FischerPanda®

5.5e

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 primary alternator and the other on the outside of the capsule base.

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

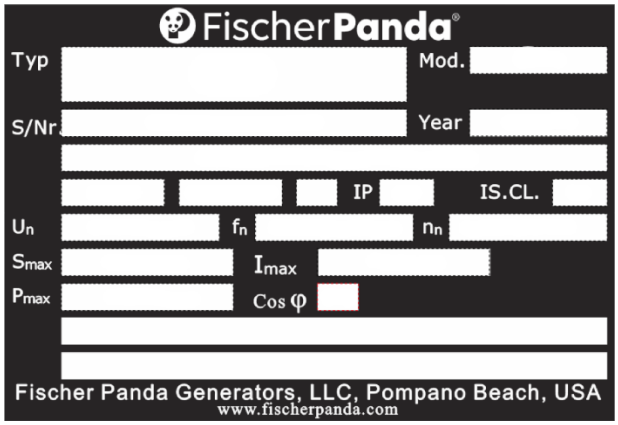


Figure 1: Serial number placard

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/marine/dealer-locator/

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

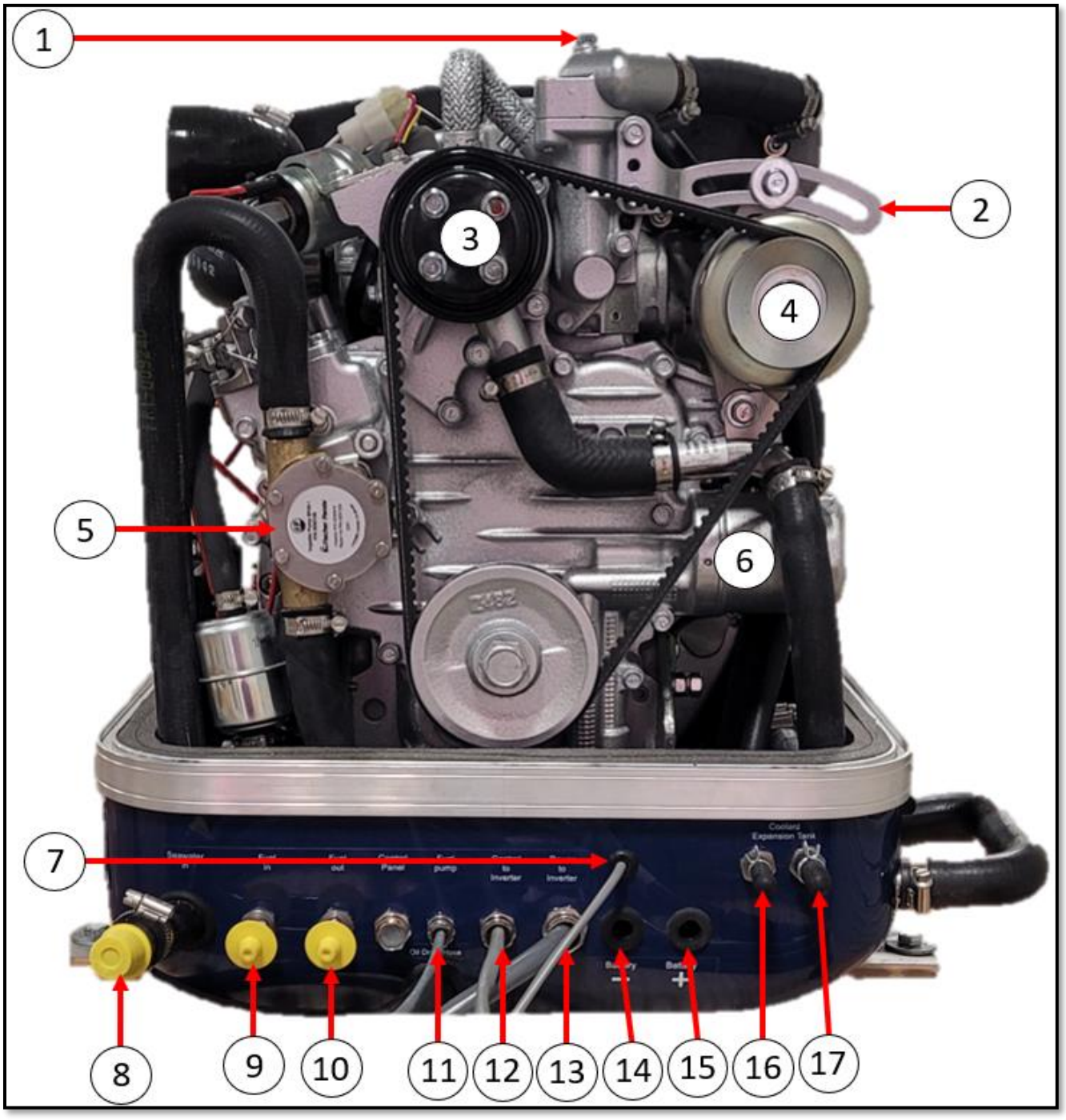


Figure 2: Front View

1.	Thermostat Coolant Bleed Screw	10.	Fuel Out
2.	Tensioner Pulley Adjustment Bracket	11.	Fuel Pump Cable
3.	Coolant Pump Pulley	12.	Control to Inverter Cable
4.	Tensioner Pulley	13.	Power to Inverter Cable
5.	Raw Water Pump	14.	Starter Battery Negative Cable
6.	Oil Filter	15.	Starter Battery Positive Cable
7.	Water Solenoid Valve (Optional)	16.	Coolant Out
8.	Raw Water	17.	Coolant In
9.	Fuel In		

1.4.2 Service Side View

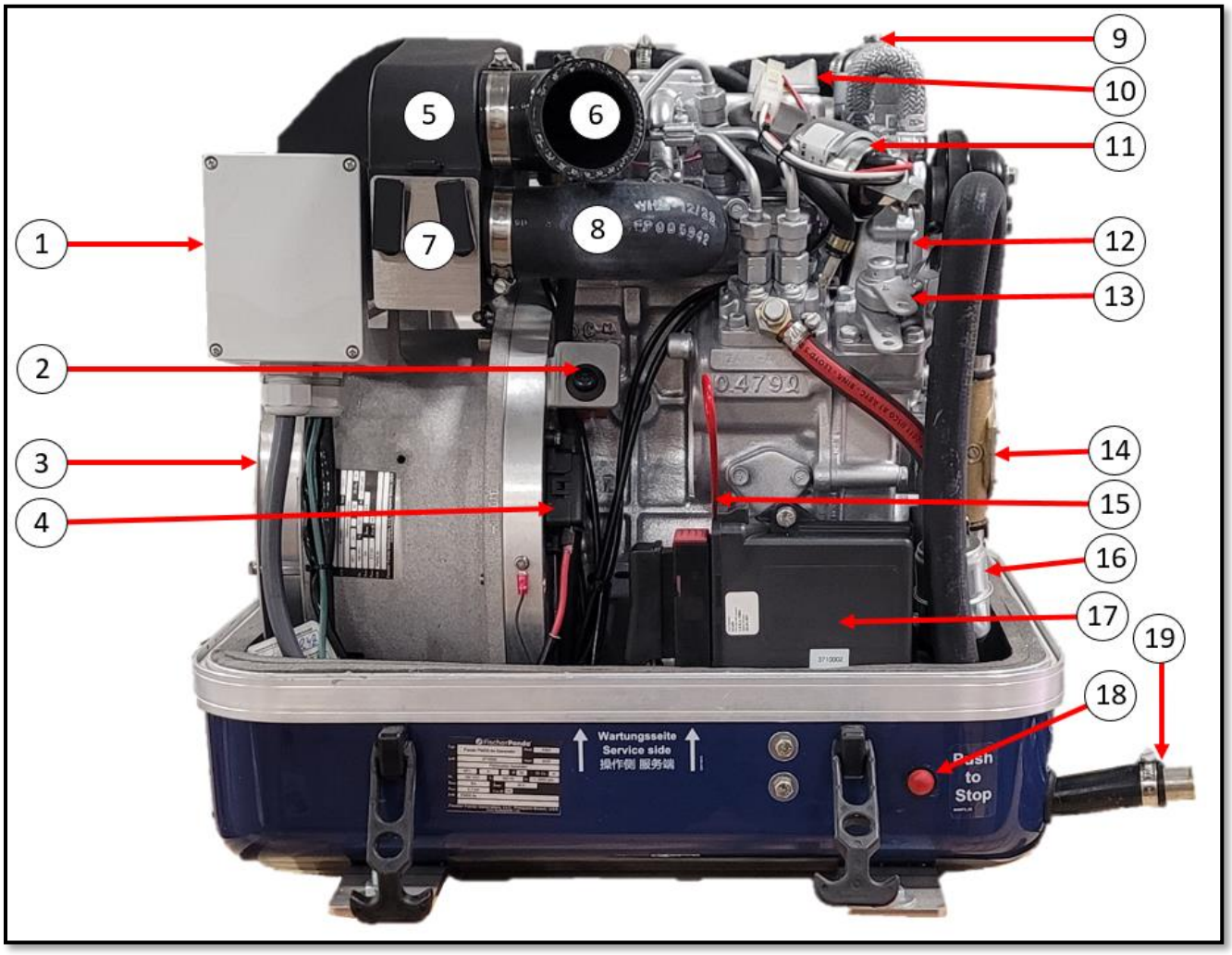


Figure 3: Service Side View

1.	Output Box	11.	Energize-to-Run Solenoid
2.	Failure Bypass Button	12.	Stop Lever
3.	Primary Alternator	13.	Speed Control Lever
4.	Strap Fuse	14.	Raw Water Intake Hose
5.	Air Intake Box	15.	Oil Dipstick
6.	Air Intake	16.	Fuel Filter
7.	Air Intake Filter Cartridge	17.	IDA208
8.	Air Intake Hose to Engine	18.	Push to Stop Button
9.	Thermostat Coolant Bleed Screw	19.	Raw Water Intake Connection
10.	Oil Fill Cap		

