OPERATION MANUAL

MQ POWER®

WHISPERWATT™ SERIES

MODEL DCA400SSI4F3PD

60 Hz GENERATOR

(ISUZU BQ-6WG1X DIESEL ENGINE)

INSTRUCTION MANUAL NO. C3844304014

Revision #4 (05/20/25)

To find the latest revision of this publication or associated parts manual, visit our website at:
www.mqpower.com

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.


WARNING
CANCER &
REPRODUCTIVE HARM
www.P65Warnings.ca.gov
P/N 38707

DCA400SSI4F3PD 60 Hz Generator

NOTICE

Specifications are subject to change without notice.

SAFETY DECALS

Safety decals are attached to the generator as shown in Figure 1. Keep these safety decals clean at all times. When the safety decals become worn or damaged, contact your nearest dealer or the Multiquip Parts Department.

NOTICE

For safety decal part numbers, refer to the associated parts manual.

Figure 1. Safety Decals

Do not operate or service the generator before reading the entire manual. Safety precautions should be followed at all times when operating this generator. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.

SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER, WARNING, CAUTION** or **NOTICE.**

SAFETY SYMBOLS

DANGER

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

WARNING

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.

CAUTION

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

NOTICE

Addresses practices not related to personal injury.

Potential hazards associated with the operation of this generator will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Overspeed hazards
	Rotating parts hazards
	Pressurized fluid hazards
	Electric shock hazards

GENERAL SAFETY

⚠ CAUTION

- **NEVER** operate this generator without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.

- **NEVER** operate this generator when not feeling well due to fatigue or illness, or when on medication.

- **NEVER** operate this generator under the influence of drugs or alcohol.

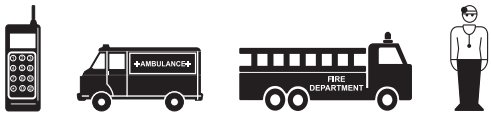
- **ALWAYS** check the generator for loosened threads or bolts before starting.
- **NEVER** use the generator for any purpose other than its intended purposes or applications.

NOTICE

- This generator should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult to read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized modification of the generator will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by MQ Power for this generator. Damage to the generator and/or injury to the user may result.
- **ALWAYS** know the location of the nearest **fire extinguisher.**

- **ALWAYS** know the location of the nearest **first aid kit.**

- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site.** Also, know the phone numbers of the nearest **ambulance, doctor,** and **fire department.** This information will be invaluable in the case of an emergency.



GENERATOR SAFETY

⚠ DANGER

- **NEVER** operate the generator in an explosive atmosphere or near combustible materials. An explosion or fire could result causing **severe bodily harm or even death**.

⚠ WARNING

- **NEVER** disconnect any **emergency or safety devices**. These devices are intended for operator safety. Disconnection of these devices can cause **severe injury, bodily harm or even death**. Disconnection of any of these devices will void all warranties.

⚠ CAUTION

- **NEVER** lubricate components or attempt service on a **running** generator.

NOTICE

- **ALWAYS** ensure the generator is on level ground before use.
- **ALWAYS** keep the generator in proper running condition.
- Fix damage to the generator and replace any broken parts immediately.
- **ALWAYS** store the generator properly when it is not being used. The generator should be stored in a clean, dry location out of the reach of children and unauthorized personnel.

ENGINE SAFETY

⚠ DANGER

- The engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause **death** if inhaled.
- The engine of this generator requires an adequate, free flow of cooling air. **NEVER** operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or engine.

- When operating the generator outdoors, **DO NOT** place the generator near doors, windows or vents that could allow carbon monoxide to enter and build up in occupied spaces.

⚠ WARNING

- **NEVER** place hands or fingers inside the engine compartment when the engine is running.
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands, hair and clothing away from all moving parts to prevent injury.

- **NEVER** operate the generator with the doors open. Stop the engine before servicing.
- **DO NOT** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the generator.

- **DO NOT** remove the coolant drain plug while the engine is hot. Hot coolant will gush out of the coolant tank and severely scald any persons in the general area of the generator.
- **DO NOT** drain the engine oil while the engine is hot. Hot oil will gush out and severely scald any persons near the generator.
- Operation of the generator may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

⚠ CAUTION

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing the generator.

NOTICE

- **NEVER** run the engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service the air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or generator can result if operating in speed ranges above the maximum allowable.

- Wet stacking is a common problem with diesel engines which are operated for extended periods with light or no load applied. When a diesel engine operates without sufficient load (less than 30-35% of the rated output), it will not operate at its optimum temperature. This will allow unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, engine valves and exhaust system, including turbochargers, and reduce the operating performance.

  In order for a diesel engine to operate at peak efficiency, it must be able to provide fuel and air in the proper ratio and at a high enough engine temperature for the engine to completely burn all of the fuel.

  Wet stacking does not usually cause any permanent damage and can be alleviated if additional load is applied to relieve the condition. It can reduce the system performance and increase maintenance. Applying an increasing load over a period of time until the excess fuel is burned off and the system capacity is reached usually can repair the condition. This can take several hours to burn off the accumulated unburned fuel.

FUEL SAFETY

⚠ DANGER

- **NEVER** start the engine near spilled fuel or combustible fluids. Diesel fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **NEVER** fill the fuel tank while the engine is **running** or **hot**.
- **NEVER** overfill the fuel tank. Spilled fuel can ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **NEVER** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.

TOWING SAFETY

⚠ CAUTION

- Check with your local county or state safety towing regulations, in addition to meeting ***Department of Transportation (DOT) Safety Towing Regulations***, before towing your generator.

- Refer to the MQ Power trailer manual for additional safety information.
- In order to reduce the possibility of an accident while transporting the generator on public roads, **ALWAYS** make sure that the trailer that supports the generator and the towing vehicle are both mechanically sound and in good operating condition.
- **ALWAYS** shut down the engine before transporting.
- Make sure the hitch and coupling of the towing vehicle are rated equal to or greater than the trailer **gross vehicle weight rating**.
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both the towing vehicle and the trailer. ***Inflate trailer tires as indicated on side wall of tire.*** Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with **safety chains**.
- **ALWAYS** properly attach the trailer's safety chains to the towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake, and trailer lights are connected and working properly.
- DOT requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is **55 MPH** unless posted otherwise. Recommended off-road towing is not to exceed **15 MPH** or less depending on the type of terrain.
- Avoid sudden stops and starts. These can cause skidding or jackknifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.
- The trailer should be adjusted to a level position at all times when towing.
- Raise and lock the trailer wheel stand in the upright position when towing.
- Place ***chock blocks*** underneath the wheels to prevent **rolling** while parked.
- Place **support blocks** underneath the trailer's bumper to prevent **tipping** while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

ELECTRICAL SAFETY

DANGER

- **NEVER** touch the output terminals during operation. Contact with the output terminals during operation can cause **electrocution, electrical shock, or burn**.

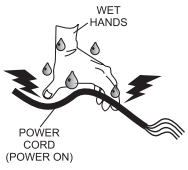
- The electrical voltage required to operate the generator can cause **severe injury or even death** through physical contact with live circuits. Turn the generator and all circuit breakers **OFF** before performing maintenance on the generator or making contact with the output terminals.
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death**.

- Backfeed to a utility system can cause **electrocution** and/or property damage. **NEVER** connect the generator to a building's electrical system without a transfer switch or other approved device. All installations should be performed by a **licensed electrician** in accordance with all applicable laws and electrical codes. Failure to do so could result in electrical shock or burn, causing **serious injury or even death**.

Power Cord/Cable Safety

DANGER

- **NEVER** let power cords or cables **lay in water**.
- **NEVER stand in water** while AC power from the generator is being transferred to a load.
- **NEVER** use **damaged** or **worn** cables or cords when connecting equipment to the generator. Inspect the insulation for cuts.
- **NEVER** grab or touch a live power cord or cable with wet hands. The possibility exists of **electrical shock, electrocution or death**.



- Make sure power cables are securely connected to the generator's output receptacles. Incorrect connections may cause electrical shock and damage to the generator.

NOTICE

- **ALWAYS** make certain that the proper power or extension cord has been selected for the job. See the Cable Selection Chart in this manual.

Grounding Safety

DANGER

- **ALWAYS** make sure that electrical circuits are properly grounded to a suitable earth ground (ground rod) per the National Electrical Code (NEC) and local codes before operating the generator. **Severe injury or death by electrocution** can result from operating an ungrounded generator.
- **NEVER** use gas piping as an electrical ground.

BATTERY SAFETY

DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **NEVER** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur.

WARNING

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin.

- Use well-insulated gloves when picking up the battery.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- **ALWAYS** recharge the battery in a well-ventilated environment to avoid the risk of a dangerous concentration of combustible gases.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.

- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.

⚠ CAUTION

- **ALWAYS** disconnect the **NEGATIVE battery terminal** before performing service on the generator.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolition and dismantlement), be sure to follow the rules below:

- **NEVER** pour waste or oil directly onto the ground, down a drain, or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.

- When the life cycle of this equipment is over, remove the battery and bring it to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the frame and all other metal parts be sent to a recycling center.

  Metal recycling involves the collection of metal from discarded products and its transformation into raw materials to use in manufacturing a new product.

  Recyclers and manufacturers alike promote the process of recycling metal. Using a metal recycling center promotes energy cost savings.

EMISSIONS INFORMATION

NOTICE

The diesel engine used in this equipment has been designed to reduce harmful levels of carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx) contained in diesel exhaust emissions.

This engine has been certified to meet US EPA evaporative emissions requirements in the installed configuration.

Attempting to modify or make adjustments to the engine emission system by unauthorized personnel without proper training could damage the equipment or create an unsafe condition.

Additionally, modifying the fuel system may adversely affect evaporative emissions, resulting in fines or other penalties.

Emission Control Label

The emission control label is an integral part of the emission system and is strictly controlled by regulations.

The label must remain with the engine for its entire life.

If a replacement emission label is needed, please contact your authorized engine distributor.

Table 1. Generator Specifications	
Model	DCA400SSI4F3PD
Type	Revolving field, self-ventilated, open protected type synchronous generator
Armature Connection	**Star with Neutral**
Phase	3Ø
Standby Output	336 kW (420 kVA)
Prime Output	320 kW (400 kVA)
3Ø Voltage (L–L/L–N) **Voltage Change-Over Bd. at 3Ø 240/139**	208Y/120, 220Y/127, 240Y/139
3Ø Voltage (L–L/L–N) **Voltage Change-Over Bd. at 3Ø 480/277**	416Y/240, 440Y/254, 480Y/277
1Ø Voltage (L–L/L–N) **Voltage Change-Over Bd. at 1Ø 240/120**	N/A
Voltage Change-Over Board Tie Bolt Torque	554.9 lbf·in (62.7 N·m)
Power Factor	0.8
Frequency	60 Hz
Speed	1,800 rpm
Aux. AC Power	Single phase, 60 Hz
Pitch	2/3
Subtransient	0.087
Transient	0.227
Synchronous	1.733
Zero Sequence Reactance	0.0087
Overload Protection	OCR / main circuit breaker
Aux. Voltage/Output	120 / 4.8 kW (2.4 kW × 2)
Dry Weight	12,280 lb. (5,570 kg)
Wet Weight	13,184 lb. (5,980 kg)

Table 2. Engine Specifications		
Model	Isuzu BQ-6WG1X Tier 4 Final Certified	
Type	4-cycle, water-cooled, direct injection, turbocharged with charge air cooled	
No. of Cylinders	6	
Bore × Stroke	5.79 in. × 6.06 in. (147 mm × 154 mm)	
Displacement	957 cu. in. (15.68 liters)	
Rated Output	467 hp at 1,800 rpm	
Starting	Electric	
Coolant Capacity	19.4 gal. (73.6 liters)[1]	
Lube Oil Capacity	15.1 gal. (57 liters)[2]	
Lube Oil Type	API service class CJ-4	
DEF Tank Capacity	14.5 gal. (55 liters)	
Fuel Tank Capacity	55.5 gal. (210 liters)	
Fuel Type	ASTM-D975, No.1 & No. 2 diesel fuel (ultra-low sulfur diesel fuel only)	
Fuel Consumption	27.63 gal. (104.58 L)/hr. at **full load**	20.35 gal. (77.04 L)/hr. at **3/4 load**
	13.4 gal. (50.76 L)/hr. at **1/2 load**	8.35 gal. (31.62 L)/hr. at **1/4 load**
Battery	12V 200Ah × 2 (24 VDC system)	

[1] Includes engine, radiator and sub tank with hoses

[2] Includes filters

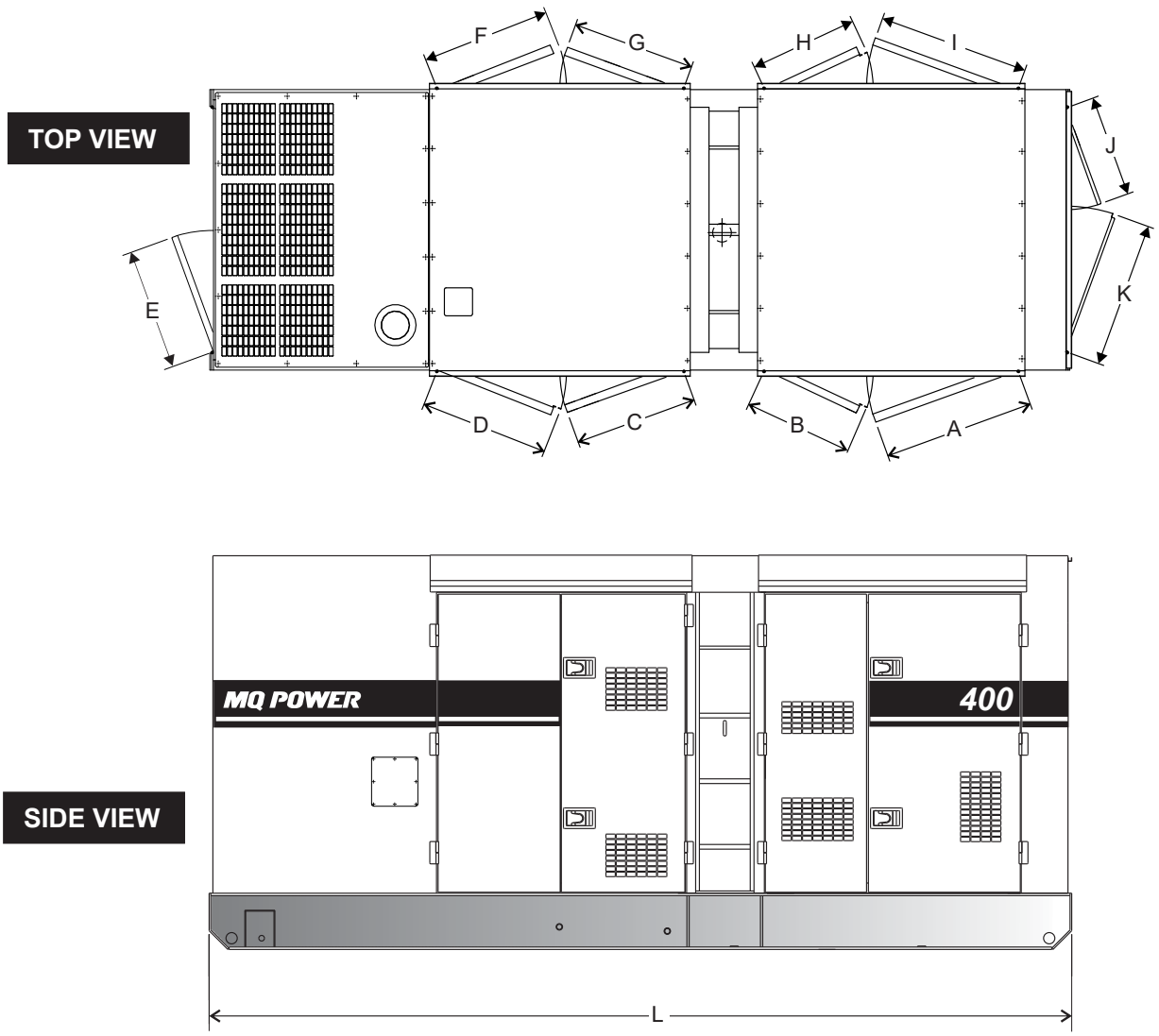


Figure 2. Dimensions

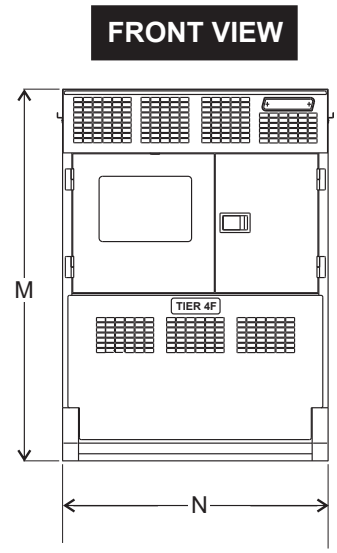


Table 3. Dimensions			
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	31.89 (810)	H	22.83 (580)
B	22.83 (580)	I	31.89 (810)
C	26.00 (660)	J	21.46 (545)
D	27.16 (690)	K	30.71 (780)
E	25.59 (650)	L	107.87 (2,740)
F	27.16 (690)	M	88.58 (2,250)
G	26.00 (660)	N	59.06 (1,500)

GENERATOR GROUNDING

ALWAYS refer to Article 250 (Grounding and Bonding) of the National Electrical Code (NEC).

NOTICE

ALWAYS check with state, province, district, and municipalities for electrical grounding requirements before using the generator.

EXAMPLE of how to ground the unit (Figure 3) if the condition of use requires such a device:

Connecting The Ground

Consult with local electrical and safety codes for proper connection based on condition of use. Refer to the Conductor Grounding Table, Article 250 of the NEC handbook.

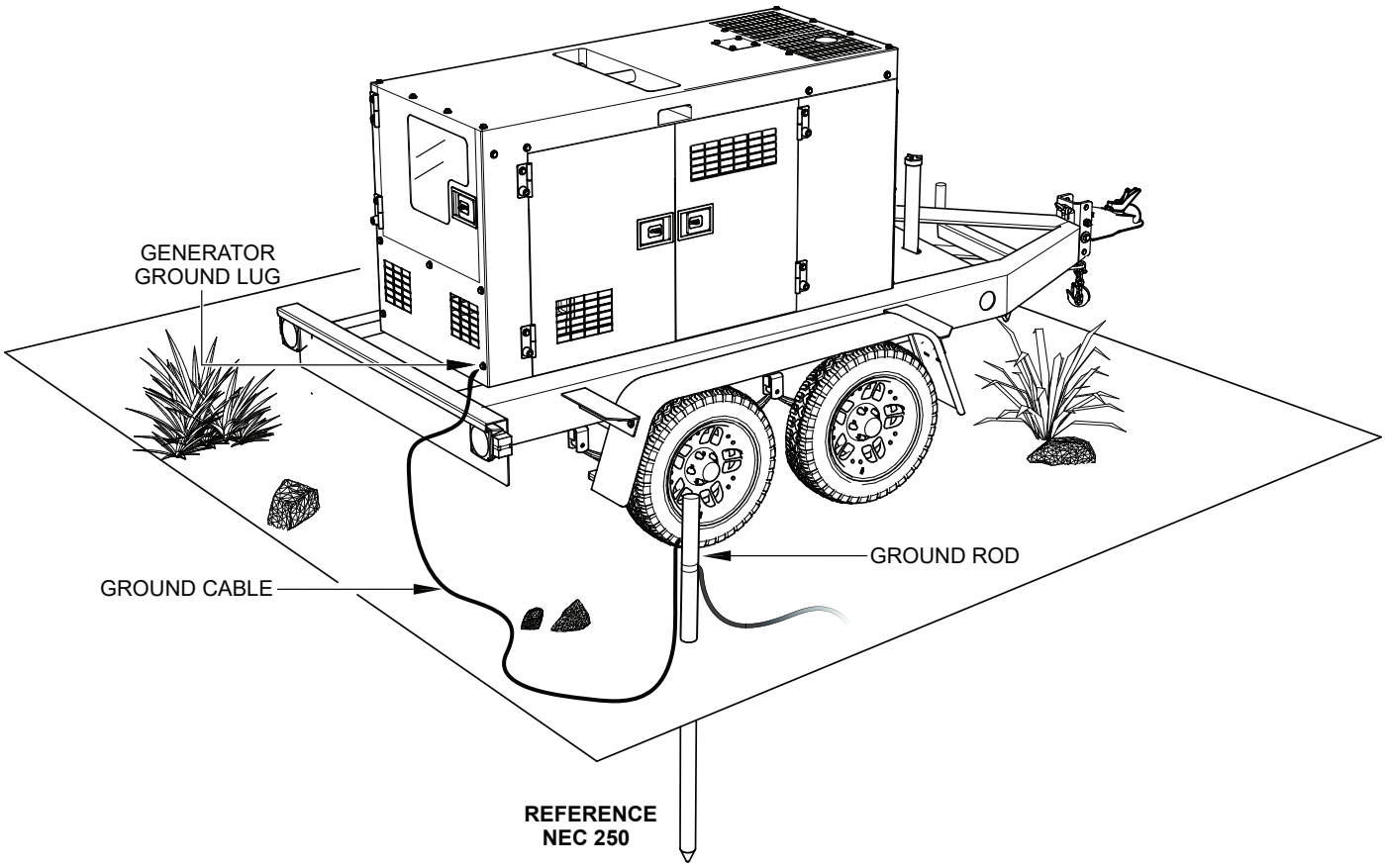


Figure 3. Typical Generator Grounding Application

NOTICE

Trailer-mounted generators are the sole responsibility of MQ Power.

OUTDOOR INSTALLATION

Install the generator in an area that is free of debris, bystanders, and overhead obstructions. Make sure the generator is on secure, level ground so that it cannot slide or shift around. Also, install the generator in a manner so that the exhaust will not be discharged in the direction of nearby homes.

The installation site must be relatively free from moisture and dust. All electrical equipment should be protected from excessive moisture. Failure to do so will result in deterioration of the insulation and will result in short circuits and grounding.

Foreign materials such as dust, sand, lint, and abrasive materials have a tendency to cause excessive wear to engine and alternator parts.

⚠ CAUTION

Pay close attention to ventilation when operating the generator inside tunnels and caves. The engine exhaust contains noxious elements. Engine exhaust must be routed to a ventilated area.

INDOOR INSTALLATION

Exhaust gases from diesel engines are extremely poisonous. Whenever an engine is installed indoors the exhaust fumes must be vented to the outside. The engine should be installed at least two feet from any outside wall. Using an exhaust pipe which is too long or too small can cause excessive back pressure which will cause the engine to heat excessively and possibly burn the valves.

MOUNTING

The generator must be mounted on a solid foundation (such as concrete) and set firmly on the foundation to isolate vibration of the generator when it is running. The generator must be mounted at least 6 inches above the floor or grade level as referenced in the National Fire Protection Association handbook (NFPA 110, Chapter 7, Section 7.4).

DO NOT remove the metal skids on the bottom of the generator. They are to resist damage to the bottom of the generator and to maintain alignment.

GENERATOR

This generator (Figure 4) is designed as a high-quality, portable (requiring a trailer for transport) power source for telecom sites, lighting facilities, power tools, submersible pumps, and other industrial and construction machinery.

CONTROL AND OPERATION PANEL

The **control and operation panel** is provided with the following:

- Touch Display Unit
- Control Power Switch
- Main Circuit Breaker ON Lamp (Green)
- Main Circuit Breaker OFF Lamp (Red)
- Pilot Lamp
- USB-B Receptacle
- Ethernet Receptacle
- Battery Switch
- Low DEF Level Lamp (Blue)
- Emergency Stop Pushbutton Switch (located on right side of rear frame)
- **Control Box** (located behind control panel)
  - Automatic Voltage Regulator
  - Rectifier
  - DEIF Controller (AGC-4)
  - 3-Pole, 1000-Amp Main Circuit Breaker
  - Overcurrent Relay
  - Current Transformer (3)
  - Voltage Selector Switch
  - Voltage Change-Over Board

OUTPUT TERMINAL PANEL

The **output terminal panel** is provided with the following:

- Three 240/139V Output Receptacles (CS-6369), 50A
- Three Auxiliary Circuit Breakers, 50A
- Two 120V Output Receptacles (GFCI), 20A
- Two GFCI Circuit Breakers, 20A
- Eight Output Terminal Lugs (3Ø Power)
- Ground Lug
- Parallel Communication Receptacles (2)
- Parallel Signal Switch
- Cam-Lok Connectors
- Engine Block Heater
- Battery Charger

OPEN-DELTA EXCITATION SYSTEM

Each generator is equipped with a state-of-the-art, **open-delta** excitation system. The open-delta system consists of an electrically independent winding wound among stationary windings of the AC output section.

There are four connections of the open delta—A, B, C, and D. During steady-state loads, the power from the voltage regulator is supplied from the parallel connections of A to B, A to D, and C to D. These three phases of the voltage input to the voltage regulator are then rectified and provide the excitation current for the exciter section.

When a heavy load such as a motor starting or a short circuit occurs, the automatic voltage regulator (AVR) switches the configuration of the open delta to the series connection of B to C. This has the effect of adding the voltages of each phase to provide higher excitation to the exciter section and thus better voltage response during the application of heavy loads.

The connections of the AVR to the AC output windings are for sensing only. No power is required from these windings.

The open-delta design provides virtually unlimited excitation current, offering maximum motor-starting capabilities. The excitation does not have a 'fixed ceiling' and responds according to the demands of the required load.

ENGINE

This generator is powered by a 6-cylinder, 4-cycle, water-cooled, direct injection, turbocharged, air-cooled EGR Isuzu BQ-6WG1X diesel engine. This engine is designed to meet every performance requirement for the generator. Refer to Table 2 for engine specifications.

In keeping with MQ Power's policy of constantly improving its products, the specifications quoted herein are subject to change without prior notice.

MICROPROCESSOR CONTROL SYSTEM

The microprocessor controls the RPM of the engine. When the engine demand increases or decreases, the microprocessor system regulates the frequency variation to ± 0.25%.

EXTENSION CABLES

When electric power is to be provided to various tools or loads at some distance from the generator, extension cords are normally used. Cables should be sized to allow for distance in length and amperage so that the voltage drop between the generator and point of use (load) is held to a minimum. Use the cable selection chart (Table 6) as a guide for selecting proper extension cable size.

PARALLELING

Paralleling is the sharing of a load between two or more generator sets.

LOAD SHARING

Load sharing is defined as the proportional division of the **kW** and **kVAR** total load between multiple generator sets in a paralleled system.

Load sharing is essential to avoid overloading and stability problems on the system's generator sets.

ACTIVE POWER (KW) LOAD SHARING

When generator sets operate in parallel, the engine speed governor of each generator set determines the proportional sharing of the total active power requirements (kW) of the system.

The kW load sharing is achieved by increasing or decreasing fuel to the system's engines. As the fuel to the engine of one generator set in a group is increased it will not lead to an increase in speed and hence frequency (as it would if it were operating alone) but it will lead to an increase in the proportion of the total kW load that it will deliver.

As the fuel to the engine of one generator set in a group is decreased it will not lead to a decrease in speed and hence frequency (as it would if it were operating alone) but it will lead to a decrease in the proportion of the total kW load that it will deliver.

The control system of the generator sets (via the engine speed control system) monitors and controls the sharing of the total kW load in proportion to the relative rating of the engines on the system's generator sets.

REACTIVE POWER (KVAR) LOAD SHARING

When generator sets operate in parallel, the alternator field excitation system of each generator set controls the proportional sharing of the total reactive power requirements (kVAR) of the system.

The kVAR load sharing is achieved by increasing or decreasing the field excitation to the system's alternators.

As the field excitation of one generator set in a group is **increased** (i.e. over excited) it will **not** lead to an increase in voltage (as it would if it were operating alone) but it will lead to an increase in the proportion of the total kVAR load it will deliver and a decrease in its power factor.

As the field excitation of one generator set in a group is **decreased** (i.e. over excited) it will **not** lead to a decrease in voltage (as it would if it were operating alone) but it will lead to a decrease in the proportion of the total kVAR load it will deliver and an increase in its power factor.

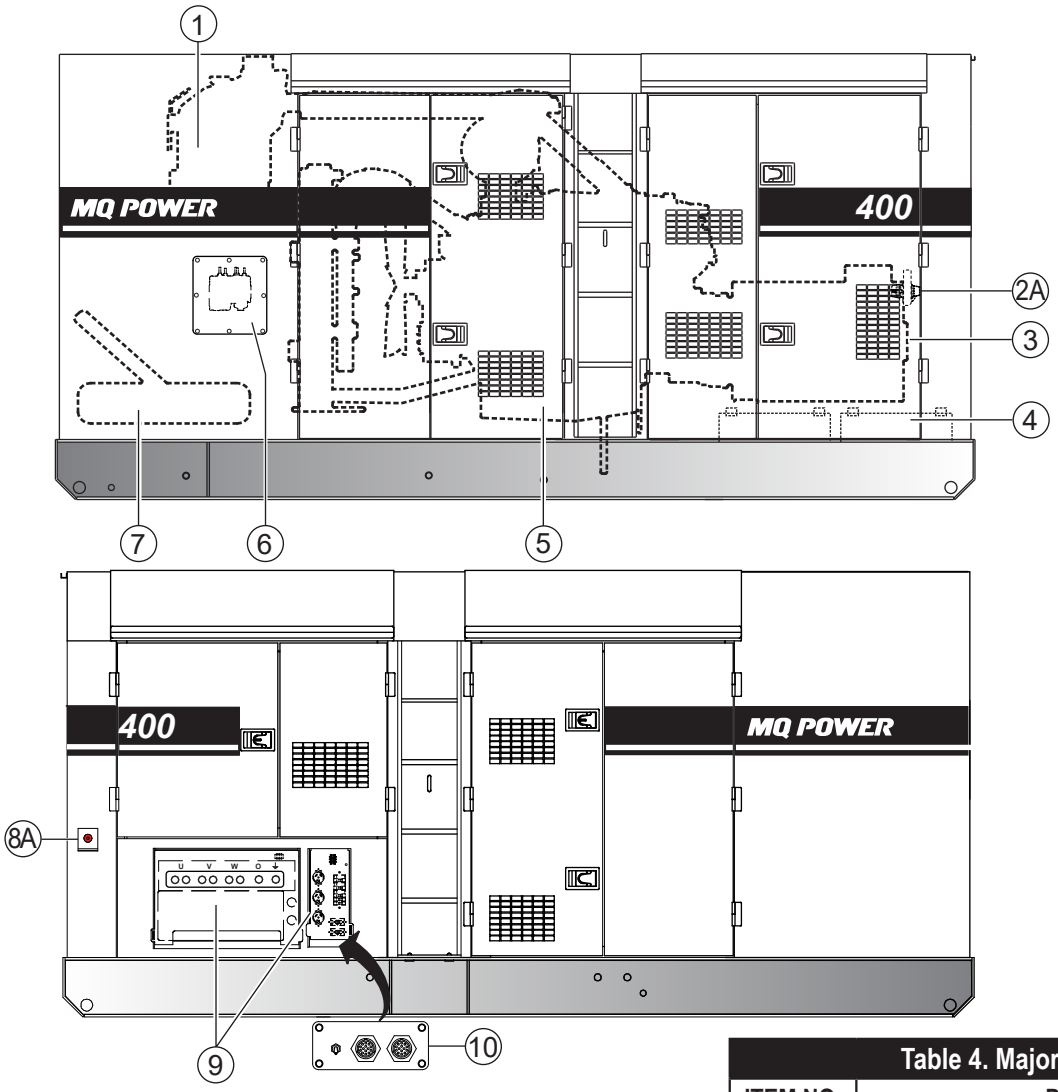
An undesirable circulating reactive current (cross current) will flow in the system if the excitation of the alternators is not matched.

LOAD MANAGEMENT

These generators are set up to automatically manage load, based on demand. While in **Auto mode**, if the auto start contacts are closed, load management is active by default. Load management will only run the number of units needed to support the load.

If the load demand is small, only one generator will run while the other generators remain in Standby mode. If the load increases above 90% of its capacity, it will start the next generator. The next generator priority is based on the time remaining on the maintenance timer.

Generators with more time until scheduled maintenance will take priority over units that are almost due for maintenance. Once the second unit starts, it will synchronize and parallel in, then ramp up to share the load. If the load levels drop below 30% of its combined rating, the generator that is no longer needed will ramp off, shut down and wait in standby mode.



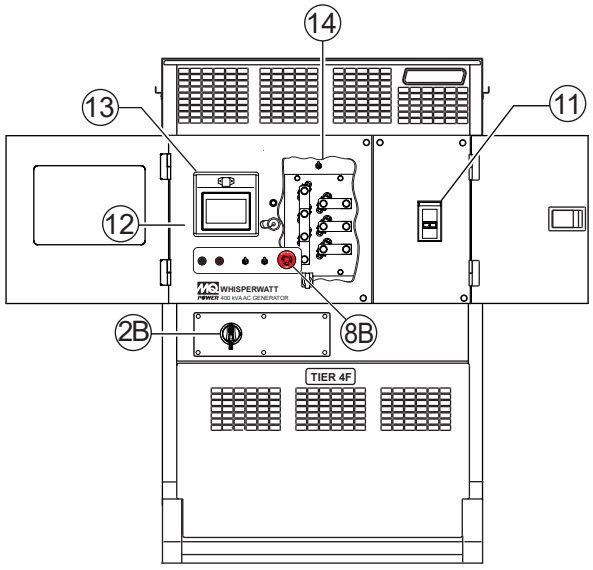


Figure 4. Major Components

Table 4. Major Components	
ITEM NO.	**DESCRIPTION**
1	Muffler Assembly
2A	Battery Switch (S/N 3979256 and Above)
2B	Battery Switch (S/N 3979255 and Below)
3	Generator Assembly
4	Battery Assembly
5	Engine Assembly
6	DEF Supply Module Assembly
7	Fuel Tank Assembly
8A	Emergency Stop Switch (S/N 3960359 and Above)
8B	Emergency Stop Switch (S/N 3960358 and Below)
9	Output Terminal Panel Assembly
10	Parallel Communication Receptacles
11	Main Circuit Breaker Assembly
12	Control and Operation Panel Assembly
13	DEIF AGC-4 Controller Assembly
14	Voltage Change-Over Board Assembly

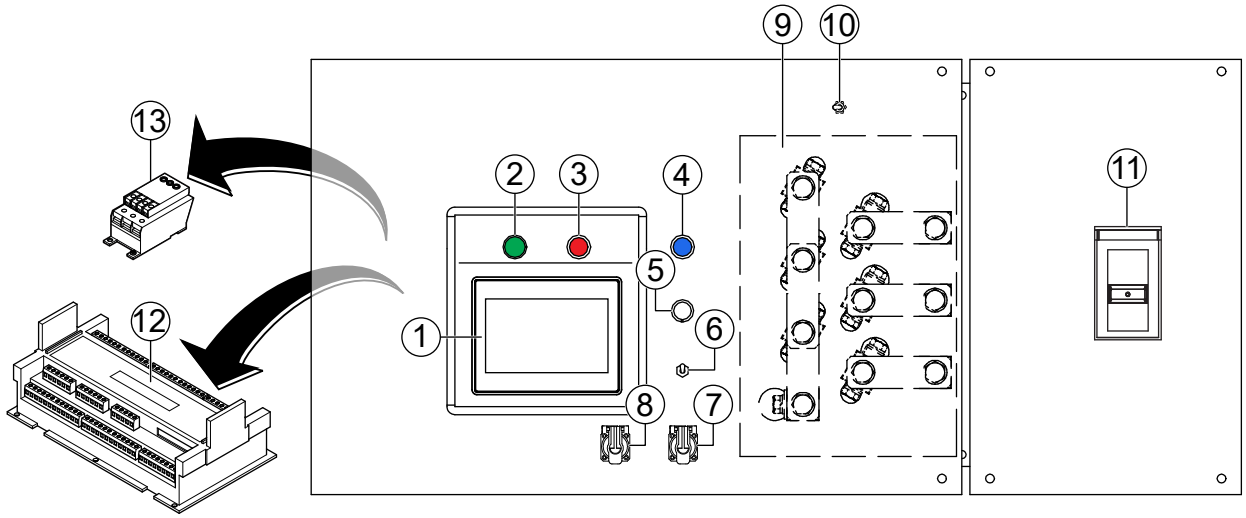


Figure 5. Control And Operation Panel

The definitions below describe the controls and functions of the **control and operation panel** (Figure 5).

1. **Touch Display Unit** — This preprogrammed touchscreen display is the user interface for the DEIF AGC-4 automatic genset controller. Allows the user to start and stop the genset, monitor operating parameters, and view diagnostic troubleshooting messages.
2. **Circuit Breaker ON Lamp** — Illuminates (green) when the main circuit breaker contacts are closed.
3. **Circuit Breaker OFF Lamp** — Illuminates (red) when the main circuit breaker contacts are open.
4. **Low DEF Level Lamp** — Illuminates (blue) when the DEF level drops below 15%.
5. **Pilot Lamp** — Illuminates during operation.
6. **Control Power Switch** — Provides power to the touch display unit. Place the switch in the **ON** position for normal operation. Place in the **OFF** position when the generator is not in use.
7. **USB Port** — A USB cable can be plugged into this port for testing/configuration of the AGC-4 controller via a remote computer.
8. **Ethernet Port** — An ethernet cable can be plugged into this port for testing/configuration of the AGC-4 controller via a remote computer. For faster data rates this is the preferred method of communication.
9. **Voltage Change-Over Board** — 6 jumper plates that allow the generator to be configured for either 240/208 or 480/460 VAC output. Located inside the control box.
10. **Voltage Selector Switch** — Use to set the controller's nominal voltage (240/208V or 480/460V) before starting the engine. Located inside the control box.
11. **Main Circuit Breaker** — 3-pole, 1000-amp, motor-controlled circuit breaker. Connects or disconnects the generator output from the output terminals. Protects the unit from short circuits or overcurrent.
12. **DEIF AGC-4 Controller** — Provides systematic control of the generator. Works in conjunction with the touch display unit. Located inside the control box.
13. **Overcurrent Relay** — Connected to the main circuit breaker. If the circuit breaker cannot be reset after an overload, the Reset button on the overcurrent relay must be pressed. Located inside the control box.

OUTPUT TERMINAL PANEL

The **output terminal panel** (Figure 6) shown below is provided for the connection of electrical loads. Lift up on the cover to gain access to receptacles and terminal lugs.

NOTICE

Terminal O is **neutral bonded** to the ground from the factory.

NOTICE

Output Terminal Bolt Torque: 1,088.6 lbf·in (123.0 N·m)

OUTPUT TERMINAL FAMILIARIZATION

The output terminal panel is provided with the following:

- Three (3) 240/139-volt output receptacles @ 50 amps
- Three (3) 50-amp circuit breakers
- Two (2) 120-volt GFCI receptacles @ 20 amps
- Two (2) 20-amp GFCI circuit breakers
- Eight (8) output terminal lugs (U, V, W, O, Ground)

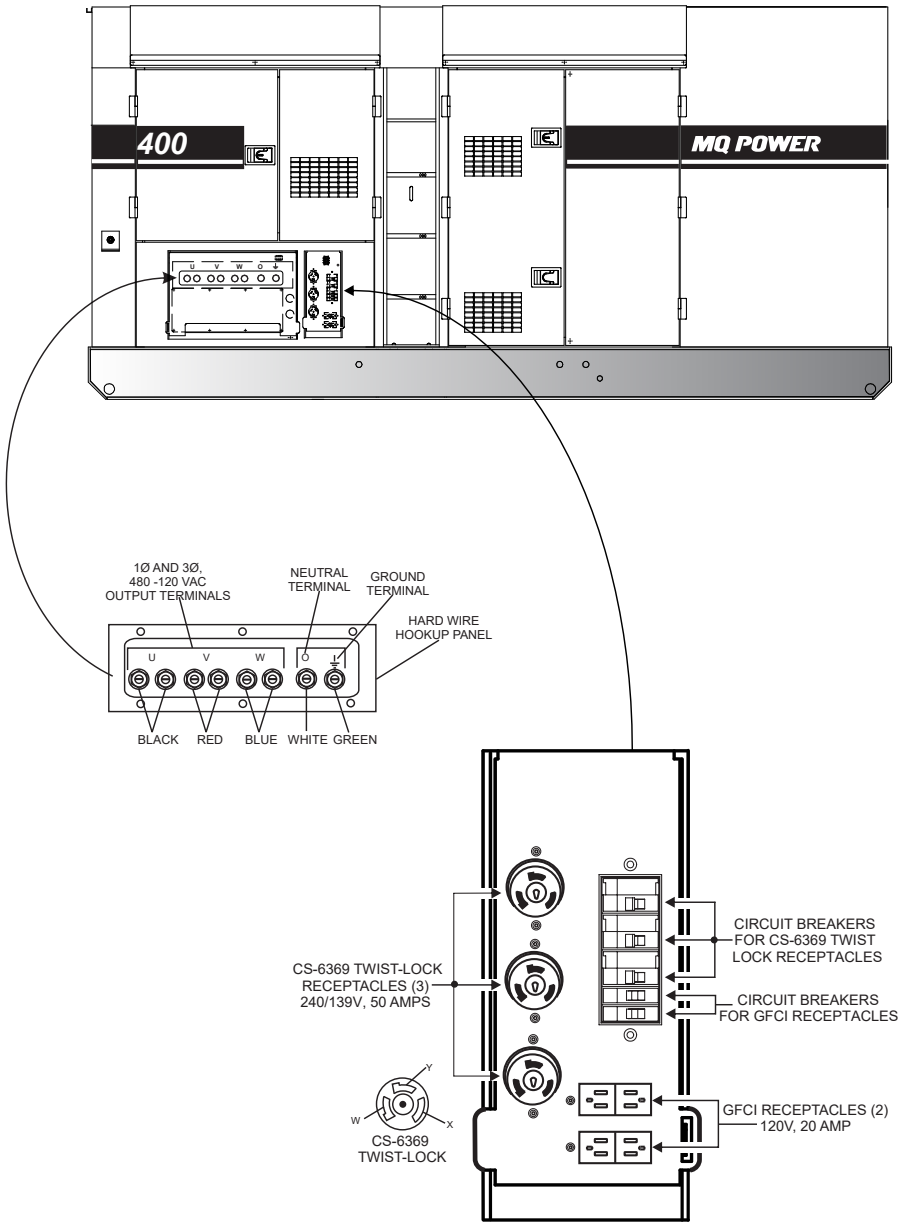


Figure 6. Output Terminal Panel

120-Volt AC GFCI Receptacles

NOTICE

It is recommended that the GFCI receptacles be tested when the generator is initially uncrated. The receptacles should then be tested daily at startup.

