

Installation

Foundations

Major functions of a foundation are to:

- Support total weight of generator set.
- Maintain alignment between engine, generator, and accessory equipment.
- Isolate generator set vibration from surrounding structures.

Ground Loading

Initial considerations include generator set weight and material supporting this weight.

The wet weight of the total package must be calculated. This includes accessory equipment and weight of all liquids (coolant, oil, and fuel,) supported by the foundation.

Liquid	Weights of Liquids	
	lb/U.S. gal	Specific Gravity
Water/Glycol	8.55	1.030
Water	8.30	1.000
Lube Oil	7.60	0.916
Diesel Fuel	7.10	0.855
Kerosene	6.70	0.800

Figure 2

Material supporting foundation must carry the total weight. Figure 3 shows bearing load capabilities of common materials.

Material	Bearing Load Capability	
	Safe Bearing Load psi	kPa
Rock, Hardpan	70	482
Hard Clay, Gravel		
Coarse Sand	56	386
Loose Medium Sand		
and Medium Clay	28	193
Loose Fine Sand	14	96.4
Soft Clay	0-14	0-96.4

Figure 3

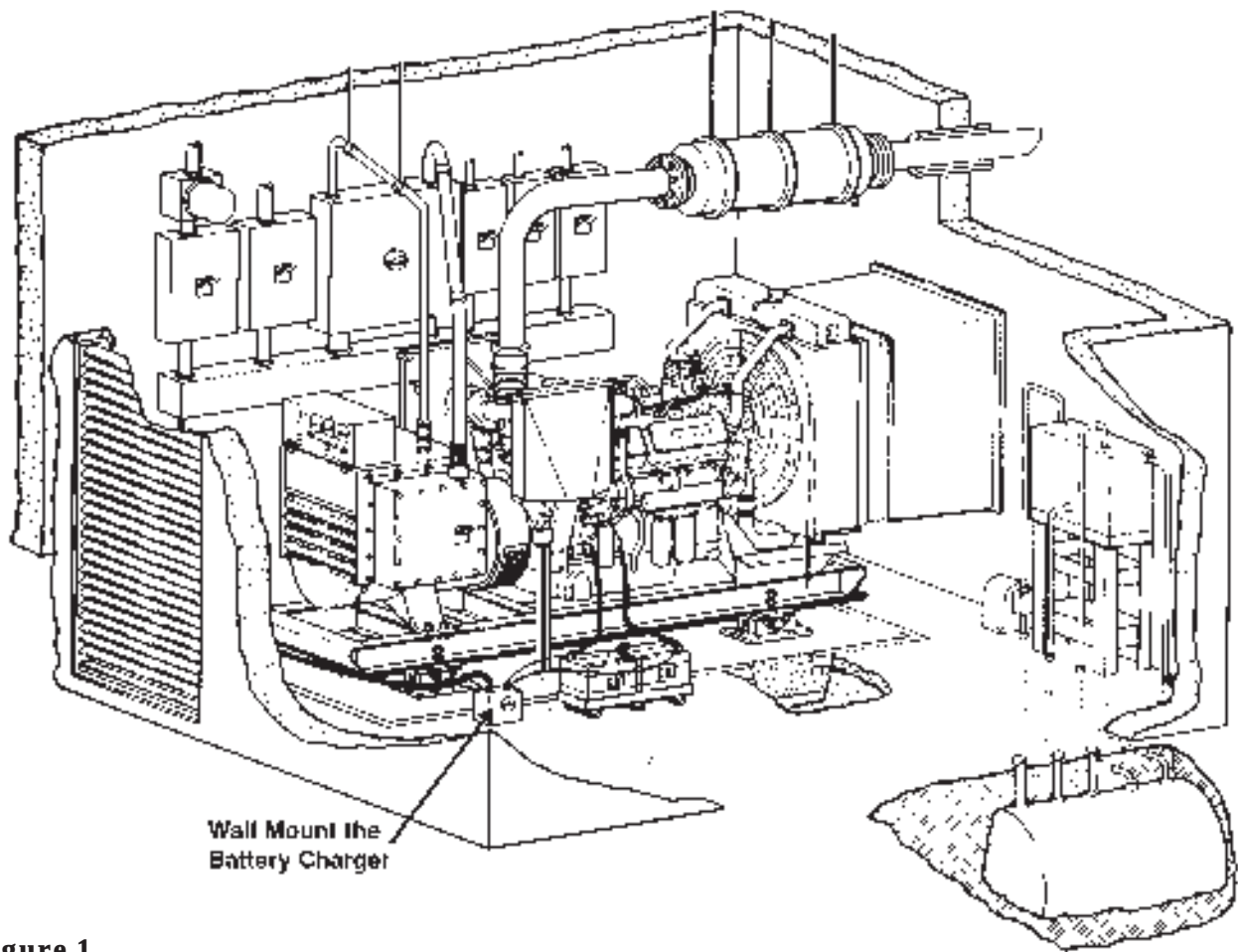


Figure 1

Firm, level soil, gravel, or rock provides satisfactory support for single-bearing generator sets used in stationary or portable service. Use this support where the weight-bearing capacity of the supporting material exceeds pressure exerted by the equipment package, and where alignment with external machinery is unimportant.

Soil, such as fine clay, loose sand, or sand near the ground water level, is particularly unstable under dynamic loads and require substantially larger foundations. Information concerning bearing capacity of soils at the site may be available from local sources and must comply with local building codes.

Area of load-bearing support is adjusted to accommodate surface material. To determine pressure (P) exerted by the generator set, divide total weight (W) by total surface area (A) of the rails, pads, or vibration mounts.

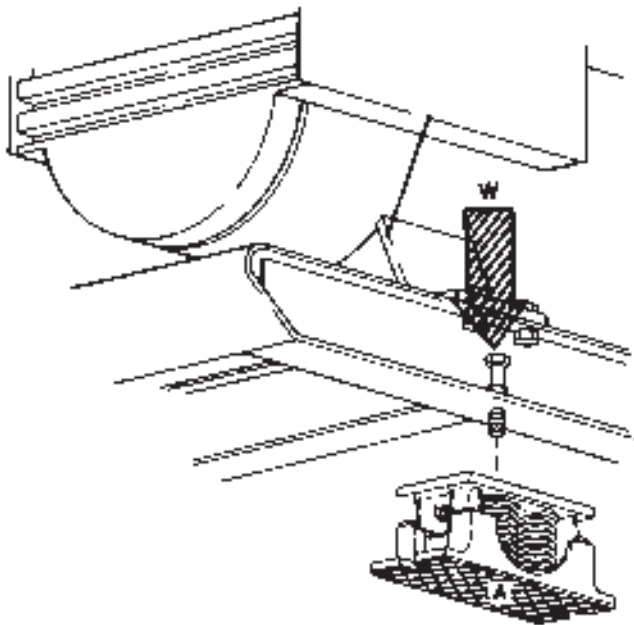


Figure 4

$$P = \frac{W}{A}$$

Where: P = Pressure in kg/m² (psi)
W = Weight in kg (lb)
A = Area in m² (in²)

Pressure imposed by the generator set weight must be less than the load-carrying capacity of supporting material.

Where support rails or mounting feet have insufficient bearing area, flotation pads can distribute the weight. The underside area and stiffness of the pad must be sufficient to support the equipment.

Seasonal and weather changes adversely affect mounting surfaces. Soil changes considerably while freezing and thawing. To avoid movement from seasonal changes, extend foundations below the frost line.

Concrete Base

Several basic foundations are applicable for generator sets. The foundation chosen will depend on factors previously outlined as well as limitations imposed by the specific location and application.

Massive concrete foundations are unnecessary for modern multicylinder medium speed generator sets. Avoid excessively thick, heavy bases to minimize subfloor or soil loading. Bases need be only thick enough to prevent deflection and torque reaction, while retaining sufficient surface area for support. (Non-parallel units require no foundation anchoring.)

If a concrete foundation is required, *minimum* design guidelines include:

- Strength must support wet weight of units plus dynamic loads.
- Outside dimensions exceed that of the generator set a minimum of 300 mm (1 ft) on all sides.
- Depth sufficient to attain a minimum weight equal to generator set wet weight (only if large mass, i.e., inertia block, is specified for vibration control).

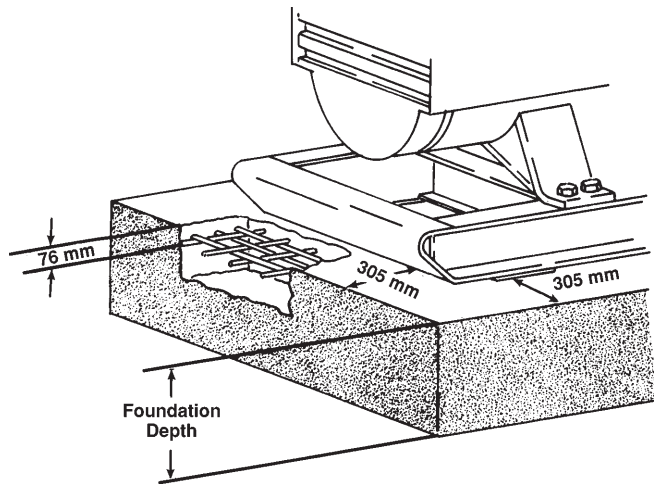


Figure 5

Calculate foundation depth to equal generator set weight by:

$$FD = \frac{W}{D \times B \times L}$$

FD = foundation depth, m (ft)

W = total wet weight of generator set, kg (lb)

D = density of concrete, kg/m³ (lb/ft³)

Note: use 2403 for metric units and 150 for English units.

B = foundation width, m (ft)

L = foundation length, m (ft)

Suggested concrete mixture by volume is 1:2:3

of cement, sand, aggregate, with maximum 100 mm (4 in.) slump and 28-day compressive strength of 20 MPa (3000 psi).

Reinforce with No. 8 gauge steel wire mesh or equivalent, horizontally placed on 150 mm (6 in.) centers. An alternative method places No. 6 reinforcing bars on 300 mm (12 in.) centers horizontally. Bars should clear foundation surfaces 75 mm (3 in.) minimum.

When effective vibration isolation equipment is used, depth of floor concrete is that needed for structural support of the static load. Major rotating and reciprocating components of Caterpillar generator sets are individually balanced and, theoretically, have no unbalance. Practically, manufacturing tolerances and combustion forces impose some dynamic loading on the foundation. If isolators are not used, dynamic loads transmit to the facility floor and requires the floor to support 125% of the generator set weight.

If generator sets are paralleled, possible out-of-phase paralleling and resulting torque reactions demand stronger foundations. The foundation must withstand twice the wet weight of the generator set.