1.4.3 Exhaust Side View

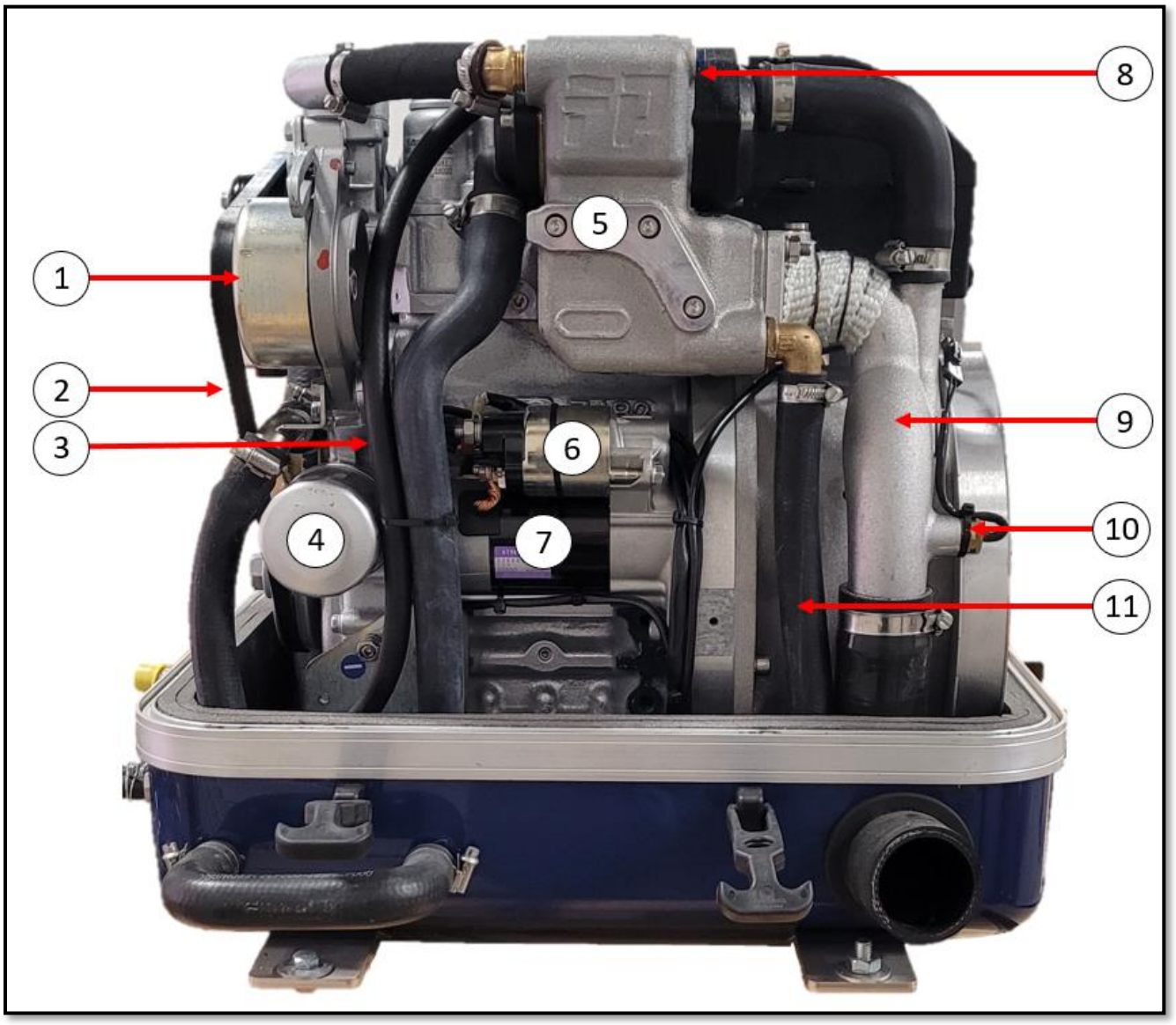


Figure 4: Exhaust Side View

1.	Tensioner Pulley	7.	Starter Motor
2.	V-Belt	8.	Exhaust Manifold Coolant Bleed Screw
3.	Oil Pressure Sensor	9.	Wet Exhaust Mixing Elbow
4.	Oil Filter	10.	Exhaust Temperature Sensor
5.	Heat Exchanger/Exhaust Manifold	11.	Coolant Return Line
6.	Starter Motor Solenoid		

