FischerPanda®

RV4

Operators and Maintenance Manual

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Revision Table

Revision Number	Description	Date
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Company Information:

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California Proposition 65

Warning: Diesel engine exhaust contains products known to the state of California to cause cancer, birth defects, and other reproductive harm.

Table of Contents

1 Introduction

1.1 How To Use This Manual

To provide the best generator performance and customer satisfaction, this manual should be read and understood completely by all operators.

1.2 Serial Number Placard

There are two identical serial number placards on each generator. One is located on the lower right of the service side of the generator. The other is located on the exhaust side of the generator next to the radiator exhaust opening.

The serial number placard provides information that identifies the generator and its performance characteristics (see Figure 1).

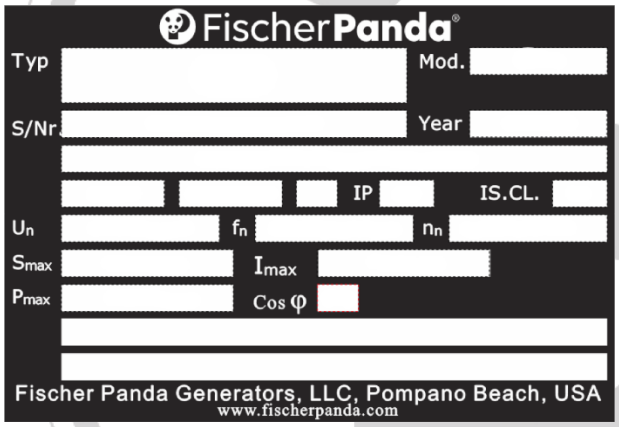

Figure 1: Serial Number Placard

Typ = Generator Type
S/Nr. = Serial Number
Year = Year of Manufacture
U_n = Nominal Voltage
f_n = Nominal Frequency
n_n = Nominal Engine RPM
S_{max} = Maximum Apparent Power
P_{max} = Maximum Real Power
I_{max} = Maximum Current
Cosφ = Rated Power Factor

1.3 How To Obtain Parts and Service

To locate your nearest service dealer, visit https://fischerpanda.com/

For parts, call 1-800-508-6494.

When contacting the parts department or a service dealer, have the following information available.

Generator Type
Serial Number
Operating Hours
Description of the part or issue

1.4 Generator Overview

The images on the following pages will familiarize you with the generator. The images depict the standard terms used throughout the manual.

1.4.1 Front View

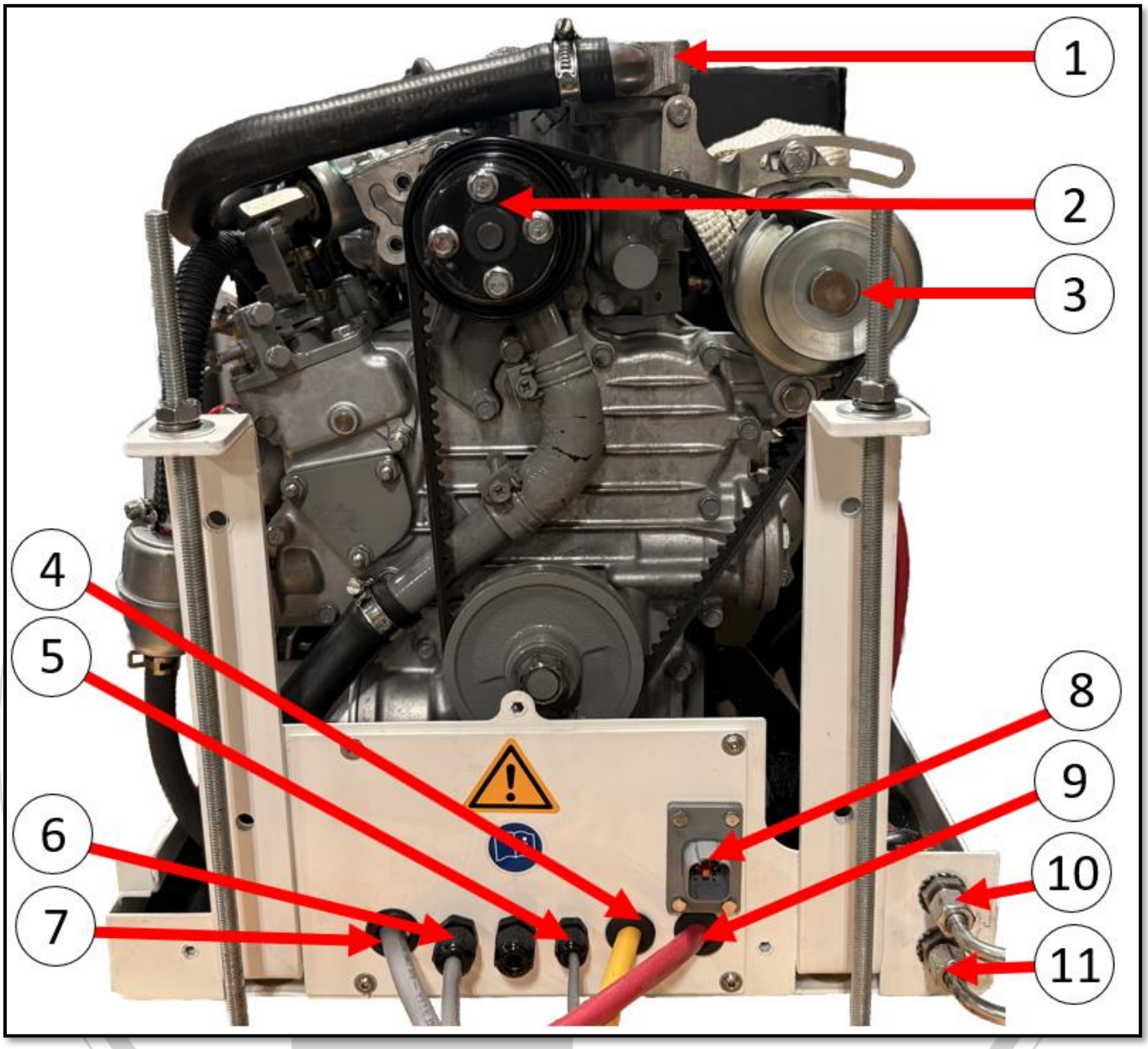

Figure 2: Front View

1.	Coolant Thermostat Housing	7.	Power to Inverter Cable
2.	Coolant Pump Pulley	8.	Day tank Control Cable
3.	Idler Pulley	9.	Starter Battery Positive Cable
4.	Starter Battery Negative Cable	10.	Fuel In
5.	Fuel Pump Cable	11.	Fuel Out
6.	Control to Inverter Cable		

1.4.2 Service Side View

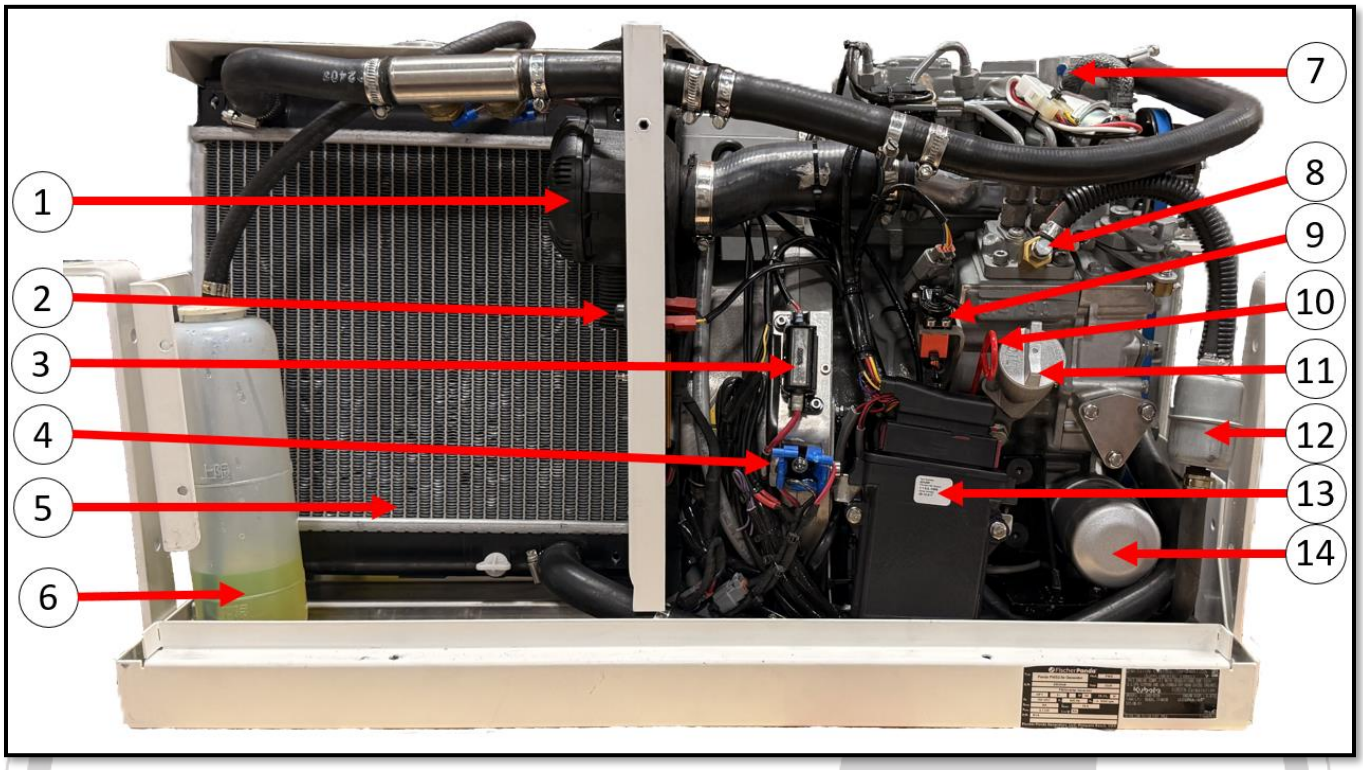

Figure 3: Service Side View

1.	Air Intake	8.	Fuel Bleed Screw
2.	Fuel Primer Button	9.	Speed Control Actuator
3.	DC Fuse	10.	Oil Dip Stick
4.	Rectifier	11.	Oil Fill Port
5	Radiator	12.	Fuel Filter
6	Coolant Expansion Tank	13.	IDA208
7.	Coolant Bleed Screw/Thermostat Housing	14.	Oil Filter

