current ground fault, both the TRIP and INHB LED's will be ON. Inhibit indication is reset when the ground-fault trip is reset. Inhibit operation and indication will not respond if the trip-inhibit switch is in the OFF position.

SPECIFICATIONS

- IEEE Device Numbers - Ground fault (50G/N, 51G/N)
- Dimensions
 - H 75 mm (3.0")
 - W 55 mm (2.2")
 - D 115 mm (4.5")
- Trip Level Settings - 1-99% CT-Primary Rating
- Trip Time Settings - 0.05-2.5 s
- Contact Operating Mode - Selectable fail-safe or non-fail-safe
- Output Contacts Isolated Form A and Form B
- Approvals CSA certified, UL Listed (E340889), CE (European Union), C-Tick (Australian)
- Analog Output 0-5 V

OUTLINE AND MOUNTING DETAILS



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UL 10 AMP BATTERY CHARGER

60Hz Only



Picture shown may not represent actual unit.

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 Fuse	2 input and 2 output
Output Voltage	12V
Frequency	60Hz
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
- Lightning and voltage transient protection
- Protection of connected equipment against load dump protection
- Constant voltage, current limited, 4-rate automatic equalization
- IP20 housing
- AC isolated from DC
- Temperature compensation
- On board temperature sensor with remote port

Output		Input	
Amps	Volts	Hz	Volts
10	12	60	110 - 120 208 - 240
Width	Depth	Height	Weight
165mm (6.5 in)	125 mm (4.9 in)	300 mm (11.8 in)	2.1 kg (4.6 lb)
Feature Code: PBC10NU			

LED Indication

In normal operation, the four circuit board LEDs indicate operating status: fault conditions, charge mode, temperature compensation and AC supply.

LED Operation	Status	
● Red	on	Fault condition (except AC supply & battery connection errors)
	flashing slow	AC Supply not available (DC connected)
	flashing fast	Battery connection error
	off	No fault conditions
● Yellow	on	In float mode
	flashing slow	In autoboot mode
	flashing fast	In AutoBoost extension mode / boost decay
	off	Output off / output to nominal
● Blue	on	Temperature compensation active
	flashing slow	Temperature compensation auto disabled due to external fault
	flashing fast	Temperature compensation at absolute limit i.e. <-10°C or >+50°C
	off	Temperature compensation disabled
● Green	on	AC supply available, charge output on
	flashing slow	AC supply available, charge output off
	flashing fast	Boost decay or battery missing (if red LED is also on)
	off	AC supply not available

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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	Length In (mm)	BCI Overall Dimensions			Nominal Weight	
									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)	–	–
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.



ULCERT UL 2200 LISTING

INCLUDES THE FOLLOWING:

ALTERNATOR

Alternator insulation system is UL Recognized (UL 1446). PMG and AREP alternators are available. Automatic voltage regulators are UL Recognized.

WIRE HARNESS

AC, DC, and power harnesses are made with UL Listed wire and UL Listed terminals.

CONTROL PANEL

Control panels are comprised of UL Listed and UL Recognized components. EMCP is UL Recognized.

CIRCUIT BREAKER

Output circuit breaker is 100% rated and UL Listed.

TESTING

All UL Listed sets are designed and rigorously tested in accordance with UL Standard for Safety, UL 2200.

LABELING

Labeling meets UL requirements.

MECHANICAL OPTIONS

Mechanical options do not require UL Listing and, therefore, are not affected. The exceptions to this are:

FUEL TANKS

If a fuel tank is ordered with the unit, it must be UL Listed. Two versions are available: 24 hour integral (FCUL2) and 24/48 hour sub-base (FSBT)

ENCLOSURES

Factory installed enclosures meet UL requirements. Weatherproof and sound attenuated versions are available.

ELECTRICAL OPTIONS

The table below shows electrical options that meet UL requirements:

EBH	Battery Heater
EOS	Lube Oil Sump Heater
WCA1	Low Coolant Level Shutdown
WSS1	Low Coolant Temperature Alarm
AH1H	Anti-Condensation Heater
WHH	Coolant Heater
GOVE5	Electronic Governor (Fully Adjustable)
FSS1	Critical Low Fuel Level Shutdown
FSS2	Low Fuel Level Alarm
FSS5	Critical High Fuel Alarm
PBC5UL	UL Listed Battery Charger
PBC10NU	NFPA Battery Charger, UL Listed

UL Listing is available on all diesel fuelled generator sets up to 175 kW at 60 Hz, 600 vac maximum.