There are two 120-volt, 20-amp GFCI (duplex NEMA 5-20R) receptacles provided on the output terminal panel. These receptacles can be accessed in any voltage change-over board position. Each receptacle is protected by a 20-amp circuit breaker. These breakers are located directly above the GFCI receptacles. Remember that the load output (current) of both GFCI receptacles is dependent on the load requirements of the U, V, and W output terminal lugs.

Press the **Reset button** (Figure 7) to reset the GFCI receptacle after it has been tripped. Press the **Test button** in the center of the receptacle to check the GFCI function. Both receptacles should be tested at least once a month. Refer to the maintenance section in this manual for further testing of the GFCI receptacle.

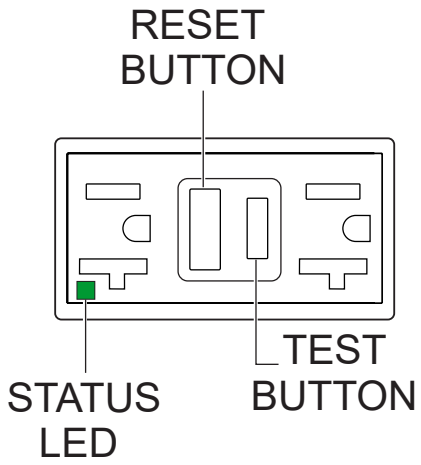


Figure 7. 120-Volt GFCI Receptacle

Twist-Lock Dual-Voltage 240/139-Volt AC Receptacles

There are **three 240/139-volt, 50-amp, auxiliary twist-lock (CS-6369) receptacles** (Figure 8) provided on the output terminal panel. For 240/139-volt usage, these receptacles can be used at any time during operation. For 208/120-volt usage, configure the voltage change-over board for 240-volt output, then select 208V using the Voltage Selector switch.

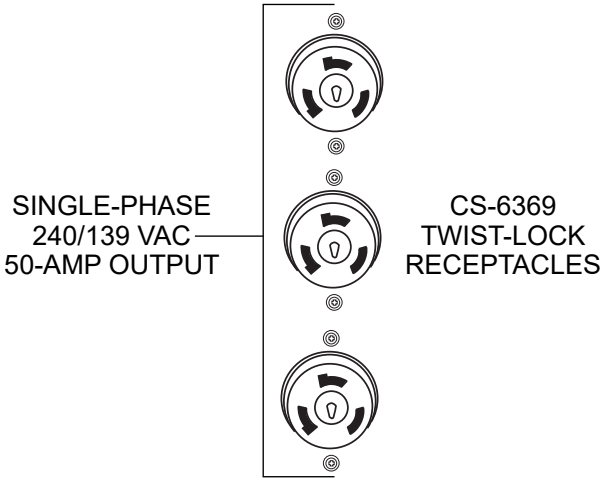


Figure 8. 240/139-Volt Twist-Lock Auxiliary Receptacles

Each auxiliary receptacle is protected by a 50-amp circuit breaker. These breakers are located next to the GFCI receptacles. Remember the load output (current) on all three receptacles is dependent on the load requirements of the **output terminal lugs**.

Removing The Plastic Face Plate (Hard Wire Hookup Panel)

The **output terminal lugs** are located behind a protective cover (Figure 9). Unscrew the securing bolts (8) and remove the cover to gain access to the output terminal lugs.

After the load wires have been securely attached to the output terminal lugs, reinstall the protective cover and reinstall the retaining bolts.

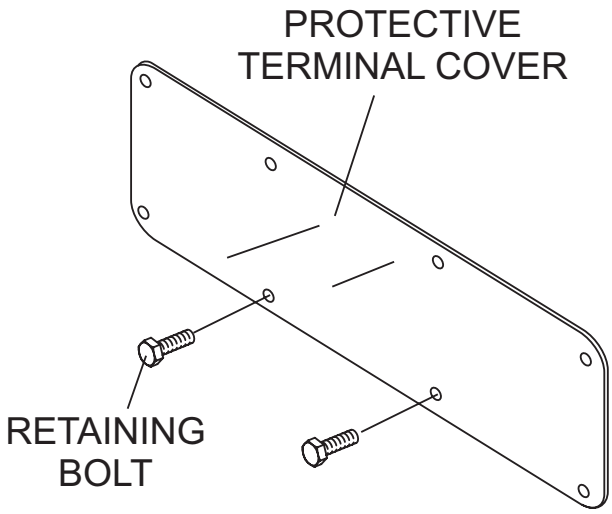


Figure 9. Protective Terminal Cover (UVWO Terminal Lugs)

Connecting Loads

Loads can be connected to the generator via the output terminal panel, convenience receptacles, or cam-loks (Figure 10). Make sure to read the operation manual before attempting to connect a load to the generator.

To protect the output terminals from overload, a motorized, 3-pole, 1000-amp, main circuit breaker is provided. Make sure to switch **ALL** circuit breakers to the **OFF** position prior to starting the engine.

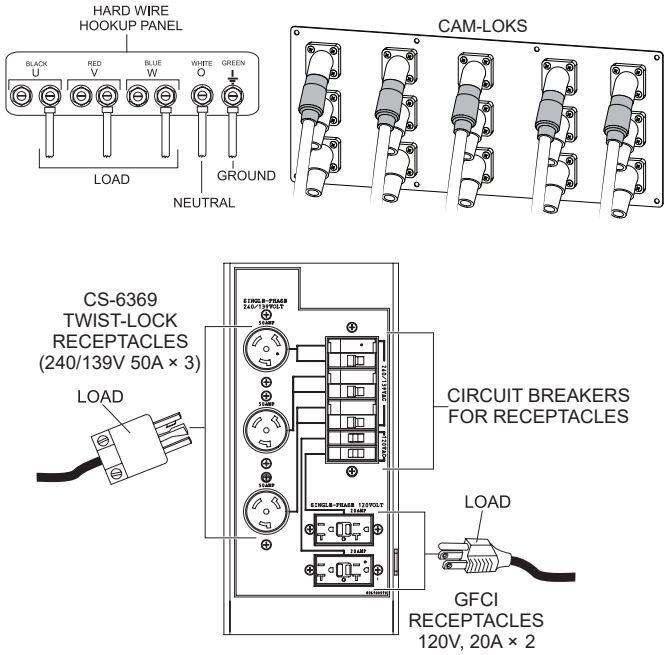


Figure 10. Connecting Loads

OVERCURRENT RELAY

An **overcurrent relay** (Figure 11) is connected to the main circuit breaker. In the event of an overload, both the circuit breaker and the overcurrent relay may trip. If the circuit breaker cannot be reset, the **Reset button** on the overcurrent relay must be pressed. The overcurrent relay is located inside the control box.

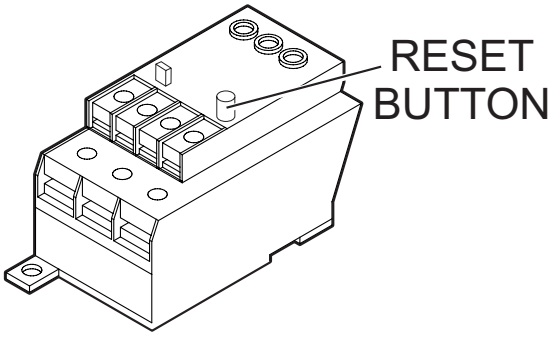


Figure 11. Overcurrent Relay

NOTICE

The **overcurrent relay** monitors the current flowing from the U,V, and W output terminal lugs to the load. In the event of a short circuit or overcurrent condition, it will automatically trip the 1000-amp main circuit breaker.

To restore power to the output terminal panel, press the Reset button on the overcurrent relay and place the main circuit breaker in the **closed (ON)** position.

SINGLE-PHASE LOAD

Always be sure to check the nameplate on the generator and equipment to ensure the wattage, amperage, frequency, and voltage requirements are satisfactorily supplied by the generator for operating the equipment.

Generally, the wattage listed on the nameplate of the equipment is its rated output. Equipment may require 130–150% more wattage than the rating on the nameplate, as the wattage is influenced by the efficiency, power factor, and starting system of the equipment.

NOTICE

If wattage is not given on the equipment's nameplate, approximate wattage may be determined by multiplying the nameplate voltage by the nameplate amperage.

WATTS = VOLTAGE × AMPERAGE

The power factor of this generator is 0.8. See Table 5 below when connecting loads.

Table 5. Power Factor By Load

Type of Load	Power Factor
Single-phase induction motors	0.4–0.75
Electric heaters, incandescent lamps	1.0
Fluorescent lamps, mercury lamps	0.4–0.9
Electronic devices, communication equipment	1.0
Common power tools	0.8

Table 6. Cable Selection (60 Hz, Single-Phase Operation)

Current in Amperes	Load in Watts		Maximum Allowable Cable Length			
	At 120 Volts	At 240 Volts	#10 Wire	#12 Wire	#14 Wire	#16 Wire
2.5	300	600	1,000 ft.	600 ft.	375 ft.	250 ft.
5	600	1,200	500 ft.	300 ft.	200 ft.	125 ft.
7.5	900	1,800	350 ft.	200 ft.	125 ft.	100 ft.
10	1,200	2,400	250 ft.	150 ft.	100 ft.	
15	1,800	3,600	150 ft.	100 ft.	65 ft.	
20	2,400	4,800	125 ft.	75 ft.	50 ft.	
CAUTION: Equipment damage can result from low voltage.						

NOTICE

Cable selection table is a general guideline. **ALWAYS** consult local and national electrical codes when sizing cables.

THREE-PHASE LOAD

When calculating the power requirements for 3-phase power, use the following equation:

$$KVA = \frac{VOLTAGE \times AMPERAGE \times 1.732}{1000}$$

NOTICE

If 3-phase load (kVA) is not given on the equipment nameplate, approximate 3-phase load may be determined by multiplying voltage by amperage by 1.732.

NOTICE

Motors and motor-driven equipment draw much greater current for starting than during operation.

An inadequately sized connecting cable which cannot carry the required load can cause a voltage drop which can burn out the appliance or tool and overheat the cable. See Table 6.

- When connecting a resistance load such as an incandescent lamp or electric heater, a capacity of up to the generating set's rated output (kW) can be used.
- When connecting a fluorescent or mercury lamp, a capacity of up to the generating set's rated output (kW) multiplied by 0.6 can be used.
- When connecting an electric drill or other power tools, pay close attention to the required starting current capacity.
- When connecting ordinary power tools, a capacity of up to the generating set's rated output (kW) multiplied by 0.8 can be used.

DANGER

Before connecting this generator to any building's electrical system, a **licensed electrician** must install an **isolation (transfer) switch**. Serious damage to the building's electrical system may occur without this transfer switch.

PowerBalance® (Figure 12) is an optional load management solution that helps protect the engine generator from problems resulting from sustained low-load operations (defined as less than 30% of the generator full-load rating).

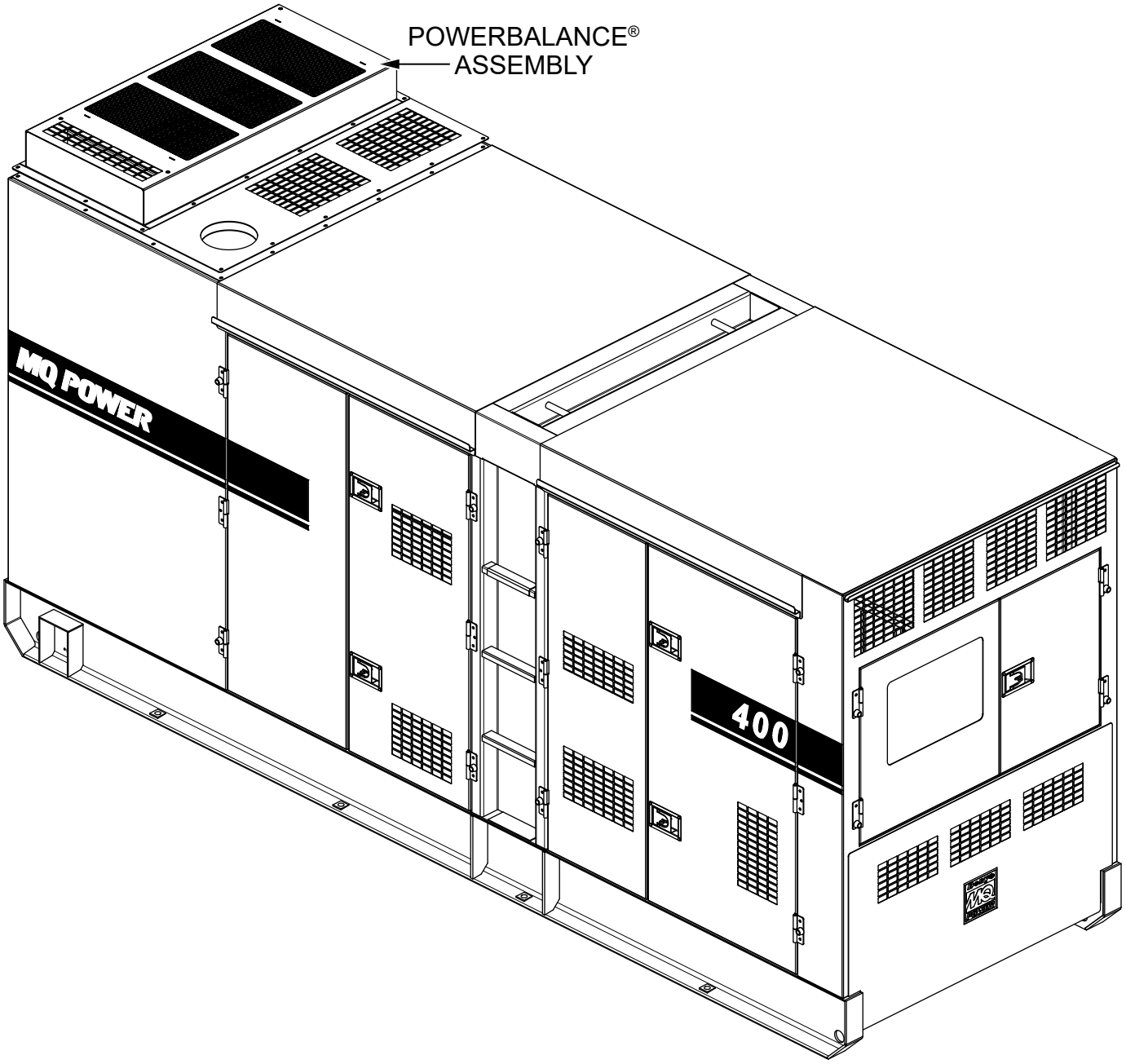


Figure 12. PowerBalance®

- PowerBalance® continuously monitors engine load. With the main circuit breaker closed, the load management controller senses and increases engine load automatically using resistive coils when the controller determines that the temperature and/or load is too low.
- When additional load demands are placed on the generator that bring it to an optimum level, PowerBalance® will automatically deactivate this additional load and remain ready for reactivation should exhaust temperatures drop.

GENERATOR OUTPUT VOLTAGES

A wide range of voltages (Table 7) is available for many different applications.

Table 7. Available Voltages

UVWO Output Terminal Lugs	Voltage Change-Over Board 3-Phase 240/139V Position			Voltage Change-Over Board 3-Phase 480/277V Position		
3Ø Line-Line	208V	220V	240V	416V	440V	480V
1Ø Line-Neutral	120V	127V	139V	240V	254V	277V

Voltage Change-Over Board

Voltages are selected by applying six jumper plates to the **voltage change-over board** (Figure 13), which is located inside the control box behind the generator control panel. This board has been provided for ease of voltage selection.

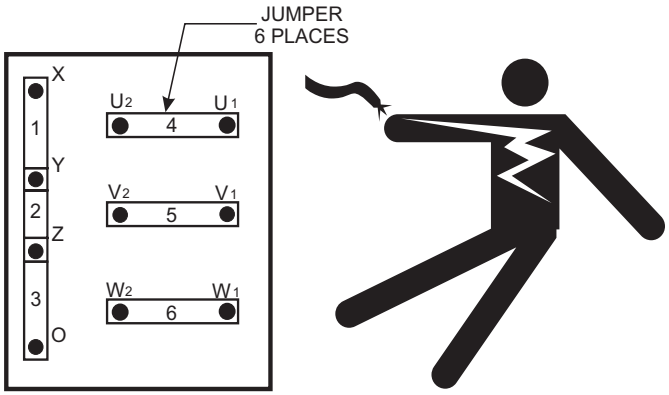


Figure 13. Voltage Change-Over Board

⚠ WARNING

NEVER attempt to place jumper plates on the **voltage change-over board** while the generator is in operation. There exists the possibility of **electrocution**, **electrical shock**, **or burn**, **which can cause severe bodily harm or even death!**

NOTICE

Make sure the tie bolts securing the voltage change-over board bus bars are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque bolts to 554.9 lbf·in (62.7 N·m).

Maximum Amps

Table 8 shows the **maximum amps** the generator can provide. **DO NOT** exceed the maximum amps as listed.

Table 8. Generator Maximum Amps

Rated Voltage	Maximum Amps
Single Phase 120 Volts	888.9 amps (4 wire)
Single Phase 240 Volts	444.4 amps (4 wire)
Three Phase 208 Volts	962.3 amps
Three Phase 240 Volts	962.3 amps
Three Phase 480 Volts	481.1 amps
Main Line Circuit Breaker Rating	1,000 amps
Overcurrent Relay Trip Set Point	480 amps

UVWO TERMINAL OUTPUT VOLTAGES

Various output voltages can be obtained using the UVWO output terminal lugs. The voltages at the terminals are dependent on the placement of the jumper plates (6) on the **voltage change-over board**.

The voltage change-over board determines the range of the output voltage and can be configured in two different positions that provide 6 different output voltages at the UVWO output terminals. The generator is shipped from the factory in the 240-volt configuration.

NOTICE

Make sure the tie bolts securing the voltage change-over board bus bars are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque bolts to 554.9 lbf·in (62.7 N·m).

NOTICE

ALWAYS make sure that the connections to the UVWO terminals are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque tie bolts to 1,088.6 lbf·in (123.0 N·m).

3-Phase 240-Volt UVWO Terminal Output Voltages

1. Jumper the **voltage change-over board** for **240-volt operation** as shown in Figure 14.

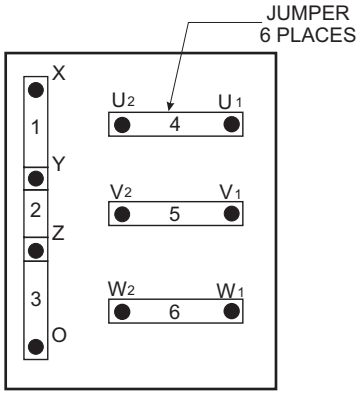


Figure 14. Voltage Change-Over Board 3-Phase 240/139-Volt Configuration

2. Connect the load wires to the UVWO terminals as shown in Figure 15.

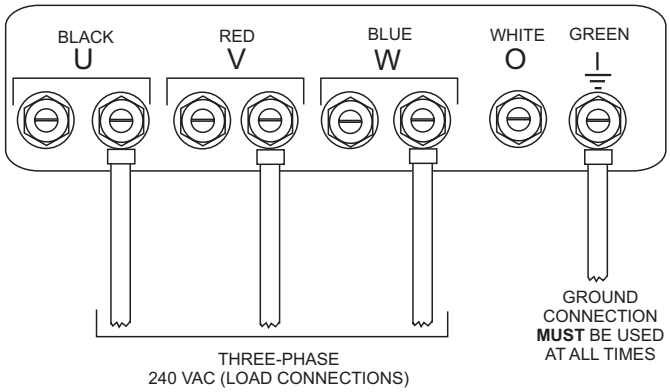


Figure 15. UVWO Terminal Lugs 3-Phase 240-Volt Connections

Single-Phase 240-Volt UVWO Terminal Output Voltages

1. Make sure the **voltage change-over board** is jumpered for **240-volt operation** as shown in Figure 14.
2. Connect the load wires to the UVWO terminals as shown in Figure 16.

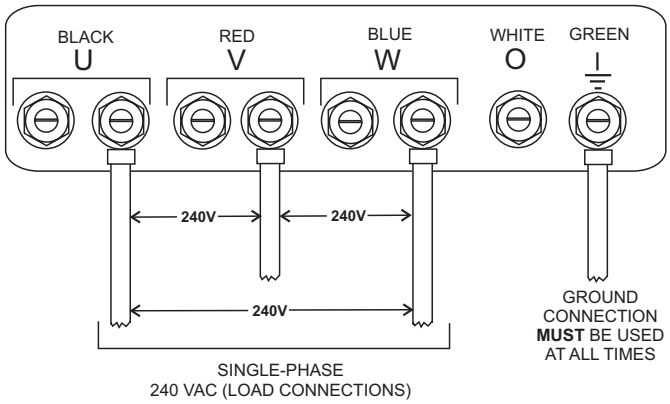


Figure 16. UVWO Terminal Lugs Single-Phase 240-Volt Connections

Single-Phase 120-Volt UVWO Terminal Output Voltages

1. Make sure the **voltage change-over board** is jumpered for **240-volt operation** as shown in Figure 14.
2. Select an output of 208 volts on the digital controller to obtain 120 volts at the UVWO terminals.
3. Connect the load wires to the UVWO terminals as shown in Figure 17.

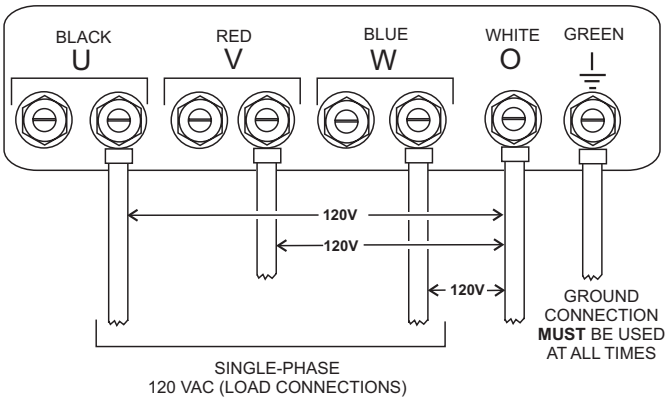


Figure 17. UVWO Terminal Lugs Single-Phase 120-Volt Connections

NOTICE

To obtain single-phase, 120-volt output, the voltage change-over board must be in the 3-phase, 240/139-volt position and the voltage on the digital controller must be set to 208 volts.

3-Phase 480-Volt UVWO Terminal Output Voltages

1. Jumper the **voltage change-over board** for **480-volt operation** as shown in Figure 18. This configuration uses 6 jumper plates in 3 different positions. Remember there are 2 jumper plates at every position. Every jumper plate **must be used**.

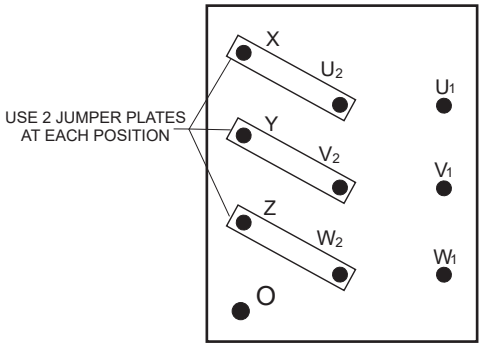


Figure 18. Voltage Change-Over Board 3-Phase 480/277-Volt Configuration

2. Connect the load wires to the UVWO terminals as shown in Figure 19.

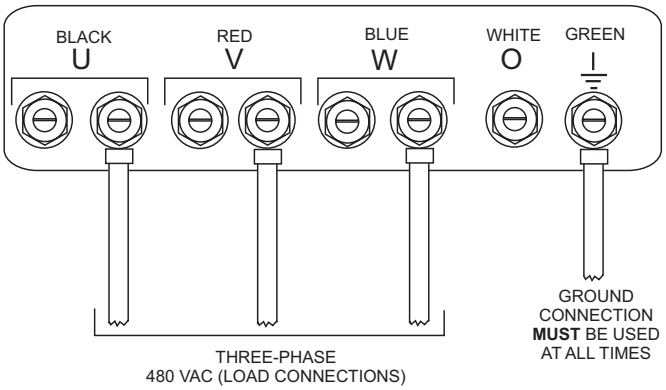


Figure 19. UVWO Terminal Lugs 3-Phase 480-Volt Connections

Single-Phase 480-Volt UVWO Terminal Output Voltages

1. Make sure the **voltage change-over board** is jumpered for **480-volt operation** as shown in Figure 18.
2. Connect the load wires to the UVWO terminals as shown in Figure 20.

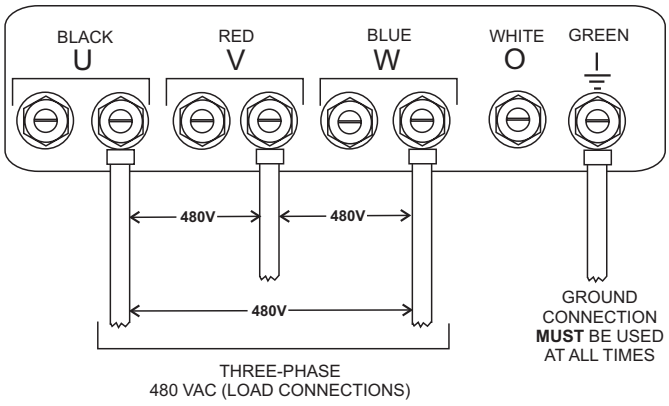


Figure 20. UVWO Terminal Lugs Single-Phase 480-Volt Connections

Single-Phase 277-Volt UVWO Terminal Output Voltages

1. Make sure the **voltage change-over board** is jumpered for **480-volt operation** as shown in Figure 18.
2. Connect the load wires to the UVWO terminals as shown in Figure 21.

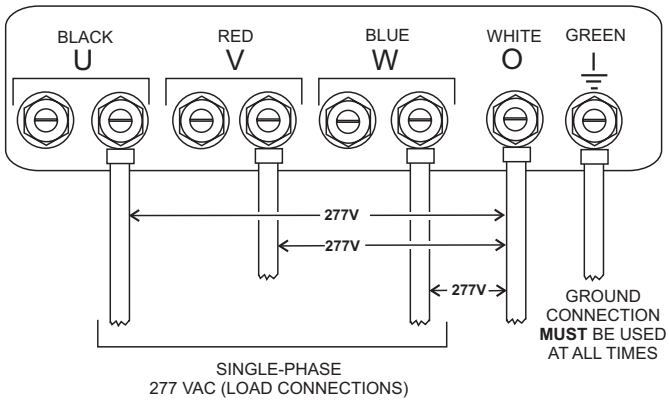


Figure 21. UVWO Terminal Lugs Single-Phase 277-Volt Connections

ENGINE OIL CHECK

1. To check the engine oil level, place the generator on secure, level ground with the engine stopped.
2. Remove the **dipstick** from its holder (Figure 22) and wipe it clean.

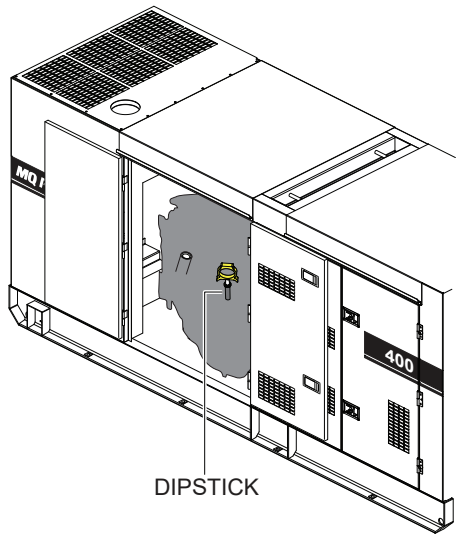


Figure 22. Engine Oil Dipstick

3. Reinsert the dipstick, then remove the dipstick from its holder. Check the oil level shown on the dipstick (Figure 23).

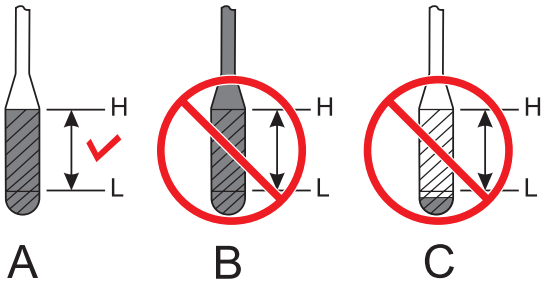


Figure 23. Engine Oil Dipstick

4. Verify that the engine oil level is maintained between the H and L markings on the dipstick as shown in Figure 23**A**.
5. If the engine oil level is low (Figure 23**C**), remove the cap from the **oil filler port** (Figure 24) and fill to a safe operating level (max) as indicated by the dipstick (Figure 23**A**). Fill with the recommended type oil listed in Table 9. Maximum oil capacity is 15.1 gallons (57 liters).

NOTICE

When adding engine oil, **DO NOT** overfill (Figure 23**B**).

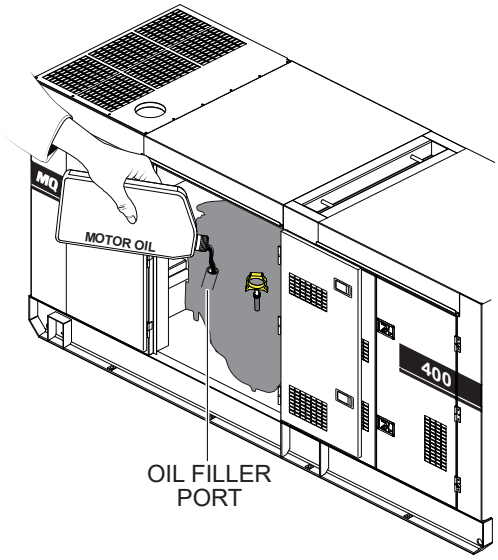
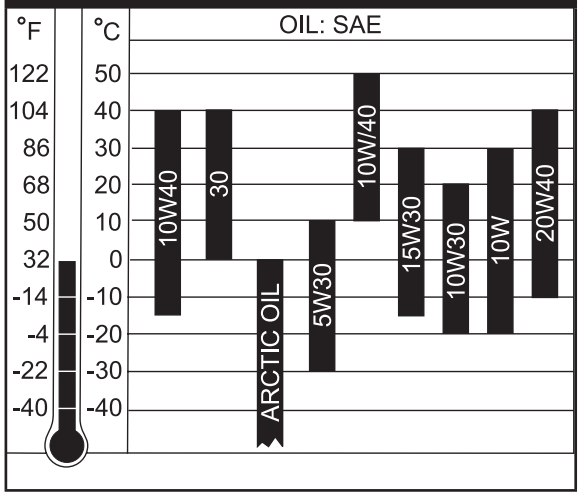


Figure 24. Engine Oil Filler Port

6. When checking the engine oil, be sure to check if the oil is clean. If the oil is not clean, drain the oil as described in the ***Maintenance*** section of this manual.
7. Allow enough time for any added oil to make its way to the oil pan before rechecking.

Table 9. Oil Selection Chart



FUEL CHECK

DANGER

Fuel spillage on a **hot** engine can cause a **fire or explosion**. If fuel spillage occurs, wipe up the spilled fuel completely to prevent fire hazards. **NEVER** smoke around or near the generator. **ALWAYS** shut down the engine prior to cleaning up any spilled fuel.

NOTICE

ALWAYS check the DEF tank level when adding fuel.

Refilling The Fuel System

CAUTION

ONLY properly trained personnel who have read and understand this section should refill the fuel tank.

ALWAYS fill the **fuel tank** (Figure 25) with clean, fresh, **#2 diesel fuel**. Pay attention to the fuel tank capacity when replenishing fuel. **DO NOT** fill the fuel tank beyond its capacity.

Close the **fuel filler cap** (Figure 25) tightly after filling. Handle fuel in a safety container. If the container does not have a spout, use a funnel. Wipe up any spilled fuel **immediately**.

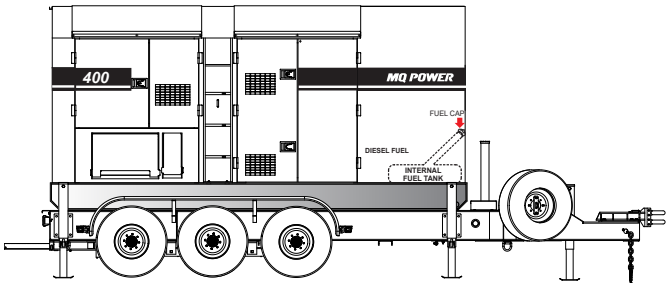


Figure 25. Fuel Tank

Refueling Procedure

WARNING

Diesel fuel and its vapors are dangerous to your health and the surrounding environment. Avoid inhalation of fumes and contact with skin.

1. **Level Tanks** — Make sure fuel cells are level with the ground. Failure to do so will cause fuel to spill from the tank before reaching full capacity (Figure 26).

CAUTION

ALWAYS place the trailer on firm, level ground before refueling to prevent spilling and to maximize the amount of fuel that can be added to the tank.

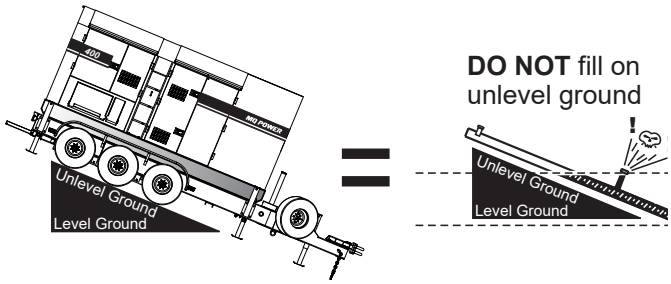


Figure 26. Only Fill On Level Ground

NOTICE

ONLY use **#2 diesel fuel** (ultra-low sulfur diesel fuel) when refueling.

2. Remove the fuel cap and fill the fuel tank as shown in Figure 27.

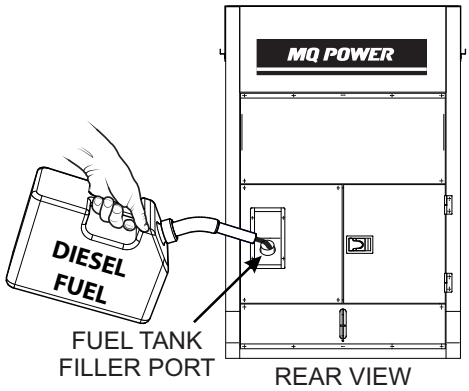


Figure 27. Fueling The Generator

3. **NEVER overfill the fuel tank.** When refueling, **DO NOT** wait for fuel to rise inside the filler neck (Figure 28). Leave room for fuel expansion. Fuel expands when heated (Figure 29).

Figure 28. Full Fuel Tank

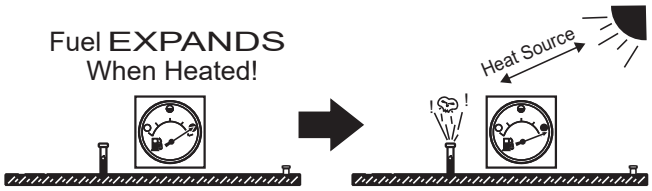


Figure 29. Fuel Expansion

DIESEL EXHAUST FLUID

Diesel exhaust fluid (DEF) is an aqueous solution made with 32.5% high-purity **urea (carbamide)** and 67.5% **deionized water**. DEF is used as a consumable in **selective catalytic reduction (SCR)** in order to lower NO_x concentration from diesel exhaust emissions.

ALWAYS check the DEF level when refueling. Before initial start-up, completely fill the DEF tank with DEF fluid. **DO NOT** overfill.

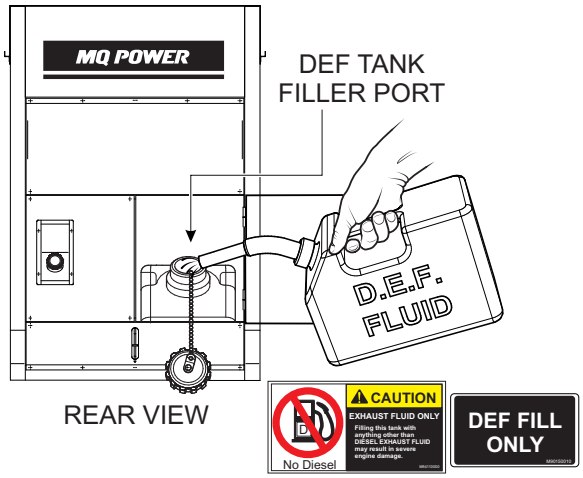


Figure 30. Filling The DEF Tank

DEF Refilling

NOTICE

ONLY fill the DEF tank with **diesel exhaust fluid**. Any other type of fluid may cause severe engine damage.

1. Make sure the engine is **OFF**.
2. Remove the cap from the DEF tank filler port (Figure 30).
3. Add diesel exhaust fluid to the tank. **DO NOT** overfill.
4. Reinstall the DEF tank cap. Tighten securely.

DEF Refilling (Continuous Operation)

It is recommended to **shut down the engine** prior to refilling the DEF tank. However, during special applications where shutdown is not possible, it is recommended to **ONLY** refill the DEF tank when the fluid level has been consumed down to 50%.

The DEF level sending unit requires a gradual DEF level decrease during continuous operation to validate proper operation. Failure of this sensor to report the decrease could result in an engine shutdown. An engine service technician would be required to remedy the shutdown.

COOLANT (ANTIFREEZE/SUMMER COOLANT/WATER)

Isuzu recommends antifreeze/summer coolant for use in their engines, which can be purchased in concentrate (and mixed with 50% demineralized water) or pre-diluted. See the **Isuzu engine owner's manual** for further details.

WARNING

When adding coolant/antifreeze mix to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. The possibility of **hot!** coolant exists which can cause **severe burns**.

Day-to-day addition of coolant is done from the reserve tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 10 for engine, radiator, and reserve tank coolant capacities.

Table 10. Coolant Capacity

Engine and Radiator	19.4 gal. (73.6 liters)
Reserve Tank	See markings

NOTICE

Normally, only the coolant level in the reserve tank needs to be checked. However, the radiator cap should be opened once a week to verify that coolant is visible (full) inside the radiator.

Verify that the coolant level in the **coolant reserve tank** is between the **FULL** and **LOW** markings as shown in Figure 31.

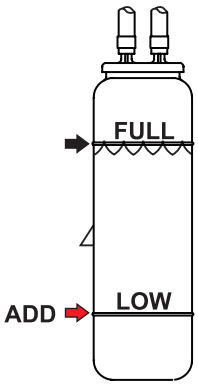


Figure 31. Coolant Reserve Tank

Operation In Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze (Table 11) has been added.

Table 11. Coolant Capacity

Climate	Outside Temperature	Longlife Coolant Concentration
Warm	10°F (–12°C) or Above	30%
Cold	–22°F (–30°C) or Above	50%

NOTICE

When the antifreeze is mixed with water, the antifreeze mixing ratio **must be** less than 50%.

Cleaning The Radiator

The engine may overheat if the radiator cooling fins (Figure 32) become overloaded with dust or debris. Periodically clean the radiator fins with compressed air. Cleaning inside the machine is dangerous, so clean only with the engine turned **OFF** and the negative battery terminal disconnected.

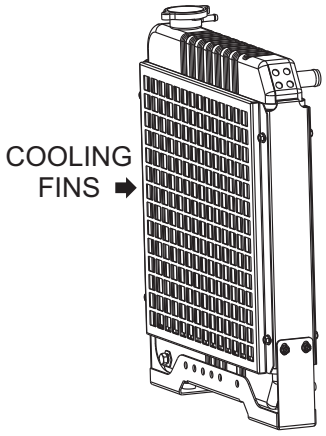


Figure 32. Radiator (Cooling Fins)

ENGINE AIR CLEANER

Periodic cleaning and replacement of the **engine air cleaner** is necessary. Inspect the air cleaner in accordance with the **Isuzu engine owner's manual**.

FAN BELT TENSION

A slack fan belt may contribute to overheating, or to insufficient charging of the battery. Inspect the fan belt for damage and wear and adjust it in accordance with the **Isuzu engine owner's manual**.

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 33) when depressed with the thumb as shown below.