1.4.3 Exhaust Side View

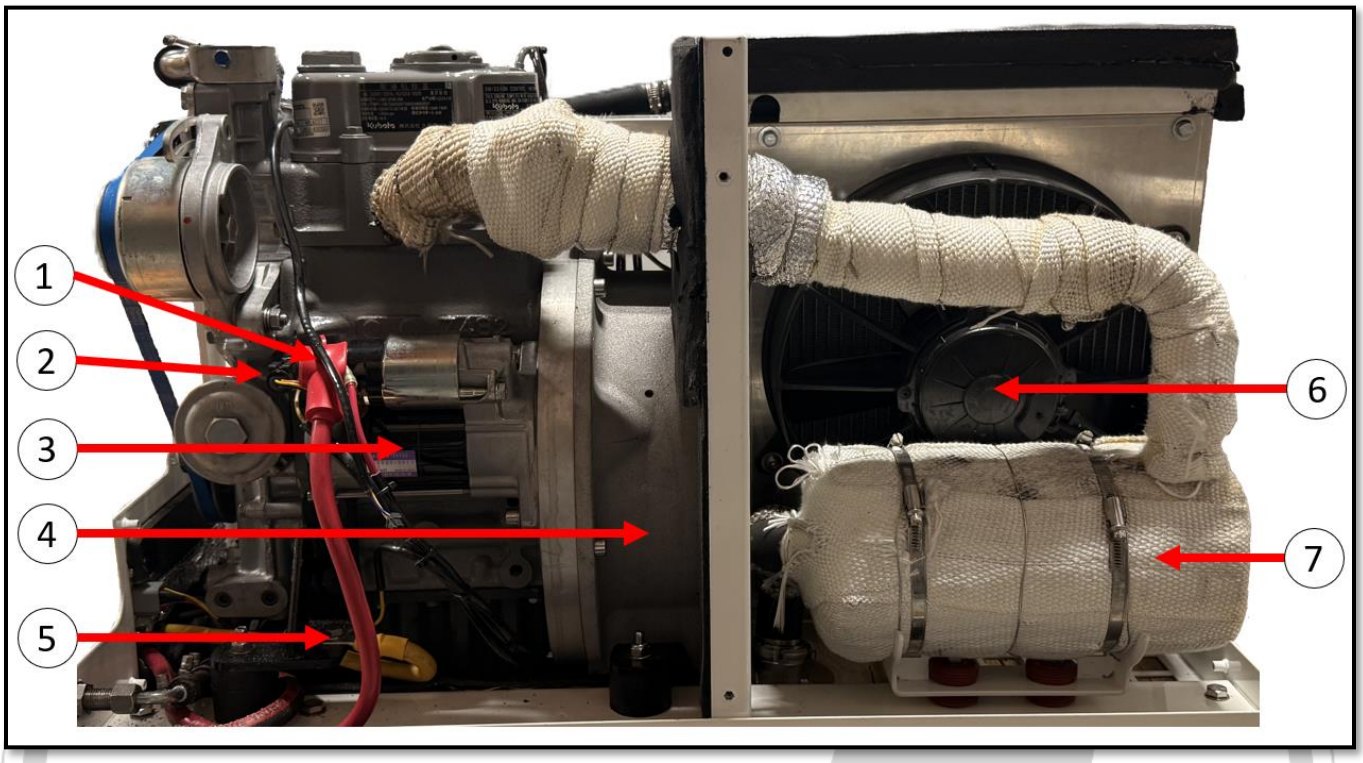

Figure 4: Exhaust Side View

1.	Positive Battery Connection	5.	Negative Battery Connection
2.	Oil Pressure Sensor	6.	Radiator Fan
3.	Starter Motor	7.	Exhaust Muffler
4.	Primary Alternator		

1.4.4 Top View

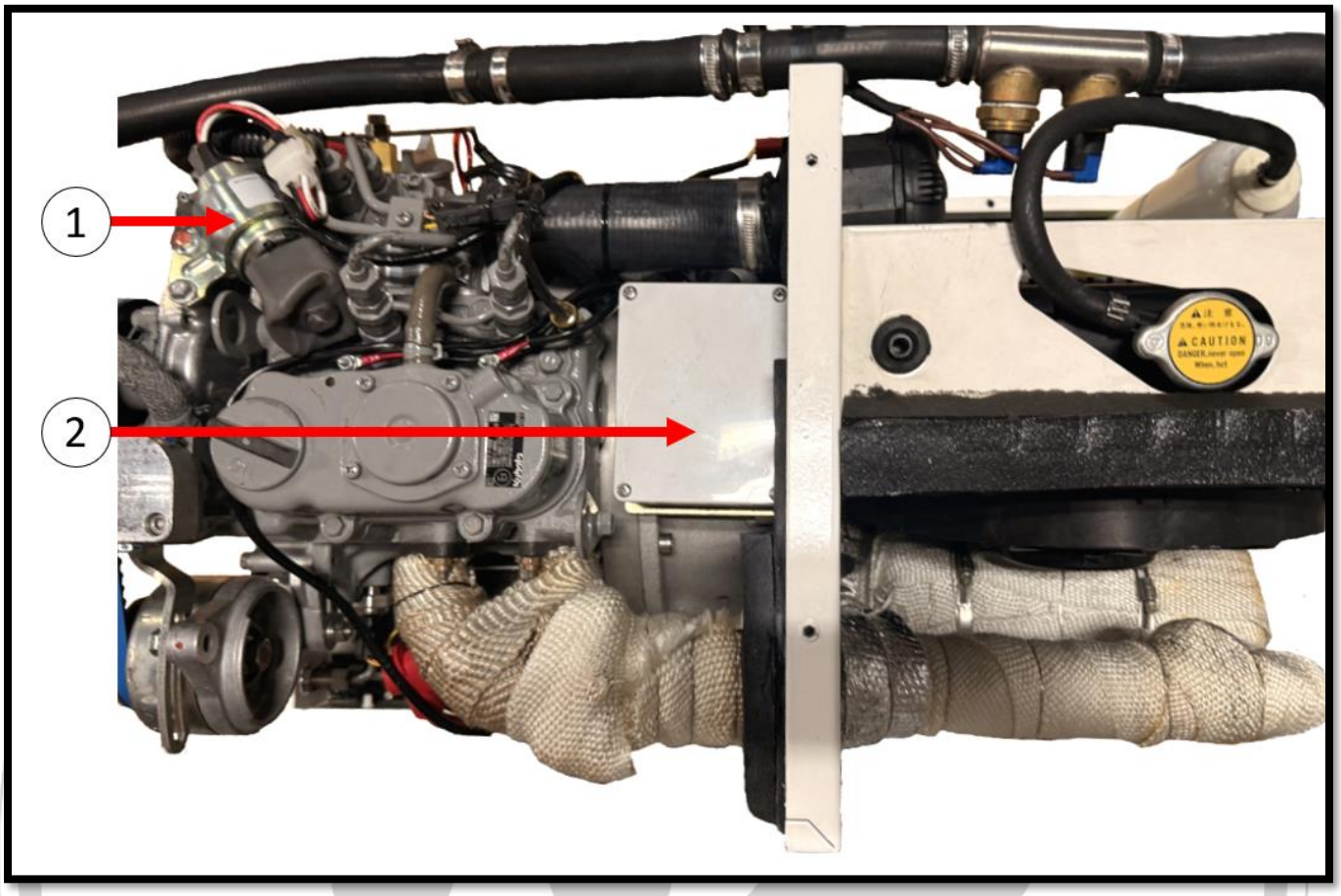

Figure 5: Top View

1	AC output to Inverter Connection w/ Fuses
2	Energize to Run Solenoid

1.4.5 Inverter Connections

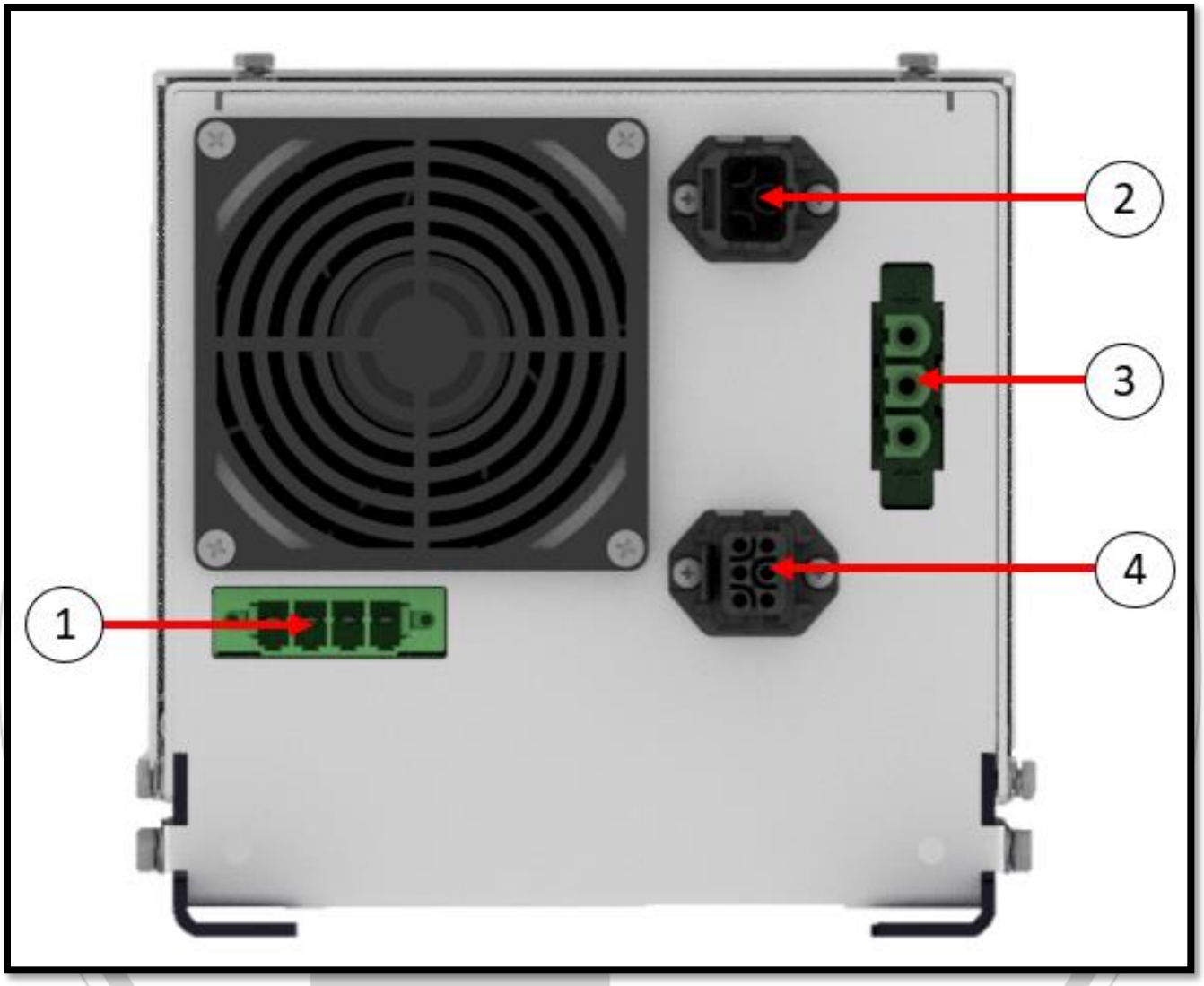

Figure 6: Inverter Connections

1	AC Input Connection (From Generator)
2	Communication Connection (From Generator)
3	Communication Connection (To Control Panel
4	AC Output Connection (To Boat)

2 Safety

2.1 Symbols

Below are explanations of the symbols that are found throughout this manual to identify safety hazards.

⚠**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, may result in moderate injury or property damage.

2.2 Safety Information

In this section you will find general safety information that pertains to the generator.

⚠**Danger:** Carbon monoxide is deadly. All internal combustion engines produce carbon monoxide. All inside cabin compartments should have functioning carbon monoxide detectors installed. See NFPA 1192 (National Fire Protection Association) for more information on the dangers of carbon monoxide.

⚠**Danger:** Diesel Fuel is flammable. When working with diesel fuel, shut off all generators, engines, appliances, and other sources of ignition. Do not allow smoking, flames, or sparks.

⚠**Danger:** Gasoline and battery vapors are explosive. Ventilate compartments around batteries, gasoline tanks, gasoline hoses, and gasoline filters before performing any maintenance in those areas. Do not allow smoking, flames, or sparks.

