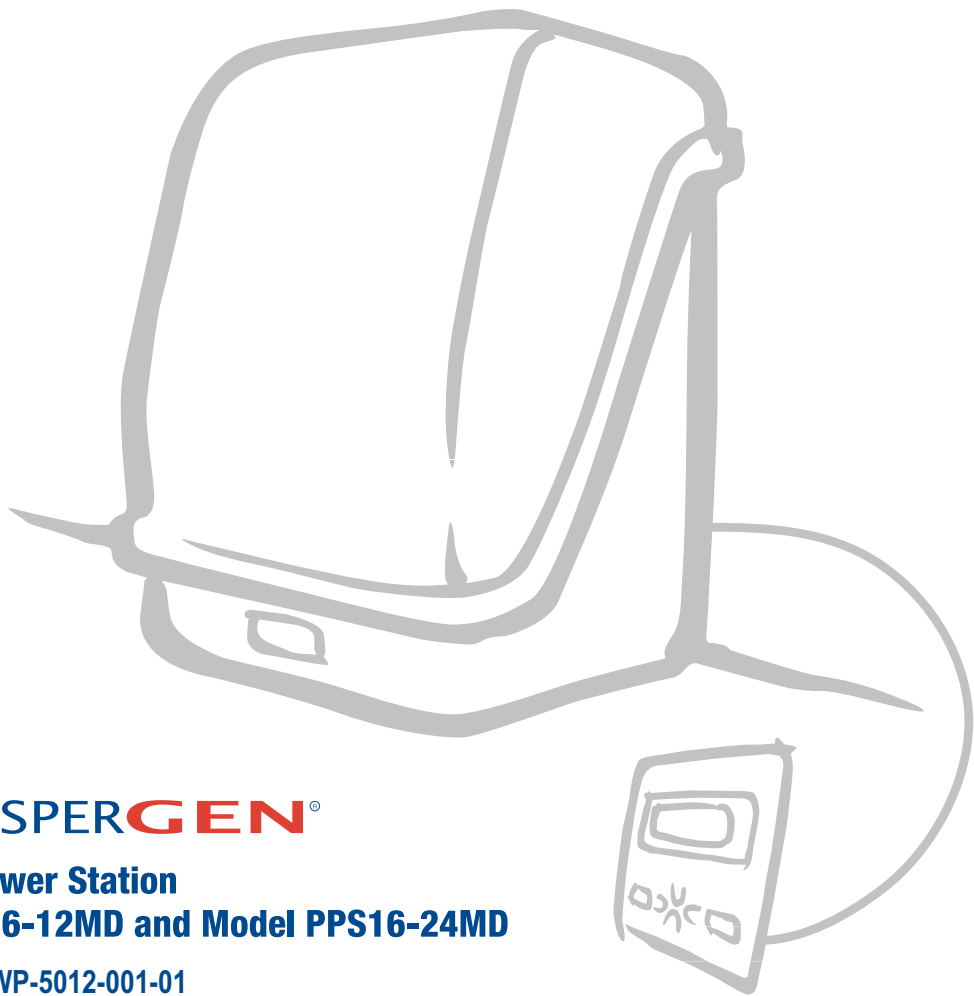




user's manual



 **WHISPERGEN[®]**

**Personal Power Station
Model PPS16-12MD and Model PPS16-24MD**

Part Number: WP-5012-001-01

Whisper Tech reserves the right to revise or change product specifications at any time. This publication describes the state of this product at the time of its publication and may not reflect the product at all times in the future.

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Title User's Manual - Models PPS16-12MD, PPS16-24MD

Part No. WP-5012-001-01

Application WhisperGen PPS16-12MD

- Diesel fired
- 12 V DC output
- Marine

WhisperGen PPS16-24MD

- Diesel fired
- 24 V DC output
- Marine

WhisperGen is designed and manufactured by

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www.whispergen.com

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Printed in New Zealand

Conditions of use

Read this manual completely before installing or operating the WhisperGen™.

The WhisperGen™ must be commissioned only by an authorised WhisperGen™ representative. Whisper Tech accepts no liability for personal injury or property damage resulting from incorrect or unauthorised installation, commissioning and servicing of the WhisperGen™. Unapproved installations may be dangerous, result in poor performance and void any WhisperGen™ warranty.

Along with any warnings, instructions and procedures in this manual, the user should also observe any such other common sense procedures generally applicable to equipment of this type.

Failure by the user to comply with any warnings, instructions, procedures, or any such other common sense procedures may result in injury, equipment damage, property damage or poor performance of the WhisperGen™. The major hazards involved with operating the WhisperGen™ include explosion, fire, carbon monoxide fumes and electrical shock. These hazards can be avoided if the user adheres to the procedures in this manual and exercises all due care.

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Whisper Tech reserves the right to change the specifications of its products, or the information in this manual, without necessarily notifying its users.

Variations in installation and operating conditions may affect the WhisperGen™'s performance. Whisper Tech has no control over each installation's unique operating environment. Hence, Whisper Tech makes no representations or warranties concerning the performance of the WhisperGen™ under the actual operating conditions prevailing at the installation. All operating parameters for each application should be validated by a technical expert of the user's choosing.

Whisper Tech has made every effort to explain all installation, commissioning, operating, maintenance, troubleshooting procedures, warnings and safety precautions as clearly and completely as possible. However, due to the range of operating environments it is not possible to anticipate every issue that may arise. Therefore, Whisper Tech is not able to guarantee that this manual will address every issue that may arise. This manual is intended to provide general guidance. For specific guidance and technical support, contact your authorised WhisperGen™ supplier.

Information in this manual shall not be deemed a warranty, representation or guarantee. For warranty provisions applicable to your WhisperGen™, please refer to the warranty provided by the supplier of your WhisperGen™.

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Every effort has been made to ensure the accuracy of this document, however it may contain technical inaccuracies or typographical errors. Whisper Tech assumes no responsibility for and disclaims all liability of such inaccuracies, errors, or omissions in this publication.

Use of the WhisperGen™ shall constitute your acceptance of the conditions above

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Symbols in this manual

Symbols are used in this manual to highlight information that is critical to the safety of people and equipment, and to the safe and correct operation of the WhisperGen™.

⚠ DANGER An extreme hazard which may result in death or injury if proper precautions are not taken.

⚠ WARNING A reminder of safety practices or unsafe practices which could result in personal injury or damage to associated equipment.

⚠ CAUTION A reminder of safety practices or unsafe practices which could result in damage to the WhisperGen™ and/or void the warranty.

⚠ NOTE Important information essential to the installation and operation of the WhisperGen™.

The WhisperGen™

Introduction

Congratulations on purchasing a WhisperGen™ PPS16.

This manual is designed to allow you to quickly learn how to safely operate your WhisperGen™. Please keep this manual for future reference and read it before operating or maintaining your WhisperGen™.

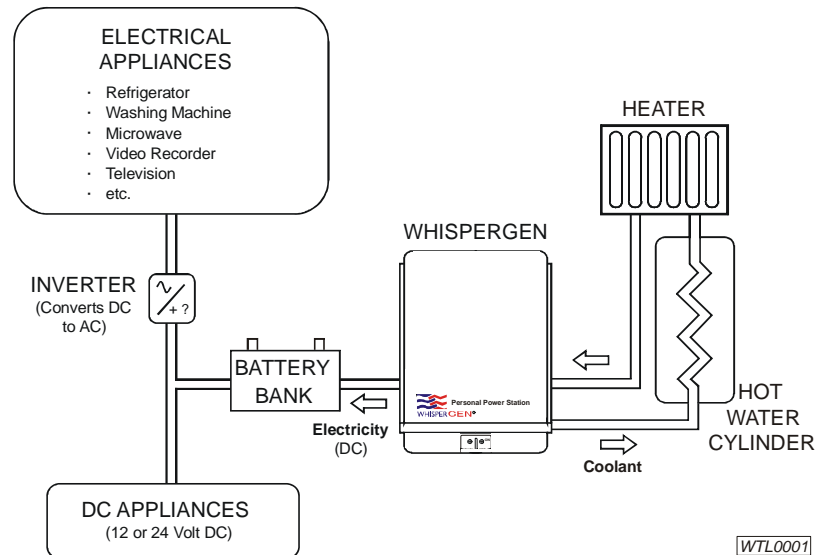
⚠ WARNING In this manual, warnings against hazards are marked with the symbol shown on the left. Heed all warnings at all times.

For information regarding the standard kit items that are supplied with each WhisperGen™, and if you have any questions or suggestions, feel free to contact your authorised WhisperGen™ agent.

In some countries, it is a legal requirement that this manual must be permanently placed alongside the WhisperGen™ and maintained in a readable condition. Check with your local authority about this requirement.

What It Does

- The WhisperGen™ PPS16 is a Personal Power Station that generates heat and electrical energy simultaneously.
- The WhisperGen™ PPS16 is capable of charging and managing a lead-acid battery bank to provide a DC electrical power supply.
- The WhisperGen™ PPS16 also provides heat energy in the form of hot coolant for space heating and domestic hot water generation.



Note: Not all elements of the actual system are shown in this schematic.

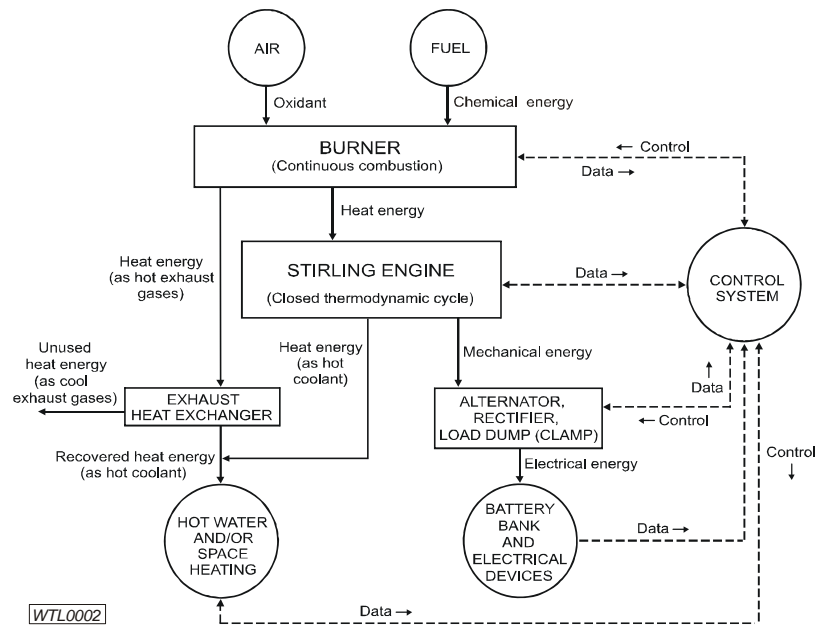
How It Works

The WhisperGen™ onboard heat and power system is based on a four-cylinder Stirling-cycle (external combustion) engine that repeatedly heats and cools a mass of pressurised nitrogen gas. Each time the gas is heated and cooled, the changing gas pressure causes the pistons to move up and down. This mechanical motion, via a special mechanism called the "wobble yoke", rotates an alternator to generate DC electricity which can be used to charge a lead-acid battery bank.

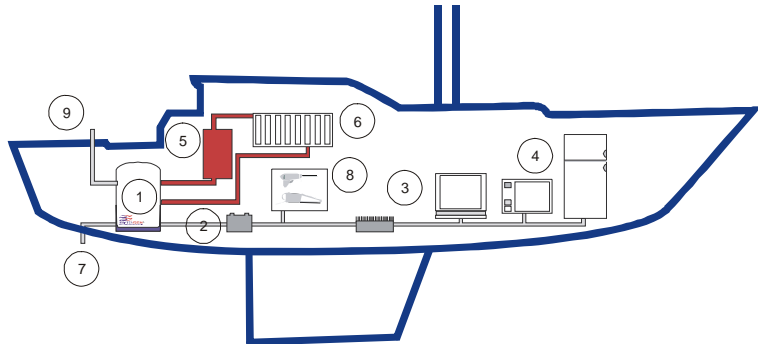
The nitrogen gas is heated by a continuous-combustion burner, and cooled by coolant circulating through engine cavities. Heat transferred to the coolant can be used to heat domestic water cylinders and for space heating.

The burner consumes air and fuel. The flow rate of air and fuel into the burner is optimised by a microcomputer. This maximises combustion efficiency and minimises exhaust emissions.

The microcomputer automatically controls all WhisperGen™ functions and displays real-time information about the system on a control panel from which the user can also alter operating options.