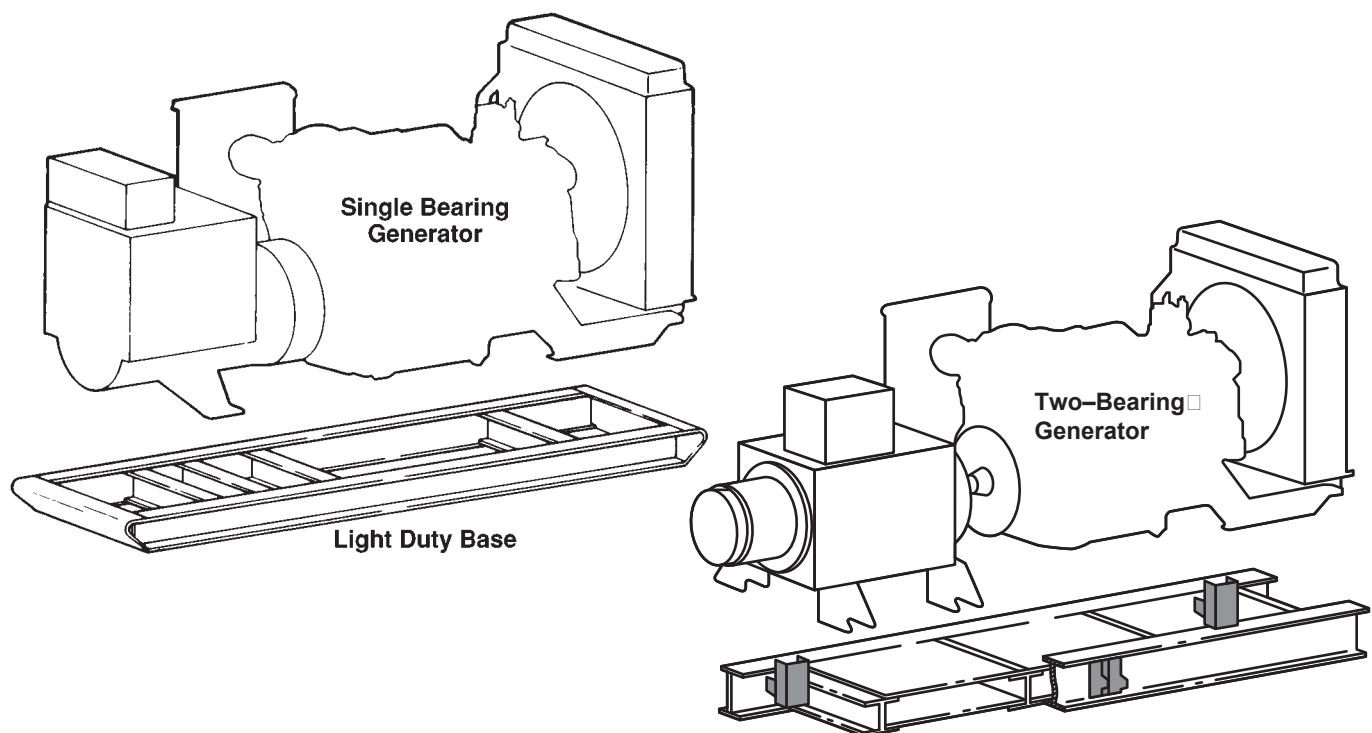


Figure 6

Structurally Rigid Base



INSTALLATION REQUIREMENTS BY OTHERS

Caterpillar Diesel Engines

The installation of the above equipment to be supplied by Macallister CAT requires (but is not limited to) the following labor and/or Material to be provided by the purchasers installing contractor(s):

- 1) Off loading, rigging and installation of all the equipment sold by Macallister Cat. Spreader bars may be required. Refer to drawings for accurate weights and dimensions or call Macallister to confirm requirements.
- 2) Foundations, pads, supports, anchor bolts, hangers, brackets, etc., to install the above equipment.
- 3) A/C power wiring, conduit, connectors, terminations, etc. (lugs not included on circuit breakers above 1000AF) to connect the generator, ATS's, distribution panels or switchgear.
- 4) A/C power circuits, wiring, conduit, over current devices, distribution panels, etc. to provide power to ancillary equipment.
- 5) All control/interconnect wiring to the generator.
 - **NOTE: Do not run DC control wires in same conduit with AC wiring. All control inter-connect wiring to be stranded wire.**
- 6) All exhaust piping, elbows, spool pieces, flanges, hangers, supports, isolators, wall thimbles/roof thimbles, insulation, screens, rain caps, expansion joints, nuts, bolts and gaskets, painting, etc.
 - **NOTE: The exhaust silencer will be shipped loose for installation by others. Silencer is to be installed by contractor prior to startup.**
- 7) Diesel fuel supply piping as required by local code.
- 8) Installation location, orientation of equipment and clearances are the responsibility of the contractor an/or engineer. Common installation problems include, but are not limited to, the following:
 - Blocking the radiator discharge air flow
 - Not enough available "free air" intake for radiator cooling and ventilation
 - Under sizing exhaust piping size on long runs
 - Exhaust flow directed at an object or building that will be drawn into air handling equipment
 - Not providing enough clearance around equipment for service and/or maintenance
 - Running DC control interconnect wire in same conduit with AC wiring
 - Requiring excessive number and/or size of power cables to generator and/or ATS's that cannot be physically installed
 - Using preliminary sales information to build an installation
- 9) Unless specifically stated above, all equipment supplied by Macallister CAT carries the manufacturer's standard warranty.
- 10) Mounting of ship loose battery chargers, wiring for battery charger (ac & dc) and jacket water heater.
- 11) We feel we have given the appropriate information required for the proper installation of the equipment to be provided by Macallister CAT. We will be happy to provide any additional information requested for this project.

Macallister CAT will not be responsible for any additional expense or project delays as a result of improper installation per Caterpillar recommendations (See Note A). Additional charges to the customer may be necessary if Macallister CAT is required to make any field modifications or additional startup and testing trips.

NOTE A: The Caterpillar Application and Installation Guide is available on the enclosed CD with the title "A&I Guide LEBX5048.pdf" or call 800-833-1789 ext. 4380 for a printed copy.



PRE-START UP CHECK LIST

Please complete the following:

- () 1. All Ship Loose Components Supplied on the Bill of Material are Installed.
- () 2. The DC control wires and AC power circuits are in separate conduits and Terminated at both ends. (Call if schematics are required)
- () 3. The Battery Charger and Engine Jacket Water Heater have the proper AC supply Voltage, & Fused at the Customers source.
- () 4. The AC Electrical connections are terminated at the generator and at the Automatic Transfer Switch, or Switches.
- () 5. Utility Source is available at the Transfer Switch and Building load is available.
- () 6. The Fuel supply lines are completed and – diesel is available
- () 7. Check the Engine Lube Oil, & also that Engine Coolant is installed.
- () 8. The Air Intake Louvers & Radiator Discharge Areas are free from obstruction. The Room / Enclosure has adequate air flow and is clean.
- () 9. The Exhaust System is installed including: rain caps, drip shields, roof or wall Thimbles, & Flexible Connectors etc.....

OPTIONAL

- () 10. You are ready for Operation & Maintenance Training at the time of start up.

Please sign and return:

Name _____ **Date** _____

Cat® D200 GC

Diesel Generator Sets



Standby : 60 Hz



Image shown might not reflect actual configuration.

Engine Model	Cat® C7.1 ACERT In-line 6, 4-cycle diesel
Bore x Stroke	105 mm x 135 mm (4.1 in x 5.3 in)
Displacement	7.01 L (428 in³)
Compression Ratio	16.7:1
Aspiration	Turbocharged Air-to-Air-Aftercooled
Fuel Injection System	Electronic, Common Rail
Governor	Electronic ADEM™ A4

Model	Standby	Emission Strategy
D200 GC	250 kVA, 200 ekW	EPA TIER III

PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	250 kVA
Genset power rating with fan, 3p@ 0.8 & 1p@1.0 power factor	200 ekW
Performance Number	P4364A
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	56.4 (14.9)
75% load with fan, L/hr (gal/hr)	45.8 (12.1)
50% load with fan, L/hr (gal/hr)	32.6 (8.6)
25% load with fan, L/hr (gal/hr)	14.3 (3.7)
Cooling System ¹	
Radiator air flow restriction (system), kPa (in. Water)	0.12 (0.48)
Engine coolant capacity, L (gal)	9.5 (2.5)
Radiator coolant capacity, L (gal)	11.5 (3.0)
Inlet Air	
Combustion air inlet flow rate, m³/min (cfm)	15.8 (558)
Max. Allowable Combustion Air Inlet Temp, °C (°F)	51 (124)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	533 (991)
Exhaust gas flow rate, m³/min (cfm)	38.3 (1353)
Exhaust system backpressure (maximum allowable) kPa (in. water)	15.0 (60.2)
Heat Rejection	
Heat rejection to jacket water, kW (Btu/min)	91.8 (5221)
Heat rejection to exhaust (total) kW (Btu/min)	183.0 (10407)
Heat rejection to aftercooler, kW (Btu/min)	45.0 (2559)
Heat rejection to atmosphere from engine, kW (Btu/min)	35.3 (2019)

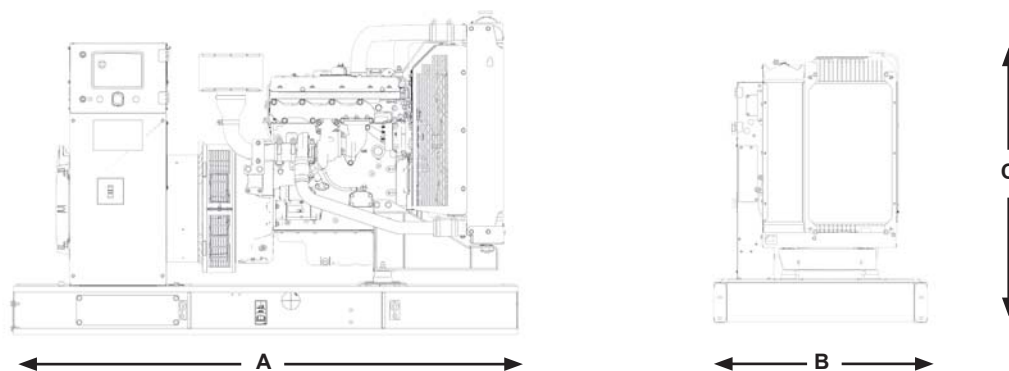
D200 GC Diesel Generator Sets

Electric Power



Emissions (Nominal) ²	Standby		
NOx + HC, g/kW-hr	3.73		
CO, g/kW-hr	1.31		
PM, g/kW-hr	0.18		
Alternator ³			
Voltages	480V	208V	600V
Motor starting capability @ 30% Voltage Dip, skVA	361	333	780
Current Amps	301	694	241
Frame Size	M2294L4	M2736L4	M2736L4
Excitation	SE	SE	AREP
Temperature Rise, °C	130	130	105

WEIGHTS & DIMENSIONS



Note: General configuration not to be used for installation. See general dimension drawings for detail.

Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
2634 (103.7)	1300 (51.2)	1492 (58.7)	1777 (3917)

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.

Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

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

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 kW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

DEFINITIONS AND CONDITIONS

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

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

³ UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

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LEHE2668-01 (01/21)

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Image shown might not reflect actual configuration

D40 GC - D200 GC Sound Attenuated Level 2 Enclosures

60 Hz:40 ekW - 200 ekW

Color: White

Features

Robust/Highly Corrosion Resistant Construction

- Factory installed on skid base or 24hr Integral fuel tank
- Caterpillar white paint
- Environmentally friendly, polyester powder baked paint
- 18 gauge steel minimum.
- Zinc plated fasteners
- Stainless steel hinges
- Internally mounted exhaust silencing system
- Designed and tested to comply with UL 2200 Listed generator set package
- Comply with ASCE /SEI 7 for Wind Loads up to 100mph
- Optional seismic certification offered
- Compression door latches providing solid door seal

Excellent Access

- Large cable entry area for installation ease
- Accommodates side mounted single or multiple breakers
- Single door on left hand side
- Dual doors on right hand side
- Doors vertically hinged allow 180° opening rotation
- Doors capable of lift off at 90° opening rotation
- For non-routine service access are removeable panels
- Lube oil drain valve standard with coolant drain and valve piped to the exterior of the enclosure base
- Radiator fill cover

Security and Safety

- Lockable (keyed or padlock) 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
- Optional externally mounted emergency stop button
- Designed for spreader bar lifting to ensure safety
- Stub-up area is rodent proof

Options

- Skid base compatible
- UL Listed integral fuel tank with 24 hour running time capacity
- DC lighting package

Enclosure Package Operating Characteristics

A. Sound Attenuated- Level 2

Model	Hz	ekW	SB	Sound Pressure Levels dBA	Air Flow Rate		Ambient Capability* @100% Load	
				7m (23ft)				
				100% Load	m³/s	cfm	°C	°F
D40 GC	60	40	SB	67.7	1.5	3178.3	60	140
D50 GC	60	50	SB	68.6	1.5	3178.3	54	129
D60 GC	60	60	SB	69.6	1.5	3178.3	48	118
D80 GC	60	80	SB	74.9	3.5	7416.1	60	140
D100 GC	60	100	SB	76.4	3.5	7416.1	52	126
D125 GC	60	125	SB	74.8	3.4	7204.2	61	142
D150 GC	60	150	SB	75.4	3.4	7204.2	54	129
D175 GC	60	175	SB	79.3	4.1	8687.4	49	120
D200 GC	60	200	SB	79.5	4.1	8687.4	44	111

*TBD - To be determined - Data will be released soon

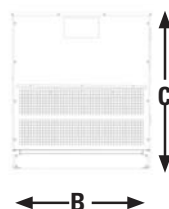
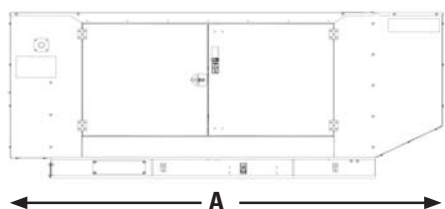
*Cooling system performance at sea level. Consult your Cat® dealer for site specific ambient and altitude capabilities.