⚠**Danger:** High Voltage. Contact with high voltage will cause death or serious injury. Shut off the generator, disconnect the starter battery prior to removing any covers.

⚠**Warning:** Fingers, hands, arms, clothing, and hair may get entangled in moving components which will cause severe personal injury. Normal operation requires the generator enclosure to be closed. Operation with the capsule open should only be done by authorized service technicians.

⚠**Warning:** High voltage AC and DC currents can be deadly. Keep all guards, shields, and covers in place while operating the generator. Only allow certified electrical technicians to make changes to the electrical systems.

⚠**Warning:** Loose and corroded electrical connections can heat up and cause fires. High current electrical connections should be checked frequently and protected from corrosive elements.

⚠**Warning:** Hot engine components and coolant may cause severe burns. Do not touch the generator while it is hot. Do not open the coolant expansion tank, or radiator cap, if the generator is hot. The hot coolant could boil and overflow causing burns.

⚠**Warning:** Batteries emit explosive gases that can cause severe personal injury or death. Do not smoke near batteries, and keep all flames, sparks, pilot lights, switches, arc-producing equipment, and other ignition sources away.

⚠**Warning:** Exhaust gases contain carbon monoxide and are deadly. Do not operate the generator when the vehicle is indoors or in any area where exhaust gases can accumulate.

⚠**Warning:** Do not use ether or any starting fluids for starting the engine, as it can cause severe damage.

⚠**Warning:** Wear appropriate safety and protective clothing when working on the generator. Do not wear loose clothing that may catch on protruding parts, pulleys, etc. and cause severe injury. Do not wear headphones or ear buds while servicing equipment.

⚠**Caution:** High Voltage, Fire and Burn Hazard shorting contacts can cause sparks, fire, and burns. Shut off generator, disconnect starter battery prior to removing any covers.

3 Operation

3.1 Preoperational Checks

The following items should be checked once daily or before starting the generator for the day. Performing these checks will help maximize performance and increase the life of your generator. If any issues are found, correct the issue immediately. More details about the inspection tasks may be found in the preventive maintenance, Section 6, of this manual.

> ⚠**Warning:** Hot engine components and coolant may cause severe burns. Do not touch the generator while it is hot. Do not open the coolant expansion tank, or radiator cap if the generator is hot. The hot coolant could boil and overflow causing burns.
>
> ⚠**Warning:** Exhaust gases contain carbon monoxide and are deadly. Do not operate the generator when the vehicle is indoors or in any area where exhaust gases can accumulate.

1. Make sure generator is shut down.
2. Remove the generator service cover.
3. Disconnect the starter battery.
4. Inspect for evidence of leaks. Locations of importance are hoses, hose connections, fuel filter, and coolant pump. Check for exhaust leaks. If found, fix and clean immediately.
5. Check Engine Oil Level – Keep to the maximum level on the dipstick.
6. Check Coolant level in the expansion tank.
7. Visually inspect motor and generator mounting screws for tightness.
8. Visually inspect motor and generator for signs of corrosion.
9. Visually inspect inside, around, and underneath generator to ensure there are no materials from nesting animals. If so, remove material and inspect for damage. Repair if found.
10. Visually inspect around the exhaust to ensure no materials are near.
11. Check for radiator blockages.
12. Reinstall the Service cover.
13. Reconnect the battery.
14. Check the fuel level.

3.2 Starting The Generator

Figure 7: Control Panel

1. Press and release the On/Off button on the control panel (Top left button in Figure 7). This turns on the control panel, engine controller, and inverter. The On/Off LED, above the On/Off button, will illuminate. The generator will communicate through the RV-C port.
2. Verify on the control panel that no values display “---“. Press up or down arrow buttons to cycle through all three screens.

3. Press and release the Start/Stop button on the control panel (Top right button in Figure 7. The Start/Stop LED, above the Start/Stop button, will flash. The engine will automatically preheat for 0 to 20 seconds, depending on the temperature of the engine. The starter will engage. The speed control actuator will gradually increase in position until the engine starts. The control system will automatically detect when the engine has started and will disengage the starter. As soon as engine RPMs are detected, the Start/Stop LED will light up solid.
4. If the generator fails to start, the shutdown message "Start Attempt Failed" will be displayed on the control panel. See Section 7, Troubleshooting, for more information on shutdown messages.

⚠**Warning:** Do not use ether or any starting fluids for starting the engine, as it can cause severe damage.

3.3 Running

The engine will run at a fixed rpm. The speed is automatically controlled by the speed control actuator.

Extended light loading will cause increased engine oil consumption. Always try to load generator to more than 30% of the rated load.

⚠**Warning:** Exhaust gases contain carbon monoxide and are deadly. Do not operate the generator when the vehicle is indoors or in any area where exhaust gases can accumulate.

3.4 Performance Reductions

The generator is rated for power output at 68°F (20°C) and at sea level. Higher temperatures and altitude cause a reduction in engine output power. Higher temperatures also reduce the efficiency of the cooling systems. If operating at a higher temperature or altitude, it may be necessary to reduce the electrical load on the generator.

Derating due to altitude begins when a height of 10,000 ft (3,048 m) has been reached. Any increase in height will need a de-rating of 3% per 1,000 ft (305 m).

Derating due to temperature begins at 90°F (32°C) Any increase in temperature will need derating of 5% per 10°F (5.6°C).

3.5 Warning And Shutdown Messages

Warning Message: A warning message is an indication that an operating parameter is approaching a shutdown limit. It is displayed as dark text with a light background at the bottom of the control panel, see Figure 8. The message will go away as soon as the operating parameter is within the acceptable limits.

Figure 8: Warning Message (dark text with a light background.)

Shutdown Message: A shutdown message is an indication that an operating parameter has reached a shutdown limit. It is displayed as light text with a dark background at the bottom of the control panel, see Figure 9. The generator will shut down shortly to help protect the generator from damage. The control panel alarm will sound. The Start/Stop LED will flash.

Figure 9: Shutdown Message (light text with a dark background.)

To silence the alarm, press and release the Alarm Mute button on the control panel.

The message for a shutdown will stay on the screen until the Start/Stop button is pressed to acknowledge it.

If a warning or shutdown message appears, the generator is operating outside of its design limits. Please consult Section 7, Troubleshooting, of this manual. It may also be necessary to contact an authorized Fischer Panda service dealer.

> ⚠ **Caution:** Operation outside of the limits will cause damage to the generator. Resolve the cause for any warning or shutdown messages before resuming operation.

3.6 Shutting Off the Generator

Allow the engine to run at a light load for two minutes prior to shut down. This allows the engine, primary alternator, and inverter to cool down.

Press and release the Start/Stop button on the control panel. The light above the Start/Stop button will turn off once the engine stops.

Press and release the On/Off button on the control panel to shut off the control panel, engine controller and inverter. The LED above the On/Off button will slowly fade on and off. NMEA communication from the generator will stop.

3.7 Post Operational Checks

Perform the post operational checks daily after shutting off the generator. These checks will help maximize performance and prolong the life of your generator. If any issues are found, fix them immediately.

> ⚠**Warning:** Hot engine components and coolant may cause severe burns. Do not touch the generator while it is hot. Do not open the coolant expansion tank if the generator is hot. The hot coolant could overflow causing burns.

1. Make sure the generator is shut down.
2. Disconnect the starter battery.
3. Open generator Service cover.
4. Inspect for evidence of leaks. Locations of importance are hoses, hose connections, fuel filter and Coolant pump. Check for exhaust leaks. If an issue is found, fix and clean immediately.
5. Reinstall service door.

3.8 Control Panel

The Control Panel allows the operator to start and stop the generator. It also provides information that is important during operation and troubleshooting. For more in-depth information about the Control panel and Control System, refer to the following Manuals:

- D00089 – General Datasheet
- D00097 – Programming Data Structure

4 Installation

4.1 Requirements

The installation of a generator must be performed by a trained Fischer Panda technician or a Fischer Panda authorized service point.

Incorrect installation of the generator may void warranty

4.2 Location

The selected location for the generator must provide convenient access for performing all required preventative maintenance. The installation area must be separated from sources of flammable vapors, such as batteries and fuel tanks, since an operating generator can ignite these vapors. The generator must not share a compartment or ventilation space with batteries or fuel tanks. Adequate access must also be provided for connecting and disconnecting fuel lines, battery cables, control panel wiring, and AC wiring.

Ensure there is unobstructed space beneath the generator to allow proper cooling airflow. The area below the cooling air outlet must remain unobstructed for at least 305 mm (12 inches). The cooling air openings should be located or shielded to prevent direct exposure to rain, road splash, and debris thrown up by the vehicle's wheels. Provide sufficient space to mount the generator with a minimum clearance of 32 mm (1.25 inches) at the top and on sides; The opening on the exhaust side of the generator (where radiator exhaust air blows out), needs a minimal clearance of what is shown in Figure 10.

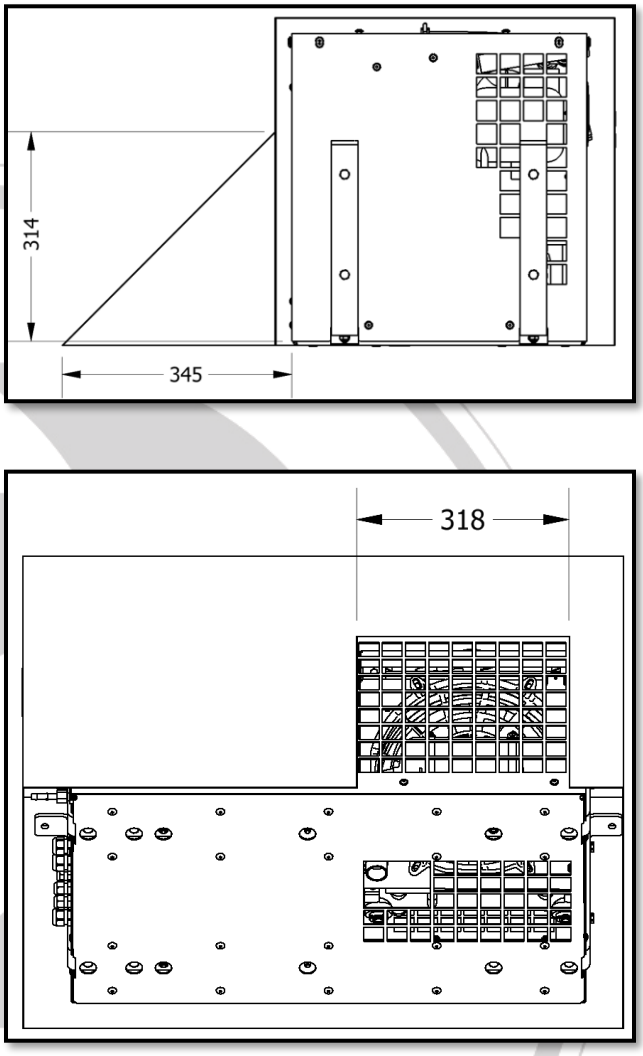

Figure 10: Generator radiator exhaust minimal clearance

these minimum clearances also apply when thermal or acoustic insulation is installed in the compartment.

If installing the generator above the floor of the vehicle, it is recommended to mount as close to the floor as possible. Excessive g-forces during vehicle operation could potentially cause damage to the generator.

4.3 Mounting

The structure that will support the generator needs to be able to withstand the dynamic loading of the generator.