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Oklahoma City, Oklahoma 73127

SECTION V

MECHANICAL DRAWINGS

NUMBER	TITLE	PAGE
460-0870 A	Installation - Composite C7.1 ENCL SA L1 & L2 W/O FT	1 of 2
460-0870 B	Installation - Composite C7.1 ENCL SA L1 & L2 W/O FT	2 of 2

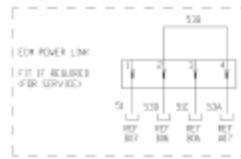
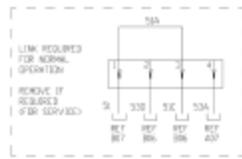
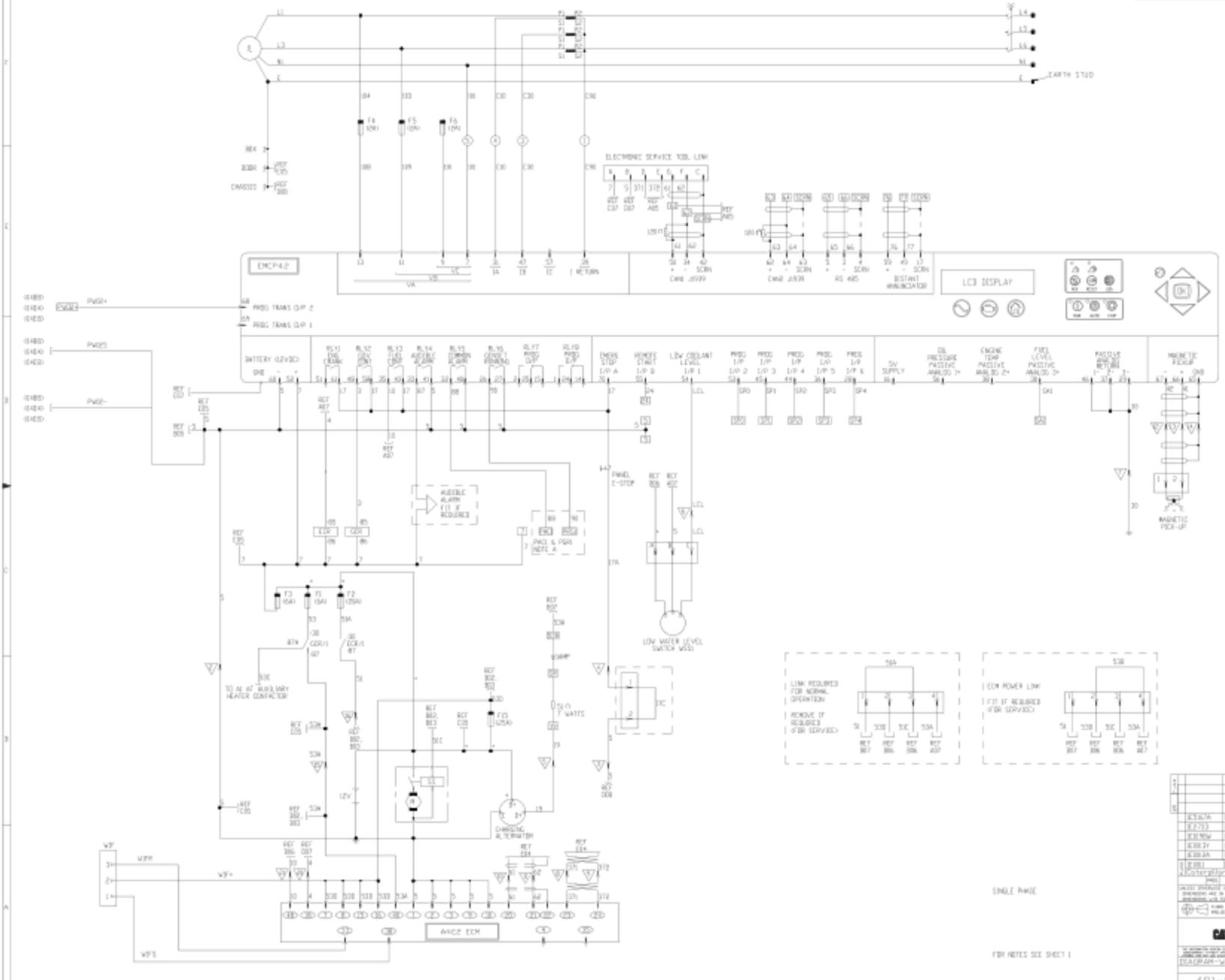