1.4.4 Top View

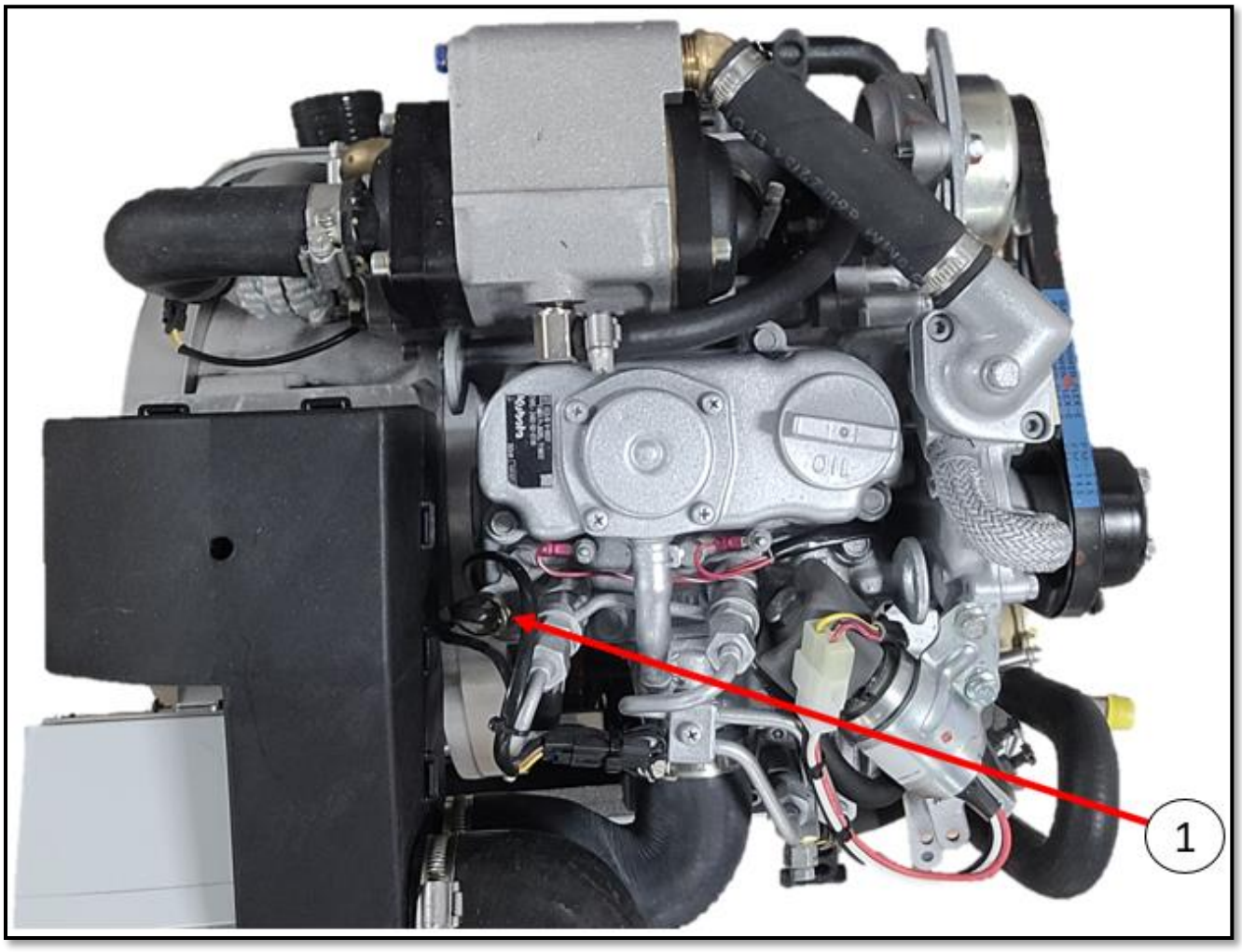


Figure 5: Top View

1	Cylinder Head Temperature Sensor

1.4.5 Inverter Connections

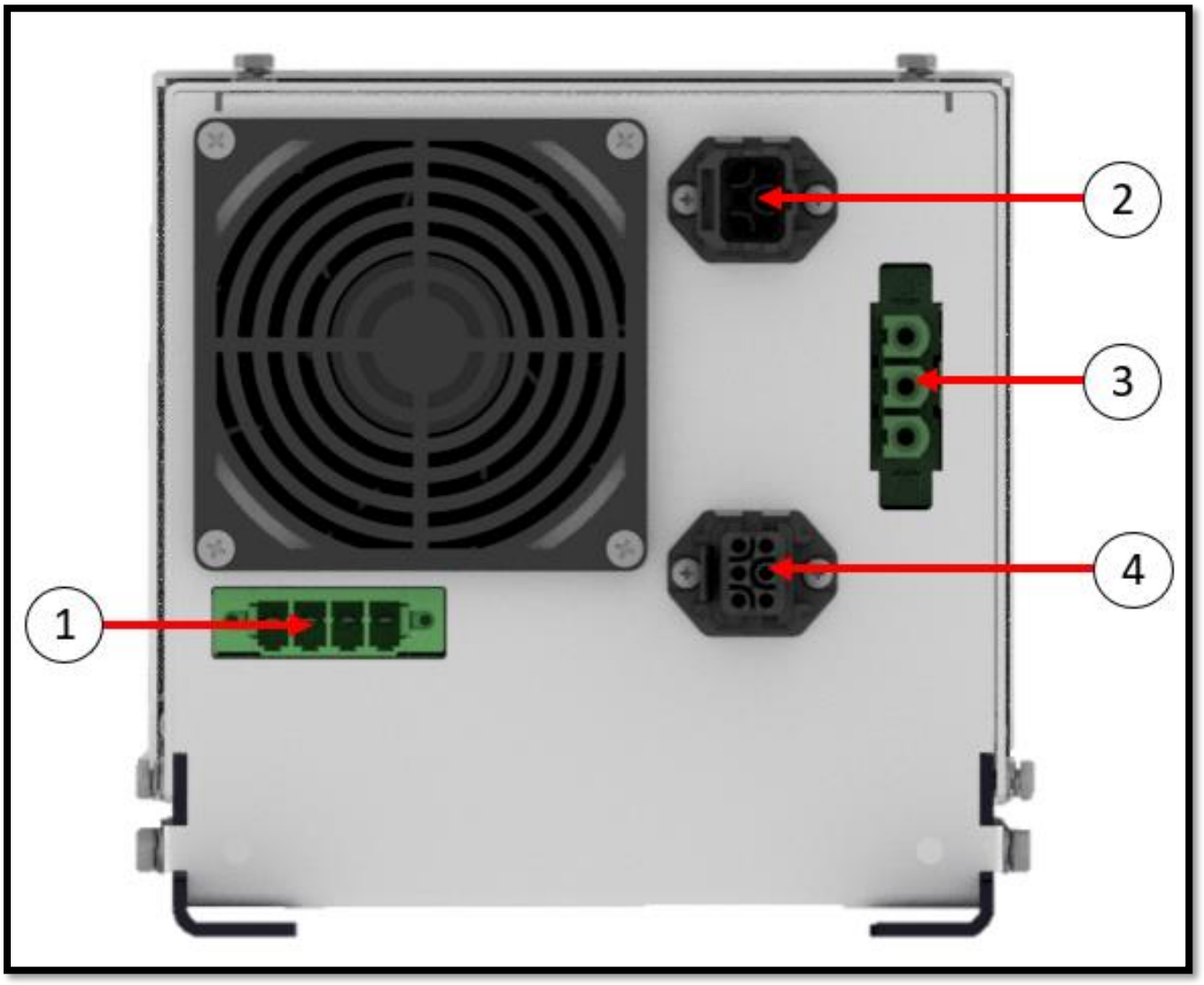


Figure 6: Inverter Connections

1	Input Connection (From Generator)
2	Communication Connection (From Generator)
3	Communication Connection (To Control Panel
4	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 ABYC (American Boat and Yacht Council) TH-22—Educational Information About Carbon Monoxide 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 generator, disconnect 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 capsule 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 if the generator is hot. The hot coolant could boil and overflow causing burns.

⚠**Caution:** Too many consecutive failed start-attempts will cause severe engine damage. Failed start attempts cause water to accumulate in the exhaust system. If enough water accumulates, it will enter the engine through the exhaust manifold. Contact an authorized Fischer Panda Service Dealer if more than 4 consecutive failed start attempts occur.

⚠**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.

⚠**Caution:** Using the generator as a step may cause damage to the generator or personal injury. When entering and exiting the compartment where the generator is located, do not use the generator as a step. No part of the generator is suitable for use as a step.

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 5, 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 if the generator is hot. The hot coolant could boil and overflow causing burns.

1. Make sure generator is shut down.
2. Remove the generator capsule top.
3. Inspect for evidence of leaks. Locations of importance are hoses, hose connections, fuel filter, and raw water pump. Check for exhaust leaks. If found, fix and clean immediately.
4. Check Engine Oil Level – Keep to the maximum level on the dipstick.
5. Check Coolant level in the expansion tank.
6. Visually inspect motor and generator mounting screws for tightness.
7. Check the sea strainer for debris. Clean as necessary.
8. Visually inspect motor and generator for signs of corrosion.
9. Reinstall the capsule top.
10. Check the fuel level.

3.2 Starting The Generator

1. Open raw water valve.
2. Press and release the On/Off button on the control panel. This turns on the engine controller and inverter. The On/Off LED will illuminate. The generator will communicate through the NMEA port.
3. Verify on the control panel that no values display "---". Press up or down arrow buttons to cycle through all three screens.
4. Press and release the Start/Stop button on the control panel. The Start/Stop LED will flash. The engine will automatically preheat for 0 to 20 seconds, depending on the temperature of the engine. The starter will engage. 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.

> ⚠**Caution:** If the generator fails to start after more than four attempts, raw water may enter the engine through the exhaust manifold. Damage to the engine due to water ingestion through the exhaust manifold is not covered under warranty.

5. If the generator fails to start, the shutdown message "Start Attempt Failed" will be displayed on the control panel. See Section 6, Troubleshooting, for more information on shutdown messages.

3.3 Running

The engine is constant speed. The engine speed will decrease as load is applied.

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

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. Also, higher temperatures reduce the efficiency of the cooling systems. The generator's rated output is reduced by 1% for every 100 meters of altitude above sea level and 2% for every 5°C of air temperature above 20°C.If operating at a higher temperature or altitude, it may be necessary to reduce the electrical load on the generator.

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 7. The message will go away as soon as the operating parameter is within the acceptable limits.

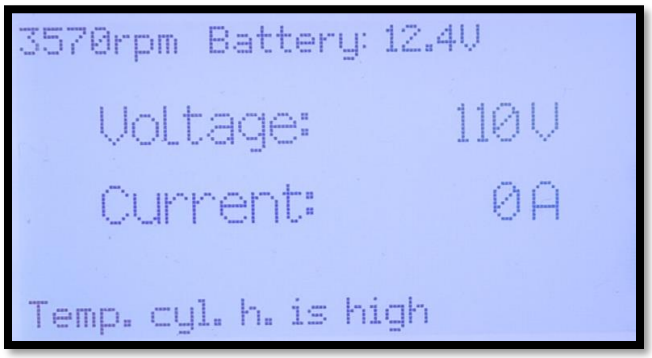


Figure 7: Warning Message: Dark text with a light background.

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 8. 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 8: 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 6, 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 capsule top.
4. Inspect for evidence of leaks. Locations of importance are hoses, hose connections, the fuel filter, and the raw water pump. Check for exhaust leaks. If an issue is found, fix and clean immediately.
5. Reinstall capsule top.

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:

- D00076 – Service Notification
- D00089 – General Datasheet
- D00094 – NMEA Interface Description
- D00097 – Programming Data Structure

3.9 Inverter

For more information on the operations of the inverter, refer to the following Manual:

- D000000

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.

4.2 Location

Install the generator in a place where common maintenance parts are accessible. Both covers of the capsule must be removable. Parts of the generator that easy access is needed to properly maintain and troubleshoot are the Oil fill, Oil Filter, Oil Dipstick, Raw Water Impeller, IDA (engine controller), AC Output Box, Fuses, and Coolant Pump Belt.

The air intake vent is located on the service side of the capsule. Guarantee that there are no blockages to the intake vent. The generator releases hot air from the bottom of the capsule. It is required to have the generator mounted with a minimum clearance of 3/8 inch below the fiberglass capsule bottom, See Figure 9.

If the generator is mounted under the seam of a deck hatch seam, cover the generator with a canvas cover.

Maximum compartment ambient air temperature is 122°F (50°C).

Ventilation is critical to prevent hazardous buildups of fuel vapors and exhaust fumes. Regulate compartment temperatures, and ensure a proper supply of combustion air. Engine temperature exhaust comes out the bottom rear of the generator, while the engine temperature intake air and engine intake air come from the vent on the service side of the generator capsule. The installation location of the generator needs to be so that there is room for air to freely move around the generator.

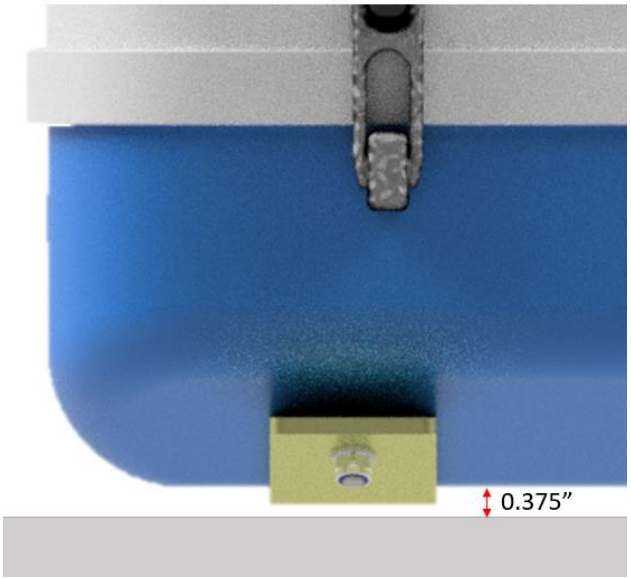


Figure 9: Generator Bottom Clearance

Avoid placing the generator next to thin walls or floors. The vibrations from the generator can be amplified by thin surfaces. If it is unavoidable, consider using sound-dampening techniques to reduce the noise.

If the generator must be mounted to a thin surface, it is recommended that ribs be attached to the bottom to provide sturdiness to the structure, such as in the Figure 10.

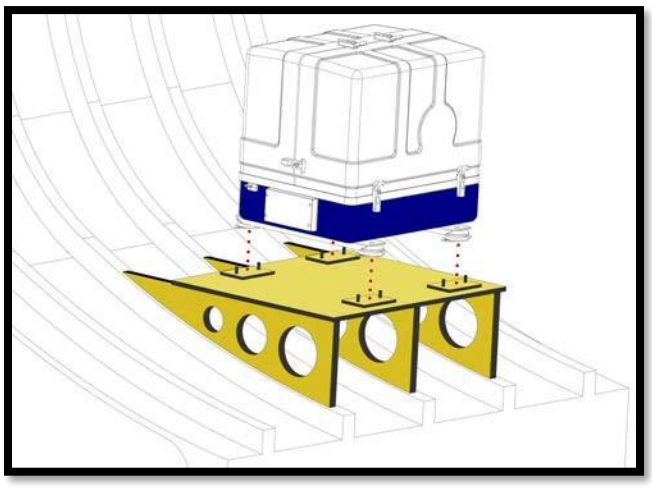


Figure 10: Noise Dampening Installation

4.3 Raw Water System

The raw water system must not have any 90° elbows or sharp bends between the thruhull and the sea (raw water) strainer.

The sea strainer needs to be mounted at or below the waterline.

There needs to be a seacock installed on the thruhull.

Verify that no positive pressure is present on the raw water connection when the generator is off and the boat is underway.

Verify there is no excessive negative pressure while underway on the raw water in connection (-10inHg gauge is the minimum accepted; 0 psig is the max. allowed relative to the waterline). The boat manufacturer is responsible for putting the boat in worst-case positive and negative pressure cases when testing the system. If pressure is too high or low, the thruhull may need to be changed or tuned for the boat. There must be no obstructions Infront of the generator thruhull that may cause turbulence while underway. The flow of water should be relatively bubble free at all speeds.