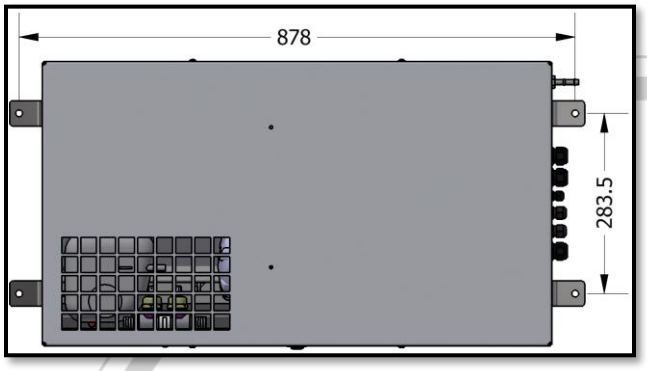

Figure 11: Generator Mounting Hole Layout (mm)

The specifications for the bolts and torque settings are shown in the table below.

Quantity	Fastner Type	Strength	Size	Torque Setting
4	Bolt	Grade 5	3/8-inch	41Nm (30 ft-lbs.)
	Bolt	Class 8.8	M10	50Nm (37 ft-lbs.)

It is highly recommended for Nylon Insert nuts to be used for the installation of the generator.

4.4 Fire and Exhaust Barriers

⚠**Danger:** Carbon monoxide is deadly. All internal combustion engines produce carbon monoxide. All inside cabin compartments should have functioning carbon monoxide detectors installed. See NFPA 1192 (National Fire Protection Association) for more information on the dangers of carbon monoxide.

Vapor and fire-resistant barriers must be installed between the generator and the interior of the vehicle when the generator is mounted below the floor. These barriers are required to prevent the passage of heat, flames, and vapors into occupied areas.

If the generator is installed in a compartment located on the vehicle floor, the entire compartment must be fully lined with approved vapor- and fire-resistant materials. Refer to National Fire Protection Association (NFPA) 1192 for detailed material and construction requirements.

All seams, joints, and openings in the barriers—including those for wiring, mounting fasteners, and other penetrations—must be properly sealed to maintain vapor and fire resistance

4.5 Exhaust System

. The generator is equipped with a U.S. Forest Service–approved spark-arresting muffler or exhaust tip. Failure to provide and properly maintain a spark arrester may violate applicable laws and regulations. Any modification of the exhaust system or use of unapproved components is the responsibility of the person performing the modification or installation. Liability for resulting damage, injury, or warranty expenses arising from unauthorized modifications rests solely with that individual.

Exhaust gases contain carbon monoxide and are deadly. To prevent exhaust gases from entering the vehicle, do not terminate the exhaust tailpipe beneath the vehicle or within 153 mm (6 inches) of any openings into the vehicle, including doors, windows, vents, or other openings. The exhaust system must be routed so that it is adequately protected from damage and road hazards. Use only approved materials when installing or modifying the exhaust system.

The exhaust tailpipe becomes extremely hot during operation and can cause severe burns. Careful consideration must be given to the location and routing of the tailpipe to minimize the risk of accidental contact.

The generator exhaust system must be gas-tight and designed to prevent any leakage or entry of exhaust gases into the vehicle interior under all operating conditions.

4.5.1 Exhaust Tailpipe installation

The muffler is mounted internally within the generator and includes an outlet pipe that stops at the bottom of the unit. The exhaust tailpipe must be clamped securely to this exhaust outlet.

Support the tailpipe near its outlet end using an automotive-type tailpipe hanger. Hangers must not be attached to combustible materials such as wood. Use a U-bolt–type muffler clamp to secure the tailpipe to the generator outlet. Any overlapping section of pipe must be slotted to allow proper clamping and sealing.

Do not route the tailpipe near fuel lines or fuel tanks. Maintain a minimum clearance of 76 mm (3 inches) from combustible materials (such as wood, felt, or cotton) unless those materials are properly insulated or shielded. Under all conditions, the temperature rise of adjacent combustible materials must not exceed 65°C (117°F). Do not route the exhaust tailpipe beneath the engine oil drain or in a manner that restricts generator cooling air inlet or outlet flow.

The tailpipe must not extend into the vehicle's approach or departure angles or below the axle clearance line. Do not interconnect the generator exhaust system with the vehicle's exhaust system. The tailpipe must not terminate underneath the vehicle; it must extend at least 25 mm (1 inch) beyond the outer perimeter of the vehicle. Support the end of the tailpipe to prevent it from being pushed inward or upward beneath the vehicle skirt.

4.6 Fuel System Installation

The maximum allowable fuel pump lift is 914 mm (36 inches). The generator fuel supply and return lines must not be interconnected with the vehicle engine fuel supply or return lines.

All fuel system connections must comply, where applicable, with the following SAE standards:

- SAE J1231 — Formed Tube Ends for Hose Connections and Hose Fittings
- SAE J1508 — Hose Clamp Specifications
- SAE J2260 — Nonmetallic Fuel System Tubing with One or More Layers
- SAE J2044 — Quick Connector Specification for Liquid Fuel and Vapor/Emissions Systems

The generator fuel pickup tube must terminate above the vehicle engine fuel pickup level within the supply tank. This prevents the generator from consuming all available fuel and leaving the vehicle without fuel.

4.6.1 Fuel Hoses

The fuel hoses installed inside the generator are low-permeation hoses designed to meet federal 50-state diesel emission standards. Low-permeation fuel hose is required to comply with regulations applicable to diesel generators sold or used for commercial purposes in all 50 states.

Replacement or external fuel hoses must meet one of the following specifications for diesel fuel applications: SAE J30R9, SAE J30R14, or SAE J1527. Only hoses meeting these standards are approved for use.

> ⚠**Caution:** Lubricants used during fuel hose installation can leave residues that may clog fuel jets and adversely affect generator performance. If lubrication is required when making fuel hose connections, use only soap-free lubricants approved for fuel system applications.

4.6.2 Routing Fuel Lines

Diesel fuel and vapor are highly flammable and can be ignited by electric arcs, posing a severe risk of personal injury or death. For this reason, fuel lines must never be routed alongside electrical wiring.

Fuel lines should be routed along bulkheads and frame members to provide protection, ensuring that the entire length of the line remains visible for inspection and accessible for replacement.

Whenever possible, route fuel lines parallel to the motorized chassis fuel lines.

To reduce the risk of fuel siphoning in the event of a line failure, the fuel line should be positioned at or above the top of the fuel tank. All fuel lines must be properly supported and protected to prevent excessive movement, chafing, or contact with sharp edges, electrical wiring, or hot exhaust components.

4.6.3 Fuel Supply Line to Generator

The fuel connections to the generator are located on the front of the enclosure (see 1.4.1. Front View). The ID of the fuel hoses is 5/16-inch. The upper connection is the fuel in, while the lower connection is the fuel out. Ensure all hoses connections are fully seated and properly secured with approved clamps.

When installing the fuel system, please make sure the order of components are as follows: fuel tank, fuel pump with pre-filter, fuel filter with water separator, then generator, as shown in Figure 12.

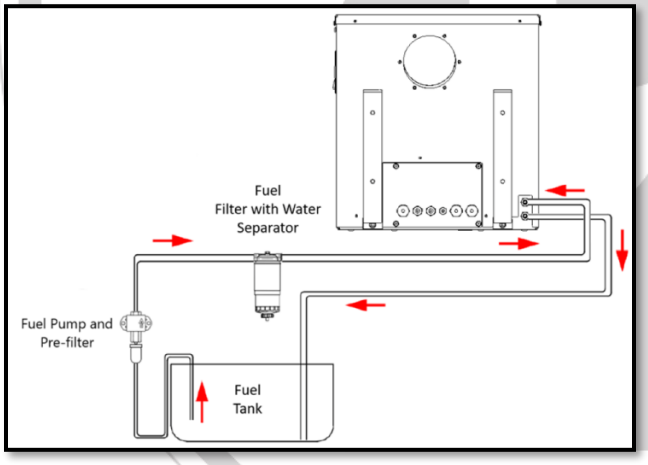

Figure 12: Fuel System Order

4.6.4 Fuel Pump

The fuel pump needs to be located as close to the tank as possible. Fuel pumps are better at pushing than sucking. It is preferred that the fuel pump be installed at a 45° angle, with the outlet higher than the inlet. The fuel pump needs to be mounted below the top of the tank. The fuel return should be to the bottom of the tank if the bottom of the tank is below the level of the injection pump. Figure 13 shows an example of a fuel pump with a pre- filter.

Figure 13: DC Fuel Pump

4.6.5 Fuel Filter/Water Separator

A fuel filter/water separator should be installed between the fuel pump and the generator. Figure 14 shows an example of a fuel filter with water separator. The fuel filter/water separator should be rated for the maximum fuel pump pressure and flow rate (11.5 psi, 36 GPH).

Figure 14: Fuel Filter/Water Separator

4.7 Starter Battery Connections

The generator is equipped with a 12 VDC starting system. Accidental starting of the generator can result in severe personal injury or death. Do not connect the starting battery until all installation procedures are complete and the generator is ready to be started.

The battery connections on the generator are in two locations. The positive cable will be run through the positive battery cable opening (marked above with the "+") at the front of the generator. The positive cable will connect to the generator by mounting to the stud on the back of the starter motor, shown in Figure 4. The negative cable will run through the negative battery cable opening at the front of the generator (marked above with the "-"). The negative cable will be secured to the front exhaust engine mount, shown in Figure 4.

It is recommended that the generator has its own starter battery. A secondary means of charging the starter battery is required while the generator is running. The generator does not directly charge the starter battery. the generator can share a battery with the 12V "house" system. Do not share a battery between the generator and the main engine of the vehicle. The diagram of the DC connections can be viewed in Figure 15.

4.7.1 Battery Compartment

Electrical arcing can ignite hydrogen gas emitted by batteries, creating a risk of severe personal injury. The battery compartment must be properly ventilated and designed to isolate the battery from any spark-producing equipment. Batteries must be installed in a compartment separate from the generator and away from all sources of ignition.

The battery should be mounted in a manner that prevents spills or leaks from dripping onto fuel lines, wiring, or other components that could be damaged by battery acid.

In RV applications, "house" batteries are often connected to the generator system. All RVs should be equipped with an appropriate battery charger to maintain battery charge during operation. Steady state load on the battery is around 1.8 amps while the engine is running.

4.7.2 Routing Battery Cables

Battery cables must be sized in accordance with the Battery Cable Size Table. The entire current path between the generator and the negative (–) battery terminal must be capable of carrying full cranking current without excessive voltage drop. It is strongly recommended to use a dedicated, full-length cable to connect the generator directly to the negative (–) battery terminal.

Applicable codes may require bonding conductors from both the generator and the battery to the vehicle frame. If the vehicle frame is used as part of the return path between the negative (–) battery terminal and the generator, all frame members in the current path must have sufficient cross-sectional capacity to carry cranking current. The electrical resistance of riveted or bolted frame joints must also be carefully evaluated, particularly in environments where corrosion may occur. A separate cable must be used to connect the frame to the designated negative (–) terminal on the generator. Generator mounting bolts are not considered an acceptable means of bonding or grounding, either for carrying cranking current or for meeting grounding requirements.

All battery cable connections should be coated with a terminal oxidation inhibitor to prevent corrosion. Battery cables must not be routed alongside fuel lines, as this may create a fire hazard and risk of severe personal injury or death. Route cables away from fuel lines and hot engine exhaust components. Ensure that all battery cables are accessible for inspection and replacement, adequately protected from physical damage, and securely supported to prevent chafing due to vibration.