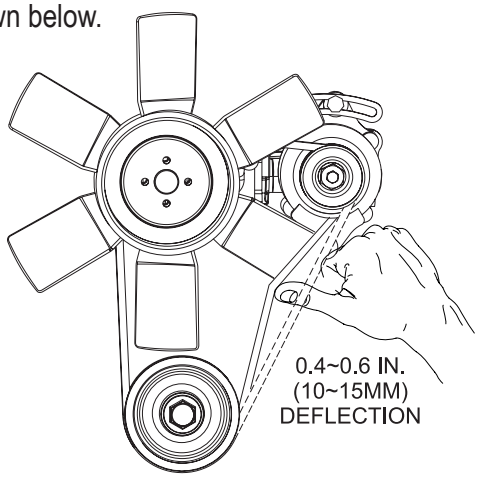


Figure 33. Fan Belt Tension

CAUTION

NEVER place hands near the belts or fan while the generator set is running.

BATTERY

This unit is of negative ground. **DO NOT** connect in reverse. **ALWAYS** maintain the battery fluid level between the specified marks. Battery life will be shortened if the fluid level is not properly maintained. Add only **distilled water** when replenishment is necessary.

DO NOT overfill. Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions. **ALWAYS** keep the terminals firmly tightened. Coat the terminals with an approved battery terminal treatment compound. Replace the battery only with the recommended type battery. The battery type used in this generator is BCI Group 27.

The battery is sufficiently charged if the specific gravity of the battery fluid is 1.28 (at 68°F). If the specific gravity should fall to 1.245 or lower, it indicates that the battery is dead and needs to be recharged or replaced.

Before charging the battery with an external electrical source, be sure to disconnect the battery cables.

Battery Cable Installation

Connect the two 12-volt batteries **in series** (24-volt system) as shown in Figure 34. Make sure the battery cables are properly connected to the battery terminals. Connect the **red cable** to the **positive terminal** of one battery, and connect the **black cable** to the **negative terminal** of the other battery.

CAUTION

ALWAYS disconnect the negative terminal first and reconnect the negative terminal last.

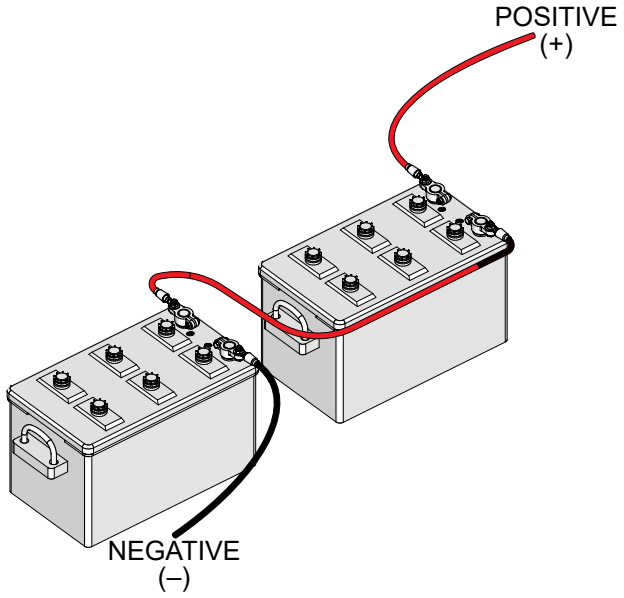


Figure 34. Battery Connections

When connecting the batteries:

1. **NEVER** connect the battery cables to the battery terminals while the **Control Power switch** is in the **ON** position. **ALWAYS** make sure that this switch is in the **OFF** position when connecting the batteries.
2. Place a small amount of battery terminal treatment compound around both battery terminals. This will ensure a good connection and will help prevent corrosion around the battery terminals.

NOTICE

If the battery cables are connected incorrectly, electrical damage to the generator will occur. Pay close attention to the polarity of the battery when connecting the battery.

NOTICE

Inadequate battery connections may cause poor starting of the generator and other malfunctions.

Battery Switch

The **Battery switch** (Figure 35) connects and disconnects the battery. Place the switch in the **ON** position prior to starting the generator. When the generator is not in use, place the switch in the **OFF** position.

NOTICE

NEVER set the battery switch to the **OFF** position **while the engine is running**. The engine may not be able to be stopped by normal operation, and damage to the equipment may result.

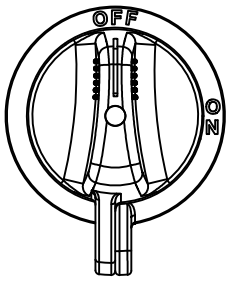


Figure 35. Battery Switch

ALTERNATOR

The polarity of the alternator is negative grounding type. When an inverted circuit connection takes place, the circuit will be in short circuit instantaneously resulting in alternator failure.

NOTICE

DO NOT put water directly on the alternator. Entry of water into the alternator can cause corrosion and damage to the alternator.

WIRING

Inspect the entire generator for bad or worn electrical wiring or connections. If any wiring or connections are exposed (insulation missing) replace wiring immediately.

PIPING AND HOSE CONNECTIONS

Inspect all piping, oil hose, and fuel hose connections for wear and tightness. Tighten all hose clamps and check hoses for leaks.

If any fuel or oil hose lines are defective, replace them immediately.

BEFORE STARTING

⚠ CAUTION

The engine's exhaust contains harmful emissions. **ALWAYS have adequate ventilation when operating.** Direct exhaust away from nearby personnel.

⚠ WARNING

NEVER manually start the engine with the **main, GFCI, or auxiliary** circuit breakers in the **ON (closed)** position.

1. Verify that the **Voltage Selection switch** and **voltage change-over board** (Figure 36) are configured for the desired output voltage.

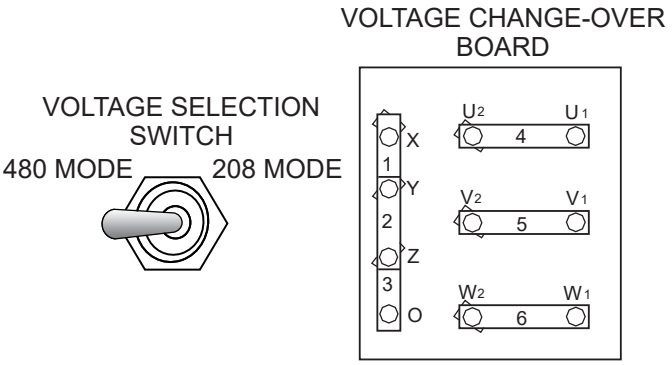


Figure 36. Voltage Selection Switch And Voltage Change-Over Board

NOTICE

Make sure the tie bolts securing the voltage change-over board bus bars are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque bolts to 554.9 lbf·in (62.7 N·m).

2. Set the **Battery switch** (Figure 37) to the **ON** position.

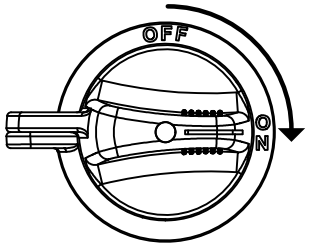


Figure 37. Battery Switch (ON)

3. Make sure the **GFCI and auxiliary circuit breakers** are placed in the **OFF** position (Figure 38).

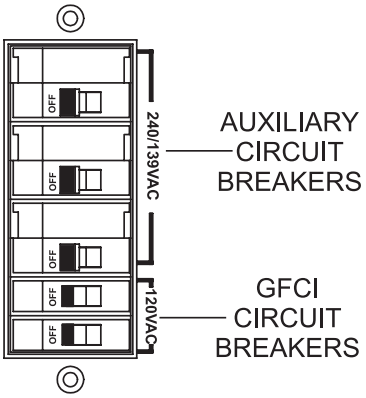


Figure 38. GFCI And Auxiliary Circuit Breakers (OFF)

4. Place the **Control Power switch** in the **ON (up)** position. See Figure 39.

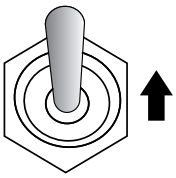


Figure 39. Control Power Switch (ON)

5. Wait approximately 120 seconds for the control system to boot up, then verify that the **Home screen (1 of 7)** is displayed. See Figure 40.

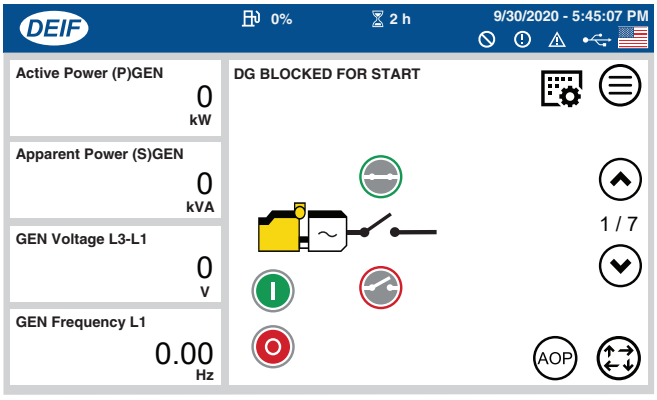


Figure 40. Home Screen (1 of 7)

6. Verify that the **Main Circuit Breaker OFF lamp** (Figure 41) is illuminated **(RED)**. This indicates that **the circuit breaker contacts are open**.

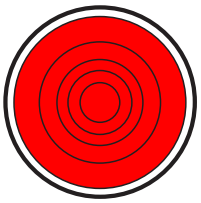


Figure 41. Main Circuit Breaker OFF Lamp (ON/RED)

7. On the touch display, press the **Page Up button** (Figure 42) to scroll to **screen 3 of 7**.

Figure 42. Page Up Button

8. On the **Voltage Selection screen (3 of 7)**, select the desired voltage output to match the selection made in step 1. See Figure 43.

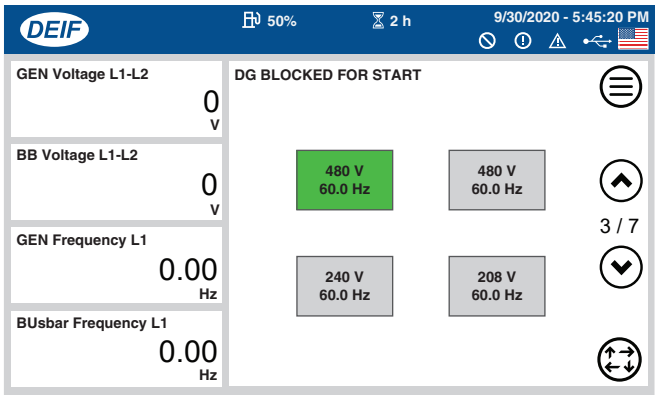


Figure 43. Voltage Selection Screen (3 of 7)

NOTICE

In the event that the Voltage Selection screen and Voltage Selector switch are set for different voltages, the voltage will automatically default to the voltage indicated by the **Voltage Selector switch**.

9. On the touch display, press the **Page Down button** (Figure 44) to scroll back to the **Home screen (1 of 7)**.

Figure 44. Page Down Button

10. Connect the load to the **output terminal panel**, **convenience receptacles**, or **cam-loks** as shown in Figure 10. These load connection points can be found on the output terminal panel and the output terminal panel's hard-wire hookup panel.

NOTICE

ALWAYS make sure that the connections to the UVWO terminals are **secure** and **tight**. The possibility exists of arcing that could cause a fire. Torque tie bolts to 1,088.6 lbf·in (123.0 N·m).

11. Close all engine enclosure doors (Figure 45).

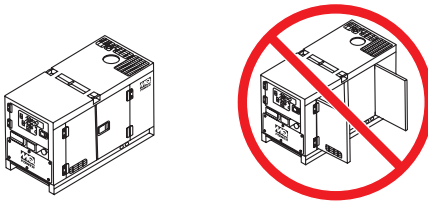


Figure 45. Engine Enclosure Doors

APPLICATION SELECTION

1. On the touch display, press the **AOP button** (Figure 46).

Figure 46. AOP Button

2. Verify that the **Main AOP screen** (Figure 47) is displayed.

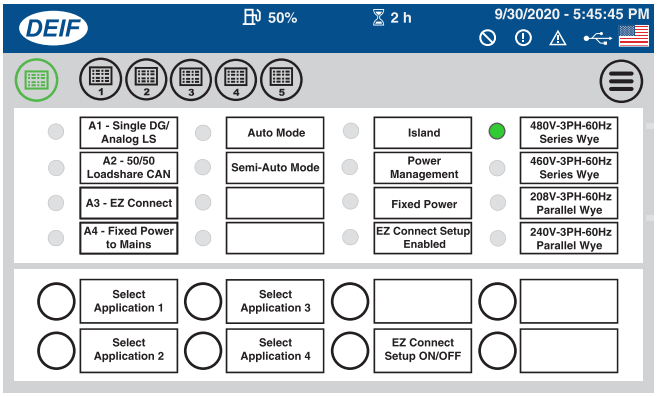


Figure 47. Main AOP Screen

3. If the Main AOP screen (Figure 47) is not displayed, press the **Main AOP button** (Figure 48).

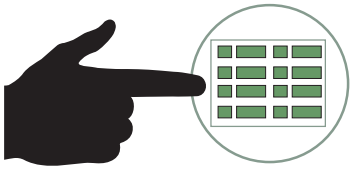


Figure 48. Main AOP Button

4. Press the **Select Application 1 button** (Figure 49).

Figure 49. Select Application 1 Button

5. Verify that the **A1 - Single DG/Analog LS status indicator** is **ON (GREEN)**. See Figure 50.

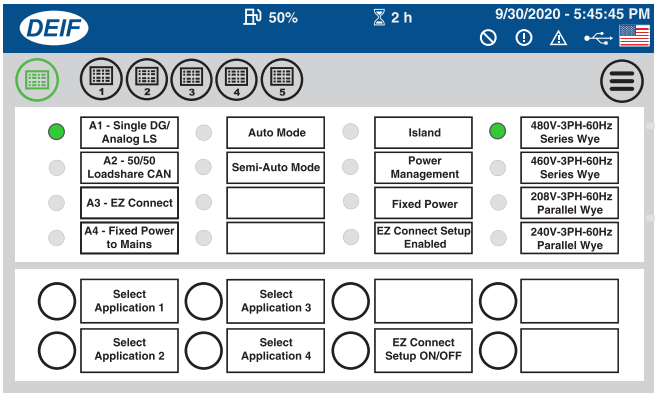


Figure 50. A1 - Single DG/Analog LS Status Indicator (ON/GREEN)

6. Press the **Main Menu button** (Figure 51).

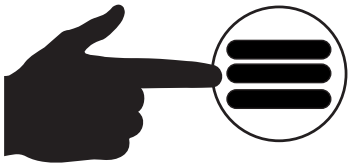


Figure 51. Main Menu Button

7. Verify that the **Main Menu screen** (Figure 52) is displayed, then press the **Home button**.

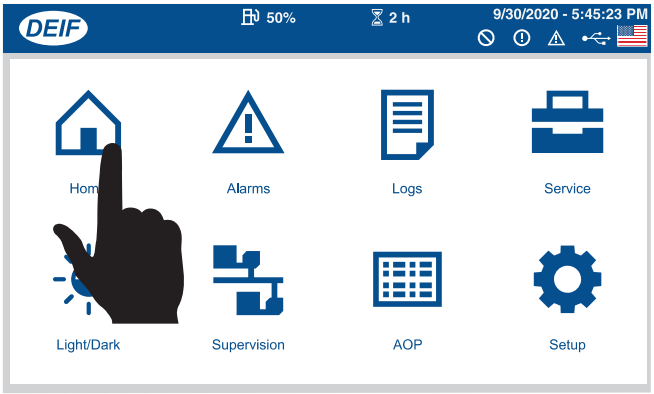


Figure 52. Main Menu Screen (Home Button)

8. Verify that the **Home screen (1 of 7)** is displayed. See Figure 40.

STARTING (SEMI-AUTO MODE)

1. On the touch display, press the **Mode Change button** (Figure 53).

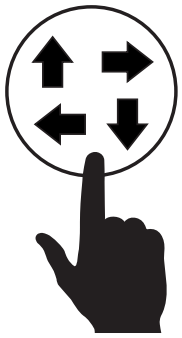


Figure 53. Mode Change Button

2. Verify that the four **Operational Mode buttons** (Figure 54) are displayed just above the **Mode Change button**.

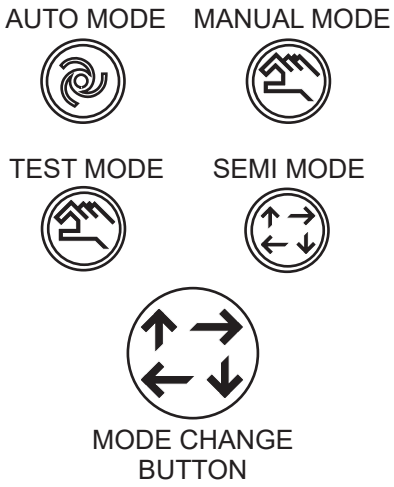


Figure 54. Operational Mode Buttons

3. Press the **Semi Mode button** as shown in Figure 55.

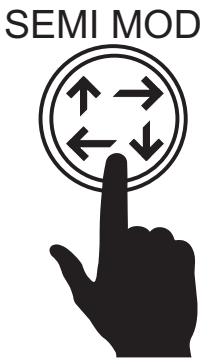


Figure 55. Semi Mode Button

> ***NOTICE***
>
> The Mode Change button will display one of the four Operational Mode icons, depending on which mode is selected. For example, if the Auto Mode button is selected, then the Mode Change button will display the Auto Mode icon.

4. Verify that the status message **ISLAND SEMI** is shown on the touch display (Figure 56).

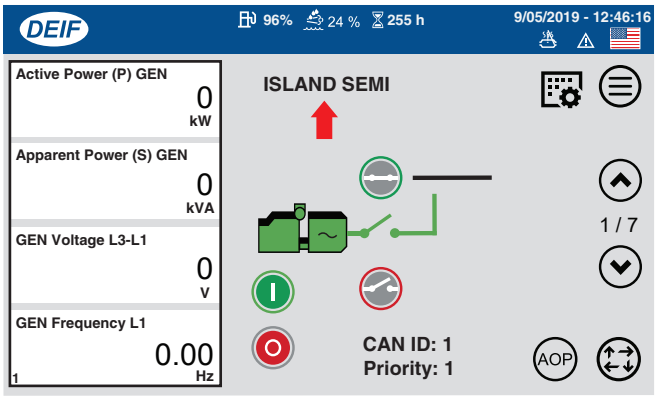


Figure 56. Status Message (ISLAND SEMI)

5. Press the **START button** (Figure 57) on the touch display to start the engine.

Figure 57. Start Button

> ***NOTICE***
>
> If the engine fails to start on the first crank attempt, two additional crank cycles will occur automatically. If the engine fails to start on the third attempt, a warning message will be shown on the touch display indicating that corrective action is required before the engine can be started.

> ***NOTICE***
>
> In cold weather conditions, the engine will pre-heat automatically and then start automatically when the pre-heating cycle has completed.

NOTICE

When the **Idle Speed Inhibit button** (located on the AOP1 screen) has been pressed and the **Low Idle Speed Inhibited status indicator** is **ON (GREEN)**, the engine will not undergo the standard idling warmup period upon start-up nor the standard cooling period upon shutdown.

6. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
7. On the touch display (Figure 58), verify that the **voltage (V)** and **frequency (Hz)** match the expected output.

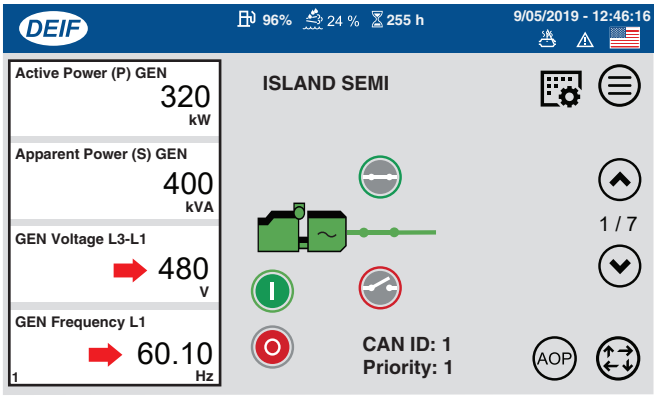


Figure 58. Voltage (V) and Frequency (Hz)

8. Press the **Main Circuit Breaker ON button** (Figure 59).

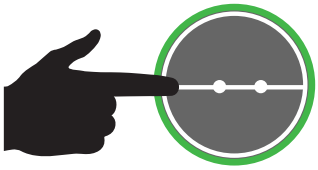


Figure 59. Main Circuit Breaker ON Button

9. Verify that the **Main Circuit Breaker ON lamp** (Figure 60) is illuminated **(GREEN)**. This indicates that **the circuit breaker contacts are closed** and power has been sent to the load.

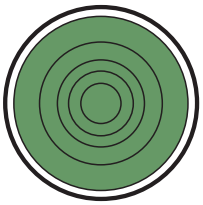


Figure 60. Main Circuit Breaker ON Lamp (ON/GREEN)

10. Place the **GFCI and auxiliary circuit breakers** (Figure 61) in the **ON** position to send power to the GFCI (120V) and auxiliary (dual-voltage) receptacles.

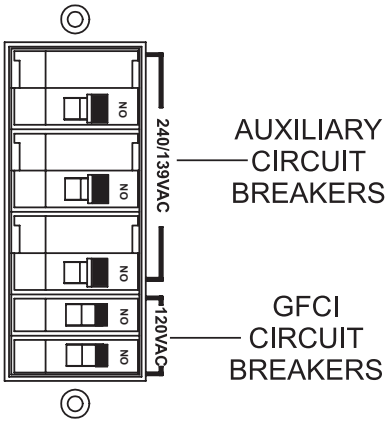


Figure 61. GFCI And Auxiliary Circuit Breakers (ON)

11. On the touch display, press the **Page Up button** (Figure 62) to scroll to **screen 4 of 7**.

Figure 62. Page Up Button

12. Verify that the **Output Voltage Status screen (4 of 7)** is displayed. Observe the **L1, L2 and L3 voltage readings**. See Figure 63.

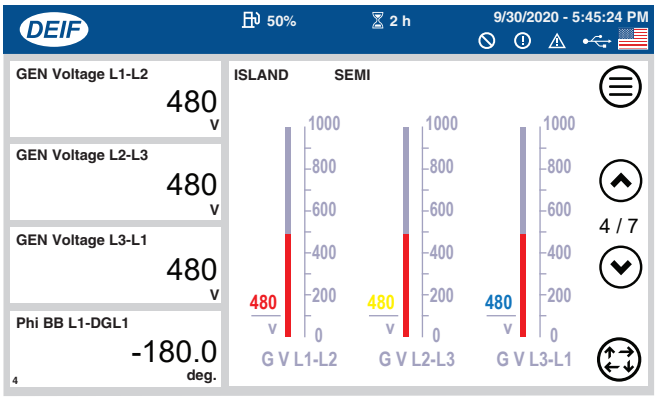


Figure 63. Output Voltage Status Screen (4 of 7)

13. Press the **Page Up button** (Figure 64) to scroll to **screen 5 of 7**.

Figure 64. Page Up Button

14. Verify that the **Output Current Status screen (5 of 7)** is displayed. Observe the **L1, L2 and L3 current readings**. The current readings will indicate zero amps until a load is applied. See Figure 65.

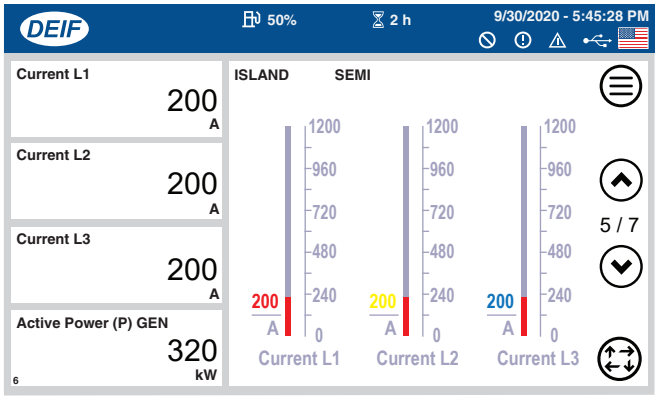


Figure 65. Output Current Status Screen (5 of 7)

15. Press the **Page Up button** (Figure 66) to scroll to **screen 6 of 7**.

Figure 66. Page Up Button

16. Verify that the **Engine Status screen (6 of 7)** is displayed. **Coolant temperature, oil pressure, and engine speed gauges** are all located on this screen (Figure 67).

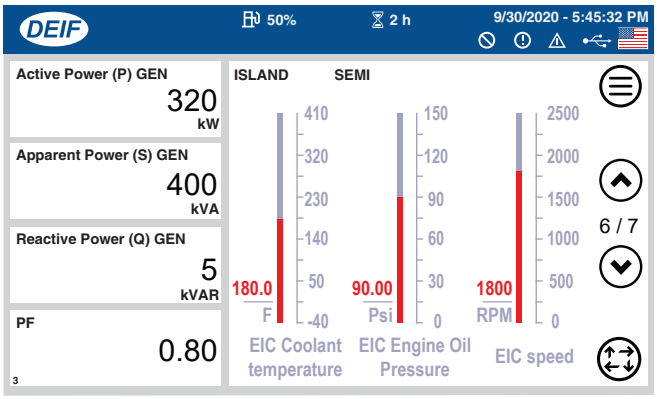


Figure 67. Engine Status Screen (6 of 7)

17. The generator will run until manually stopped or an abnormal condition occurs.

18. If desired, press the **AOP button on screen 1 of 7** (Figure 46) ***or*** press the **AOP button on the Main Menu screen** (Figure 68) to view the operating status of the generator as shown in Figure 69.

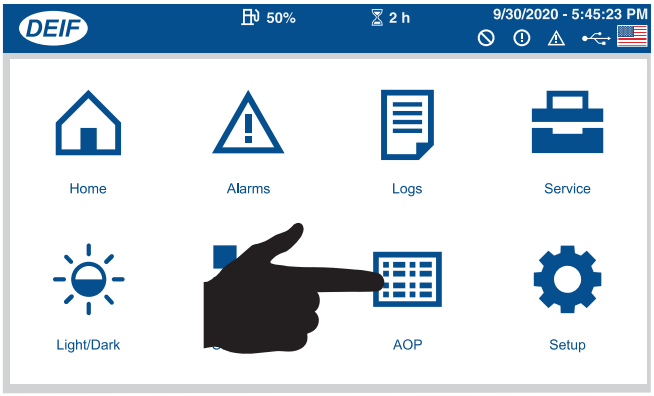


Figure 68. AOP Button (Main Menu Screen)

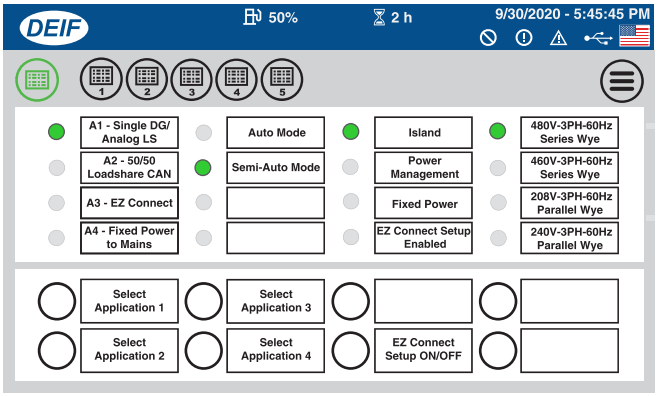


Figure 69. Operating Status (Main AOP Screen)

STARTING (AUTO MODE)

⚠ WARNING

When running the generator in **Auto mode**, remember that the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance while the generator is in **Auto mode**.

NOTICE

When the generator is placed in **Auto mode**, the engine glow plugs will be warmed if necessary and the engine will start automatically.

1. Perform steps 1–2 of the previous section, ***Starting (Semi-Auto Mode)***.
2. Press the **Auto Mode button** (Figure 70).

Figure 70. Auto Mode Button

3. Once the start signal is received (the remote start contacts are closed), the pre-heating process will begin. When the pre-heating process has completed, the engine will start automatically and accelerate to rated speed.
4. When voltage and frequency match the expected output, the main circuit breaker contacts will close automatically and send power to the load.
5. Upon removal of the start signal (the remote start contacts are opened), the main circuit breaker contacts will open automatically and disconnect from the load.
6. Once the main circuit breaker contacts are open, the engine will shut down after a 30-second cool-down period. The control system will remain in **Auto mode** and continue monitoring the remote start contacts.

STARTING (MANUAL MODE)

Manual mode enables the use of the **Voltage Up/Down buttons** (Figure 71) on the AOP1 screen for manual voltage adjustment.

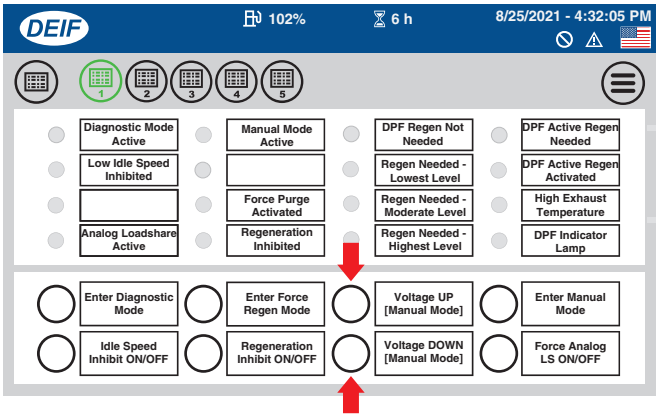


Figure 71. AOP1 Screen (Voltage Up/Down Buttons)

1. Perform steps 1–2 of the previous section, ***Starting (Semi-Auto Mode)***.
2. Press the **Manual Mode button** as shown in Figure 72.

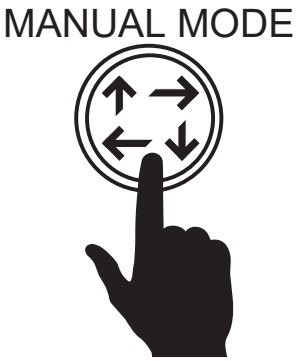


Figure 72. Manual Mode Button

3. Verify that the message **ISLAND MANUAL** is shown on the touch display (Figure 73).

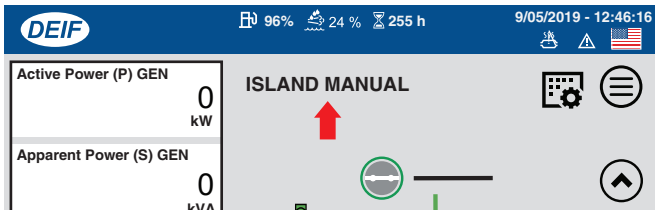


Figure 73. Status Message (ISLAND MANUAL)

4. Perform steps 5–18 of the previous section, ***Starting (Semi-Auto Mode)***.

NORMAL SHUTDOWN PROCEDURE

WARNING

NEVER stop the engine suddenly except in an emergency.

1. Place the load's ON/OFF switch in the **OFF** position.
2. Place the **GFCI and auxiliary circuit breakers** (Figure 74) in the **OFF** position.

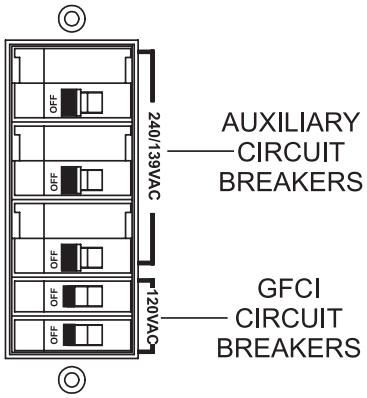


Figure 74. GFCI and Auxiliary Circuit Breakers (OFF)

3. Press the **Main Circuit Breaker OFF button** (Figure 75) on the touch display.

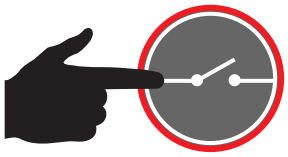


Figure 75. Main Circuit Breaker OFF Button

4. Verify that the **Main Circuit Breaker OFF lamp** (Figure 76) is illuminated **(RED)**. This indicates that **the circuit breaker contacts are open**.

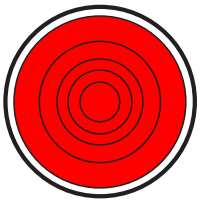


Figure 76. Main Circuit Breaker OFF Lamp (ON/RED)

5. Press the **STOP button** (Figure 77) on the touch display. The engine will stop after a 30-second cool-down period.

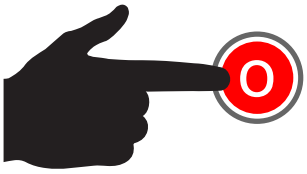


Figure 77. Stop Button

6. Place the **Control Power switch** (Figure 78) in the **OFF (down)** position.

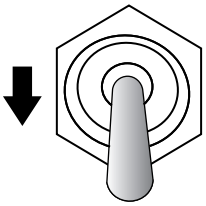


Figure 78. Control Power Switch (OFF)

7. Wait at least two minutes to allow the DEF system to purge, then place the **Battery switch** (Figure 79) in the **OFF** position.

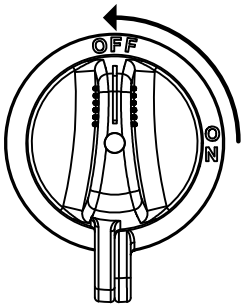


Figure 79. Battery Switch (OFF)

EMERGENCY SHUTDOWN PROCEDURE

NOTICE

The **Emergency Stop switch** should only be used to stop the engine in case of an emergency or to lock out operation during service. The Emergency Stop switch should **NEVER** be used for routine stopping of the engine.

To stop the engine in the event of an emergency:

1. Press the **Emergency Stop switch** (Figure 80).

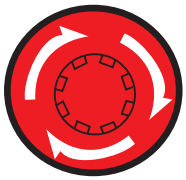


Figure 80. Emergency Stop Switch

2. After the engine has completely stopped, place the **Control Power switch** in the **OFF** position (Figure 78).
3. The Emergency Stop switch is a push-locked type switch. The switch contact can only be released by rotating the button in the clockwise direction. The engine cannot be restarted until the contact is released (closed) and all alarms have been cleared from the list on the touch display.

AUTOMATIC SHUTDOWN SYSTEM

This generator is equipped with engine protection devices that will automatically shut down the engine and provide a warning to the operator when a fault occurs. Refer to the ***Troubleshooting (Faults)*** section of this manual for more information. Table 16 contains a complete list of engine protection devices and fault codes. If necessary, contact MQ Power for additional technical support.

NOTICE

Before inspecting the cause of an engine shutdown, make sure the **STOP button** on the touch display has been activated (the main circuit breaker contacts are **open**). Also, place the Battery switch and all circuit breakers in the **OFF** position.

NOTICE

Although the unit is equipped with engine protection devices, regularly scheduled preventive maintenance is strongly advised. Refer to Table 12.

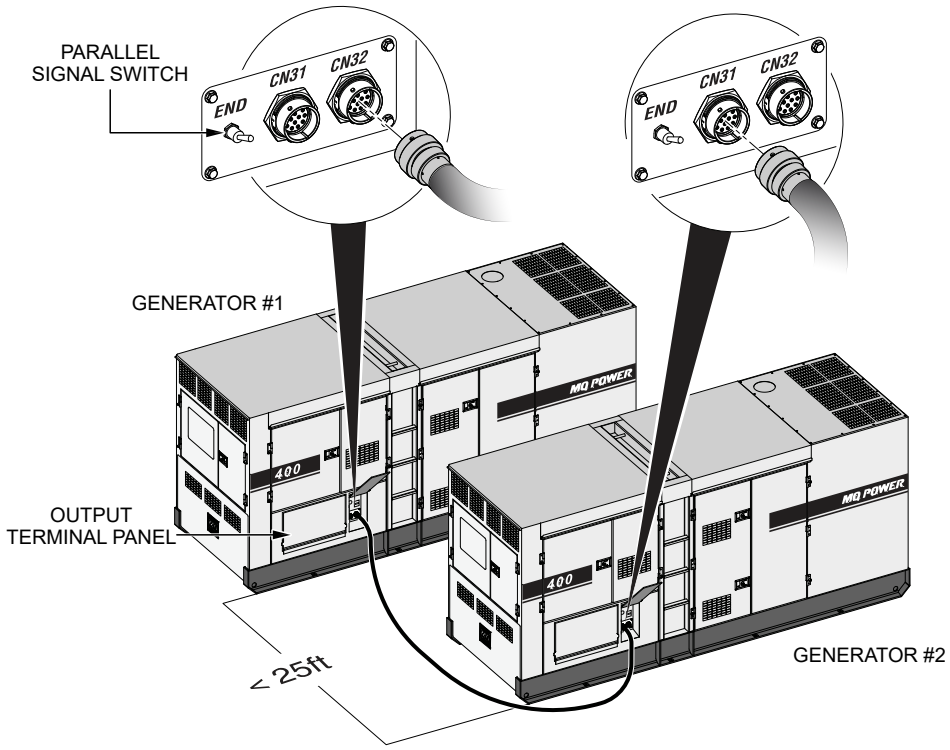


Figure 81. Communication Cable Connections (Two Generators)

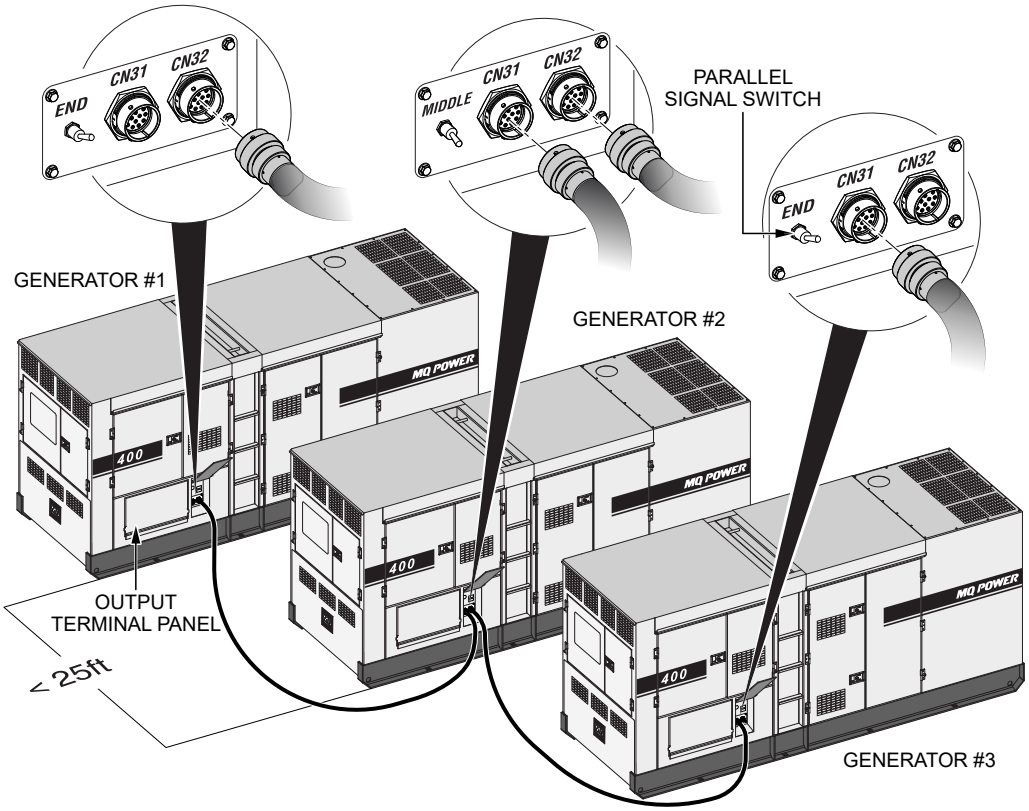


Figure 82. Communication Cable Connections (Three Or More Generators)

NOTICE

To ensure stable operation of multiple generator units connected in parallel and working as one unit, it is necessary to maintain equal voltage, frequency, and engine governor characteristics between them.

For this reason, it is necessary to perform parallel operation using generator units with identical alternator pitch and brand-compatible controllers. **Therefore, using multiple units of the same model generator for paralleling is recommended.**

COMMUNICATION AND POWER CONNECTIONS (TWO GENERATORS)

1. Make sure the spacing between each generator does not exceed **25 feet (7.62 m)**. See Figure 81.
2. **On generator #1**, connect the male end of the 25-foot (7.62-meter) communication cable to the female parallel operation receptacle labeled **CN32** (Figure 81).
3. Connect the female end of the communication cable to the male parallel operation receptacle labeled **CN31** on **generator #2** (Figure 81).
4. Place the **Parallel Signal switch** on each generator in the **END** position (Figure 81).
5. Connect the **output terminals** on each paralleled unit in accordance with local state/county and National Electrical Code requirements.
6. To prevent arcing, make sure all wires are securely connected. In addition, make sure the phasing is correct. All wires should be matched with the letters (U, V, W, O) engraved on the output terminal panel of each unit.
7. Make sure the load's ON/OFF switch is in the **OFF** position.

⚠ WARNING

ALWAYS connect the output terminals to the load **before** starting up the generators. Making power connections while the generators are running can lead to shock/electrocution, causing **severe personal injury or even death!**

COMMUNICATION AND POWER CONNECTIONS (THREE OR MORE GENERATORS)

NOTICE

A maximum of 32 generators can be operated in parallel. The total length of all communication cables used must be less than 328 feet (100 meters).