4.4 Thru Hull Fitting

All installations require a thru-hull. Figure 11 shows the two common thru-hulls used are mushroom style (left), or high-speed style (right). High speed style thru-hulls needs to be in forward facing position.

No forward-facing scoop thruhulls allowed, as they will generate a positive pressure. Any thru hull used must meet the pressure requirements mentioned in Section 4.3.

Figure 11**: Types of Thru Hulls**

4.5 Installing Siphon Break

A Siphon Break must be installed on the siphon break loop, if the engine exhaust ports are less than 600mm (24in.) above the water line. On the exhaust side of the generator, there is a loop in the raw water line. The loop needs to be cut, as shown in Figure 12 below.

Figure 12: Cutting the Siphon Break Loop

The siphon break needs to be installed on both ends of the cut tubing (or remove the tubing and install the loop on the two tubing unions coming out of the capsule), and installed on the boat where both ends are 600mm (24in.) above the waterline. Connect both ends to the siphon break. The siphon break will prevent water from siphoning into exhaust system when the generator is off. Failure to install the siphon break correctly, will cause the engine to fill with water causing engine damage**.** Figure 13 shows an installation example of a siphon break.

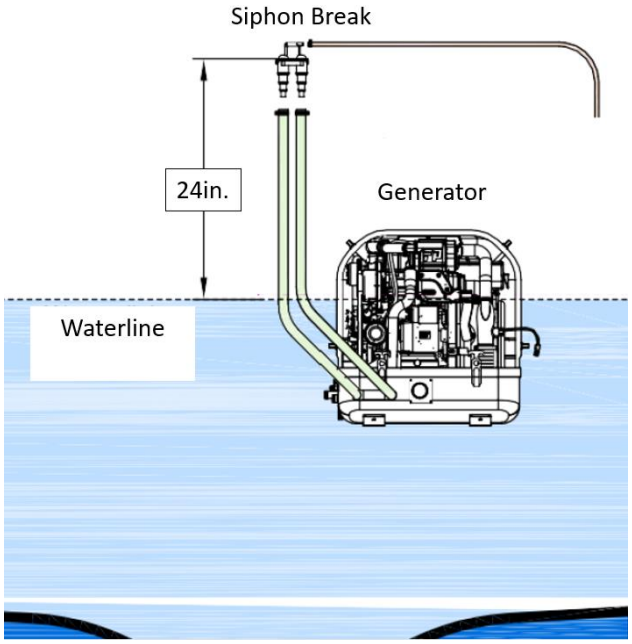


Figure 13: Siphon Break Installation

4.6 Installation of Coolant System

The generator comes with an external coolant expansion tank. The tank needs to be installed so that the lower edge of the tank is 24in. above the highest point of the generator. If that is not possible, the tank needs to be removable and be able to be lifted above the generator during the bleeding procedure. An example of the installation of the coolant tank is show in Figure 14. Failure to install the system correctly will allow air into the coolant system causing the engine to overheat. The coolant hose with the larger inner diameter connects to the bottom of the coolant expansion tank.

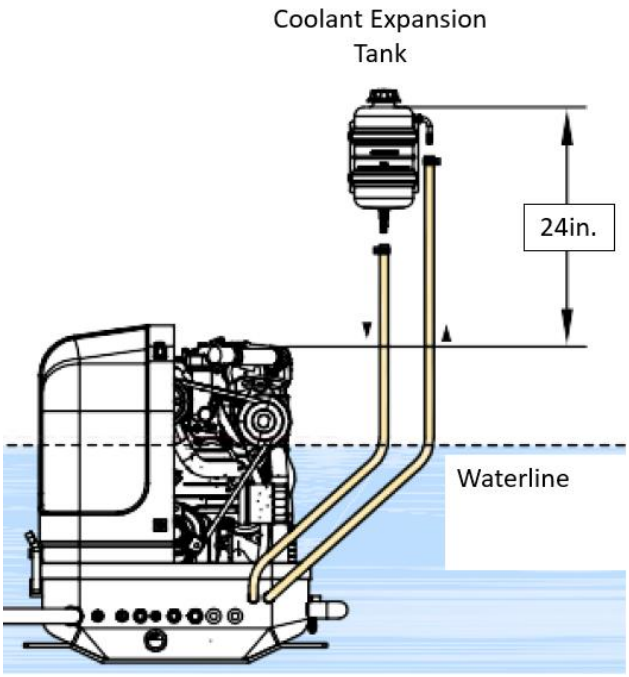


Figure 14: Coolant Expansion Tank Installation

4.7 Installation of the Exhaust System

The generator requires a designated exhaust outlet on the boat. The maximum allowable back pressure, measured at the exhaust elbow of the generator, is 37.5 inH_20. There should be no dips/raises in the wet exhaust hose. All water should drain away from the generator. The waterlift muffler has a specific flow direction, make sure to install this correctly. After the waterlift muffler, a horizontal run should be kept at a minimum before the exhaust loop.

The exhaust loop must be 24in. above the waterline. Dry or dry/wet exhaust must discharge above the waterline. An example of an exhaust system installation is in Figure 15.

If using a water separator, the thru hull should have a valve if below the waterline. Additional back pressure testing may be needed during the installation review.

A Carbon Monoxide detector must be present per ABYC A24.7 if the boat has an enclosed accommodation compartment(s).

If the boat is towed, please protected against water intrusion from the exhaust port.

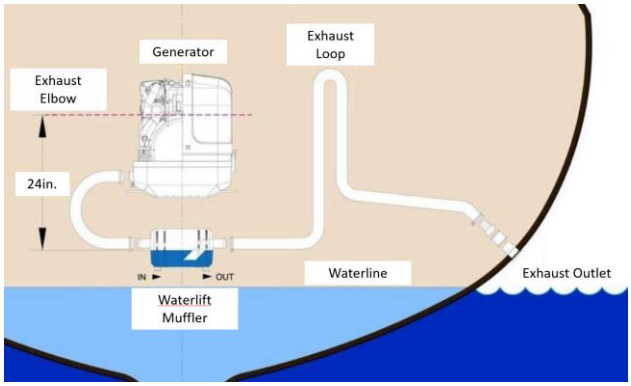


Figure 15: Exhaust System Installation

4.7.1 Installation of Waterlift Muffler

The position of the waterlift muffler is important to prevent damage to the generator.

For sailboats, the waterlift muffler shall be placed 24in. below the center of the generator, as shown in Figure 15.

For powerboats, the waterlift muffler shall be placed 6in below the generator and towards the back of the ship.

4.7.2 Waterlift Muffler Size

The size needed for the waterlift muffler is determined by the volume of the exhaust hose past the muffler, before the exhaust loop, shown in Figure 16.

To find the volume needed for the waterlift muffler, take the length of the hose from the back of the muffler to the top of the Exhaust loop, and multiply that to the area of the inner hose.

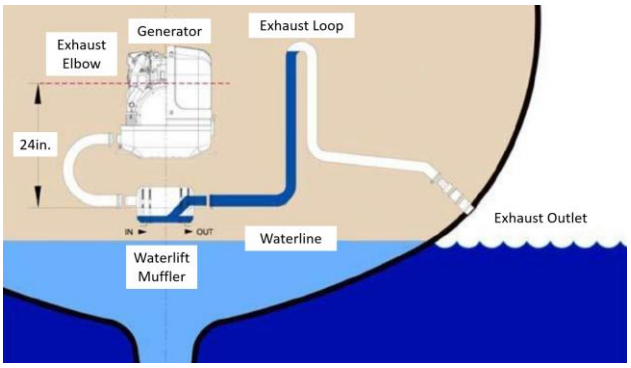
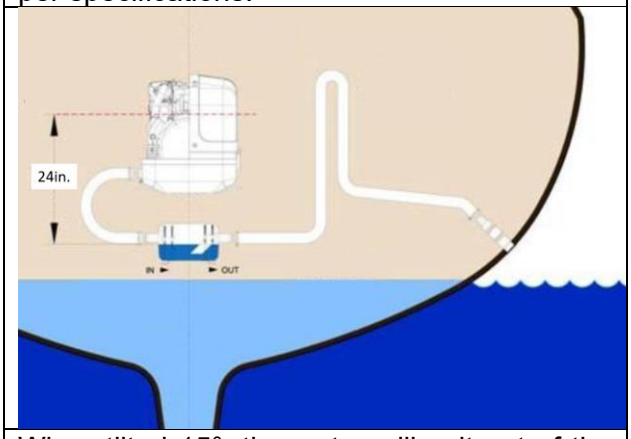


Figure 16: Waterlift Muffler Size Determination

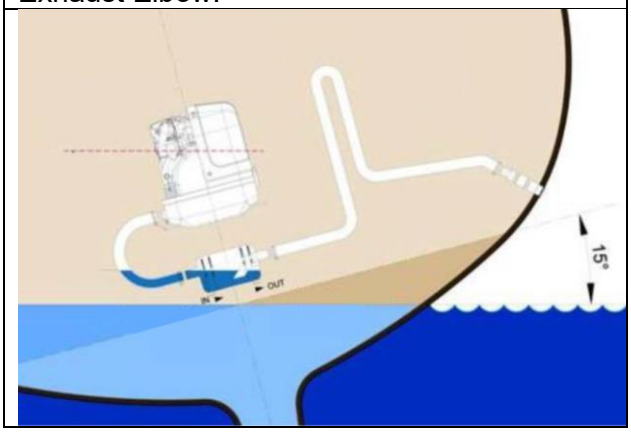
4.7.3 Waterlift Muffler Position Examples

The following diagrams will explain the benefits for the proper installation location.