Note: Sound level measurements are subject to instrumentation, installation and manufacturing variability, as well as ambient site conditions.

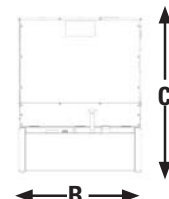
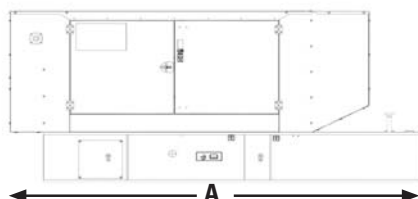
B. Component Weights to Calculate Package Weight

Standby ekW	Wide Skid Base		Sound Attenuated Enclosure (Steel)	
	kg	lb	kg	lb
40-60	92.6	204.1	178.8	394.2
80-100	96.2	212.1	189.1	416.9
125-200	115.9	255.5	274.4	604.9

C. Weights & Dimensions



Sound Attenuated Enclosure on Skid Base



Sound Attenuated Enclosure
on a UL Listed Integral Fuel Tank Base

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

Enclosure Type	Standby ratings	Length, L		Width, W		Height, H		Package Weights	
	ekW	mm	in	mm	in	mm	in	kg	lb
Open Set on Skid (wide Base)	40	1976	77.2	1099.8	43.3	1219.2	48.0	837.7	1847
	50	1976	77.2	1099.8	43.3	1219.2	48.0	931.6	2054
	60	1976	77.2	1099.8	43.3	1219.2	48.0	905.8	1997
	80	2098	82.6	1099.8	43.3	1343.6	52.9	950.2	2095
	100	2098	82.6	1099.8	43.3	1343.6	52.9	1007.8	2222
	125	2634	103.7	1300.4	51.2	1402	55.2	1405.6	3099
	150	2634	103.7	1300.4	51.2	1402	55.2	1561.7	3443
	175	2634	103.7	1300.4	51.2	1490.9	58.7	1696.8	3741
	200	2634	103.7	1300.4	51.2	1490.9	58.7	1776.7	3917
Open Set on a UL Listed Integral Fuel Tank Base	40	2707.6	106.6	1099.8	43.3	1384.3	54.5	1536.3	3387
	50	2707.6	106.6	1099.8	43.3	1384.3	54.5	1630.2	3594
	60	2707.6	106.6	1099.8	43.3	1384.3	54.5	1604.3	3537
	80	3035.3	119.5	1099.8	43.3	1582.4	62.3	1914.1	4220
	100	3035.3	119.5	1099.8	43.3	1582.4	62.3	1972.2	4348
	125	3670.3	144.5	1300.4	51.2	1757.6	69.2	3207.8	7072
	150	3670.3	144.5	1300.4	51.2	1757.6	69.2	3363.3	7415
	175	3670.3	144.5	1300.4	51.2	1846.6	72.7	3498.5	7713
	200	3670.3	144.5	1300.4	51.2	1846.6	72.7	3578.4	7889
Sound Attenuated Enclosure on Skid Base	40	2456.1	96.1	1120.1	44.1	1330.9	52.4	1016.5	2241
	50	2456.1	96.1	1120.1	44.1	1330.9	52.4	1110.4	2448
	60	2456.1	96.1	1120.1	44.1	1330.9	52.4	1084.5	2391
	80	2768.6	109.0	1120.1	44.1	1432.5	56.4	1139.4	2512
	100	2768.6	109.0	1120.1	44.1	1432.5	56.4	1197.0	2639
	125	2633.9	103.7	1318.2	51.9	1569.7	61.8	1680.1	3704
	150	2633.9	103.7	1318.2	51.9	1569.7	61.8	1836.1	4048
	175	2633.9	103.7	1318.2	51.9	1569.7	61.8	1971.3	4346
	200	2633.9	103.7	1318.2	51.9	1569.7	61.8	2051.1	4522
Sound Attenuated Enclosure on a UL Listed Integral Fuel Tank Base	40	2931.1	115.4	1120.1	44.1	1496	58.9	1715.0	3781
	50	2931.1	115.4	1120.1	44.1	1496	58.9	1808.9	3988
	60	2931.1	115.4	1120.1	44.1	1496	58.9	1783.1	3931
	80	3256.2	128.2	1120.1	44.1	1673.8	65.9	2103.3	4637
	100	3256.2	128.2	1120.1	44.1	1673.8	65.9	2161.4	4765
	125	4008.1	157.8	1318.2	51.9	1925.3	75.8	3481.8	7676
	150	4008.1	157.8	1318.2	51.9	1925.3	75.8	3637.8	8020
	175	4008.1	157.8	1318.2	51.9	1925.3	75.8	3773.0	8318
	200	4008.1	157.8	1318.2	51.9	1925.3	75.8	3852.8	8494

*Note: Weights include genset, enclosure (where applicable), tank and fuel (where applicable)

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Integral Fuel Tanks D40 GC – D200 GC

Image show might not reflect actual product

Features

- UL Listed for United States (UL 142) and Canada (CAN/ULC S601)
- Facilitates compliance with NFPA 30 code, NFPA 37 and 110 standards and CSA C282 code
- Dual wall
- Low fuel level warning standard, customer configurable warning or shutdown
- Primary tank leak detection switch in containment basin
- Tank design provides capacity for thermal expansion of fuel
- Fuel supply dip tube is positioned so as not to pick up fuel sediment
- Fuel return and supply dip tube is separated by an internal baffle to prevent immediate re-supply of heated return fuel
- Pressure washed with an iron phosphate solution
- Interior tank surfaces coated with a solvent-based thin-film rust preventative
- Heavy gauge steel gussets with internal lifting rings
- Primary and secondary tanks are leak tested at 20.7 kPa (3 psi) minimum
- Compatible with open packages and enclosures
- Gloss black polyester alkyd enamel exterior paint
- Welded steel containment basin (minimum of 110% of primary tank capacity)
- Direct reading fuel gauge with variable electrical

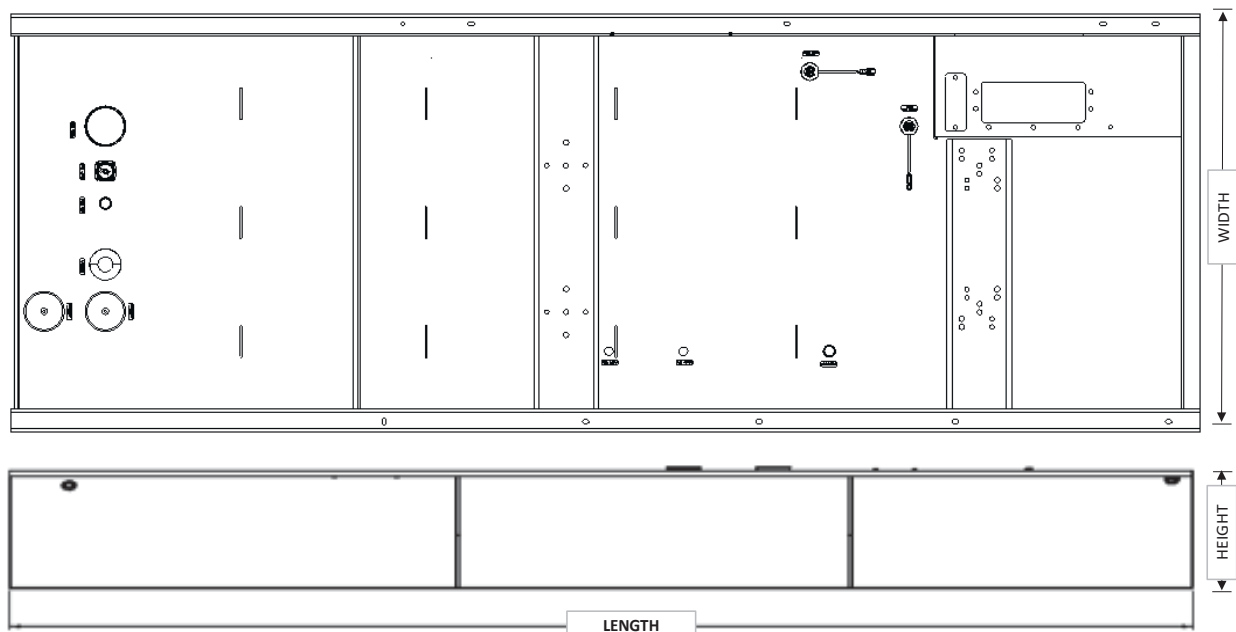
Integral

- Integral diesel fuel tank is incorporated into the generator set base frame
- Robust base design includes linear vibration isolators between tank base and engine generator.

Options

- Audio/visual fuel level alarm panel
- 5 gal (18.9L) spill containment
- Fuel tank fill pipe and lockable cap
- Overfill prevention Valve

Integral Fuel Tank Base Useable Capacities with Fuel Tank Dimensions & Weights



The heights listed above do not include lumber used during manufacturing and shipping

A. Open Set & Sound Attenuated Enclosure

Standby	Feature Code	Total Capacity		Useable Capacity	
eKW		Litre	Gallon	Litre	Gallon
40-60	FTDW044	523	138.2	466	123.1
80-100	FTDW043	769	203.1	690	182.3
125-200	FTDW045	1511	399.2	1355	357.9

Standby	Feature Code	Tank Only								Overall Package Height with Tank			
eKW		Dry Weight		Height 'H'		Length 'L'		Width		Open		Enclosure	
		kg	lb	mm	in	mm	in	mm	in	mm	in	mm	in
40-60	FTDW044	387.5	853.2	365	14.4	2708	106.6	1100	43.3	1384	54.5	1496	58.9
80-100	FTDW043	462.5	1019.6	440	17.3	3035	119.5	1100	43.3	1583	62.3	1673	65.9
125-200	FTDW045	736.1	1622.8	555	21.9	3670	144.5	1300	51.2	1847	72.7	1925	75.8

Time (Hours)

Tank Design	Feature Code	Standby Ratings (kVA)						
		ekW	100%		75%		50%	
			Hrs	L/hr	Hrs	L/hr	Hrs	L/hr
Integral Tank	FTDW044	40	33.5	13.9	43.1	10.8	57.5	8.1
		50	27.7	16.8	36.4	12.8	50.1	9.3
		60	24.0	19.4	27.7	16.8	35.6	13.1
	FTDW043	80	29.1	23.7	36.3	19.0	49.6	13.9
		100	24.0	28.8	29.7	23.2	40.1	17.2
	FTDW045	125	35.8	37.8	44.7	30.3	61.9	21.9
		150	31.5	43.0	38.8	34.9	54.2	25.0
		175	26.5	51.2	32.3	41.9	47.4	28.6
		200	24.0	56.4	29.6	45.8	41.6	32.6

Tanks include RH stub-up area directly below the circuit breaker or power terminal strips.

Fuel tanks and applicable options facilitate compliance with the following United States NFPA Code and Standards:

NFPA 30: Flammable and Combustible Liquids Code

NFPA 37: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

NFPA 110: Standard for Emergency and Standby Power Systems

Fuel tanks and applicable options facilitate compliance with the following Canadian Standard and Code:

CSA C282 – Emergency Electrical Power Supply for Buildings

CSA B139-09 – Installation Code for Oil-Burning Equipment

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LET'S DO THE WORK.™

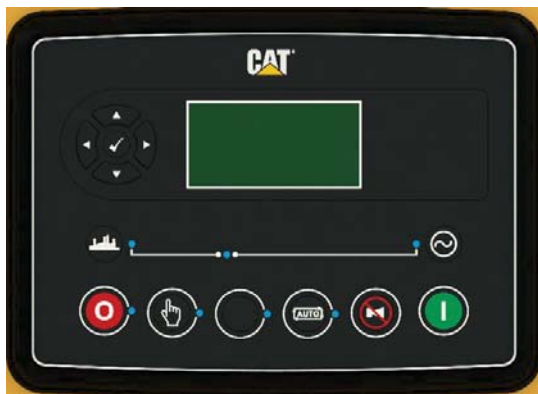


Image shown might not reflect actual configuration

GCCP 1.2 - Control Panel

GCCP 1.2 is an auto Start Control Module suitable for a wide variety of diesel gen-set applications. Monitoring an extensive number of engine parameters, the modules will display warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LEDs and remote PC.

