

Installation

Commercial Mobile Generator Sets



Model:

10ERG

13ERG

15ERG

KOHLER[®]
POWER SYSTEMS

9001
KOHLER
POWER SYSTEMS
NATIONALLY REGISTERED

TP-6335 9/04

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Notes

Safety Precautions and Instructions

IMPORTANT SAFETY INSTRUCTIONS. Electromechanical equipment, including generator sets, transfer switches, switchgear, and accessories, can cause bodily harm and pose life-threatening danger when improperly installed, operated, or maintained. To prevent accidents be aware of potential dangers and act safely. Read and follow all safety precautions and instructions. **SAVE THESE INSTRUCTIONS.**

This manual has several types of safety precautions and instructions: Danger, Warning, Caution, and Notice.

DANGER

Danger indicates the presence of a hazard that **will cause severe personal injury, death, or substantial property damage.**

WARNING

Warning indicates the presence of a hazard that **can cause severe personal injury, death, or substantial property damage.**

CAUTION

Caution indicates the presence of a hazard that **will or can cause minor personal injury or property damage.**

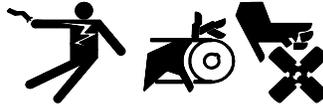
NOTICE

Notice communicates installation, operation, or maintenance information that is safety related but not hazard related.

Safety decals affixed to the equipment in prominent places alert the operator or service technician to potential hazards and explain how to act safely. The decals are shown throughout this publication to improve operator recognition. Replace missing or damaged decals.

Accidental Starting

WARNING



Accidental starting. Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

Battery

WARNING



Sulfuric acid in batteries. Can cause severe injury or death.

Wear protective goggles and clothing. Battery acid may cause blindness and burn skin.

Battery electrolyte is a diluted sulfuric acid. Battery acid can cause severe injury or death. Battery acid can cause blindness and burn skin. Always wear splashproof safety goggles, rubber gloves, and boots when servicing the battery. Do not open a sealed battery or mutilate the battery case. If battery acid splashes in the eyes or on the skin, immediately flush the affected area for 15 minutes with large quantities of clean water. Seek immediate medical aid in the case of eye contact. Never add acid to a battery after placing the battery in service, as this may result in hazardous spattering of battery acid.

Battery acid cleanup. Battery acid can cause severe injury or death. Battery acid is electrically conductive and corrosive. Add 500 g (1 lb.) of bicarbonate of soda (baking soda) to a container with 4 L (1 gal.) of water and mix the neutralizing solution. Pour the neutralizing solution on the spilled battery acid and continue to add the neutralizing solution to the spilled battery acid until all evidence of a chemical reaction (foaming) has ceased. Flush the resulting liquid with water and dry the area.

Battery gases. Explosion can cause severe injury or death. Battery gases can cause an explosion. Do not smoke or permit flames or sparks to occur near a battery at any time, particularly when it is charging. Do not dispose of a battery in a fire. To prevent burns and sparks that could cause an explosion, avoid touching the battery terminals with tools or other metal objects. Remove all jewelry before servicing the equipment. Discharge static electricity from your body before touching batteries by first touching a grounded metal surface away from the battery. To avoid sparks, do not disturb the battery charger connections while the battery is charging. Always turn the battery charger off before disconnecting the battery connections. Ventilate the compartments containing batteries to prevent accumulation of explosive gases.

Battery short circuits. Explosion can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Disconnect the battery before generator set installation or maintenance. Remove all jewelry before servicing the equipment. Use tools with insulated handles. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery. Never connect the negative (-) battery cable to the positive (+) connection terminal of the starter solenoid. Do not test the battery condition by shorting the terminals together.

Engine Backfire/Flash Fire

⚠ WARNING

<p>Fire. Can cause severe injury or death.</p> <p>Do not smoke or permit flames or sparks near fuels or the fuel system.</p>

Servicing the fuel system. A flash fire can cause severe injury or death. Do not smoke or permit flames or sparks near the carburetor, fuel line, fuel filter, fuel pump, or other potential sources of spilled fuels or fuel vapors. Catch fuels in an approved container when removing the fuel line or carburetor.

Servicing the air cleaner. A sudden backfire can cause severe injury or death. Do not operate the generator set with the air cleaner removed.

Combustible materials. A fire can cause severe injury or death. Generator set engine fuels and fuel vapors are flammable and explosive. Handle these materials carefully to minimize the risk of fire or explosion. Equip the compartment or nearby area with a fully charged fire extinguisher. Select a fire extinguisher rated ABC or BC for electrical fires or as recommended by the local fire code or an authorized agency. Train all personnel on fire extinguisher operation and fire prevention procedures.

Exhaust System

⚠ WARNING

<p>Carbon monoxide. Can cause severe nausea, fainting, or death.</p> <p>The exhaust system must be leakproof and routinely inspected.</p>

Generator set operation. Carbon monoxide can cause severe nausea, fainting, or death. Carbon monoxide is an odorless, colorless, tasteless, nonirritating gas that can cause death if inhaled for even a short time. Avoid breathing exhaust fumes when working on or near the generator set. Never operate the generator set inside a building unless the exhaust gas is piped safely outside. Never operate the generator set where exhaust gas could accumulate and seep back inside a potentially occupied building or vehicle. Do not obstruct the exhaust outlet when parking your vehicle. The exhaust gases must discharge freely to prevent carbon monoxide from deflecting into the vehicle.

Carbon monoxide symptoms. Carbon monoxide can cause severe nausea, fainting, or death. Carbon monoxide is a poisonous gas present in exhaust gases. Carbon monoxide poisoning symptoms include but are not limited to the following:

- Light-headedness, dizziness
- Physical fatigue, weakness in joints and muscles
- Sleepiness, mental fatigue, inability to concentrate or speak clearly, blurred vision
- Stomachache, vomiting, nausea

If experiencing any of these symptoms and carbon monoxide poisoning is possible, seek fresh air immediately and remain active. Do not sit, lie down, or fall asleep. Alert others to the possibility of carbon monoxide poisoning. Seek medical attention if the condition of affected persons does not improve within minutes of breathing fresh air.

Installing the exhaust tail pipe. Carbon monoxide can cause severe nausea, fainting, or death. Install the exhaust system tail pipe to prevent the drawing of discharged exhaust gases into the vehicle interior through windows, doors, air conditioners, and other openings. Do not use flexible tail piping because it could crack and allow lethal exhaust fumes to enter the vehicle.

Inspecting the exhaust system. Carbon monoxide can cause severe nausea, fainting, or death. For the safety of the vehicle's occupants, install a carbon monoxide detector. Consult the coach builder or dealer for approved detector location and installation. Inspect the detector before each generator set use. In addition to routine exhaust system inspection, test the carbon monoxide detector per the manufacturer's instructions and keep the detector operational at all times.

Fuel System

WARNING



Explosive fuel vapors. Can cause severe injury or death.

Use extreme care when handling, storing, and using fuels.

The fuel system. Explosive fuel vapors can cause severe injury or death. Vaporized fuels are highly explosive. Use extreme care when handling and storing fuels. Store fuels in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running because spilled fuel may ignite on contact with hot parts or from sparks. Do not smoke or permit flames or sparks to occur near sources of spilled fuel or fuel vapors. Keep the fuel lines and connections tight and in good condition. Do not replace flexible fuel lines with rigid lines. Use flexible sections to avoid fuel line breakage caused by vibration. Do not operate the generator set in the presence of fuel leaks, fuel accumulation, or sparks. Repair fuel systems before resuming generator set operation.

Explosive fuel vapors can cause severe injury or death. Take additional precautions when using the following fuels:

Gasoline—Store gasoline only in approved red containers clearly marked GASOLINE.

Propane (LP)—Adequate ventilation is mandatory. Because propane is heavier than air, install propane gas detectors low in a room. Inspect the detectors per the manufacturer's instructions.

Draining the fuel system. Explosive fuel vapors can cause severe injury or death. Spilled fuel can cause an explosion. Use a container to catch fuel when draining the fuel system. Wipe up spilled fuel after draining the system.

LP gas fuel leaks. Explosive fuel vapors can cause severe injury or death. Fuel leakage can cause an explosion. Check the LP vapor gas fuel system for leakage by using a soap and water solution with the fuel system test pressurized to 6–8 ounces per square inch (10–14 inches water column). Do not use a soap solution containing either ammonia or chlorine because both prevent bubble formation. A successful test depends on the ability of the solution to bubble.

Hazardous Noise

CAUTION



Hazardous noise. Can cause hearing loss.

Never operate the generator set without a muffler or with a faulty exhaust system.

Engine noise. Hazardous noise can cause hearing loss. Generator sets not equipped with sound enclosures can produce noise levels greater than 105 dBA. Prolonged exposure to noise levels greater than 85 dBA can cause permanent hearing loss. Wear hearing protection when near an operating generator set.

Hazardous Voltage/ Electrical Shock

WARNING



Hazardous voltage. Moving rotor. Can cause severe injury or death.

Operate the generator set only when all guards and electrical enclosures are in place.

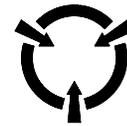
WARNING



Hazardous voltage. Backfeed to the utility system can cause severe injury, death, or property damage.

Connect the generator set to the building's electrical system only through an approved device and after the building's main switch is opened.

CAUTION



Welding the generator set. Can cause severe electrical equipment damage.

Never weld components of the generator set without first disconnecting the battery, controller wiring harness, and engine electronic control module (ECM).

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocutation is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set, transfer switch, and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Welding the generator set. Can cause severe electrical equipment damage. Before welding the generator set perform the following steps: (1) Remove the battery cables, negative (-) lead first. (2) Disconnect all engine electronic control module (ECM) connectors. (3) Disconnect all generator set controller and voltage regulator circuit board connectors. (4) Disconnect the engine battery-charging alternator connections. (5) Attach the weld ground connection close to the weld location.

Short circuits. Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

Engine block heater. Hazardous voltage can cause severe injury or death. The engine block heater can cause electrical shock. Remove the engine block heater plug from the electrical outlet before working on the block heater electrical connections.

Electrical backfeed to the utility. Hazardous backfeed voltage can cause severe injury or death. Connect the generator set to the building/campground electrical system only through an approved device and after the building/campground main switch is opened. Backfeed connections can cause severe injury or death to utility personnel working on power lines and/or personnel near the work area. Some states and localities prohibit unauthorized connection to the utility electrical system. Install a transfer switch to prevent interconnection of the generator set power and other sources of power.

Testing live electrical circuits. Hazardous voltage or current can cause severe injury or death. Have trained and qualified personnel take diagnostic measurements of live circuits. Use adequately rated test equipment with electrically insulated probes and follow the instructions of the test equipment manufacturer when performing voltage tests. Observe the following precautions when performing voltage tests: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Do not touch the enclosure or components inside the enclosure. (4) Be prepared for the system to operate automatically. (600 volts and under)

Hot Parts

⚠ WARNING

Hot coolant and steam. Can cause severe injury or death.
Before removing the pressure cap, stop the generator set and allow it to cool. Then loosen the pressure cap to relieve pressure.

⚠ WARNING

Hot engine and exhaust system. Can cause severe injury or death.
Do not work on the generator set until it cools.

Checking the coolant level. Hot coolant can cause severe injury or death. Allow the engine to cool. Release pressure from the cooling system before removing the pressure cap. To release pressure, cover the pressure cap with a thick cloth and then slowly turn the cap counterclockwise to the first stop. Remove the cap after pressure has been completely released and the engine has cooled. Check the coolant level at the tank if the generator set has a coolant recovery tank.

Servicing the exhaust system. Hot parts can cause severe injury or death. Do not touch hot engine parts. The engine and exhaust system components become extremely hot during operation.

Combustible materials. Fire can cause severe injury or death. A hot exhaust system can ignite adjacent combustible materials. Do not locate electrical wiring, fuel lines, or combustible materials above the exhaust muffler. Exercise caution when parking your vehicle to prevent the exhaust system and hot exhaust gases from starting grass fires.

Combustible materials. Fire can cause severe injury or death. A hot generator set can ignite debris in the compartment. Keep the compartment and generator set clean and free of debris and combustible materials to minimize the possibility of fire. Do not block the fuel/oil drain opening in the generator set mounting tray. Cut a corresponding hole in the subfloor, if used, for the drain opening.

Moving Parts

⚠ WARNING	
	
Hazardous voltage. Moving rotor. Can cause severe injury or death.	
Operate the generator set only when all guards and electrical enclosures are in place.	