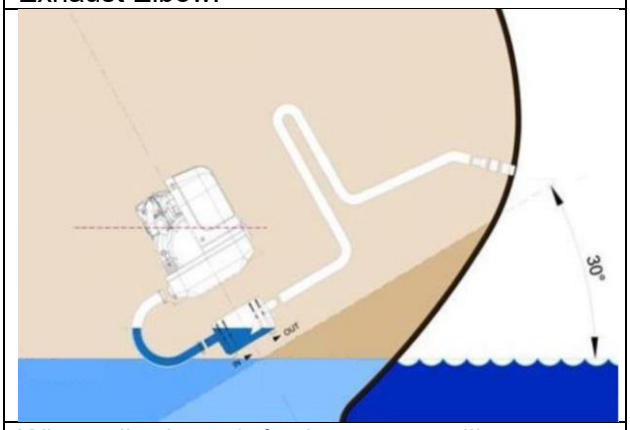
When the boat is levelflat, the water in the exhaust system will be held in the waterlift muffler, given the installation is done correctly per specifications.



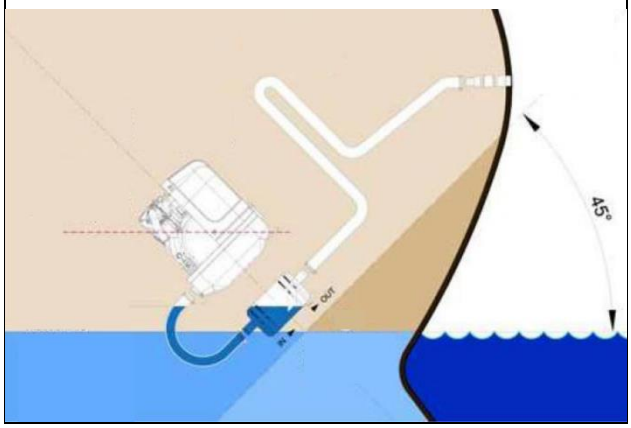
When tilted 15°, the water will exit out of the waterlift muffler and move towards the generator, but will not be near entering the Exhaust Elbow.



When tilted 30°, the water will travel closer to the generator, but still will not enter the Exhaust Elbow.



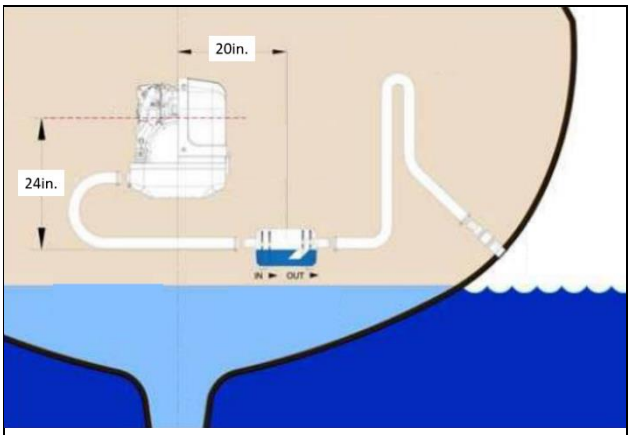
When tilted at 45°, the water will progress closer to the generator, but will not enter the exhaust elbow.



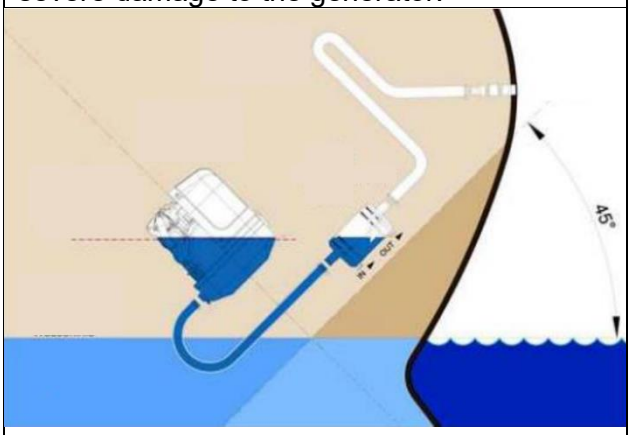
4.7.4 Examples of Off-Center Waterlift Installations

The following shows examples of waterlift muffler installations that are off-center from the generator, and show the effects from it.

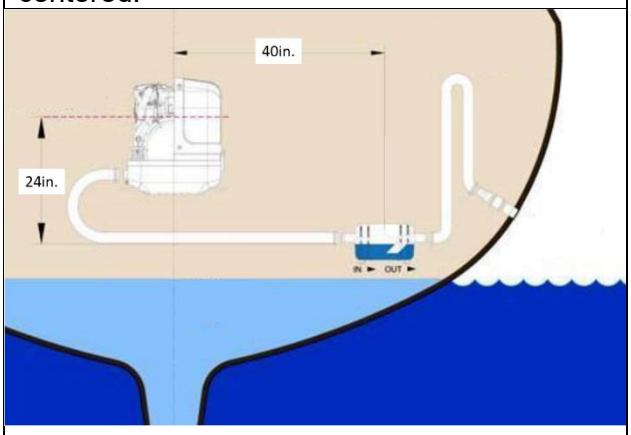
Example 1: The Waterlift Muffler is installed 24in. below the generator, but 20in. off-centered.



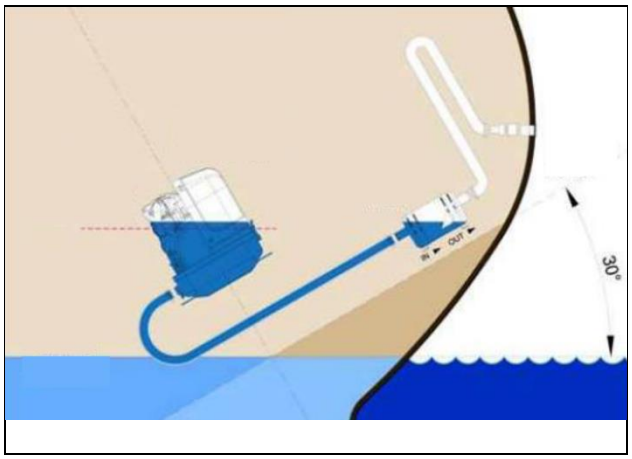
When the boat is tilted to 45°, water intrusion is inevitable. The water reaches the exhaust elbow (Critical point), potentially leading to severe damage to the generator.



Example 2: The Waterlift Muffler is installed 24in. below the generator, but 40in. off-centered.



When the boat is tilted to 30°, water intrusion also happens. The water reaches the exhaust elbow (Critical point), potentially leading to severe damage to the generator.



4.7.5 Exhaust/Water Separator

An optional exhaust/water separator can be installed in the exhaust system. The installation will be near the thru hull fitting. This will also serve as an exhaust loop in the system. Additional back pressure testing may be needed during the installation review.

4.8 Fuel System Installation

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 17.

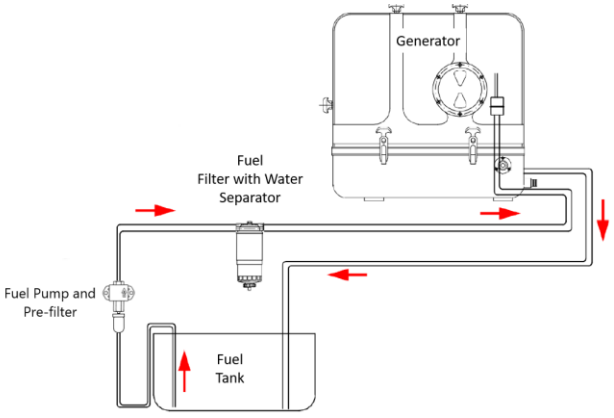


Figure 17: Fuel System Order

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 18 shows an example of a DC fuel pump with a pre- filter.

Figure 18: DC fuel Pump

4.8.1 Fuel Filter/Water Separator

A fuel filter/water separator should be installed between the fuel pump and the generator. Figure 19 shows an example of a fuel filter with water separator. The fuel filter/water separator should be rated for the maximum fuel pump pressure.

Figure 19: Fuel Filter/Water Separator

4.8.2 Fuel Tank Connections

The outlet and return fuel lines will be on separate connectors at the tank. The return line should be installed at the same height as the suction line. This will help prevent fuel returning to the tank when the generator is off.

4.9 Starter Battery Connections

The size and type of the output cables should meet local regulations such as ABYC. Cables need to be of the correct size and type to handle the current and voltage of the system.

Position the starter battery as close to the generator as possible, as this will minimize voltage drop. A battery switch must be installed on the positive wire between the battery and the generator. A fuse or circuit breaker is recommended between the battery and the battery switch. Prior to connecting the cables to the generator, ensure the battery switch is off and the battery is disconnected. All battery cables inside the capsule need to be protected with sleeving and routed to prevent chaffing. Ensure all connections are tightened securely for a reliable connection. Connect the negative cable through the “Battery -” grommet (see Figure 20) at the front of the generator and attach it to the front engine. Use a bolt or stud to secure the negative cable. This point is marked with a yellow circle in Figure 21.

Connect the positive cable through the “Battery +” grommet (Shown in Figure 20) at the front of the generator and attach it to the positive connection point on the starter motor solenoid. It needs to be protected with a boot. This point is marked with a red circle in Figure 21.

Figure 20: Starter Battery Cable Openings on Capsule

Figure 21: Starter Battery Cable Attachment Points

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. If the generator shares a battery with an outboard engine, start up the outboard and measure the voltage drop between the battery positive at the generator starter and the negative battery connection at the generator. Start the generator and measure the voltage drop between the battery positive at the generator starter and the negative battery connection at the generator.

4.10 AC Output

The diagram in Figure 22, 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 ABYC. Cables need to be of the correct size and type to handle the current and voltage of the system.

Figure 22: Inverter AC Connections

In Figure 23, 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.

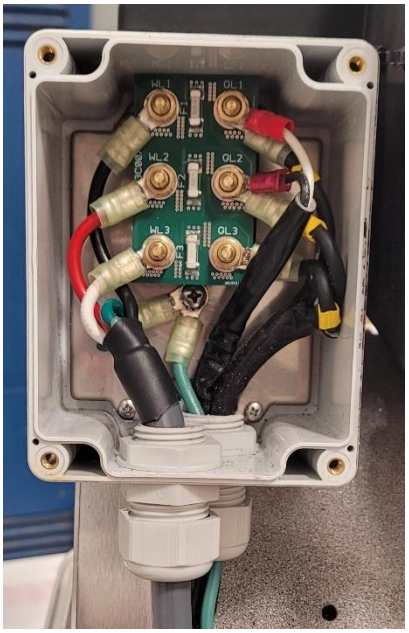


Figure 23 Fuse Board Connections

4.11 DC Connections

A diagram to demonstrate the overall layout of the DC connections of the generator is shown in Figure 24. The size and type of the output cables should meet local regulations such as ABYC. Cables need to be of the correct size and type to handle the current and voltage of the system.