1. Make sure the spacing between each generator does not exceed **25 feet (7.62 m)**. See Figure 82.
2. **On generator #1**, connect the male end of a 25-foot (7.62-meter) communication cable to the female parallel operation receptacle labeled **CN32** (Figure 82).
3. Connect the female end of the communication cable to the male parallel operation receptacle labeled **CN31** on **generator #2** (Figure 82).
4. **On generator #2**, connect the male end of a 25-foot (7.62-meter) communication cable to the female parallel operation receptacle labeled **CN32** (Figure 82).
5. Connect the female end of the communication cable to the male parallel operation receptacle labeled **CN31** on **generator #3** (Figure 82).
6. Connect any remaining generators to the system using additional communication cables as shown in Figure 82.
7. **On generator #1**, place the **Parallel Signal switch** in the **END** position (Figure 82).
8. **On the last generator in the system**, place the **Parallel Signal switch** in the **END** position (Figure 82).
9. **On each generator located *in between* the first and last generators**, place the **Parallel Signal switch** in the **MIDDLE** position (Figure 82).
10. Connect the **output terminals** on each paralleled unit in accordance with local state/county and National Electrical Code requirements.
11. Make sure all wires are securely connected. In addition, make sure the phasing is correct. All wires should be matched with the letters (U, V, W, O) engraved on the output terminal panel of each unit.
12. Make sure the load's ON/OFF switch is in the **OFF** position.

PARALLEL OPERATION (TWO OR MORE GENERATORS)

There are two available applications for parallel operation of multiple generators — **50/50 Loadshare** and **EZ Connect**.

- **50/50 Loadshare** — Shares power equally between generators. Internal communication IDs must be programmed manually. Recommended for use with identical generator models.
- **EZ Connect** — Shares power proportionally between generators based on kW ratings. Internal communication IDs are set automatically based on scheduled maintenance timers (more time until scheduled maintenance = higher priority; less time until scheduled maintenance = lower priority). Recommended for use when paralleling various generator models.

NOTICE

For ease of use, the EZ Connect application is recommended for parallel operation.

50/50 LOADSHARE APPLICATION

Perform the following procedures to operate two or more units in parallel using the 50/50 Loadshare application. For EZ Connect application procedures, proceed to page 53.

Before Starting

WARNING

ALWAYS connect the output terminals to the load **before** starting up the generators. Making power connections while the generators are running can lead to shock/electrocution, causing **severe personal injury or even death!**

NOTICE

If the preset voltage (set on the voltage change-over board) is different between the paralleled units, the main circuit breakers **will not turn on**.

On each generator, perform steps 1–9 under ***Before Starting*** in the ***Generator Start-Up Procedure (Single Unit)*** section of this manual.

Application Selection (50/50 Loadshare)

Perform the following procedure on each generator:

1. On the touch display, press the **AOP button** (Figure 83).

Figure 83. AOP Button

2. Verify that the **Main AOP screen** (Figure 84) is displayed.

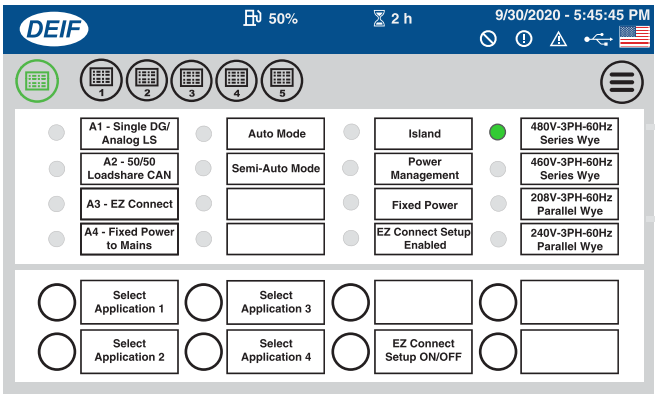


Figure 84. Main AOP Screen

3. If the Main AOP screen (Figure 84) is not displayed, press the **Main AOP button** (Figure 85).

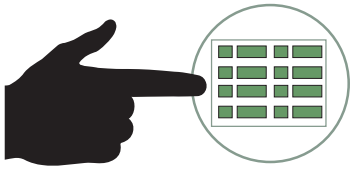


Figure 85. Main AOP Button

4. Press the **Select Application 2 button** (Figure 86).

Figure 86. Select Application 2 Button

5. Verify that the **A2 - 50/50 Loadshare CAN status indicator** is **ON (GREEN)**. See Figure 87.

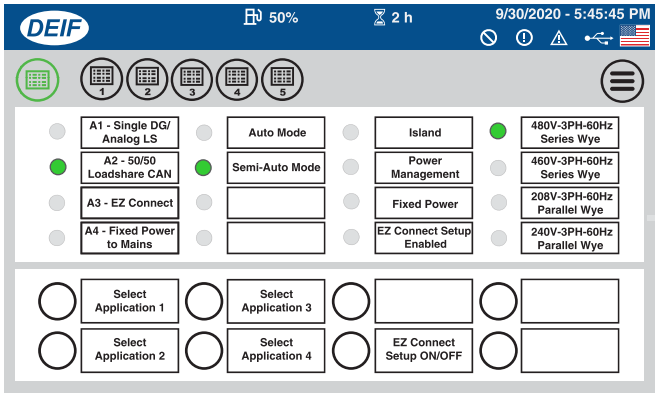


Figure 87. A2 - 50/50 Loadshare CAN Status Indicator (ON/GREEN)

6. Press the **Main Menu button** (Figure 88).

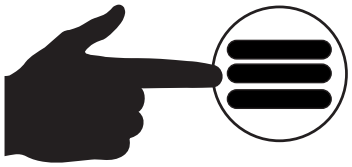


Figure 88. Main Menu Button

7. Verify that the **Main Menu screen** (Figure 89) is displayed, then press the **Home button**.

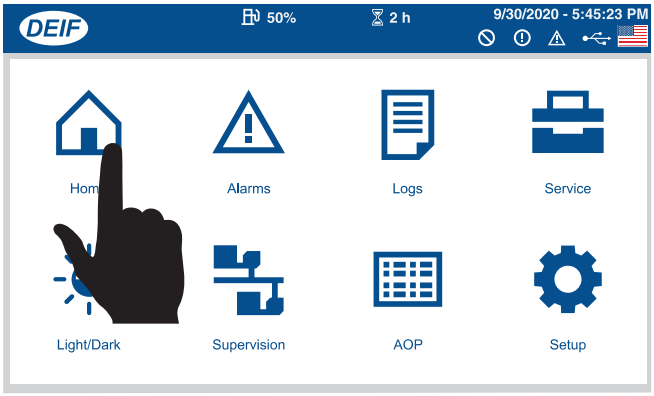


Figure 89. Main Menu Screen (Home Button)

8. Verify that the **Home screen (1 of 7)** is displayed. See Figure 90.

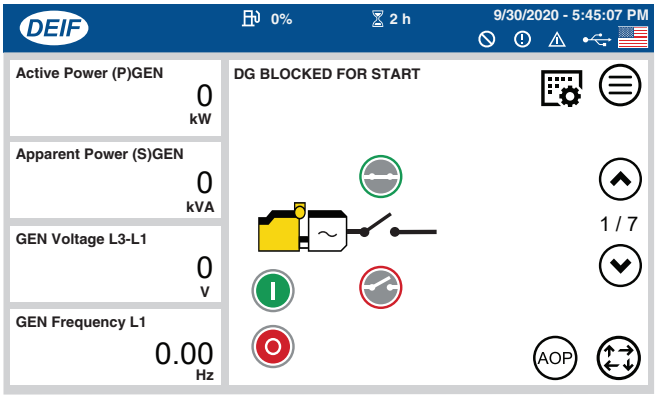


Figure 90. Home Screen (1 of 7)

9. Press the **Page Up button** (Figure 91) to scroll to **screen 2 of 7** on the touch display.

Figure 91. Page Up Button

10. Verify that **screen 2 of 7** is displayed (Figure 92), then press the **Power Management button**.

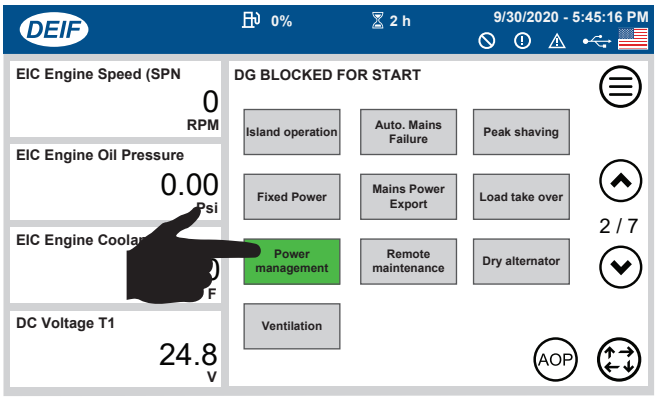


Figure 92. Screen 2 of 7 (Power Management Button)

11. Press the **AOP Button** (Figure 93).

Figure 93. AOP Button

12. Verify that the **Main AOP screen** (Figure 94) is displayed. If the Main AOP screen is not displayed, press the **Main AOP button** (Figure 85).

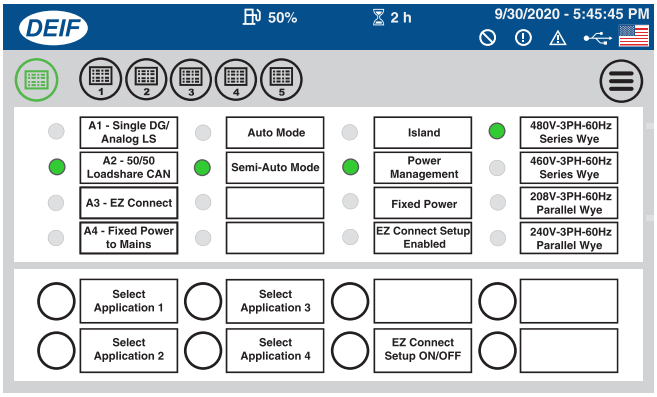


Figure 94. Main AOP Screen
Power Management Status Indicator ON

13. Verify that the **Power Management status indicator** (Figure 94) is **ON (GREEN)**.

14. Repeat steps 1–13 **on each generator**.

Setting the Internal Communication IDs

Perform the following procedure on each generator:

1. Press the **Main Menu button** (Figure 95).

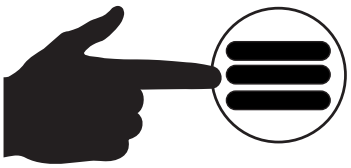


Figure 95. Main Menu Button

2. Verify that the **Main Menu screen** (Figure 89) is displayed, then press the **Home button**.

3. Verify that the **Home screen (1 of 7)** is displayed. See Figure 90.

4. Press the **Controller Settings Shortcut button** (Figure 96) on the touch display.

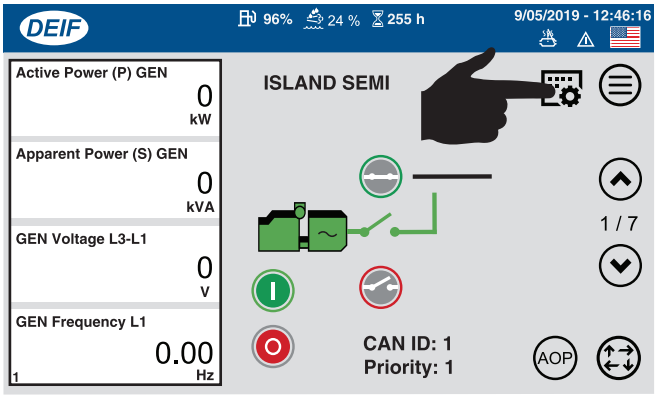


Figure 96. Controller Settings Shortcut Button

5. Verify that the **Controller Settings Groups screen** is displayed (Figure 97), then press the **Jump button**.

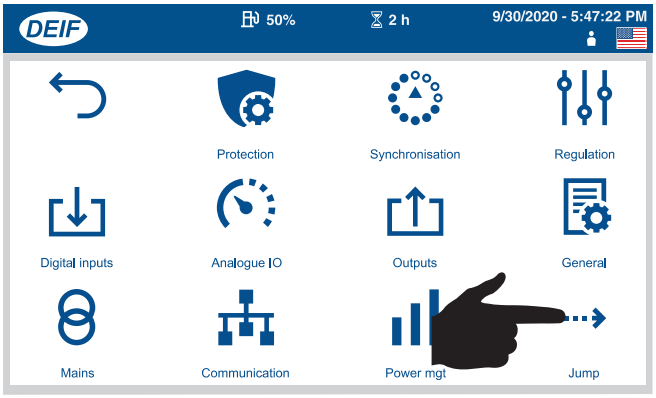


Figure 97. Controller Settings Groups Screen (Jump Button)

6. Verify that the **Search Results screen** is displayed (Figure 98), then press the **Search button**.

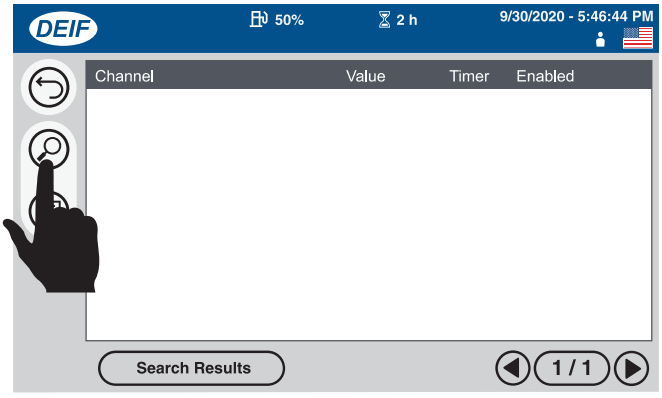


Figure 98. Search Results Screen

7. Verify that the **Text Keyboard screen** (Figure 99) is displayed.

Figure 99. Text Keyboard Screen

8. Using the keyboard, enter the parameter value **7531**, then press the **Enter key** as shown in Figure 99.

9. Wait a few seconds for the parameter search to initialize. The search result will be displayed on the **Search Results screen** (Figure 100).

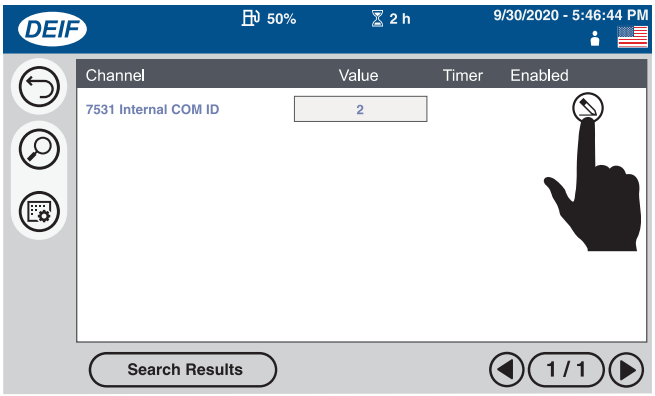


Figure 100. Search Results Screen (Edit Button)

10. Press the **Edit button** (Figure 100).

11. Verify that the **Password Required screen** is displayed (Figure 101), then press the **Unlock button**.

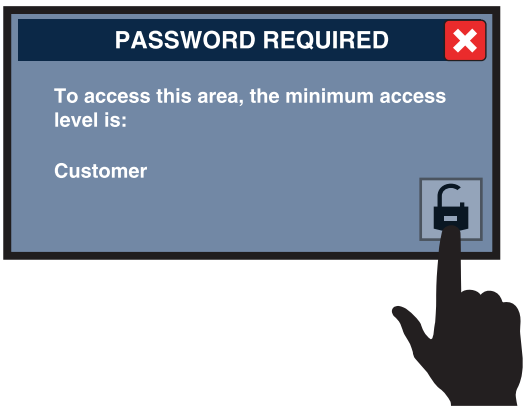


Figure 101. Password Required Screen

12. Verify that the **Passcode Keypad screen** (Figure 102) is displayed.

Figure 102. Passcode Keypad Screen (User ID)

13. Using the keypad (Figure 102), enter the **4-digit user ID password**, then press the **ENTER** key.

14. Verify that the **Internal Communication ID screen** (Parameter 7531) is displayed. See Figure 103.

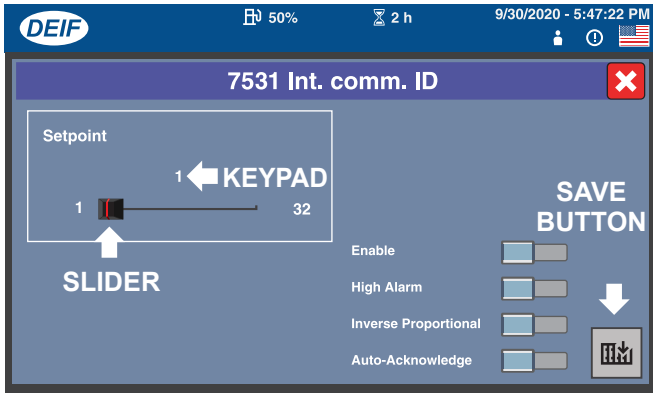


Figure 103. Internal Communication ID Screen (Parameter 7531)

NOTICE

The **Internal Communication ID value** is unique for each generator (Figure 103). A different numerical value must be entered for each generator. Enter a value of **1** for generator #1 and a value of **2** for generator #2.

15. There are two methods for entering an **Internal Communication ID value**:

    - **Method 1** — On the **Internal Communication ID screen**, move the slider (Figure 103) to the desired value (1–32), then press the **Save button**.
    - **Method 2** — Select the numerical value (Figure 103) located just above the slider and verify that the **Value Keypad screen** (Figure 104) is displayed. Enter the desired value on the keypad, then press the **Enter key**.

Figure 104. Value Keypad Screen (Internal Communication ID)

16. Verify that the **Internal Communication ID screen** is displayed with the correct **Internal Communication ID value** (Figure 105).

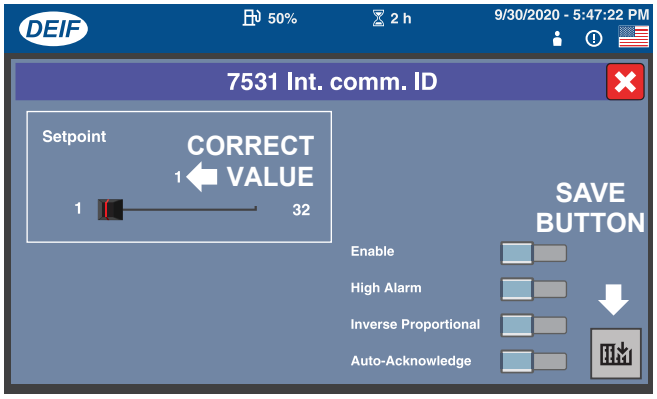


Figure 105. Internal Communication ID Screen (Value Entered)

17. Press the **Save button** (Figure 105). The touch display will return to the **Search Results screen** (Figure 106).

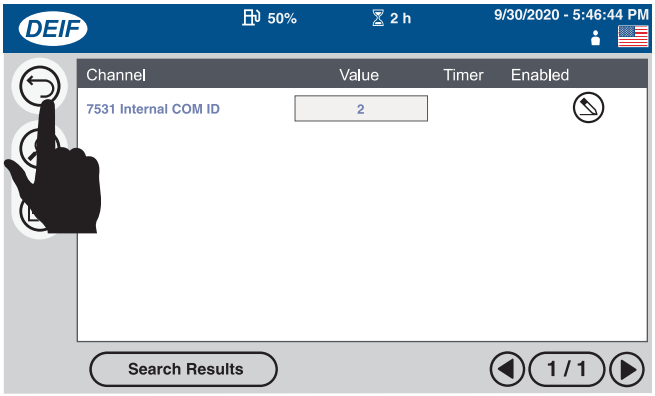


Figure 106. Search Results Screen (Return Button)

18. Press the **Return button** (Figure 106) to return to the **Controller Settings Groups screen**. See Figure 107.

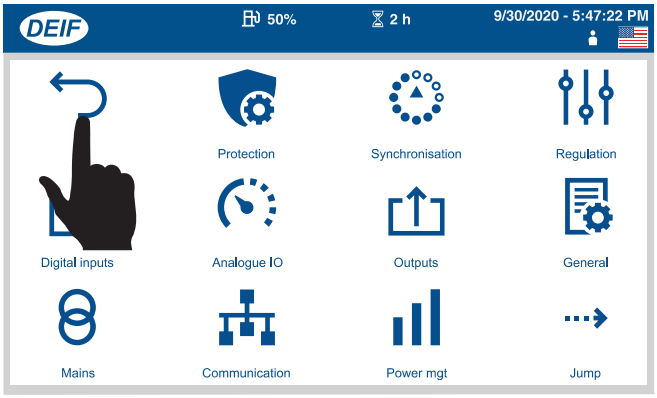


Figure 107. Controller Settings Groups Screen (Return Button)

19. Press the Return button (Figure 107) to return to the **Home screen (1 of 7)** on the touch display.

20. Repeat steps 1–19 **on each generator**. Remember to select a different **Internal Communication ID value** (1–32) for each generator.

Starting (50/50 Loadshare)

NOTICE

When multiple generators are connected in parallel to act as a single unit, it is important that the voltage and phasing of each generator be synchronized.

NOTICE

DO NOT try to run parallel units in Manual mode.

1. **On generator #1**, press the **Mode Change button** (Figure 108) on the touch display.

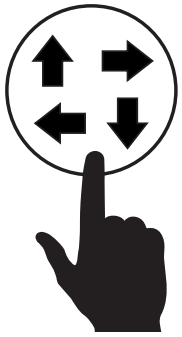


Figure 108. Mode Change Button

2. Verify that the four **Operational Mode buttons** (Figure 109) are displayed just above the **Mode Change button**.

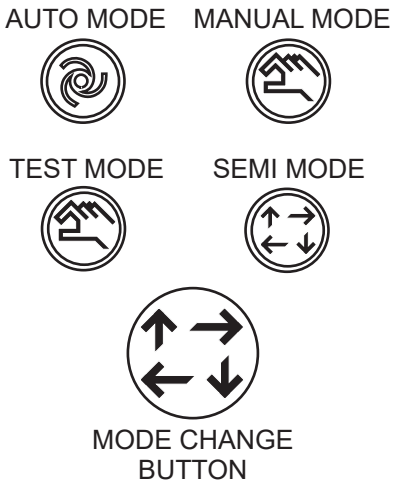


Figure 109. Operational Mode Buttons

3. Press the **Semi Mode button** (Figure 110).

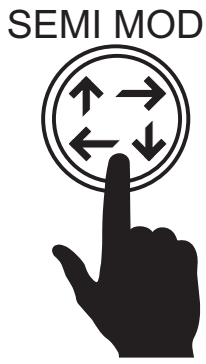


Figure 110. Semi Mode Button

NOTICE

The Mode Change button will display one of the four Operational Mode icons, depending on which mode is selected. For example, if the Auto Mode button is selected, then the Mode Change button will display the Auto Mode icon.

4. Verify that the message **DG READY** (Figure 111) is shown on the touch display of **generator #1**.

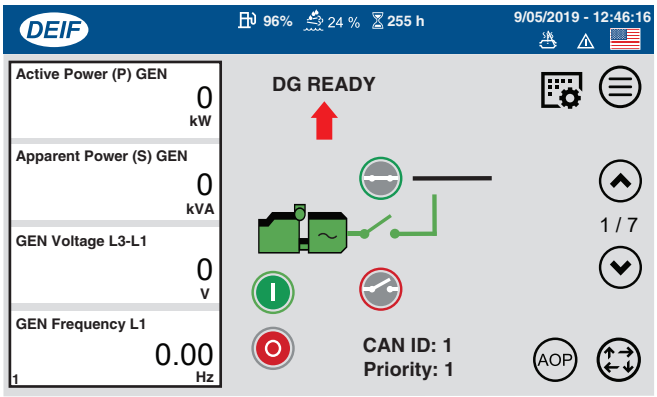


Figure 111. Status Message (DG READY)

5. Press the **START button** (Figure 112).

Figure 112. Start Button

NOTICE

If the engine fails to start on the first crank attempt, two additional crank cycles will occur automatically. If the engine fails to start on the third attempt, a warning message will be shown on the touch display indicating that corrective action is required before the engine can be restarted.

NOTICE

In cold weather conditions, the engine will pre-heat automatically and then start automatically after the pre-heating cycle has completed.

NOTICE

When the **Idle Speed Inhibit button** (located on the **AOP1 screen**) has been pressed and the **Low Idle Speed Inhibited status indicator** is **ON (GREEN)**, the engine will not undergo the standard idling warmup period upon start-up nor the standard cooling period upon shutdown.

6. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
7. On the touch display (Figure 113), verify that the **voltage (V)** and **frequency (Hz)** match the expected output.

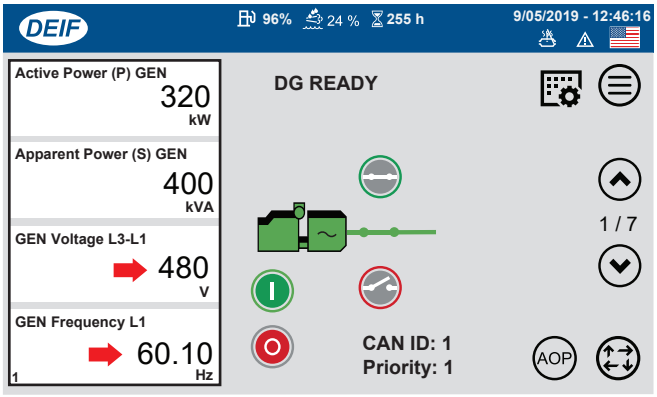


Figure 113. Voltage (V) and Frequency (Hz)

8. Press the **Main Circuit Breaker ON button** (Figure 114).

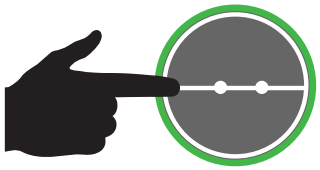


Figure 114. Main Circuit Breaker ON Button

9. Verify that the **Main Circuit Breaker ON lamp** (Figure 115) is illuminated **(GREEN)**. This indicates that **the circuit breaker contacts are closed** and power has been sent to the load.

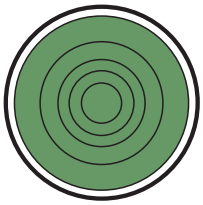


Figure 115. Main Circuit Breaker ON Lamp (ON/GREEN)

10. Perform steps 1–8 on **generator #2**.
11. After pressing the **Main Circuit Breaker ON button** on **generator #2**, verify that the **Synchronization Status screen (7 of 7)** is shown on the touch display. See Figure 116.

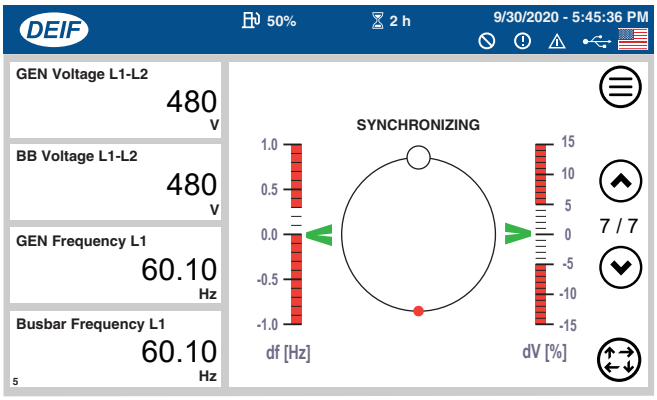


Figure 116. Synchronization Status Screen

12. Observe as the small red circle (Figure 116) rotates about the axis, indicating that synchronization between the two generators is in progress.
13. Once the smaller (red) circle is **inside** the larger (white) circle located at the top of the axis, the synchronization process has completed.
14. Once the synchronization process has completed, the main circuit breaker contacts on **generator #2** will close automatically, and the touch display will return to the **Home screen (1 of 7)**.
15. Perform steps 10–14 **on each remaining generator** in the system.

EZ CONNECT APPLICATION

Perform the following procedures to operate two or more units in parallel using the EZ Connect application.

Before Starting

WARNING

ALWAYS connect the output terminals to the load **before** starting up the generators. Making power connections while the generators are running can lead to shock/ electrocution, causing **severe personal injury or even death!**

NOTICE

If the preset voltage (set on the voltage change-over board) is different between the paralleled units, the main circuit breakers **will not turn on**.

On each generator, perform steps 1–9 under ***Before Starting*** in the ***Generator Start-Up Procedure (Single Unit)*** section of this manual.

Application Selection (EZ Connect)

Perform steps 1–23 on generator #1:

1. On the touch display, press the **AOP button** (Figure 117).

Figure 117. AOP Button

2. Verify that the **Main AOP screen** (Figure 118) is displayed.

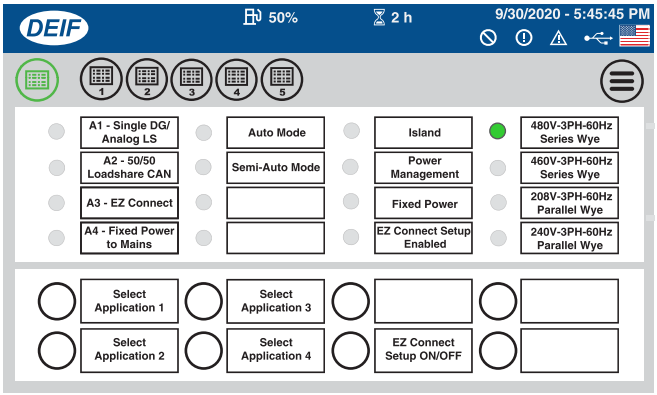


Figure 118. Main AOP Screen

3. If the Main AOP screen (Figure 118) is not displayed, press the **Main AOP button** (Figure 119).

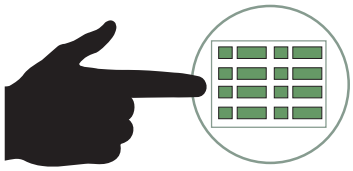


Figure 119. Main AOP Button

4. Press the **Select Application 3 button** on the touch display (Figure 120).

Figure 120. Select Application 3 Button

5. Verify that the **A3 - EZ Connect status indicator** (Figure 121) is **ON (GREEN)**.

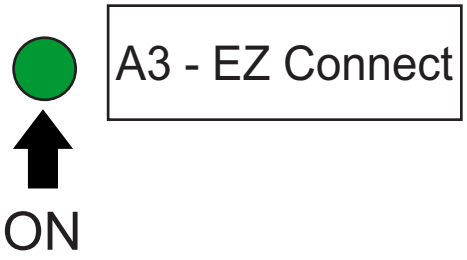


Figure 121. A3 - EZ Connect Status Indicator (ON/GREEN)

6. Press the **EZ Connect Setup ON/OFF button** (Figure 122).

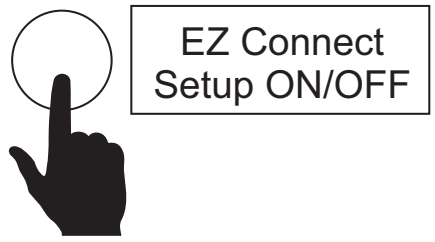


Figure 122. EZ Connect Setup ON/OFF Button

7. Verify that the **EZ Connect Setup Enabled status indicator** (Figure 123) is **ON (GREEN)**.

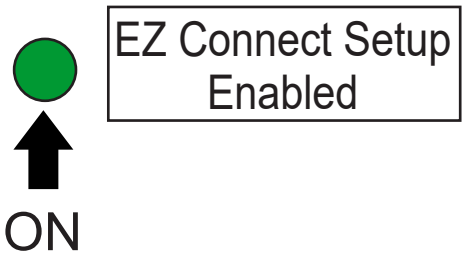


Figure 123. EZ Connect Setup Enabled Status Indicator (ON/GREEN)

8. Next, verify that the **Checking PM CAN screen** is displayed (Figure 124).

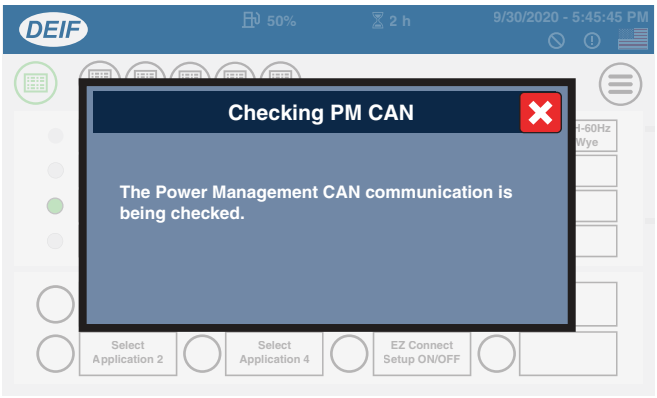


Figure 124. Checking PM CAN Screen

9. Next, the **Receiving Application screen** will be displayed (Figure 125).

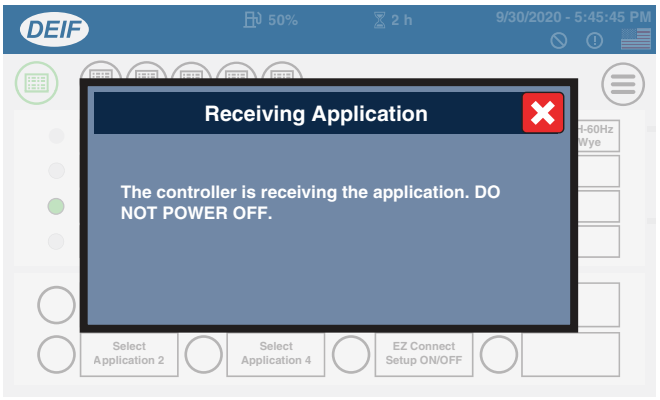


Figure 125. Receiving Application Screen

10. After the application has been received, verify that the **Start New Plant screen** is displayed (Figure 126), then press the **OK button**.

Figure 126. Start New Plant Screen

11. Verify that the **Receiving Application screen** is displayed again (Figure 125).

12. Once the application has been received, verify that the **Main AOP screen** is displayed (Figure 127).

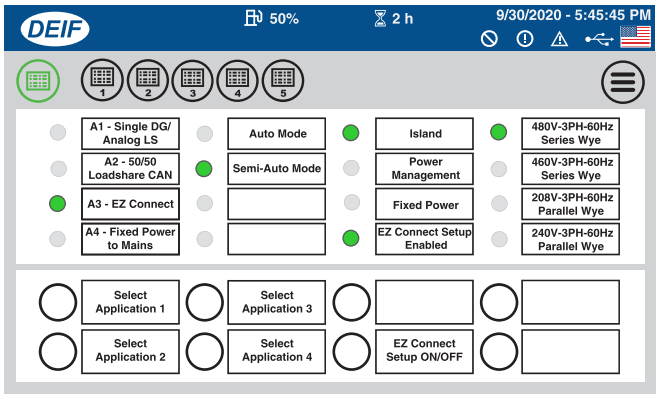


Figure 127. Main AOP Screen (EZ Connect)

13. Press the **Main Menu button** (Figure 128).

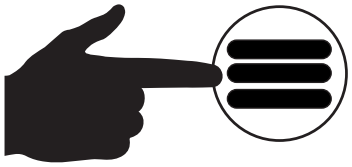


Figure 128. Main Menu Button

14. Verify that the **Main Menu screen** (Figure 129) is displayed, then press the **Home button**.

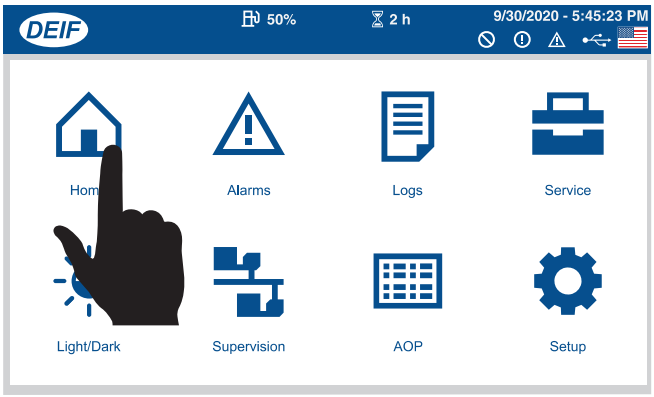


Figure 129. Main Menu Screen (Home Button)

15. Verify that the **Home screen (1 of 7)** is displayed. See Figure 130.

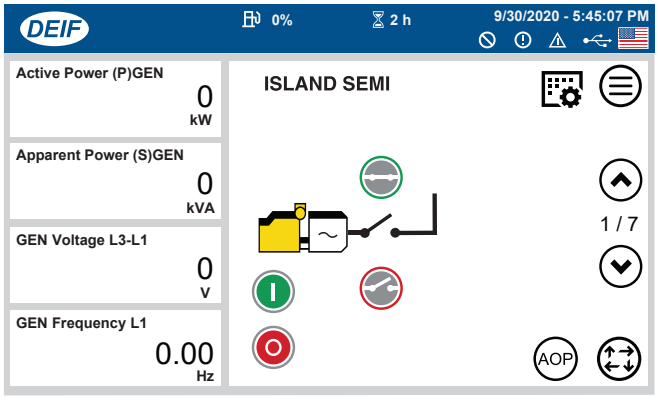


Figure 130. Home Screen (1 of 7)

16. Press the **Page Up button** (Figure 131) to scroll to **screen 2 of 7** on the touch display.

Figure 131. Page Up Button

17. Verify that **screen 2 of 7** is displayed (Figure 132), then press the **Power Management button**.

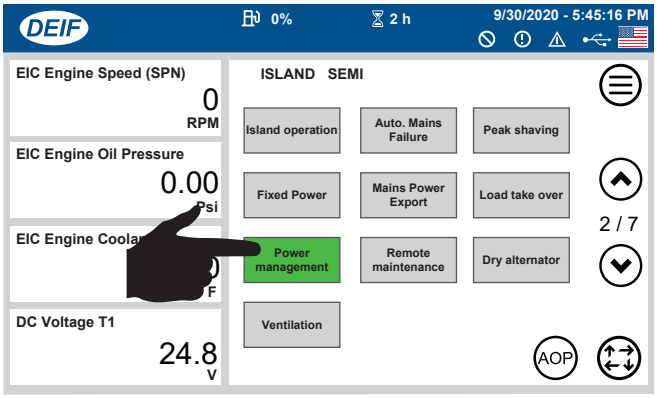


Figure 132. Screen 2 of 7 (Power Management Button)

18. Verify that the **Change Plant Mode screen** is displayed (Figure 133), then press the **OK button.**

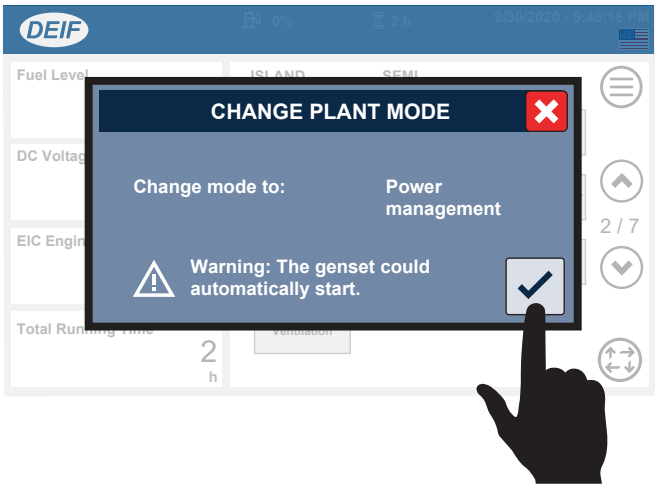


Figure 133. Change Plant Mode Screen

19. Repeat steps 13–15 to return to the **Home screen (1 of 7)**.

20. Press the **AOP button** (Figure 134).

Figure 134. AOP Button

21. Verify that the **Main AOP screen** (Figure 135) is displayed. If the Main AOP screen is not displayed, press the **Main AOP button** (Figure 119).

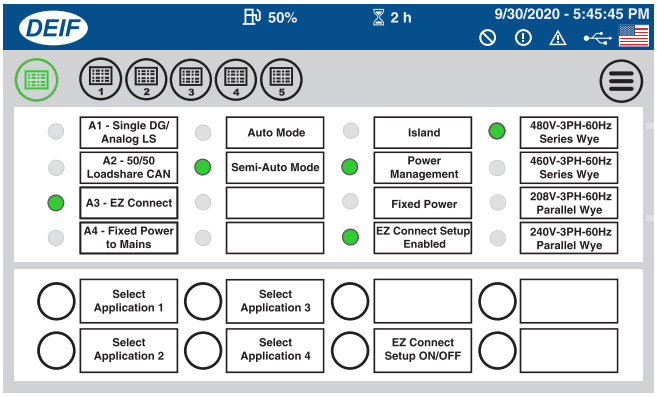


Figure 135. Main AOP Screen

22. Verify that the **Power Management status indicator** (Figure 135) is **ON (GREEN)**.

23. Repeat steps 13–15 to return to the **Home screen** (Figure 130).

24. Perform steps 1–9 on **generator #2**.

25. **On generator #2**, verify that the **Add DG to Plant screen** is displayed (Figure 136), then press the **OK button**.