⚠ WARNING

Rotating parts. Can cause severe injury or death.
Operate the generator set only when all guards, screens, and covers are in place.

⚠ WARNING



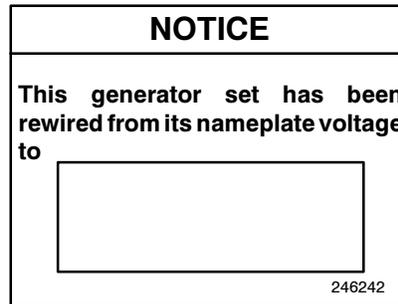
Airborne particles. Can cause severe injury or blindness.

Wear protective goggles and clothing when using power tools, hand tools, or compressed air.

Tightening the hardware. Flying projectiles can cause severe injury or death. Loose hardware can cause the hardware or pulley to release from the generator set engine and can cause personal injury. Retorque all crankshaft and rotor hardware after servicing. Do not loosen the crankshaft hardware or rotor throbolt when making adjustments or servicing the generator set. Rotate the crankshaft manually in a clockwise direction only. Turning the crankshaft bolt or rotor throbolt counterclockwise can loosen the hardware.

Servicing the generator set when it is operating. Exposed moving parts can cause severe injury or death. Keep hands, feet, hair, clothing, and test leads away from the belts and pulleys when the generator set is running. Replace guards, screens, and covers before operating the generator set.

Notice



NOTICE

Voltage reconnection. Affix a notice to the generator set after reconnecting the set to a voltage different from the voltage on the nameplate. Order voltage reconnection decal 246242 from an authorized service distributor/dealer.

NOTICE

Hardware damage. The engine and generator set may use both American Standard and metric hardware. Use the correct size tools to prevent rounding of the bolt heads and nuts.

NOTICE

When replacing hardware, do not substitute with inferior grade hardware. Screws and nuts are available in different hardness ratings. To indicate hardness, American Standard hardware uses a series of markings, and metric hardware uses a numeric system. Check the markings on the bolt heads and nuts for identification.

NOTICE

Canadian installations only. For standby service connect the output of the generator set to a suitably rated transfer switch in accordance with Canadian Electrical Code, Part 1.

NOTICE

This generator set does not comply with United States Coast Guard (USCG) requirements and must not be used for marine applications. For marine installations use only generator sets specified for marine use. USCG Regulation 33CFR183 requires that a generator set must be ignition protected when used in a gasoline-fueled environment.

Notes

All information in this publication represents data available at the time of print. Kohler Co. reserves the right to change this literature and the products represented without incurring obligation.

The safe and successful operation of a mobile power system depends primarily on the installation. Use this manual as a guide for installing the mobile generator set. Refer to the operation manual for operating instructions.

1.1 Installation Standards

Mobile generator set installations must comply with the Kohler detailed installation instructions following and state and local requirements.

The installer is responsible for improper installations resulting in penalties from noncompliance with California Air Resources Board (CARB) or Environmental Protection Agency (EPA) emission standards as well as state and local requirements.

1.2 Generator Set Specifications

Refer to the model's specification sheet for details. Use the spec sheet as a guide for planning the installation. Use the current dimension drawing and wiring diagrams.

1.3 Generator Set Operation

After the installer attaches the generator set to the vehicle's frame and makes connections, do the following to make the generator set operational:

- Attach the exhaust system
- Add radiator coolant
- Add oil to the engine crankcase until the dipstick indicates full
- Connect the fuel inlet and fuel return lines (for gasoline models) or fuel inlet line (for LP models)
- Connect the remote switch, if equipped
- Connect the load leads
- Connect the battery terminals

Notes

Section 2 Location and Mounting

2.1 General Considerations

Consider the following items concerning the generator set and Section 2.2 for the proposed location.

1. Select a generator set having adequate capacity to handle the electrical load.
2. Design the fuel system to prevent fuel starvation of the main or generator set engine.
3. Ensure that the exhaust system meets all safety requirements after installation.
4. Ensure compatibility of all electrical systems (battery, load, and remote switch) with the vehicle's electrical systems.

2.2 Location

Note: This generator set is not designed for installation in a compartment or enclosure.

Before making final plans for locating the generator set, ensure the following:

1. The location has sufficient room to maintain required minimum clearances.
2. The location provides enough air flow to allow required cooling and combustion.
3. The location can support the generator set weight.
4. The location provides ample room for routine service of the generator set's engine, controller, cooling system, and fuel system components.

See the current generator set specification sheet or Section 7 of this manual for generator set dimensions and weights.

For angular operating limits, consult the operation manual.

2.3 Vehicle-Floor Mounting

Install the Kohler mobile generator set on an open vehicle's floor or truck bed. Follow the guidelines below. Contact an authorized Kohler service distributor/dealer with your specific application questions.

Minimum clearance. Allow clearance for vibration and cooling during operation. Minimum clearance for vibration (top, front, rear, and sides) is 38 mm (1 1/2 in.). Keep the radiator end unobstructed for proper air flow.

Additional clearance. Generator set service requires more clearance than 38 mm (1 1/2 in.). Design the mounting location to allow for sufficient room to easily remove the generator set to perform major service.

Securely fasten the generator set to avoid unwanted movement from vibration and road shock. Attach the generator set vibromounts directly to the vehicle's frame. See Figure 2-1 for vibromount installation.

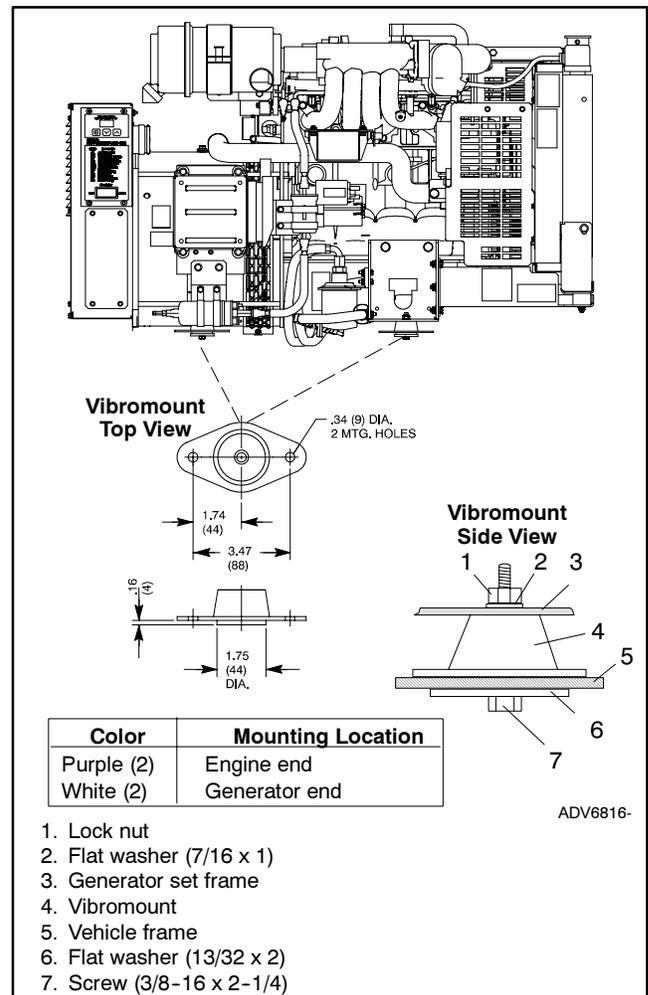


Figure 2-1 Vibromount Installation

Notes

Section 3 Cooling System

3.1 Air Requirements

Air flow around the generator set is necessary for adequate cooling. See the current generator set specification sheet for air requirements. The air intake silencer/cleaner provides combustion air to the engine. See Figure 3-1 for allowable intake restriction. The engine/generator performance will be adversely affected if these guidelines are neglected. Follow these guidelines to optimize generator set performance.

Model	Normal Intake Restriction
10/13/15ERG	0.06 psi (0.50 in. H ₂ O)

Figure 3-1 Intake Restriction

3.2 Block Heaters

Block heaters are available as installed accessories on these generator sets. Use block heaters in applications where the generator set is subject to temperatures below 16°C (60°F). Connect the block heater to a power source that is energized when the generator set is not running.

Note: Block heater damage. The block heater will fail if the energized heater element is not immersed in coolant. Fill the cooling system before turning on the block heater. Run the engine until it is warm and refill the radiator to purge the air from the system before energizing the block heater.

3.3 High Water Temperature Switch

Each generator set includes a high water temperature shutdown switch that automatically shuts down the set if operating temperatures climb too high. Follow the guidelines described in Section 3.1 to prevent shutdowns.

3.4 Unit-Mounted Radiator Cooling

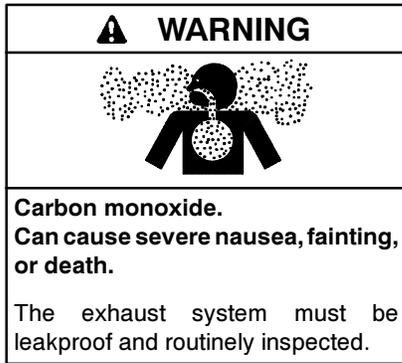
The generator set is equipped with a unit-mounted radiator common cooling system.

3.4.1 System Features

The system's major components include an engine-driven fan and circulating water pump, a radiator, and a thermostat. The pump circulates water through the engine until it reaches operating temperature. Then, the engine thermostat opens, allowing water circulation through the radiator. The thermostat restricts water flow as necessary to prevent overcooling. The fan blows air from the engine side of the radiator across the cooling surface.

Notes

Section 4 Exhaust System



Generator set operation. Carbon monoxide can cause severe nausea, fainting, or death. Carbon monoxide is an odorless, colorless, tasteless, nonirritating gas that can cause death if inhaled for even a short time. Avoid breathing exhaust fumes when working on or near the generator set. Never operate the generator set inside a building unless the exhaust gas is piped safely outside. Never operate the generator set where exhaust gas could accumulate and seep back inside a potentially occupied building or vehicle. Do not obstruct the exhaust outlet when parking your vehicle. The exhaust gases must discharge freely to prevent carbon monoxide from deflecting into the vehicle.

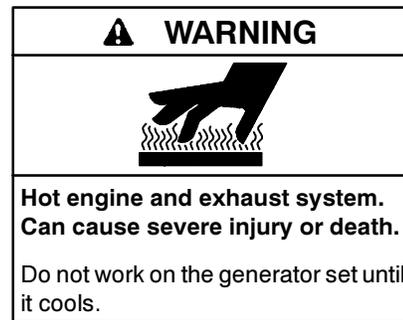
Carbon monoxide symptoms. Carbon monoxide can cause severe nausea, fainting, or death. Carbon monoxide is a poisonous gas present in exhaust gases. Carbon monoxide poisoning symptoms include but are not limited to the following:

- Light-headedness, dizziness
- Physical fatigue, weakness in joints and muscles
- Sleepiness, mental fatigue, inability to concentrate or speak clearly, blurred vision
- Stomachache, vomiting, nausea

If experiencing any of these symptoms and carbon monoxide poisoning is possible, seek fresh air immediately and remain active. Do not sit, lie down, or fall asleep. Alert others to the possibility of carbon monoxide poisoning. Seek medical attention if the condition of affected persons does not improve within minutes of breathing fresh air.

Installing the exhaust tail pipe. Carbon monoxide can cause severe nausea, fainting, or death. Install the exhaust system tail pipe to prevent the drawing of discharged exhaust gases into the vehicle interior through windows, doors, air conditioners, and other openings. Do not use flexible tail piping because it could crack and allow lethal exhaust fumes to enter the vehicle.

Inspecting the exhaust system. Carbon monoxide can cause severe nausea, fainting, or death. For the safety of the vehicle's occupants, install a carbon monoxide detector. Consult the coach builder or dealer for approved detector location and installation. Inspect the detector before each generator set use. In addition to routine exhaust system inspection, test the carbon monoxide detector per the manufacturer's instructions and keep the detector operational at all times.



Combustible materials. Fire can cause severe injury or death. A hot exhaust system can ignite adjacent combustible materials. Do not locate electrical wiring, fuel lines, or combustible materials above the exhaust muffler. Exercise caution when parking your vehicle to prevent the exhaust system and hot exhaust gases from starting grass fires.

4.1 Planning

Carefully plan the generator exhaust system to ensure a safe, quiet installation. Verify that the installation complies with all state and local requirements and applicable articles of the codes listed at the beginning of this manual.