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SECTION VI

ELECTRICAL DRAWINGS

NUMBER	TITLE	PAGE
491-9573 A	Diagram – Wiring Three Phase EMCP 4.2	1 of 4
491-9573 B	Diagram – Wiring Single Phase EMCP 4.2	2 of 4
491-9573 C	Diagram – Wiring Symbols Abbreviations	3 of 4
491-9573 D	Diagram – Wiring Voltage Regulator	4 of 4
380-5925 A	Diagram - Wiring Options Schematic	1 of 4
380-5925 B	Diagram - Wiring Options Schematic	2 of 4
380-5925 C	Diagram - Wiring Options Schematic	3 of 4
380-5925 D	Diagram - Wiring Options Schematic	4 of 4

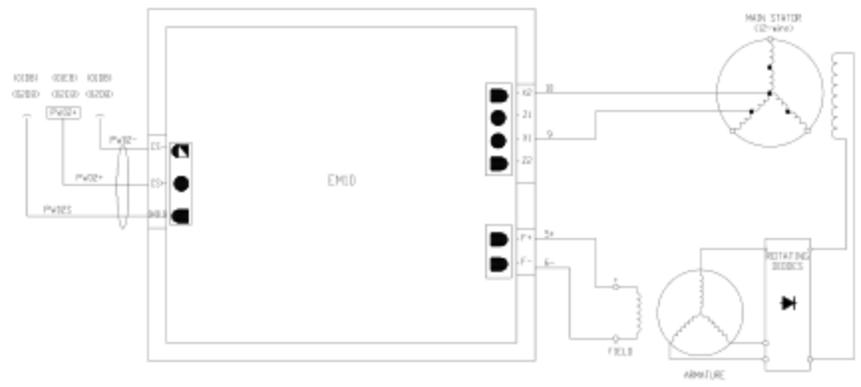


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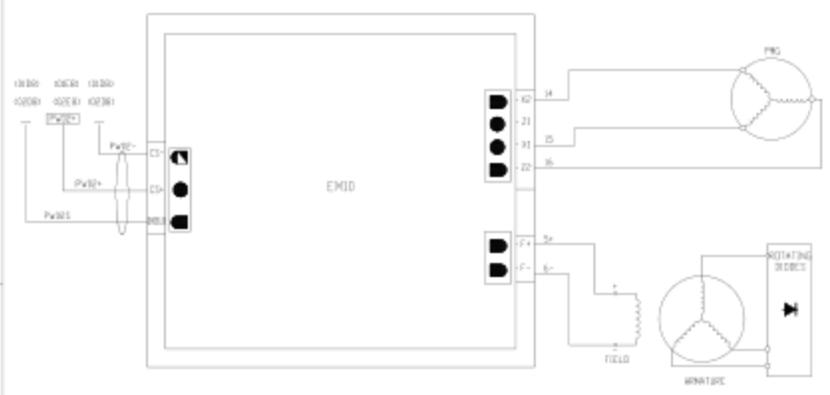
SINGLE PHASE

FOR NOTES SEE SHEET 1

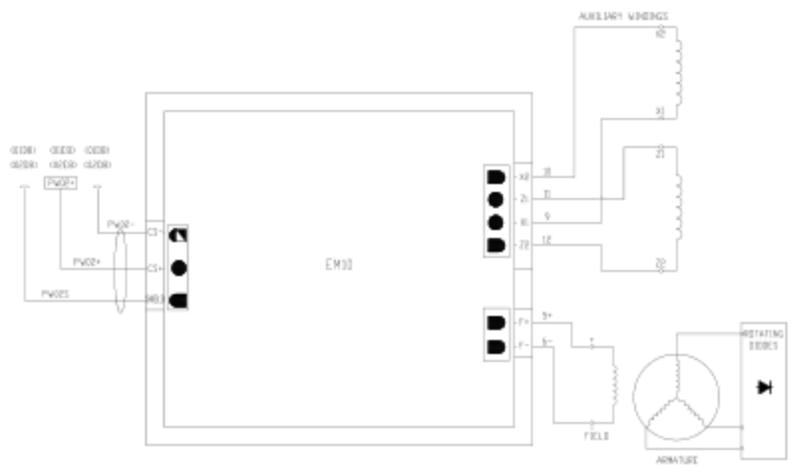
EM10 IVR CONNECTION DIAGRAM
SELF EXCITATION (SHUNT)