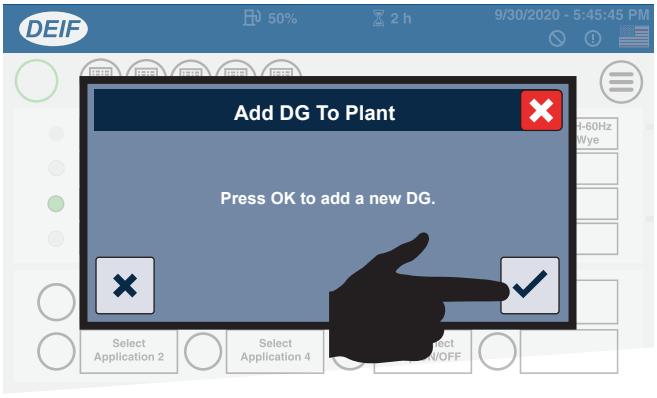


Figure 136. Add DG to Plant Screen

26. Perform steps 11–17 on **generator #2**.

27. Press the **Main Menu button** (Figure 137) on **generator #2**.

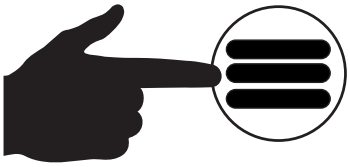


Figure 137. Main Menu Button

28. Verify that the **Main Menu screen** is displayed (Figure 138), then press the **Supervision button**.

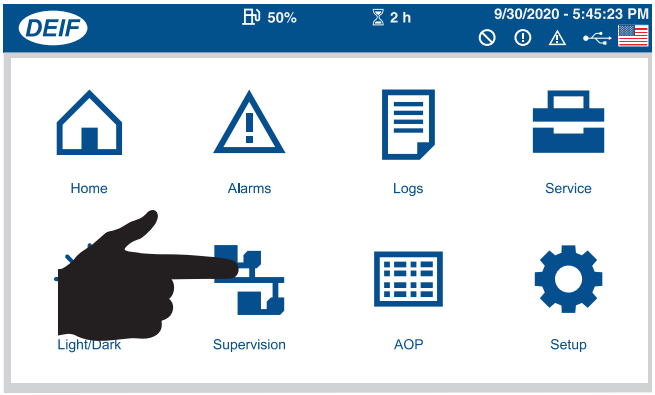


Figure 138. Main Menu Screen (Supervision Button)

29. Verify that the generator layout shown on the **Supervision screen** (Figure 139) identifies **two generators** in the paralleled system.

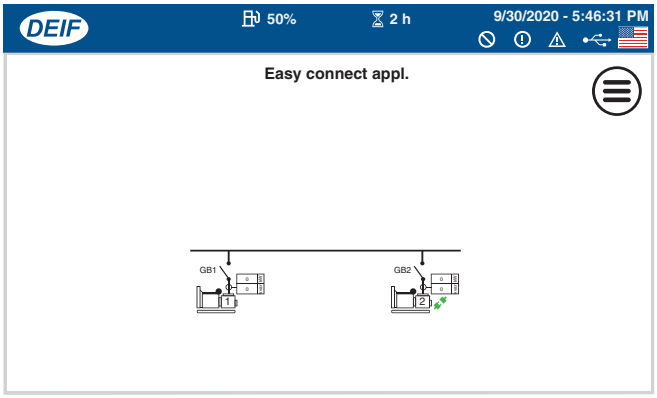


Figure 139. Supervision Screen

30. Perform steps 13–15 to return to the **Home screen** (Figure 130).

31. Perform steps 24–30 **on each remaining generator** in the system.

Starting (EZ Connect, Semi-Auto Mode)

NOTICE

DO NOT try to run parallel units in Manual mode.

1. **On generator #1**, press the **Mode Change button** (Figure 140) on the touch display.

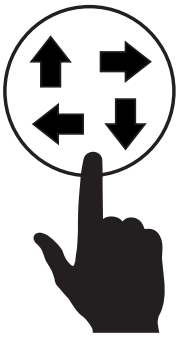


Figure 140. Mode Change Button

2. Verify that the four **Operational Mode buttons** (Figure 141) are displayed just above the **Mode Change button**.

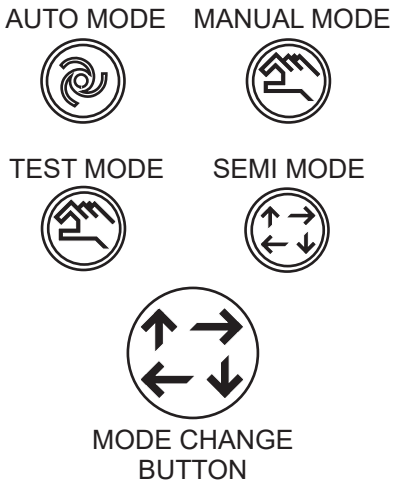


Figure 141. Operational Mode Buttons

NOTICE

The Mode Change button will display one of the four Operational Mode icons, depending on which mode is selected. For example, if the Auto Mode button is selected, then the Mode Change button will display the Auto Mode icon.

3. Press the **Semi Mode button** (Figure 142).

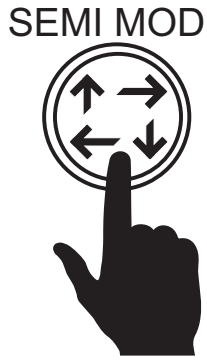


Figure 142. Semi Mode Button

4. Repeat steps 1–3 on each generator in the system.

Perform steps 5–12 on each generator (2–x) in the system <u>except</u> generator #1:

5. Press the **START button** (Figure 143) on the touch display.

Figure 143. Start Button

NOTICE

If the engine fails to start on the first crank attempt, two additional crank cycles will occur automatically. If the engine fails to start on the third attempt, a warning message will be shown on the touch display indicating that corrective action is required before the engine can be restarted.

NOTICE

In cold weather conditions, the engine will pre-heat automatically and then start automatically after the pre-heating cycle has completed.

NOTICE

When the **Idle Speed Inhibit button** (located on the **AOP1 screen**) has been pressed and the **Low Idle Speed Inhibited status indicator** is **ON (GREEN)**, the engine will not undergo the standard idling warmup period upon start-up nor the standard cooling period upon shutdown.

6. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
7. On the touch display (Figure 144), verify that the **voltage (V)** and **frequency (Hz)** match the expected output.

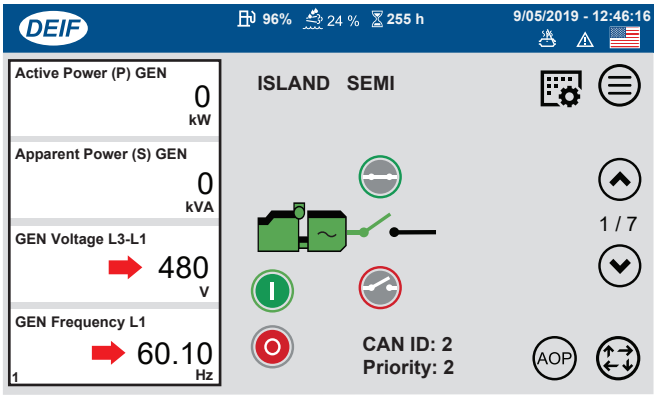


Figure 144. Voltage (V) and Frequency (Hz)

8. Press the **Main Circuit Breaker ON button** (Figure 145).

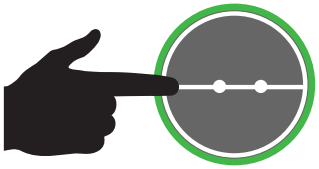


Figure 145. Main Circuit Breaker ON Button

9. Verify that the **Main Circuit Breaker ON lamp** (Figure 146) is illuminated **(GREEN)**. This indicates that **the circuit breaker contacts are closed** and power has been sent to the load.

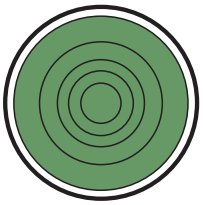


Figure 146. Main Circuit Breaker ON Lamp (ON/GREEN)

10. Press the **Main Menu button** (Figure 137).
11. Verify that the **Main Menu screen** is displayed (Figure 138), then press the **Supervision button**.
12. Verify that the generator layout on the Supervision screen (Figure 147) shows all generators in the paralleled system.

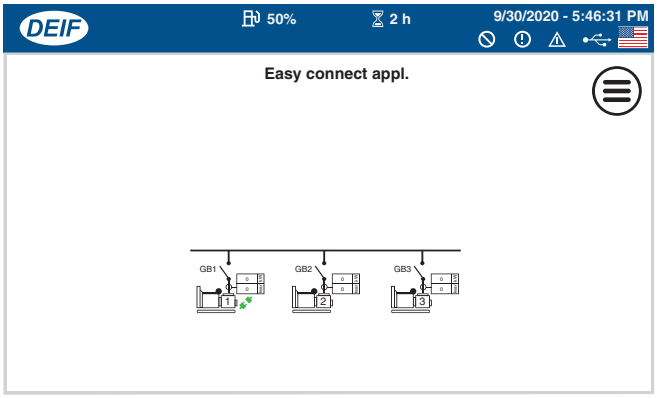


Figure 147. Supervision Screen (Circuit Breakers Closed)

13. Repeat steps 5–12 on **every generator *except* generator #1**.
14. Perform steps 5–8 on **generator #1**.
15. Verify that the **Synchronization Status screen (7 of 7)** is shown on the touch display of **generator #1**. See Figure 148.

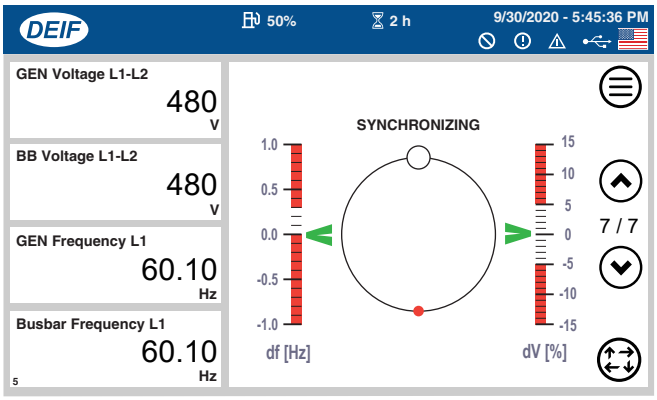


Figure 148. Synchronization Status Screen

16. Observe as the small red circle (Figure 148) rotates about the axis, indicating that synchronization between the generators is in progress.
17. Once the smaller (red) circle is **inside** the larger (white) circle located at the top of the axis, the synchronization process is complete.
18. Once the synchronization process has completed, the main circuit breaker contacts on **generator #1** will close automatically, and the touch display will return to the **Home screen (1 of 7)**.

19. Before proceeding, confirm that there are no active alarms on any of the generators in the layout. The presence of the **Alarm icon** (Figure 149) on the status bar indicates that there are active alarms. Refer to the ***Troubleshooting*** section for more information on active alarms.

Figure 149. Status Bar (Alarm Icon)

20. Repeat steps 10–12 on **generator #1**.

Starting (EZ Connect, Auto Mode)

WARNING

When running a generator in **Auto mode**, remember that the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance while a generator is in **Auto mode**.

NOTICE

When a generator is placed in **Auto mode**, the engine glow plugs will be warmed if necessary and the engine will start automatically.

NOTICE

DO NOT try to run parallel units in Manual mode.

1. Perform steps 1–2 of the previous section, ***Starting (EZ Connect, Semi-Auto Mode)***.
2. Press the **Auto Mode button** (Figure 150).

Figure 150. Auto Mode Button

3. The paralleled system will now start up or shut down connected generators as needed, utilizing a 90/30 threshold scheme: Once the load has reached 90% of the total combined capacity of all active units, another generator will be brought online automatically. Once the load has dropped to below 30% of the total combined capacity of all active units, one of the units will shut down automatically.
4. The engines may also be started by closing the remote start contacts on all units, beginning with generator #1 and moving down the chain. Once the start signals are received (the remote start contacts are closed), the engine pre-heating process will begin.
5. When the engine pre-heating process has completed, the engines will start automatically and accelerate to rated speed.
6. When voltage and frequency match the expected output, the main circuit breaker contacts will close automatically and send power to the load.
7. Upon removal of the start signals (the remote start contacts are opened), the main circuit breaker contacts will open automatically and disconnect from the load.
8. Once the main circuit breaker contacts are open, the engines will shut down after a 30-second cool-down period. The control system will remain in **Auto mode** and continue monitoring the remote start contacts.

DISABLE EASY CONNECT

NOTICE

To avoid faults or shutdowns in the future, **ALWAYS** disable the EZ Connect application **after each use**.

1. **On generator #1**, navigate to the **Main AOP screen**.
2. Press the **EZ Connect Setup ON/OFF button**.

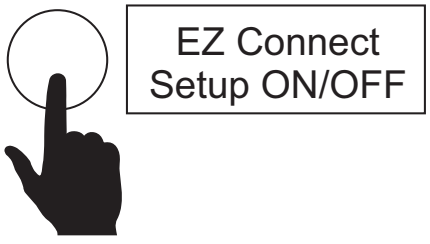


Figure 151. EZ Connect Setup ON/OFF Button

3. Verify that the **EZ Connect Setup Enabled status indicator** (Figure 152) is **OFF**.

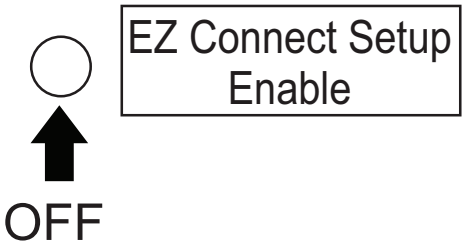


Figure 152. EZ Connect Setup Enabled Status Indicator (OFF)

4. Repeat steps 1–3 **on each generator** in the paralleled system.

PARALLEL OPERATION (SINGLE GENERATOR IN PARALLEL WITH TRANSFER SWITCH)

Perform the following procedures to operate one unit in parallel with a transfer switch (automatic or manual).

Communication And Power Connections

ALWAYS consult with the local Authority Having Jurisdiction (AHJ) before attempting to connect the generator to a transfer switch.

NOTICE

ALWAYS check state, province, district, and municipality electrical requirements before connecting a generator to a transfer switch.

DANGER

Before connecting this generator to any building's electrical system, a **licensed electrician** must install an **isolation (transfer) switch**. Serious damage to the building's electrical system may occur without this transfer switch.

NOTICE

When connecting the generator to an isolation (transfer) switch, **ALWAYS** have power applied to the generator's internal battery charger. This will ensure that the engine will not fail due to a dead battery.

WARNING

Incorrect electrical connections could cause severe damage to equipment and **serious injury or death** to personnel.

Before Starting

Perform steps 1–9 under ***Before Starting*** in the ***Generator Start-Up Procedure (Single Unit)*** section of this manual.

Application Selection

1. On the touch display, press the **AOP button** (Figure 153).

Figure 153. AOP Button

2. Verify that the **Main AOP screen** (Figure 154) is displayed.

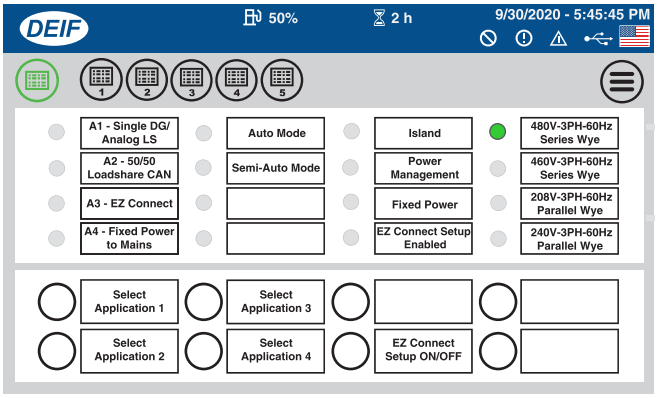


Figure 154. Main AOP Screen

3. If the Main AOP screen (Figure 154) is not displayed, press the **Main AOP button** (Figure 155).

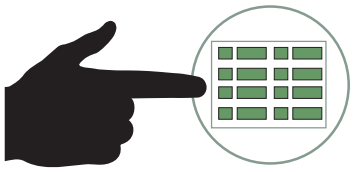


Figure 155. Main AOP Button

4. Press the **Select Application 4 button** (Figure 156).

Figure 156. Select Application 4 Button

5. Verify that the **A4 - Fixed Power To Mains status indicator** (Figure 157) is **ON (GREEN)**.

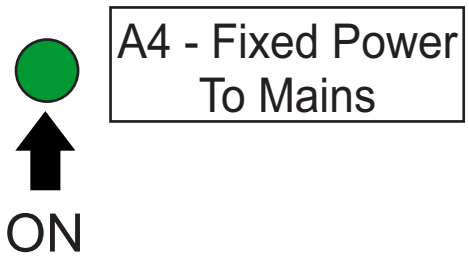


Figure 157. A4 - Fixed Power To Mains Status Indicator (ON/GREEN)

6. Press the **Main Menu button** (Figure 158).

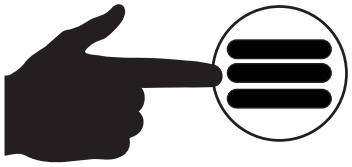


Figure 158. Main Menu Button

7. Verify that the **Main Menu screen** (Figure 159) is displayed, then press the **Home button**.

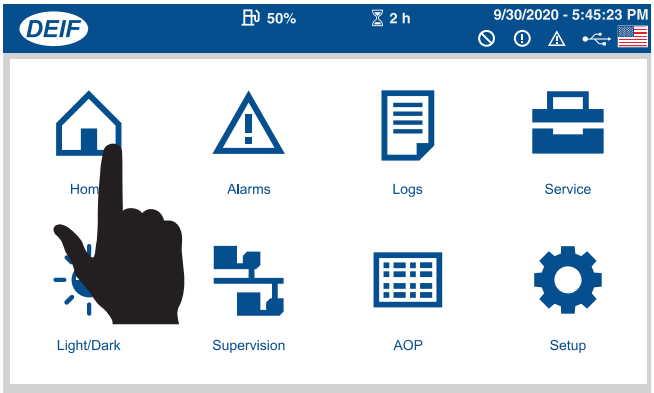


Figure 159. Main Menu Screen (Home Button)

8. Verify that the **Home screen (1 of 7)** is displayed. See Figure 160.

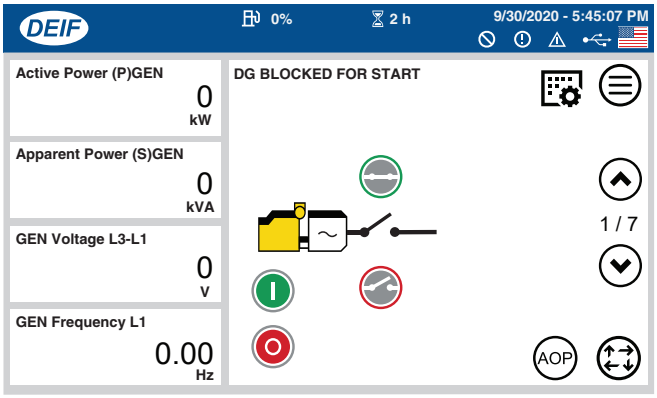


Figure 160. Home Screen (1 of 7)

9. Press the **Page Up button** (Figure 161) to scroll to **screen 2 of 7** on the touch display.

Figure 161. Page Up Button

10. Verify that **screen 2 of 7** is displayed (Figure 162), then press the **Fixed Power button**.

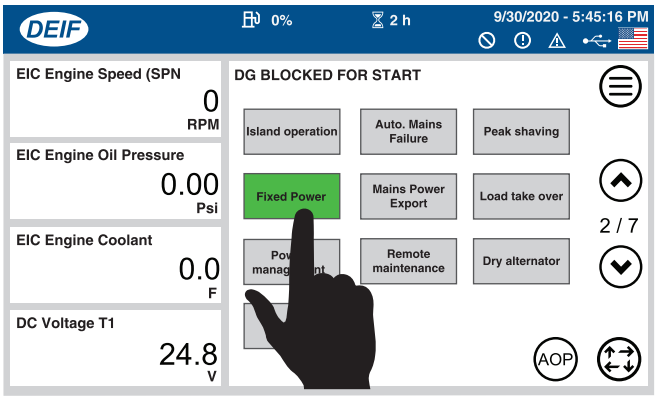


Figure 162. Screen 2 of 7 (Fixed Power Button)

11. Repeat steps 1–3 to return to the **Main AOP screen** (Figure 163). Verify that the **Fixed Power status indicator** is **ON (GREEN)**.

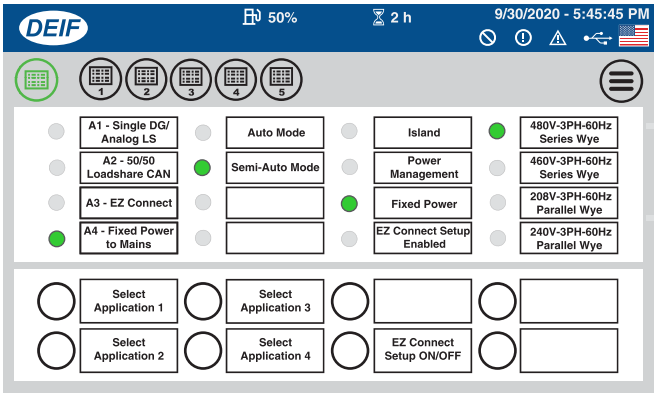


Figure 163. Main AOP Screen (Fixed Power)

12. Repeat steps 6–7 to return to the **Home screen (1 of 7)**.

Starting (Single Generator In Parallel With Transfer Switch)

NOTICE

When the generator is placed in **Auto mode**, the generator will **automatically start** in the event of commercial power falling below a prescribed level by means of a contact closure that is generated automatically by a transfer switch.

WARNING

When running the generator in **Auto mode**, remember that the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance while the generator is in **Auto mode**.

NOTICE

When the generator is placed in **Auto mode**, the engine glow plugs will be warmed if necessary and the engine will start automatically.

NOTICE

While operating in **Auto mode**, should a power outage occur while connected to an **automatic transfer switch (ATS)**, the ATS will start the generator automatically via the generator's auto-start contacts connected to the ATS's start contacts. Please refer to your ATS installation manual for instructions on the correct installation of the auto-start contacts of the generator to the ATS.

NOTICE

While operating in **Auto mode**, should a power outage occur while connected to a **manual transfer switch (MTS)**, the MTS **will not start the generator automatically**. The generator will only start once the MTS has been closed manually. Please refer to your MTS installation manual for instructions on the correct installation of the auto-start contacts of the generator to the MTS.

1. On the touch display, press the **Mode Change button** (Figure 164).

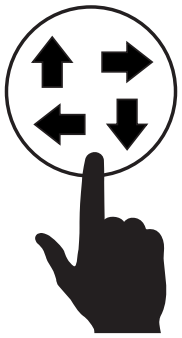


Figure 164. Mode Change Button

2. Verify that the four **Operational Mode buttons** (Figure 165) are displayed just above the **Mode Change button**.

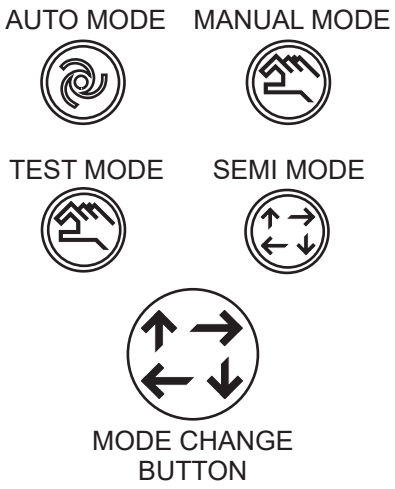


Figure 165. Operational Mode Buttons

3. Press the **Auto Mode button** (Figure 166).

Figure 166. Auto Mode Button

4. Verify that the message **READY ISLAND AUTO** is shown on the touch display (Figure 167).

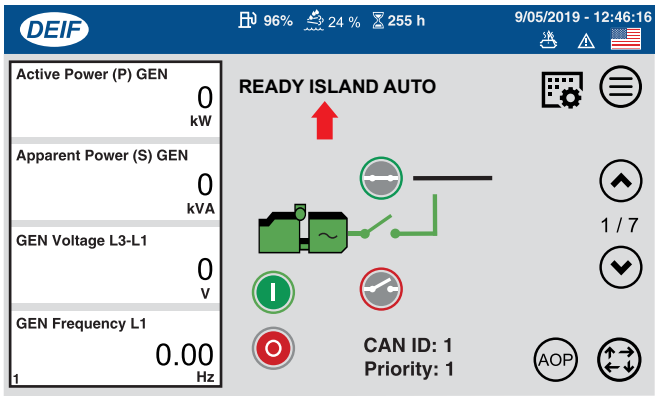


Figure 167. Status Message (READY ISLAND AUTO)

5. When the generator is connected to a building's AC power source via an **automatic** transfer switch (ATS), and the building's power has been interrupted (power outage), the ATS will start the generator automatically via the generator's auto-start contacts connected to the ATS's start contacts (Figure 168). If the generator is connected via a **manual** transfer switch (MTS), close the switch manually to start the generator.

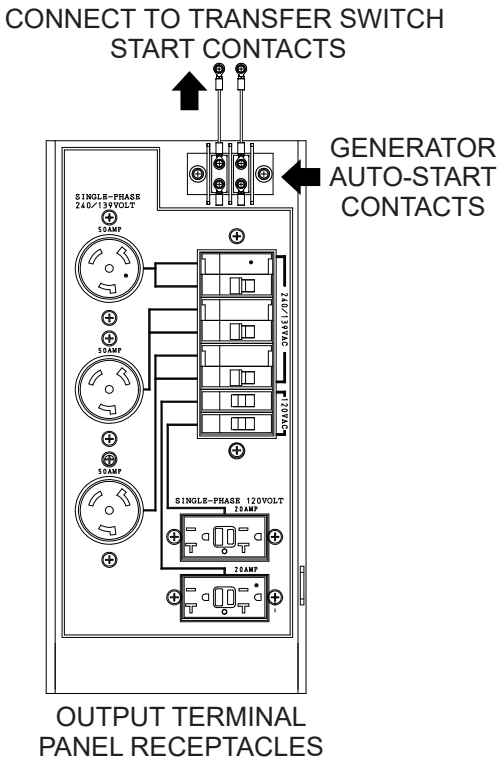


Figure 168. Auto-Start Contacts

6. Once the generator receives the start signal from the transfer switch (automatic or manual), the engine will start and accelerate to rated speed.

7. When voltage and frequency match the expected output, the main circuit breaker contacts will close automatically and send power to the load.

8. Upon removal of the start signal (from the transfer switch), the main circuit breaker contacts will open automatically and disconnect from the load.

9. Once the main circuit breaker contacts are open, the engine will shut down. The control system will remain in **Auto mode** and continue monitoring the auto-start contacts.

SHUTDOWN PROCEDURE (PARALLEL OPERATION)

⚠ WARNING

NEVER stop the engine suddenly except in an emergency.

1. Place the load's ON/OFF switch in the **OFF** position.
2. **On generator #1**, place the **GFCI and auxiliary circuit breakers** in the **OFF** position.
3. **On generator #1**, press the **Main Circuit Breaker OFF button** (Figure 169) on the touch display.

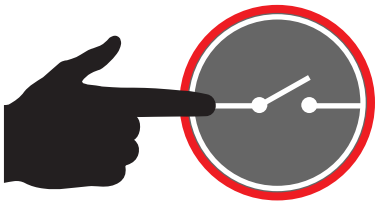


Figure 169. Main Circuit Breaker OFF Button

4. **On generator #1**, verify that the **Main Circuit Breaker OFF lamp** (Figure 170) is illuminated **(RED)**. This indicates that **the circuit breaker contacts are open**.

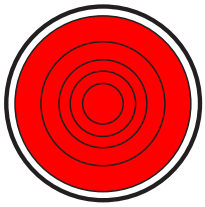


Figure 170. Main Circuit Breaker OFF Lamp (ON/RED)

5. Repeat steps 2–4 **on each generator** in the system.
6. **On generator #1**, press the **STOP button** (Figure 171) on the touch display. The engine will shut down after a 30-second cool-down period.

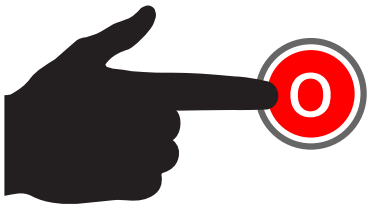


Figure 171. Stop Button

7. Repeat step 6 **on each generator** in the system.
8. After all of the engines have completely stopped, place the **Control Power switch** (Figure 172) in the **OFF** (down) position on **generator #1**.

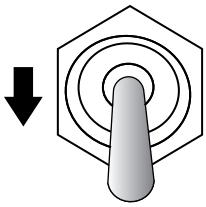


Figure 172. Control Power Switch (OFF)

9. The **Remove DG message screen** (Figure 173) will be displayed on each of the remaining units. Press the **OK button**.

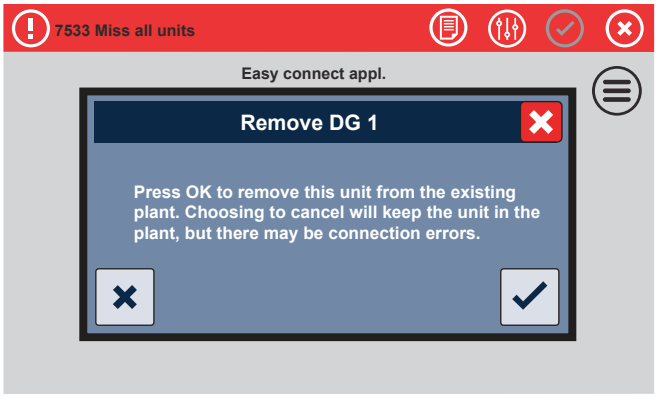


Figure 173. Remove DG Screen

10. The **Receiving Application screen** will be displayed next (Figure 174). After this message has cleared, repeat steps 8–10 on the remaining units.

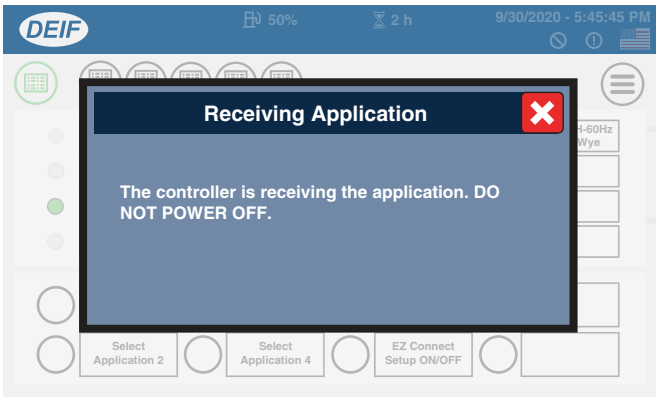


Figure 174. Receiving Application Screen

11. Wait at least two minutes to allow the DEF system to purge, then place the **Battery switch** (Figure 175) in the **OFF** position.

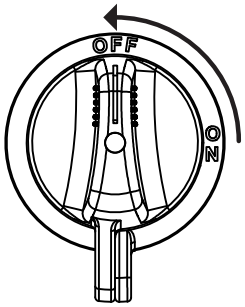


Figure 175. Battery Switch (OFF)

12. Repeat step 11 **on each generator** in the system.

NOTICE

Be sure to remove all generator communication cables when not performing parallel operation.

	Table 12. Inspection/Maintenance	Daily	Every 250 Hours	Every 500 Hours	Every 1,000 Hours	Other
Engine	Check Engine Oil and Coolant Levels	X				
	Check Fuel Filter/Water Separator Bowl	X				
	Check Battery Fluid Level	X				
	Check Air Cleaner	X				
	Check for Leaks	X				
	Visual Walk Around Inspection	X				
	Clean Air Cleaner Element		X			
	Drain Bottom of Fuel Tank		X			
	Replace Engine Oil and Oil Filter*1		(X)	X		
	Replace Fuel Filter Elements		(X)	X		
	Check Fan Belt Condition	X		X		
	Check Electrical Ground Connection			X		
	Clean Radiator and Check Cooling System			X		
	Check and Adjust Engine Valve Clearance				X	
	Clean Inside Fuel Tank				X	
	Check All Hoses and Clamps*4				X	
	Check Engine Mounts				X	
	Replace Air Cleaner Elements*5				X	
	Inspect Air Filter Case for Damage, Replace If Necessary					1,500 hours
	Check/Correct DEF Leakage	X				
	Replace DEF Filter (in Supply Module)				X	
	Check SCR System*2					4,500 hours
	Inspect Dosing Module (SCR System)*2					4,500 hours
	Flush and Refill Cooling System*3					1 year or 2,000 hours
	Inspect Turbocharger					4,500 hours (blower cleaning as necessary)
	Inpsect and Clean EGR Valve and Cooler					4,500 hours
Generator	Measure Insulation Resistance Over 3M Ohms*6		X			
	Check Rotor Rear Support Bearing			X		

*1 During the initial operation of a new engine, change engine oil and filter between a minimum of 100 hours and a maximum of 250 hours. The service interval depends on the type of engine oil.

*2 Perform inspection and maintenance of DEF in the SCR system every 4,500 hours. The system does not need to be replaced/exchanged if no problem is detected. DO NOT make any modification or changes, or remove the emission control system's related parts. Contact your nearest dealer or Multiquip Inc. for SCR maintenance.

*3 Use fully formulated antifreeze/coolant.

*4 If the blow-by hose needs to be replaced, make sure that the slope of the blow-by hose is at least 1/2 inch per foot, with no sags or dips that could collect moisture and oil.

*5 Replace the air cleaner element when the restriction indicator shows a vacuum of 635 mm (25 in.) H_2O.

*6 Make sure to disconnect the O – Earth line and CN5 – CN6 before performing the measurement. Refer to the ***Generator Wiring Diagram***.

GENERAL INSPECTION

Prior to each use, the generator should be cleaned and inspected for deficiencies. Check for loose, missing, or damaged nuts, bolts, or other fasteners. Also check for fuel, oil, and coolant leaks. Use Table 12 as a general inspection and maintenance guideline. For more detailed engine maintenance instructions, refer to the engine owner's manual.

ENGINE AIR CLEANER

This Isuzu diesel engine is equipped with a replaceable, high-density, paper air cleaner element (Figure 176). The air cleaner is also equipped with an inner (secondary) element that is used as a backup filter should the primary element become damaged. Check the air cleaner daily or before starting the engine. Replace the air cleaner as needed.

NOTICE

If the engine is operating in very dusty or dry grass conditions, a clogged air cleaner will result. This can lead to a loss of power, excessive carbon buildup in the combustion chamber, and high fuel consumption. Change the air cleaner more frequently if these conditions exist.

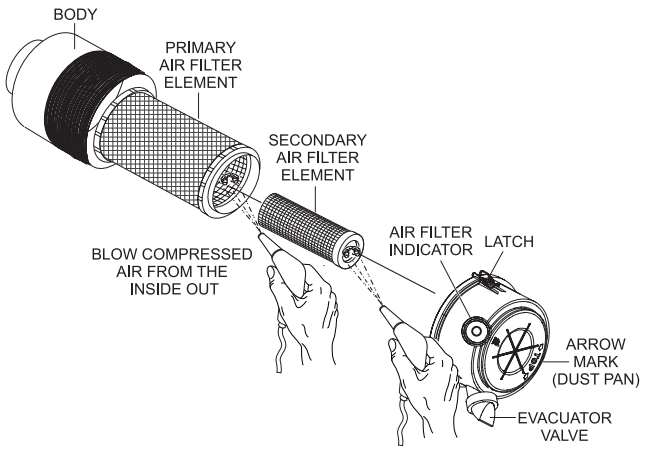


Figure 176. Engine Air Cleaner

Primary And Secondary Air Cleaner Elements

Every 250 hours: Remove the air cleaner elements and clean them with a light spray of compressed air.

⚠ CAUTION

Wear protective equipment such as approved safety glasses or face shields and dust masks or respirators when cleaning air filters with compressed air.

1. Release the latches that secure the cover to the air cleaner body (Figure 176).
2. Remove the **air cleaner cover** (Figure 176) and set it aside.
3. Remove both the primary and secondary air cleaner elements (Figure 176).
4. Check for and correct heavy buildup of dirt and debris along with loose or damaged components.

NOTICE

Operating the engine with loose or damaged air cleaner components could allow unfiltered air into the engine causing premature wear and failure.

5. To clean the **primary element** (paper air filter) as shown in Figure 176, tap the filter element several times on a hard surface to remove dirt, or blow compressed air, not to exceed 30 psi (207 kPa, 2.1 kgf/cm^2), through the filter element from the inside out.
6. Clean the **secondary element** (paper air filter) as described in step 5.
7. Replace both elements if they are damaged or excessively dirty.
8. Clean the inside of the **air cleaner body** (Figure 176).
9. Reinstall the primary and secondary air filter elements back into the air cleaner body.
10. Reinstall the air cleaner cover and secure with latches.

NOTICE

DO NOT run the engine with the air cleaner removed or without an element.

Air Cleaner Restriction Indicator

The air cleaner is equipped with a **restriction indicator** (Figure 177). As the air cleaner element becomes clogged, air intake restriction increases and the indicator signal shows **RED**, indicating that the element needs to be replaced. After replacing the air cleaner element, press the restriction indicator button to reset the indicator.

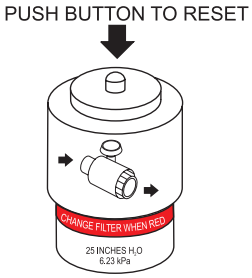


Figure 177. Air Cleaner Restriction Indicator

NOTICE

The air cleaner element should not be changed until the indicator displays **RED**. Dispose of the old element. It cannot be cleaned or reused.

ENGINE FUEL FILTER

Inspect the **engine fuel filter** daily. If the fuel filter has collected a significant amount of water and sediment at the bottom of the cup, it should be drained off immediately.

Draining The Fuel Filter

1. Loosen the **air bleeder plug** (Figure 178) on the fuel filter body.

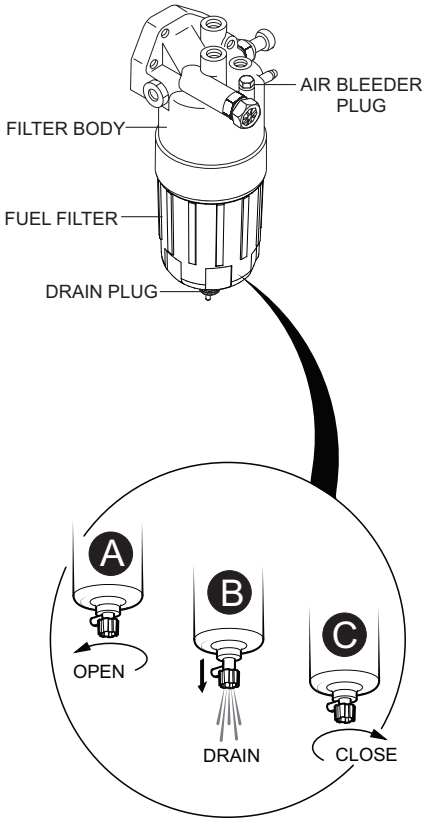


Figure 178. Draining The Fuel Filter

2. To discharge the fuel inside the fuel filter cartridge, open the **drain valve** on the fuel filter by turning the knob **counterclockwise** (Figure 178**A**) approximately 3-1/2 turns until the valve drops down 1 inch (25.4 mm) and draining occurs (Figure 178**B**).
3. Let the residue or foreign substances inside the fuel filter flow into a suitable container.
4. At completion of draining, close the drain valve (Figure 178**C**).

Fuel Filter Element Replacement

1. Using a **filter wrench**, remove the **element case** from the **fuel filter body** (Figure 179).

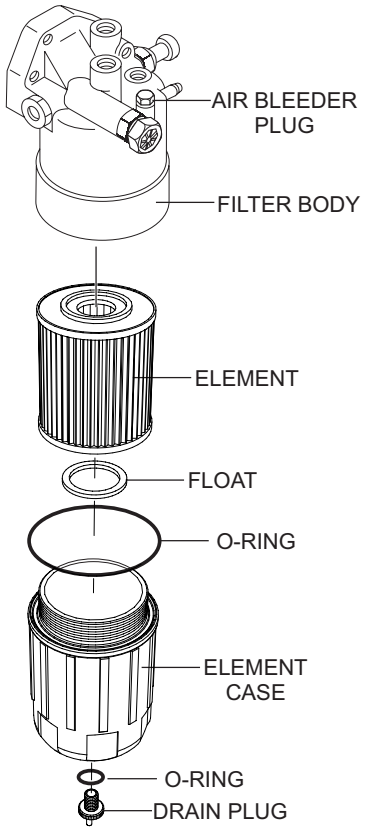


Figure 179. Fuel Filter Replacement

2. Wipe the inside of the **filter body** (Figure 179) with a clean cloth to remove any foreign matter or debris that may have accumulated.
3. Insert the new fuel filter element into the element case.
4. Replace both **O-rings**. Coat each O-ring with a small amount of clean 15W-40 engine oil.
5. Reinstall the element case first by hand until it makes contact with the fuel filter body surface.
6. Torque the element case to 22.4 lbf·ft (30 N·m).
7. Torque the drain plug to 1.4 lbf·ft (2.0 N·m).
8. Remove the air from the fuel system. Refer to ***Bleeding the Fuel System*** in the Isuzu engine owner's manual.

REMOVING WATER FROM THE FUEL TANK

After prolonged use, water and other impurities accumulate in the bottom of the fuel tank. Occasionally inspect the fuel tank for water contamination and drain the contents if required.

During cold weather, the more empty volume inside the tank, the easier it is for water to condense. This can be reduced by keeping the tank full with diesel fuel.

CLEANING INSIDE THE FUEL TANK

If necessary, drain the fuel inside the fuel tank completely. Using a **spray washer** (Figure 180), wash out any deposits or debris that have accumulated inside the fuel tank.