4.8 DC Connections

A diagram to demonstrate the overall layout of the DC connections of the generator is shown in Figure 15. The size and type of the output cables should meet local regulations such as NFPA 1192. Cables need to be of the correct size and type to handle the current and voltage of the system.

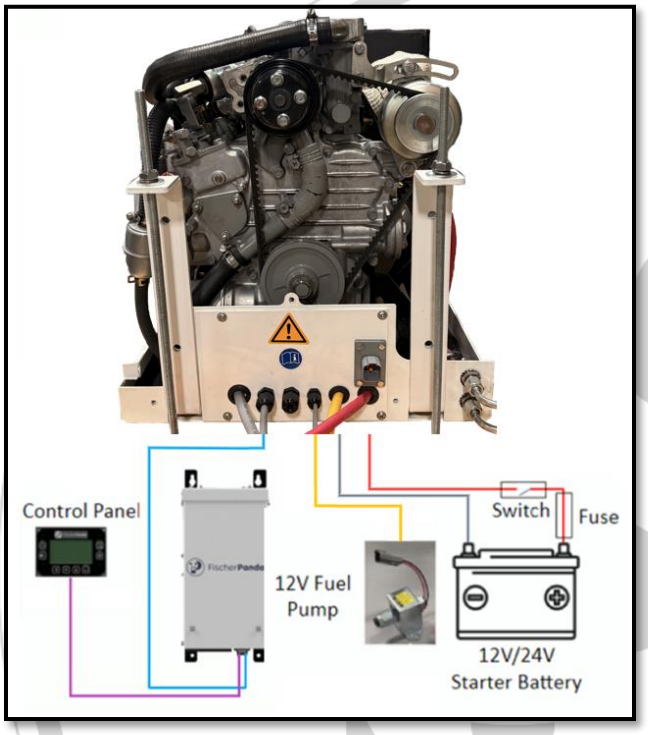

Figure 15: DC Connections

4.9 AC Output

The diagram in Figure 16, shows the AC connections at the inverter. AC In is on the left and AC Out is on the right. The size and type of the output cables should meet local regulations such as NFPA 1192. Cables need to be of the correct size and type to handle the current and voltage of the system.

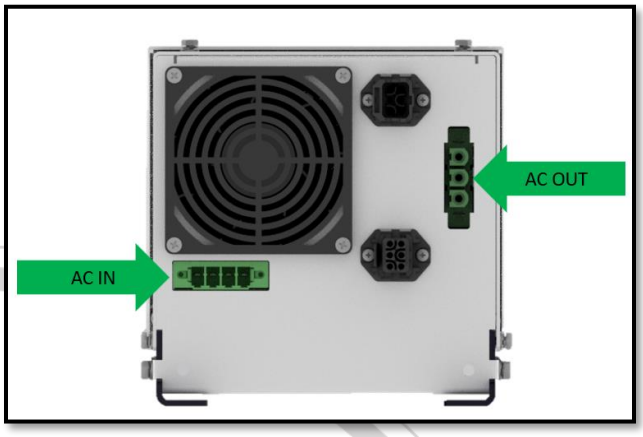

Figure 16: Inverter AC Connections

In Figure 17, the AC connections to the fuse board are shown. The right side of the board are the wires coming from the alternator (from top to bottom: L1, L2, L3). Notice the sensor wires are on the top two connections on the right side (white on top, black below). On the left side of the fuse board, there are the output connections (from top to bottom: Black, Red, White). Notice the PE (green) wire, in the four-conductor cable, is connected below the fuse board to another PE wire coming from the generator.

Figure 17: Fuse Board Connections

4.10 Inverter Installation

The inverter must be installed in a dry area of the chassis that is well ventilated. The minimum flow rate is 100 CFM of fresh air. The inverter generates about 150 W of heat. The ambient temperature around the inverter should be at a temperature of less than 122°F (50°C). The clearance around the inverter (at the orientation in Figure 18) needs to be as follows:

4 in. (101.6mm) of clearance from the top of the inverter.

1 in. (25.4mm) of clearance to either side of the inverter.

6 in. (152.4mm) of clearance from the bottom.

Strain relief is required within 6 in. of the inverter for all four cables that connect to it. The AC output cable from the inverter needs go to an appropriately sized circuit breaker.

The dimensions for installing the inverter are in Figure 18. The top set of holes are keyholes for ease of installation. All holes are 0.25in. (6.5mm) in diameter for bolts, allowing a hex head screw up to 16.5mm (flat to flat) or a round screw up to 0.75in in diameter.

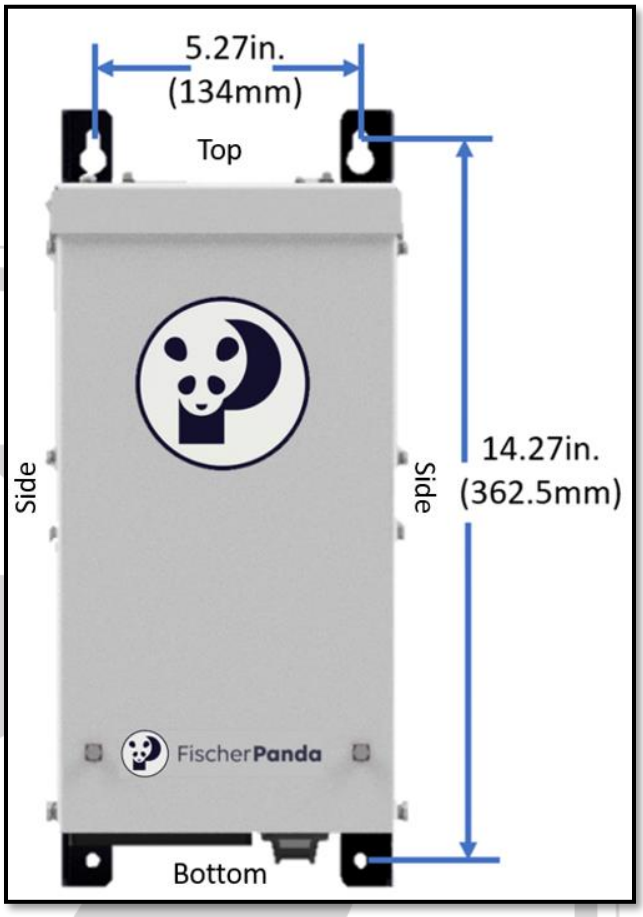

Figure 18: Inverter Hole Layout

5 Installation Review

5.1 Installation Review

Before starting the generator, inspect the installation and verify that each of the following requirements can be answered “yes” with a checkmark. If any item cannot be confirmed, corrective action must be taken before operating the generator.

☑	Question
☐	Is the generator control panel easily accessible for starting and stopping the unit?
☐	Is the circuit breaker readily accessible?
☐	Is there convenient access for checking and adding engine oil and for servicing the air filter?
☐	Is the generator securely mounted and properly bolted in place?
☐	Are all specified clearances provided?
☐	Are the air inlet and outlet openings free of obstructions?
☐	Is there adequate access for draining engine oil and replacing the oil filter?
☐	Are all exhaust tailpipe connections tight, with all hangers and support straps secure?
☐	Does the tailpipe extend at least 25 mm (1 inch) beyond the vehicle perimeter and terminate at least 153 mm (6 inches) away from any vehicle opening?
☐	Is the generator located outside the vehicle interior or properly isolated using approved vapor- and fire-resistant materials?
☐	Are all penetrations into the vehicle, including those for AC wiring, properly sealed to prevent exhaust gas entry? Are AC conduit connectors sealed both inside and outside?
☐	Have all AC electrical connections been inspected and approved?
☐	Has a properly sized battery been installed in a ventilated compartment isolated from the generator?
☐	Are battery cables correctly sized, properly secured, and protected from chafing, sharp edges, fuel lines, and hot exhaust components?
☐	Are all fuel system connections secure and leak-free?
☐	Are fuel lines properly supported and secured at appropriate intervals to prevent chafing and contact with sharp edges, electrical wiring, and hot exhaust components?

5.2 Startup

⚠**Warning:** Batteries emit explosive gases that can cause severe personal injury or death. Do not smoke near batteries, and keep all flames, sparks, pilot lights, switches, arc-producing equipment, and other ignition sources away.

Once all items on the installation review checklist have been verified, connect the battery cables, attaching the positive (+) cable first. Perform all daily required maintenance (Section 6.7) and pre-start inspections as specified (Section 3.1). Although the generator is shipped from the factory with the correct engine oil level, the oil level must be checked prior to initial startup.

Start and operate the generator in accordance with all instructions and safety precautions. While the generator is running under both full and intermediate loads, inspect for fuel and exhaust leaks and listen for any unusual noises. Do not place the generator into service until all leaks have been corrected and proper operation has been confirmed.

⚠**Warning:** Exhaust gases contain carbon monoxide and are deadly. Do not operate the generator when the vehicle is indoors or in any area where exhaust gases can accumulate.

6 Preventative Maintenance

6.1 Preventative Maintenance

Preventative maintenance is required to ensure trouble-free operation and top performance. Maintenance should be performed at intervals per the Preventative Maintenance Schedule at the end of this section. Keep a log of engine hours, date, and maintenance performed.

6.1.1 Remove Enclosure Door

1. Ensure the generator is shut down.
2. Disconnect starter battery.
3. Open generator service side door by pressing the button on the top of the latch, releasing the handle.

> ⚠**Warning:** Fingers, hands, arms, clothing, and hair may get entangled in moving components which will cause severe personal injury. Normal operation requires the generator enclosure to be closed. Operation with the enclosure open should only be done by authorized service technicians.

6.1.2 Fuel Level and Allowable Fuels

Before operating, verify adequate fuel supply is available for operation. A general guideline is 0.4 liters per kWh or 0.11 gallons per kWh.

No. 2 S15 or No. 1 S15 Diesel are required when operating in US EPA regulated areas.

Blending Diesel No.2 and No.1. is recommended when temperatures drop to and below 35°F (1.7°C). Please research proper mixing ratios, to ensure no gelling of diesel fuel.

> ⚠**Danger:** Diesel Fuel is flammable. When working with diesel fuel, shut off all generators, engines, appliances, and other sources of ignition. Do not allow smoking, flames, or sparks.

6.1.3 Fuel Bleeding

It is necessary to bleed the fuel system in the following cases.

1. Replacement of any fuel system component including hoses, filters, pump, or fittings.
2. Running the engine out of fuel. Note that this occurs at approximately ¼ tank on most chassis that share a fuel tank with the generator.
3. After extended periods of storage.

Fuel Bleeding Procedure:

1. Stop Generator. Turn on control panel.
2. Press the fuel primer button (Item 2 in 1.4.2 Service Side View) for 3 minutes.
3. While pressing the fuel primer button, check for air in the fuel by opening the fuel bleed point (Item 5 in 1.4.2 Service Side View) at the injection pump while pressing the fuel primer button.
4. If air is noted, continue to hold the primer button until no air/bubbles are observed.
5. Close fuel bleeder screw.
6. Press the fuel primer for an additional 30 seconds. Verify no leaks are present.
7. Turn off the control panel.

Rarely, it is required to bleed the high-pressure lines. To do this, the high-pressure lines must be loosened at the injectors. Two wrenches must be used when loosening or tightening the high-pressure lines at the injectors to provide counter torque. Failure to do so will result in the bridging pipe between the injectors being damaged. After fuel is verified to be coming out of each injector, retighten the high-pressure lines at the injector with two wrenches to provide counter torque.