EM10 IVR CONNECTION DIAGRAM
PERMANENT MAGNET (PM) EXCITATION



EM10 IVR CONNECTION DIAGRAM
AUXILIARY EXCITATION (AREP), 4-WIRE



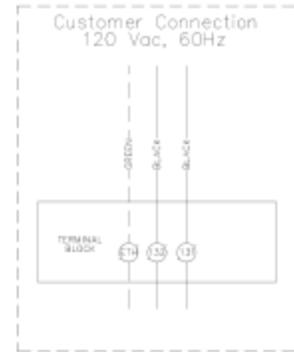
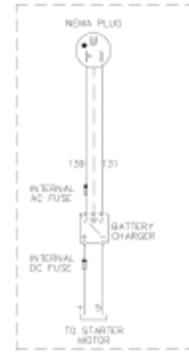
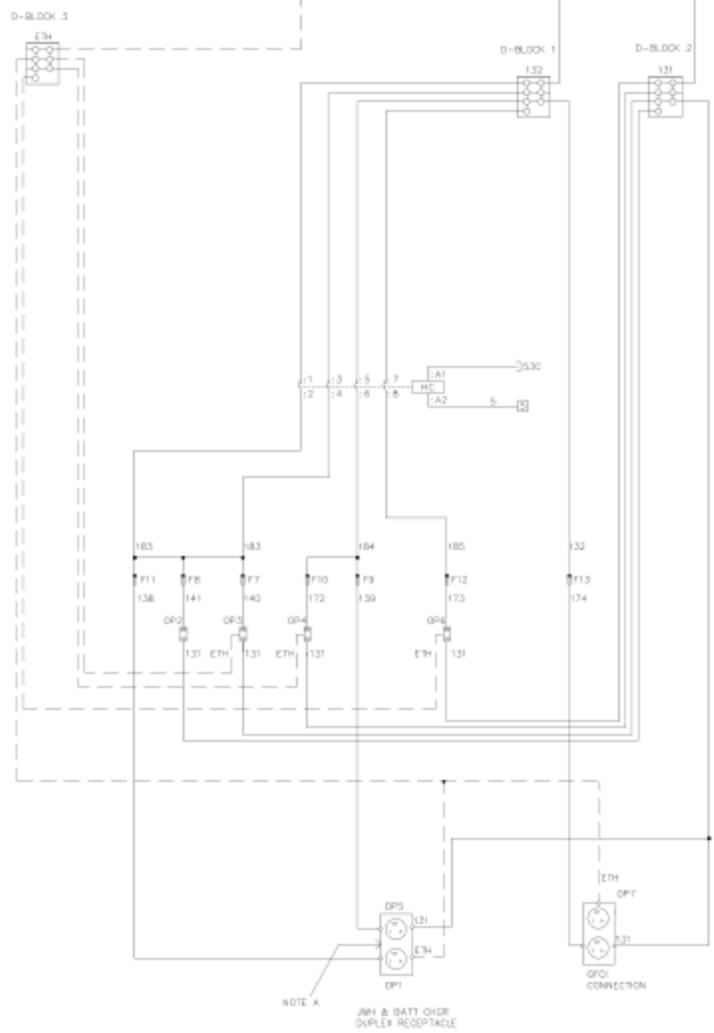
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FOR NOTES SEE SHEET 1

CATERPILLAR

491-9573 (REV. 08-01)

Inside Breaker Box 120 Vac, 60Hz



OPTION GROUPING - BASE GROUP C4.4

OPTION NUMBER	SET DESCRIPTION	FUSE DESCRIPTION	FUSE DESCRIPTION
OPTION 1	JACKET WATER HEATER RECEPTACLE	F11 - 15AMP	
OPTION 2	ALT HEATER	F8 - 4AMP	WH, AH1H, EBH
OPTION 3	BATTERY HEATER	F7 - 2AMP	COG, PRC10N1
OPTION 4	SUMP HEATER	F10 - 2AMP	
OPTION 5	BATTERY CHARGER RECEPTACLE	F9 - 10AMP	

OPTION GROUPING - BASE GROUP C1.1

OPTION NUMBER	SET DESCRIPTION	FUSE DESCRIPTION	FUSE DESCRIPTION
OPTION 1	JACKET WATER HEATER RECEPTACLE	F11 - 20AMP	
OPTION 2	ALT HEATER	F8 - 4AMP	WH, AH1H, EBH
OPTION 3	BATTERY HEATER	F7 - 2AMP	COG, PRC10N1
OPTION 4	SUMP HEATER	F10 - 2AMP	
OPTION 5	BATTERY CHARGER RECEPTACLE	F9 - 10AMP	

OPTION GROUPING - ADD'N C4.4/7.1

OPTION NUMBER	SET DESCRIPTION	FUSE DESCRIPTION	FUSE DESCRIPTION
OPTION 6	PROVISION FOR CAMP'S SPACE HEATER	F12 - 15AMP	CASH