4.2 Clearance Requirements

Kohler Co. recommends a minimum clearance of 38 mm (1 1/2 in.) between the exhaust system parts and the fuel system, the electrical system, and all combustible components to protect the generator set components and to avoid igniting adjacent combustible materials.

4.3 Exhaust Piping, If Used

Route the exhaust piping to maintain minimum clearances and to minimize exhaust piping bends. Use a tail pipe as short as possible with as few bends as possible to reduce back pressure. Design the exhaust piping to prevent excessive back pressure of the unit-mounted muffler, if equipped. See Figure 4-1 for the allowable exhaust back pressure. Do not apply weight or pressure to the unit-mounted muffler, otherwise premature exhaust-system damage will occur. Adding exhaust-pipe extensions to the unit-mounted muffler may cause excessive vibration and noise transmitted to the vehicle.

For generator sets without a unit-mounted muffler, install a muffler made of aluminized steel or other corrosion-resistant material of welded or crimped construction.

Model	Allowable Exhaust Back Pressure
10/13/15ERG	< 10.2 kPa (3.0 in. Hg)

Figure 4-1 Allowable Exhaust Back Pressure

⚠ WARNING



**Explosive fuel vapors.
Can cause severe injury or death.**

Use extreme care when handling, storing, and using fuels.

The fuel system. Explosive fuel vapors can cause severe injury or death. Vaporized fuels are highly explosive. Use extreme care when handling and storing fuels. Store fuels in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running because spilled fuel may ignite on contact with hot parts or from sparks. Do not smoke or permit flames or sparks to occur near sources of spilled fuel or fuel vapors. Keep the fuel lines and connections tight and in good condition. Do not replace flexible fuel lines with rigid lines. Use flexible sections to avoid fuel line breakage caused by vibration. Do not operate the generator set in the presence of fuel leaks, fuel accumulation, or sparks. Repair fuel systems before resuming generator set operation.

Draining the fuel system. Explosive fuel vapors can cause severe injury or death. Spilled fuel can cause an explosion. Use a container to catch fuel when draining the fuel system. Wipe up spilled fuel after draining the system.

5.1 Gasoline

Fuel system design. Design the generator set gasoline fuel system to operate independently of the vehicle engine fuel system if the operator may operate both engines simultaneously. Kohler Co. recommends using separate fuel tanks, if possible; however, using separate fuel tanks is usually impractical because of space restrictions. In most installations, both engines operate off a common tank with a separate dip-tube arrangement as shown in Figure 5-1. The dip-tube arrangement prevents the larger engine from starving the smaller engine of fuel. The generator set dip tube is generally shorter than the vehicle dip tube to stop the generator set before the vehicle engine runs out of fuel. With the dip-tube arrangement, the generator may not get fuel during a low fuel-supply situation.

Tee arrangement. Do not use the tee arrangement. Do not tee into the fuel-supply or -return line of fuel-injected systems.

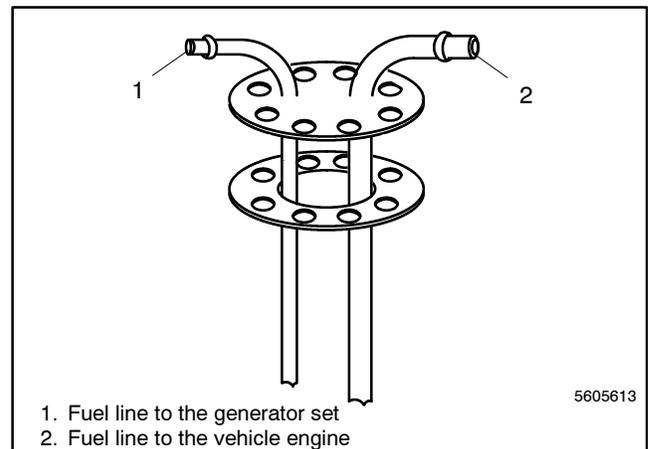


Figure 5-1 Two Dip Tubes in Fuel Tank

Note: Supply the fuel using a two dip-tube arrangement if the generator shares the vehicle engine fuel tank. Consult an authorized Kohler service distributor/dealer for further fuel system installation information.

5.1.1 Fuel Lines

Note: Keep fuel lines away from the exhaust system.

Routing fuel lines. Take care when routing the fuel line from the fuel tank to the generator set. Keep the fuel lines as short as possible but maintain adequate clearance from the exhaust system. Route the fuel lines along the frame or undercarriage—never route the fuel lines inside the habitable area of the vehicle. Locate the fuel lines with the entry point near the fuel pump. See Section 5.4 for the fuel pump lift.

Sizing fuel inlet and return lines. Size the fuel line to handle the flow of fuel and to withstand road shock and year-round climate conditions. Use steel tubing as the codes require. Use 8 mm (0.31 in.) ID tubing with a 230 mm (8 in.) (minimum) flexible section to allow free movement of the generator set.

Flexible hose sections. If a metal fuel line draws fuel from the fuel tank, install a flexible hose section to connect the metal line to the fuel pump. The flexible section allows generator set vibrational motion during operation. See Section 7 for the fuel inlet and the fuel return connection points.

Note: Gasoline-fueled engines require a type A1 hose.

5.2 Fuel Filters or Strainers

Gasoline model generator sets are shipped with a fuel filter. No additional fuel filter or strainer is required.

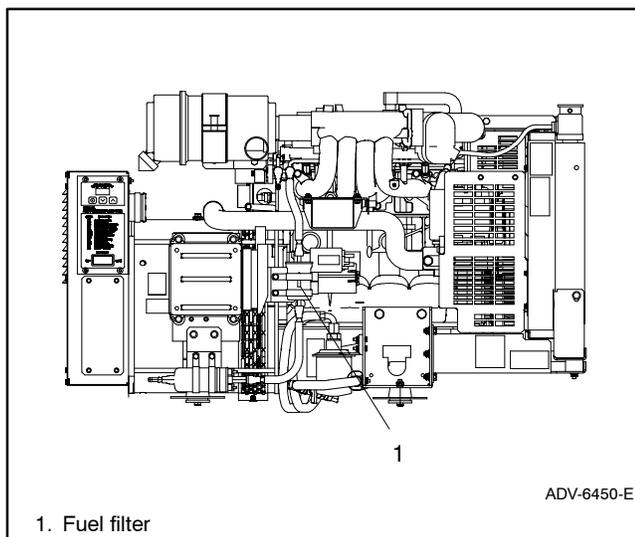


Figure 5-2 Fuel Filter Location (Gasoline Models)

5.3 LP Gas

LP fuel hose. Use a flexible fuel hose designated for use with LP fuel between the generator set and the main fuel tank. See Section 7 for the fuel inlet connection point. Take care when routing the fuel line. Maintain a 51 mm (2 in.) clearance between the fuel line and any bare exhaust component. Do not tie any electrical wiring to the fuel line. If the flexible fuel line passes through sheet metal, install grommets or clamps to prevent hose abrasion. The LP fuel system shall conform to Section 3-6.4 of NFPA58, Storage and Handling of Liquefied Petroleum Gases.

For an LP gas system, use UL classified pipe joint sealing compound to prevent dangerous fuel leaks. Use a sealing compound approved for use with LP gas. Apply UL classified sealing compound at all fuel line pipe joints.

Use flexible fuel lines in areas where vibration and/or movement of connected components is likely, such as the main fuel line to the generator set. Use seamless steel tubing wherever long main fuel lines are required.

Testing the fuel system. After all of the LP connections have been completed, pressure test the entire system to 6–8 ounces (10–14 inches) water column. Test the connections for leakage with soapy water or bubble solution. Do not use solutions that contain ammonia or chlorine since the solution will not bubble for an accurate leakage test.

The gas supply pressure should not exceed 6 ounces. To check the inlet pressure, remove the plug on the fuel inlet for the gas regulator. Insert an ounce pressure gauge or manometer. Adjust the operating pressure to 4–6 ounces or 7–11 inches water column; adjust the inlet pressure on the primary regulator.

Note: Fuel leakage could cause an explosion. After making all LP gas connections, pressure test the entire system to 6–8 ounces (10–14 inches) water column.

Note: Gas pressure above 10 ounces can result in non operation of the gas valve.

5.4 Fuel Pump Lift and Fuel Consumption

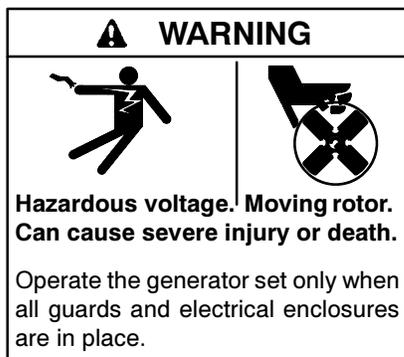
See Figure 5-3 for the fuel pump lift capability. Consult the current generator set specification sheet for the generator set fuel consumption rates. Do not exceed 3 1/2 psi fuel pump pressure to the carburetor.

Note: Fuel system alterations may adversely affect emissions levels. Fines resulting from higher-than-allowable emissions levels are the responsibility of the user.

Model	Fuel Pump Lift m (ft.)
10/13/15ERG	0.9 (3)

Figure 5-3 Fuel Pump Lift Capability (Max.), Gasoline Models

Notes



Electrical backfeed to the utility. Hazardous backfeed voltage can cause severe injury or death. Connect the generator set to the building/campground electrical system only through an approved device and after the building/campground main switch is opened. Backfeed connections can cause severe injury or death to utility personnel working on power lines and/or personnel near the work area. Some states and localities prohibit unauthorized connection to the utility electrical system. Install a transfer switch to prevent interconnection of the generator set power and other sources of power.

6.1 Electrical Connections

Have qualified electricians make electrical connections. Connections to the load leads, battery, and remote switch panel complete the installation. To prevent unintentional starting, make final connections to the battery only after making all other connections.

The following paragraphs provide details on each connection. Refer also to the wiring diagram in the operation manual.

Securely support or harness all wiring to the generator set to prevent abrasion. Provide additional support for the wiring to prevent exposure to the exhaust system and drippage of fuel, oil, or grease. Allow at least a 51 mm (2 in.) clearance between the electrical wiring and hot exhaust parts. Do not locate the wiring directly below or near the fuel system parts or the oil-fill tube.

The following paragraphs cover some other points to consider when making AC load connections.

Note: At the time of installation, make the wiring connections accessible for inspection and service.

6.2 AC Load Lead Connections

Routing. Each generator set has four color-coded load leads. The black leads (L1 and L2) are hot, the white lead (L0) is neutral, and the green lead is the hazard ground. See Section 8 for the AC load lead connections. Route the load leads directly from the junction box to the vehicle AC circuit or transfer switch connection. Route the load leads of all installations through flexible conduit from the generator end bracket to the junction box. Keep the load lead junction box accessible for service and inspection.

Note: Keep the load lead circuit away from the generator fuel and exhaust system components.

Note: Use field-supplied wiring capable of withstanding temperatures of 75°C (167°F).

Connect the neutral of the AC circuit in the vehicle to lead L0 (white or gray). If the vehicle uses equipment ground-type plugs and receptacles (3-pronged), connect the green wire to the U-shaped pin. On vehicles that also have provisions for using an outside AC power source, completely isolate the neutral as well as the hot (black) leads from the generator set when switching power to the outside source. See Figure 6-1.

Note: Transfer switch. Use a triple-pole, double-throw transfer switch rated for the calculated load of the vehicle to transfer the load from one source to the other. Install a ground-fault circuit interrupter in the wiring system to protect all branch circuits.

Note: AC load circuit protection. Protect the AC load circuit of the generator set against overloading or short circuiting with a circuit breaker(s).

Note: For standby service connect output of the generator to a suitably rated transfer switch in accordance with the Canadian Electrical Code, Part 1.