6.1.4 Engine Oil

Checking: Check the engine oil with the dipstick either with a cold engine or after the engine has been stopped for 5 minutes. The engine must be level side to side and front to back. Remove the dipstick and wipe it clean. Fully insert the dipstick, wait at least 2 seconds, then remove. Immediately position the dipstick horizontally to prevent a misreading. Engine oil should be maintained at or near the maximum mark on the dipstick. See Figure 19, to ensure adequate lubrication if the boat is heeling or trimming. Do not overfill or underfill the engine oil, as this can cause engine damage.

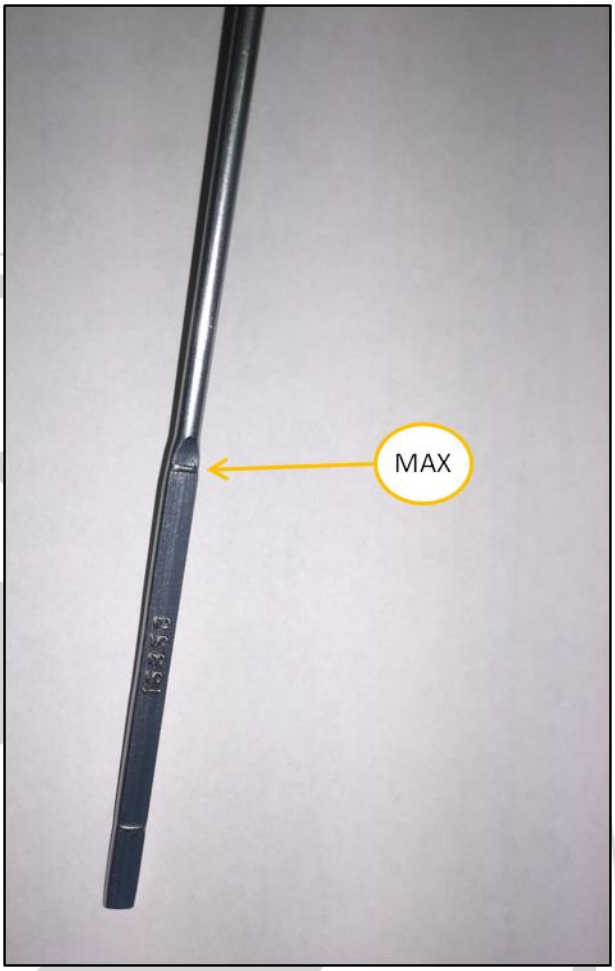

Figure 19: Engine Oil Dipstick

Adding: Add engine oil through the oil fill port on the service side of the engine, see Figure 20. Engine oil should be maintained at or near the maximum mark on the dip stick (See Section 6.1.4 Engine Oil). Clean up any spilled oil immediately. Do not overfill or underfill the engine oil, as engine damage may occur.

Figure 20: Oil Filler Cap

> ⚠**Warning:** Spilled oil could result in fire. Clean up any spilled oil immediately.

Changing: Run the generator under load until it reaches normal operating temperature. Remove the load, shut off the generator, and disconnect the starter battery. To drain the engine oil, remove the oil cap in Figure 20, and the cap on the oil drain hose at the front of the engine. A pump may be hooked to the hose if it is more convenient. Once the oil is completely drained, replace the oil drain hose cap. Refill the engine oil to the maximum mark on the dipstick. Do not overfill or underfill the engine oil, as this can cause engine damage. Dispose of used engine oil according to local regulations.

> **California Proposition 65**
> ⚠**Warning:** Used engine oil contains products known to the state of California to cause cancer, birth defects, and other reproductive harm.

6.1.5 Engine Oil Leaks

Check for oil leaks in key areas, including the rear main seal, oil pan, cylinder head seal, valve cover seal, timing chain cover, oil drain hose, and dipstick. Address any leaks immediately to prevent engine damage.

6.1.6 Charging Starter Battery

Ensure the starter battery has a charge above 12 volts before starting the generator. After starting, confirm the charger is working by checking for an increase in battery voltage over time. Follow the battery manufacturer's maintenance guidelines, as the generator does not charge the starter battery.

6.1.7 Coolant Hoses and Fuel Hoses

Check all hoses, both inside and outside the capsule, for leaks, brittleness, abrasion, or cracks. If any signs of wear or damage are found, replace the hoses before operating the generator.

6.1.8 Exhaust Leaks

Check for exhaust leaks by looking for black soot buildup near potential leak points. Inspect the exhaust manifold, exhaust pipe, and muffler for any signs of leakage.

> ⚠ **Danger:** Carbon monoxide is a deadly gas produced by all internal combustion engines. To ensure safety, all enclosed cabin compartments must have working carbon monoxide detectors. For more details on carbon monoxide risks and prevention, refer to NFPA 1192

6.1.9 Coolant Level

Check the coolant level in the expansion tank when the engine is cold. The level should be between the bottom band and the "max" mark (see Figure 21). When refilling, always use the correct coolant mixture for the expected temperature (refer to Section 6.5 for specifications).

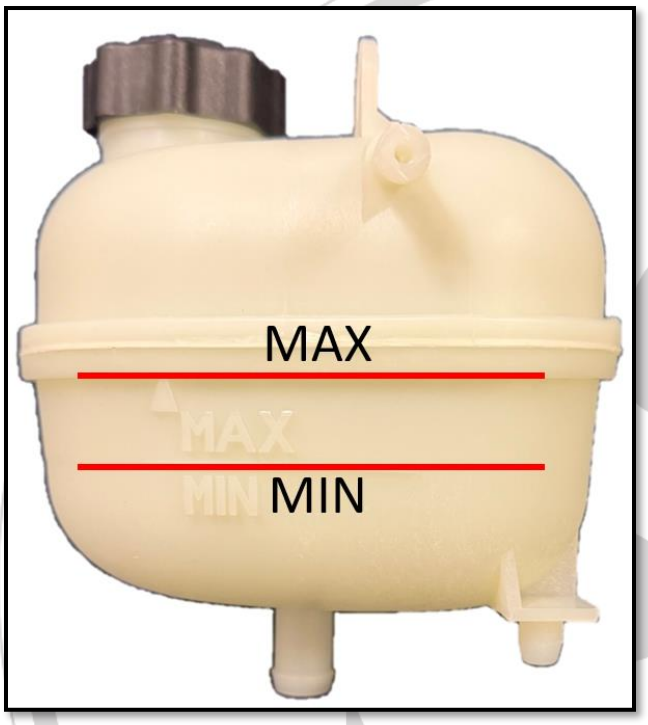

Figure 21: Coolant Expansion Tank

> **Warning:** Hot engine components and coolant can cause serious burns. Avoid touching the generator while it is hot. Do not open the coolant expansion tank, or radiator cap, when the generator is hot, as boiling coolant may overflow and cause burns.

6.1.10 Coolant Bleeding

To remove air from the coolant system, follow these steps:

1. Ensure the engine is cool.
2. Remove coolant expansion tank from the generator, but leave the hoses attached.
3. Remove the coolant expansion tank cap and lower the tank below the bleed screw level.
4. Open the bleed point (Item 4 in 1.4.2 Service Side View). Gravity will push coolant from the engine into the tank.
5. Raise the coolant expansion tank above the thermostat housing, allowing gravity to push coolant back into the engine. Do not let the tank empty.
6. Observe the bleed point. Close the bleed points once only coolant (no air bubbles) is flowing.
7. Secure the expansion tank cap.
8. Run the generator for one minute.
9. Repeat the bleeding process two more times to ensure all air is removed.
10. Reinstall the coolant expansion tank inside the generator.

6.1.11 Mounting Fasteners

Check mounting fasteners regularly, as vibration can cause them to loosen. Try moving the washer under each nut; it should not move. Also, check for gaps or signs of shifting, which indicate a loose fastener. Pay close attention to fasteners on the actuator, Energize to Run solenoid, starter, generator-to-enclosure interface, enclosure-to-vehicle interface, engine-to-mounting bracket interface, and engine-to-primary alternator interface.

6.1.12 Isolation Mounts

Isolation mounts can wear out over time due to age, oil, fuel, or UV exposure. If the engine moves excessively despite tight fasteners, the mounts may need to be replaced. Check for cracks or brittleness. The generator assembly typically has four isolation mounts connecting it to the enclosure, and the enclosure usually has four more connecting it to the vehicle.

6.1.13 Engine Sensors

All engine sensors should display values, as shown in Figure 22. If "---" appears, it means the sensor is either disconnected or malfunctioning. This issue should be addressed immediately, as the control system will not be able to protect the generator from overheating or low oil pressure. Additionally, the generator will not start if the cylinder head temperature sensor is missing.

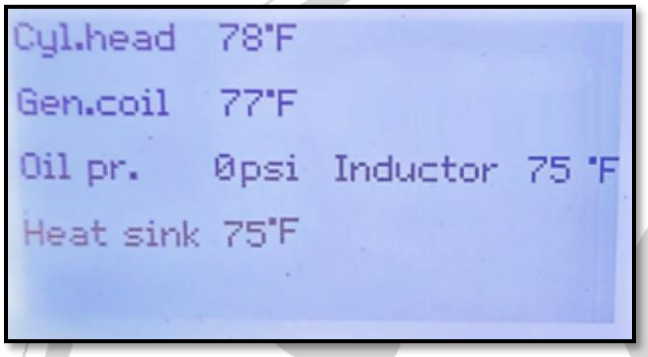

Figure 22: Control Panel Temperature Page

⚠**Caution:** Running the generator without a sensor can cause severe damage. The control system will no longer be able to protect the generator from overheating or low oil pressure, potentially leading to costly repairs. It is important to ensure all sensors are properly connected and functioning.

⚠**Caution:** Operating the generator outside of its specified limits can result in significant damage. Always address the cause of any warning or shutdown messages before restarting the generator to prevent further issues or potential failures.

6.1.14 Air Filter

To replace the air filter, first ensure the generator is off. Then, remove the service side door of the enclosure. Locate the Air Intake Box in the radiator compartment (as shown in Section 1.4.2). Turn the cap counterclockwise to unlock and pull the cap off the housing. The filter should be centered in the housing, as seen in Figure 23. When a new filter is inserted, turn the cap clockwise so that the arrows align, as shown in the top picture of Figure 23. Replace the filter as per the maintenance schedule (see Section 6.6) or if it appears dirty. If the generator operates in dusty or dirty environments, the filter may need to be replaced more frequently.

Figure 23: Air Intake Housing and Filter

6.1.15 Valve Clearance

See Kubota Workshop Manual.

6.1.16 Electrical Cable Connections

Electrical cable connections can generate heat if they are loose. To prevent this, ensure that the high-current electrical connections to components like the output box, inverter, starter, engine ground, and batteries are secure and free of corrosion. Regularly inspect these connections to maintain proper function and prevent potential damage or overheating.

> ⚠**Warning:** Loose and corroded electrical connections can generate heat, leading to fires. It is essential to regularly inspect high-current electrical connections and ensure they are tight, clean, and protected from corrosive elements like salt or moisture. Proper maintenance, such as using corrosion-resistant materials and sealing connections, can help prevent these risks and ensure safe, efficient operation of the generator and related systems.

6.1.17 AC output Current and Voltage

The inverter AC output current and voltage should be checked occasionally. Calibrated instruments in good working condition should be used to verify current and voltage.

Voltage: Measure the voltage where the output cables connect to the vehicle. The measurement should be performed with little to no load on the generator. Compare the measured voltage to the voltage displayed on the control panel.