Typical Marine Application



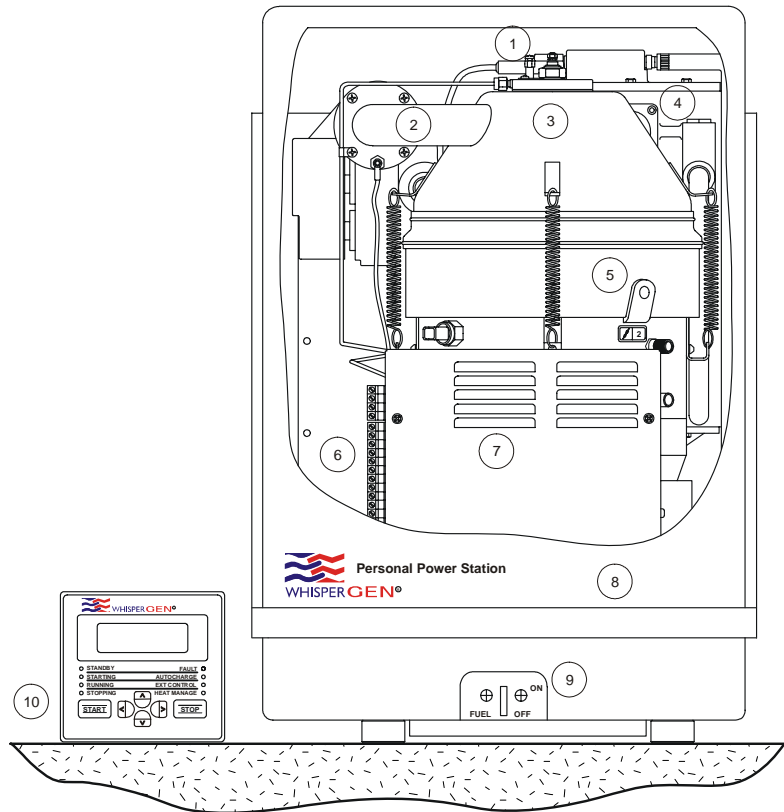
Number	Description
1	WhisperGen™
2	Battery Bank
3	DC/AC inverter
4	Standard domestic appliances
5	Hot water for domestic use
6	Space heating
7	Excess heat removal
8	12 or 24 V equipment
9	Cool exhaust vent

Technical Specifications

Feature	Specification	Remark
Prime mover	4-cylinder Stirling-cycle engine pressurised to 28 bar with nitrogen.	Closed thermodynamic cycle.
Power output	Co-generation of heat and electricity.	
Heat	5.5kW useable heat (up to 6.5kW in heating mode).	Heat output depends on operating conditions.
Electrical	800W electrical.	Gross output depends on operating conditions.
Duty cycle	1 to 24 hours per day.	
Fuel **		
Type	Diesel: EN590; BS2869: 2000 Class A2, D.	Minimum flash point, closed, 56°C.
Consumption	Less than 1 litre per hour.	At nominal power output.
Control		
Manual	Manual start/stop from control panel.	
External	Optional remote starting via external switch.	Timer, thermostat, or on/off switch may be used.
Auto-charge	Optional automatic battery bank charging.	Starts and stops at preset discharge levels.
Heat management	Optional automatic heat generation to maintain coolant temperature.	Coolant temperature is user-selectable.
External heater	Optional control of an external heater to boost and maintain coolant temperature.	Coolant temperature is user-selectable.
Electrical **		
Nominal voltage	12V or 24V DC.	
Battery bank capacity	12V: 200Ah minimum recommended. 24V: 100Ah minimum recommended.	Battery bank not included in standard kit.
Battery bank charging	3-stage charging on each run: bulk, absorption, and float.	Battery bank voltage, current, and Amp-hours monitored and displayed on control panel.
** Machine type is set at the factory		

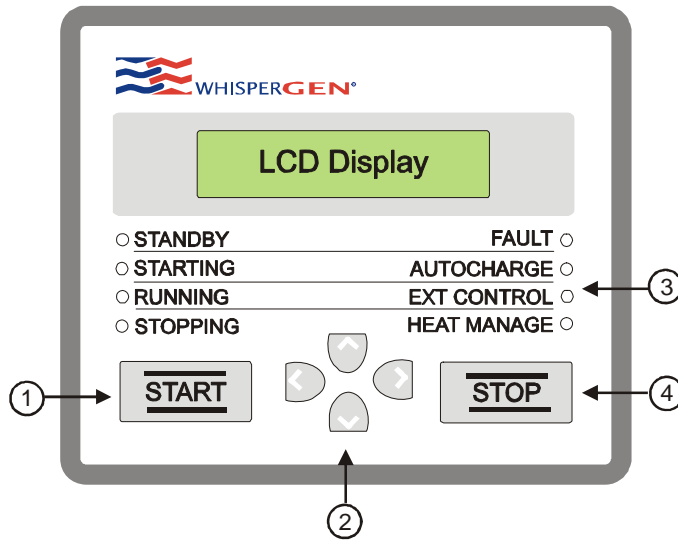
Feature	Specification	Remark
Cooling system		
Cooling method	Primary Cooling: High quality marine grade glycol-based corrosion-inhibited anti-freeze for freezing conditions. Clean distilled water and high-quality marine-grade corrosion-inhibitor, suitable for use with aluminium.	Removes heat from engine. Heat is transferred to hot water cylinder(s) and space heater(s).
	Secondary Cooling: Water-cooling (marine applications).	Raw water cooling.
Heat exchangers	Internal exhaust and marine heat exchangers.	Requires external coolant pump and seawater pump.
Exhaust temperature	80°C nominal, 95°C maximum.	Cooling system extracts heat from exhaust.
Connections		All connections provided on the rear panel of the enclosure.
Fuel	Rp 1/8 (ISO 7-1).	BSPP 1/8
Heat exchangers	Rp 3/4 (ISO 7-1).	BSPP 3/4
Exhaust	Rp 1 1/4 (ISO 7-1).	Exhaust must be vented outside occupied areas.
Exhaust flushing	G 3/4 (ISO 228-1).	Face sealing fitting required.
Condensate draining	12.7mm O.D. plain tube.	
Battery bank	50mm ² screw terminals.	
External switch	0.5 to 2.5mm ² screw terminals.	
PC	RJ 45.	Via RS485-to-RS232 converter.
Physical		
Dimensions	450mm (W) x 500mm (D) x 650mm (H).	
Dry weight	90kg.	
Environmental		
Temperature/humidity	-10°C to 40°C. 99% RH, non-condensing.	With suitable fuel and coolants.

Summary of Parts



Number	Description
1	Fuel evaporator assembly
2	Air intake
3	Burner assembly
4	Exhaust heat exchanger
5	Lifting lug
6	Terminal block
7	Electronics enclosure
8	Main enclosure (cover)
9	Fuel valve
10	User control panel

Control Panel Parts

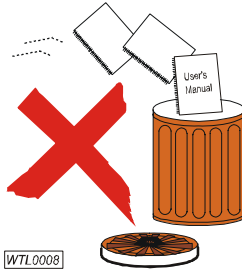


Number	Name	Function
1	START Key	The key that: (a) Starts up the WhisperGen™; (b) Begins battery bank bulk-charging; and (c) Clears faults.
2	SELECT Keys	The arrow keys that provide access to system menus for; (a) Information display; and (b) Editing system parameters.
3	STOP Key	The key that shuts down the WhisperGen™.
4	Indicators	The lights that indicate the status of the WhisperGen™ system. STANDBY: the WhisperGen™ is ready to start. STARTING: the WhisperGen™ is starting. RUNNING: the WhisperGen™ is operating. STOPPING: the WhisperGen™ is stopping. FAULT: a fault or warning is present. AUTOCHARGE: the battery bank auto-charging function is turned on. EXT CONTROL: external control of the WhisperGen™ is enabled. HEAT MANAGE: the heat management function is turned on.
5	LCD Display	A liquid-crystal display that shows system information such as charging current, battery bank voltage, power output, etc.

Safety Precautions

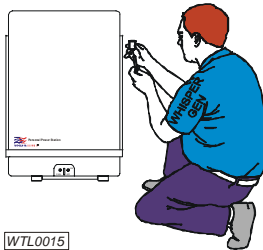
⚠ WARNING

Please read and understand this section ENTIRELY before operating or maintaining the WhisperGen™. Not heeding the warnings or recommendations could damage the WhisperGen™, cause personal injury, and/or void the warranty.



WTL0008

This manual must be permanently placed alongside the WhisperGen™ and maintained in a readable condition.

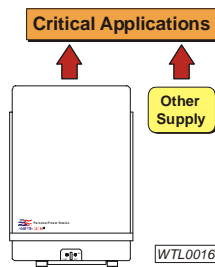


WTL0015

The WhisperGen™ is a pressurised device and must be installed and serviced by an authorised WhisperGen™ service agent. Incorrect installation or servicing can damage the WhisperGen™ and property, cause personal injury, and/or void the warranty.

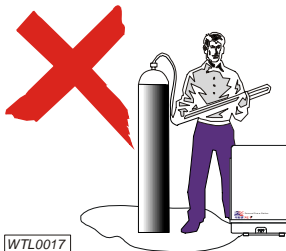
⚠ WARNING

Always heed warning signs on the WhisperGen™. The engine contains high-pressure nitrogen and some internal surfaces are hot.



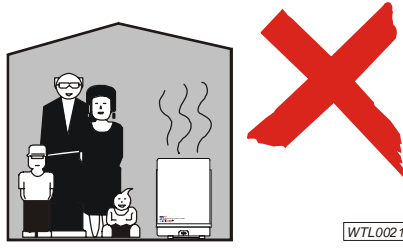
WTL0016

Never use the WhisperGen™ as the sole source of electrical power for critical applications.

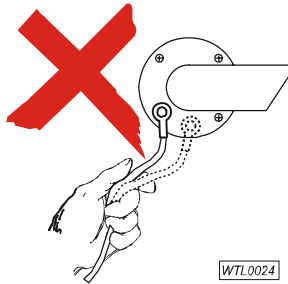


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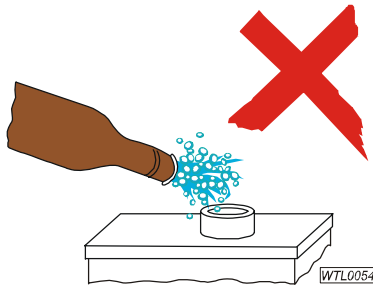
The WhisperGen™ should be pressurised by an authorised service agent only. Do not do it yourself and do not adjust the pressure relief valve.



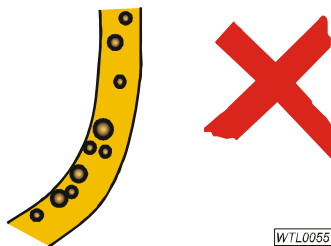
Exhaust gases from the WhisperGen™ should always be vented outside closed areas. Exhaust piping in enclosed areas must be properly sealed.



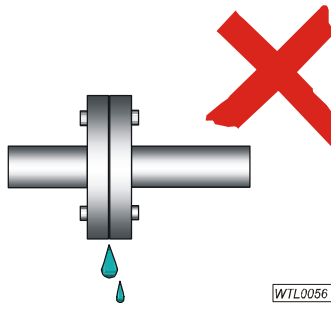
Never remove the burner earthing strap as this will cause the fuel line to act as the earthing path for the glow plug. The fuel could heat up, causing a malfunction or a fire.



Do not use fuels other than the specified class of fuel as this may damage the WhisperGen™ and/or cause a fire



Air bubbles present in the fuel line can cause the WhisperGen™ to malfunction. Bleed the fuel line after filling a completely empty fuel tank.



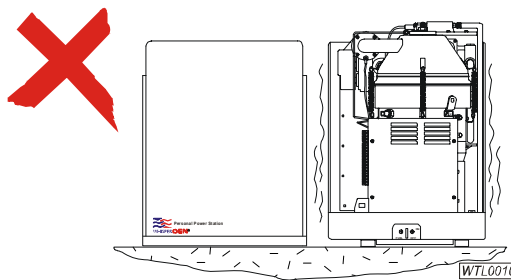
The cooling system is vital to the performance of the WhisperGen™. If there are leakages in the cooling circuit, or the water is not flowing, inform an authorised WhisperGen™ agent immediately.



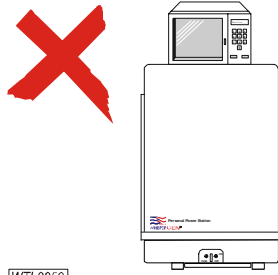
Use only the recommended coolant mixture. Using an incorrect type of coolant fluid can cause serious corrosion in the WhisperGen™.



Ensure that fuel and coolant used on the WhisperGen™ are clean and free of particulate contaminants. Foreign particles can obstruct fuel/coolant passages, resulting in a malfunction or damage to the WhisperGen™.