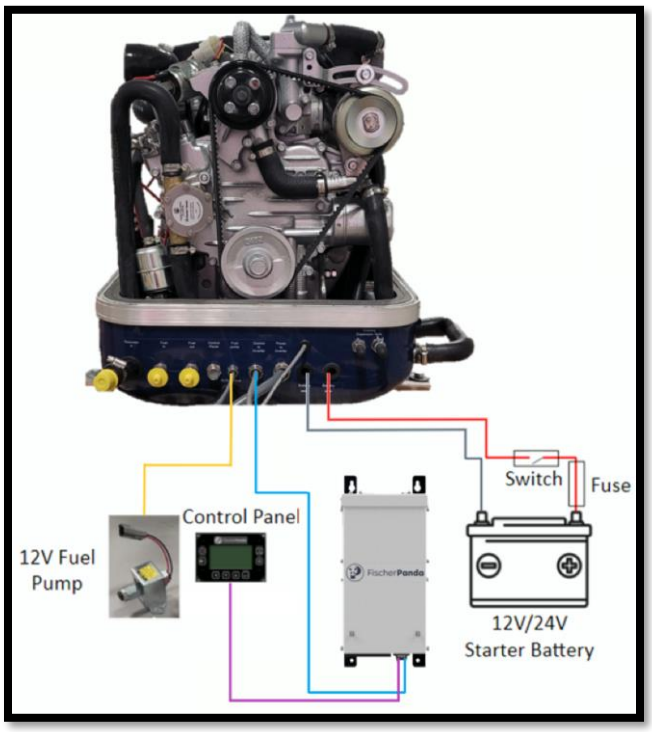


Figure 24: DC Connections

4.12 Inverter Installation

The inverter must be installed in an area of the boat that is well ventilated. The minimum flow rate is 100 CFM of fresh air. The inverter generates about 150 W of heat. The area should be at a temperature of less than 122°F (50°C). The clearance around the inverter 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 25. 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.

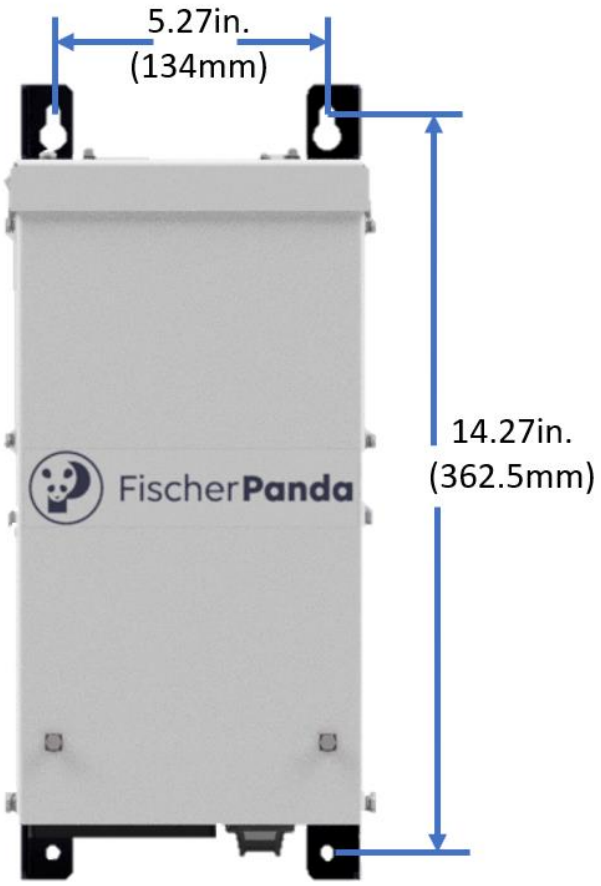


Figure 25: Inverter Hole Layout

5 Preventative Maintenance

5.1 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.

5.1.1 Capsule Top Removal

1. Ensure the generator is shut down.
2. Disconnect starter battery.
3. Open generator capsule top.

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

5.1.2 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.

> ⚠**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.

5.1.3 External Fuel Filter with Water Separator

Check for signs of water in the fuel. Most fuel filter/water separators have a small drain screw at the bottom that allows for water drainage. Dispose of water contaminated with fuel according to local regulations. If fuel is poor quality, more frequent draining and/or replacement may be necessary. Fuel system will require bleeding following water drainage, filter replacement, or if the tank runs out of fuel. See Fuel Bleeding in section 5.1.5. Make sure that there are no fuel leaks after draining or replacing the fuel filter.

> ⚠**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.

5.1.4 Internal Fuel Filter

To change the internal fuel filter, first put rags under the filter to catch any spilled fuel. Loosen hose clamps on each end of the fuel filter and remove the filter. Install a new filter in the bracket ensuring flow direction arrow points up. Reinstall hoses and hose clamps. Dispose of rags and old filter according to local regulations. More frequent replacement may be necessary if poor quality fuel is used. Fuel system will require bleeding following replacement. See fuel bleeding in this section 5.1.5. Make sure that there are no fuel leaks after replacing the fuel filter.

5.1.5 Fuel Bleeding

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

1. Replacement of any fuel system component including hoses, filters, and fittings.
2. Draining of fuel filter/water separator.
3. Running the engine out of fuel.
4. After extended periods of storage.

Fuel Bleeding Procedure:

1. Stop Generator. Turn on control panel.
2. Press the fuel primer button (left arrow in Figure 26) for 3 minutes.
3. Check for air in the fuel by opening the fuel bleeder screw (right arrow in Figure 26) at the injection pump while pressing the fuel primer button.
4. Close fuel bleeder screw.
5. If air is noted, repeat steps 2 and 3 until no air is observed.
6. Press the fuel primer for an additional 30 seconds. Verify no leaks are present.
7. Turn off the control panel.

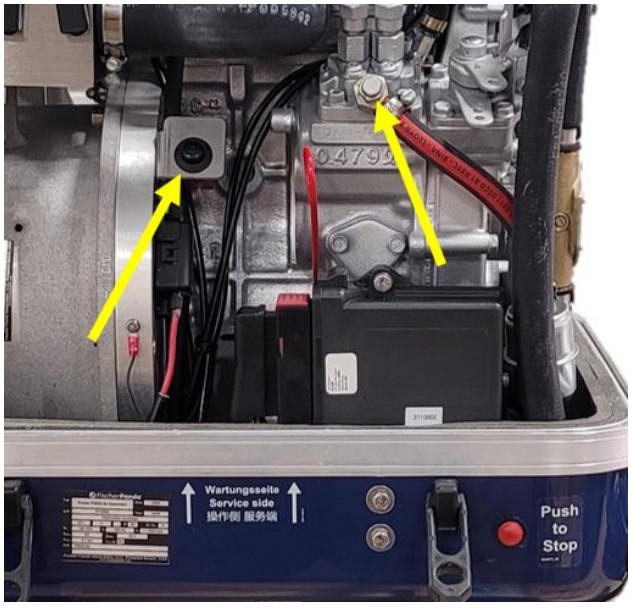


Figure 26: Failure bypass switch.

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. Shut off the raw water valve prior to cranking the engine. 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.

5.1.6 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. Engine must be level side to side and front to back. Remove the dipstick and wipe clean. Fully insert the dipstick, wait at least 2 seconds, then remove. Immediately position the dipstick horizontally to prevent a miss-reading. Engine oil should be maintained at or near the maximum mark on the dipstick, see Figure 27, to ensure adequate lubrication if the boat is heeling or trimming. Do not overfill or underfill the engine oil as engine damage may occur.

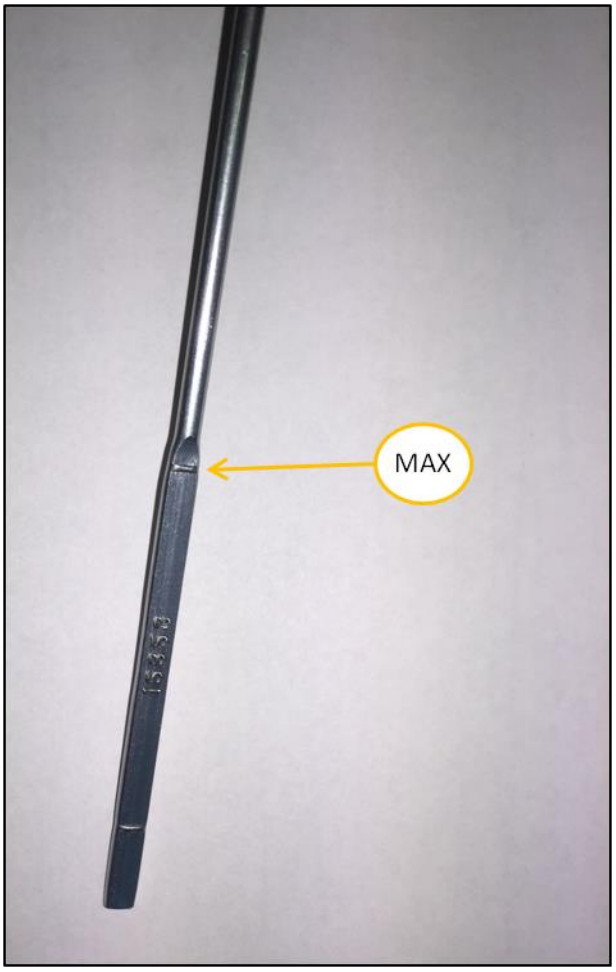


Figure 27: Engine Oil Dip Stick

Adding: Add engine oil through the oil fill port on the valve cover, see Figure 28. Engine oil should be maintained at or near the maximum mark on the dip stick (See Section 5.1.6 Engine Oil). Clean up any spilled oil immediately. Do not overfill or underfill the engine oil as engine damage may occur.