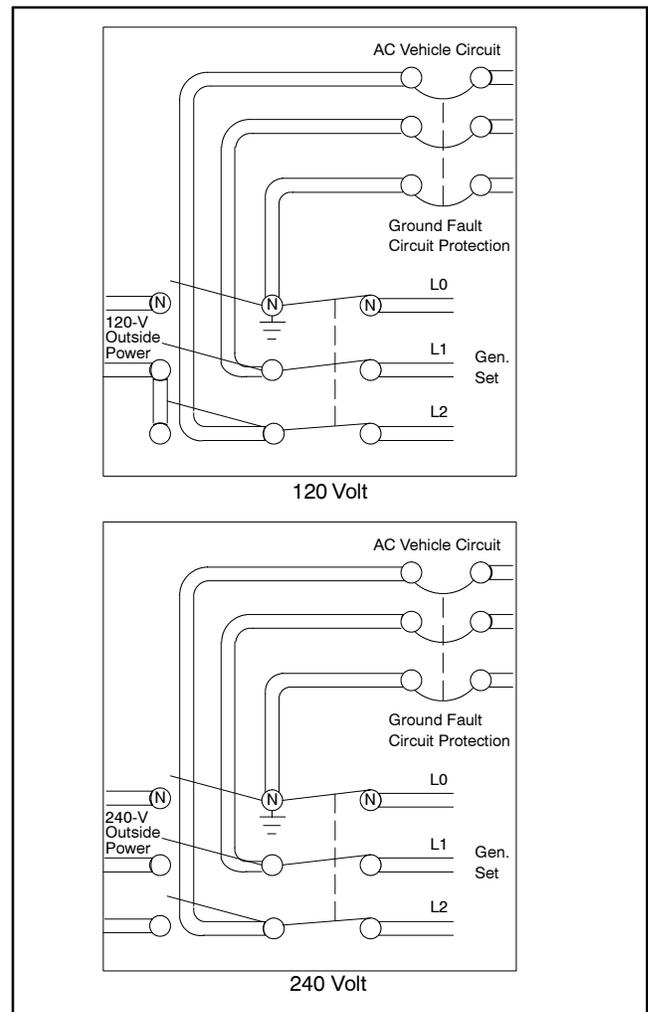


Figure 6-1 Transfer Switch Connections, 3-Wire AC Circuit

6.3 Circuit Protection

The AC circuit breaker protects the generator set from extreme overload. The AC circuit breaker trips when it detects a fault in the output circuit.

For application and selection information contact an authorized distributor/dealer.

After correcting the fault, reset the AC circuit breaker by placing it in the ON position. Restart the unit. See an authorized service distributor/dealer for AC circuit breaker ratings. The unit's voltage configuration determines the circuit breaker selection.

Note: Circuit breaker ampere rating and availability are subject to change.

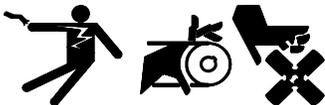
6.3.1 Circuit Breaker Considerations

Mounting location. Mount the circuit breaker in the generator set's junction box.

Sizing. Use the generator set voltage/frequency configuration to determine the circuit breaker amperage. If the circuit breaker was sized for one voltage configuration and later the generator set is reconnected to a different voltage, change the circuit breaker accordingly to provide optimum protection.

Have a qualified electrician or technician install circuit breakers and reconnect the generator set. Comply with all governing standards and codes.

⚠ WARNING

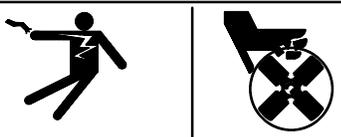


**Accidental starting.
Can cause severe injury or death.**

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

⚠ WARNING



**Hazardous voltage. Moving rotor.
Can cause severe injury or death.**

Operate the generator set only when all guards and electrical enclosures are in place.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocutation is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set, transfer switch, and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Short circuits. Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

Electrical backfeed to the utility. Hazardous backfeed voltage can cause severe injury or death. Connect the generator set to the building/campground electrical system only through an approved device and after the building/campground main switch is opened. Backfeed connections can cause severe injury or death to utility personnel working on power lines and/or personnel near the work area. Some states and localities prohibit unauthorized connection to the utility electrical system. Install a transfer switch to prevent interconnection of the generator set power and other sources of power.

6.3.2 Circuit Breaker Installation

Note: Wire material. Use stranded copper for all wiring. Use wire gauges and insulation, conductor temperature ratings, sheath stripping, conductor support and protection, conductor terminals and splices, and overcurrent protection (circuit breakers, fuses) that conform to standards and codes.

Note: Wire protection. Use rubber grommets and cable ties as necessary to protect and secure the wiring from sharp objects, the exhaust system, and any moving parts.

1. Turn the generator set off and disconnect the generator set engine starting battery, negative (-) lead first.
2. Remove the screws and remove the access cover.
3. Remove the screws and nuts to remove the circuit breaker cover plate. Save the mounting hardware.
4. Install the circuit breaker from the inside of the cutout panel and mount it using the existing screws. Position the circuit breaker with ON in the normal upright position or to the left side. Cover the cutout opening, if applicable, with the circuit breaker coverplate. Use the existing screws and nuts.
5. See Section 8 for voltage reconnection.
6. Install insulation boots over the stator lead terminals if the kit includes insulation boots.

Note: See Figure 6-2 for electrical connections.

7. Make the recommended connections for the following three reconnection systems using circuit breakers.

Two-pole circuit breaker with a single-voltage system (example: 120 volt, 3 wire).

Attach stator leads marked 2 and 4 to the side of the circuit breaker marked LINE. Install the jumper lead across the LINE side of the circuit breaker terminals (see Section 8). Attach stator leads 1 and 3 to L0.

Two-pole circuit breaker with a dual-voltage system (example: 120/240 volt, 3 wire).

Attach stator leads marked 1 and 4 to the side of the circuit breaker marked LINE. Do not use a jumper

lead (see Section 8). Attach stator leads 2 and 3 to L0.

Single-pole circuit breaker with a single-voltage system (example: 240 volt, 2 wire).

Attach the stator lead marked 1 to the side of the circuit breaker marked LINE (see Section 8). Bolt together leads 2 and 3 and tape to insulate from ground. Attach the stator lead marked 4 to L0.

8. Connect the stator lead(s) used for neutral connection to the L0 stud. See Figure 6-2.
9. Connect the side of the circuit breaker marked LOAD to the transfer switch or vehicle. Attach insulation boots to the black leads if the kit includes insulation boots. With a single-pole circuit breaker use one black lead L1. With a two-pole circuit breaker use two black leads L1 and L2. Connect the neutral white lead to the L0 stud. Connect the equipment ground green lead to the GRD stud. See Figure 6-2.
10. Replace the circuit breaker box access panel.
11. Reconnect the generator set engine starting battery, negative (-) lead last.
12. For voltage adjustments, refer to the procedure in Section 8.2.

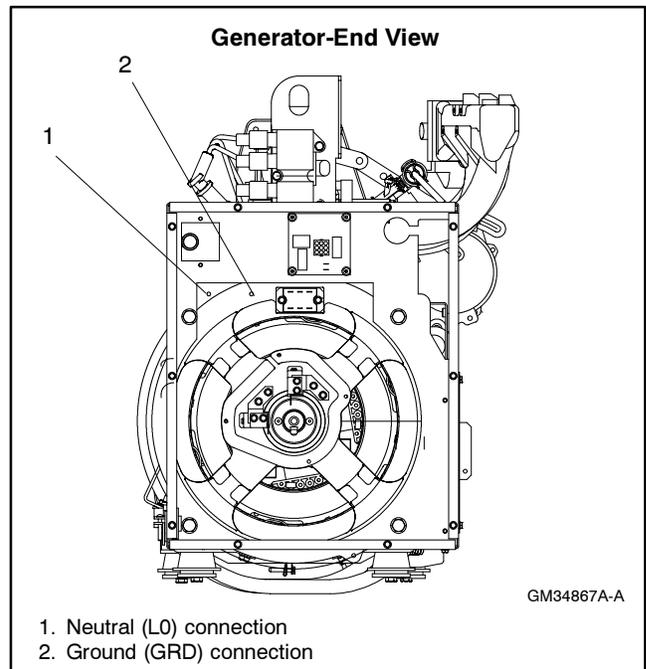


Figure 6-2 Electrical Connections

6.4 ADC 2100 Continuous Power Mode Jumper

A jumper on connector P7 on the back of the controller causes the controller to remain powered at all times. Controllers are shipped from the factory with the jumper connected. Disconnecting the jumper causes the controller to automatically power down 48 hours after the generator set shuts down. See the wiring diagram and schematic drawing in the operation manual.

Note: Be advised that the ADC consumes 250 mA when the master switch is in the AUTO position with the jumper connected. If you do not plan to use your generator set for a long period of time, Kohler recommends moving the master switch to the OFF/RESET position (0 mA draw). Remote communications require an active (powered-up) controller.

Note: For most applications, it is not necessary to disconnect the continuous power mode jumper.

Procedure to disconnect the continuous power mode jumper (optional).

1. Prevent the generator set from starting.
 - a. Move the generator set master switch to the OFF/RESET position.
 - b. Disconnect power to the battery charger, if equipped.
 - c. Disconnect the generator set engine starting battery, negative (-) lead first.
2. Remove the controller from the generator set.
 - a. Disconnect the engine wiring harness connector P1 plug (35-pin) from the controller. Disconnect the J15 and J16 connectors. See Figure 6-3.
 - b. Remove the controller from the generator set housing in order to access the back of the controller.
3. Remove the controller's back cover to access the jumper.
 - a. Note the labels on the three leads connected to the generator set master switch for reconnection later. Disconnect the leads at the pink connectors. See Figure 6-3.
 - b. Remove the cover screws and remove the controller's back cover. See Figure 6-3.

4. Locate the P7 connector near the top of the controller. See Figure 6-3. Remove the jumper from pins 1 and 2 of the P7 connector. If the P7 connector has three pins, connect the jumper across pins 2 and 3 for storage.

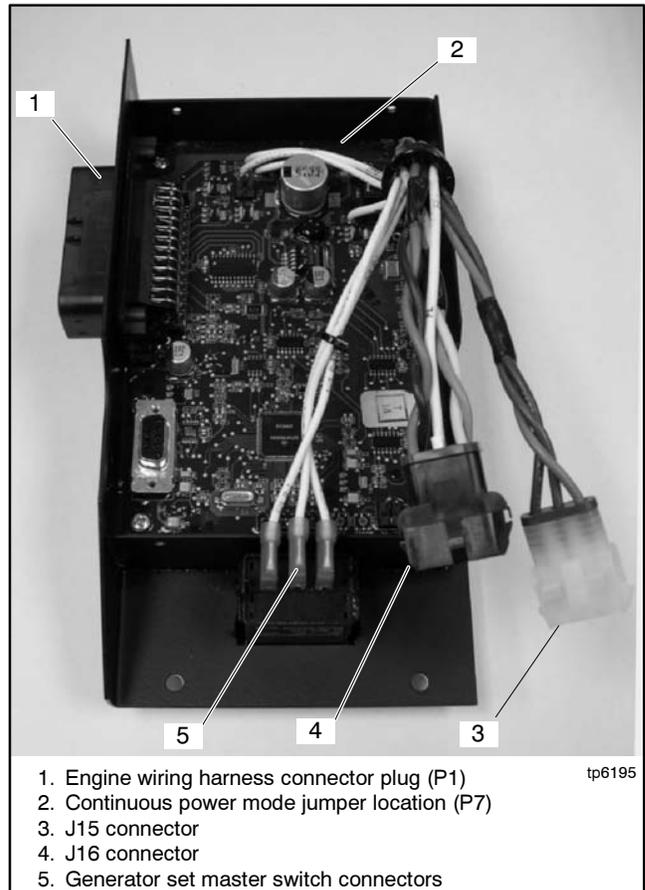


Figure 6-3 Advanced Digital Control Connections (Shown with the Back Cover Removed)

5. Replace the controller's back cover and secure the cover screws.
6. Reconnect the three pink connectors to the generator set master switch.
7. Reconnect the J15 and J16 connectors.
8. Reconnect the engine wiring harness connector P1 plug (35-pin) to the controller.
9. Reinstall the controller in the generator set.
10. Reconnect the generator set engine starting battery, negative (-) lead last.
11. Reconnect power to the battery charger, if equipped.
12. Place the generator set master switch in the AUTO position.

6.5 Battery and Connections

WARNING



**Sulfuric acid in batteries.
Can cause severe injury or death.**

Use protective goggles and clothes. Battery acid can cause permanent damage to eyes, burn skin, and eat holes in clothing.

Battery gases. Explosion can cause severe injury or death. Battery gases can cause an explosion. Do not smoke or permit flames or sparks to occur near a battery at any time, particularly when it is charging. Do not dispose of a battery in a fire. To prevent burns and sparks that could cause an explosion, avoid touching the battery terminals with tools or other metal objects. Remove all jewelry before servicing the equipment. Discharge static electricity from your body before touching batteries by first touching a grounded metal surface away from the battery. To avoid sparks, do not disturb the battery charger connections while the battery is charging. Always turn the battery charger off before disconnecting the battery connections. Ventilate the compartments containing batteries to prevent accumulation of explosive gases.