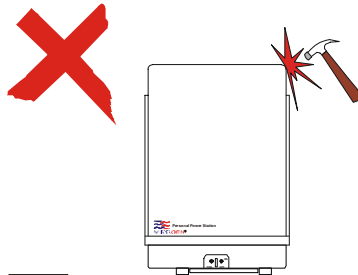


During normal operation of the WhisperGen™, the enclosure lid and electronics enclosure lid must be fitted.



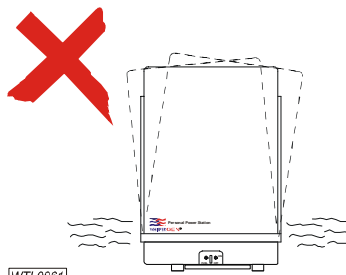
WTL0059

Do not sit anything on the WhisperGen™ or press down hard on the top.



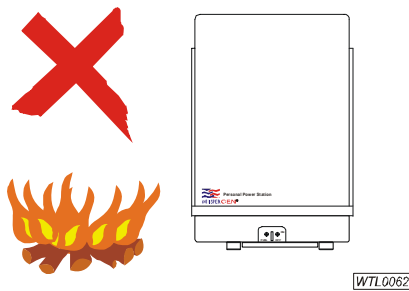
WTL0060

Do not expose the WhisperGen™ to large physical impacts.



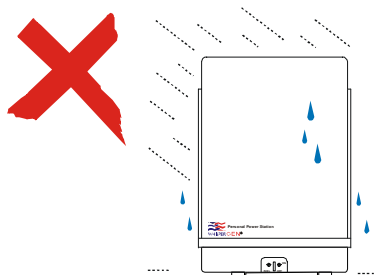
WTL0061

Do not expose the WhisperGen™ to excessive vibration.



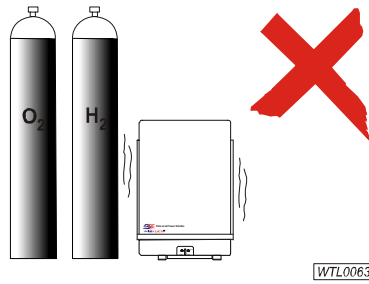
WTL0062

Do not expose the WhisperGen™ to extreme temperatures. The ambient temperature should not exceed 40°C or fall below -10°C

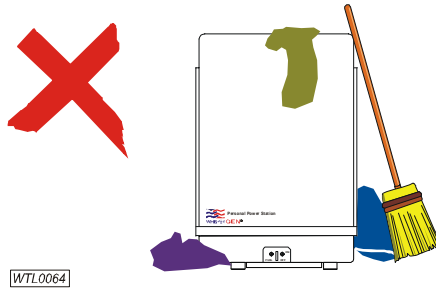


WTL0009

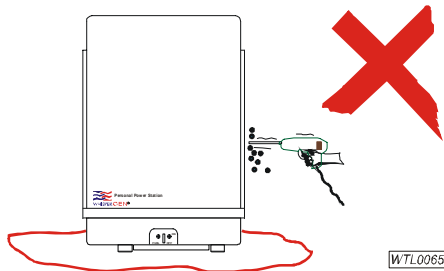
Do not install, operate or store the WhisperGen™ in a wet or poorly ventilated place.



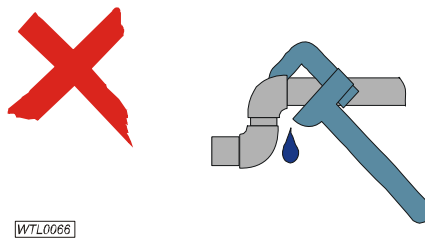
Do not operate the WhisperGen™ in a potentially explosive environment.



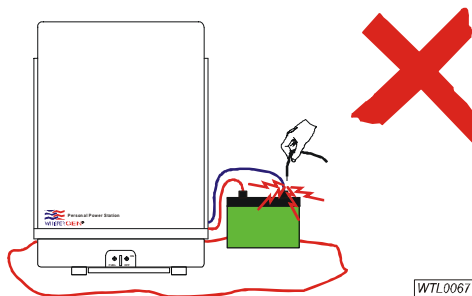
Do not store rags or other items inside or beside the WhisperGen™ as the air circulation through the WhisperGen™ may be disrupted.



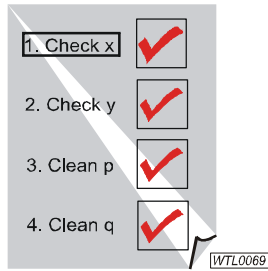
Do not drill holes in the enclosure. Air circulation through the WhisperGen™ may be disrupted.



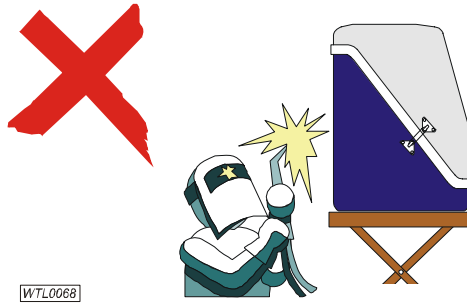
Do not modify the piping for the fuel, exhaust, and cooling systems of the WhisperGen™ without first consulting an authorised WhisperGen™ agent.



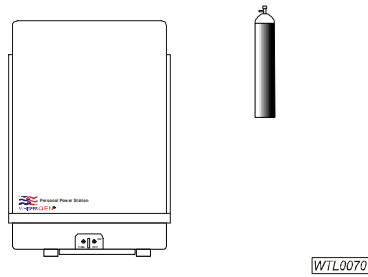
Isolate the WhisperGen™ from the battery bank before making or breaking other connections on the battery bank.



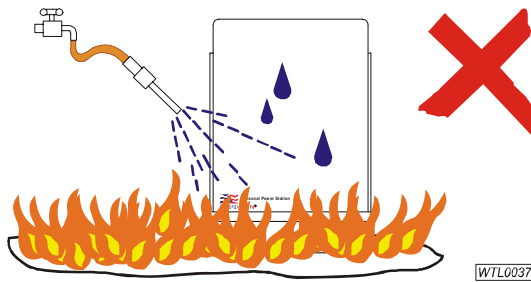
Ensure that maintenance procedures and schedules as recommended in this manual are adhered to at all times.



Perform maintenance procedures mentioned in this manual only. If in doubt, call your authorised WhisperGen™ service agent.



In some countries, it is a requirement that a maintained fire extinguisher be permanently located alongside an installed WhisperGen™. Consult your local authority for information.



In case of fire, use a carbon dioxide or dry powder extinguisher - do not use water.

Operation

Introduction

This section outlines the procedure for operating your WhisperGen™. It will show you how to:

- Start and stop the WhisperGen™;
- Charge the battery bank;
- Manage heat generation;
- Clear faults and warnings;
- Adjust the contrast of the LCD; and
- Display and edit system parameters of the WhisperGen™.

⚠ WARNING You should read and understand all safety precautions before operating your WhisperGen™.

Installing the WhisperGen™

To install the WhisperGen™, contact your authorised WhisperGen™ service agent.

⚠ WARNING The WhisperGen™ must be installed and commissioned by an authorised WhisperGen™ service agent. If you install the WhisperGen™ yourself, the warranty will be void. Incorrect installation may damage the WhisperGen™ and property, and/or cause personal injury.

Quick Reference - Operating Options

Depending on the options selected, the WhisperGen™ may stop running before or after the battery bank is charged, as shown in the table below.

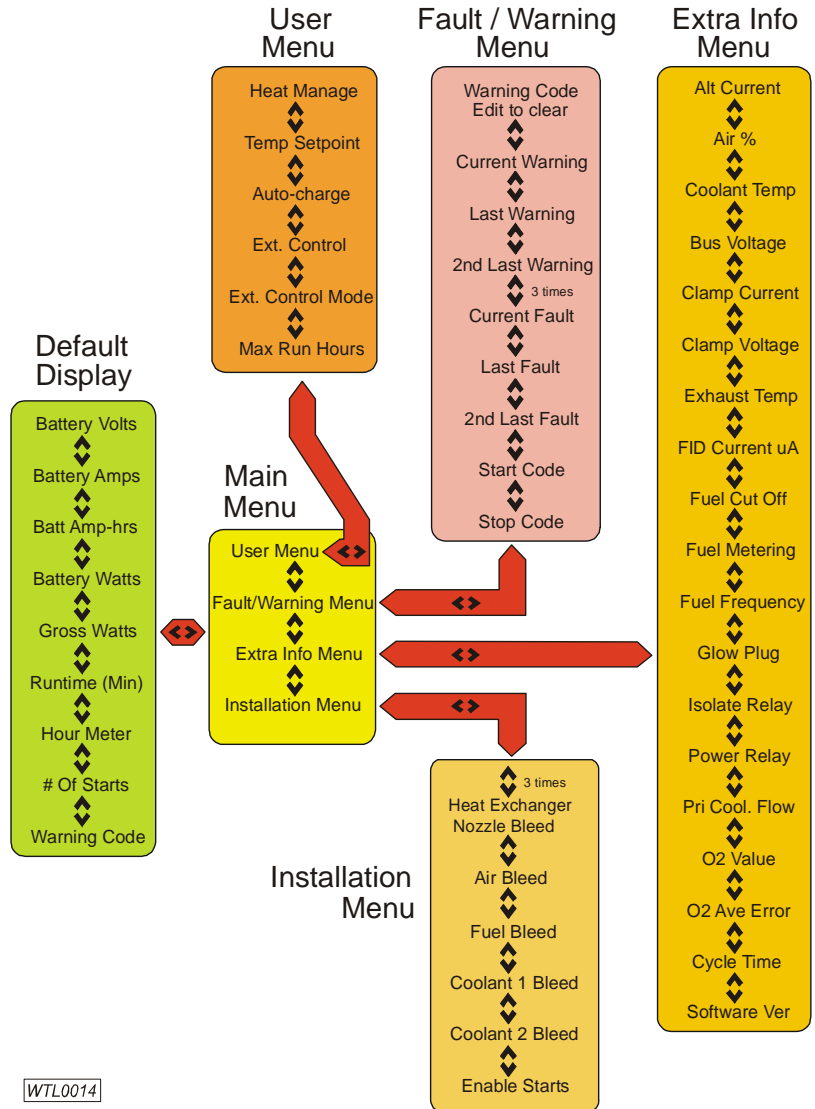
WhisperGen™ starting method	Heat Manage ON		Heat Manage OFF	
	Max Run Hours < 25	Max Run Hours = 25	Max Run Hours < 25	Max Run Hours = 25
Manual start	Stops when Max Run Hours value is reached, even if the battery bank is not yet fully charged.	Continues running until stopped by the user.	Stops when the battery bank is charged or when Max Run Hours value is reached, whichever comes first.	Continues running until the battery bank is charged, then stops.
Remote switch start with Ext Cont Mode set to 1		Continues running until stopped by the user or remote switch.		
Remote switch start with Ext Cont Mode set to 2*				
Auto-charge start	Stops when the battery bank is charged, regardless of Max Run Hours and Heat Manage settings.			

In all cases, the WhisperGen™ can be stopped at any time by pressing **STOP** on the control panel.

* In this mode, the WhisperGen™ will run for at least one hour.

Information Structure

The information displayed on the control panel is structured as shown below. For an explanation on how to navigate within this information structure, individual parameter meanings and edit settings refer the section entitled Displaying System Information.