OPTION GROUPING - ADD'N C4.4/7.1

OPTION NUMBER	SET DESCRIPTION	FUSE DESCRIPTION	FUSE DESCRIPTION
OPTION 7	20AMP GFI CUSTOMER RECEPTACLE	F13 - 20AMP	GFI

OPTION GROUPING - ADD'N C4.4/7.1

OPTION NUMBER	SET DESCRIPTION	FUSE DESCRIPTION	FUSE DESCRIPTION
OPTION 7	JACKET WATER HEATER RECEPTACLE	F11 - 15AMP	WH44

NOTE A: JH & BATT CHGR DUPLER RECEPTACLE

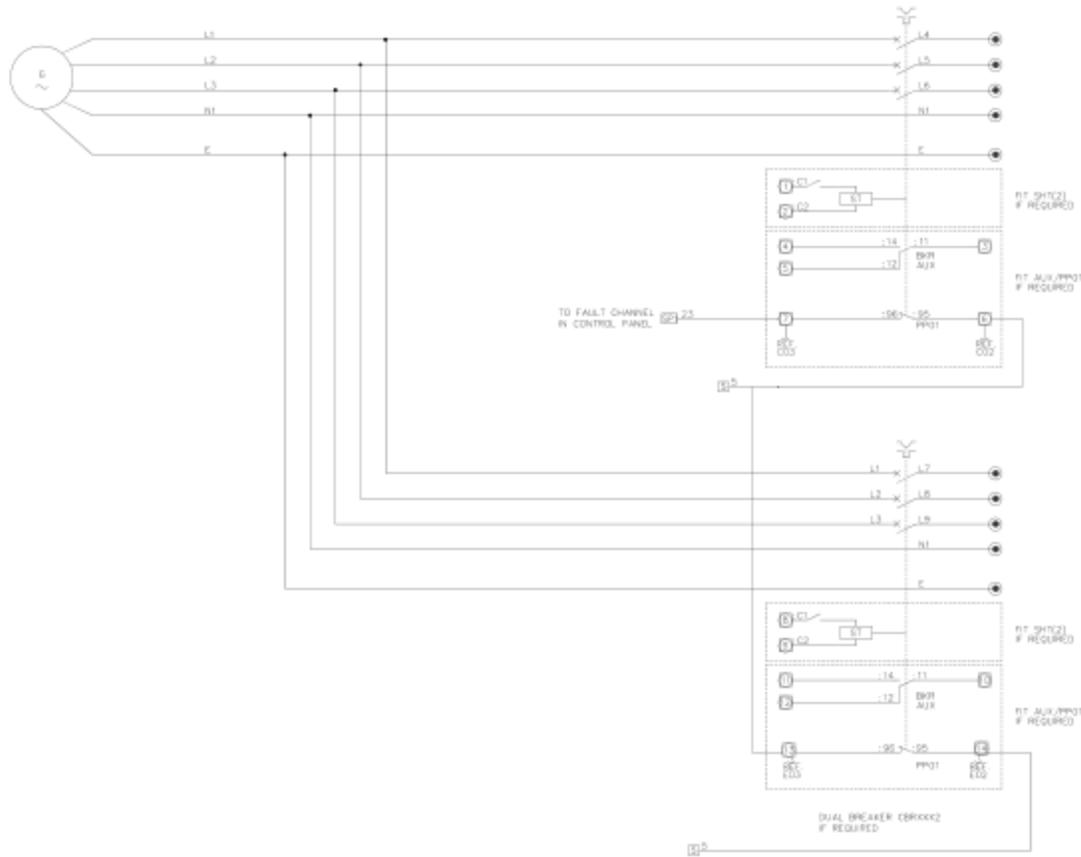
NOTE A: REMOVE AND DISCARD METAL LINK

CATERPILLAR: CONFIDENTIAL YELLOW

REVISIONS

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TERMINAL LIST GROUP
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FOR DUAL BREAKER AUX SWITCH OPTION ONLY - PLEASE CONNECT WIRE 5 FROM CIRCUIT BREAKER 1 TO WIRE 23 FROM CIRCUIT BREAKER 2.
 USE INSULATED CRIMP SPLICE TO MAKE CONNECTION.
 WIRE 23 AND WIRE 5 CORRESPONDS TO WIRE ID OF HARNESS

FOR NOTES SEE SHEET 1
 CATERPILLAR - CONFIDENTIAL YELLOW

REV	DESCRIPTION	DATE
1	ISSUED FOR PRODUCTION	01/01/00
2	REVISION	01/01/00
3	REVISION	01/01/00
4	REVISION	01/01/00
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7	REVISION	01/01/00
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Warren CAT
15 North Meridian Avenue
Oklahoma City, Oklahoma 73127

SECTION VII

START UP & COMMISSIONING CHECK LIST



CAUTION! Only qualified Caterpillar personnel who have been properly trained to support this product should proceed with the startup process.