Starting battery. A separate 12-volt battery is recommended for the generator set. With a separate battery, the battery can be installed closer to the generator set and the cable length can be minimized to eliminate voltage drop. See Figure 6-4 for the minimum cold cranking amps (CCA) battery recommendation.

Model	CCA
10/13/15ERG	600

Figure 6-4 Battery Recommendation

Lengths and sizes. See Figure 6-5 for the lengths and recommended sizes of the battery cables.

Distance (from battery to generator set)	Required Battery Cable AWG Gauge (Minimum)
2.5 m (8.3 ft.)	6
5 m (16.4 ft.)	2

Figure 6-5 Battery Cable Sizing Recommendations, 10-15ERG Models

Cable connections. See Section 7 for the battery positive and negative connection points. Refer to Figure 6-6 (View A) for cable connections. (Note that installers must connect a ground strap between the ground lug on the generator set and the frame of the vehicle with this arrangement.)

For installations where the starting battery for the vehicle engine must also be used for starting the generator engine, ground the negative battery terminal to the vehicle frame and connect a heavy gauge (#4) ground strap to the ground lug on the generator set to the vehicle frame as illustrated in Figure 6-6 (View B).

Note: Ensure a ground connection between the generator and the vehicle frame even if the battery used to start the generator is not the same as the vehicle.

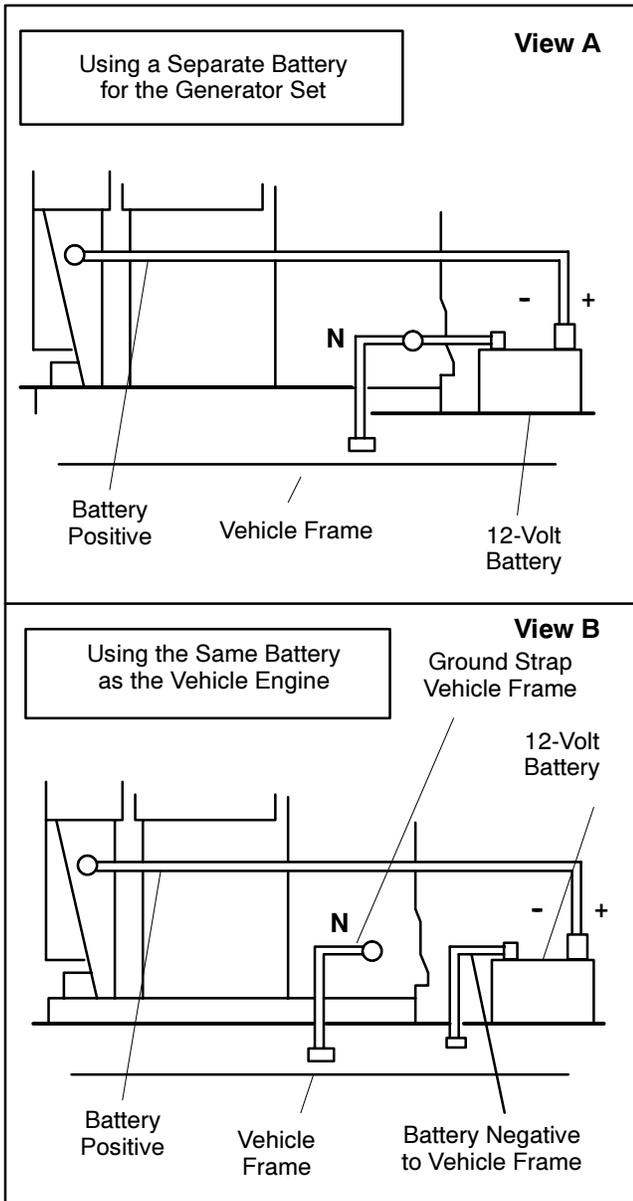


Figure 6-6 Battery Connection Details

6.6 Remote Connection

Kohler Co. offers several remote panels for connection to the generator set. Contact your local Kohler® distributor/dealer for detailed descriptions. See Figure 6-7 for the location of the remote interface connection to the generator set junction box. Kohler Co. also offers wiring harnesses in various lengths with a connector keyed to the junction box connector. A “pigtail” harness is also offered which includes the appropriate connector on one end and has pigtails that the installer can use to connect to a customer-supplied start/stop switch or separate lights and hourmeter. Consult wiring diagrams, ADVs, and instruction sheets for connection information/details.

These models use a 12-pin connector for the remote interface connection. See Figure 6-7 for the connector’s location. See Figure 6-8 for the correct customer-supplied plug and pin part numbers.

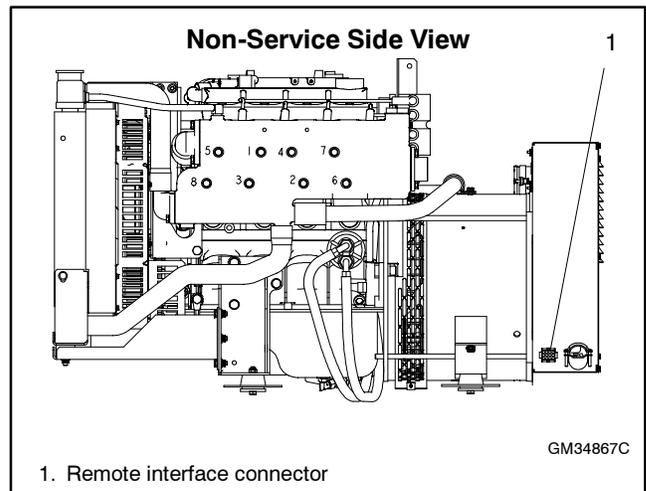


Figure 6-7 Remote Interface Connector

Component	Amp Part No.	Kohler Part No.
Plug	350735-1	229998
Pin	350218-6	241618
Cable Seal	794280-1	GM29252
Interface Seal	794279-1	GM29507
Cavity Plug	770377-1	GM28769

Figure 6-8 Connector Components

Note: Gauge senders. Gauge senders are available for most generator sets. If using customer-supplied gauges, be sure they are compatible with generator set senders. Contact an authorized Kohler® service distributor/dealer. Gauges and senders are available as service items from an authorized Kohler® service distributor/dealer.

Notes

Section 7 Installation Drawing

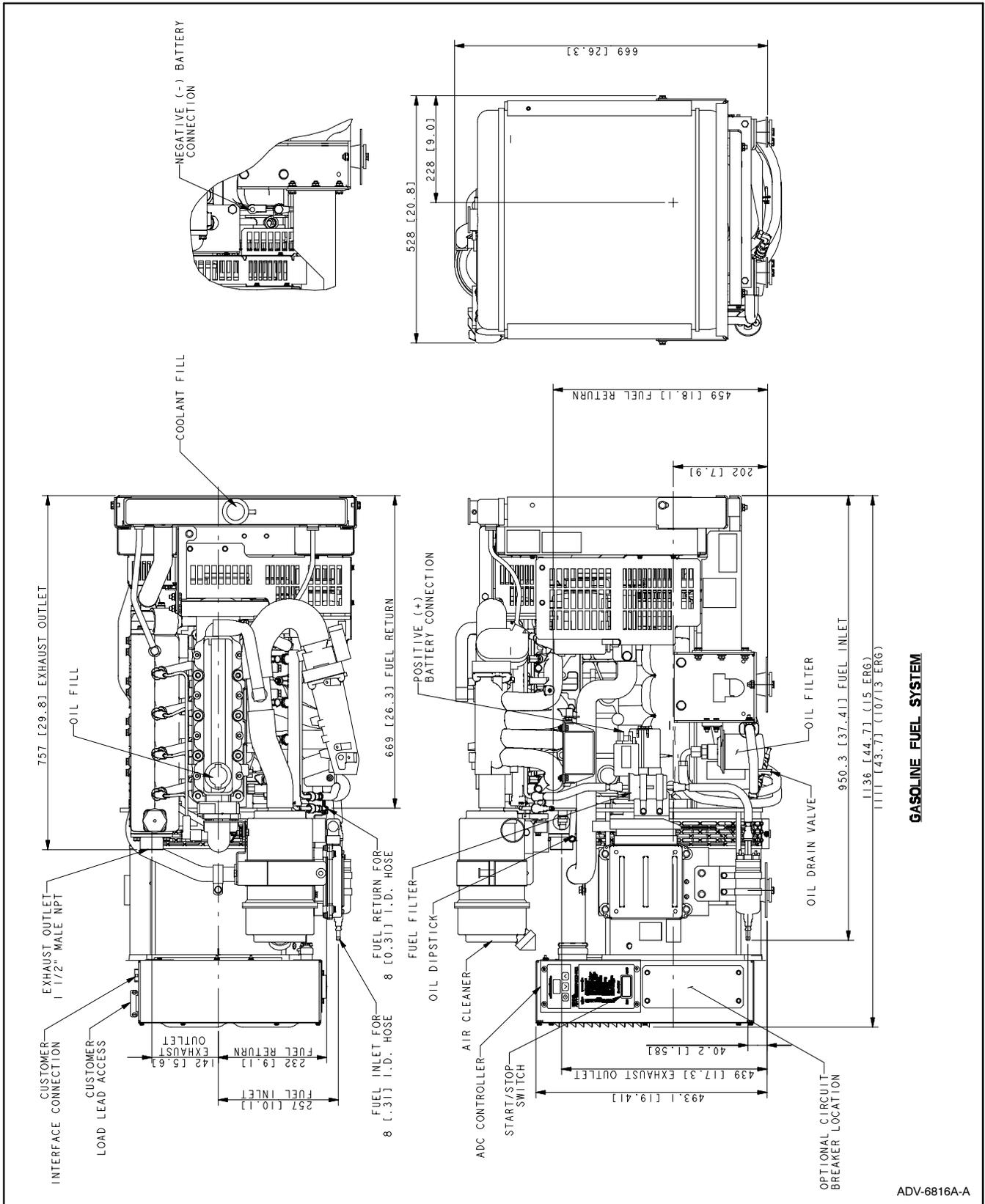
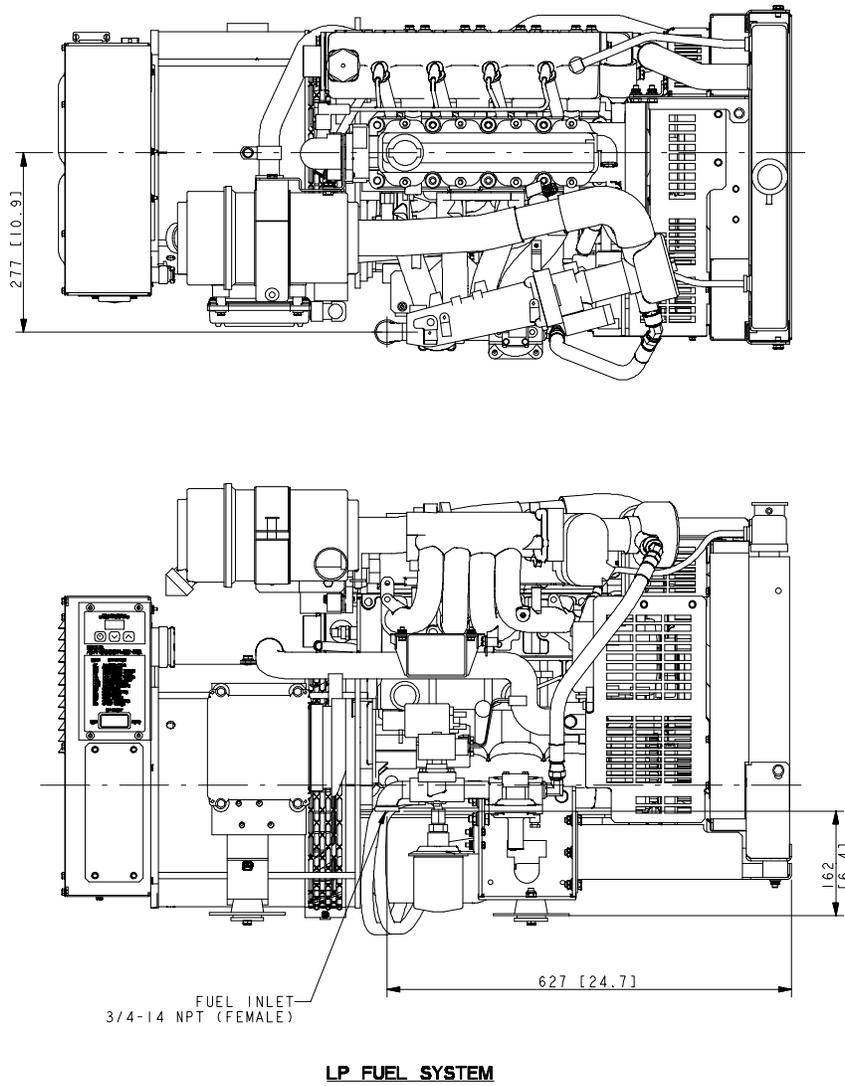
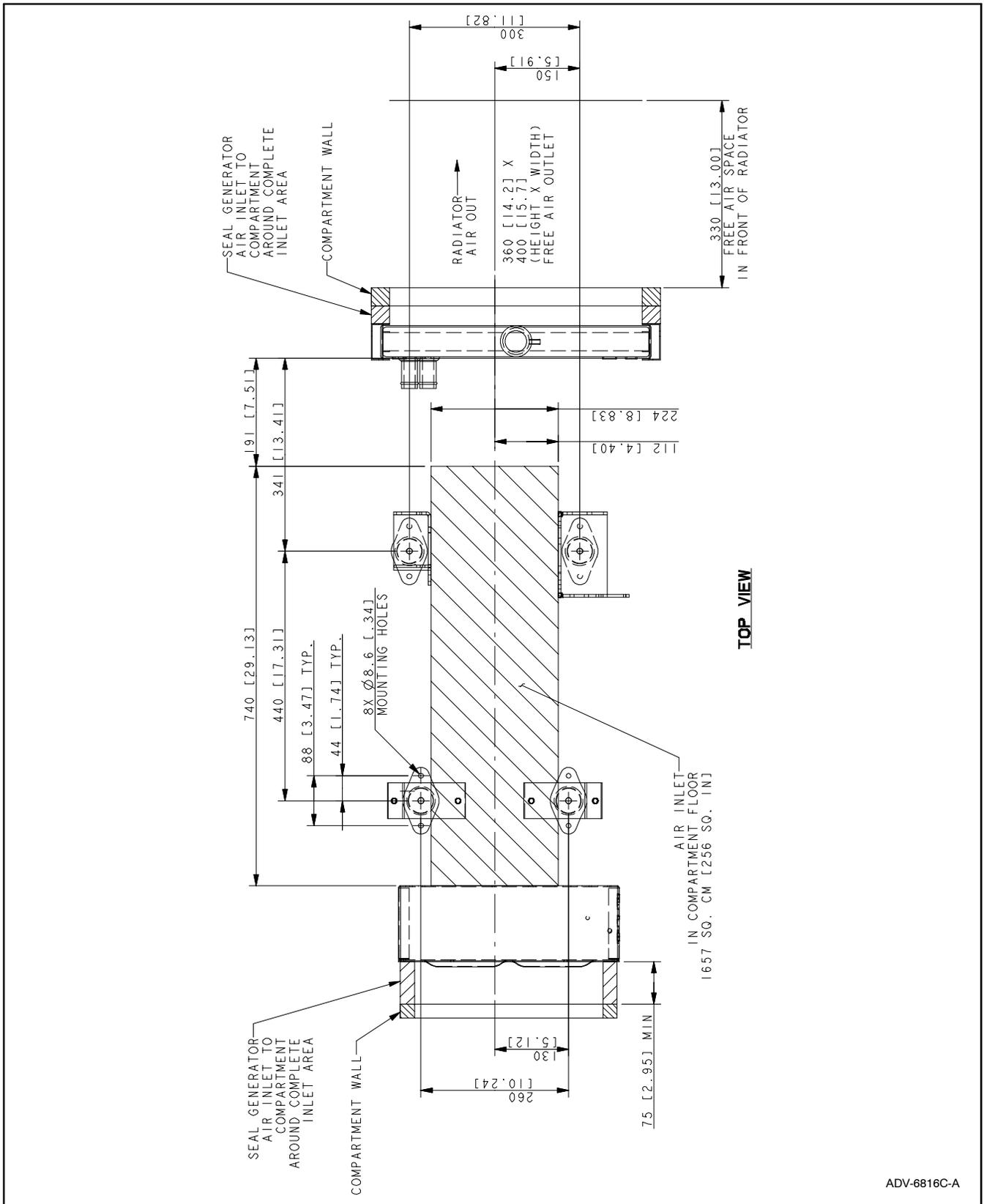