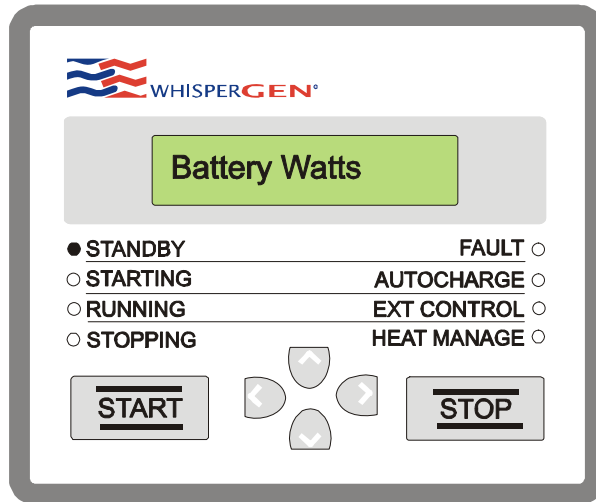


WTL0014

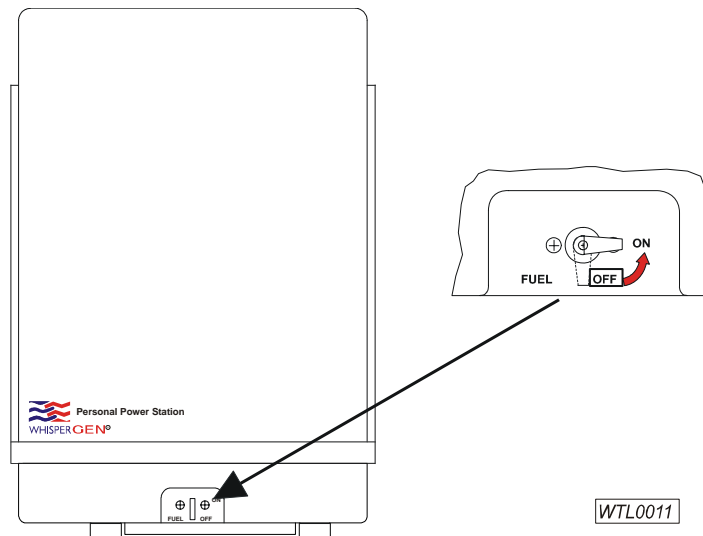
Starting the WhisperGen™

To manually start the WhisperGen™:

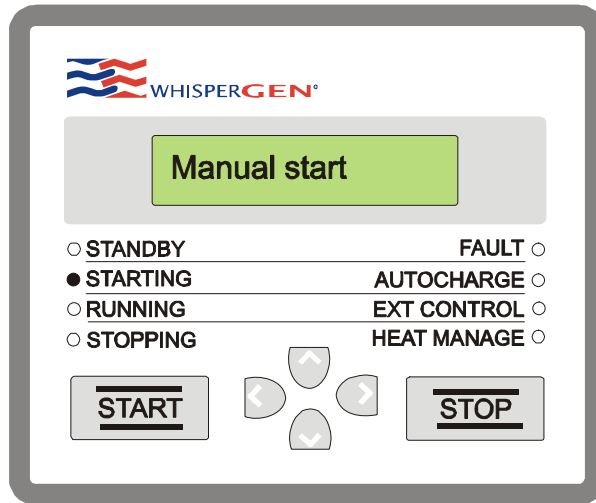
1. Check that the **STANDBY** indicator on the control panel is lit. If the fault indicator is constantly lit, you will need to clear the fault – see section entitled Clearing Faults and Warnings. If nothing is displayed on the control panel, check that the WhisperGen™ is connected to the battery bank and that the 3A fuse (F2 position as marked on PCB) is not blown.



2. Turn on the fuel valve.



- Hold down **START** on the control panel until all indicators flash and a beep is heard. The **STARTING** indicator lights up and "Manual start" is displayed on the control panel. As an anti-tamper feature, short presses of the **START** key are ignored.



In the starting mode, as indicated by a lit **STARTING** indicator, the WhisperGen™ goes through a starting-up sequence over a few minutes during which the engine is heated to a working temperature.

The WhisperGen™ is operating normally when the **RUNNING** indicator lights up and the control panel displays "Bulk Charge". This may take up to 10 minutes.

If a fault occurs, the WhisperGen™ may automatically attempt to restart. By default, the WhisperGen™ will attempt to restart once. If you wish to change this setting, contact your authorised WhisperGen™ agent.

Every time the WhisperGen™ is operated, the battery bank is charged. Once the battery bank is fully charged**, the WhisperGen™ automatically stops and returns to the standby mode (as indicated by a lit **STANDBY** indicator) if the default settings are used. (i.e. Auto charge mode)

If the WhisperGen™ is in Heat Manage mode, the WhisperGen™ will continue to run for as long as there is a heat demand.

If you press **START** while the WhisperGen™ is in the process of stopping, it will ignore the key press and continue stopping. The WhisperGen™ must be in the standby mode before it can be started. The WhisperGen™ must also be allowed to cool down before it can be restarted.

The WhisperGen™ can also be started by remote switch, refer to section entitled Remote Controlling for more details.

**** If the WhisperGen™ is started manually or from a remote switch, and the *Max Run Hours* setting is less than 25, the WhisperGen™ will automatically stop when the *Max Run Hours* set value is reached, even if the battery bank is not yet fully charged.**

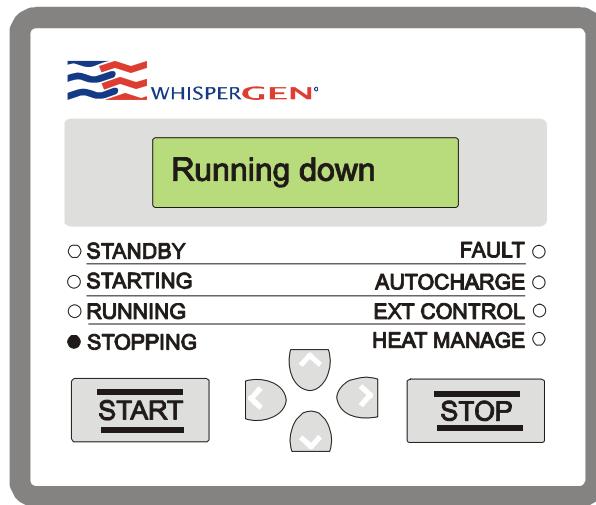
Stopping the WhisperGen™

Manual Stopping

The default setting of the **Heat Manage** option is **OFF**. Unless it is turned **ON**, the WhisperGen™ automatically stops once the battery bank is fully charged - you do not need to manually stop the unit.

Should you wish to manually stop the WhisperGen™, refer to the following:

1. Hold down **STOP** on the control on the control panel until a beep is heard. The **STOPPING** indicator lights up and "Running down" is displayed on the control panel. As an anti-tamper feature, short presses of the **STOP** key are ignored.



In the stopping mode, as indicated by a lit **STOPPING** indicator, the WhisperGen™ goes through a shutdown sequence lasting two to five minutes during which the engine is cooled down.

When the WhisperGen™ has fully stopped, the **STANDBY** indicator lights up and the control panel displays "WhisperGen". The WhisperGen™ must be in the standby mode before it can be started again.

If a remote switch has been installed to control the WhisperGen™, you can also stop the WhisperGen™ with the remote switch, refer to section entitled Remote Controlling for more details.

If you stop the WhisperGen™ manually or from a remote switch when it is auto-charging the battery bank, the WhisperGen™ will immediately start again if the battery bank charge level is still below the set level.

To prevent the WhisperGen™ from restarting, turn the **Auto-charge** option **OFF**, refer to section entitled Managing the Battery Bank - Auto charging.

Emergency Stopping

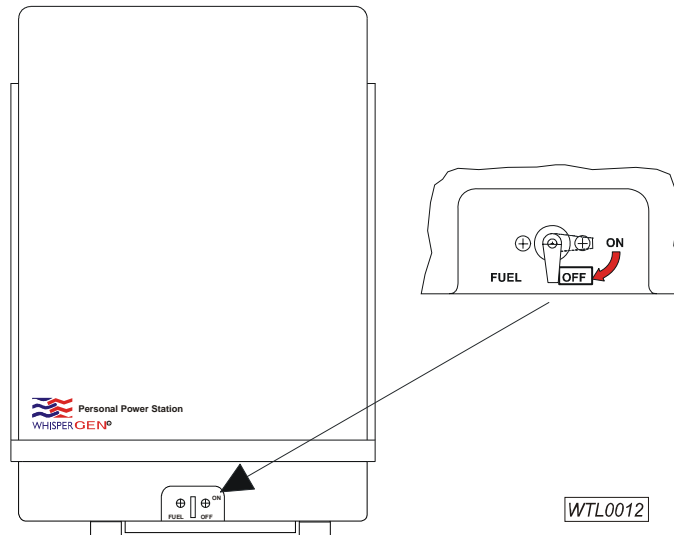
⚠ WARNING The WhisperGen™ must complete a cool down sequence. There is no way to immediately stop the engine.

⚠ WARNING In case of fire, use a carbon dioxide or dry powder extinguisher - do not use water.

⚠ WARNING To cancel auto re-start, push the stop button on the control panel.

To stop the WhisperGen™ in an emergency:

1. Turn off the fuel valve in front of the WhisperGen™.



The flame in the WhisperGen™ burner will be extinguished within a few seconds. The fuel cut-off will be registered as a fault and the WhisperGen™ will stop. The fault will need to be cleared (see section entitled Clearing Faults and Warnings) before the WhisperGen™ can be started again.

The WhisperGen™ will attempt to re-start (if auto restart is enabled). If the fuel valve remains off, the attempt will fail. It is recommended that once the fuel valve has been turned off and the stop button on the control panel activated, this will cancel all auto-restarts.

Setting the Maximum Run Time

If the WhisperGen™ is started manually or from a remote switch, you can limit the operating duration of the system by setting a maximum operating time.

To set the maximum operating time of the WhisperGen™:

1. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



Battery Watts

2. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



User Menu

3. Press **Right Arrow** to display the first item on the User Menu.



Heat Manage

4. Press **Down Arrow** to scroll down to **Max Run Hours**.



Max Run Hours

5. Press **Right Arrow** to begin editing the maximum operating time of the WhisperGen™.
6. Press **Up Arrow** or **Down Arrow** to select the maximum number of operating hours for the WhisperGen™. If **25** (hours) is selected, the WhisperGen™ will run continuously until the battery bank is fully charged.



Max Run Hours 21

- Optional: press **Left Arrow** repeatedly to return to the default display. The default display will re-appear automatically after a few minutes of inactivity on the control panel.

If the **Max Run Hours** setting is less than **25**, the WhisperGen™ will automatically stop when the **Max Run Hours** set value is reached, even if the battery bank is not yet fully charged. If the **Max Run Hours** setting is left at its default value of **25**, no maximum operating time condition is imposed: the WhisperGen™ will run continuously until the battery bank is fully charged.

Note that the **Max Run Hours** setting applies only if the WhisperGen™ is started manually or from a remote switch. It does not apply if the WhisperGen™ automatically starts by itself as a result of the auto-charge or heat manage function.

For more information on battery bank auto-charging, see section Managing the Battery Bank in the User Manual. For a summary on operating options, see the Quick Reference in the User Manual.

Remote Controlling

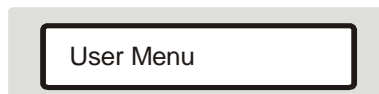
You can start and/or stop the WhisperGen™ using a remote on/off switch, timer, or thermostat, if one of these is fitted.

To set the remote switch to start/stop the WhisperGen™:

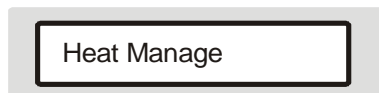
1. Access the **User Menu** on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



2. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



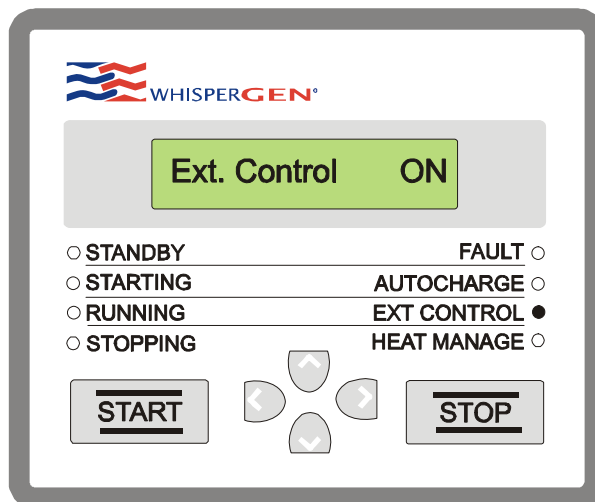
3. Press **Right Arrow** to display the first item on the User Menu.



4. Press **Down Arrow** to scroll down to **Ext. Control**.



5. Press **Right Arrow** to begin editing the external control setting.
6. Press **Up Arrow** to select **ON**. The **EXT CONTROL** indicator lights up.



7. Press **Left Arrow** to quit editing **Ext. Control**.
8. Press **Down Arrow** to scroll down to **Ext Cont Mode**.
9. Press **Right Arrow** to begin editing the external control mode setting.
10. Press **Up Arrow** or **Down Arrow** to select option **1**, **2** or **3**. These options are described in the table below.

Setting	Control Options	Control Logic
1	Starting only	The WhisperGen™ starts when the remote switch is closed and continues running even if the remote switch is then opened.
2	Starting and stopping	The WhisperGen™ starts when the remote switch is closed and stops when it is opened. Once started, the WhisperGen™ operates for at least an hour.
3	Stopping only	If the WhisperGen™ is started while the remote switch is closed, the WhisperGen™ stops when the remote switch is opened.