Note 1: Service Engineer must communicate with customer to understand site requirements for Personal Protective Equipment (PPE), Lockout and other safety procedures.

Note 2: All "No" answers must be documented and explained in the Start Up Details section provided.

Start-up & Commissioning Checklist

1. Safety and Serviceability

1 Genset is free of damage. Note: Freight damage is the responsibility of the Shipper	Yes No N/A	16 Emergency stop functions correctly	Yes No N/A
2 Hot pipes are wrapped	Yes No N/A	17 Sight glasses are visible	Yes No N/A
3 All hoses, piping & wiring are secure	Yes No N/A	18 Gauges are functional (oil, fuel, air, other...)	Yes No N/A
4 Spillage containment acceptable	Yes No N/A	19 Proper grounding (refer to REHS4634)	Yes No N/A
5 Personal Protection Equip. (PPE) available & used	Yes No N/A	20 Air intake free of airborne debris	Yes No N/A
6 Floors are clean no hazards	Yes No N/A	21 Access routes unobstructed	Yes No N/A
7 Floor openings are covered	Yes No N/A	22 Overhead obstructions are clearly marked	Yes No N/A
8 Genset is level with all holding bolts secure	Yes No N/A	23 Overhead clearance is acceptable	Yes No N/A
9 Warning decals & plates are installed	Yes No N/A	24 Canopy door access opening unrestricted for 90deg. No operator access restrictions.	Yes No N/A
10 All guards and heat shields are in place	Yes No N/A	25 Adequate access to fluid fill areas to prevent spills	Yes No N/A
11 All known safety shutdowns & warnings operational	Yes No N/A	26 Air / oil / fuel filters are accessible	Yes No N/A
12 Fire extinguisher present & charged	Yes No N/A	27 Level indicators are accessible	Yes No N/A
13 Fire suppression unlocked & operational	Yes No N/A	28 Key components are labeled	Yes No N/A
14 Pipe work & services (electrical & fuel) are color coded / labeled	Yes No N/A	29 Engine room noise level policy satisfied	Yes No N/A
15 Remote start/stop checked & operational	Yes No N/A	30 Unauthorized Site Access	Yes No N/A

2. Maintenance and Coverage

1 Reviewed start-up procedure & safety information	Yes No N/A	4 Any Special Site Requirements & Testing	Yes No N/A
2 Reviewed OMM, Parts Manual, Warranty, SOS & Service Requirements with Customer	Yes No N/A	5 Additional parts purchased or ordered	Yes No N/A
3 Verify that the appropriate customer personnel been trained on engine operation and maintenance	Yes No N/A		

3. Lube System

1 Oil sample taken (SOS)	Yes No N/A	3 Check for leaks	Yes No N/A
2 Oil level is correct	Yes No N/A	4 Engine Oil Type and Viscosity Correct	Yes No N/A

4. Alarm / Shutdown Verification

1 Low water level	Yes No N/A	9 Over speed	Yes No N/A
2 High water temperature	Yes No N/A	10 Low DC Voltage	Yes No N/A
3 Low oil pressure	Yes No N/A	11 Shutdown device	Yes No N/A
4 Low oil level	Yes No N/A	12 High air inlet manifold temperature	Yes No N/A
5 Low Fuel Level (Diesel)	Yes No N/A	13 Generator Over Frequency	Yes No N/A
6 Low Fuel Pressure (Gaseous)	Yes No N/A	14 Generator Under Frequency	Yes No N/A
7 E-Stop	Yes No N/A	15 Generator Over Voltage	Yes No N/A
8 High fuel level (Diesel)	Yes No N/A		