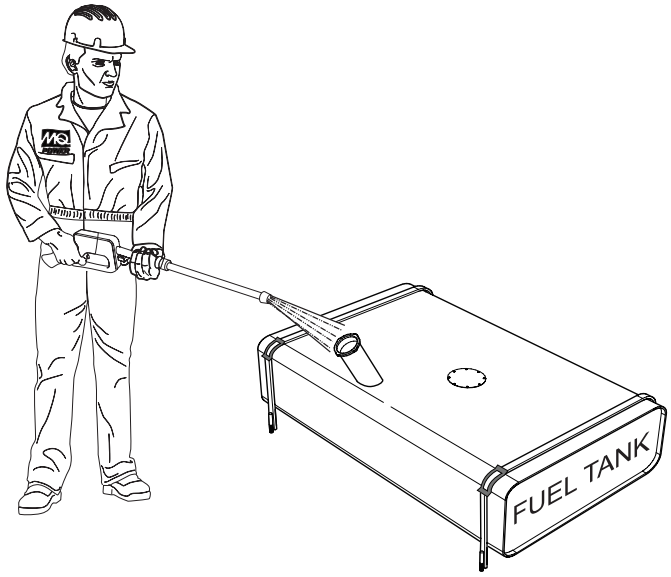


Figure 180. Cleaning The Fuel Tank

FUEL TANK INSPECTION

In addition to cleaning the fuel tank, the following components should be inspected for wear:

- **Rubber Suspension** — Look for signs of wear or deformity due to contact with oil. Replace the rubber suspension if necessary.
- **Fuel Hoses** — Inspect nylon and rubber hoses for signs of wear, deterioration or hardening.
- **Fuel Tank Lining** — Inspect the fuel tank lining for signs of excessive amounts of oil or other foreign matter.

DRAINING THE ENGINE OIL

1. Run the engine until the engine coolant reaches a temperature of 140°F (60°C).
2. Turn the engine **OFF**.
3. Remove the oil dipstick from its holder.
4. Remove the **oil drain cap** (Figure 181).

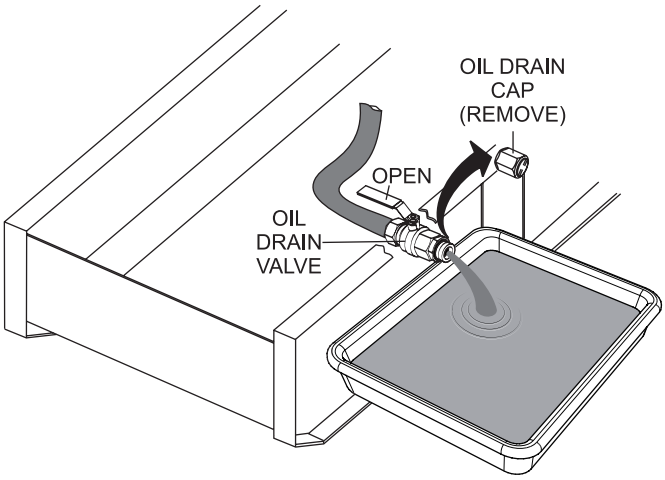


Figure 181. Draining The Engine Oil

5. Place the **oil drain valve** in the open position (Figure 181) and allow the oil to drain into a suitable container.
6. After the engine oil has completely drained, reinstall the oil drain cap and tighten securely.
7. Place the oil drain valve in the closed position.

ENGINE OIL FILTER REPLACEMENT

NOTICE

Filter head appearance may vary.

1. Clean the area around the **oil filter head** (Figure 182).

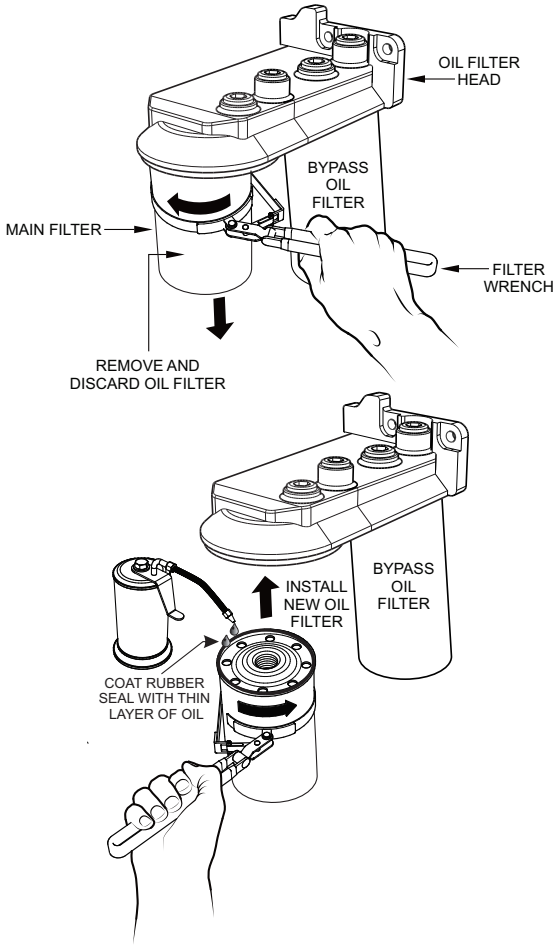


Figure 182. Oil Filter Replacement

2. Using an **oil filter wrench**, remove the **engine oil filter** (Figure 182).
3. Coat the rubber seal (gasket) surface of the new oil filter with clean 15W-40 engine oil (Figure 182).
4. Install the new oil filter (main) first by hand until it makes contact with the filter head surface. Tighten it another 3/4 turn using a filter wrench.
5. Fill the engine crankcase with high-quality detergent oil classified “For Service CI-4.” Fill to the upper limit of the dipstick. **DO NOT** overfill. Refer to Table 2 for engine oil capacity.

6. Run the engine for several minutes. Watch for oil leakage. Shut the engine down and allow it to sit for several minutes. Top off the oil to the upper limit on the dipstick.
7. Repeat this procedure for the **bypass oil filter**.

DRAINING THE ENGINE COOLANT

WARNING

DO NOT remove the pressure cap from the radiator when the engine is hot! Wait until the coolant temperature is below 120°F (50°C) before removing the pressure cap.

Heated coolant spray or steam can cause severe scalding and personal injury.

1. Remove the **radiator pressure cap** (Figure 183) only when the coolant temperature is below 120°F (50°C).

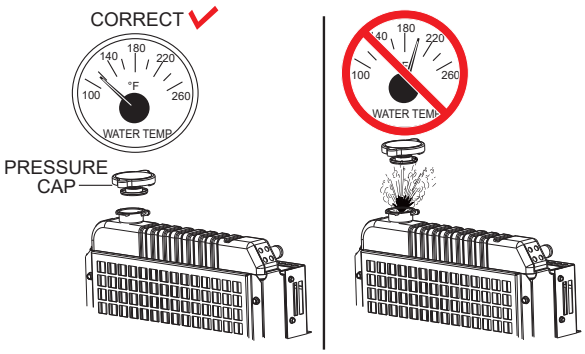


Figure 183. Radiator Pressure Cap Removal

2. Place the **coolant drain valve** in the **OPEN** position (Figure 184) and allow the coolant to drain into a suitable container.

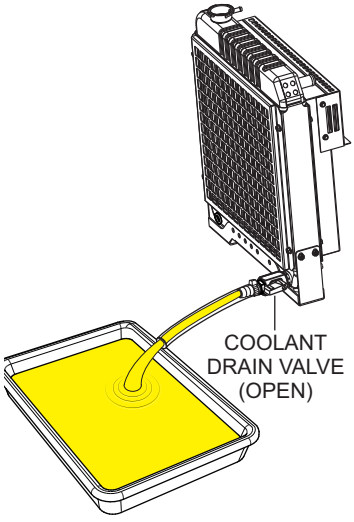


Figure 184. Draining The Engine Coolant

3. After the coolant has completely drained, place the coolant drain valve in the **CLOSED** position.
4. Reinstall the radiator pressure cap and tighten securely.
5. Flush out the radiator and replace the coolant. Refer to ***Cleaning the Coolant Passages*** and ***Filling the Coolant System*** in the Isuzu engine owner's manual.

CLEANING THE RADIATOR

The radiator (Figure 185) should be sprayed (cleaned) with a high-pressure washer when excessive amounts of dirt and debris have accumulated on the cooling fins or tube. When using a high-pressure washer, stand at least 5 feet (1.5 meters) away from the radiator to prevent damage to the fins and tube.

NOTICE

It may be necessary to remove additional generator components in order to access the radiator for cleaning.

Figure 185. Cleaning The Radiator

DRIVE BELT

Drive Belt Tension

A slack drive belt may contribute to overheating or insufficient charging of the battery. Adjust the drive belt in accordance with the Isuzu engine owner's manual.

Drive Belt Inspection

Inspect the **drive belt** (Figure 186) for damage and wear. Horizontal cracks (across the belt) are acceptable. Vertical cracks (direction of belt ribs) that intersect with horizontal cracks are not acceptable.

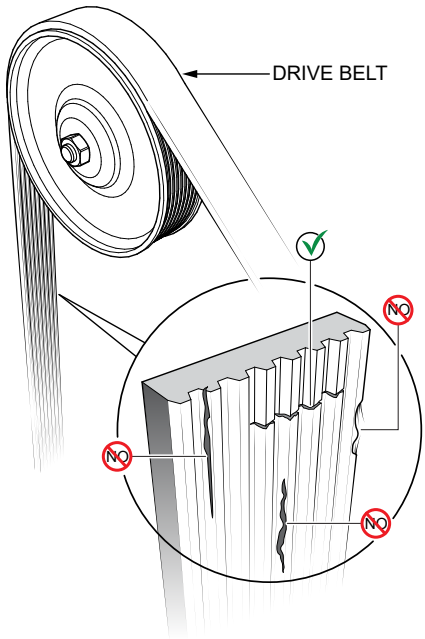


Figure 186. Drive Belt Inspection

Also, examine the belt and determine if it is **oil soaked** or **glazed** (a hard shiny appearance on the sides of the belt). Either of these two conditions can cause the belt to run hot, which can weaken it and increase the danger of it breaking.

If the drive belt exhibits any of the above wear conditions, replace the drive belt immediately.

TESTING THE GFCI RECEPTACLE

NOTICE

The GFCI receptacle is designed to interrupt power when a ground fault exists to prevent injuries and shock hazards. **DO NOT** use the GFCI receptacle if the test below fails. Consult a qualified electrician for repair or replacement of the GFCI receptacle. Test the GFCI receptacle **at least once a month**.

1. Start the generator as shown in the start-up procedure in this manual.
2. Place a **GFCI circuit breaker** (Figure 187) in the **ON** position.

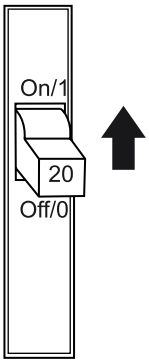


Figure 187. GFCI Circuit Breaker

3. Verify that the **status LED** on the corresponding GFCI receptacle (Figure 188) is **ON (GREEN)**.

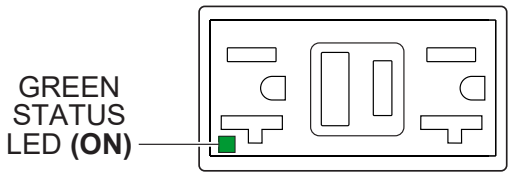


Figure 188. GFCI Receptacle (ON)

4. Press the **TEST** button (Figure 189) on the GFCI receptacle and verify that the status LED turns **OFF**.

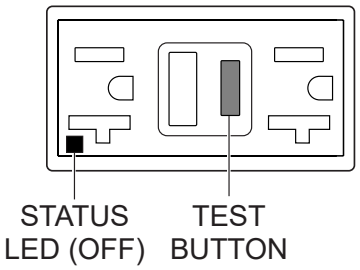


Figure 189. GFCI Receptacle (OFF)

5. Press the **RESET** button (Figure 190) to restore power to the GFCI receptacle and verify that the status LED is **ON (GREEN)**.

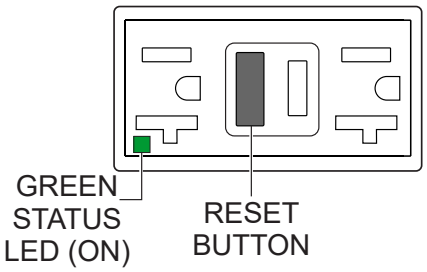


Figure 190. GFCI Receptacle (ON/Restore)

6. If the **status LED** (Figure 191) is **flashing (RED)**, **DO NOT** use the GFCI receptacle. Replace it immediately.

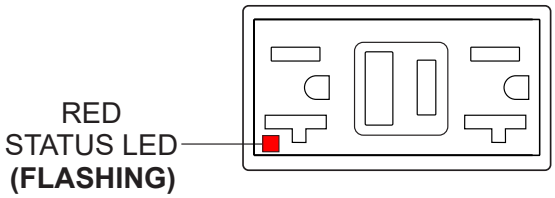


Figure 191. GFCI Receptacle (Red Flashing LED)

7. Repeat the above procedure for all other GFCI receptacles.

GENERATOR STORAGE

For long-term storage of the generator the following is recommended:

- Drain the fuel tank completely. Treat with a fuel stabilizer if necessary.
- Completely drain the oil from the crankcase and refill if necessary with fresh oil.
- Clean the entire generator, internal and external.
- Disconnect the battery.
- Make sure engine coolant is at the proper level.
- Cover the generator and store it in a clean, dry place.
- If the generator is mounted on a trailer, jack the trailer up and place it on blocks so the tires do not touch the ground, or block and completely remove the tires.

ENGINE BLOCK HEATER AND INTERNAL BATTERY CHARGER 120 VAC INPUT RECEPTACLES

This generator is equipped with an **engine block heater** and an **internal battery charger**. These components are provided with electrical power cords to connect to a commercial power source.

The engine block heater and internal battery charger both require 120 VAC in order to operate. Two power receptacles (Figure 192) are provided on the output terminal panel to allow commercial power to be applied.

These units will **ONLY** function when commercial power has been supplied to them. When using extension cords, refer to Table 6 for the correct size and length.

When using the generator in hot climates there is no reason to apply power to the engine block heater. However, if the generator will be used in cold climates it is always a good idea to apply power to the heater at all times.

If the generator will be used daily, the battery should normally not require charging. If the generator will be idle (not used) for long periods of time, apply power to the battery charger receptacle via commercial power using a power cord of adequate size.

NOTICE

If the generator will be idle (not used) for long periods of time, **ALWAYS** keep power supplied to the generator's internal battery charger to ensure adequate starting capability.

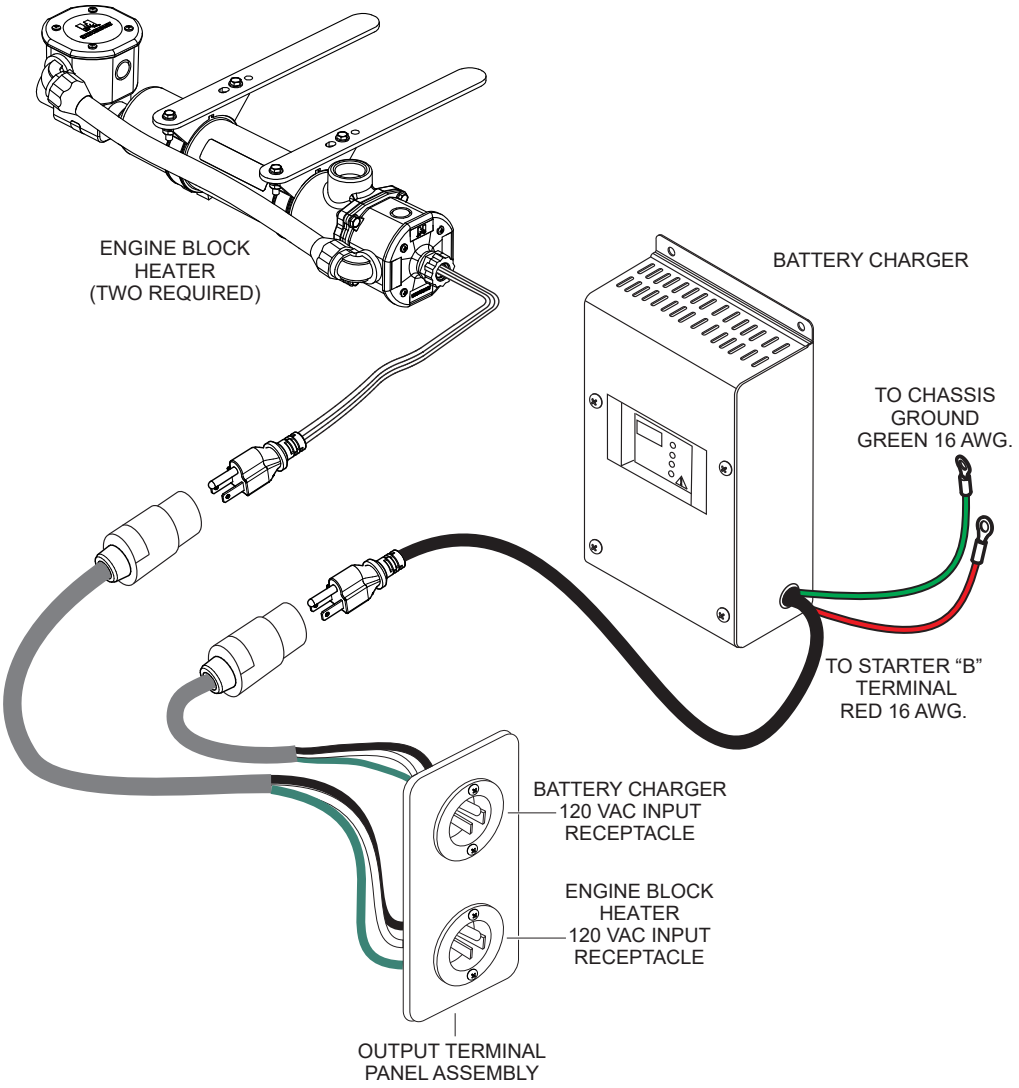


Figure 192. Engine Block Heater And Battery Charger

EMISSION CONTROL

The emission control system employed with this diesel engine consists of a **diesel oxidation catalyst (DOC)** and a **selective catalytic reduction (SCR)** catalyst as an exhaust gas after-treatment system that helps reduce harmful gases and destroy the organic fraction of particulate matter produced from the exhaust gas to meet the requirement for EPA Tier 4 (Final) regulations.

The DOC device (Figure 193) helps in filtering out large amounts of harmful nitrogen oxides (NO_X) and particulate matter (PM) which are emitted by diesel engines. These exhaust emissions pose serious environmental and health risks. It is important to maintain and service the DOC emission safety device on a periodic basis.

Diesel Oxidation Catalyst (DOC)

The DOC does not filter particles; it oxidizes them. This catalyst (honeycomb-like structure) uses a chemical process to break down pollutants in the exhaust stream into less harmful components. In general this catalyst collects/burns accumulated particulates. The DOC contains palladium and platinum which serve as catalysts to oxidize hydrocarbons and carbon monoxide.

PREVENTIVE MAINTENANCE PROGRAMS

Most challenging to a rental organization is the fact that a customer's power assumptions may not meet the minimum load requirements of the power equipment selected. When in doubt, it is always recommended to apply a **load bank application** to the equipment following a longer rental period.

Equipment on extended, long-term contracts needs periodic on-site inspection. If possible, interview the operator and survey the equipment hooked up to the generator to estimate load conditions.

Preventive maintenance and a few extra steps prevent downtime and protect your investment and business. A well-planned preventive maintenance program will reward you with years of service.

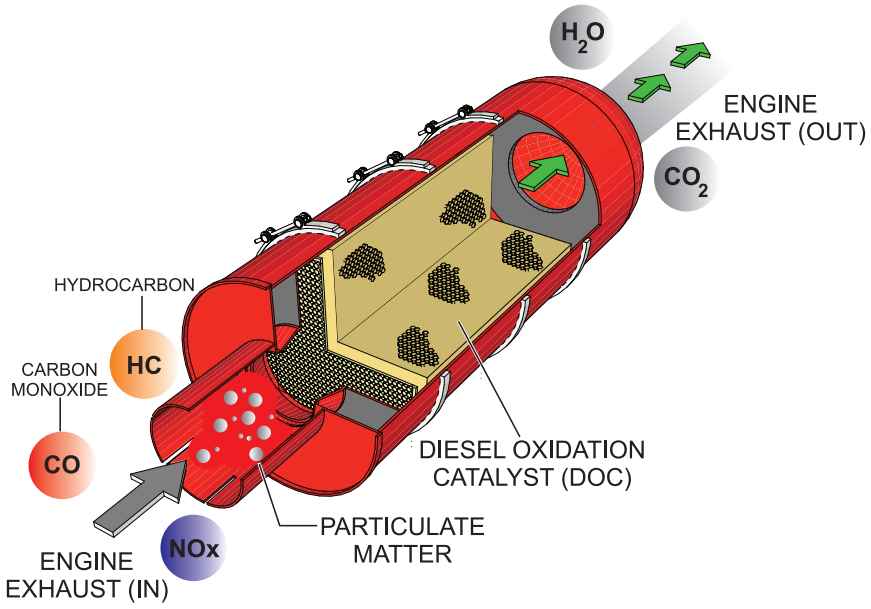


Figure 193. Diesel Oxidation Catalyst (DOC)

SELECTIVE CATALYTIC REDUCTION (SCR)

Diesel engines can be run with a lean burn air-to-fuel ratio, to ensure the full combustion of soot and to prevent the exhaust of unburnt fuel. The excess of air necessarily leads to generation of nitrogen oxides (NO_X), which are harmful pollutants, from the nitrogen in the air. **Selective catalytic reduction (SCR)** is used to reduce the amount of NO_X released into the atmosphere.

Diesel exhaust fluid (DEF) is injected from a separate tank into the exhaust pipeline, where the aqueous urea solution vaporizes and decomposes to form ammonia and carbon dioxide. Within the SCR catalyst, the nitrogen oxides are catalytically reduced by the ammonia (NH_3) into water (H_2O) and nitrogen (N_2), which are both harmless; these are then released through the exhaust.

The SCR system creates a certain amount of ammonia (NH_3) that is stored within the SCR catalyst. During purge operations the increase in temperature at regular intervals eliminates the stored ammonia.

The process of keeping accurate ammonia storage amounts is by counting urea injection quantities from the **dosing control unit (DCU)**.

EXHAUST AFTER-TREATMENT DASHBOARD

Exhaust system (SCR) status is shown during operation on the **Exhaust After-Treatment Dashboard screen** (Figure 194) on the touch display. The following symbols indicate the exhaust system state and when an **SCR purge operation** is required.

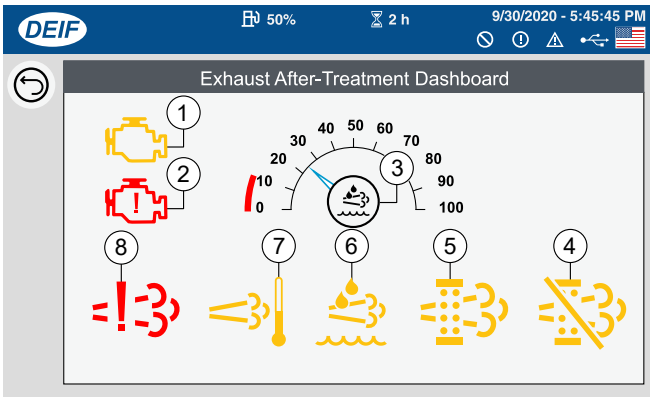


Figure 194. Exhaust After-Treatment Dashboard Indicators

1. **Check Engine Indicator (Yellow)** — This symbol is displayed when an engine fault occurs. Check active diagnostic trouble codes (DTC).
2. **Check Engine Indicator (Red)** — This symbol is displayed when an engine fault occurs. The engine will undergo an emergency stop. Check active diagnostic trouble codes (DTC).
3. **Diesel Exhaust Fluid (DEF) % Level** — Indicates the amount (%) of diesel exhaust fluid remaining in the DEF tank.
4. **Regen Inhibit Indicator** — Not used with this engine model.
5. **SCR Purge Indicator** — This symbol is displayed during both automatic and forced purge operation.
6. **Check DEF Indicator** — This symbol is displayed when the DEF tank level is low (less than 10%) or the DEF quality is poor. Refer to the following ***Diesel Exhaust Fluid (DEF) Maintenance*** section for more information.
7. **Exhaust Temperature High Indicator** — Not used with this engine model.
8. **Emissions Failure Indicator** — This symbol is displayed when there is a problem in the exhaust system. Check active diagnostic trouble codes (DTC).

SCR PURGE OPERATION

During operation, some reductant particles remain and accumulate on the SCR substrate. This accumulated reductant composite must be removed periodically by a **purge operation** to prevent clogging, low efficiency of SCR process performance, and other problems.

SCR Purge Operation Guidelines

For the safe operation of equipment, protection of the surrounding area, and prevention of bodily harm, use the guidelines below when a purge operation is required:

- **DO NOT** perform purge operations in conditions where it may be unsafe due to high exhaust temperatures.
- **DO NOT** operate the unit in an area with poor ventilation.
- If operating the engine indoors, install exhaust/ventilation equipment and ensure that there is sufficient ventilation.
- If you begin to feel sick, stop the unit immediately and ventilate the area.
- **Remember** — Due to the emission reduction functions of the exhaust system, exhaust emissions from the tailpipe have a different smell than those emitted from engines without urea SCR systems.
- During the purge operation, the area above and around the generator should be free of any type of debris or flammable/combustible materials, as temperatures during the purge process can reach as high as 1,022°F (550°C).
- If a purge operation is performed while the unit is operating under a light load (0–30%), unusual sounds may be produced. This should not be considered a problem.
- During SCR purge operations, white smoke may be temporarily emitted from the exhaust tailpipe. This shoud not be considered a failure. In addition, the smell of ammonia during the purge process should not be considered a failure.

Automatic Purge Operation

The **Automatic Purge operation** is performed automatically every 30 hours. No operator action is required for this process. The **SCR Purge indicator** (Figure 195) will be shown on the touch display.

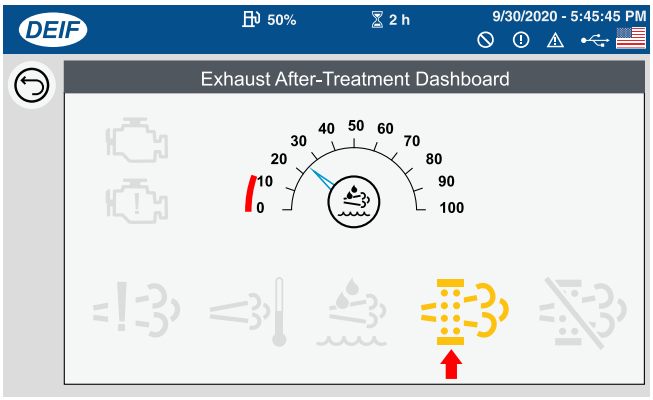


Figure 195. SCR Purge Indicator

Forced Purge Operation

NOTICE

DO NOT run the unit in parallel during a Forced Purge operation.

If the Automatic Purge operation cannot be performed, **Forced Purge operation** will activate automatically for a unit in single operation (not in parallel).

If the unit is in parallel operation (2 or more units) during this condition, the Automatic Purge operation will not be activated and the SCR purge indicator (Figure 195) will blink slowly. In this condition, perform the following procedure to activate the Forced Purge operation.

1. Navigate to the **Home screen (1 of 7)** on the touch display, then press the **Main Circuit Breaker OFF button** (Figure 196) to open the circuit breaker contacts. If the generator is running in Auto mode, stop the engine and place the unit in **Semi-Auto mode**.

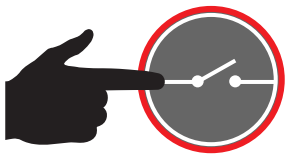


Figure 196. Main Circuit Breaker OFF Button

2. The unit will run as a single unit and the Forced Purge operation will be performed automatically.
3. Once the Forced Purge operation has completed, press the **Main Circuit Breaker ON button** on the touch display to **CLOSE** the circuit breaker contacts.

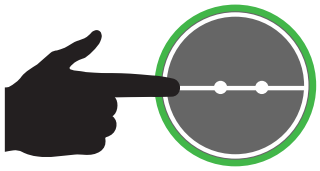


Figure 197. Main Circuit Breaker ON Button

4. After the contacts on the main circuit breaker have closed, the generator can be returned to parallel operation.

If the Force Purge operation cannot be completed or interrupted (engine shutdown), approximately 8 hours after the **3570 Force Purged Err** message is displayed on the Touch Display, the engine will stop.

In this condition, the engine can still be restarted. Make sure to perform the above procedures after the engine has been restarted. The engine can only run for approximately 7 minutes after restart and will shut down again if the Force Purge operation is not performed.

If the Force Purge operation is still not performed for approximately another two hours, manual purging will become impossible. If this occurs, contact your nearest MQ Power or Sunbelt dealer.

DIESEL EXHAUST FLUID (DEF) MAINTENANCE

The amount of fluid in the DEF tank will be indicated on the **Exhaust After-Treatment Dashboard screen** during operation (Figure 198).

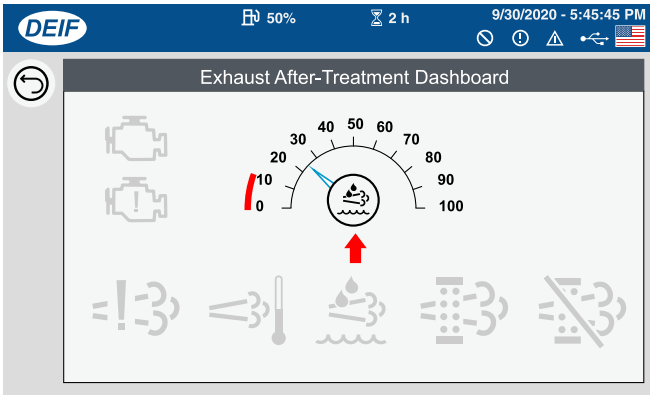


Figure 198. DEF Tank Level Gauge

NOTICE

When the DEF level decreases to 10%, the engine will shut down, but can still be restarted. When the DEF level decreases to 5%, the engine will shut down, and will not be able to restart until DEF is replenished.

The **Check DEF indicator** (Figure 199) displayed on the **Exhaust After-Treatment Dashboard screen** indicates one of the following:

- The level of diesel exhaust fluid in the DEF tank is below 10% capacity. Refer to Table 13, DEF Level System Action.
- DEF quality is poor. Check the DEF tank level and check active diagnostic trouble codes.

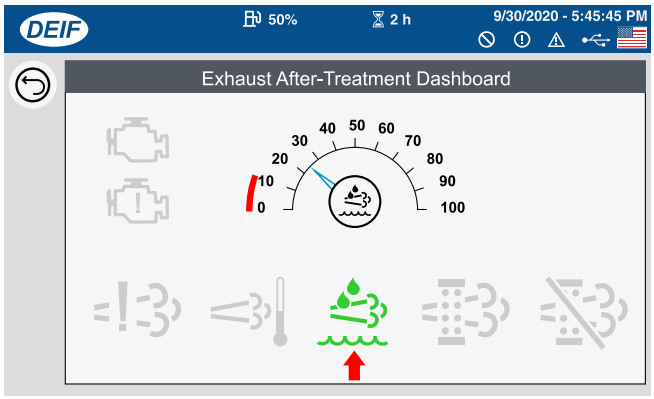


Figure 199. Exhaust After-Treatment Dashboard (Check DEF Indicator)

Table 13. DEF Level System Action

DEF Level	Below 15%	Below 10%	Below 5%
Controller Message	DEF Low 15% WA	DEF Low 10% SD	DEF Low 5% SD
DEF Indicator	—	Not Flashing	Slow Flashing
Engine Shutdown	—	Restart Available	Restart Unavailable

INDUCEMENT

When the system senses improper usage such as no supply of DEF, use of poor quality DEF, problems with DEF dosing, or disconnection of sensors, a warning will be issued before the situation becomes critical. If the warnings are ignored and the unit enters intermittent operation, the emergency shutdown will activate. The warning levels are shown in Table 14 and Table 15:

NOTICE

Replace the DEF filter (located in the urea SCR system supply module) every 1,000 hours of operation. Refer to the ***Replacement of DEF Filter*** section in the Isuzu engine owner's manual.

Table 14. DEF Inducement (DEF Level)

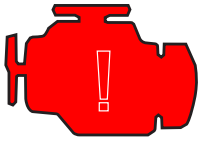
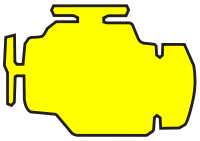
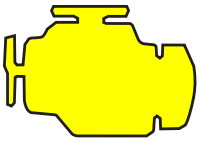
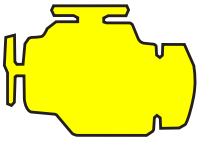
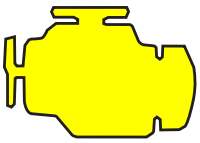
Stage	DEF Indicator	Check Engine Indicator (Yellow)	Check Engine Indicator (Red)	Engine Emission Indicator
Stage 1 Warning Level 1		—	—	—
Stage 2 Warning Level 2	 Slow Flashing	—	—	—
Stage 3 Shutdown	 Fast Flashing	—		—
Escape Mode	 Fast Flashing	—	—	—

Table 15. DEF Inducement (Poor Quality, Tampering, and Repeat Offense)				
Stage	DEF Indicator	Check Engine Indicator (Yellow)	Check Engine Indicator (Red)	Engine Emission Indicator
Stage 1 Warning Level 1			—	
Stage 2 Warning Level 2	 Slow Flashing		—	
Stage 3 Shutdown	 Fast Flashing			
Escape Mode	 Fast Flashing		—	

ESCAPE MODE

When emergency shutdown occurs, inspection and repair should generally be performed promptly. However, if emergency protective measures are necessary which require the unit to be running, the engine can be started in **Escape mode**, which allows the unit to run for 30 minutes.

NOTICE

Escape mode can only be activated if the exhaust system state indicators are displayed as shown in Table 15.

NOTICE

This unit will perform an emergency shutdown if the DEF level falls to below 5%. It will not be able to be restarted without replenishing DEF. Escape mode cannot be activated in this low-DEF state on this model.

Escape Mode Activation

1. Navigate to the **AOP1 screen** (Figure 200) and press the **Enter Diagnostic Mode button**.

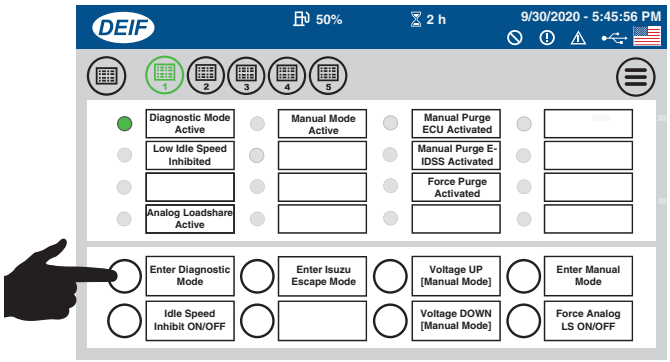


Figure 200. AOP1 Screen (Enter Diagnostic Mode Button)

2. Press the **Enter Isuzu Escape Mode button** (Figure 201).

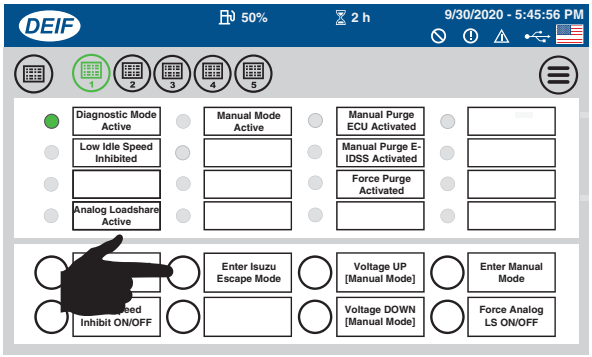


Figure 201. AOP1 Screen (Enter Isuzu Escape Mode Button)

3. Navigate to the Home screen (1 of 7) and verify that the **Escape Mode timer** is displayed. The timer value will be displayed in minutes.

4. Press the **START button** (Figure 202) on the touch display to start the engine.

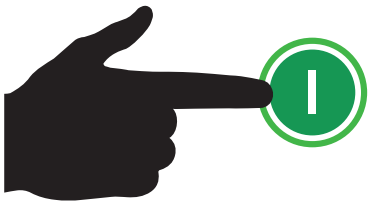


Figure 202. Start Button

5. To deactivate Escape mode, press the **STOP button** (Figure 203) on the touch display to stop the engine, then place the **Control Power switch** (Figure 204) in the **OFF** position.

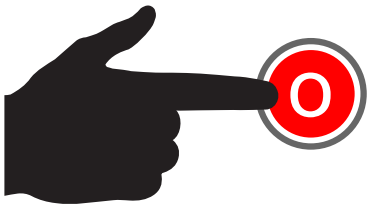


Figure 203. Stop Button

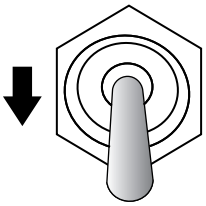


Figure 204. Control Power Switch (OFF)

- If Escape mode is temporarily suspended before the 30-minute period has ended, no request for Escape mode is necessary when the unit is restarted. The 30-minute period will resume from the last shutdown after the unit is restarted.
- Once the Escape mode period (30 minutes) ends, the engine will automatically stop. The Escape mode can only be requested **one time**. Please perform inspection and repair the fault before restarting the engine.
- If the unit returns to Warning Level 1 while Escape mode is running, Escape mode will be cancelled, the Escape Mode timer display will close, and normal operation will resume.

FAULTS/ALARMS

This unit is equipped with engine protection devices that automatically shut down the engine when a fault occurs.

1. When a fault is detected, the **Alarm pop-up** (Figure 205) will be shown on the touch display.

Figure 205. Alarm Pop-Up

2. Press the **X button** (Figure 205) on the pop-up screen to close the pop-up and view the **Alarm screen** (Figure 206).

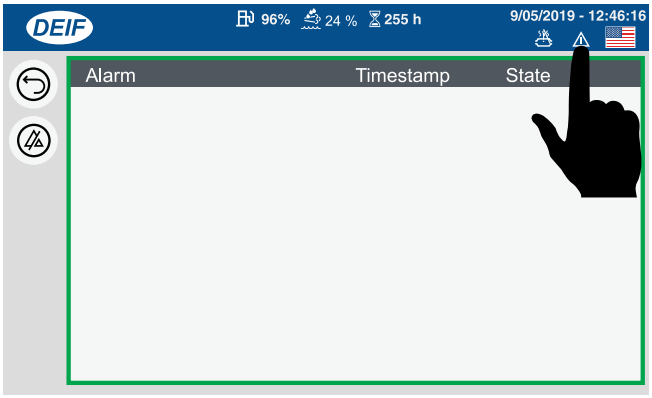


Figure 206. Alarm Screen (Alarm Icon Button)

3. Press the **Alarm Icon button** (Figure 206) located in the upper right-hand corner of the Alarm screen to view a list of active alarms.

4. To reset an alarm, stop operation and shut down the engine. Allow a sufficient cooling period, then inspect the unit and repair the problem before restarting operation.

   The active alarm shown in Figure 207 indicates the generator is low on fuel. After correcting the condition that caused the alarm (in this example, adding fuel to the generator), press the **Acknowledge (Check Mark) button**.

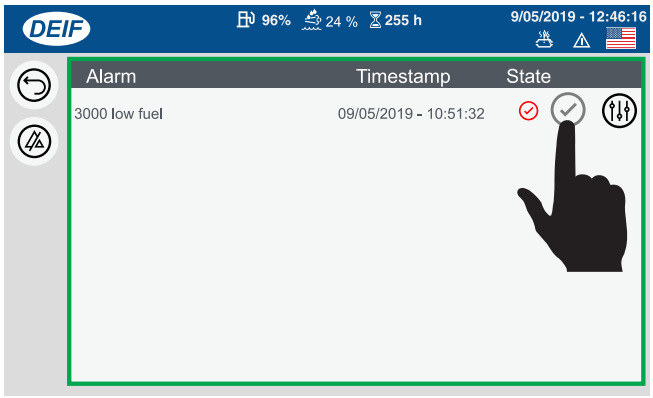


Figure 207. Alarm Screen (Acknowledge Button)

5. After pressing the Acknowledge button, verify that the color of the **Alarm State icon (small check mark)** changes from red to green. Operation of the unit can now be resumed.

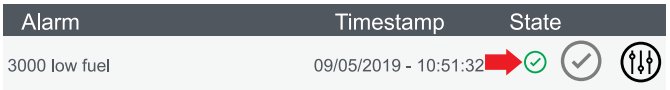


Figure 208. Alarm State Icon (Green)

6. Press the **Alarm Icon button** (Figure 206) whenever it is present on the status bar to identify specific alarms that are active. Perform steps 1–5 to clear any alarms that may appear during operation. Refer to Table 16 for a complete list of fault codes.

DIAGNOSTIC MODE

Diagnostic mode allows the digital controller to communicate with the **engine control module (ECM)** to view active fault messages and codes as well as previous fault occurrences which have been recorded in the ECM. Whenever the generator cannot be started due to a fault, place the generator in Diagnostic mode to identify the problem.

NOTICE

Always place the generator in Diagnostic mode when utilizing the Isuzu Diagnostic Service System to clear and refresh codes, take diagnostic readings, and perform limited calibrations.