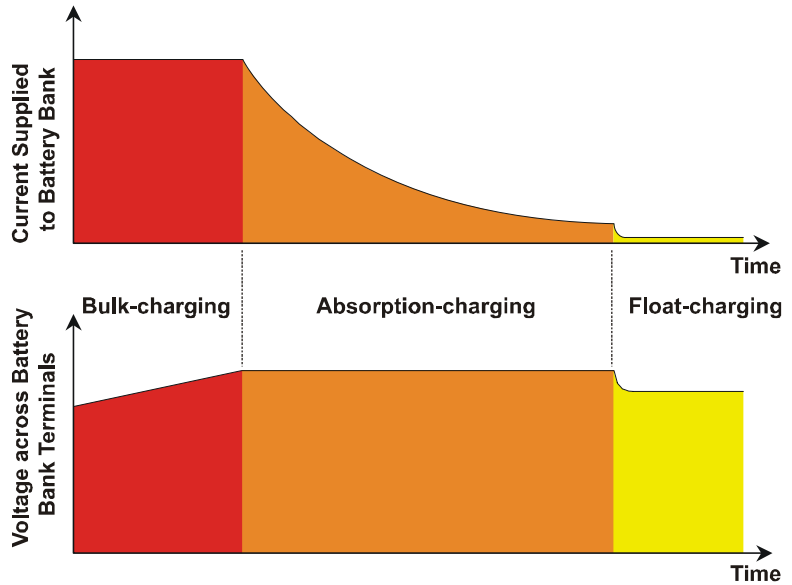
- Optional: press **Left Arrow** repeatedly to return to the default display. You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.

The effect of starting or stopping the WhisperGen™ using a remote switch is similar to pressing **START** or **STOP** on the control panel. Refer to section entitled Starting the WhisperGen™ and Stopping the WhisperGen™ in the User Manual. For a summary on operating options, refer to the Quick Reference in the User Manual.

Managing the Battery Bank

Stages of Charging

Every time the WhisperGen™ is operated, it charges the battery bank. There are three stages in a typical charging cycle, as shown below:



Bulk-charging

The battery bank is charged at the maximum rate. The voltage typically rises 2 or 3 Volts while the current is maintained at a fixed level.

Absorption-charging

The battery bank is about 80% charged at the beginning and the voltage is maintained at a fixed level to fully charge it. The current decreases gradually.

Float-charging

The charged state of the battery bank is maintained with a small current and reduced voltage.

WTL0013

The absorption and float charging voltages, the current level at which absorption-charging ceases, and other battery-charging settings, are set during the commissioning of the WhisperGen™. These settings are set according to the needs of your particular application. If you wish to change these settings, contact your authorised WhisperGen™ agent.

⚠ WARNING During the commissioning of the WhisperGen™, some system parameters are set specifically for the particular battery bank that is being used. Before changing the battery bank to a different type or size, consult your authorised WhisperGen™ agent.

Auto-Charging the Battery Bank

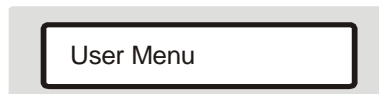
You can set the WhisperGen™ to automatically start and charge the battery bank when the battery bank charge level is low.

To set the WhisperGen™ to auto-charge the battery bank:

1. Access the User Menu on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



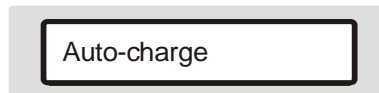
2. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



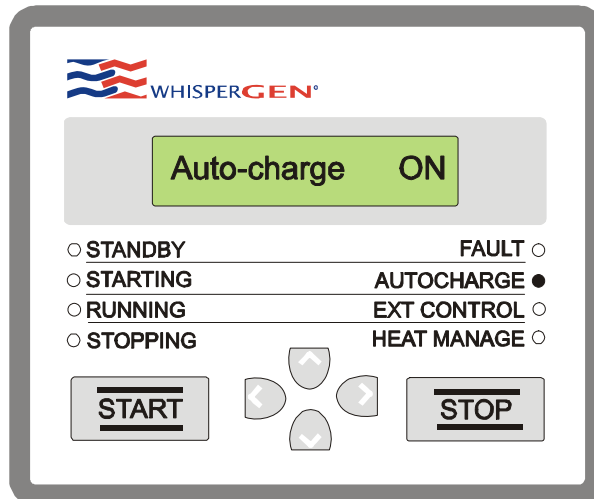
3. Press **Right Arrow** to display the first item on the User Menu.



4. Press **Down Arrow** to scroll down to **Auto-charge**.



5. Press **Right Arrow** to begin editing the auto-charge setting.
6. Press **Up Arrow** to select **ON**. The **AUTOCHARGE** indicator lights up.



- Optional: press **Left Arrow** repeatedly to return to the default display. The default display re-appears automatically after a few minutes of inactivity on the control panel.

With the **Auto-charge** option turned **ON**, the WhisperGen™ will automatically start whenever the battery bank charge level falls below a preset level. This "threshold" level is set during the commissioning of the WhisperGen™ according to the needs of your particular application. If you wish to change it, contact your authorised WhisperGen™ agent.

The battery bank is typically charged in three stages as described in section entitled Stages of Charging in the User Manual. Once the battery bank is fully charged, the WhisperGen™ stops automatically and returns to the standby mode. Regardless of heat management settings, the WhisperGen™ will stop once the battery bank is fully charged if the WhisperGen™ had been started by the auto-charge function.

⚠ WARNING While the WhisperGen™ is auto-charging the battery bank, you can stop it at any time by pressing **STOP** on the control panel. However, the WhisperGen™ will immediately start again if the battery bank charge level is still below the preset level. To prevent the WhisperGen™ from restarting, turn the Auto-charge option OFF


If the WhisperGen™ was started by the auto-charge function, the **Max Run Hours** setting does not affect the operating time of the WhisperGen™. Regardless of the **Max Run Hours** setting, the WhisperGen™ will fully charge the battery bank before stopping. For a summary on operating options, see the Quick Reference in the User Manual.

Bulk-charging the Battery Bank

While the WhisperGen™ is running, you can start a new cycle of battery bank charging, that is, return to bulk-charging the battery bank, see section Stages of Charging. This can be done regardless of auto-charging and heat management settings.

To bulk-charge the battery bank while the WhisperGen™ is running:

Hold down **START** on the control panel until you hear a beep. The control panel displays "Bulk charge". As an anti-tamper feature, short presses of the **START** key are ignored.



Bulk charge

A new charging cycle, beginning with bulk-charging, will be started. See section Stages of Charging.

Managing Heat Generation

Setting the Coolant Temperature

Whenever it is running, the WhisperGen™ regulates the temperature of the coolant circulating through it. The coolant is used for space and domestic water heating. By default, the temperature of the coolant is maintained at approximately 60°C. You may, however, set the coolant temperature to any temperature from 45°C to 70°C.

To set the temperature of the coolant:

1. Access the **User Menu** on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



Battery Watts

2. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



User Menu

3. Press **Right Arrow** to display the first item on the User Menu.



Heat Manage

4. Press **Down Arrow** to scroll down to **Temp Setpoint**.



Temp Setpoint

5. Press **Right Arrow** to begin editing the coolant temperature setting.
6. Press **Up Arrow** or **Down Arrow** to select the coolant temperature. The values shown on the control panel are in °C.



Temp Setpoint 62

- Optional: press **Left Arrow** repeatedly to return to the default display. You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.

Turning On Heat Management

The WhisperGen™ maintains the coolant temperature at the set point until the battery bank is fully charged when it is running. When the battery bank is fully charged, the system stops and returns to the standby mode and the coolant temperature is no longer maintained.

However, you can however turn on the Heat Management option to keep the system running to maintain the coolant temperature continuously even after the battery bank has been fully charged.

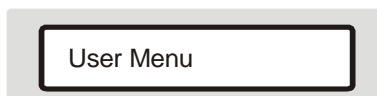
The WhisperGen™ will continuously maintain the coolant temperature after the battery bank is fully charged only if the system is started manually or from a remote switch. If the WhisperGen™ starts as a result of the Auto-charge function, the system will stop and return to the standby mode once the battery bank is fully charged. For more information refer to the Quick Reference section in the User Manual.

To turn on the heat management option:

1. Access the **User Menu** on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



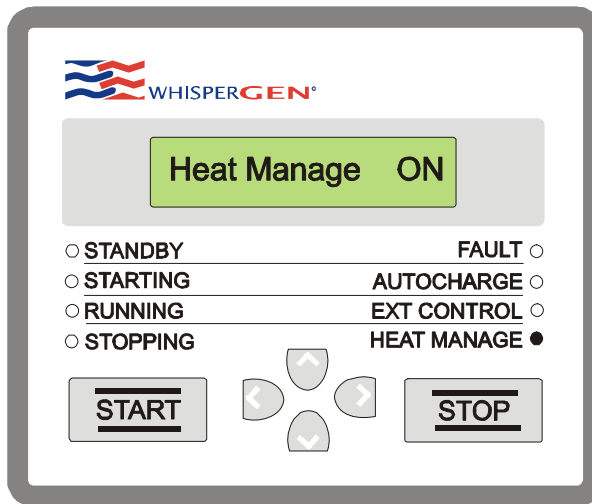
2. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



3. Press **Right Arrow** to display the first item on the User Menu.



4. Press **Right Arrow** to begin editing the heat management setting.
5. Press **Up Arrow** to turn the Heat Manage option ON. The **HEAT MANAGE** indicator lights up.



- Optional: press **Left Arrow** repeatedly to return to the default display.

You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.

With the **Heat Manage** option turned **ON**, the WhisperGen™, if started manually or from a remote switch, will run continuously and maintain the coolant temperature until it is stopped manually or from the remote switch. If a **Max Run Hours** setting of less than **25** has been set, the WhisperGen™ will automatically stop when the **Max Run Hours** set value is reached. See the Quick Reference in the User Manual for a summary of operating options.

Clearing Faults and Warnings

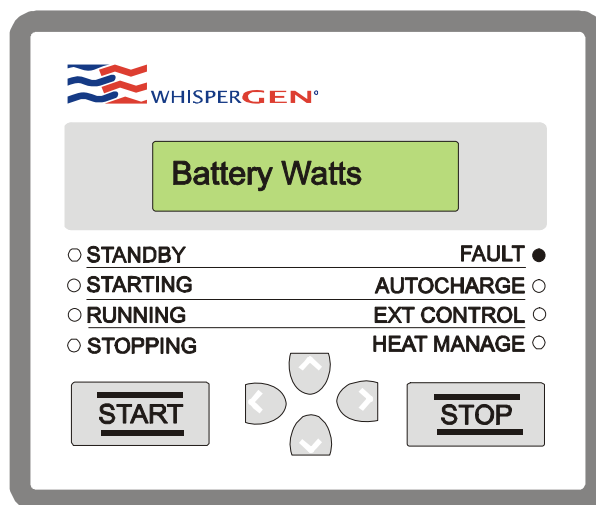
There are two types of errors that the WhisperGen™ automatically detects, as described below:

Error Type	Meaning	Indication
Warning	Error that is minor or which indicates that a fault might be developing.	<ul style="list-style-type: none"> ▪ The FAULT indicator on the control panel flashes while the error exists. ▪ No error message is displayed on the control panel. ▪ The WhisperGen™ continues operating.
Fault	Functional error that causes the WhisperGen™ to shut down.	<ul style="list-style-type: none"> ▪ The FAULT indicator on the control panel is constantly lit. ▪ An error message is displayed on the control panel. ▪ The WhisperGen™ shuts down automatically.

Upon detecting a fault, the WhisperGen™ will shut down, and then automatically clear the fault and attempt to restart. By default, the WhisperGen™ will attempt to restart once. If you wish to change this setting, contact your authorised WhisperGen™ agent. Error messages associated with faults from which the WhisperGen™ cannot recover by itself need to be cleared before normal operation of the WhisperGen™ may be resumed.

To clear an error message:

1. Physically correct the fault. Refer to the Trouble Shooting section for more information.
2. Hold down **START** on the control panel until a beep is heard and the **FAULT** indicator turns off. The WhisperGen™ does not restart automatically. To restart it, see section entitled Starting the WhisperGen™.



A warning can be cleared, even if the physical cause of it has not been corrected. It is possible for the WhisperGen™ to detect a warning and then subsequently a fault.

If this occurs the WhisperGen™ will attempt to clear the fault and restart itself. The fault needs to be cleared before the WhisperGen™ can be started again.

However, it is however recommended that you determine and correct the cause of the warning as soon as possible. See the section entitled Trouble Shooting for more information.

When the WhisperGen™ is started, any warning present is automatically cleared.

To manually clear a warning:

1. Access the main menu on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.




Battery Watts

2. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



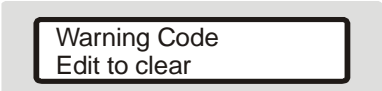
User Menu

3. Press **Down Arrow** to scroll down to **Fault/Warning Menu**.



Fault/Warning Menu

4. Press **Right Arrow** to display the first item on the **Fault/Warning Menu**.



Warning Code
Edit to clear

5. Press **Right Arrow** to begin clearing the warning.
6. Press **Down Arrow** to clear the warning. The Fault indicator turns off.
 - Optional: press **Left Arrow** repeatedly to return to the default display. The default display re-appears automatically after a few minutes of inactivity on the control panel.