Figure 7-1 Dimension Drawing, Gasoline Fuel System



ADV-6816B-A

Figure 7-2 Dimension Drawing, LP Fuel System



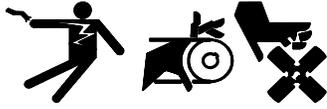
ADV-6816C-A

Figure 7-3 Dimension Drawing, Floor Template

Notes

Section 8 Reconnection/Adjustments

WARNING

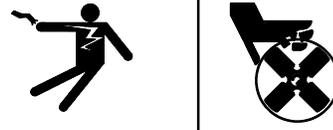


Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

WARNING



Hazardous voltage. Moving rotor.
Can cause severe injury or death.

Operate the generator set only when all guards and electrical enclosures are in place.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocutation is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set, transfer switch, and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

8.1 Four-Lead Reconnection

The following drawings illustrate the reconnection of four-lead generator sets. In all cases, conform to the National Electrical Code (NEC).

NOTICE

Voltage reconnection. Affix a notice to the generator set after reconnecting the set to a voltage different from the voltage on the nameplate. Order voltage reconnection decal 246242 from an authorized service distributor/dealer.

100-120-Volt Configurations

If the installation requires a factory two-pole circuit breaker, do not connect the load-side terminals of the circuit breaker. See Figure 8-1. If the installation requires a 100-120-volt, 2-wire system, use a single-pole circuit breaker. See Figure 8-2. When connecting stator phase leads together, size the output lead (L1) to handle the amperage. Use a jumper lead on the *line* side of the circuit breaker to balance the load of the generator set.

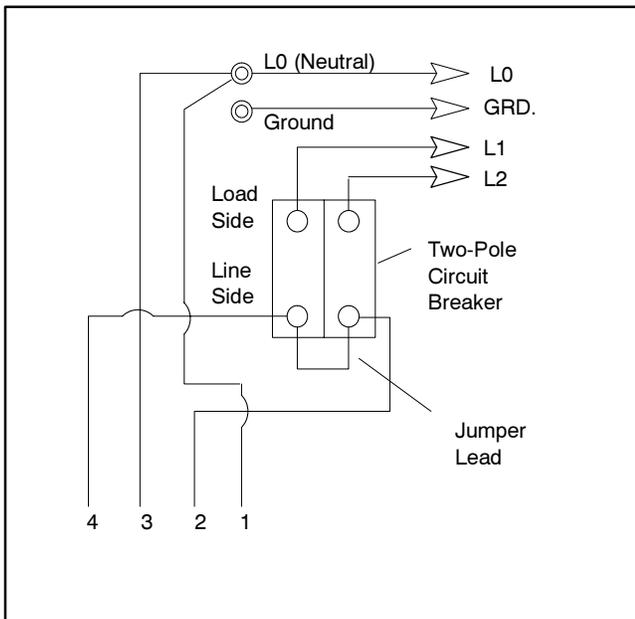


Figure 8-1 100-120-Volt, 3-Wire Configuration

100-120/200-240-Volt Configurations

The 100-120/200-240-volt configuration does not use a jumper lead. If the unit was originally wired for straight 100-120 volt, 3 wire, remove the jumper lead (see Figure 8-1 for location). Select a two-pole circuit breaker. Application of two single-pole circuit breakers does not conform to NEC requirements for supplying a 200-240 volt load—even if the breakers are mechanically attached. Leads L1 and L2 are for different phases—**never** connect them.

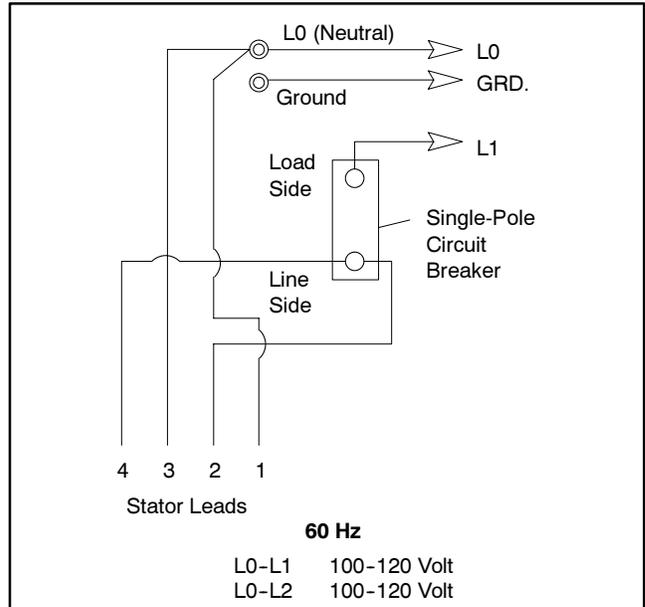


Figure 8-2 100-120-Volt, 2-Wire Configuration

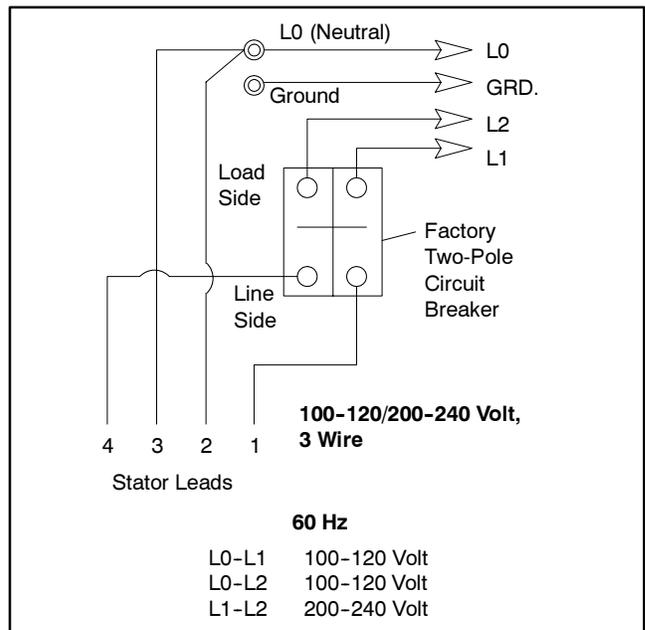


Figure 8-3 100-120/200-240-Volt, 3-Wire Configuration

200-240-Volt Configurations

The 200-240-volt configuration does not use a jumper lead. If the unit was originally wired for straight 100-120 volt, 3 wire, remove the jumper lead (see Figure 8-1 for location).

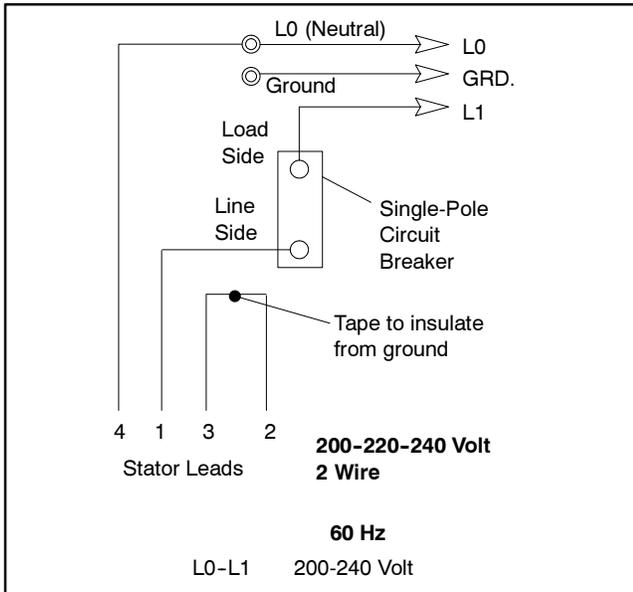


Figure 8-4 200-220-240-Volt, 2-Wire Configuration for *Models with ADC 2100*

8.2 Advanced Digital Control (ADC 2100)

The model 10/13/15ERG generator sets use the ADC 2100. The ADC 2100 uses password-protected menus for generator output adjustments and controller configuration.

This section contains instructions for using the ADC's password-protected menus to check and adjust the generator output and controller configuration. The controller configuration and generator set output are factory-set and should not require field adjustment under normal circumstances. Check and adjust the configuration and/or output in the following cases:

- Check and adjust the controller configuration and generator output after generator set reconnection to a different voltage.
- Check the controller configuration when troubleshooting generator set problems.
- Check and adjust the generator set output after installation if the voltage requires adjustment for a particular application.