1. Navigate to the **AOP1 screen** (Figure 209) and press the **Enter Diagnostic Mode button**.

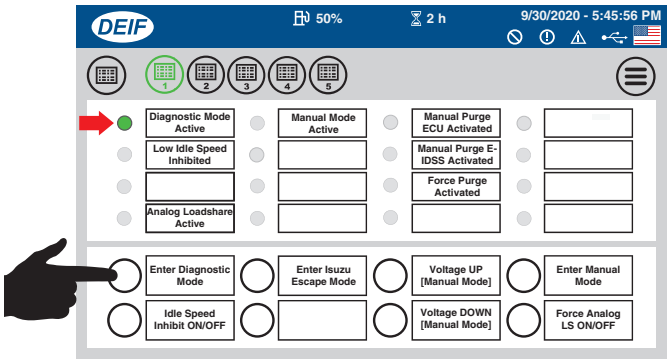


Figure 209. AOP1 Screen (Diagnostic Mode)

2. Verify that the **Diagnostic Mode Active status indicator** is **ON (GREEN)**. See Figure 209.
3. Navigate to the Alarm screen or Engine Data screen as needed to perform fault diagnostics.
4. After completing fault diagnostics, do one of the following to exit Diagnostic mode.
   - Press the **Enter Diagnostic Mode button**.
   - Place the **Control Power switch** in the **OFF** position.
   - Start the engine as described in the ***Generator Start-Up Procedure*** section of this manual.

Table 16. Automatic Engine Shutdown System					
Fault Code	**Condition**	**Display Message**	**Setpoint**	**Timer**	**Fail Class**
1000	Reverse Power	Reverse Power 1	–10%	30 s	Warning
1010	Reverse Power	Reverse Power 2	–15%	10 s	Trip + Stop
1030	Over Current	Over Current 1	101%	300 s	Warning
1040	Over Current	Over Current 2	111%	60 s	Warning
1050	Over Current	Over Current 3	115%	30 s	Trip + Stop
1060	Over Current	Over Current 4	120%	10 s	Trip + Stop
1130	Fast Over Current	Fast OverCurnt 1	150%	2 s	Trip + Stop
1140	Fast Over Current	Fast OverCurnt 2	200%	0.5 s	Trip + Stop
1150	Over Voltage	G OverVoltage 1	110%	10 s	Warning
1160	Over Voltage	G OverVoltage 2	115%	5 s	Shutdown
1170	Under Voltage	G UnderVoltage 1	90%	10 s	Warning
1180	Under Voltage	G UnderVoltage 2	80%	5 s	Trip + Stop
1210	Over Frequency	G OverFreq 1	105%	5 s	Warning
1220	Over Frequency	G OverFreq 2	110%	3 s	Shutdown
1240	Under Frequency	G UnderFreq 1	95%	5 s	Warning
1250	Under Frequency	G UnderFreq 2	90%	5 s	Trip + Stop
1450	Over Load	kW Overload 1	100%	60 s	Warning
1460	Over Load	kW Overload 2	105%	30 s	Trip GB
1470	Over Load	kW Overload 3	110%	10 s	Safety Stop
1520	Reverse kVAR	Loss of Excit	40%	10 s	Trip + Stop
1981	GB External Trip	GB Ext. tripped			Warning
1983	MB External Trip	MB Ext. tripped			Warning
2130	GB Breaker Synchronization Failure	GB Sync Failure		60 s	Block
2140	MB Breaker Synchronization Failure	MB Sync Failure		60 s	Warning
2150	Phase Sequence Error DG	Phas seq err DG			Block
2155	Phase Sequence Error BB	Phas seq err BB			Block
2160	GB Open Failure	GB Open Fail		2 s	Warning
2170	GB Close Failure	GB Close Fail		2 s	Warning
2180	GB Breaker Position Failure	GB Pos fail		1 s	Warning
2200	MB Open Failure	MB Open Fail		2 s	Warning
2210	MB Close Failure	MB Close Fail		2 s	Warning
2220	MB Breaker Position Failure	MB Pos fail		1 s	Warning
2270	Close Before Excitation Failure	Cl.bef.exc.fail		5 s	Warning
2320	Busbar Blocked	Busbar blocked		1 s	Warning
2560	Governor Regulation Fail	GOV reg. fail	30%	60 s	Warning
2630	Deload Error	Deload error		10 s	Warning
2680	AVR Regulation Failure	AVR reg. fail	30%	60 s	Warning
3440	Low Coolant Level	Low Coolant Lvl		0 s	Shutdown
3450	Air Cleaner Clogged	Check AirFilter		0 s	Warning

Table 16. Automatic Engine Shutdown System					
Fault Code	**Condition**	**Display Message**	**Setpoint**	**Timer**	**Fail Class**
3460	Crank Case SW Clogged	Crank Case Pres		0 s	Shutdown
3490	Emergency Stop	Emergency STOP		0 s	Shutdown
3570	Force Regeneration Request Error	Force purge ERR		0 s	Controlled Stop
4120	Low Fuel	Low Fuel WA	20%	90 s	Warning
4130	Low Fuel	Low Fuel SD	5%	90 s	Controlled Stop
4540	Run Feedback Fail	Run feedb. fail		2 s	Warning
4570	Start Failure	Start failure			Block
4580	Stop Failure	Stop failure		30 s	Shutdown
4610	Low DEF Level	DEF Low 15% WA	–16%	5 s	Warning
4620	Low DEF Level	DEF Low 10% SD	–10%	4 s	Controlled Stop
4630	Low DEF Level	DEF Low 5% SD	–5%	5 s	Controlled Stop
4960	Low Battery Voltage	Lo DC Volts T1	18 V	20 s	Warning
4970	High Battery Voltage	Hi DC Volts T1	30 V	0 s	Warning
4980	Low Battery Voltage	Lo DC Volts.T98	18 V	20 s	Warning
4990	High Battery Voltage	Hi DC Volts.T98	30 V	0 s	Warning
6280	Internal Communication Fail	Int. comm. fail			Warning
6352	External Engine Stop	Ext. Eng. Stop		10 s	Warning
6411	Battery Test	Battery test	18 V		Warning
7533	Missing All Units	Miss. all units			Warning
7534	Fatal CAN Error	Fatal CAN error			Warning
7535	Any DG Missing	Any DG missing			Warning
7536	Any DG Missing	Any mains miss.			Warning
7600	EIC Over speed	EIC Overspeed	115%	0.5 s	Shutdown
7610	EIC Coolant Temperature High	EIC Coolant T.1	200°F	0 s	Warning
7620	EIC Coolant Temperature High	EIC Coolant T.2	212°F	0 s	Controlled Stop
7630	EIC Oil Pressure Low	EIC Oil Pres. 1	25 psi	5 s	Warning
7640	EIC Oil Pressure Low	EIC Oil Pres. 2	7 psi	5 s	Controlled Stop
7871	Any BTB Missing	Any BTB miss.			Warning
7872	Any BTB Application Hazard	Appl. hazard			Warning
7873	Any Load Group missing	Any LG miss.			Warning
7874	Any PV Missing	Any PV miss.			Warning
7875	Any Battery Missing	Any Bat miss.			Warning
7940	CAN2 Communication Error	CAN2 Comm Error		10 s	Warning
8124	Ground Failure	Ground failure		1 s	Trip GB
8131	Ground Open fail	Gnd Open fail		1 s	Trip GB
8133	Ground Close Fail	Gnd Close fail		1 s	Block
8135	Ground Position Fail	Gnd Pos fail		1 s	Trip GB
8291	BB Measurement Failure	BB meas failure		10 s	Trip + Stop

Table 17. Fail Class Actions (Engine Running)							
Fail Class	**Alarm Horn**	**Alarm Display**	**De-Load**	**Trip of GB**	**Trip of MB**	**Cool Down Generator**	**Stop Genset**
Block	✓	✓	–	–	–	–	–
Warning	✓	✓	–	–	–	–	–
Trip GB	✓	✓	–	✓	–	–	–
Trip + Stop	✓	✓	–	✓	–	✓	✓
Shutdown	✓	✓	–	✓	–	–	✓
Trip MB	✓	✓	–	–	✓	–	–
Safety Stop	✓	✓	(✓)	✓	–	✓	✓
Trip MB/GB	✓	✓	–	✓	✓	–	–
Controlled Stop	✓	✓	✓	✓	–	✓	✓

Table 18. Fail Class Actions (Engine Stopped)			
Fail Class	**Block Engine Start**	**Block MB Sequence**	**Block GB Sequence**
Block	✓	–	–
Warning	–	–	–
Trip GB	✓	–	✓
Trip + Stop	✓	–	✓
Shutdown	✓	–	✓
Trip MB	–	✓	–
Safety Stop	✓	–	–
Trip MB/GB	✓	✓	✓
Controlled Stop	✓	–	✓

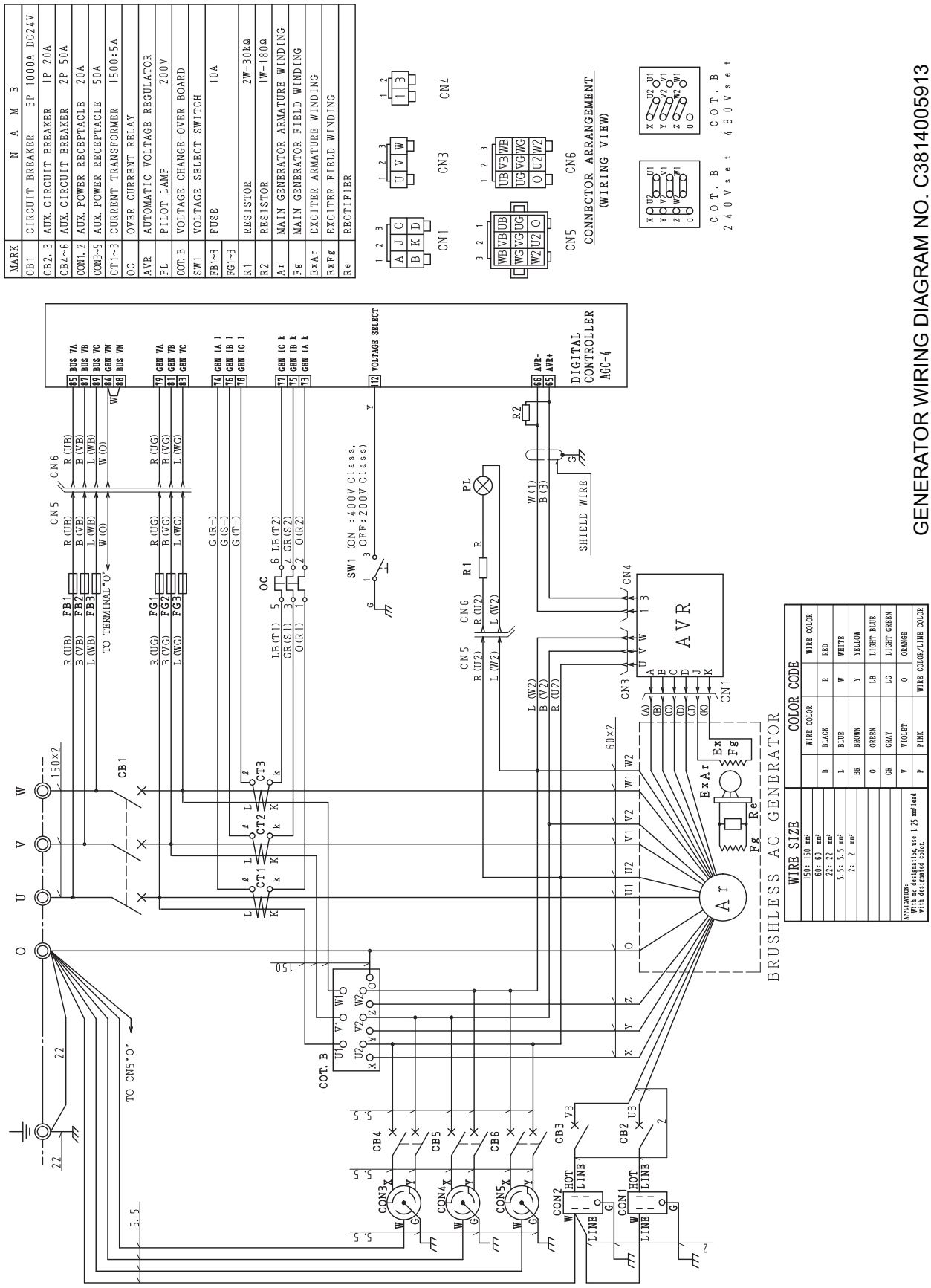
Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, use Table 19 below for diagnosis of the generator. If the problem cannot be remedied, consult our company's business office or service plant.

Table 19. Generator Troubleshooting

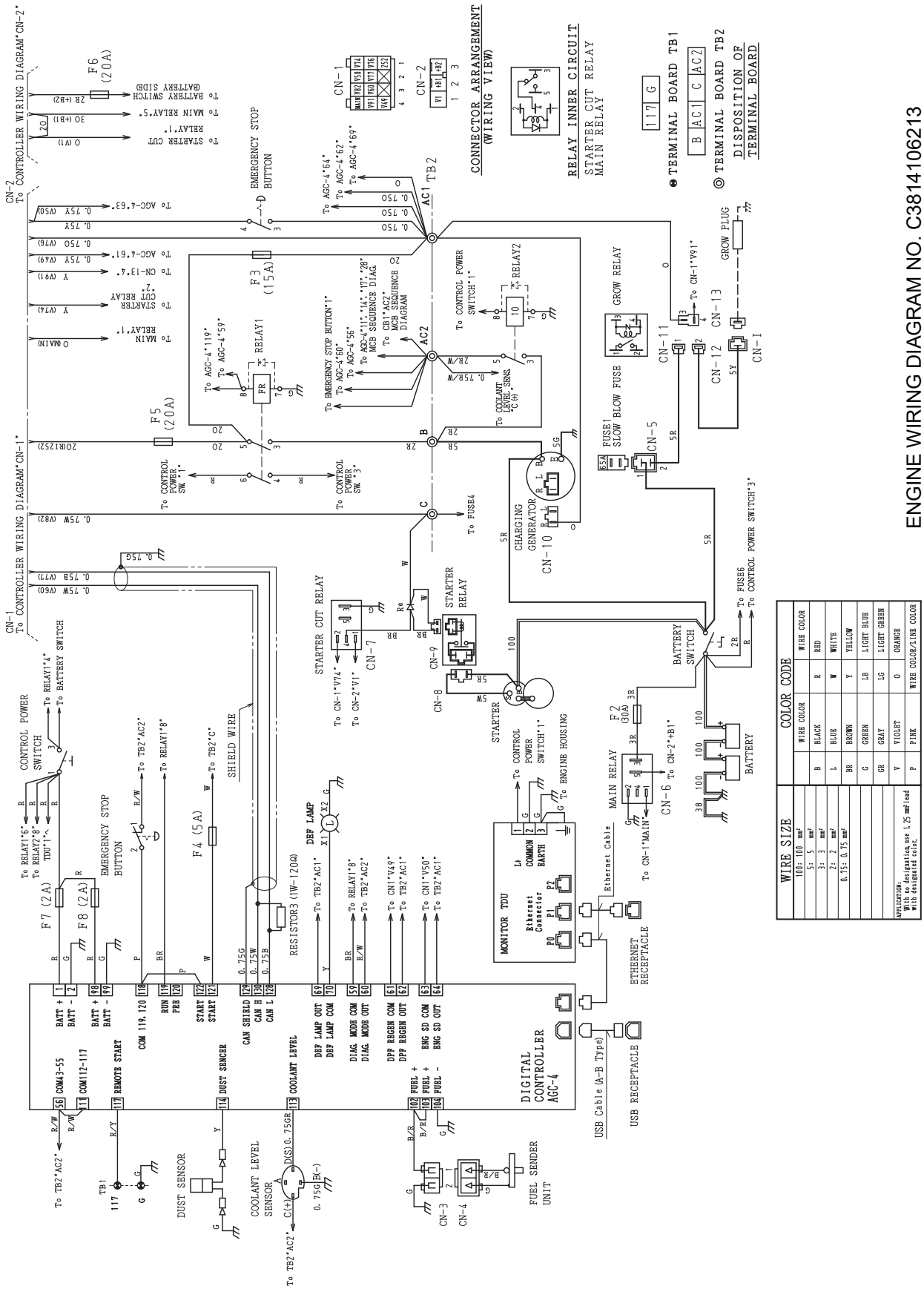
Symptom	Possible Problem	Solution
No Voltage Output	Loose wiring connection?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
	Defective rotating rectifier?	Check and replace.
Low Voltage Output	Loose wiring connection?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Loose wiring connection?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short circuit in load?	Check load and repair.
	Over current?	Confirm load requirement and reduce.
	Defective circuit breaker?	Check and replace.
	Overcurrent relay actuated?	Confirm load requirement and reset.

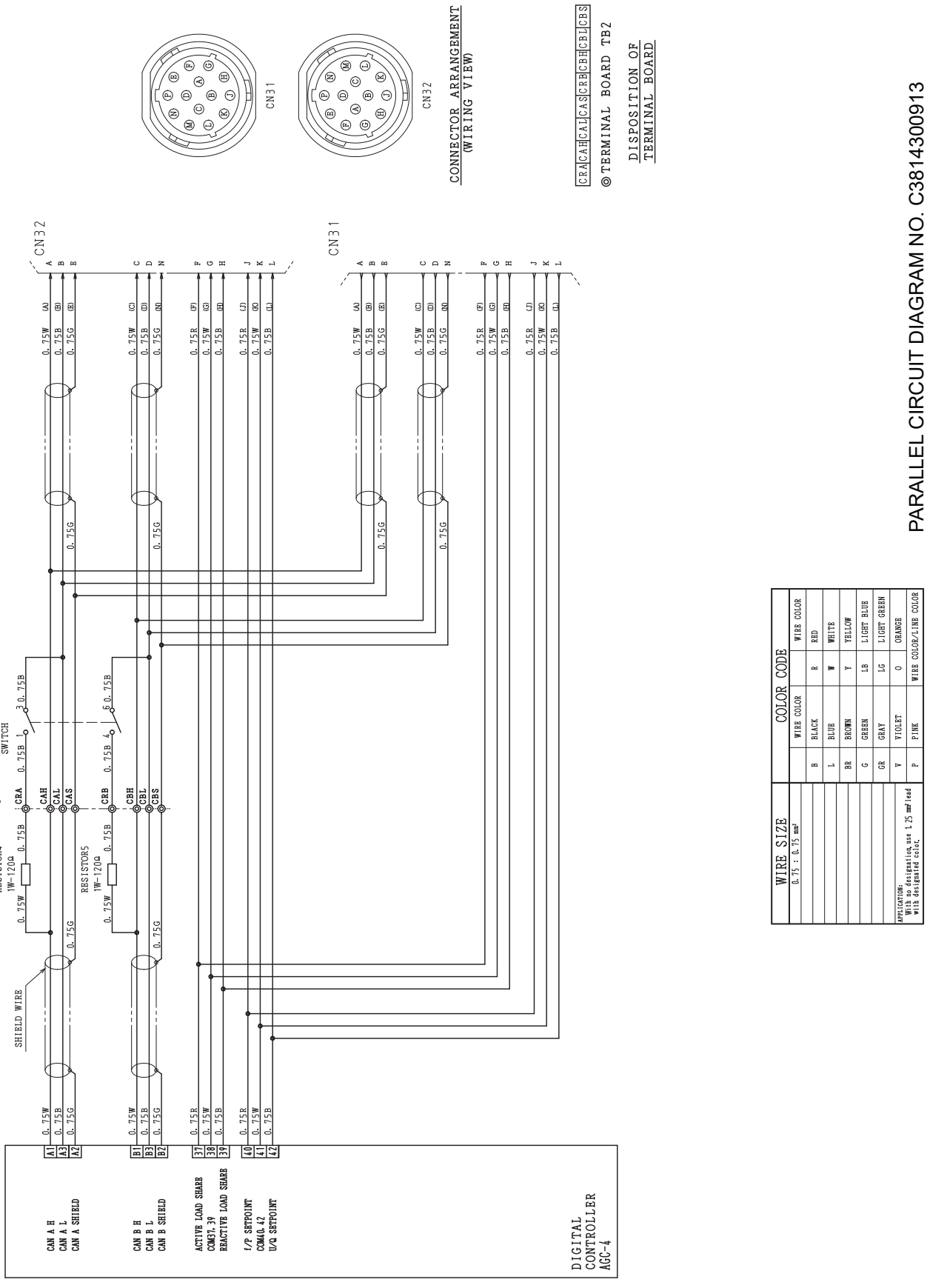
Troubleshooting (Engine)		
Symptom	**Possible Problem**	**Solution**
Engine will not start or start is delayed, although engine can be turned over.	No fuel reaching injection pump?	Add fuel. Check entire fuel system.
	Defective fuel pump?	Replace fuel pump.
	Fuel filter clogged?	Replace fuel filter and clean tank.
	Faulty fuel supply line?	Replace or repair fuel line.
	Compression too low?	Check piston, cylinder and valves. Adjust or repair per engine repair manual.
	Fuel pump not working correctly?	Repair or replace fuel pump.
	Oil pressure too low?	Check engine oil pressure.
	Low starting temperature limit exceeded?	Comply with cold starting instructions and proper oil viscosity.
	Defective battery?	Charge or replace battery.
	Air or water mixed in fuel system?	Check carefully for loosened fuel line coupling, loose cap nut, etc.
At low temperatures engine will not start.	Engine oil too thick?	Refill engine crankcase with correct type of oil for winter environment.
	Defective battery?	Replace battery.
Engine fires but stops as soon as starter is switched off.	Fuel filter blocked?	Replace fuel filter.
	Fuel supply blocked?	Check the entire fuel system.
	Defective fuel pump?	Replace fuel pump.
Engine stops by itself during normal operation.	Fuel tank empty?	Add fuel.
	Fuel filter blocked?	Replace fuel filter.
	Defective fuel pump?	Replace fuel pump.
	Mechanical oil pressure shutdown sensor stops the engine due to low oil?	Add oil. Replace low oil shutdown sensor if necessary.
Low engine power, output and speed.	Fuel tank empty?	Add fuel.
	Fuel filter clogged?	Replace fuel filter.
	Fuel tank venting is inadequate?	Ensure tank is adequately vented.
	Leaks at pipe unions?	Check threaded pipe unions. Tape and tighten unions as required.
	Speed control lever does not remain in selected position?	See engine manual for corrective action.
	Engine oil level too full?	Correct engine oil level.
	Injection pump wear?	Use No. 2-D diesel fuel only. Check the fuel injection pump element and delivery valve assembly and replace as necessary.

Troubleshooting (Engine) - continued		
Symptom	**Possible Problem**	**Solution**
Low engine power output and low speed, black exhaust smoke.	Air filter blocked?	Clean or replace air filter.
	Incorrect valve clearances?	Adjust valves per engine specification.
	Malfunction at injector?	See engine manual.
Engine overheats.	Too much oil in engine crankcase?	Drain off engine oil down to upper mark on dipstick.
	Entire cooling air system contaminated or blocked?	Clean cooling air system and cooling fin areas.
	Fan belt broken or elongated?	Change belt or adjust belt tension.
	Coolant insufficient?	Replenish coolant.
	Radiator net or radiator fin clogged with dust?	Clean net or fin carefully.
	Fan, radiator, or radiator cap defective?	Replace defective part.
	Thermostat defective?	Check thermostat and replace if necessary.
	Head gasket defective or water leakage?	Replace parts.



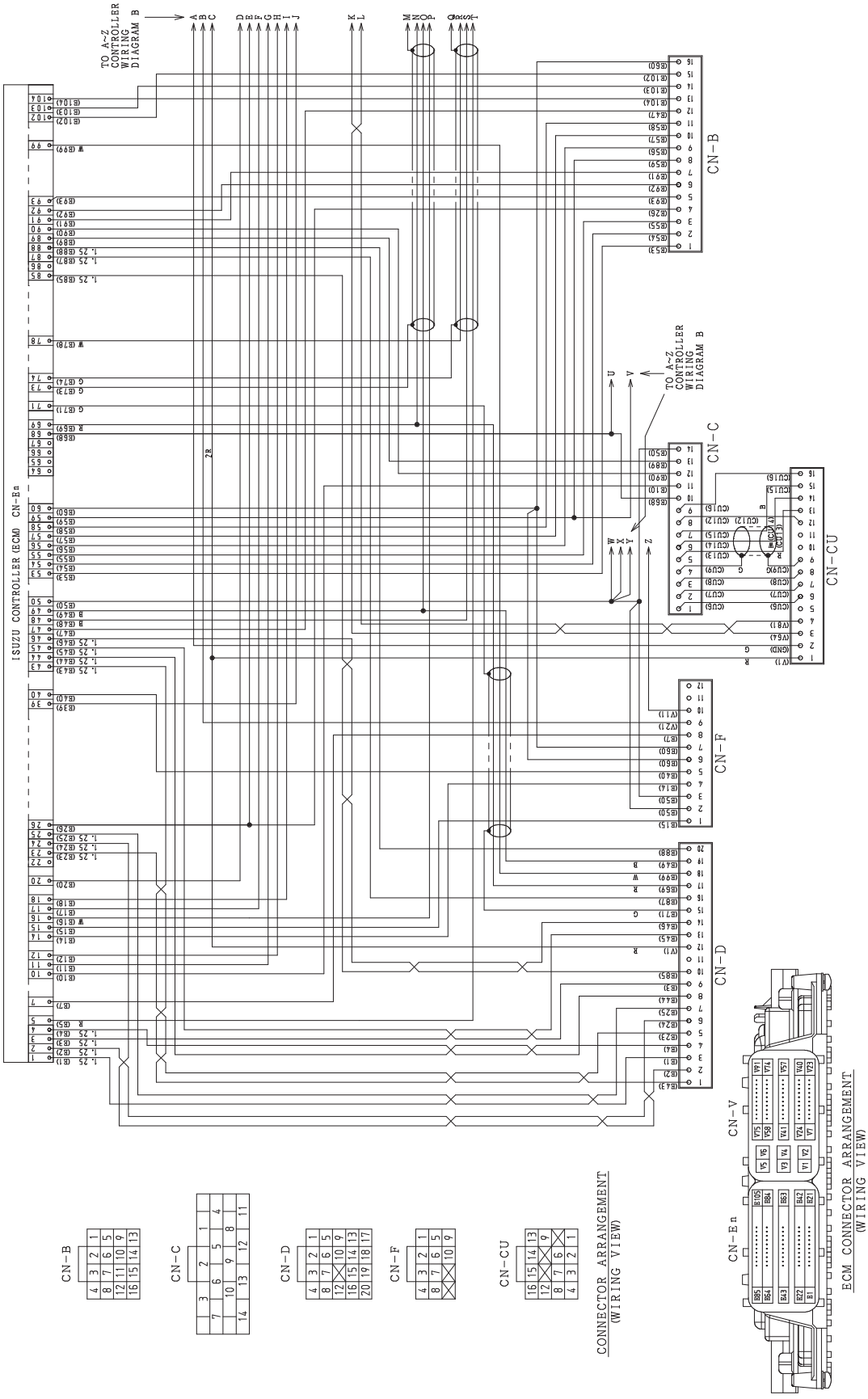
GENERATOR WIRING DIAGRAM NO. C3814005913


ENGINE WIRING DIAGRAM NO. C3814106213
DIGITAL CONTROLLER AGC-4
MONITOR TDU
CONNECTOR ARRANGEMENT (WIRING VIEW)
RELAY INNER CIRCUIT
STARTER CUT RELAY
MAIN RELAY
TERMINAL BOARD TB1
TERMINAL BOARD TB2
DISPOSITION OF TERMINAL BOARD
CHARGING GENERATOR
STARTER
STARTER RELAY
STARTER CUT RELAY
BATTERY SWITCH
BATTERY
MAIN RELAY
GROW RELAY
GROW PLUG
FUSE1 SLOW BLOW FUSE
CONTROL POWER SWITCH
EMERGENCY STOP BUTTON
DUST SENSOR
COOLANT LEVEL SENSOR
FUEL SENDER UNIT
ETHERNET RECEPTACLE
USB RECEPTACLE
USB Cable (A-B Type)
RESISTOR3 (1W-120Ω)
DEF LAMP
SHIELD WIRE
WIRE SIZE
COLOR CODE

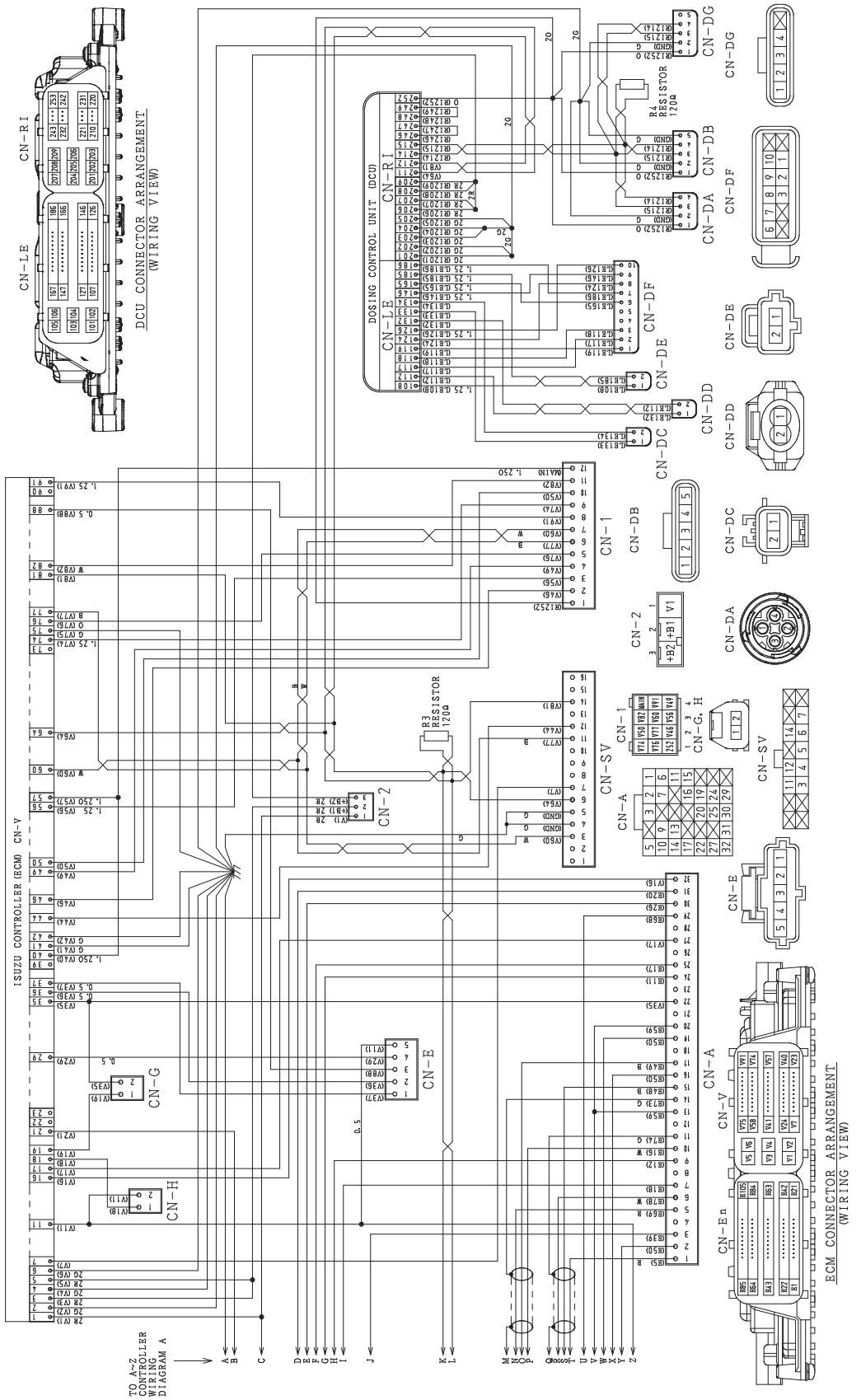


WIRE SIZE	COLOR CODE		
0.75 : 0.75 mm²	WIRE COLOR		WIRE COLOR
	BLACK	B	RED
	BLUE	L	WHITE
	BROWN	BR	YELLOW
	GREEN	G	LIGHT BLUE
	GRAY	GR	LIGHT GREEN
	VIOLET	V	ORANGE
APPLICATION: With no designation, use 1.25 mm² lead with designated color.	PINK	P	WIRE COLOR/LINE COLOR

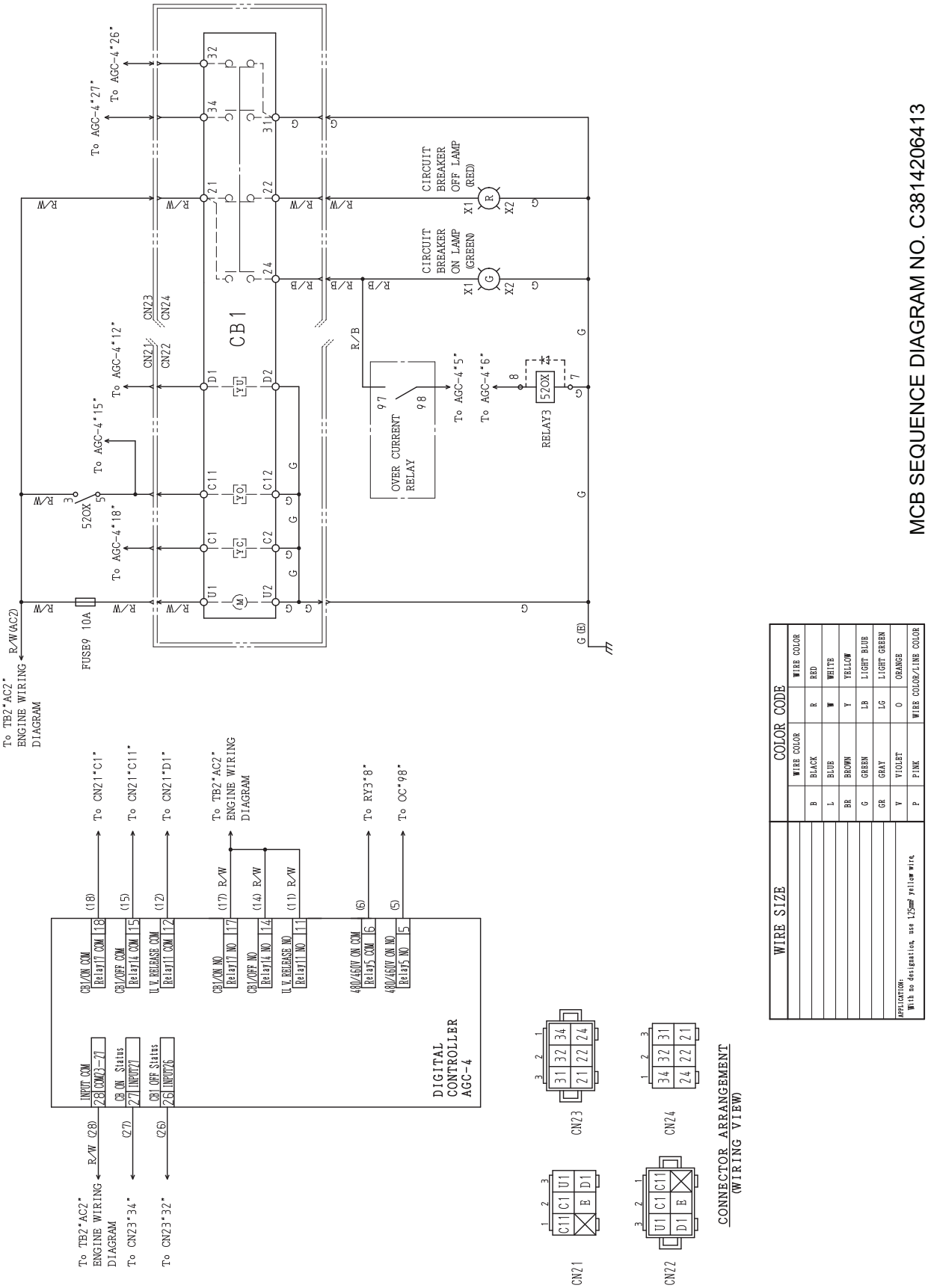
PARALLEL CIRCUIT DIAGRAM NO. C3814300913



CONTROLLER WIRING DIAGRAM (A) NO. C3844304004



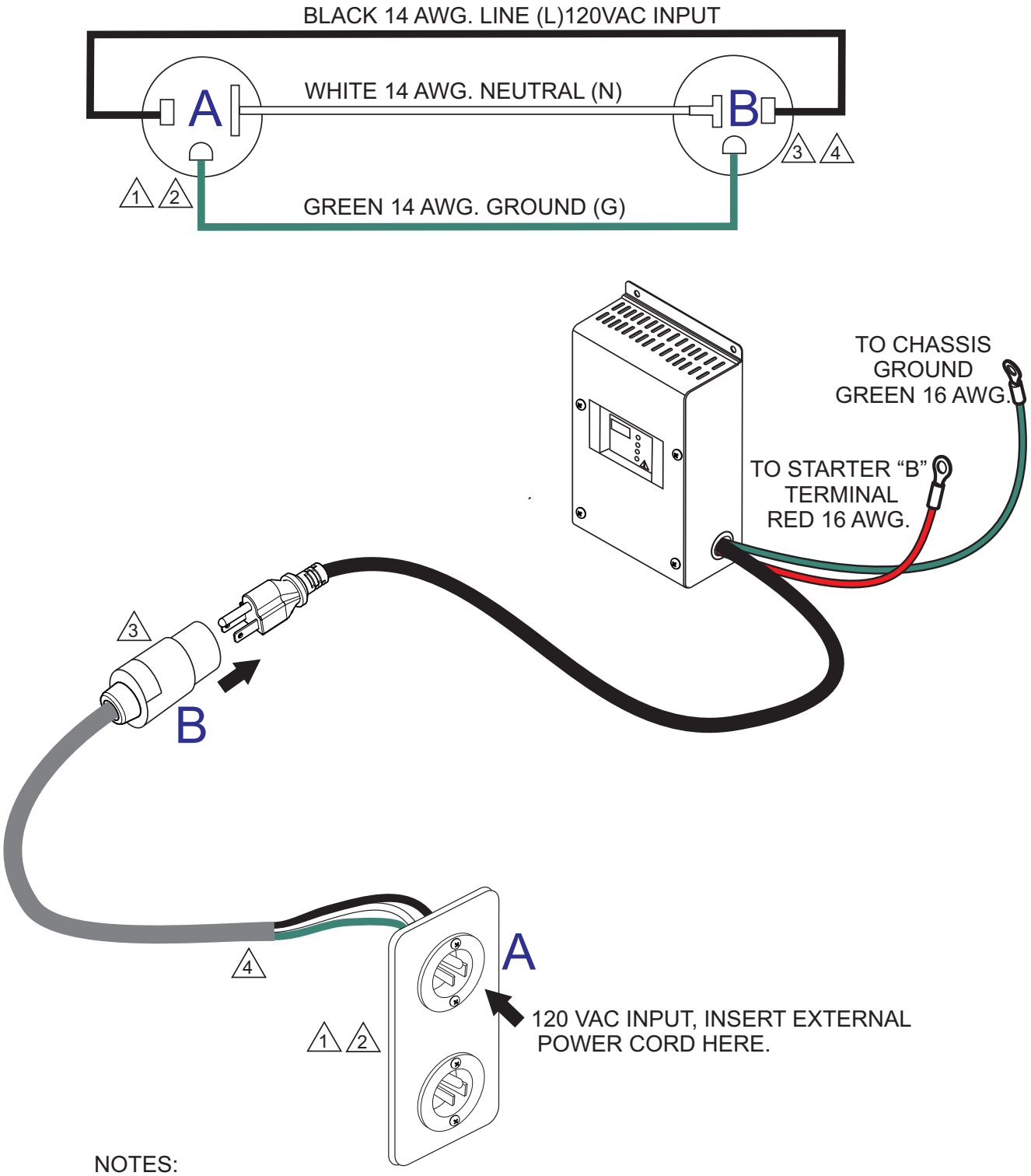
CONTROLLER WIRING DIAGRAM (B) NO. C3844304004



WIRE SIZE		COLOR CODE		
		WIRE COLOR		WIRE COLOR
	B	BLACK	R	RED
	L	BLUE	W	WHITE
	BR	BROWN	Y	YELLOW
	G	GREEN	LB	LIGHT BLUE
	GR	GRAY	LG	LIGHT GREEN
	V	VIOLET	O	ORANGE
APPLICATION: With no designation, use 1.25mm² yellow wire.	P	PINK	WIRE COLOR/LINE COLOR	

MCB SEQUENCE DIAGRAM NO. C3814206413

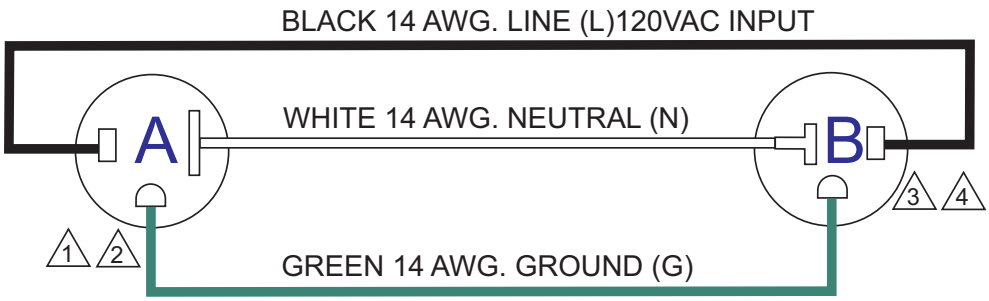
BATTERY CHARGER WIRING DIAGRAM

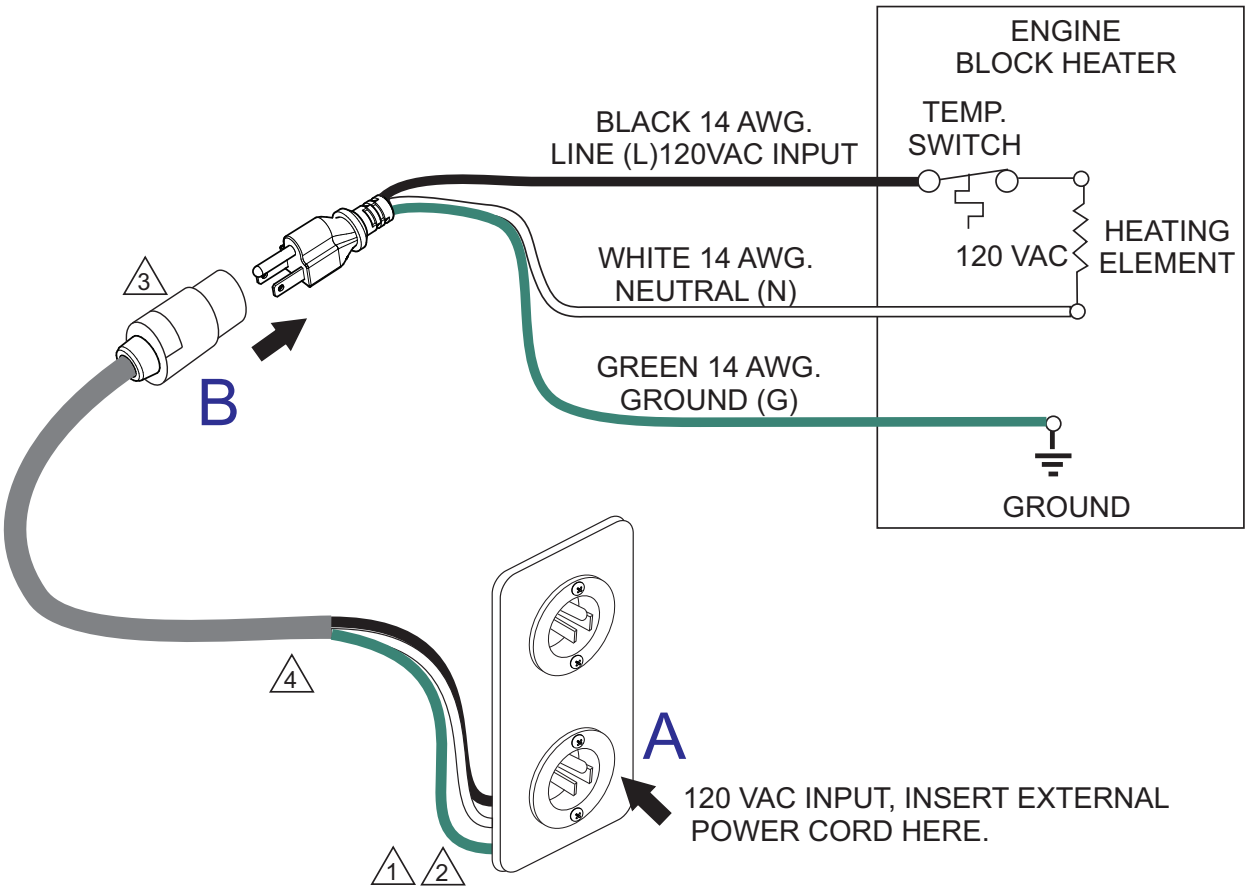


NOTES:

1. NEMA 5-15, 15A, 120 VAC, P/N EE6176 (HBL5278C/HUBBLE RECEPTACLE).
2. RECEPTACLE IS MOUNTED ON OUTPUT TERMINAL PANEL ASSY.
3. 20 AMP, 5-20R RECEPTACLE, P/N EE6131 (HBL5369C/HUBBLE RECEPTACLE).
4. CORD, CAROL 3/C 14 AWG., P/N EE56557.