FEATURES

- 4-line back-lit LCD text display
- Multiple display languages
- Five-key menu navigation
- LCD alarm indication
- Customisable power-up text and images
- Data logging facility
- Internal PLC editor
- Protections disable feature
- Fully configurable via PC using USB & RS485 communication
- Front panel configuration with PIN protection
- Power save mode
- 3-phase generator sensing and protection
- Generator current and power monitoring (kW, kvar, kVA, pf)
- kW and kvar overload and reverse power alarms
- Over current protection
- Unbalanced load protection
- Breaker control via fascia buttons
- Fuel and start outputs configurable when using CAN Support for 0 V to 10 V & 4 mA to 20 mA sensors
- 8 configurable digital inputs (3 available for Customer use)
- 8 configurable digital outputs (5 available for Customer use)
- 4 configurable analogue inputs (3 available for Customer Use)
- CAN, MPU and alternator frequency speed sensing in one variant
- Real time clock
- Engine pre-heat and post-heat functions
- Engine run-time scheduler
- Engine idle control for starting & stopping
- Fuel usage monitor and low fuel level alarms
- 3 configurable maintenance alarms

BENEFITS

- Hours counter provides accurate information for monitoring and maintenance periods
- User-friendly set-up and button layout for ease of use
- Multiple parameters are monitored & displayed simultaneously for full visibility
- The module can be configured to suit a wide range of applications for user flexibility
- PLC editor allows user configurable functions to meet user specific application requirements.
- RS485 Communication port can be used for the Remote Monitoring Communication (Compatible with Cat PLG)

SPECIFICATION

DC SUPPLY

CONTINUOUS VOLTAGE RATING

8 V to 35 V Continuous
5 V for upto 1 minute

CRANKING DROPOUTS

Able to survive 0 V for 100 ms, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries.

LEDs and backlight will not be maintained during cranking.

MAXIMUM OPERATING CURRENT

260 mA at 12 V, 150 mA at 24 V

MAXIMUM STANDBY CURRENT

145 mA at 12 V, 85 mA at 24 V

CHARGE FAIL/EXCITATION RANGE

0 V to 35 V

GENERATOR & MAINS (UTILITY) VOLTAGE RANGE

15 V to 415 V AC (Ph to N)
26 V to 719 V AC (Ph to Ph)

FREQUENCY RANGE

3.5 Hz to 75 Hz

MAGNETIC PICKUP VOLTAGE RANGE

+/- 0.5 V to 70 V

FREQUENCY RANGE

10,000 Hz (max)

INPUTS

DIGITAL INPUTS A TO H

Negative switching

ANALOGUE INPUTS A & D

Configurable as:

Negative switching digital input 0 V to 10 V sensor
4 mA to 20 mA sensor Resistive sensor

ANALOGUE INPUTS B & C

Configurable as:

Negative switching digital input Resistive sensor

OUTPUTS

OUTPUT A & B (FUEL & START)

15 A DC at supply voltage

AUXILIARY OUTPUTS C, D, E, F, G & H

2 A DC at supply voltage

DIMENSIONS OVERALL

216 mm x 158 mm x 43 mm
8.5" x 6.2" x 1.5"

PANEL CUT-OUT

184 mm x 137 mm
7.2" x 5.3"

MAXIMUM PANEL THICKNESS

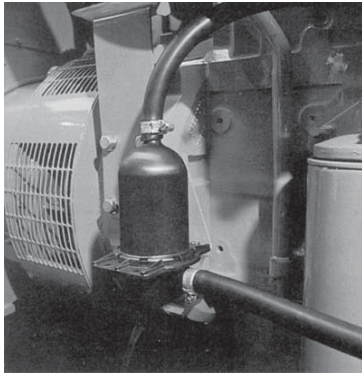
8 mm
0.3"

STORAGE TEMPERATURE RANGE

-40°C to +85°C
-40 °F to +185 °F

OPERATING TEMPERATURE RANGE

-30°C to +70°C
-22 °F to +158 °F



Picture shown may not represent actual package.

Coolant Heater (WHH / WHHH / WHHA / JWH0089)

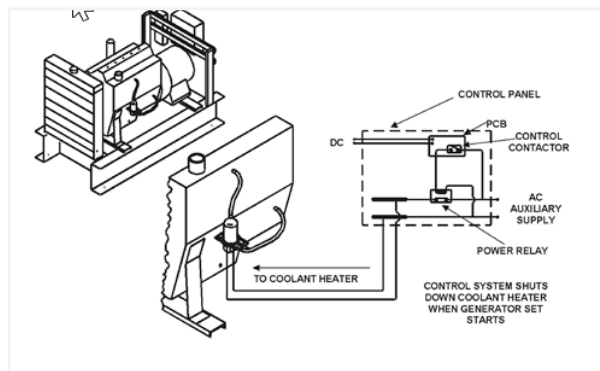
Appropriate when the generator set is to be sited in a low ambient environment, the heater maintains the engine coolant at a temperature [typically 38°C (100°F)] which facilitates rapid starting and load acceptance. The heater assembly uses UL compliant components (to UL1030) and has CSA certification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

The heater itself is powered either by a 110/120 volt (VAC 120) for 60 Hz or 240V (VAC 240) for 50 Hz 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*, C7.1*	1000
C3.3, C4.4	1500
C7.1	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

VAC 240

Diesel Generator Set Engine Models	Feature Code
C3.3, C4.4, C7.1	1500
C13, C15, C18	3000

* For North American Region

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Image shown might not reflect actual configuration

Remote Annunciator Module

It is an LED expansion module that can be used with compatible control modules. The module has been designed to display a maximum of eight individual LED indications up to a maximum distance of 1 KM (0.6 miles).

The Annunciator will consist of two modules to provide a 16 Channel Fault annunciation.

It is presented in a vertical enclosure. It includes an alarm sounder that is triggered when the host controller detects an alarm condition. The alarm can be muted using the front push button.

The Panels will be fitted with removable label cards which can be used to identify the standard NFPA alarms. If desired

It includes individual LEDs for each channel and a 'Power On' LED that flashes when the link with the host controller is lost.

FEATURES

- The Remote annunciator has an integral Sounder / Horn
- Eight configurable LEDs (per module)
- Works up to 1 KM (0.6 miles) from the host controller
- A single Controller can support five Caterpillar Configured remote annunciator control boxes

ENVIRONMENTAL TESTING STANDARDS

ELECTRO-MAGNETIC COMPATIBILITY

BS EN 61000-6-2
EMC Generic Immunity Standard for the Industrial Environment
BS EN 61000-6-4
EMC Generic Emission Standard for the Industrial Environment

ELECTRICAL SAFETY

BS EN 60950
Safety of Information Technology Equipment, including Electrical Business Equipment

TEMPERATURE

BS EN 60068-2-1
Ab/Ae Cold Test -30 °C BS EN 60068-2-2
Bb/Be Dry Heat +70°C

VIBRATION

BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm, 8 Hz to 500 Hz @ 2 gn

SHOCK

BS EN 60068-2-27
Three shocks in each of three major axes 15 gn in 11 Ms

HUMIDITY

BS EN 60068-2-30
Db Damp Heat Cyclic 20/55 °C @ 95% RH 48 Hours
BS EN 60068-2-78
Cab Damp Heat Static 40 °C @ 93% RH 48 Hours

DEGREES OF PROTECTION PROVIDED BY ENCLOSURES BS EN 60529

IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

SPECIFICATION

CONTINUOUS VOLTAGE RATING

8 V to 35 V Continuous

CRANKING DROPOUTS

Able to survive 0 V for 50 mS, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries. LEDs and backlight will not be maintained during cranking.

MAXIMUM OPERATING CURRENT

112 mA at 12 V, 53 mA at 24 V

MAXIMUM STANDBY CURRENT

74 mA at 12 V, 35 mA at 24 V

DIMENSIONS OVERALL

355 mm x 369 mm x 90 mm
13.97" x 14.52" x 3.54"

PANEL CUT-OUT

286 mm x 326 mm x 93 mm
11.25" x 12.83" x 3.66"

MAXIMUM PANEL THICKNESS

8 mm
0.3"

LEHE2021-01 (03-21)

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Image shown might not reflect actual configuration

BATTERY CHARGER

The intelligent battery charger has been developed with safety, usability, optimised battery performance and maximum battery lifetimes in mind.

A comprehensive range of input and output protections ensures a continued safe charging environment also enabling the use of the charger as a power supply.

FEATURES

- Intelligent two, three and four stage charging profiles
- Configurable to suit most battery types (12V/24V)
- Adjustable current limit
- Can be used as a battery charger, power supply or both at the same time
- Automatic or Manual boost and storage charge functions to help maintain battery condition
- Digital Microprocessor Technology
- Temperature compensation for battery charging
- Low Output Ripple and superb line regulation
- Three LED Indicators
- AC input Under voltage
- AC input Over voltage
- Battery charger output Over voltage
- Battery charger output Over current
- Optional battery temperature compensation with over temperature protection
- Output short circuit and Inversion polarity with auto recovery
- Configurable charge termination

Automatic Boost Mode

- Boosts and equalises cell charge improving battery performance and life

Power Save Mode

- Once the battery is fully charged the chargers switch to Eco-Power to save energy

Communication

- Can be integrated into external systems through MODBUS RTU using RS485
- Fully configurable via PC Software
- External remote LCD option

BENEFITS

- Fully flexible to maximise the life of the battery
- Suitable for a wide range of battery types
- Switched mode design
- Minimum 86% efficiency throughout full operating range
- No external intervention for boost mode
- Multiple chargers can be linked together to provide larger current output
- Can be permanently connected to battery and mains (utility) supply. No need to disconnect through high load conditions.

SPECIFICATION

AC SUPPLY

VOLTAGE RANGE 90 V to 305 V (L-N)

FREQUENCY RANGE

48 Hz to 64 Hz (L-N)

DC OUTPUT RATING

10 A DC at 24 V DC

RIPPLE AND NOISE

<1%

EFFICIENCY

>86%

REGULATION LINE

<0.5%

LOAD

2%

TEMPERATURE SENSOR INPUT

PT1000

PROTECTIONS

Short Circuit
DC Over Voltage
DC Over Current
Reverse Polarity
Over Temperature
AC Under & Over Voltage

CHARGE FAILURE RELAY

3 A at 30 V DC volt free relay

DIMENSIONS OVERALL

70 mm x 200 mm x 130 mm
2.7" x 7.9" x 5.1"

WEIGHT

0.75 kg

OPERATING TEMPERATURE RANGE

-30 °C to +80 °C
-22 °F to +176 °F

STORAGE TEMPERATURE RANGE

-40 °C to +70 °C
-22 °F to +158 °F

Specifications

Input supply	110 – 120 V 208 – 240 V
AC and DC fuses	2 input and 2 output)
Output voltage	24V
Output amps	10
Frequency	50 / 60 Hz
Operating temperature	-20°C (-4°F) to +60°C (140°F)
Housing constructed of rustproof anodized Aluminum	

Dimensions			
Width	Depth	Height	Weight
195 mm (7.66 in)	165 mm (6.5 in)	318 mm (12.5 in)	10.4 kg (23 lb)

NFPA 110 alarm package as follows:

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

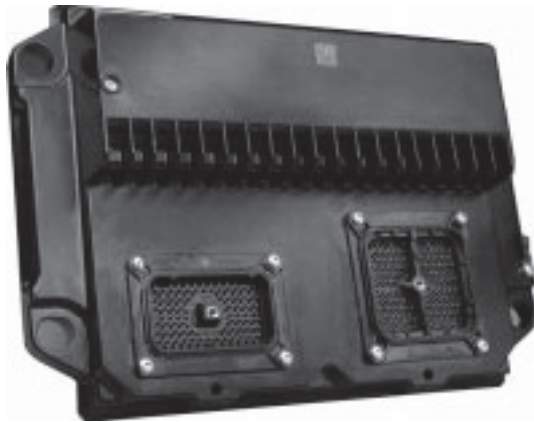
Feature Codes:

BTC1024 BTC1028 BTC1035 BTC1025 BTC1032

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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 cast-iron. 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 20g