Current: Current should be measured with a current (amp) clamp. It may be measured on the L1 AC output cable on the inverter or where it connects to the vehicle. The generator should be loaded to at least 50% of rated load. Compare the measured current to the current displayed on the control panel.

Adjustments should be made if either reading is off by more than ±5%

6.1.18 Corrosion

Open service side door and check for signs of corrosion. Corrosion should be dealt with immediately. To reduce corrosion, keep the generator clean and dry. Some possible causes of corrosion:

1. Leak inside of the enclosure
2. External leak on top of the enclosure

6.1.19 Foreign Debris

Check the inside of the capsule for foreign debris. Depending on how the generator was stored, animals may have brought foreign debris inside the enclosure.

> ⚠**Warning:** Foreign debris in the enclosure may result in a fire. After any storage period, inspect the capsule and remove any foreign debris.

6.1.20 Speed Control Actuator Adjustment

Verify that speed control actuator cycles between the 4 o'clock position to the 8 o'clock position when the panel is turned on, shown in Figure 24. Verify that all the mounting bolts are tight. The bolts on the actuator rod will have slight clearance to allow free movement of the speed control lever. If necessary, the two nuts on the actuator rod may be adjusted to eliminate any excess movement.

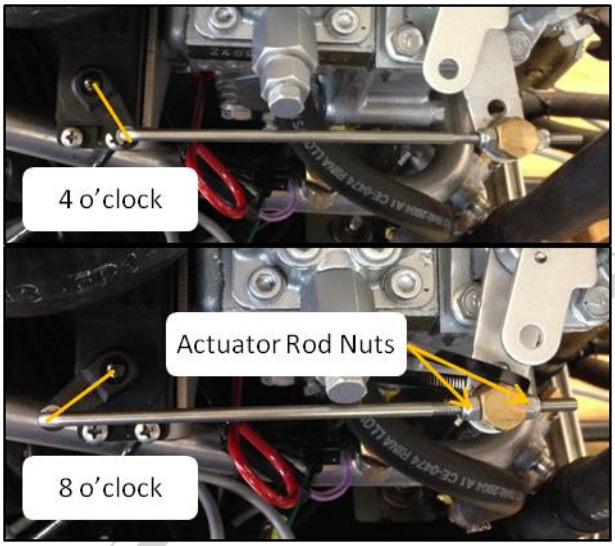

Figure 24: Actuator adjustment

6.1.21 Hose Clamps.

Inspect hose clamps for tightness and signs of corrosion. Replace if corroded or damaged.

6.1.22 Energize to Run Solenoid

The control system applies voltage to the solenoid whenever the engine starts. This extends the piston and pushes the engine stop lever to the run position. To stop the generator, the control system stops applying voltage to the solenoid. The spring in the solenoid pulls the engine stop lever to the stop position. The solenoid has two circuits. The first is a high-power push circuit that pushes the piston out. The second is low power hold circuit that holds the piston out once it is pushed all the way out.

6.1.23 Adjustment to Energize to Run Solenoid

The adjustment of the Energize to Run Solenoid is a two-person job.

1. Connect Battery Power to the generator.
2. Person 1: Press and hold the Fuel Primer Button (item 2 in Figure 3: Service Side View), and press on the back of the Energize to Run Solenoid plunger until it engages and holds position. As shown in Figure 25.

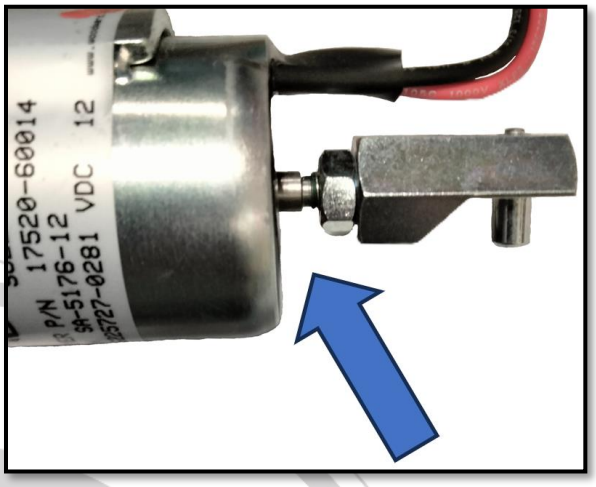

Figure 25: Energize to Run Solenoid plunger extended

3. Person 2: With the plunger now extended. Loosen the two mounting bolts on the side of the solenoid. As shown in Figure 26.

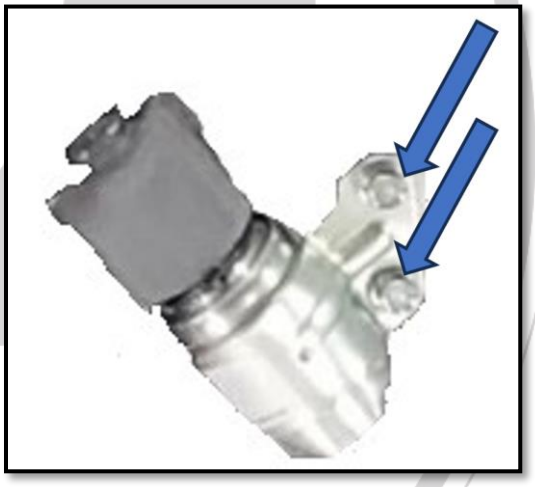

Figure 26: Solenoid Mounting Bolt location

4. Person 2: Adjust the position of the solenoid so that the stop lever is 1/32" from the stop block on the governor. As shown in Figure 27.

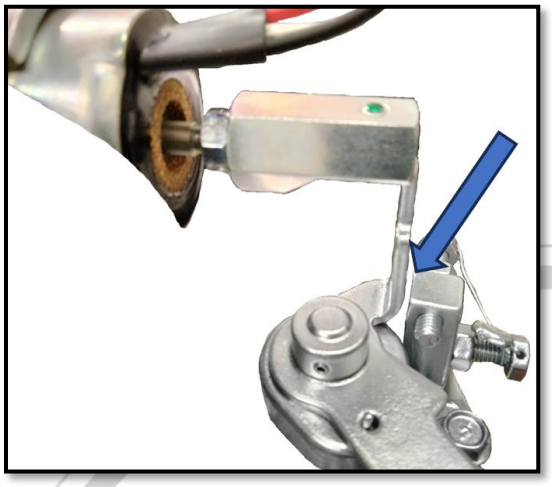

Figure 27: Spacing between Stop Lever and Stop Block

5. Person 2: Tighten the two bolts next to the solenoid.
6. Person 1: release the Fuel Primer Button.

6.1.24 Injector Nozzle Condition

See Kubota Workshop Manual

6.1.25 Injection Timing

See Kubota Workshop Manual

6.1.26 Injection Pump

See Kubota Workshop Manual

6.1.27 Inverter Parts

There are no serviceable parts contained in the inverter.

6.2 Short Term Storage

The items below should be performed anytime the generator is being stored for greater than 1 month. If below freezing temperatures are expected, perform long term storage.

1. Charge batteries and disconnect.
2. It is recommended to start the generator at least once per month and allow it to run for 10 minutes.

6.3 Long Term and Winter Storage

The items below should be performed anytime the generator is being stored for greater than 3 months or if below freezing temperatures are expected.

1. Add correct amount of diesel stabilizer to the fuel tank.
2. Check engine coolant mixture to verify the mixture is acceptable for the lowest temperature expected.
3. Change engine oil and filter.
4. Change fuel filters.
5. Run the engine for 10 minutes to circulate stabilized fuel into generator and filter.
6. Charge batteries and disconnect.
7. Fill diesel tank to prevent condensation.
8. Clean and dry any moisture in enclosure. Paint any exposed metal to prevent corrosion. Fix any corrosion noticed.
9. If possible, store the vehicle in a humidity-controlled environment. Too high of humidity causes mold, bacteria, and rotting. Too low of humidity causes rubber parts to dry out.
10. Remove injectors and spray fogging oil in each combustion chamber. Turn the engine by hand for a couple revolutions. Reinstall injectors.

6.4 Recommissioning

The items below should be performed before resuming operation after long term or winter storage.

1. Charge batteries and reconnect.
2. Perform any scheduled preventative maintenance not performed before long-term storage.
3. Turn the engine over by hand for a couple revolutions.
4. Perform Pre-operational Checks. Section 3.1
5. Start engine.
6. Check for exhaust, fuel, and coolant leaks.

6.5 Fluids And Capacities

Engine Oil: Oil should meet MIL-L-2104C or API class CF or higher. See Table 1 for oil weights depending on expected ambient temperature. Oil capacity is 2.5 Liters (2.6 Quart).

Temperature and Oil Weight		
Below 0°C (32°F)	0°C (32°F) to 25°C (77°F)	Above 25°C (77°F)
SAE 10	SAE 20	SAE 30
SAE 10W-30		
SAE 15W-40		

Table 1: Ambient Temperature and Oil Weight

Engine Coolant: Coolant should be ethylene glycol type with corrosion inhibitors. It should be listed as safe for use with aluminum. Mix according to the chart below for expected minimum temperature. Use distilled water in the mixture. Tap water contains impurities that may cause corrosion. Coolant capacity is 3.8 Liters (1 gallon).

Volume		Freezing Point	
% Water	% ethylene glycol	°C	°F
70	30	-14	7
60	40	-24	-10
50	50	-37	-34
40	60	-52	-63

Table 2: Freezing Point of Ethylene Glycol and Water Solution

Diesel Fuel: It is important to use good quality, clean diesel fuel. Fuel should meet EN590 or ASTM D975. No 1 and No 2 diesel are acceptable. It is mandatory to use Ultra Low Sulfur Diesel (less than 15 ppm sulfur content) in the United States to meet EPA emissions requirements. Always use fuel to comply with emissions regulations in the area operated. Never use fuel with sulfur content greater than 1000 ppm. Minimum cetane rating is 45. Cetane rating must be greater than 50 when operated above 1500 m (5000 ft). Do not use alternative fuels because the quality is unknown.

6.6 Exhaust Muffler and Spark arrestor

The generator has a spark arrestor that is integrated with the muffler. Cleaning the spark arrestor is necessary for keeping the generator running optimally and to stay up to code by SAE Standard J335.

Acknowledge the service intervals in Section 6.7 to know when to service the spark arrestor. To “check” on the muffler/spark arrestor, examine the muffler and look for signs of gas leakage, cracks, or significant areas of damage.

When cleaning the muffler/spark arrestor, remove the plugs and vacuum or blow the spark box clean. Examine connection flanges and supporting bolts. Retighten any bolts that seem to be loose.

Twice a year (or at 1500 hours, whichever comes first). “Inspect” the exhaust in darkness, while repeatedly running through different loads. Notice if any sparks are observed to be exiting the exhaust of the generator.

The generator must not be put back into service until any issues identified have been corrected.