ENGINE BLOCK HEATER WIRING DIAGRAM





NOTES:

1. NEMA 5-15, 15A, 120 VAC, P/N EE6176 (HBL5278C/HUBBLE RECEPTACLE).
2. RECEPTACLE IS MOUNTED ON OUTPUT TERMINAL PANEL ASSY.
3. 20 AMP, 5-20R RECEPTACLE, P/N EE6131 (HBL5369C/HUBBLE RECEPTACLE).
4. CORD, CAROL 3/C 14 AWG., P/N EE56557.

TOUCH DISPLAY UNIT DIGITAL ICONS

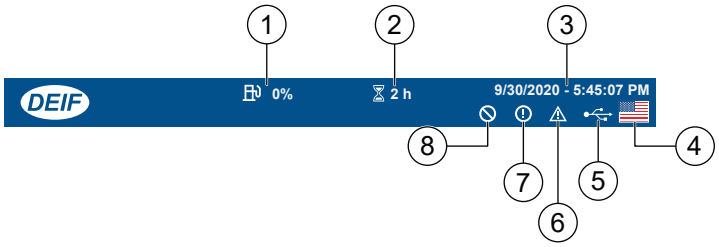


Figure 210. Status Bar

Table 20. Status Bar Icons		
No.	**Item**	**Description**
1	Fuel Level	Indicates the current fuel level.
2	Running Hours	Indicates the total running hours.
3	Date and Time	Indicates the controller date and time.
4	Language	Press to open Language (shortcut).
5	USB Drive	Indicates a USB drive was detected. Press for a prompt to remove the USB drive safely.
6	Alarm(s)	Press to view Alarm(s) (shortcut).
7	Alert	Indicates a minor fault. Does not prevent starting.
8	Blocked for Start	Indicates that engine starting is blocked due to the current alarm.

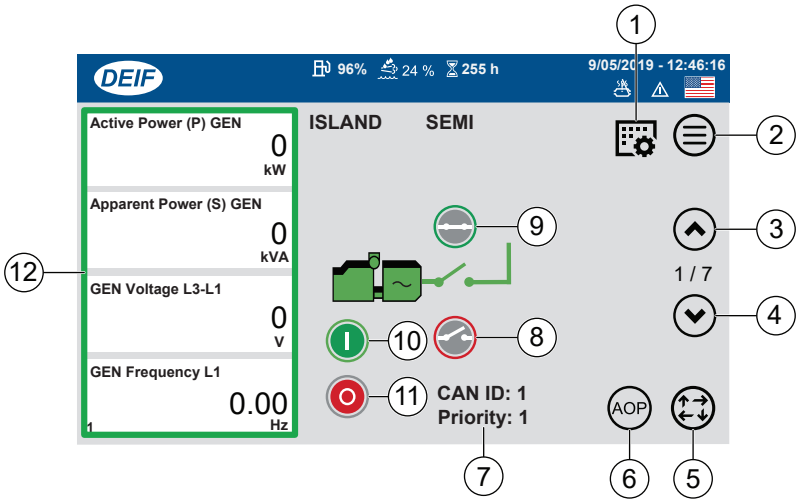


Figure 211. Home Screen (1 of 7)

Table 21. Home Screen Icons

No.	Item	Description
1	Settings	Press to view controller settings.
2	Menu	Press to view the Menu screen.
3	Scroll Page Up	Press to scroll up.
4	Scroll Page Down	Press to scroll down.
5	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
6	AOP	Press to view Additional Operator Panel (shortcut).
7	CAN ID/Priority	Indicates the CAN ID and the priority number in power management applications. **NOTE:** Only displayed during power management applications. NOT displayed during single genset operation.
8	Breaker Open	Press to open breaker.
9	Breaker Closed	Press to close breaker.
10	Generator Start	Press to start generator.
11	Generator Stop	Press to stop generator.
12	Generator Instrument Values	Instruments indicate generator Active Power (kW), Apparent Power (kVA), Voltage (V) and Frequency (Hz).

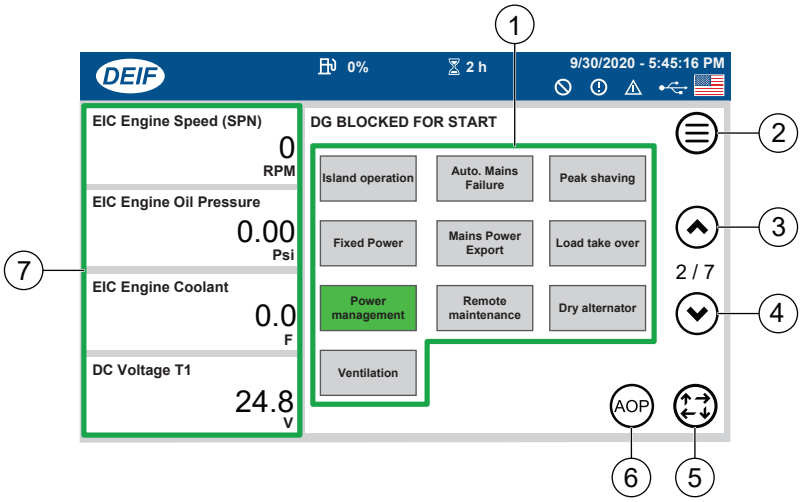


Figure 212. Application Selection Screen (2 of 7)

Table 22. Application Selection Screen Icons

No.	Item	Description
1	Applications	Press to select application. Lit (green) indicates selected application.
2	Menu	Press to view the Menu screen.
3	Scroll Page Up	Press to scroll up.
4	Scroll Page Down	Press to scroll down.
5	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
6	AOP	Press to view Additional Operator Panel (shortcut).
7	Engine Instrument Values	Instruments indicate engine Speed (RPM), Oil Pressure (PSI), Coolant Temperature (°F) and DC Voltage (V).

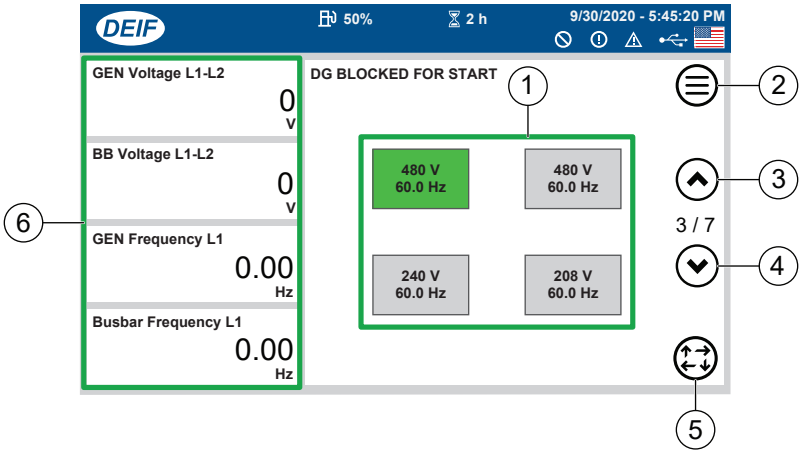


Figure 213. Voltage Selection Screen (3 of 7)

Table 23. Voltage Selection Screen Icons

No.	Item	Description
1	Voltage	Press to select voltage. Lit (green) indicates selected voltage.
2	Menu	Press to view the Menu screen.
3	Scroll Page Up	Press to scroll up.
4	Scroll Page Down	Press to scroll down.
5	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
6	Voltage and Frequency	Instruments indicate generator and busbar Voltage (V) and Frequency (Hz).

NOTICE

In the event that the Voltage Selection screen and Voltage Selector switch are set for different voltages, the voltage will automatically default to the voltage indicated by the **Voltage Selector switch**.

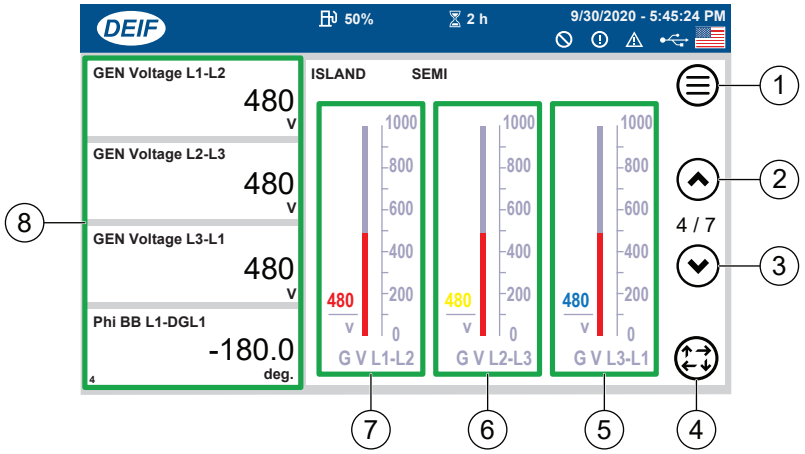


Figure 214. Output Voltage Status Screen (4 of 7)

Table 24. Output Voltage Status Screen Icons

No.	Item	Description
1	Menu	Press to view the Menu screen.
2	Scroll Page Up	Press to scroll up.
3	Scroll Page Down	Press to scroll down.
4	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
5	Generator Voltage L3–L1	Indicates generator voltage L3–L1.
6	Generator Voltage L2–L3	Indicates generator voltage L2–L3.
7	Generator Voltage L1–L2	Indicates generator voltage L1–L2.
8	Generator Voltage and Busbar Phase Angle	Instruments indicate generator Voltage L1–L2, L2–L3 and L3–L1 (V), and Phase Angle (deg.)

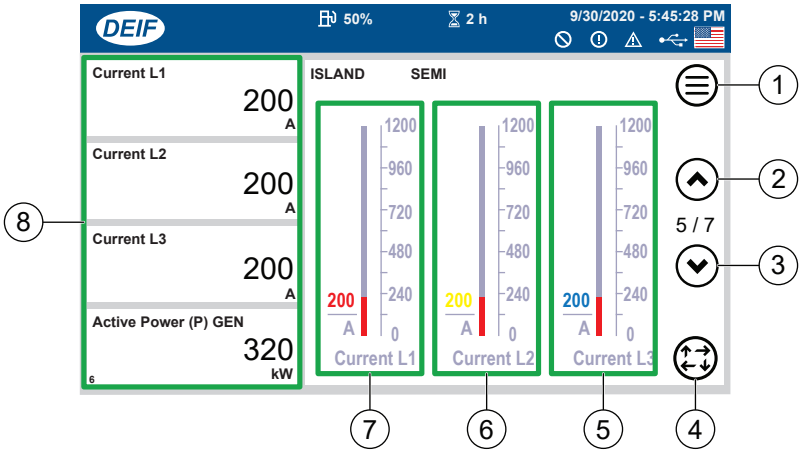


Figure 215. Generator Amperage Screen (5 of 7)

Table 25. Generator Amperage Screen Icons		
No.	**Item**	**Description**
1	Menu	Press to view the Menu screen.
2	Scroll Page Up	Press to scroll up.
3	Scroll Page Down	Press to scroll down.
4	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
5	Generator Current L3	Indicates generator current at L3.
6	Generator Current L2	Indicates generator current at L2.
7	Generator Current L1	Indicates generator current at L1.
8	Generator Power and Amperage	Instruments indicate generator Current L1, L2 and L3 (A), and Active Power (kW).

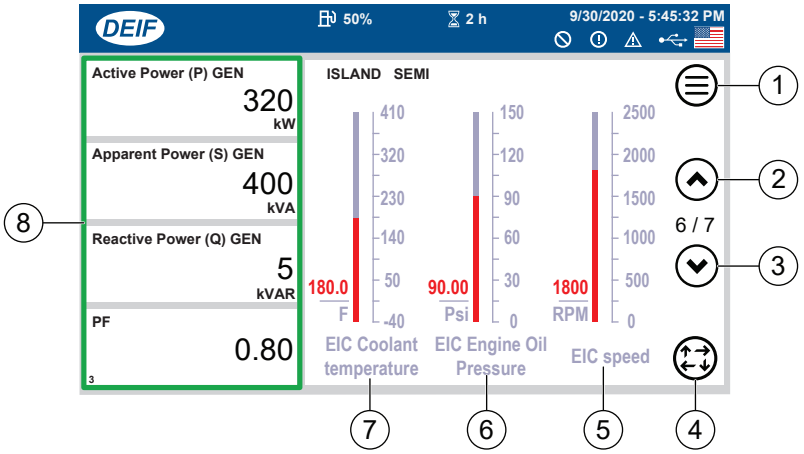


Figure 216. Engine Data Screen (6 of 7)

Table 26. Engine Data Screen Icons		
No.	**Item**	**Description**
1	Menu	Press to view the Menu screen.
2	Scroll Page Up	Press to scroll up.
3	Scroll Page Down	Press to scroll down.
4	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
5	Engine Speed	Indicates engine speed.
6	Engine Oil Pressure	Indicates engine oil pressure.
7	Engine Coolant Temperature	Indicates engine coolant temperature.
8	Generator Power Values	Instruments indicate generator Active Power (kW), Apparent Power (kVA), Reactive Power (kVAR) and Power Factor.

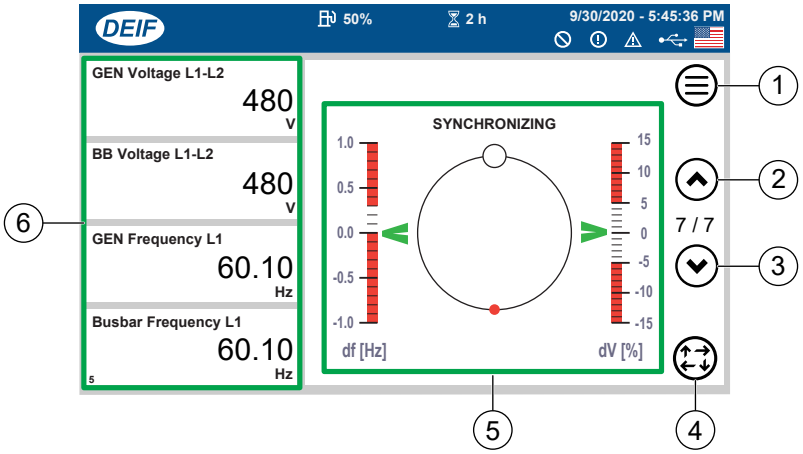


Figure 217. Synchronization Status Screen (7 of 7)

Table 27. Synchronization Status Screen Icons

No.	Item	Description
1	Menu	Press to view the Menu screen.
2	Scroll Page Up	Press to scroll up.
3	Scroll Page Down	Press to scroll down.
4	Mode Change	Indicates selected operational mode. Press to change operational mode: Manual mode. Semi mode. Auto mode. Test mode.
5	Synchronization Status	Indicates synchronization status.
6	Voltage and Frequency	Instruments indicate generator and busbar Voltage (V) and Frequency (Hz).

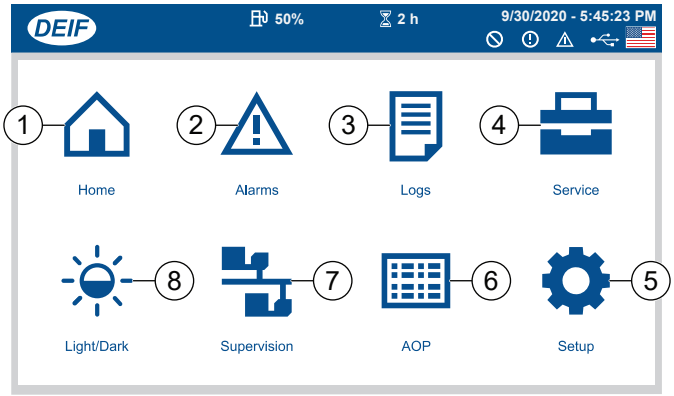


Figure 218. Main Menu Screen

Table 28. Main Menu Screen Icons

No.	Item	Description
1	Home	Press to return to the Home screen.
2	Alarm	Press to view Alarm(s).
3	Logs	Press to view logs.
4	Service	Press to view the Service Menu.
5	Setup	Press to view the Setup screen.
6	AOP	Press to view Additional Operator Panel (AOP) screen.
7	Supervision	Press to view Supervision screen.
8	Light/Dark	Press to toggle between Light Mode and Dark Mode.

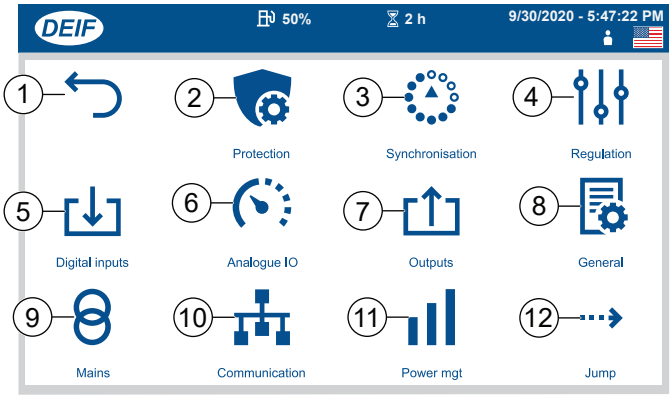


Figure 219. Controller Settings Groups Screen

Table 29. Controller Settings Groups Screen Icons

No.	Item	Description
1	Back	Press to return to the previous display.
2	Protection	Press to view a list (group) of controller Protection settings.
3	Synchronization	Press to view a list (group) of controller Synchronization settings.
4	Regulation	Press to view a list (group) of controller Regulation settings.
5	Digital Inputs	Press to view a list (group) of controller Digital Input settings.
6	Analogue IO	Press to view a list (group) of controller Analogue IO settings.
7	Outputs	Press to view a list (group) of controller Output settings.
8	General	Press to view a list (group) of controller General settings.
9	Mains	Press to view a list (group) of controller Mains settings.
10	Communication	Press to view a list (group) of controller Communication settings.
11	Power Management	Press to view a list (group) of controller Power Management settings.
12	Jump	Press to display Controller Settings search window.

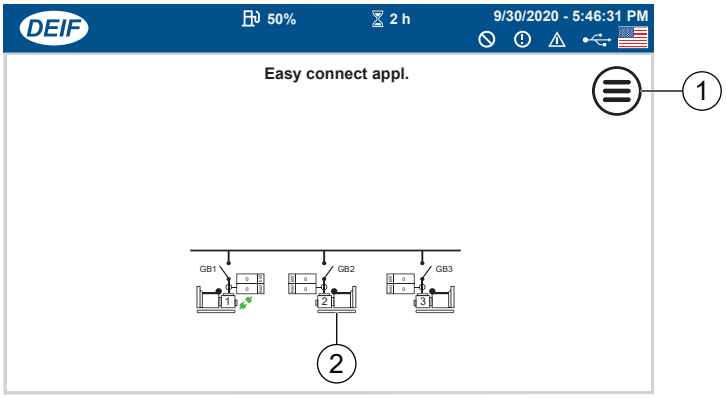


Figure 220. Supervision Screen

Table 30. Supervision Screen Icons		
No.	**Item**	**Description**
1	Menu	Press to view the Menu screen.
2	Live System Overview	Displays the system state. **NOTE:** Actual system shown depends on your plant configuration.

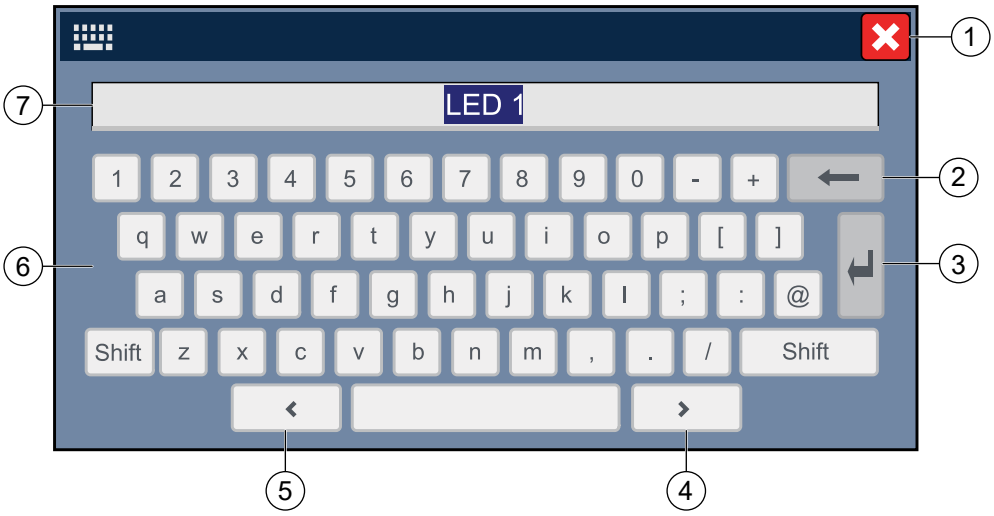


Figure 221. Text Keyboard

Table 31. Text Keyboard Icons		
No.	**Item**	**Description**
1	Cancel	Press to cancel the changes.
2	Backspace	Press to delete the last character.
3	Enter	Press to confirm the text entered.
4	Right Cursor	Press to move the cursor to the right.
5	Left Cursor	Press to move the cursor to the left.
6	Keyboard	Press to select letters, numbers or symbols.
7	Text	Displays the text you are entering.

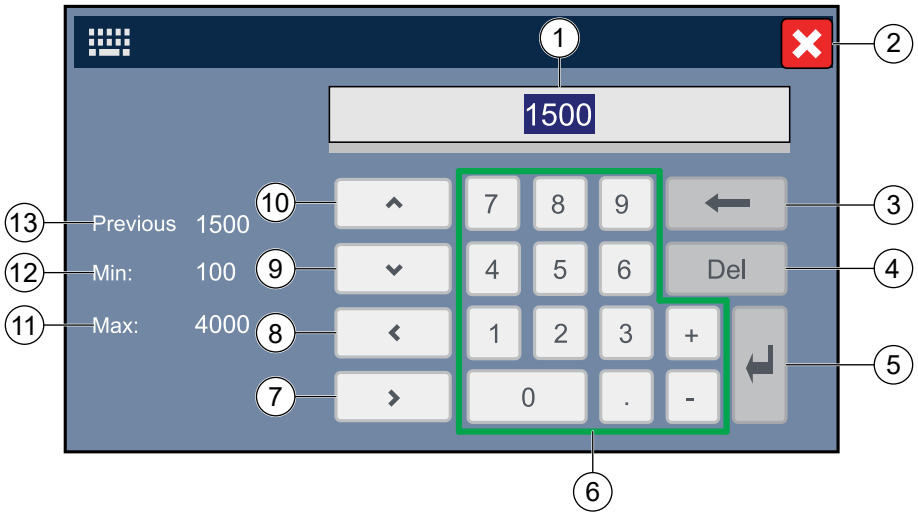


Figure 222. Value Keyboard

Table 32. Value Keyboard Icons		
No.	**Item**	**Description**
1	Value	Displays the value you are entering.
2	Cancel	Press to cancel the changes.
3	Backspace	Press to delete the last character.
4	Forward Delete	Press to delete the next character.
5	Enter	Press to confirm the value entered.
6	Keypad	Press to select a number or symbol.
7	Right Cursor	Press to move the cursor to the right.
8	Left Cursor	Press to move the cursor to the left.
9	Decrease	Press to decrease the value.
10	Increase	Press to increase the value.
11	Maximum Value	Indicates the maximum allowable value.
12	Minimum Value	Indicates the minimum allowable value.
13	Previous Value	Indicates the value before any changes.

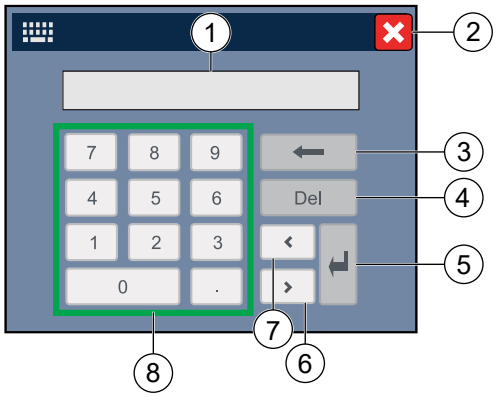


Figure 223. Passcode Keypad

Table 33. Passcode Keypad Icons		
No.	**Item**	**Description**
1	Value	Displays the value you are entering.
2	Cancel	Press to cancel the changes.
3	Backspace	Press to delete the last character.
4	Forward Delete	Press to delete the next character.
5	Enter	Press to confirm the value entered.
6	Right Cursor	Press to move the cursor to the right.
7	Left Cursor	Press to move the cursor to the left.
8	Keypad	Press to select a number or symbol.

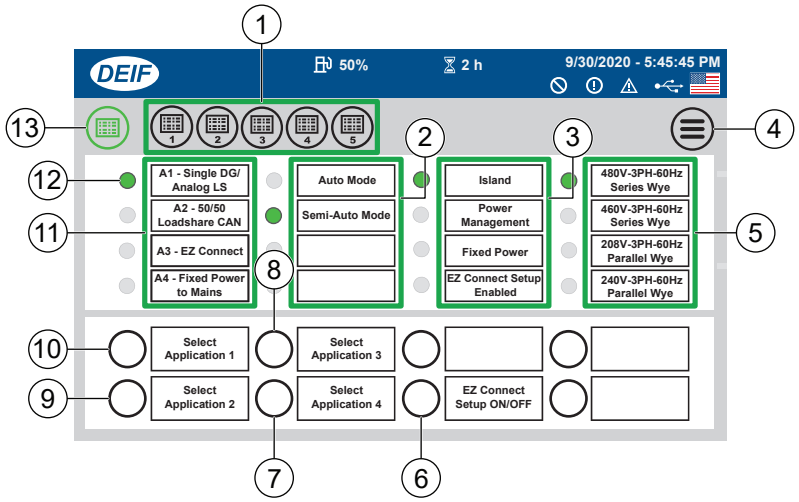


Figure 224. Main Additional Operator Panel (AOP) Screen

Table 34. Main Additional Operator Panel (AOP) Screen Icons

No.	Item	Description
1	AOP Panel Selection (1–5)	Press to select AOP 1–5. Green icon indicates which AOP is selected.
2	Running Mode Selection	Green LED indicates which running mode is selected.
3	Power Mode Selection	Green LED indicates which power mode is selected.
4	Menu	Press to view the Menu screen.
5	Voltage Configuration Selection	Green LED indicates which voltage configuration is selected.
6	EZ Connect	Press to activate/deactivate EZ Connect.
7	Application 4	Press to select Application 4 (Fixed Power to Mains)
8	Application 3	Press to select Application 3 (EZ Connect)
9	Application 2	Press to select Application 2 (50/50 Loadshare)
10	Application 1	Press to select Application 4 (Single DG)
11	Application Selection	Green LED indicates which application is selected.
12	LED Status	LEDs indicate selection status.
13	AOP Panel Selection (Main)	Press to select Main AOP. Green icon indicates Main AOP is selected.

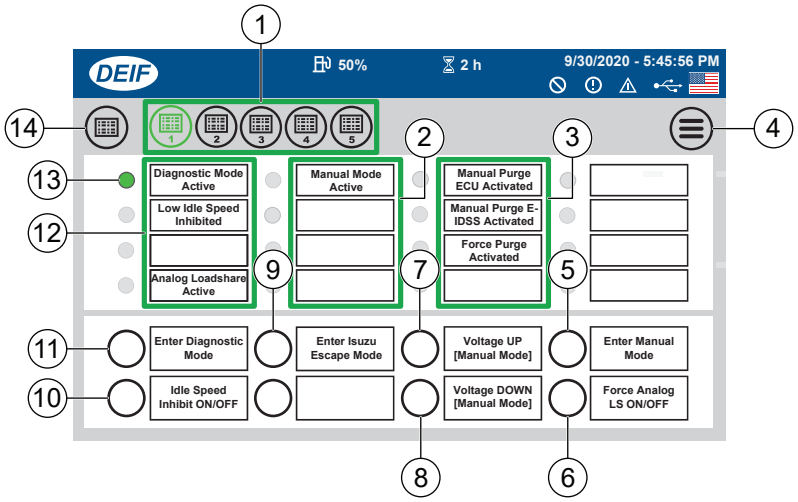


Figure 225. Additional Operator Panel 1 (AOP1) Screen

Table 35. Additional Operator Panel 1 (AOP1) Screen Icons

No.	Item	Description
1	AOP Panel Selection (1–5)	Press to select AOP 1–5. Green icon indicates which AOP is selected.
2	Manual Mode Status	Green LED indicates Manual Mode is active.
3	Purge Status	Green LED indicates purge status.
4	Menu	Press to view the Menu screen.
5	Manual Mode	Press to activate Manual Mode.
6	Force Analog LS	Press to turn Load Sharing function ON/OFF.
7	Voltage Up	Press to increase voltage while in Manual Mode.
8	Voltage Down	Press to decrease voltage while in Manual Mode.
9	Escape Mode	Press to activate Isuzu Escape Mode.
10	Idle Speed Inhibit	Press to turn Idle Speed Inhibit function ON/OFF.
11	Diagnostic Mode	Press to activate Diagnostic Mode.
12	Selection Status	Green LED indicates selected function.
13	LED Status	LEDs indicate selection status.
14	AOP Panel Selection (Main)	Press to select Main AOP. Green icon indicates Main AOP is selected.

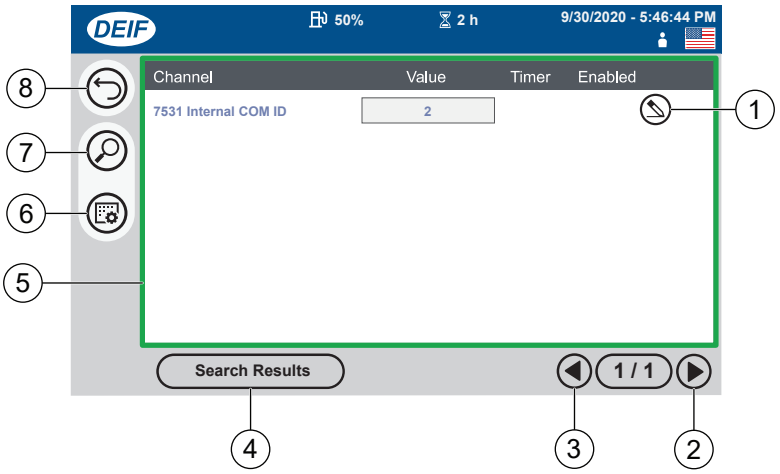


Figure 226. Controller Settings List Screen

Table 36. Controller Settings List Screen Icons		
No.	**Item**	**Description**
1	Edit	Press to edit the setting.
2	Scroll Page Right	Press to scroll the page to the right.
3	Scroll Page Left	Press to scroll the page to the left.
4	Search Results	Press to return to settings search results.
5	Controller Settings List	Swipe up or down to scroll through controller settings.
6	Filter Groups	Press to view groups of settings.
7	Search	Press to open the search keyboard.
8	Return	Press to return to the previous display.

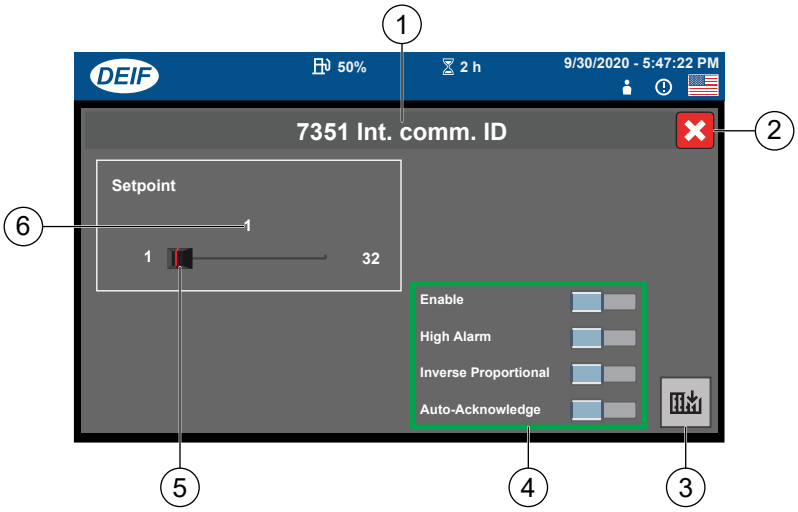


Figure 227. Edit Internal Communication ID Screen

Table 37. Edit Internal Communication ID Screen Icons		
No.	**Item**	**Description**
1	Setting	Displays the name of the current setting.
2	Cancel	Press to cancel the changes.
3	Save	Press to save the settings to the controller.
4	Settings	Setting enabled. Setting disabled. Setting cannot be changed.
5	Setpoint Value Slider	Press and slide left or right to increase or decrease the setpoint value.
6	Setpoint Value	Indicates the setpoint value. Press to open the Value Keyboard to edit the value.

Figure 228. Alarm Pop-Up

Table 38. Alarm Pop-Up Icons		
No.	**Item**	**Description**
1	Alarm	Indicates the activated alarm.
2	Alarm List	Press to view the Alarm list (shortcut).
3	Alarm Settings	Press to view the Alarm settings (shortcut).
4	Acknowledge	Press to acknowledge the alarm (shortcut).
5	Cancel	Press to cancel the pop-up message.

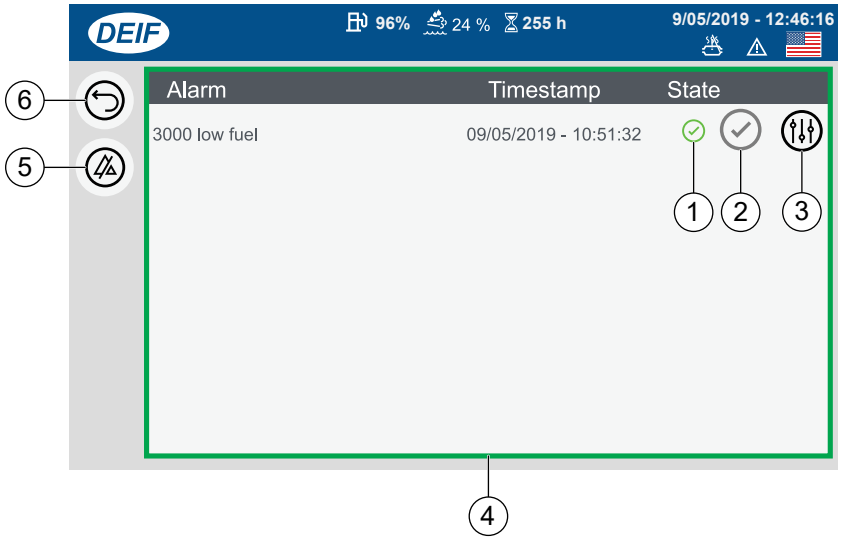


Figure 229. Alarm Screen

Table 39. Alarm Screen Icons		
No.	**Item**	**Description**
1	Alarm State	Indicates the current state of the alarm: Acknowledged alarm. Unacknowledged alarm.
2	Acknowledge	Press to acknowledge alarm.
3	Alarm Settings	Press to view the alarm configuration.
4	Alarm List	Swipe to scroll the alarm list up or down.
5	Acknowledge All Alarms	Press to acknowledge all unacknowledged alarms.
6	Back	Press to return to the previous display.

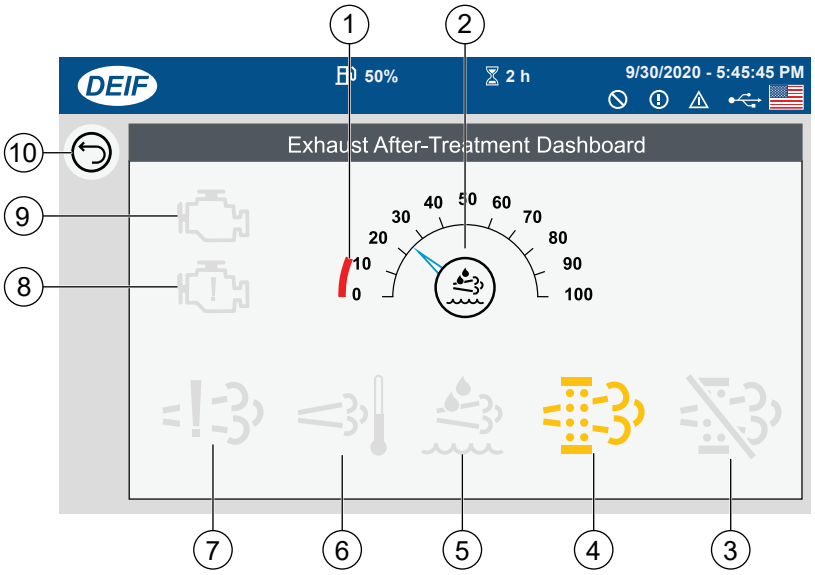


Figure 230. Exhaust After-Treatment Dashboard Screen

Table 40. Exhaust After-Treatment Dashboard Screen Icons		
No.	**Item**	**Description**
1	Minimum DEF Level (%)	Displays the minimum level for the diesel exhaust fluid.
2	Diesel Exhaust Fluid Level (%)	Indicates the current level of the diesel exhaust fluid.
3	Diesel Particle Filter (DPF) Inhibit	Not used with this engine model.
4	SCR Purge Indicator	When lit (yellow), indicates that a purge operation is in progress.
5	Diesel Exhaust Fluid (DEF)	When lit (yellow), indicates that the DEF level is too low or DEF quality is poor.
6	High Temperature – Regeneration	Not used with this engine model.
7	Engine Emission System Failure	When lit (red), indicates an emission failure or malfunction.
8	Engine Shutdown	When lit (red), indicates an engine shutdown.
9	Engine Warning	When lit (yellow), indicates an engine warning.
10	Return	Press to return to previous display.

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL NUMBER ON HAND WHEN CALLING

UNITED STATES

Multiquip Inc.

(310) 537- 3700
6141 Katella Avenue Suite 200
Cypress, CA 90630
E-MAIL: mq@multiquip.com
WEBSITE: www.multiquip.com

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Multiquip

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Laval, Quebec, Canada H7L 6V3
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Multiquip (UK) Limited Head Office

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