8.2.1 Configuration Mode Time Out

The controller will automatically exit the configuration mode without saving any changes after about 1 minute if no buttons are pressed. Start the configuration procedure over again from the beginning if the controller exits the configuration mode before the settings have been saved.

8.2.2 Controller Software Version Number

The application software for controller operation is factory-loaded onto the Advanced Digital Control. At times, it may be necessary to check the software version number for troubleshooting purposes.

The controller's application software version number is displayed on the LED screen during the key sequence to enter the configuration mode, after the Select button has been pressed and held for about five seconds. For example, 01.00 will be displayed for software version 1.00.

8.2.3 Adjusting the Voltage, Gain, and Volts/Hz

After setting the system voltage, check the output voltage and adjust, if necessary, using the following procedures. Follow the instructions in Figure 8-6 to adjust the voltage, gain, and volts/Hz while the engine is running. An x in the Display column in Figure 8-6 indicates a number from 0 to 9. Use the up arrow to increase a setting or the down arrow to decrease the setting.

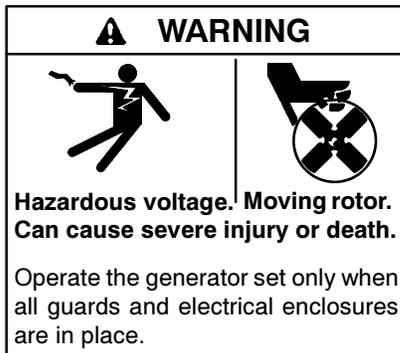
Note: Save your settings before exiting the configuration mode.

Pressing the Select button when SAVE is displayed returns to the first parameter, voltage adjust (1P).

Voltage changes are lost if they are not saved before the generator set shuts down. The generator set continues to run with the new settings until it shuts down but then reverts to the previous settings at the next startup if the changes have not been saved.

Note: A digital multimeter is required for these adjustments.

8.2.4 Voltage Adjustment



Short circuits. Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocutation is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set, transfer switch, and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Voltage Adjustment Procedure

Note: Refer to Figure 8-6 and Figure 8-7 for instructions to adjust the voltage using the ADC 2100.

1. With the generator set off, connect a digital multimeter to the output leads or an electrical outlet on the load side of the generator set. Set the meter to measure AC voltage.
2. Start the generator set by moving the generator set master switch to the RUN position.
3. Use the ADC controller to adjust the voltage (parameter 1P) until the output voltage reaches the desired value. See Figure 8-5 for the approximate change in voltage per step in parameter 1P.

Measured Voltage, VAC	Voltage Change per Step, VAC	
	Coarse Adjust	Fine Adjust
85-132	5	0.5
180-251	7	0.7

Figure 8-5 Voltage Adjustment

4. Adjust the voltage stability (gain, parameter 2P) to minimize light flicker.
5. Readjust the voltage, if necessary.
6. Readjust the voltage stability (gain, parameter 2P), if necessary.
7. Readjust the voltage (parameter 1P), if necessary.
8. Stop the generator set.

Output Voltage Adjustment Mode:

Move the generator set master switch to the RUN position. The generator set engine starts and the controller display shows the engine runtime hours.

Display :*

X X X X

Hold:



Wait about 5 seconds until the display changes from runtime hours to the program version number.

X.X X

Press the down arrow key and then the up arrow key 3 times to enter the adjustment mode. (This is the controller "password.")



1 P X X

The controller is now in the voltage coarse adjustment mode.

Press:



or



To raise or lower the voltage in large increments (approximately 5-7 volts per step).

1 P X X



To enter fine voltage adjustment mode.

1 P X X



or



To raise or lower the voltage in smaller increments (approximately 0.5-0.7 volts per step).



To enter coarse voltage stability (gain) adjustment mode.

2 P X X



or



To raise or lower the voltage stability (gain) in large increments.



To enter fine voltage stability (gain) adjustment mode.

2 P X X



or



To raise or lower the voltage stability (gain) in smaller increments.



To enter volts/Hz adjustment mode.

3 P 0 X



or



To raise or lower the volts/Hz: 00=low; 09= high

Continued on Figure 8-7.

* Shaded boxes show which character in the controller display changes for each adjustment. "X" in the examples above denotes any number from 0 to 9. The actual values may vary from model-to-model.

TP6196

Figure 8-6 Output Voltage Adjustments

Continued from Figure 8-6:

Display : *



To enter SAVE mode.

S A V E

Note: Be sure to save your settings before exiting the configuration mode. The controller reverts to the last saved settings when the master switch is moved to the OFF/RESET position.

There are 3 options when the display says SAVE:

Press:

S A V E



To return to the first parameter, coarse voltage adjustment, to check or change settings before saving. See Figure 8-6.

1 P x x

or



To save changes.

Y E S

or



To discard changes without saving.

n o

“Yes” or “no” flashes when the up or down arrow is pressed and then the controller exits the configuration mode. The display returns to the runtime hours.

X X X X

Now move the master switch to OFF/RESET.

* x in the examples above denotes any number from 0 to 9. The actual values may vary from model-to-model.

Figure 8-7 Output Voltage Adjustments, Continued

8.2.5 Controller Configuration

The controller configuration for each generator model is set at the factory and should not normally require changes. The controller's configuration mode allows adjustment of the system parameters listed in this section. Use the instructions in this section to check the configuration after installation and change them to match the settings shown in Figure 8-8, if necessary.

The controller will automatically exit the configuration mode without saving any changes after about 1 minute if no buttons are pressed. Start the configuration procedure over again from the beginning if the controller exits the configuration mode before the settings have been saved.

Follow the instructions in Figure 8-9 to enter the configuration mode while the engine is not running and then step through the following parameters. Use the up (Λ) and down (∇) arrow buttons to select the appropriate setting for the application.

Voltage/frequency setting (Uu). Select the system voltage and frequency from the table in Figure 8-8. For system voltages not listed in the table, select the setting closest to the system voltage and then adjust the output voltage to the desired level using the instructions in Section 8.2.4.

Note: This parameter sets the nominal system voltage and frequency. To adjust the output (measured) voltage, see Section 8.2.4.

Unit configuration (Uc). This parameter sets the generator set type: marine, standby, or mobile. The setting for the 10/13/15ERG is Uc02, mobile.

Note: The engine type (EC) and the engine data input type (ED) are factory set and should only be changed by an authorized Kohler dealer/distributor. Incorrect settings will make your unit non-functional.

Engine configuration (Ec). The engine configuration must match the generator set engine type. The engine configuration setting for the 10/13/15ERG is Ec03.

Advanced configuration mode (Adnc). The data input types, battery voltage, and communications setting can be changed in the advanced configuration mode. Press the up arrow button when *Adnc* is displayed to enter the advanced configuration mode.

Engine data input types (Ed). This setting defines the type of senders used on the generator set engine. Setting the Ec parameter automatically sets the Ed parameter.

The remote digital gauge requires the optional analog oil pressure sender. Install the optional sender and change the Ed parameter to Ed02.

Battery voltage (Bt). This setting toggles between 12 and 24 VDC for the engine starting battery voltage. The 10/13/15ERG models use a 12-volt battery, Bt12.

Communications setting (Cn). This setting allows the user to set the controller for communication with optional meters. The 10/13/15ERG models are factory-set for no CAN communications, Cn00. Change this setting to Cn01 if the optional Remote Digital Gauge is used.

Note: Be sure to save your settings before exiting the configuration mode. The controller reverts to the last saved settings when the master switch is moved to the OFF/RESET position.

Parameter	Setting	Definition
Unit's system voltage and frequency	Uu01	Single phase, 60 Hz, 120/240 VAC
Unit configuration	Uc02	Mobile generator set
Engine type	Ec03	10/13/15ERG
Engine data input types (No magnetic pick-up)	Ed00	All digital inputs
	Ed01	Digital: Low coolant level and low oil pressure Analog: Low coolant temperature
	Ed02	Digital: Low coolant level and low coolant temperature Analog: Low oil pressure
	Ed03	Digital: Low coolant level Analog: Low coolant temperature and low oil pressure
	Ed08	Digital: Low coolant temperature and low oil pressure Analog: Low coolant level
	Ed09	Digital: Low oil pressure Analog: Low coolant level and low coolant temperature
	Ed10	Digital: Low coolant temperature Analog: Low coolant level and low oil pressure
	Ed11	All analog inputs
Battery voltage	Bt12	Battery voltage 12 VDC
Communications	Cn00	No CAN communications
	Cn01	SAE J1939 (Used for ADC remote digital gauge)
	Cn02	Future CANbus

Figure 8-8 Controller Parameters

Controller Configuration Mode (Use with Figure 8-8, Controller Parameters):

Hold the Select button:

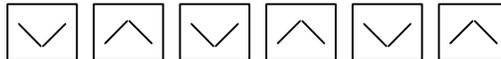


Move the generator set master switch to the RUN position. (The generator set engine will not start.)

Display:

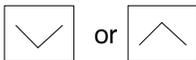
Wait about 5 seconds until the display shows the program version number. (The number may be different than the one shown here.)

Press the down arrow key and then the up arrow key 3 times to enter the configuration mode. (This is the controller "password.")



Now release the Select button.

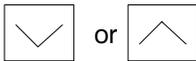
Press:



To set the voltage/frequency setting for 60 Hz models.



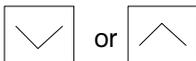
To step to the next parameter, unit configuration Uc.



To set the unit configuration setting to Uc02, if necessary.



To step to the next parameter, engine type Ec.



To set the engine type, if necessary.



To step to the next parameter, advanced configuration mode or save mode selection.

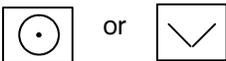
Now either save your settings or enter the Advanced Configuration Mode to set the engine data inputs, battery voltage, and communications.

Press:



To enter advanced configuration mode.
Go to Figure 8-10.

OR:



To proceed to the save mode without entering the advanced configuration mode.
Go to Figure 8-7.

Note: Shaded boxes show which number in the controller display changes when the up or down arrow key is pressed. "x" denotes any number from 0 to 9.

Figure 8-9 Configuration Mode (system voltage, unit configuration, and engine type parameters)

Pressing the up arrow key at the Adnc display (See Figure 8-9) puts you into the Advanced Configuration Mode.

Press:

 or  To set the engine data input type. **E d 0 x**

 To enter battery voltage selection mode.

 or  To toggle between 12 and 24 VDC. **B t 1 2**

 To enter communications selection mode.

 or  To set the communications parameter. **C n 0 x**

 To enter SAVE mode. **Go to Figure 8-11.** **S A V E**

Note: Shaded boxes show which number in the controller display changes when the up or down arrow key is pressed. “x” denotes any number from 0 to 9.

Note: Be sure to save your settings before exiting the configuration mode. The controller reverts to the last *saved* settings when the master switch is moved to the OFF/RESET position.

Figure 8-10 Advanced Configuration Mode (engine data input types, battery voltage, and engine communications)

There are 3 options when the display says SAVE:

Press:

 To return to the first parameter, system voltage/frequency Uu, to check or change settings before saving. See Figure 8-9.

or

 To save changes.

or

 To discard changes without saving.

S A V E

U u 0 x

Y E S

n o

“Yes” or “no” flashes when the up or down arrow is pressed and then the controller exits the configuration mode. The display returns to the runtime hours.

x x x x

* x in the runtime hours display above denotes any number from 0 to 9.

Now move the master switch to OFF/RESET.

Figure 8-11 Save Mode (after configuring generator set parameters)

Notes

Appendix A Generator Selection and Wattage Requirements

General Wattage Requirements

Consider the total wattage requirements (lights, motors, appliances) when selecting a generator set, or when sizing wattage usage in which available space and construction limit the size of the generator set.

Motor Loads

When figuring generator set capacity requirements for loads that include electric motors, consider the high current demanded by the motors during startup. The inrush or starting current is typically 2 to 3 times higher than that required when the motor reaches normal operating speed. Allow a reserve for inrush demands plus other loads that could be on the line as the electric motor starts. Use Figure 1 as a guide when selecting generator set capacity requirements involving motor loads.