5. Fuel System and Fuel Storage

DIESEL FUELED UNIT		Yes / No		Yes / No / N/A
1	Confirm Fuel Tank Base is level		Yes No N/A	
2	Confirm proper Fuel Level in Tank		Yes No N/A	
3	Fuel filter primed		Yes No N/A	
4		Check fuel lines & connectors for leaks (fuel or air)		Yes No N/A
5		Confirm Rupture Basin Tank is empty		Yes No N/A
6		Day Tank Provided		Yes No N/A
GASEOUS FUELED UNIT		Yes / No		
1	Gaseous Fuel Type		N.G., LPG-V	
3	Primary Fuel Pressure Regulator			
			Manufacturer	
			Connector Size (in.)	
			Static Output Pressure (inH2O)	
			Model	
			Spring Rate (inH2O)	
			Regulator to be Spaced 10ft from base rail connection.	
4	Stainless Steel Flex Hose Installed Perpendicular to the base rail connector. Flex Hose Must Be Installed.		Yes / No	
5	Confirm Low Pressure Fuel Supply is not shared. Must be a dedicated source to the genset.		Yes / No	
6	Confirm Sediment Trap is present and located on the High Pressure side (Inlet) of the Primary Regulator		Yes / No	
7	Primary Fuel Pressure Regulator - Diaphragm Case Orientation. Vertical Not Flat.		Yes / No	
8	Confirm Shut-Off valve is present and located on the High Pressure side of the Primary Regulator		Yes / No	
9		LPG Fuel Tank Information. If applicable answer the items listed below.		If Applicable
		LPG Tank Orientation		Vertical / Horizontal
		LPG Tank Capacity		Gallons
		LPG Tank Location		Above Ground / Below Ground
10.		Confirm Fuel Type Selection Configuration Wiring matches Fuel Source. Reference Caterpillar Media M0076230. Available on SISWeb		Yes / No
		For Natural Gas Fuel Type Configuration - No Jumper Installed.		Yes / No
		For Liquid Propane Gas (LPG) - Install jumper across "-" and "LP" terminals.		Yes / No

6. Engine - Governor Settings

1	As-Shipped: Electronic copy of the ECM replacement file and configuration file downloaded and saved.		Yes / No	
2	Commissioned: Electronic copy of the ECM replacement file and configuration file downloaded and saved.		Yes / No	

7. Aftertreatment

1.	Following initial start-up procedure from Appendix B in the A&I Guide		Yes No N/A	
2.	Communicate that top of CEM is not suitable for a work platform		Yes No N/A	
3.	Urea quality meets ISO22241-1		Yes No N/A	
4.	Urea lines temperature between -5 deg C and 50 degC		Yes No N/A	
5.	DEF tank sample port installed		Yes No N/A	
6.	DEF tank temperature less than 40deg. C		Yes No N/A	
7.	Ratio of 1 fuel tank refill to 1 DEF tank refill for systems with a constantly visible DEF level indicator		Yes No N/A	
8.	DEF tank venting routed to meet local and OSHA guidelines for ammonia fumes		Yes No N/A	
9.	Maximum 10kPa difference from CEM to atmospheric pressure		Yes No N/A	
10.	Exhaust/CEM connected properly		Yes No N/A	
11.	Exhaust weight transfer to CEM meets A&I		Yes No N/A	
			Yes No N/A	
			Yes No N/A	

8. Intake System/Exhaust System

1 Pre-lube turbo charger		Yes No N/A	4 Flexible exhaust fitting to isolate vibrations and allow for thermal expansion		Yes No N/A
2 Exhaust directed away from building / personnel		Yes No N/A	5 Check intake and exhaust systems for leaks		Yes No N/A
3 Emissions control unit installed & operational (Diesel)		Yes No N/A	6 Record intake manifold air temperature:		Yes No N/A

9. Jacket Water & Space Heater

1 Jacket water heater (JWH) Purge Air in system required		Yes No N/A	4 Adjust JWH thermostat and record setting		
2 Verify JWH valve position is open during usage		Yes No N/A	5 Record engine block temperature		
3 If installed, operate alternator space heater(s) 48 hours before start-up		Yes No N/A			

10. Starter & Battery

1 Confirm battery is fully charged		Yes No N/A	6 Engine Alternator Charger Installed		Yes No N/A
2 Proper electrolyte level		Yes No N/A	7 Engine Alternator Charger Configured Properly		Yes No N/A
3 Confirm battery provides proper system voltage		Yes No N/A			
4 Battery Charger Installed		Yes No N/A			
5 Battery Charger Configured Properly		Yes No N/A			

11. Cooling System (Jacket Water and SCAC Systems)

1 Check for leaks		Yes No N/A	7 Hot air recirculation prevented		Yes No N/A
2 Check coolant level		Yes No N/A	8 Confirm Jacket Water Heater Power supply is correct.		Yes No N/A
3 Confirm Antifreeze Mixture with a Hydrometer		Yes No N/A	9 Pressure test cooling system - record test pressure (psi)		Yes No N/A
4 Isolation valves & drain valves installed		Yes No N/A			
5 Expansion tank highest level		Yes No N/A			
6 Discharge air unobstructed		Yes No N/A			