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

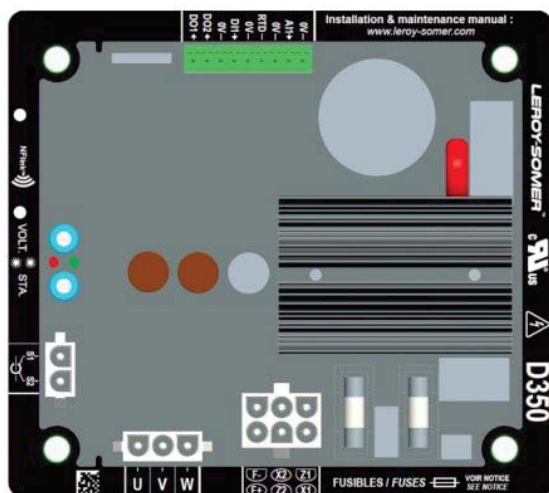
Withstands 8.0g @ 24 to 2 kHz

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AUTOMATIC VOLTAGE REGULATOR



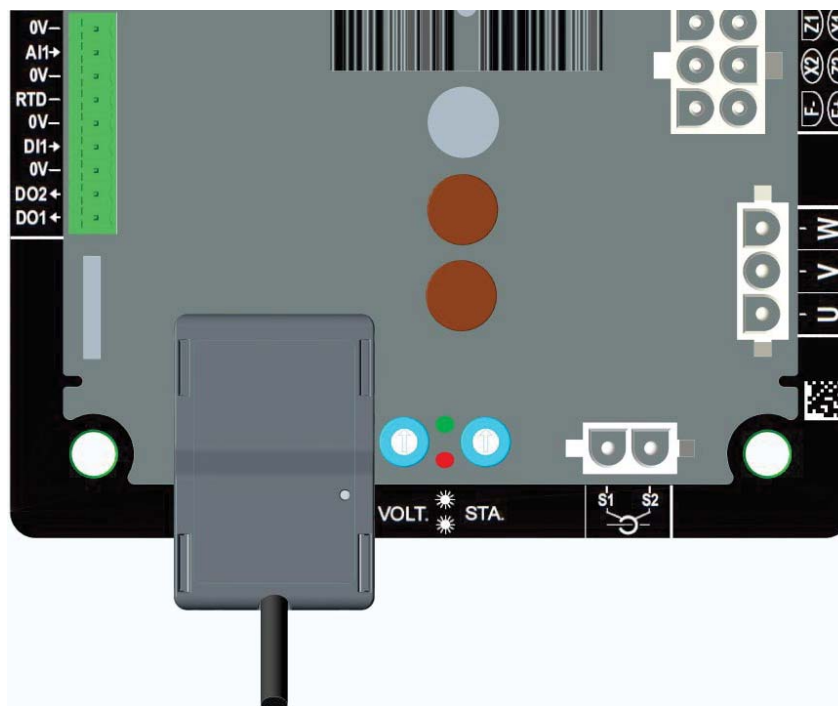
D350 AVR

The D350, Digital Voltage Regulator is used to regulate alternators with a field current of less than 5 A in continuous operations, and 10 A maximum in the event of short-circuit for 10 seconds maximum.

Its design is in accordance with mounting in a generator terminal box or a control cabinet. It is required, at a minimum, to follow the local protection and safety standards, especially those specific to electrical installations for voltages of 300 VAC phase-to-neutral maximum.

NFLink™ configuration module

The D350 is equipped with NFC technology for communication and configuration purposes. The configuration module is placed over the two dedicated positioning holes on the plastic enclosure as shown below. Once the configuration is done, the NF Link must be removed as it is not supposed to be left on the



Technical characteristics

D350 regulator can be used to perform the following functions:

Voltage regulation

- With or without reactive droop compensation (Reactive droop to allow parallel operation)
- With or without line droop compensation.

Regulation of the field current, or manual mode, which allows direct control of the field current.

The D350 can also be used to:

- Adjust the reference for the regulation mode in progress, using an analogue input (0-10V and potentiometer)
- Monitoring of temperature sensor (Pt100 or CTP)
- Limit the minimum field current delivered to the exciter field
- Monitoring of the maximum stator current limit
- Loss of voltage sensing
- Withstand a sudden short-circuit for 10 seconds maximum in AREP, PMG
- Signals monitoring (events logger).
- 2 digital outputs for various trip, regulation mode and measurement data

Alternator voltage sensing:

- 3 phases without neutral, 2 phases or 1 phase with neutral
- Three-phase range 0-530VAC
- Consumption < 2VA

Stator current measurement with CT:

- Range 0-1A or 0-5A
- Consumption < 2VA

Power supply:

- 4 terminals for PMG, AREP, SHUNT
- Range 50-277 VAC
- Consumption max < 3000VA

Field excitation:

- Rated 0-5 A
- Short-circuit 10A max.
- Field winding resistance > 4 ohms

Frequency:

- Range 10-100Hz

AUTOMATIC VOLTAGE REGULATOR



- Regulation accuracy: $\pm 0.25\%$ of the average of the three phases on a linear load, with harmonic distortion less than 5%
- Voltage adjustment range: 0 to 150% of the rated voltage
- Quadrature droop adjustment range: -20% to 20%
- Under frequency protection: integrated, adjustable threshold, slope adjustable from 0.5 to 3V/Hz in steps of 0.1 V/Hz
- Excitation ceiling: adjustable by configuration at 3 points
- Environment: ambient temperature from -40°C to $+65^{\circ}\text{C}$, relative humidity of less than 95% non-condensing, mounted in a cabinet or in a terminal box

Easy Reg Advanced:

- All the D350 settings are entered / configured using the "EasyReg Advanced" software.
- This program is only compatible with computers running WINDOWS® versions Windows 7 and Windows 10 operating systems.

Dimensions:

- Height : 52.9mm
- width : 125mm
- Length : 140mm

Mounting:

- Holes spacing on the Length : 115mm
- Holes spacing on the width: 100mm

Weight: 0.45kg

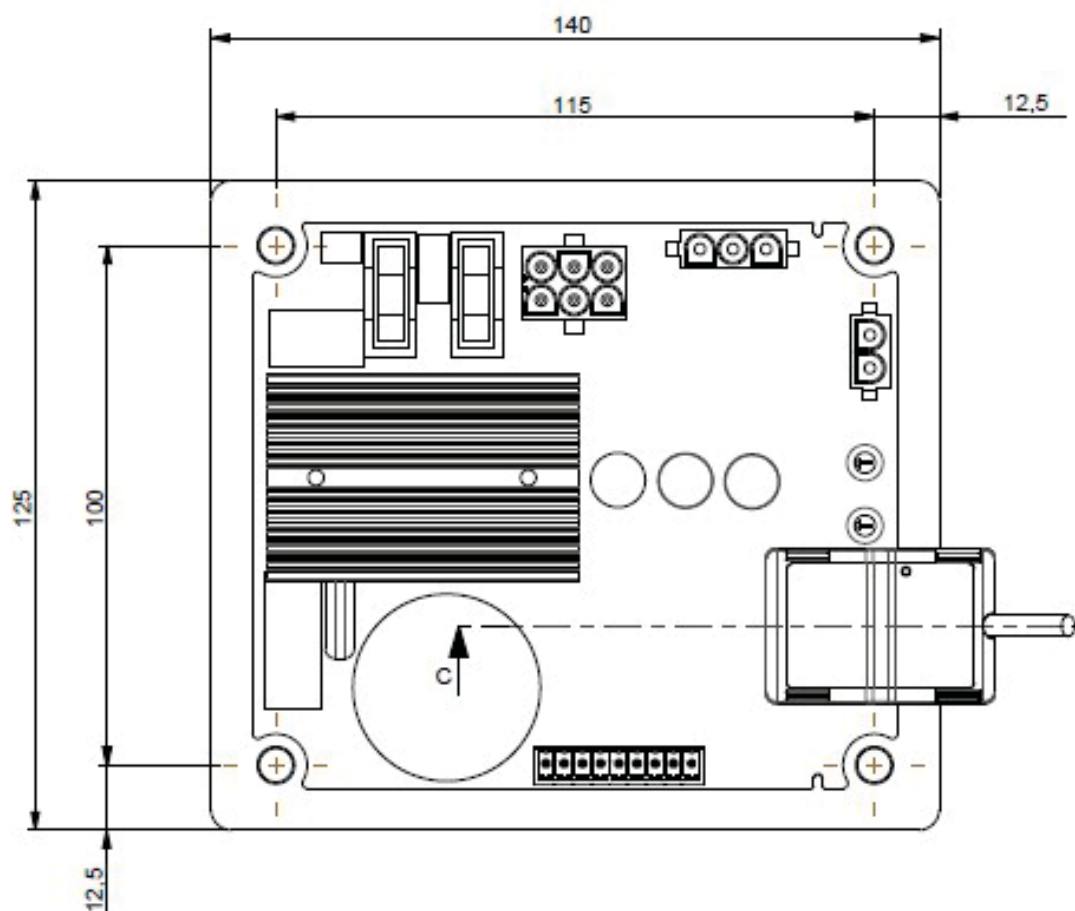
Conformity to standards

- EMC: IEC 61000-6-2, IEC 61000-6-4
- Humidity: IEC 60068-1 and test in accordance with IEC 60068-2-14
- Dry heat: IEC 60068-2-2
- Damp heat: IEC 60028-2-30
- Cold: IEC 600068-2-1

AUTOMATIC VOLTAGE REGULATOR



D350 AVR and NFLink™ Dimensions



LEHE1923-00 (05-19)

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Manually Operated Circuit Breakers for D40 GC – D200 GC Diesel Generator Sets

Current (A)	Frame	Number of poles	Interrupting Ratings (kA ms)			Trip Unit	#) Lugs Size	Aux options
			240V	480V	600V			
60	H	3	65	35	18	LSI	* (1) 14-2/0 AWG	Form C (1NC & 1NO) Shunt Trip (12V)
100	H	3	65	35	18			
150	H	3	65	35	18		* (1) 1/0-300 kcmil	1 Form C + 1 Bell Alarm Shunt Trip (12V)
200	J	3	65	35	18			
400	T5N	3	65	35	18		Bus Bar	
600	T6N	3	65	35	20			
800	T6N	3	65	35	20			

(#) No of Cables per Lug

* Bus Bar provided on breaker. All Lugs needed will be the responsibility of others.

Diesel D40 GC - D60 GC

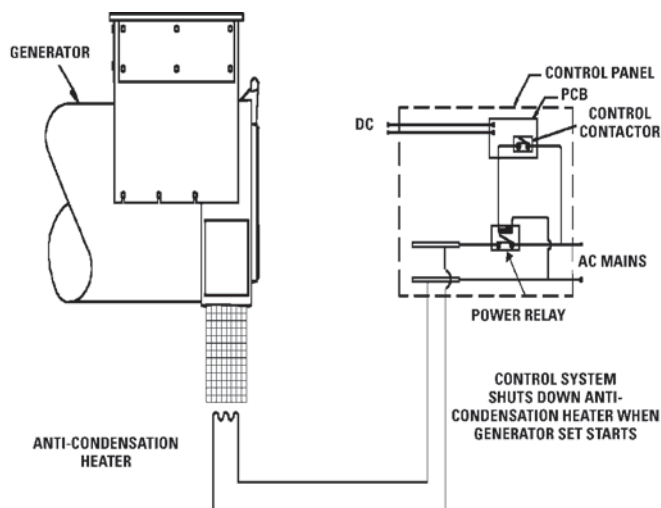
First Breaker	Second Breaker
Circuit Breaker (A)	Circuit Breaker (A)
60	60
100	100
150	150
250	

Diesel D80 GC - D200 GC

First Breaker	Second Breaker
Circuit Breaker (A)	Circuit Breaker (A)
100	60
150	100
250	150
400	200
600	
800	

Available Breaker Configurations	
First Breaker	Second Breaker
H	—
H	H
H	J
J	—
J	J
J	H

Available Breaker Configurations		
First Breaker	Second Breaker	
H	H	J
J	H	J
T5	H	J
T6	H	J



Generator anti-condensation heater AH1H

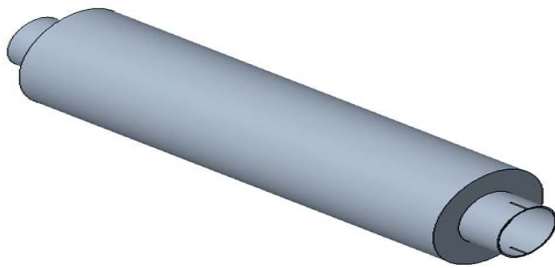
Appropriate when the generator set is to be sited in a low ambient and/or high humidity environment, the heater maintains the AC generator at a suitable temperature to prevent winding corrosion due to condensation.