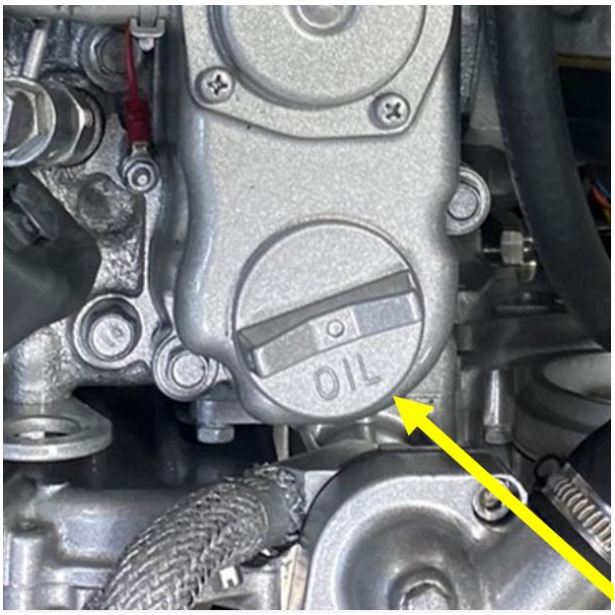


Figure 28: Oil filler cap

> ⚠**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 28, 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 completely drained, replace oil drain hose cap. Refill the engine oil to the maximum mark on the dipstick. Do not overfill or underfill the engine oil, as engine damage may occur. 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.

5.1.7 Engine Oil Filter

Replace engine oil filter, see in Figure 29, according to the preventative maintenance schedule. Place oil absorbent pads under oil filter to catch remaining oil from oil filter. Ensure area around the filter is free of dirt and debris. Remove used filter. On new filter, place a light coating of new oil on top of the seal. Screw on the filter until the seal contacts the surface. Continue tightening by hand an additional 3/5 of a turn. Dispose of used engine oil and filter according to local regulations.

Figure 29: Oil filter

5.1.8 Engine Oil Leaks

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

5.1.9 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.

5.1.10 Coolant Hoses, Raw Water Hoses, Fuel Hoses, Exhaust Hoses, And Siphon Break.

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. If the siphon break is leaking, replace it as well.

5.1.11 Exhaust Leaks

Check for exhaust leaks by looking for black soot buildup near potential leak points. Inspect the exhaust manifold, exhaust elbow, capsule exhaust outlet, muffler, exhaust water separator (if installed), and exhaust thru-hull fitting 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 ABYC **TH-22—Educational Information About Carbon Monoxide**.

5.1.12 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 30). When refilling, always use the correct coolant mixture for the expected temperature (refer to Section 5.5 for specifications).

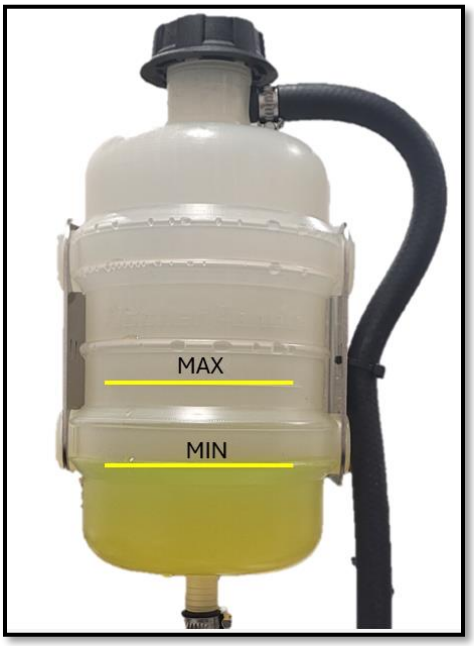


Figure 30: Coolant Expansion Tank

> **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 when the generator is hot, as boiling coolant may overflow and cause burns.

5.1.13 Coolant Bleeding

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

1. Ensure the engine is cool.
2. Remove the coolant expansion tank cap and lower the tank below the thermostat housing.
3. Open the bleed points (see Figure 31). Gravity will push coolant from the engine into the tank.
4. Raise the coolant expansion tank above the thermostat housing, allowing gravity to push coolant back into the engine. Do not let the tank empty.
5. Observe the bleed points. The thermostat bleed point will clear first, followed by the heat exchanger bleed point. Close the bleed points once only coolant (no air bubbles) is flowing.
6. Secure the expansion tank cap.
7. Run the generator for one minute.
8. Repeat the bleeding process two more times to ensure all air is removed.

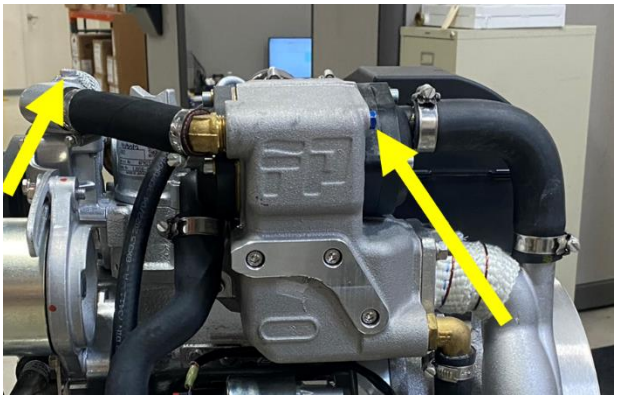


Figure 31: Coolant bleed screws

5.1.14 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, stop solenoid, starter, generator-to-capsule interface, capsule-to-boat interface, engine-to-mounting bracket interface, and engine-to-primary alternator interface.

5.1.15 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 capsule, and the capsule usually has four more connecting it to the boat.

5.1.16 Engine Sensors

All engine sensors should display values. 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 exhaust elbow or cylinder head temperature sensor is missing.

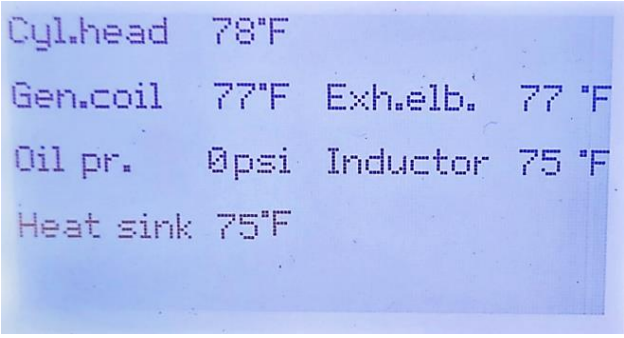


Figure 32: Control Panel Temperature Page

> ⚠**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.

5.1.17 Raw Water Impeller

To inspect and maintain the raw water impeller:

1. Close the raw water seacock to stop the water flow.
2. Remove the cover and inspect the impeller for cracks, chips, wear, or missing vanes.
3. Replace the impeller if it is removed or has damaged vanes.
4. Locate and remove any missing vanes in the raw water system to prevent blockages that could cause overheating. These vanes could be anywhere from the raw water strainer to the heat exchanger, including hoses, fittings, siphon break, and heat exchanger end cap.
5. Replace the raw water pump shaft seal whenever the impeller is replaced.
6. Use the lubricant that comes with the new impeller during installation to prevent damage.
7. Reinstall the impeller into the pump and place the cover back on with a new gasket.

Note: If operating in abrasive environments like coral or sand, impellers may wear out faster, so they should be replaced more frequently.

5.1.18 Raw Water Pump Maintenance

To maintain the raw water pump:

1. Inspect the raw water pump housing for signs of leakage, see Figure 33, and wear after removing the impeller.
2. If excessive wear or leakage is found, replace the entire raw water pump.
3. Perform daily checks before starting the generator to check for signs of corrosion, moisture, or salt crystallization. Failure to do this can cause raw water to leak into the capsule, potentially damaging the generator coils, engine, and electrical wiring. If water is found inside the capsule, dry it up immediately.

Follow these steps for ongoing maintenance:

- Replace the raw water impeller according to the intervals outlined in Section 5.6.

- Replace the water pump shaft seal whenever the impeller is replaced.
- Inspect raw water pump screws for corrosion. Replace them if any corrosion is found.
- Clean any corrosion on the outside of the raw water pump.

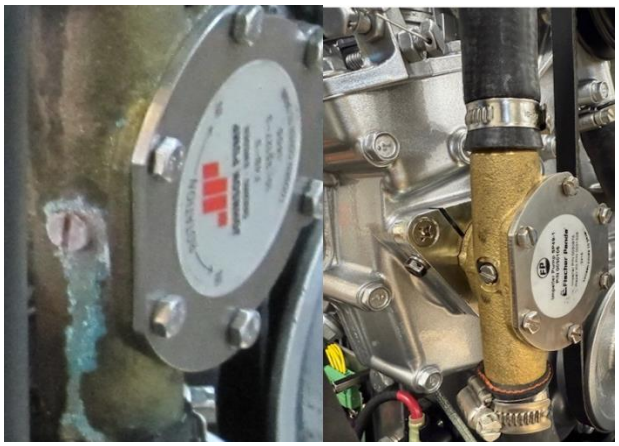


Figure 33: Leaking raw water pump (left), Good raw water pump (right)

5.1.19 Raw Water Flow

To measure the raw water flow, position a bucket or similar container to catch the water coming from the generator exhaust outlet. Measure the flow for one minute. The raw water flow should be between 16 to 28 liters per minute (4.2 to 7.4 gallons per minute). This ensures proper cooling and efficient operation of the system.

5.1.20 Air Filter

To replace the air filter, ensure the generator is off first. Then, remove the service side of the top capsule. Locate the Air Intake Box at the rear of the generator (as shown in Section 1.4.2). Flip the release tabs on the Air Intake Filter Cartridge to release it. Once the tabs are flipped outward, the cartridge can be pulled out. The filter inside the cartridge is a fiber element. Replace the filter as per the maintenance schedule (see Section 5.6) or if it appears dirty. If the generator operates in dusty or dirty environments, the filter may need to be replaced more frequently.

5.1.21 Coolant Pump Belt

To maintain the coolant pump belt, inspect it for any signs of cracks or fraying. If the belt shows any damage, replace it. Next, check the fan belt tension between the tensioner pulley and the crankshaft pulley. Apply moderate thumb pressure to check the tension. The belt should move 7 to 9 mm (0.28 to 0.35 inches) when 10kgf (22 lbs.) of pressure is applied perpendicular to the axis of the belt. If the tension is incorrect, adjust the tensioner pulley until the proper tension is achieved.