Motor HP	Starting (Inrush) Watts	Running Watts
1/4	750	330
1/3	1000	400
1/2	1500	600
3/4	2000	750
1	3300	1100
2	4000	2000
3	5000	3000

Figure 1 Motor Requirements

Appliance Loads

Generator sets often furnish AC for appliances such as TVs, stereos, and electric water heaters. Except for the resistance-type loads such as the water heater, the requirements for appliances are usually low. Do not overlook such loads when figuring the total requirements. Allow a reserve capacity for anticipated appliance loads to avoid overloading a generator set.

Lighting Load

To calculate the lighting load, add the wattage of each generator set-operated lamp. Note that not all of the lights or lamps are on the generator set AC circuit—some are DC powered by a 12-volt battery. Ensure that the calculated total wattage includes only lights actually on the generator set AC circuit.

Air Conditioners

The starting characteristics of air conditioners vary greatly—for example, one 12,000 Btu unit has lower starting requirements than a 10,000 Btu unit of another variety. When using only one unit, there is usually no starting problem provided that the lighting and appliance load is not too high when starting the generator set.

Simultaneous starting of two air conditioning units, however, can present problems if the generator set capacity is marginal. Because of the variation in starting characteristics among air conditioners, this publication makes no statements regarding multiple-motor starting capabilities of the generator set covered. Consider delayed starting or the use of easy-starting devices on air conditioner units whenever simultaneously starting more than one motor.

See Figure 2 for typical air conditioner requirements. The requirements vary among different manufacturers.

	Air Conditioner Size (Btu)									
	7,000		9,000		12,000		16,000		24,000	
Voltage	115	230	115	230	115	230	115	230	230	
Full load amps	9.3	4.8	9.9	5.0	11.8	6.3	16.3	8.0	11.6	
Rated load amps	7.7	4.0	7.0	3.5	8.9	4.8	13.0	6.2	10.2	
Locked rotor amps	34.0	20.0	40.0	20.0	50.0	31.0	75.0	36.0	56.0	
Starting (inrush) watts	3910	4600	4600	4600	5750	7130	8630	8280	12,900	
Running watts	886	920	805	805	1020	1100	1500	1430	2350	

Figure 2 Typical Air Conditioner Requirements (60 Hz)

Appendix B Abbreviations

The following list contains abbreviations that may appear in this publication.

A, amp	ampere	CG	center of gravity	fglass.	fiberglass
ABDC	after bottom dead center	CID	cubic inch displacement	FHM	flat head machine (screw)
AC	alternating current	CL	centerline	fl. oz.	fluid ounce
A/D	analog to digital	cm	centimeter	flex.	flexible
ADC	analog to digital converter	CMOS	complementary metal oxide substrate (semiconductor)	freq.	frequency
adj.	adjust, adjustment			FS	full scale
ADV	advertising dimensional drawing	cogen.	cogeneration	ft.	foot, feet
AHWT	anticipatory high water temperature	Com	communications (port)	ft. lbs.	foot pounds (torque)
AISI	American Iron and Steel Institute	conn.	connection	ft./min.	feet per minute
ALOP	anticipatory low oil pressure	cont.	continued	g	gram
alt.	alternator	CPVC	chlorinated polyvinyl chloride	ga.	gauge (meters, wire size)
Al	aluminum	crit.	critical	gal.	gallon
ANSI	American National Standards Institute (formerly American Standards Association, ASA)	CRT	cathode ray tube	gen.	generator
		CSA	Canadian Standards Association	genset	generator set
AO	anticipatory only	CT	current transformer	GFI	ground fault interrupter
API	American Petroleum Institute	Cu	copper	GND, ⊕	ground
approx.	approximate, approximately	cu. in.	cubic inch	gov.	governor
AR	as required, as requested	cw.	clockwise	gph	gallons per hour
AS	as supplied, as stated, as suggested	CWC	city water-cooled	gpm	gallons per minute
ASE	American Society of Engineers	cyl.	cylinder	gr.	grade, gross
ASME	American Society of Mechanical Engineers	D/A	digital to analog	GRD	equipment ground
assy.	assembly	DAC	digital to analog converter	gr. wt.	gross weight
ASTM	American Society for Testing Materials	dB	decibel	H x W x D	height by width by depth
ATDC	after top dead center	dBA	decibel (A weighted)	HC	hex cap
ATS	automatic transfer switch	DC	direct current	HCHT	high cylinder head temperature
auto.	automatic	DCR	direct current resistance	HD	heavy duty
aux.	auxiliary	deg., °	degree	HET	high exhaust temperature
A/V	audiovisual	dept.	department	hex	hexagon
avg.	average	dia.	diameter	Hg	mercury (element)
AVR	automatic voltage regulator	DI/EO	dual inlet/end outlet	HH	hex head
AWG	American Wire Gauge	DIN	Deutsches Institut fur Normung e. V. (also Deutsche Industrie Normenausschuss)	HHC	hex head cap
AWM	appliance wiring material	DIP	dual inline package	HP	horsepower
bat.	battery	DPDT	double-pole, double-throw	hr.	hour
BBDC	before bottom dead center	DPST	double-pole, single-throw	HS	heat shrink
BC	battery charger, battery charging	DS	disconnect switch	hsg.	housing
BCA	battery charging alternator	DVR	digital voltage regulator	HVAC	heating, ventilation, and air conditioning
BCI	Battery Council International	E, emer.	emergency (power source)	HWT	high water temperature
BDC	before dead center	EDI	electronic data interchange	Hz	hertz (cycles per second)
BHP	brake horsepower	EFR	emergency frequency relay	IC	integrated circuit
blk.	black (paint color), block (engine)	e.g.	for example (<i>exempli gratia</i>)	ID	inside diameter, identification
blk. htr.	block heater	EG	electronic governor	IEC	International Electrotechnical Commission
BMEP	brake mean effective pressure	EGSA	Electrical Generating Systems Association	IEEE	Institute of Electrical and Electronics Engineers
bps	bits per second	EIA	Electronic Industries Association	IMS	improved motor starting
br.	brass	EI/EO	end inlet/end outlet	in.	inch
BTDC	before top dead center	EMI	electromagnetic interference	in. H ₂ O	inches of water
Btu	British thermal unit	emiss.	emission	in. Hg	inches of mercury
Btu/min.	British thermal units per minute	eng.	engine	in. lbs.	inch pounds
C	Celsius, centigrade	EPA	Environmental Protection Agency	Inc.	incorporated
cal.	calorie	EPS	emergency power system	ind.	industrial
CARB	California Air Resources Board	ER	emergency relay	int.	internal
CB	circuit breaker	ES	engineering special, engineered special	int./ext.	internal/external
cc	cubic centimeter	ESD	electrostatic discharge	I/O	input/output
CCA	cold cranking amps	est.	estimated	IP	iron pipe
ccw.	counterclockwise	E-Stop	emergency stop	ISO	International Organization for Standardization
CEC	Canadian Electrical Code	etc.	et cetera (and so forth)	J	joule
cfh	cubic feet per hour	exh.	exhaust	JIS	Japanese Industry Standard
cfm	cubic feet per minute	ext.	external	k	kilo (1000)
		F	Fahrenheit, female	K	kelvin
				KA	kiloampere
				KB	kilobyte (2 ¹⁰ bytes)

kg	kilogram	MW	megawatt	rms	root mean square
kg/cm ²	kilograms per square centimeter	mW	milliwatt	rnd.	round
kgm	kilogram-meter	μF	microfarad	ROM	read only memory
kg/m ³	kilograms per cubic meter	N, norm.	normal (power source)	rot.	rotate, rotating
kHz	kilohertz	NA	not available, not applicable	rpm	revolutions per minute
kJ	kilojoule	nat. gas	natural gas	RS	right side
km	kilometer	NBS	National Bureau of Standards	RTV	room temperature vulcanization
kOhm, kΩ	kilo-ohm	NC	normally closed	SAE	Society of Automotive Engineers
kPa	kilopascal	NEC	National Electrical Code	scfm	standard cubic feet per minute
kph	kilometers per hour	NEMA	National Electrical Manufacturers Association	SCR	silicon controlled rectifier
kV	kilovolt	NFPA	National Fire Protection Association	s, sec.	second
kVA	kilovolt ampere	Nm	newton meter	SI	<i>Système international d'unites</i> , International System of Units
kVAR	kilovolt ampere reactive	NO	normally open	SI/EO	side in/end out
kW	kilowatt	no., nos.	number, numbers	sil.	silencer
kWh	kilowatt-hour	NPS	National Pipe, Straight	SN	serial number
kWm	kilowatt mechanical	NPSC	National Pipe, Straight-coupling	SPDT	single-pole, double-throw
L	liter	NPT	National Standard taper pipe thread per general use	SPST	single-pole, single-throw
LAN	local area network	NPTF	National Pipe, Taper-Fine	spec, specs	specification(s)
L x W x H	length by width by height	NR	not required, normal relay	sq.	square
lb.	pound, pounds	ns	nanosecond	sq. cm	square centimeter
lbm/ft ³	pounds mass per cubic feet	OC	overcrank	sq. in.	square inch
LCB	line circuit breaker	OD	outside diameter	SS	stainless steel
LCD	liquid crystal display	OEM	original equipment manufacturer	std.	standard
ld. shd.	load shed	OF	overfrequency	stl.	steel
LED	light emitting diode	opt.	option, optional	tach.	tachometer
Lph	liters per hour	OS	oversize, overspeed	TD	time delay
Lpm	liters per minute	OSHA	Occupational Safety and Health Administration	TDC	top dead center
LOP	low oil pressure	OV	overvoltage	TDEC	time delay engine cooldown
LP	liquefied petroleum	oz.	ounce	TDEN	time delay emergency to normal
LPG	liquefied petroleum gas	p., pp.	page, pages	TDES	time delay engine start
LS	left side	PC	personal computer	TDNE	time delay normal to emergency
L _{wa}	sound power level, A weighted	PCB	printed circuit board	TDOE	time delay off to emergency
LWL	low water level	pF	picofarad	TDON	time delay off to normal
LWT	low water temperature	PF	power factor	temp.	temperature
m	meter, milli (1/1000)	ph., ∅	phase	term.	terminal
M	mega (10 ⁶ when used with SI units), male	PHC	Phillips head crimptite (screw)	TIF	telephone influence factor
m ³	cubic meter	PHH	Phillips hex head (screw)	TIR	total indicator reading
m ³ /min.	cubic meters per minute	PHM	pan head machine (screw)	tol.	tolerance
mA	milliampere	PLC	programmable logic control	turbo.	turbocharger
man.	manual	PMG	permanent-magnet generator	typ.	typical (same in multiple locations)
max.	maximum	pot	potentiometer, potential	UF	underfrequency
MB	megabyte (2 ²⁰ bytes)	ppm	parts per million	UHF	ultrahigh frequency
MCM	one thousand circular mils	PROM	programmable read-only memory	UL	Underwriter's Laboratories, Inc.
MCCB	molded-case circuit breaker	psi	pounds per square inch	UNC	unified coarse thread (was NC)
meggar	megohmmeter	pt.	pint	UNF	unified fine thread (was NF)
MHz	megahertz	PTC	positive temperature coefficient	univ.	universal
mi.	mile	PTO	power takeoff	US	undersize, underspeed
mil	one one-thousandth of an inch	PVC	polyvinyl chloride	UV	ultraviolet, undervoltage
min.	minimum, minute	qt.	quart	V	volt
misc.	miscellaneous	qty.	quantity	VAC	volts alternating current
MJ	megajoule	R	replacement (emergency) power source	VAR	voltampere reactive
mJ	millijoule	rad.	radiator, radius	VDC	volts direct current
mm	millimeter	RAM	random access memory	VFD	vacuum fluorescent display
mOhm, mΩ	milliohm	RDO	relay driver output	VGA	video graphics adapter
MOhm, MΩ	megohm	ref.	reference	VHF	very high frequency
MOV	metal oxide varistor	rem.	remote	W	watt
MPa	megapascal	RFI	radio frequency interference	WCR	withstand and closing rating
mpg	miles per gallon	RH	round head	w/	with
mph	miles per hour	RHM	round head machine (screw)	w/o	without
MS	military standard	rly.	relay	wt.	weight
m/sec.	meters per second			xfrm	transformer
MTBF	mean time between failure				
MTBO	mean time between overhauls				
mtg.	mounting				

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KOHLER[®] POWER SYSTEMS

KOHLER CO. Kohler, Wisconsin 53044
Phone 920-565-3381, Fax 920-459-1646
For the nearest sales/service outlet in the
US and Canada, phone 1-800-544-2444
KohlerPowerSystems.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65)6264-6422, Fax (65)6264-6455