The heater itself is powered by a 110/120 volt (VAC 120) or 208/240 volt (VAC 240) AC auxiliary supply protected by a fuse inside the main control panel. 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.

Generator Frame	Nominal Heater Power Consumption (Watts)
LC1500	60
LC3100	100
LC5000	250

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**10 dBA, 25 dBA
& 35 dBA**

**Silencers for
D125 GC – D200 GC**

Image shown might not reflect actual configuration.

Standard Features

- End Inlet / End Outlet can be adapted to different exhaust configurations for ease of installation
- Coated with satin black paint rated to 650°C to retain appearance and corrosion resistance over time
- Complete with condensate drain and plug
- Mild steel all welded construction for heavy duty application and corrosion resistance

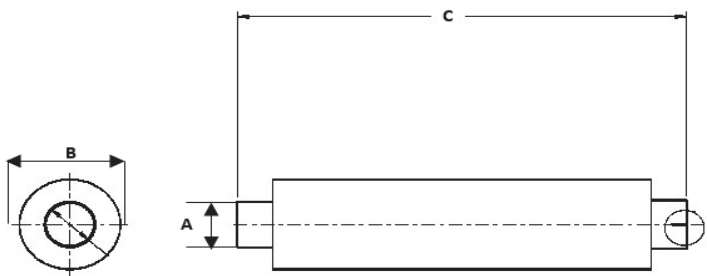


Image shown might not reflect actual configuration

Residential Silencer – 10 dBA

Generator Model	Freq	Sound Attenuation @ 100% Load	Dimensions			Weight
	Hz	dBA	Length (C) mm	Diameter (B) mm	Inlet Diameter (A) mm	Kg
D125 GC – D200 GC	60	10	890	200	102	12

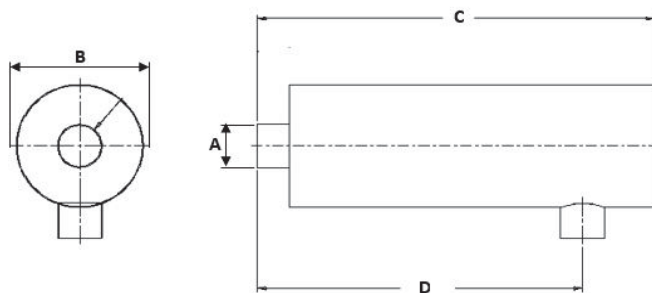


Image shown might not reflect actual configuration

Residential Silencer – 25 dBA

Generator Model	Freq	Sound Attenuation @ 100% Load	Dimensions				Weight
	Hz	dBA	Inlet Diameter Distance (D) mm	Length (C) mm	Diameter (B) mm	Inlet Diameter (A) mm	Kg
D125 GC – D200 GC	60	25	1205	1250	400	140	78

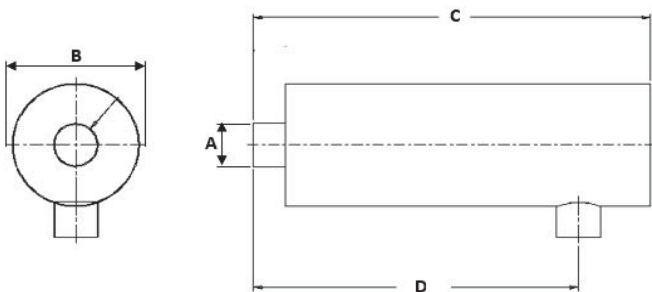


Image shown might not reflect actual configuration

Critical Silencer – 35 dBA

Generator Model	Freq	Sound Attenuation @ 100% Load	Dimensions				Weight
	Hz	dBA	Inlet Diameter Distance (D) mm	Length (C) mm	Diameter (B) mm	Inlet Diameter (A) mm	Kg
D125 GC – D200 GC	60	35	1550	1755	455	140	105

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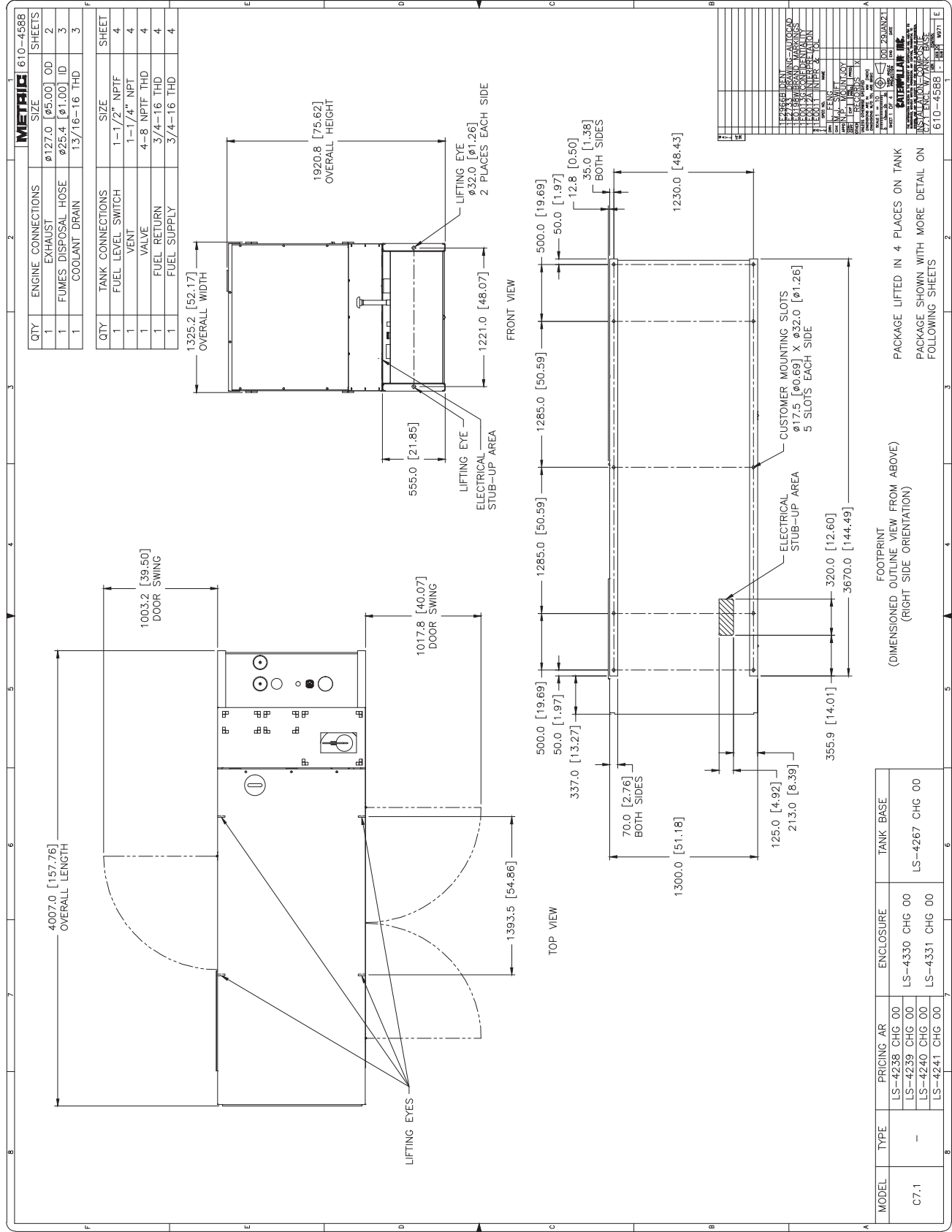
Materials and specifications are subject to change without notice.

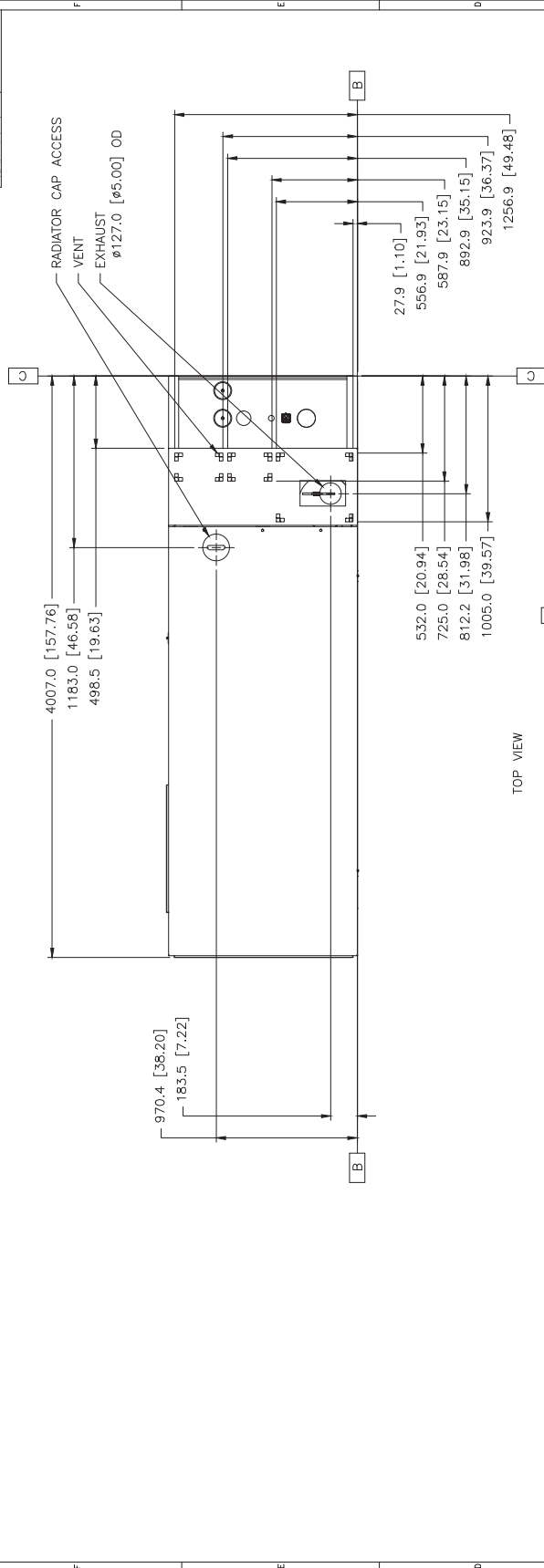
The International System of Units (SI) is used in this publication.