Adjusting the LCD

Adjusting the Contrast

The control panel has a liquid-crystal display (LCD) which shows system information. The contrast of the LCD can be manually adjusted.

To increase the contrast of the LCD:

- Hold down **Left Arrow** and press the **Up Arrow** repeatedly until the desired contrast is achieved.

To decrease the contrast of the LCD:

- Hold down **Left Arrow** and press the **Down Arrow** repeatedly until the desired contrast is achieved.

If the battery bank is disconnected from the WhisperGen™, LCD contrast settings are retained for up to approximately one month after the disconnection.

Adjusting the Backlight

The LCD has a backlight which makes the LCD more visible in dark environments. The backlighting can be manually adjusted.

To adjust the LCD backlight:

- Hold down **Left Arrow** and press the **Right Arrow** repeatedly until the desired level of backlighting is achieved. Three levels of backlighting are available namely: high, low, and off.

If no keys are pressed, the backlight will be automatically turned off after four minutes. It will be automatically turned on again when a key is pressed.

If the battery bank is disconnected from the WhisperGen™, backlighting settings are retained for up to approximately one month after the disconnection.

Displaying System Information

Available Information

The control panel displays information regarding the status of the WhisperGen™ system. The following information, structured as shown in section entitled Quick Reference - Information Structure, may be obtained from the control panel:

Default Display

Default Display		
Parameter	Meaning	Typical Range
Battery Volts	The voltage across the terminals of the battery bank.	12V battery bank: 9.5 to 15.5 Volts. 24V battery bank: 19.0 to 31.0 Volts.
Battery Amps	The net quantity of electric current in Amperes, flowing through the battery bank. Positive values indicate charging, and negative values indicate discharging.	-600 to 200A.
Batt Amp-hrs	The state of battery bank discharge in Ah. A fully charged battery bank is assigned zero Ah.	-700 to 100Ah.
Battery Watts	The quantity of electrical power in Watts supplied to the battery bank. Positive values indicate charging, and negative values indicate discharging.	-7000 to 1000 Watts.
Gross Watts	The gross electrical power in Watts, from the WhisperGen™ generator before power to auxiliary devices such as the air blower and pumps.	200 to 1000 Watts.
Runtime (Min)	The total operating time in minutes since starting.	0 to 999,999 minutes.
Hour Meter	The cumulative number of hours of operation since the WhisperGen™ was first commissioned. The WhisperGen™ must be serviced by an authorised WhisperGen™ agent every 12 months or every 500 hours of operating time, whichever comes first.	0 to 999,999 hours.
# Of Starts	The cumulative number of times the WhisperGen™ has started since it was first commissioned.	0 to 999,999.
Warning Code	The code of the prevailing warning, if there is one. A flashing FAULT indicator indicates the presence of a warning. The flashing will stop if the cause of the warning disappears.	100 to 199.

User Menu

User Menu		
Parameter	Meaning	Typical Range
Heat Manage	The heat management function – see section entitled Turning on heat management.	ON or OFF (default).
Temp Setpoint	The temperature in °C that the coolant is to be maintained at during operation of the WhisperGen – see section entitled Setting the coolant temperature.	45 to 70°C (default is 60°C).
Auto-charge	The Auto-charge function – see section entitled Auto-charging the battery bank.	ON or OFF (default).
Ext. Control	The external or remote control function – see section entitled Remote controlling.	ON or OFF (default).
Ext Control Mode	The mode of operation for the external or remote control switch – see section entitled Remote controlling.	1, 2 (default), or 3.
Max Run Hours	The number of hours of operation after which the WhisperGen is to stop. This parameter setting is a "timer" by which the WhisperGen operates – see section entitled Setting the maximum run time.	1 to 24 hours, or 25 hours for continuous operation (default).

Fault/Warning Menu

Fault/Warning Menu		
Parameter	Meaning	Typical Range
Warning Code Edit to clear	The current warning code and the warning clearing function – see section 2.8.	100 to 199.
Current Warning	The code of the prevailing warning, if there is one.	100 to 199.
Last Warning	The code of the last warning.	100 to 199.
2nd Last Warning	The code of the warning prior to the last.	100 to 199.
Current Fault	The code of the prevailing fault, if there is one.	2 to 99.
Last Fault	The code of the last fault.	2 to 99.
2nd Last Fault	The code of the fault prior to the last.	2 to 99.
Start Code	The code indicating how the WhisperGen™ last started. "1" = "manual start"; "2" = "auto-charge start"; "3" = "external control start".	1, 2, or 3.
Stop Code	The code indicating how the WhisperGen™ last stopped. "9" = "fault"; "1" = "manual stop"; "2" = "battery charge complete"; "3" = "external control stop"; "4" = "max run hours exceeded"; "5" = "parallel charger turned on".	9YY, X1, X2, X3, X4, or X5 where YY is the code of the prevailing fault and X is the start code.

Extra Info Menu

Extra Info Menu		
Parameter	Meaning	Typical Range
Alt Current	The electric current in Amperes that is being generated by the WhisperGen™ alternator. Positive values indicate current generation and negative values indicate current flow to the WhisperGen™ from the battery bank during cranking.	12V: -20 to 75A. 24V: -10 to 37A.
Air %	The power applied to the air blower as a percentage of the maximum power that can be applied to it. The higher the air flow rate, the higher the combustion rate.	0 to 100%.
Bus Voltage	The voltage across the electrical terminals of the WhisperGen™.	12V: 10 to 15.5V. 24V: 20 to 31V.
Coolant Temp	The temperature in °C of the coolant. The coolant temperature reflects the temperature of the engine block.	-10 to 85°C.
Clamp Current	The excess electric current in Amperes being diverted into the "clamp", an electric water heating element located inside the WhisperGen™ enclosure.	0 to 70A.
Clamp Voltage	The voltage setting of the "clamp" system.	12V: 12.2 to 16.3V. 24V: 24.85 to 32.7V.
Exhaust Temp	The temperature in °C of exhaust gases between the burner and exhaust heat exchanger.	-10 to 550°C.
FID Current uA	The current in µA flowing between the FID (flame-ionisation detector) electrode and the burner shell. A large current indicates a good stable flame in the burner and correct FID operation.	0 to 10µA.
Fuel Cut Off	The position of the automatic fuel isolation valve located inside the WhisperGen™. It should be ON when the WhisperGen™ is operating.	ON or OFF.
Fuel Metering	The operating state of the fuel pump. It should be ON when the WhisperGen™ is operating.	ON or OFF.
Fuel Frequency	The rate at which fuel is pulsed into the burner. The fuel pulse rate is adjusted in relation to power demand and the air/fuel ratio.	2 to 16Hz
Glow Plug	The operating state of the glow plug. The glow plug is turned ON as required during the start-up of the burner.	ON or OFF.
Isolate Relay	The position of the main electrical isolator relay located inside the WhisperGen™. It should be ON when the WhisperGen™ is operating.	ON or OFF.
Power Relay	The power supply to ancillary components such as the fuel pump, coolant pump, etc. The power supply should be ON when the WhisperGen™ is operating.	ON or OFF.
O2 Value	The quantity of oxygen in the exhaust. This reflects the air/fuel ratio.	200 to 2500.
O2 Ave Error	The averaged difference between the air/fuel ratio set point and the actual ratio. The smaller the difference, the more stable the burner.	2 to 400.
Software Ver	The version of software the WhisperGen™ is operating on.	A five-digit number.

Installation Menu

Installation Menu		
Parameter	Meaning	Typical Range
Heat exchanger Nozzle Bleed	Spraying water through the heat exchanger to clean internal cavities.	On for 1 sec.
Air Bleed	Blowing air through the burner and exhaust system.	ON or OFF (default).
Fuel Bleed	The fuel bleeding function – see section entitled Bleeding the Fuel Line. The water pumps may start when the fuel line is bled.	ON or OFF (default).
Coolant 1 Bleed	The coolant bleeding function – see section entitled Bleeding the Coolant Circuit.	ON or OFF (default).
Coolant 2 Bleed	The seawater and coolant bleeding function – see section 3.8.	ON or OFF (default).
Enable Starts	The function that enables or disables WhisperGen starts during maintenance or servicing. "0" = "no starts allowed"; "1" = "allow manual starts only"; "2" = "allow all manual and automatic starts".	0 (default), 1 or 2.

Displaying Information

Information displayed on the control panel is structured as shown in the section entitled Quick Reference - Information Structure. The default display is the highest level on the information structure. If no keys are pressed for a few minutes, the control panel defaults to the last displayed parameter on the default display

To access the default display at any time:

- Press **Left Arrow** repeatedly until one of the default display parameters appear. For example, if **Alt Current** (a parameter of the "extra info" menu) is initially displayed, pressing **Left Arrow** twice returns to the default display.

A screenshot of a control panel display showing the text "Battery Watts" centered within a rectangular frame.

To display a menu at a lower level:

- Press **Right Arrow**. For example, if **Battery Volts** (a parameter in the default display) is displayed initially, then to display the main menu, press **Right Arrow** once as shown.

A screenshot of a control panel display showing the text "User Menu" centered within a rectangular frame.

To display a menu at a higher level:

- Press **Left Arrow**. For example, if **Alt Current** is displayed initially, then to display the main menu, press **Left Arrow**.

To scroll up within a menu:

- Press **Up Arrow**. For example, if **Bus Voltage** is displayed initially, then to display Alt Current, press **Up Arrow** twice.

A screenshot of a control panel display showing the text "Alt Current" centered within a rectangular frame.

To scroll down within a menu:

- Press **v**. For example, if **Alt Current** is displayed initially, then to display **Coolant Temp**, press **Down Arrow** three times.

A screenshot of a control panel display showing the text "Coolant Temp" centered within a rectangular frame.


Editing Parameter Settings

Information displayed on the control panel is structured as shown in section entitled Quick Reference. The settings of all the parameters under the **User Menu** and **Installation Menu** can be edited. The **Warning Code Edit to clear** parameter under the **Fault/Warning Menu** can also be edited. All other parameter settings can be displayed but not edited.

To edit the setting of a parameter:

1. Display the parameter on the control panel – see section entitled Displaying System Information - Displaying Information.

For example, if you wish to edit the battery bank auto-charging setting, then display **Auto-charge** on the control panel by pressing **Right Arrow** twice followed by **Down Arrow** twice from the default display.



Auto-charge

2. Press **Right Arrow** to begin editing the setting of the parameter. The existing setting of the parameter will be displayed. In the above example, either **ON** or **OFF** will be displayed, depending on the existing setting of Auto-charge.



Auto-charge OFF

3. Press **Up Arrow** or **Down Arrow** to edit the setting. In the above example, if the existing setting is **OFF** and you wish to turn on auto-charging, then press **Up Arrow** to change the setting to **ON**.



Auto-charge ON

- Optional: press **Left Arrow** repeatedly to return to the default display. You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.



Battery Watts

Maintenance

Introduction

This section outlines maintenance procedures for your WhisperGen™. It will show you how to:

- Develop a basic maintenance routine for the WhisperGen™;
- Maintain the fuel and coolant systems;
- Check the battery bank connections; and
- Replace the glow plug, fuses, FID, oxygen sensor, and evaporator.