6.7 Preventative Maintenance Schedule

Section	Maintenance	Daily	Installation Check	50h initial inspection	every 100 hours or 3 months	every 600 hours or 1 year	every 1500 hours or 2 years	every 6000 hours or 8 years
6.1.2	**Fuel Level**	Check	Check	-	-	-	-	-
6.1.3	**Fuel Bleeding**	-	Check	-	Check	Check	Check	Check
6.1.4	**Engine Oil**	Check	Check	Replace	Replace	Replace	Replace	Replace
6.1.5	**Oil Leaks**	Check	Check	Check	Check	Check	Check	Check
6.1.6	**Starter Battery Charge**	Check	Check	Check	Check	Check	Check	Check
6.1.7	**Coolant Hoses and Fuel Hoses**	Check	Check	Check	Check	Check	Check	Replace
6.1.8	**Exhaust Leaks**	Check	Check	Check	Check	Check	Check	Check
6.1.9	**Coolant Level**	Check	Check	Check	Check	Check	Check	Check
6.1.10	**Coolant Bleeding**	-	Check	-	-	-	-	-
6.1.11	**Mounting Fasteners**	Check	Check	Check	Check	Check	Check	Check
6.1.12	**Isolation Mounts**	Check	Check	Check	Check	Check	Check	Replace
6.1.13	**Generator Sensors**	Check	Check	Check	Check	Check	Check	Check
6.1.14	**Air Filter**	Check	Check	Check	Check	Check	Replace	Replace
6.1.15	**Valve Clearance**	-	-	-	-	Check	Check	Check
6.1.16	**Electrical Cable Connections**	Check	Check	Check	Check	Check	Check	Replace
6.1.17	**Current and Voltage**	-	Check		-	Check	Check	Check
6.1.17	**Corrosion**	Check	Check	Check	Check	Check	Check	Check
6.1.19	**Foreign Debris**	Check	Check	Check	Check	Check	Check	Check
6.1.20	**Spark arrestor**	Check	Check	Check	Clean	Check	Inspect	Check
6.1.21	**Actuator Adjustment**	-	-	-	-	Check	Check	Check
6.1.22	**Hose Clamps**	-	-	-	Check	Check	Check	Check
6.1.24	**Engine Energize to Run Solenoid**	-	-	-	Check	Check	Check	Check
6.1.25	**Injector Nozzle Condition**	-	-	-	-	-	Check	Check
6.1.26	**Injection Timing**	-	-	-	-	-	Check	Check
6.1.27	**Injection Pump**	-	-	-	-	-	Check	Check

7 Troubleshooting

7.1 Troubleshooting Chart

Symptom or Message	Potential Issue	Resolution
Control panel does not power on.	No power to Generator.	Turn on battery switch. Check fuses or circuit breakers to the generator. Check 40 Amp Fuse on Generator (Item 3 in Figure 3.) Check connections on back of control panel. Green connector on back of control panel should have full battery voltage between pins 1 and 2. Ensure both communication cables are plugged into the inverter.
	Poor battery connection or Low Battery.	Check both positive and negative battery connections to generator. Check battery voltage with a multi-meter.
“Lost inverter connection”, “Not connected”, “Lost FP CAN bus connection”, “No CAN nodes detected”	Loose connection or wire.	Check connections on green plug on back of control panel. Ensure each is fully inserted. Ensure all Inverter and Engine controller connectors are securely fastened. Unplug both communication connectors at the inverter and plug them into each other. This bypasses the inverter for troubleshooting purposes.
	Failed engine controller, inverter, or Control Panel.	Replace components.

Symptom or Message	Potential Issue	Resolution
Control Panel powers on but generator engine does not crank.	Pending shutdown message displayed on panel.	Check control panel for shutdown message. Resolve issue causing message.
	Poor battery connection or low battery.	Check both positive and negative battery connections to generator. Check battery voltage with a multi-meter. Charge or replace as necessary.
	Engine locked up.	Verify by manually rotating crankshaft.
	Starter failed.	Replace starter.
	Clogged fuel filter.	Replace fuel filters.
	Failed fuel pump.	Replace fuel pump.
"Starter batt. voltage low" message displayed on control panel.	Poor battery connection or Low Battery.	Check both positive and negative battery connections to generator.
		Check battery voltage with a multi-meter. Charge or replace as necessary.
"Failed start attempt" message displayed on Control Panel. Engine starts and runs smoothly for more than 4 seconds (No RPMS are displayed on control panel).	Bad AC speed signal connection.	Check connection of AC speed signal 1 and 2 on the AC output box to the engine controller.
"Failed start attempt" message displayed on control panel. Starter turns engine over but engine does **NOT** start and run smoothly for more than 4 seconds.	Low fuel level.	Add fuel.
	Clogged fuel filter.	Replace fuel filters.
	Failed fuel pump.	Replace fuel pump.
"Unexpected engine Stop" message displayed on control panel.	Low fuel level.	Add fuel.
	Clogged fuel filter.	Replace fuel filters.
	Failed fuel pump.	Replace fuel pump.

Symptom or Message	Potential Issue	Resolution
"Cyl. h. temp. high" message displayed on control panel.	Generator overloaded.	Reduce electrical load.
	Low Engine Oil.	Fill engine oil to full mark on dipstick.
	Low coolant level.	Refill coolant with engine cold.
	Air in coolant.	Bleed coolant system.
	Low or reduced air flow	Remove blockages from cooling air intake
		Remove blockages from cooling air exhaust
		Clean Radiator fins
	Fan not running	Check for proper voltage and signal to radiator fan.
"Coil temp. high" message displayed on control panel.	Generator overloaded.	Reduce electrical load.
	Primary alternator airflow blocked.	Check for obstructions for primary alternator air intake.
"Oil pressure is low" message displayed on control panel.	Engine oil low.	Fill engine oil to full mark on dipstick.
	Oil pressure sensor not connected.	Verify oil pressure sensor is connected securely.
Engine exhaust is black and sooty	Generator overloaded	Reduce electrical load
	Clogged intake filter	Replace intake filter
	Poor quality fuel	Replace fuel with recommended fuel
	Valve clearance, low compression, injector failure, or injection pump failure	Have engine inspected and serviced.
“Heat sink temperature high” or “Inductor temp. high”	High ambient air temperature around inverter.	Increase ventilation into inverter compartment
	Blockage of inverter air inlet or outlet	Ensure inverter has the recommended installation clearance noted in Section 4.10
	Inverter fan not operating	Send inverter in for service.

7.2 Control Panel Messages

Below are the control panel messages listed in alphabetical order with a brief description.

2 static panels conflict: Two control panels are connected to the Fischer Panda CAN network, and the remote start switch is set to static.
Act. voltage out of range: Voltage to actuator and oil pressure sensor not within range.
Actuator fault: Calibration of the speed control actuator failed or has another fault.
Aux. output current is high.: A high current was detected on the auxiliary output connection of VCS.
Batt. voltage high: Starter battery voltage is greater than the programmed maximum.
Batt. voltage too low: Starter battery voltage is lower than allowed by the control system.
Battery voltage is low: Starter battery voltage is lower than the programmed minimum.
Cannot stop engine: Control system cannot stop the engine.
Check/bleed coolant system: Cylinder head temperature is greater than the programmed maximum.
Coil temp. is high: Coil temperature is greater than the programmed maximum.
Cooling down engine: Control system is allowing the engine to cool down for a preset time or until the cylinder head temperature reaches a minimum temperature.
Crank. or run sol. in SC: A short circuit was detected while the starter or run solenoid outputs were on.
Cranking engine: Starter motor is on.
DC link voltage is high: DC link voltage is higher than the programed maximum.
DC link voltage is low: DC link voltage is lower than the programed minimum.
Engine is idling: Engine is in low idle mode.
Engine speed is high: The measured engine speed is greater than the programmed maximum.
Fuel pump current high: The fuel pump current (amps) is higher than the programmed maximum.
Fuel pump current low: The fuel pump current (amps) is lower than expected.
Fuel pump is in S.C.: A short circuit was detected while the fuel pump output was on.
Gen. start by NMEA bus: Generator was started via the NMEA2000 bus.
Gen. start by panel button: Generator was started with the button on the front of the control panel.
Gen. stop by alarm condition: Generator was stopped via the control system due to an alarm condition.
Gen. stop by NMEA bus: Generator was started via the NMEA2000 bus.
Gen. stop by panel button: Generator was stopped with the button on the front of the control panel.
Generating: Inverter is outputting voltage.
Generator is stopped: Generator is not running.
Glow plugs in SC: A short circuit was detected while the glow plug outputs were on.
Halon Stop: If enabled in settings, the remote stop connection on the back of the control panel has detected open contacts.
Heat sink temperature high: The heat sink temperature is greater than the programmed maximum.
Hold coil in SC: A short circuit was detected while the hold coil output was on.
HW configuration mismatch: The control system has detected that some of the components are not compatible with the programed settings.
Idle mode: Inverter is waiting for control system to command it to generate output.
Inductor temp. high: Inductor temperature is higher than the programed maximum.
Initializing System: Control system is performing power up tests and calibrating the actuator.
Invalid program data: The programed settings are not valid.
Inverter error: Inverter has detected an error.
Inverter fan is on: The fan on the inverter is on.
Inverter temp. is high: The inverter power board temperature is greater than the programmed maximum.
Loading param.: Inverter is waiting for parameters to be loaded via the Fischer Panda CAN network.

Lost FP CAN bus connection: The control panel is no longer communicating with the IDA on the Fischer Panda CAN bus.
Lost inverter connection: Engine controller is no longer communicating with inverter.
Missing cyl.head sensor: The cylinder head temperature sensor is not connected.
Missing engine temp. sensor: Both the cylinder head and coolant in temperature sensors are not connected.
Missing gen. coil sensor: The coil temperature sensor is not connected.
Missing inductor temp. sensor: The inverter inductor temperature sensor is not connected.
Missing heat sink sensor: The inverter heat sink temperature sensor is not connected.
Missing sensor coolant in: The coolant in temperature sensor is not connected.
Oil pr. reading faulty: The oil pressure sensor reading is greater than the maximum plausible oil pressure reading.
Oil pressure is low: The oil pressure sensor reading is less than the programmed minimum.
Output current high: The main output current (amps) is greater than the programmed maximum.
Output power high: The main output power (kW) is greater than the programmed maximum.
Output voltage high: The main output voltage (volts) is greater than the programed maximum.
Output voltage low: The main output voltage (volts) is less than the programed minimum.
Panel in no-start mode: Another panel on the same Fischer Panda CAN bus is on a screen that does not allow the generator to start.
Pre-charging: Inverter is waiting for the DC link voltage to increase above the programmed minimum.
Preparing to start: Control system is preparing to start the engine by running fuel pump and starting aids.
Remote Stop Panel: If enabled in settings, the remote stop connection on the back of the control panel has detected open contacts.
Remote stop eng. cont. activated: The engine controller has detected that the remote stop switch contacts have been opened.
Restart delay: A minimum time has not elapsed since the previous generator shut down.
Start stop conflict: If static remote start is enabled, the generator has shut down, but the remote start switch is still in the run position.
Stop solenoid in SC: A short circuit was detected while the Energize to Run solenoid output was on.
Stopping engine: Control system is stopping the engine.
Supply oil pr. sensor faulty: The voltage supply to the oil pressure switch is out of range.
Tank level is low: The generator fuel tank level is low.
Tank sensor failed: The generator fuel tank sensor is not present or out of range.
Temp. cool. in. is high: The coolant in temperature is greater than the programmed maximum.
Temp. cyl. h. is high: The cylinder head temperature is greater than the programmed maximum.
Temp. exh. m. is high: The exhaust elbow temperature is greater than the programmed maximum.
Temp.inv.controller board high.: The inverter power board temperature is greater than the programmed maximum.
Unacknowledged alarm pending: Generator is stopped. An alarm is pending. The alarm must be acknowledged prior to further operation.
Unexpected engine stop: The engine controller has detected a loss of oil pressure and speed signal even though the VCS did not try to stop the engine.
Unknown msg. or al. pending: Control panel does not recognize message or error code. Write down all numbers next to “Code” lines in view more data screen and contact Fischer Panda.
VCS Powered up via CAN bus: The engine controller was powered on via the Fischer Panda CAN bus.