LET'S DO THE WORK.™

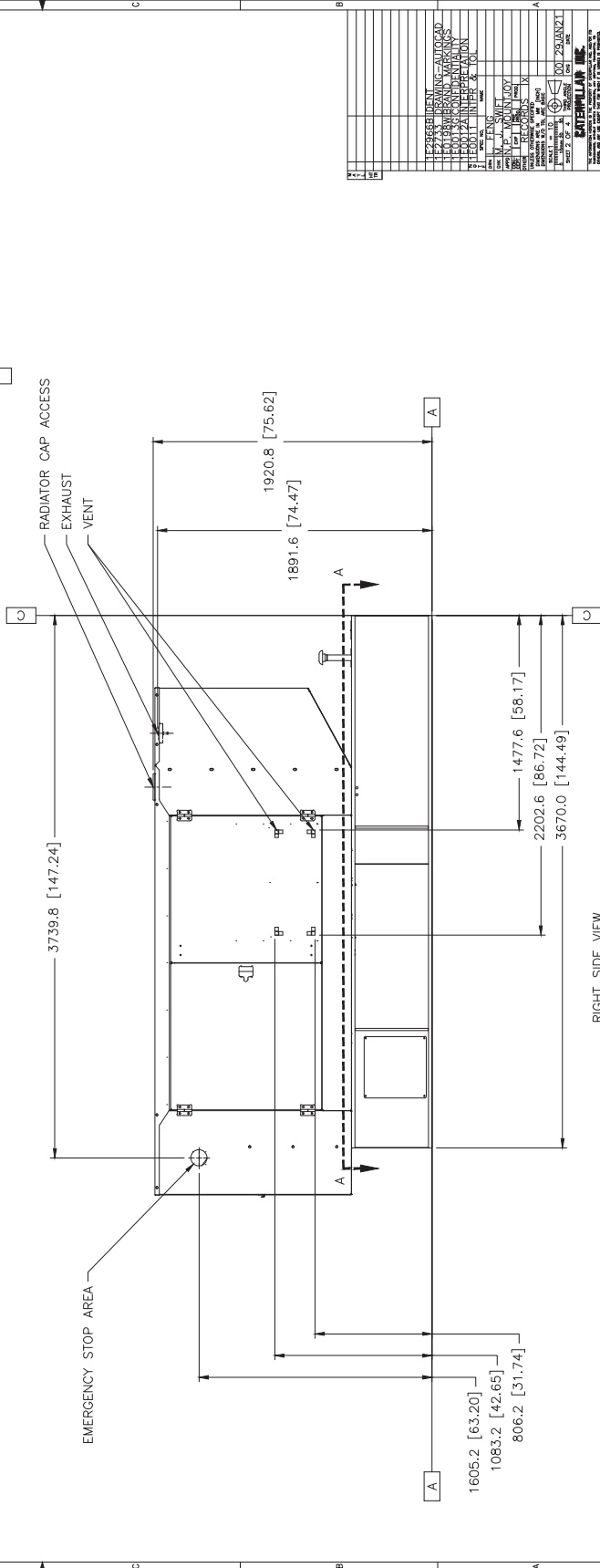
LEHE2682-00 (09/20)

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TOP VIEW



RIGHT SIDE VIEW

[illegible]



610-4588	VER	CONTROL	E
	013	W071	



10

GCCP 1.2 CONTROLLER

SIGNAL ID	SIGNAL DESCRIPTION
1	NEGATIVE RUNSTOP
2	STOP
3	CM SW (USED SWA)
4	CM SW SW (USED SWA)
5	STOP
6	AVR 2 TO GENERATOR 1/2
7	STOP
8	ACTIVE RUN STOP
9	STOP
10	ACTIVE RUN STOP
11	STOP
12	AUX CONTACT NC
13	AUX CONTACT NO
14	AUX CONTACT NO
15	AUX CONTACT NO
16	AVR 2 PHASE TO AVR #2
17	AVR 2 PHASE TO AVR #1
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100	AVR 2 PHASE TO AVR #1

XXXX-XX#-XX-XX	WIRE GAUGE	WIRE COLOUR	WIRE NUMBER	HARNESS IDENT	CIRCUIT IDENT

ABBREVIATION	DESCRIPTION
RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
PK	PINK
BK	BLACK
GY	GREY
PU	PURPLE
BR	BROWN
GN	GREEN
BU	BLUE
CU	COPPER
GN-YL	GREEN-YELLOW

ABBREVIATIONS	DESCRIPTION
AC	ALTERNATING CURRENT
AHR	ALTERNATOR HEATER RELAY
AVR	AUTOMATIC VOLTAGE REGULATOR
BATT	BATTERY
CR	CONTROL RELAY
DC	DIRECT CURRENT
ECM	ENGINE CONTROL MODULE
ECR	ENGINE CRANK RELAY
ELC	ELECTRIC LOCKS RELAY
EMSTOP	EMERGENCY STOP
FCR	FUEL CONTROL RELAY
FLS	FUEL LEVEL SENDER
GFR	GROUND FAULT RELAY
GND	GROUND
GRR	GENERATOR RUNNING RELAY
LCL	LOW COOLANT LEVEL
MCB	MINIATURE CIRCUIT BREAKER
OF	AUXILIARY SWITCH
PMG	PERMANENT MAGNET GENERATOR
Q1	AUXILIARY SWITCH
SD	ALARM SWITCH
TR	TRIP RELAY
SW	SWITCH
TERM	PANEL TERMINAL
VFC	VOLT FREE CONTACT

	MINIATURE CIRCUIT BREAKER
	EMERGENCY STOP PUSHBUTTON
	FUSED AUTOMOTIVE RELAY
	RESISTOR
	EARTH/GROUND
	CURRENT TRANSFORMER
	PANEL TERMINAL
	TERMINAL
	CONNECTOR
	BATTERY
	SPLICE
	WIRE
	SCREEN CABLE
	FUSE

[illegible][illegible]

[illegible]

CONTROL SCHEMATIC

The diagram illustrates the control system for a 6S10 controller, showing the internal wiring and connections to various components. The main sections are:

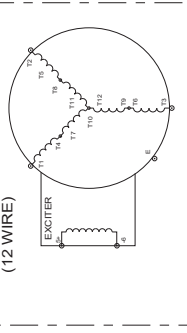
- CUSTOMER TERMINALS:** Connections for CAN bus, remote start, stop, and alarm.
- 6S10 CONTROLLER:** Internal wiring for inputs (MAG PICKUP, POS-A, POS-B, etc.) and outputs (STARTER MOTOR, ALARM, etc.).
- ENCLOSURE ESTOP:** Emergency stop circuit with a push button and interlocking.
- OPEN SET LINK:** Circuit for the open set link.
- FUEL LEVEL SENSOR:** Circuit for monitoring fuel levels.
- LOW COOLANT LEVEL:** Circuit for monitoring coolant levels.
- REMOTE ESTOP (OPTIONAL):** Optional remote emergency stop circuit.
- PROGRAMMABLE INPUTS:** Inputs for various programmable functions.
- ANALOG INPUTS:** Inputs for analog signals.
- EXPANSION DATALINK:** Expansion datalink connection.
- RS485 CONNECTIONS:** RS485 communication ports.

The diagram includes a legend for component types and values, and a table of component specifications.

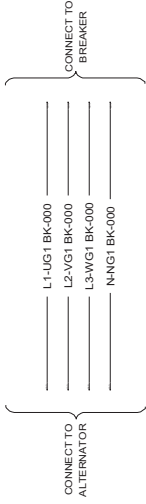
Component	Value	Notes
6S10 CONTROLLER	6S10	Controller unit
ENCLOSURE ESTOP	10A	Emergency stop button
OPEN SET LINK	10A	Open set link button
FUEL LEVEL SENSOR	10A	Fuel level sensor
LOW COOLANT LEVEL	10A	Low coolant level sensor
REMOTE ESTOP (OPTIONAL)	10A	Remote emergency stop button
PROGRAMMABLE INPUTS	10A	Programmable input buttons
ANALOG INPUTS	10A	Analog input buttons
EXPANSION DATALINK	10A	Expansion datalink button
RS485 CONNECTIONS	10A	RS485 communication ports

POWER SCHEMATIC

SERIES STAR
(12 WIRE)



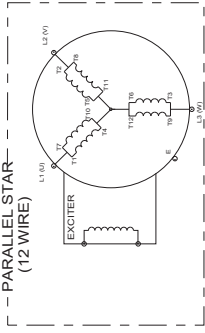
150A HARNESS



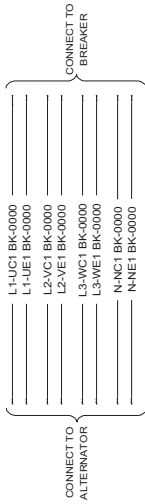
100A/60A HARNESS



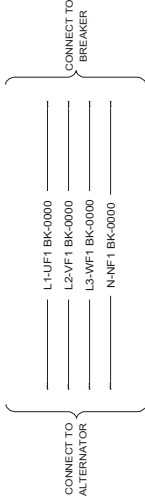
PARALLEL STAR
(12 WIRE)



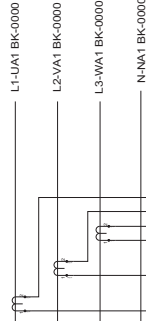
600A/800A HARNESS



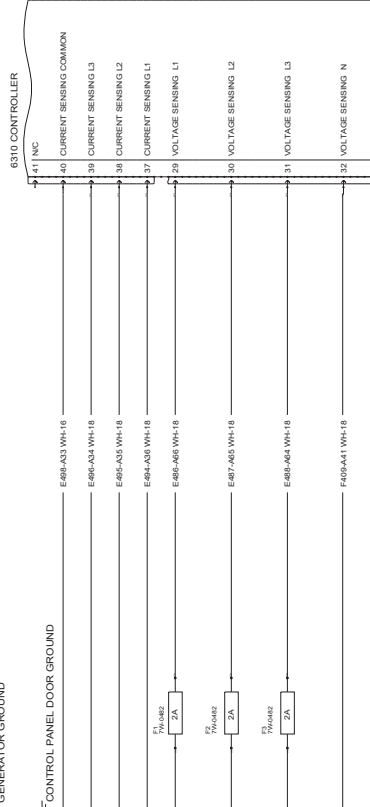
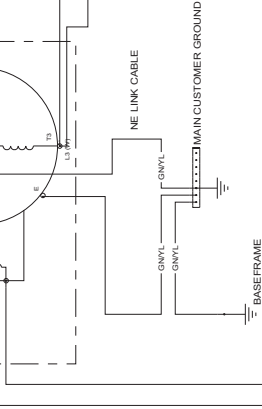
250A HARNESS



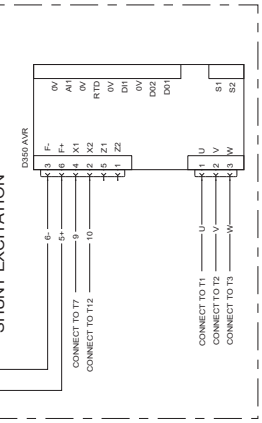
400A HARNESS



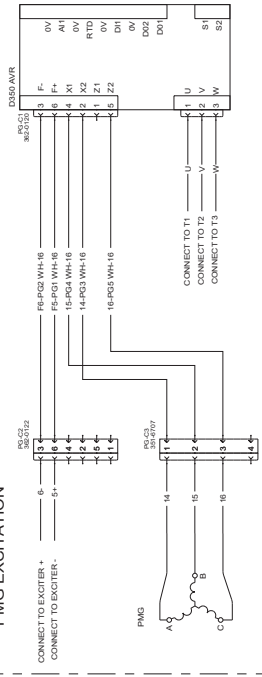
3 PHASE STAR
(6 WIRE)



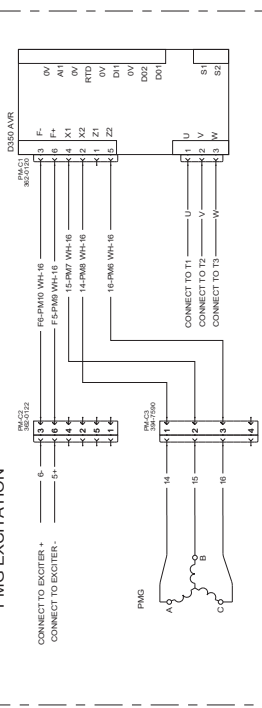
STANDARD
SHUNT EXCITATION



OPTIONAL
PMG EXCITATION

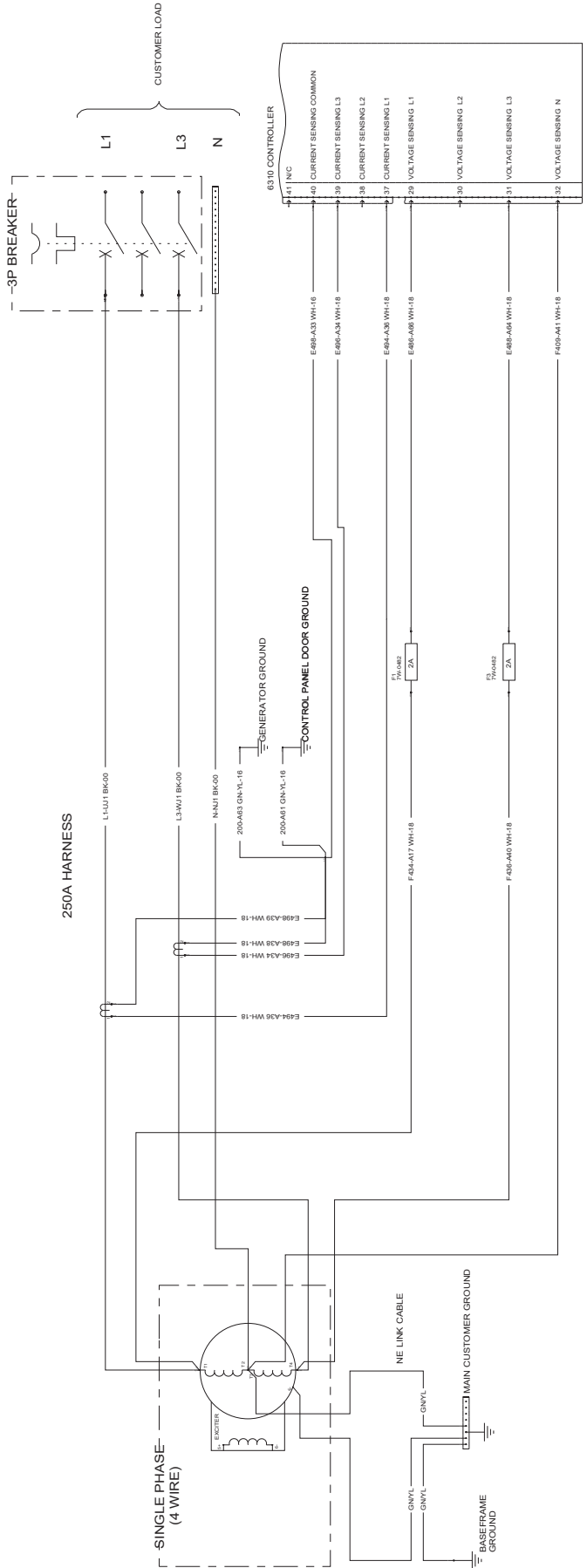
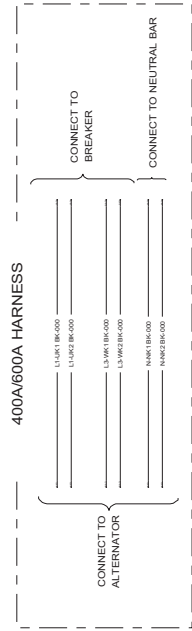