⚠ WARNING *You should read and understand all safety precautions before operating or maintaining your WhisperGen™. Contact your authorised WhisperGen™ distributor or dealer to order spare parts.*

⚠ WARNING *Before carrying out maintenance, the Enable Starts option in the Installation Menu should be set to 0 to prevent unintentional starts of the WhisperGen™. Reset to either 1 or 2 (depending on the user setting requirement) after maintenance has been completed. For information on how to edit the settings, refer to the section entitled Displaying System Information - Editing Parameter Settings.*

⚠ WARNING *If service checks are not performed by an authorised WhisperGen™ service agent every 12 months or 500 hours of operating time from the date of commissioning, the warranty on the WhisperGen™ will be void.*

⚠ WARNING *When performing any maintenance work on the WhisperGen™, refer to the applicable sections when removing or replacing parts and stopping or starting the WhisperGen™.*

Scheduled service intervals and tasks

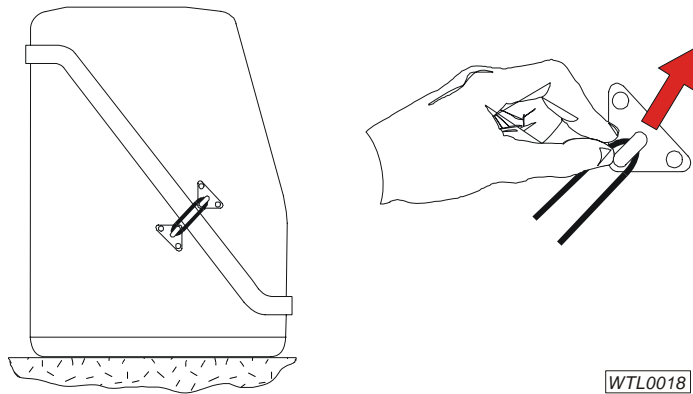
Service A – Minor Service Interval	What to check after each 500 hours of use:
<p>Service A Schedule:</p> <p>500 hours use (12 months since installed)</p> <p>1,500 hours use (36 months since installed)</p> <p>2,500 hours use (60 months since installed)</p> <p>3,500 hours use (84 months since installed)</p> <p>4,500 hours use (108 months since installed)</p> <p>5,500 hours use (132 months since installed)</p> <p>(etc.)</p>	<p>Carry out Service A Tasks in the sequence listed below:</p> <ol style="list-style-type: none"> 1. Check all coolant levels and flow rates. Bleed the system as required check for signs of leakage. 2. Check the condition of all hoses. 3. Check the seawater filter and inlet for debris and build up. 4. Inspect the fuel filter and fuel pump. Clean and replace the fuel filter and fuel pump as required. 5. Check the condensate drain is working correctly. 6. Check the FID and reset FID height. 7. Change the Evaporator wick. 8. Check the condition of all battery cables. 9. Check all the battery cable connections. 10. Remove the electronics cover and check the wiring, loom and elements cables. 11. Check and reset variables using Micromon. 12. Check that the user display is working correctly. 13. Carry out a test run 14. Check exhaust with a gas analyzer for 9% Oxygen. 15. Check for any exhaust gas leakage.
Service B – Intermediate Service Interval	What to check after each 1000 hours of use:
<p>Service B Schedule:</p> <p>1,000 hours use (24 months since installed)</p> <p>3,000 hours use (72 months since installed)</p> <p>5,000 hours use (120 months since installed)</p> <p>(etc.)</p>	<p>Carry out Service B tasks 13- 19 after completing Service A tasks 1-12 first:</p> <ol style="list-style-type: none"> 13. Change the primary coolant and reverse flush the system. 14. Check the FID and glow plug. Change the FID and glow plug as needed. 15. Replace the fuel filter element. 16. Remove the heat exchanger top plate and check for any blockage. Clear any blockage as needed. 17. Check the flushing nozzle for blockage and wear. Clear blockage or replace the flushing nozzle. 18. Strip and clean the seawater heat exchanger. 19. Check the Nitrogen pressure. 20. Carry out a test run. 21. Check exhaust with a gas analyzer for 9% Oxygen. 22. Check for any exhaust gas leakage.
Service C – Major Service Interval	What to check after each 2000 hours of use:
<p>Service C Schedule:</p> <p>2,000 hours use (48 months since installed)</p> <p>4,000 hours use (96 months since installed)</p> <p>6,000 hours use (144 months since installed)</p> <p>(etc.)</p>	<p>Carry out Service C tasks 20-24 after completing Service A tasks 1-12 then Service B tasks 13- 19:</p> <ol style="list-style-type: none"> 20. Remove the top burner ceramic and check its condition. Replace the ceramic as needed. 21. Replace the ceramic rope and heater head seals. 22. Carry out a test run. 23. Check exhaust with a gas analyzer for 9% Oxygen. 24. Check for any exhaust gas leakage.

Removing the Enclosure Lid

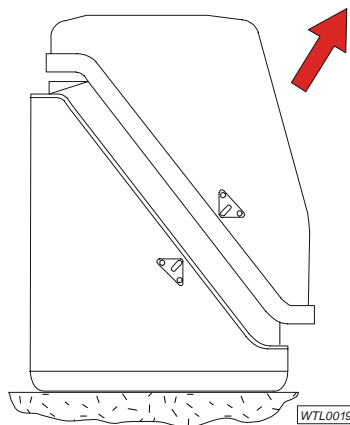
The enclosure lid protects the internal parts of the WhisperGen™ and is held in place by two rubber rings. Some maintenance and troubleshooting procedures require the enclosure lid to be removed.

To remove the enclosure lid:

1. Remove the rubber rings from the upper plastic hooks on both sides of the WhisperGen™.



2. Carefully lift the enclosure lid.



⚠ WARNING Do not touch the surfaces that are labelled as hot and do not operate the WhisperGen™ without the enclosure lid on for more than 10 minutes as air circulation through the WhisperGen™ will be disrupted.

When replacing the lid, hook it over the back of the enclosure base and swing it down over the front. **Ensure the lid is well seated on the rubber seal.** Then connect the rubber rings to the hooks.

Checking the Fuel

Overview

Check the fuel level regularly to ensure a constant fuel supply to the WhisperGen™. How often the fuel needs to be checked and replenished depends on the operating conditions of the WhisperGen™ and the size of the fuel tank.

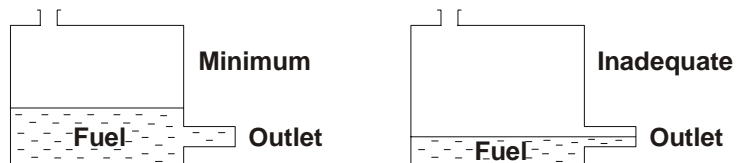
In general, the WhisperGen™ consumes 0.5 to 0.85 litres of fuel per hour of operation.

⚠ WARNING Use only good quality automotive diesel (EN590 or BS2869: 2000 burner fuel class A2, D, minimum flash point, closed 56°C). Do not use other fuel types such as bio diesel, heating oil, petrol or aviation fuel.

Procedure

To check the fuel level:

1. Remove the fuel tank cap. The fuel tank is located outside the WhisperGen™ and is typically within five metres of it.
2. Ensure that the fuel level is adequate. The fuel level must be higher than the fuel outlet point at all times.



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3. Replenish fuel if necessary, taking care not to spill any on or in the vicinity of the WhisperGen™.
4. Replace the fuel tank cap.

If the fuel tank is empty and a fuel-related error message is displayed on the control panel, you will need to bleed the fuel line before the WhisperGen™ can be operated normally again.

If you need to bleed the fuel line then see bleed the fuel system.

Bleeding the Fuel Line

Overview

⚠ WARNING Filling a fuel tank that has run empty may introduce air bubbles into the fuel line that could cause the WhisperGen™ to malfunction. After filling an empty fuel tank, you must bleed the fuel line to remove any air bubbles that might be trapped in it.

⚠ WARNING The coolant and seawater pumps may start when the fuel line is bled.

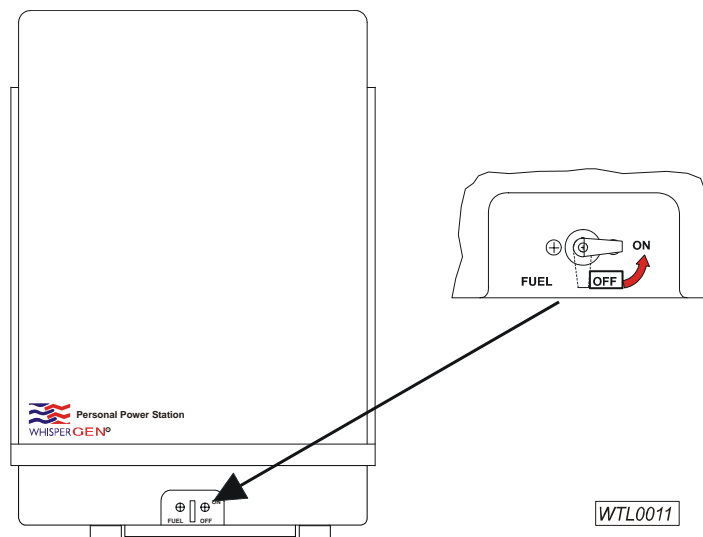
⚠ WARNING To prevent unintentional starts of the WhisperGen™, heed the warning given at the beginning of this section.

⚠ WARNING Do not touch the surfaces that are labelled as hot.

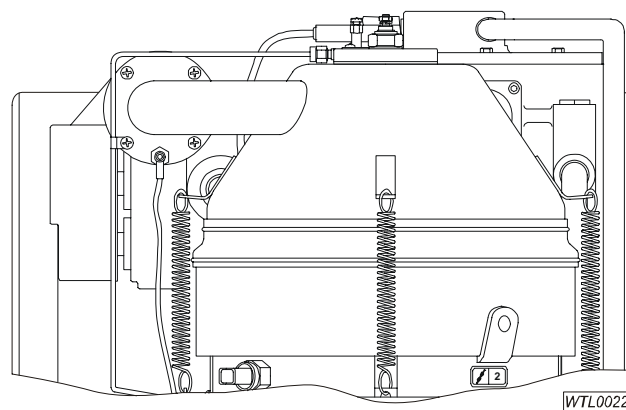
Procedure

To bleed the fuel line:

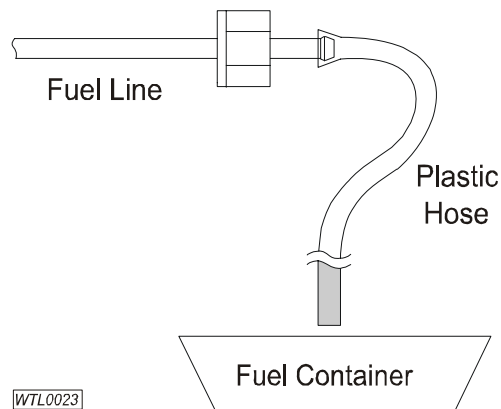
1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit.
2. Remove the enclosure lid and wait for the engine to cool
3. Turn on the WhisperGen™ fuel valve.



4. Unscrew the fuel line fitting on top of the burner.



- Connect a clear plastic hose to the exposed end of the fuel line, and allow the hose to drain into a container that will hold at least a litre of fuel.



- Access the Main Menu on the control panel - follow the first two steps of the procedure outlined in the section entitled Stopping the WhisperGen™ - Setting the maximum run time.
- Press **Down Arrow** to scroll down to **Installation Menu**.

Installation Menu

- Press **Right Arrow** to display the third item on the Installation Menu, **Fuel Bleed**.

Fuel Bleed

- Press **Right Arrow** to begin editing the fuel bleeding setting.
- Press **Up Arrow** to select **ON**. Fuel will be bled through in pulses for 60 minutes. You can stop the fuel pump at any time by pressing v.

At least twice the volume of fuel in the entire fuel line connecting the fuel tank to the evaporator must be bled. For example, if the fuel line measures 3mm in inner-diameter and 5m in length, then 70ml of fuel must be bled.

Fuel Bleed ON

- Optional: press **Left Arrow** repeatedly to return to the default display. You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.
- Reconnect the fuel line to the evaporator.
- Finger tighten the nut against the shoulder. Using a spanner, tighten $\frac{3}{4}$ turn only.
- Ensure that there is no leakage.
- Replace the enclosure lid.

The WhisperGen™ may now be started as required.

Cleaning the Fuel Pump Filter

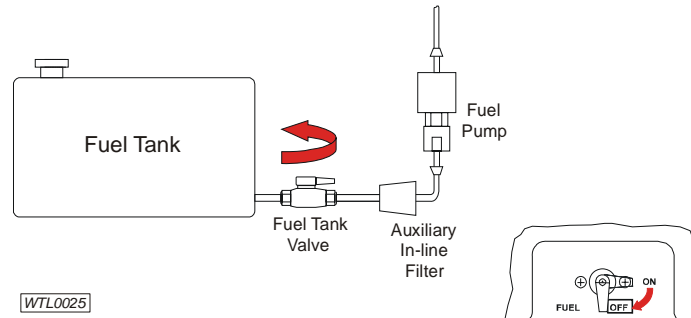
Overview

Fuel supplied to the WhisperGen™ must have low levels of contamination. Clean the fuel filter inside the fuel pump if faults related to fuel supply occur frequently or if the power output is constantly low.

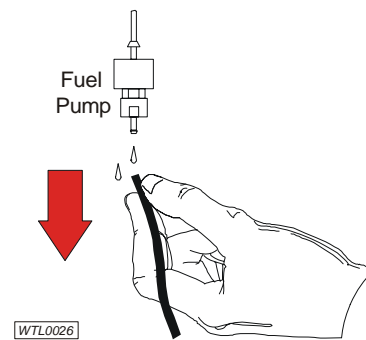
Procedure

To clean the fuel filter:

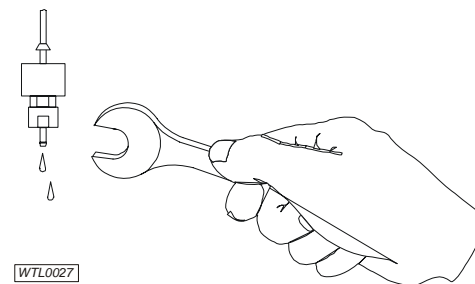
1. Turn off the fuel tank valve and the WhisperGen™ fuel valve.