5.1.22 Valve Clearance

See Kubota Workshop Manual.

5.1.23 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 saltwater 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.

5.1.24 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 boat. 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 boat. 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%

5.1.25 Corrosion

Open capsule 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:

5. Leak inside of the capsule
6. External leak on top of the capsule
7. High bilge water

5.1.26 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 capsule.

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

5.1.27 Actuator Adjustment (If equipped)

Verify that actuator cycles between the 4 o'clock position to the 8 o'clock position when the panel is turned on, shown in Figure 34. 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.

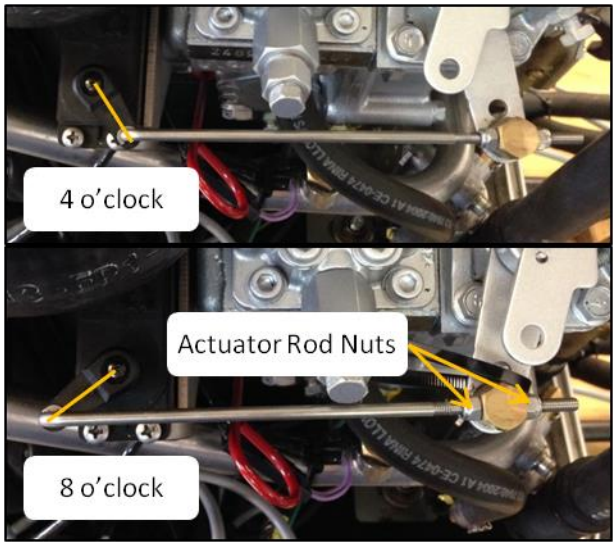


Figure 34: Actuator Adjustment

5.1.28 Hose Clamps.

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

5.1.29 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.

5.1.30 Injector Nozzle Condition

See Kubota Workshop Manual

5.1.31 Injection Timing

See Kubota Workshop Manual

5.1.32 Injection Pump

See Kubota Workshop Manual

5.1.33 Inverter Parts

There are no serviceable parts contained in the inverter.

5.2 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.

5.3 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. Run generator for 15 minutes with fresh water flowing through the raw water system.
4. Allow the engine to run an additional 5 minutes with non-toxic anti-freeze circulating in the raw water system. Even if below freezing temperatures are not expected, it contains corrosion protectants. Observe local regulations for the disposal of antifreeze.
5. Remove impeller to completely drain water. It is recommended to always replace with a new impeller. If it is necessary to reuse, cover the impeller with petroleum jelly and store in a sealed plastic bag.
6. Change engine oil and filter.
7. Change fuel filters.
8. Charge batteries and disconnect.
9. Fill diesel tank to prevent condensation.
10. Close all generator seacocks.
11. Apply low tact duct tape to generator intake hose and exhaust outlet to prevent rodents or other animals from entering the generator capsule. Apply tape to any capsule or inverter air intakes or openings.
12. Drain raw water system if below freezing temperatures are expected. Disconnect siphon break lines at capsule. Disconnect exhaust at low points to allow water to drain. Drain muffler or other low points in the exhaust system.
13. Clean and dry any moisture in capsule. Paint any exposed metal to prevent corrosion. Fix any corrosion noticed.
14. If possible, store the boat in a humidity-controlled environment. Too high of humidity causes mold, bacteria, and rotting. Too low of humidity causes rubber parts to dry out.
15. Remove injectors and spray fogging oil in each combustion chamber. Turn the engine by hand for a couple revolutions. Reinstall injectors.

5.4 Recommissioning

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

1. Reconnect raw water hoses.
2. Remove tape on air intakes and exhaust.
3. Charge batteries and reconnect.
4. Install raw water impeller.
5. Perform any scheduled preventative maintenance not performed before long-term storage.
6. Turn the engine over by hand for a couple revolutions.
7. Perform Pre-operational Checks. Section 3.1
8. Start engine.
9. Check for exhaust, fuel, and water leaks.

5.5 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.

5.6 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
5.1.2	**Fuel Level**	Check	Check	-	-	-	-	-
5.1.3	**External Fuel Filter/Water Separator**	Check/Drain	Check	Replace	Replace	Replace	Replace	Replace
5.1.4	**Internal Fuel Filter**	Check	-	Check	Replace	Replace	Replace	Replace
5.1.5	**Fuel Bleeding**	-	Check	-	Check	Check	Check	Check
5.1.6	**Engine Oil**	Check	Check	Replace	Replace	Replace	Replace	Replace
5.1.7	**Oil Filter**	-	-	Replace	Replace	Replace	Replace	Replace
5.1.8	**Oil Leaks**	Check	Check	Check	Check	Check	Check	Check
5.1.9	**Starter Battery Charge**	Check	Check	Check	Check	Check	Check	Check
5.1.10	**Coolant Hoses, Raw Water Hoses, Fuel Hoses, Exhaust Hoses, and Siphon Break**	Check	Check	Check	Check	Check	Check	Replace
5.1.11	**Exhaust Leaks**	Check	Check	Check	Check	Check	Check	Check
5.1.12	**Coolant Level**	Check	Check	Check	Check	Check	Check	Check
5.1.13	**Coolant Bleeding**	-	Check	-	-	-	-	-
5.1.14	**Mounting Fasteners**	Check	Check	Check	Check	Check	Check	Check
5.1.15	**Isolation Mounts**	Check	Check	Check	Check	Check	Check	Replace
5.1.16	**Generator Sensors**	Check	Check	Check	Check	Check	Check	Check
5.1.17	**Raw Water Impeller**	-	-	Check	Check	Replace	Replace	Replace
5.1.18	**Raw Water Pump**	-	-	-	Check	Check	Check	Replace
5.1.19	**Raw Water Flow**	-	Check	-	-	-	-	-
5.1.19	**Air Filter**	Check	Check	Check	Replace	Replace	Replace	Replace
5.1.21	**Coolant Pump Belt**	Check	Check	Check	Replace	Replace	Replace	Replace
5.1.22	**Valve Clearance**	-	-	-	-	Check	Check	Check
5.1.23	**Electrical Cable Connections**	Check	Check	Check	Check	Check	Check	Replace
5.1.24	**Current and Voltage**	-	Check		-	Check	Check	Check
5.1.24	**Corrosion**	Check	Check	Check	Check	Check	Check	Check
5.1.26	**Foreign Debris**	Check	Check	Check	Check	Check	Check	Check

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
5.1.27	**Actuator Adjustment**	-	-	-	-	Check	Check	Check
5.1.28	**Hose Clamps**	-	-	-	Check	Check	Check	Check
5.1.29	**Engine Stop Solenoid**	-	-	-	Check	Check	Check	Check
5.1.30	**Injector Nozzle Condition**	-	-	-	-	-	Check	Check
5.1.31	**Injection Timing**	-	-	-	-	-	Check	Check
5.1.32	**Injection Pump**	-	-	-	-	-	Check	Check

6 Troubleshooting

6.1 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 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.
	Failed engine controller, inverter, or Control Panel.	Replace components.
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.

Symptom or Message	Potential Issue	Resolution
"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 diode block and CT board.
"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. Limit number of start attempts because of the potential for water ingestion into the engine.	Low fuel level. Clogged fuel filter. Failed fuel pump.	Add fuel. Replace fuel filters. Replace fuel pump.
"Unexpected engine Stop" message displayed on control panel.	Low fuel level. Clogged fuel filter. Failed fuel pump.	Add fuel. Replace fuel filters. Replace fuel pump.
"Exh. m. temp. high" message displayed on control panel.	No or restricted raw (sea) water flow.	Open sea water valve. Clean obstructions in sea water strainer. Check for water flow in exhaust. Replace sea water impeller.

Symptom or Message	Potential Issue	Resolution
"Cyl. h. temp. high", or "Temp. diode HS is high" message displayed on control panel.	Generator overloaded.	Reduce electrical load.
	No or restricted raw (sea) water flow.	Open sea water valve.
		Clean obstructions in sea water strainer.
		Check for water flow in exhaust.
		Replace sea water impeller.
	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.
"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.

6.2 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 FIRE SYSTEM: If enabled in settings, the remote stop connection on the back of the control panel has detected open contacts.
Check/bleed coolant system: Cylinder head temperature is greater than the programmed maximum.
CHK FIRE SYS: If enabled in settings, the remote stop connection on the back of the control panel has detected open contacts.
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.
Fire Suppression: If enabled in settings, the remote stop connection on the back of the control panel has detected open contacts.
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 dyn. rem.in.: Generator was started with a remote contact to the back of the control panel.
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. start by static rem.in.: Generator was started with a remote contact to the back of the control panel.
Gen. stop by alarm condition: Generator was stopped via the control system due to an alarm condition.
Gen. stop by dyn. rem.in.: Generator was stopped with a remote contact to the back of the control panel.
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.
Gen. stop by static rem.in.: Generator was stopped with a contact to the back 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 VCS and CT board on the Fischer Panda CAN bus.
Lost inverter connection: Engine controller is no longer communicating with inverter.
Max. No. of failed starts: The maximum number of start attempts has been exceeded.

> ⚠**Caution:** Too many consecutive failed start attempts will cause severe engine damage. Failed start attempts cause water to accumulate in the exhaust system. If enough water accumulates, it will enter the engine through the exhaust manifold. Contact an authorized Fischer Panda Service Dealer if more than 3 consecutive failed start attempts occur.

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 exhaust elbow sensor: The exhaust elbow temperature sensor is 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.
R.W. valve output SC: A short circuit was detected while the raw water output was on.

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.
Sea water valve active: Raw water valve output is on.
Start attempt failed: The VCS attempted to start the engine, but no speed signal was detected.

> ⚠**Caution:** Too many consecutive failed start-attempts will cause severe engine damage. Failed start attempts cause water to accumulate in the exhaust system. If enough water accumulates, it will enter the engine through the exhaust manifold. Contact an authorized Fischer Panda Service Dealer if more than 3 consecutive failed start attempts occur.

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 stop 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.
Water leak sensor trigger: The water leak sensor has detected water in the capsule