OPTIONAL
PMG EXCITATION

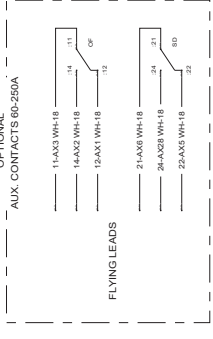
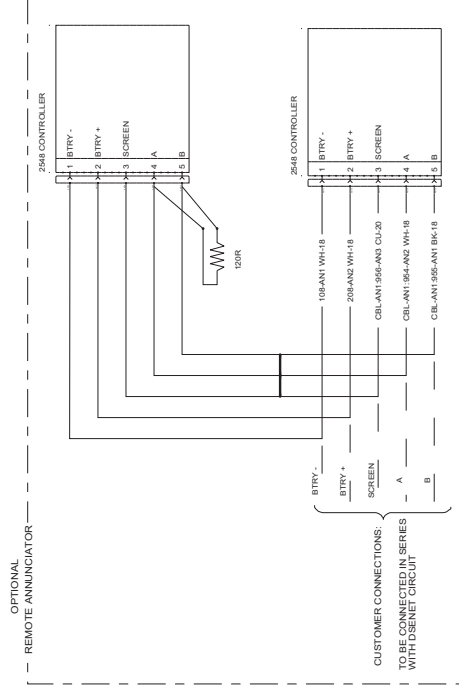
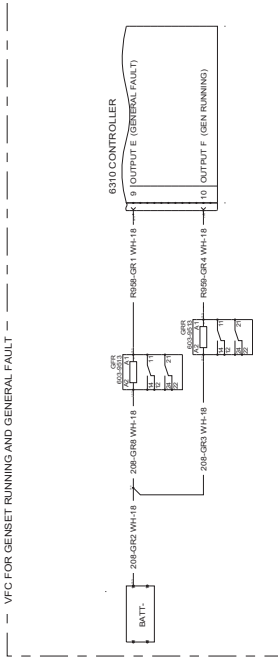


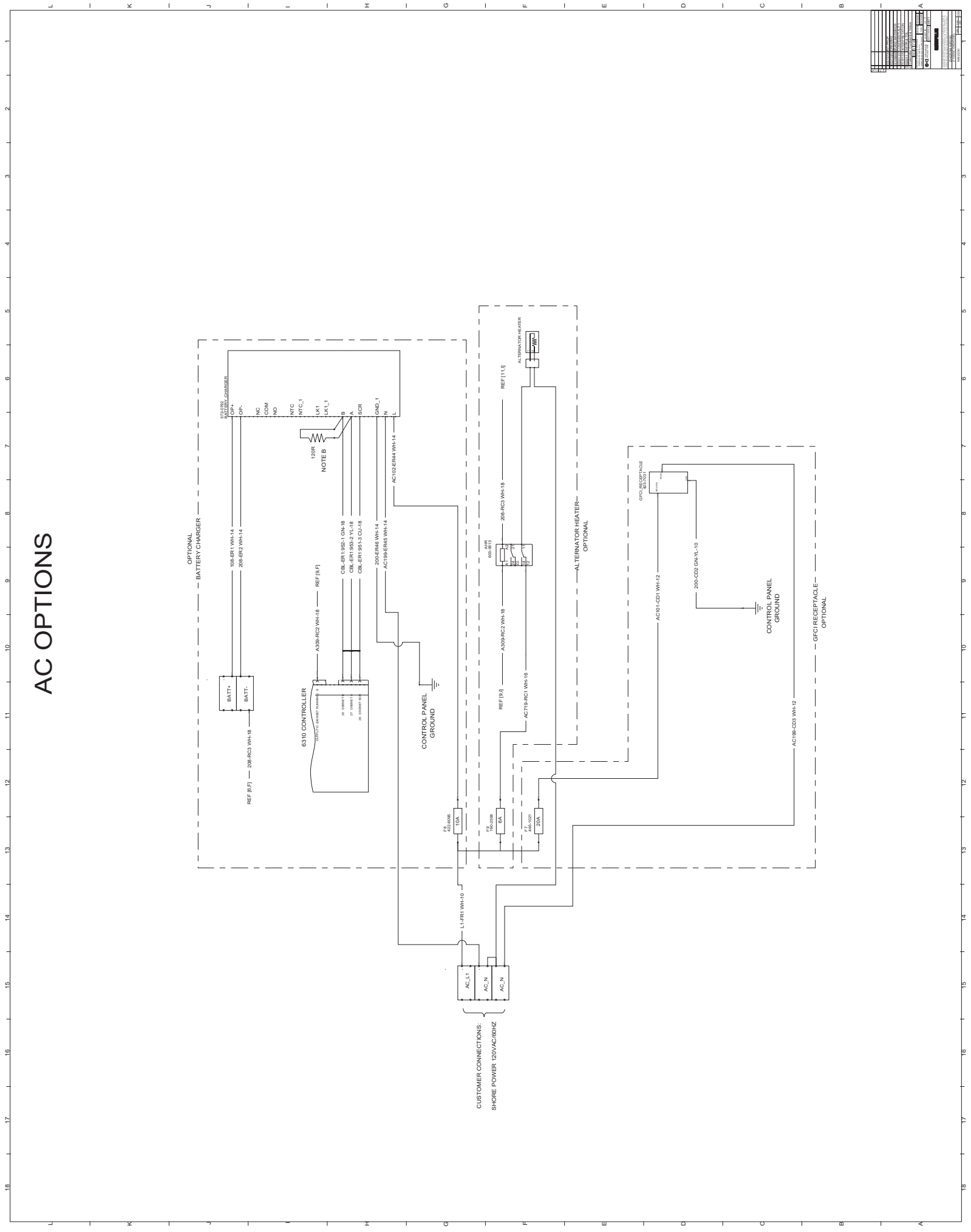
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POWER SCHEMATIC (SINGLE PHASE)



REV	DATE	BY	CHK	APP
1	01/01/2020	J. SMITH	M. JONES	D. BROWN
2	02/01/2020	J. SMITH	M. JONES	D. BROWN
3	03/01/2020	J. SMITH	M. JONES	D. BROWN
4	04/01/2020	J. SMITH	M. JONES	D. BROWN
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[illegible][illegible]

ADDITIONAL INFORMATION - COMPONENT DETAILS & CUSTOMER CONNECTIONS

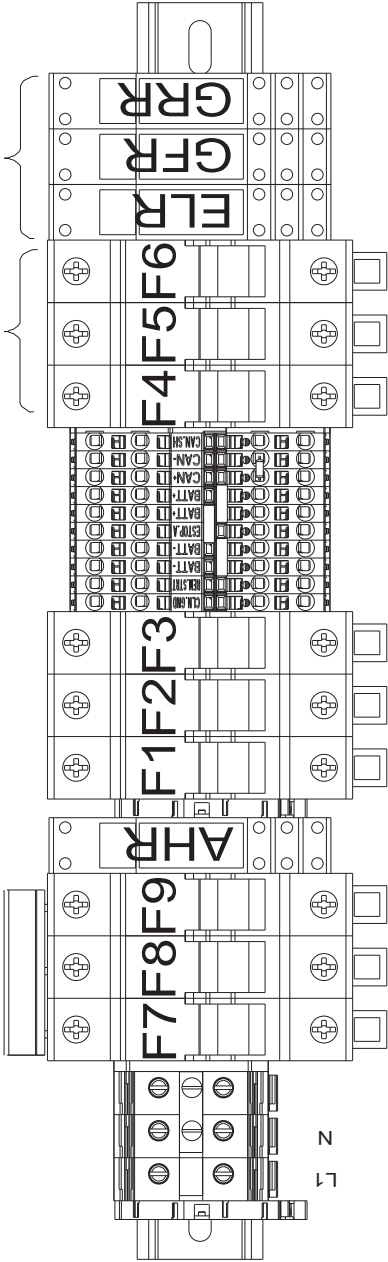
MAIN CUSTOMER RAIL
(OPTIONS INCLUDED)

COMPONENT DESCRIPTION	
AHR	ALTERNATOR SPACE HEATER RELAY
F7	GFCI FUSE (20A)
F8	BATTERY CHARGER FUSE (10A)
F9	ALTERNATOR HEATER FUSE (6A)

FUSE ID	CURRENT RATING	WIRE ID	DESCRIPTION	RAIL	CURRENT RATING	DESCRIPTION
F4	10A	101: 108	PANEL SUPPLY	GFR	8A	GENERAL FAULT RELAY
F5	25A	101: 105	ECM POWER	GRR	8A	GENSET RUNNING RELAY
F6	2A	148: 101	ENCLOSURE LIGHTS	ELR	8A	ENCLOSURE LIGHTS RELAY

DC FUSES

DC FUSES RELAY VFC CONNECTIONS



SHORE POWER 120VAC/60HZ
CONNECTION

COMPONENT DESCRIPTION	
L1	SHORE POWER AC SUPPLY LINE
N	SHORE POWER AC SUPPLY NEUTRAL

AC FUSES

FUSE ID	CURRENT RATING	WIRE ID	DESCRIPTION
F1	2A	F434: E486	L1 SENSING AC
F2	2A	F435: E487	L2 SENSING AC
F3	2A	F436: E488	L3 SENSING AC

CUSTOMER TERMINALS

TERMINAL ID	WIRE ID	DESCRIPTION
CLN_GND	229	CLEAN GROUND FOR ANALOG INPUTS
REM_STRT	879	REMOTE START INPUT
BATT-	208	BATTERY NEGATIVE
BATT+	208	BATTERY POSITIVE
ESTOP_A	345	GENSET CONTROLLER ESTOP INPUT
BATT+	108	BATTERY POSITIVE (10A FUSED)
BATT+	108	BATTERY POSITIVE (10A FUSED)
CAN+	Y78	CAN+ COMMS
CAN-	Y78	CAN- COMMS
CAN_SH	Y79	CAN SH COMMS

REVISION	DATE	BY	CHKD	APPD
1	10/1/2023	JL		
2	10/1/2023	JL		
3	10/1/2023	JL		
4	10/1/2023	JL		
5	10/1/2023	JL		
6	10/1/2023	JL		
7	10/1/2023	JL		
8	10/1/2023	JL		
9	10/1/2023	JL		
10	10/1/2023	JL		
11	10/1/2023	JL		
12	10/1/2023	JL		
13	10/1/2023	JL		
14	10/1/2023	JL		
15	10/1/2023	JL		
16	10/1/2023	JL		
17	10/1/2023	JL		
18	10/1/2023	JL		