12. Mechanical

1 Package properly mounted		Yes No N/A	3 Motorized dampers are operational		Yes No N/A
2 Package supports & vibration isolators installed		Yes No N/A			

13. Generator Set System - Electrical

1 Over voltage protection shutdown set		Yes No N/A	5 Adjust output voltage, within specification.		Yes No N/A
2 Over current protection shutdown set		Yes No N/A	6 Confirm all protective covers are in position		Yes No N/A
3 Confirmed correct output voltage wiring configuration		Yes No N/A	7 Adjust output frequency for application (+/- 0.1hz of Nominal Rating)		Yes No N/A
4 Confirm alternator conductors are secured properly on the link board and are routed to prevent chaffing		Yes No N/A	8 Unit is properly grounded (REHS4632)		Yes No N/A
			9 Confirm output Phase Rotation is correct		Yes No N/A

14. Generator Set System - Control Panel

1 Confirm wire loom(s) are properly secured and routed		Yes No N/A	9 Confirm Generator System control parameters are properly set		Yes No N/A
2 Confirm all wire terminations for secured. Pull Test as required.		Yes No N/A	10 Confirm Control Panel is configured with the most current Flashfile. Update as required.		Yes No N/A
3 Confirm B+ Wiring is correct. (i.e. Polarity, secured) for the Control Panel and all ancillary devices.		Yes No N/A	11 Confirm that meters are wired properly and conductor terminations are secured.		Yes No N/A
4 Energize set & system controls. Confirm devices energize properly.		Yes No N/A	12 Confirm that meters function properly		Yes No N/A
5 Verify operation of annunciator device		Yes No N/A	13 Confirm that the all Emergency E-Stops (local & remote) are wired properly and function correctly		Yes No N/A
6 Confirm operation of Auto, Manual and Stop functions.		Yes No N/A	14 Confirm all interconnect wiring is correct and properly secured		Yes No N/A
7 Check generator local controls		Yes No N/A	15 Commissioned: Electronic copy of the ECM replacement configuration file downloaded and saved.		Yes / No
8 Check generator remote controls		Yes No N/A	16 Generate and Save a PSRP		Yes No N/A

15. Generator Set System - Mechanical

1 Check for loose or missing hardware		Yes No N/A			
---------------------------------------	--	------------	--	--	--

16. Generator Set System - Circuit Breakers

1 Test any alarms / shunt trip		Yes No N/A	3 Record circuit breaker settings		Yes No N/A
2 Set circuit breaker trip unit for site conditions		Yes No N/A			

17. Generator Set System - Integrated Voltage Regulator

1 Confirm Integrated Voltage Regulator (IVR) Type		EM10, EM15	4 Confirm IVR Fuses are installed and secure.		Yes No N/A
2 Confirm IVR Interface Harness is correctly installed		Yes No N/A	5 Confirm IVR Parameters have been Set. Use ET to view parameters.		Yes No N/A
3 Confirm IVR Over-Excitation Protection LED is GREEN. LED is Green for Normal Conditions.		Yes No N/A	For Technical reference use LEBE0006 A&I Manual, Section -Integrated Voltage Regulator		

18. Automatic Transfer Switch

1 Verify voltage/amperage		Yes No N/A	4 Confirm proper phase rotation		Yes No N/A
2 Confirm No Damage is present (Mechanical, Structural, Electrical)		Yes No N/A	5 Set Exercise Timer		Yes No N/A
3 Confirm all conductors are terminated properly and secured.		Yes No N/A	Exercise Timer Frequency Setting		

Start Up Details:



Warren CAT
15 North Meridian Avenue
Oklahoma City, Oklahoma 73127

SECTION VIII

WARRANTY



Photographs included in this document are for page break purpose only and do not necessarily represent the equipment supplied.

Effective with sales to the first user on or after August 1, 2014

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 to engines sold for use in on-highway vehicle or marine applications; engines in machines manufactured by or for Caterpillar; C-175, 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 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 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 new 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 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.

(Continued on reverse side...)

- 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.
- 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, Cat Selective Catalytic Reduction System or electric power generation product (including any products of other manufacturers packaged and sold by Caterpillar).

- Repair of components sold by Caterpillar that is warranted directly to the user by their respective manufacturer. Depending on type of application, certain exclusions may apply. Consult your Cat dealer for more information.

This warranty covers every major component of the products. Claims under this warranty should be submitted to a place of business of a Cat dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N. E. Adams St., Peoria, IL USA 61629.

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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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