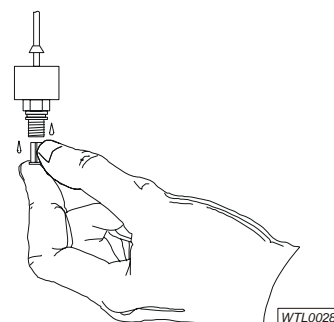
2. Place a container below the fuel pump to collect fuel spillage.
3. Remove the fuel line from the brass end of the fuel pump.



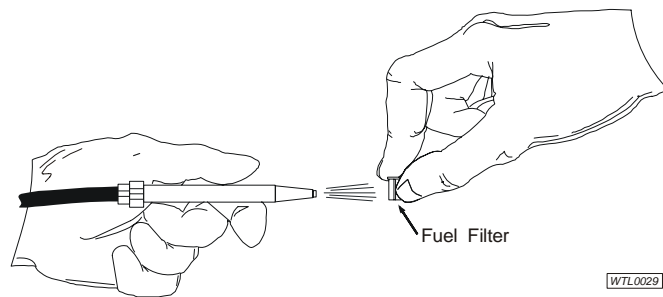
4. Undo the cylindrical brass fitting.



5. Remove the filter from the fuel pump.



6. Clean the filter by either blowing clean compressed air through it or by brushing it in clean diesel or kerosene. Do not use a cloth rag to clean or dry the filter.



7. Replace the filter in the brass fitting and secure the brass fitting to the fuel pump, making sure that the o-ring is correctly seated.
8. Secure the fuel line to the fuel pump.
9. Turn on the fuel tank and WhisperGen™ fuel valves.
10. Bleed the fuel line.
11. Check that there is no fuel leakage.

If there is another fuel filter installed external to the fuel pump, it should be cleaned also. Follow the instructions provided by the WhisperGen™ service agent who installed the external filter.

Checking the Coolant

Overview

Check the coolant level regularly to ensure a constant circulation of coolant through the WhisperGen™. How often the coolant needs to be checked and replenished depends on the size of the coolant header tank and the coolant circuit.

Use clean distilled water and high quality marine-grade corrosion inhibitor, suitable for use with aluminium and any other metals that may be encountered in the system (i.e. steel, copper).

If freezing conditions are expected, a marine-grade anti-freeze and corrosion inhibitor is to be used. All additives must be pre-mixed. Follow the dilution recommendation of the manufacturer.

⚠ WARNING *The cooling system of the WhisperGen™ is vital to its performance. If the coolant level is not maintained correctly, damage may occur.*

⚠ WARNING *Glycol can be harmful if swallowed or inhaled. Do not store it in open or unlabelled containers. Wash your hands thoroughly after handling it.*

⚠ WARNING *Using an incorrect type of coolant can cause serious corrosion in the WhisperGen™ - use only the recommended coolant.*

⚠ WARNING *Ensure that the coolant is free of particulate contaminants. Foreign particles in the coolant can obstruct coolant passages in the engine, resulting in damage to the WhisperGen™.*

⚠ WARNING *Do not connect the boat's main engine cooling system to the same circuit as the WhisperGen™, as cast iron contaminants may damage critical internal components.*

⚠ WARNING *If the coolant system is used to heat the vessel potable water system, a compatible non-toxic corrosion inhibitor (and anti-freeze if required) must be used.*

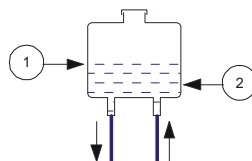
Procedure

To check the coolant level:

1. Remove the coolant header tank cap.

⚠ NOTE *The WhisperGen™ coolant header tank is typically located outside and above the WhisperGen™.*

2. Ensure that the coolant level is adequate. The coolant level must be between the maximum (1) and minimum (2) levels at all times.



3. Replenish coolant if necessary. Use a high quality marine-grade corrosion-inhibited anti-freeze that is designed for aluminium engines. Follow the dilution recommendations of the manufacturer.
4. Replace the coolant header tank cap.

Bleeding the Coolant Circuit

Overview

⚠ WARNING Filling a coolant header tank, in which the coolant level has fallen below the outlet level of the tank, may introduce air bubbles into the coolant circuit that could cause the WhisperGen™ to malfunction. Should this occur, bleed the coolant circuit.

⚠ WARNING To prevent unintentional starts of the WhisperGen™, heed the warning given at the beginning of this section

⚠ WARNING Do not touch the surfaces that are labelled as hot.

Procedure

To bleed the coolant circuit:

1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit.
2. Remove the enclosure lid and wait for the engine to cool.
3. Access the Main Menu on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



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4. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



User Menu

5. Press **Down Arrow** to scroll down to **Installation Menu**.



Installation Menu

6. Press **Right Arrow** to display the first item on the Installation Menu, **Hx Nozzle Bleed**.



Hx Nozzle Bleed

7. Press **Down Arrow** to scroll down to **Coolant Bleed 1**.



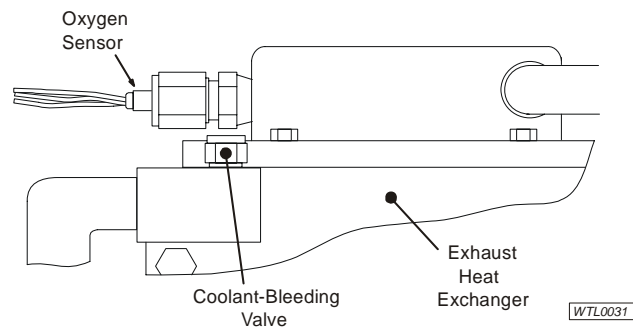
Coolant 1 Bleed

8. Press **Right Arrow** to begin editing the coolant bleed setting.
9. Press **Up Arrow** to select **ON**. the coolant pump will be turned on to bleed the coolant circuit.



Coolant 1 Bleed ON

10. Get a clean rag ready.
11. Open the coolant-bleeding valve with a 6mm hex socket (or with a suitable key). Use the rag to absorb the coolant bleeding out.



12. After the coolant pump has been running for five minutes, press **Down Arrow** to turn it off.

Coolant 1 Bleed OFF

13. Allow the coolant to rest for one minute.
14. Repeat steps 8 to 12 until coolant bleeds out of the coolant-bleeding valve without air bubbles.
15. Close the coolant-bleeding valve securely.
16. Repeat steps 3 to 7 to begin editing the coolant pump setting, and then press **Down Arrow** to turn off the coolant pump.

Coolant 1 Bleed OFF

17. Optional: press **Left Arrow** repeatedly to return to the default display. You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.
18. Replace the enclosure lid.

The WhisperGen™ may now be started as required.

The seawater circuit may need to be bled if the seawater pump inlet has been lifted above seawater level.

To bleed the seawater circuit, follow step 1 plus steps 3 to 8 as listed but turn on **Coolant Bleed 2** instead of **Coolant Bleed 1** in the **Installation Menu**.

The seawater pump, and the coolant pump, turns on to bleed both the seawater and coolant circuits for one hour after which the pumps will automatically stop.

You can also stop the pumps at any time by pressing **Down Arrow**.

Checking Battery Bank Connections

Overview

Power flows between the WhisperGen™ and battery bank via two power cables connected to the terminals of the battery bank. The WhisperGen™ also monitors the battery bank voltage, current, and temperature via electrical wires connected to the battery bank.

If an electrical fault or warning occurs, you may need to check these electrical connections. Refer to the Trouble Shooting section in the User Manual.

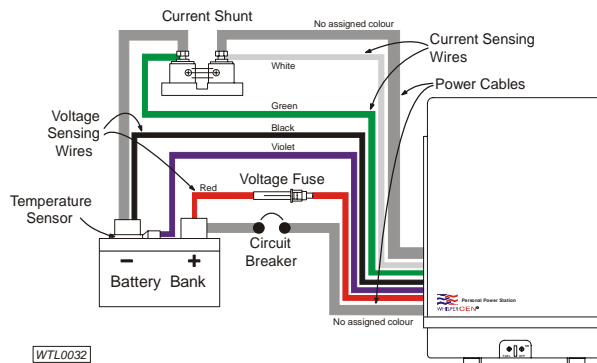
⚠ WARNING Do not touch the surfaces that are labelled as hot.

⚠ WARNING If stopping the WhisperGen™ to re-secure a wire/cable, heed the warning given at the beginning of this section to prevent unintentional starts of the WhisperGen™.

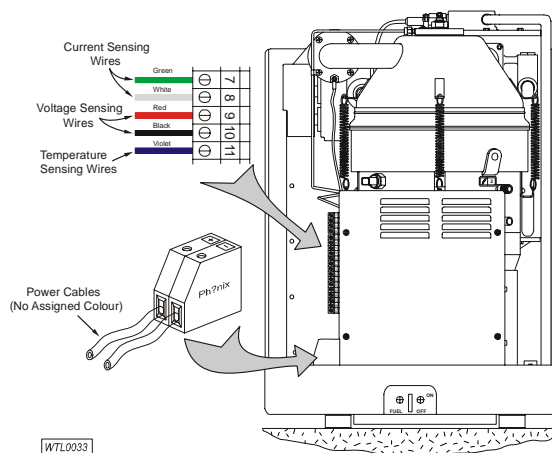
Procedure

To check the battery bank connections:

1. Access the battery bank managed by the WhisperGen™, and ensure that the battery bank connections, as shown below, are intact and clean.



2. Check that the circuit breaker is closed.
3. Replace the voltage fuse if it has blown.
4. Check that the electrical insulation of the wires/cables is intact.
5. Remove the enclosure lid.
6. Check that the electrical connections on the side of the electronics enclosure, as shown below, are intact. Before re-securing a wire/cable, first stop the WhisperGen™ and disconnect it from the battery bank by opening the circuit breaker.



7. Replace the enclosure lid. If you had disconnected the WhisperGen™ from the battery bank, reconnect it by closing the circuit breaker.

Replacing the Glow Plug

Overview

Should a "Glowplug cct fault" error message be displayed on the control panel, and the glow plug circuit fuse is intact, it may be necessary to replace the glow plug. In general, you should check the glow plug circuit fuse before deciding to replace the glow plug.

⚠ WARNING To prevent unintentional starts of the WhisperGen™, heed the warning given at the beginning of this section.

⚠ WARNING Do not touch the surfaces that are labelled as hot.

⚠ WARNING The glow plug may be hot.

⚠ WARNING Do not touch the wire coil on the new glow plug, as this will shorten its life span

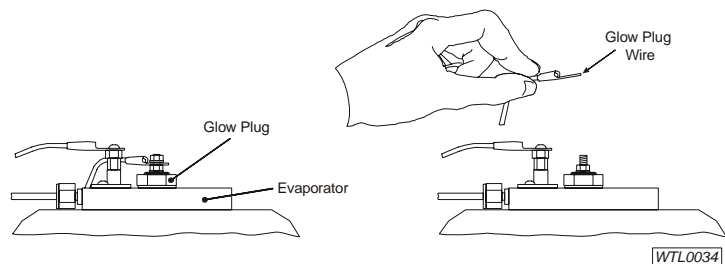
⚠ WARNING It is advisable to keep a spare glow plug with the WhisperGen™ at all times.

⚠ WARNING Glow plugs used on the WhisperGen™ should be obtained from authorised WhisperGen™ agents.

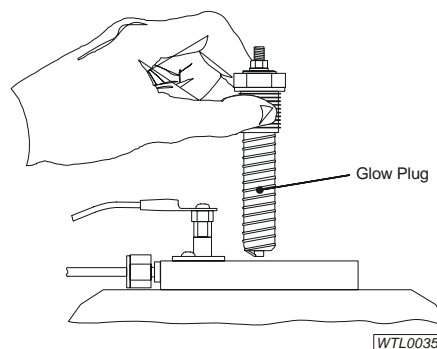
Procedure

To replace the glow plug:

1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit.
2. Remove the enclosure lid and wait for the engine to cool.
3. Remove the nut on top of the glow plug and detach the wire.



4. Unscrew the glow plug using a 22mm (spark-plug size) spanner.
5. Remove the glow plug.



6. Insert a new glow plug with a washer into the evaporator and fasten the glow plug securely with a torque of 20 to 25Nm
7. Replace the wire terminal and washer on the threaded tip of the glow plug and fasten the nut securely.
8. Replace the enclosure lid.

The old glow plug can be returned to your authorised WhisperGen™ service agent for checking.

Replacing Fuses

Replacing the Battery Bank Voltage Fuse

Overview

The WhisperGen™ detects the voltage of the battery bank via two wires connected to the terminals of the battery bank as shown below.

If the battery bank voltage displayed on the control panel is abnormal, the fuse in the circuit may have blown.

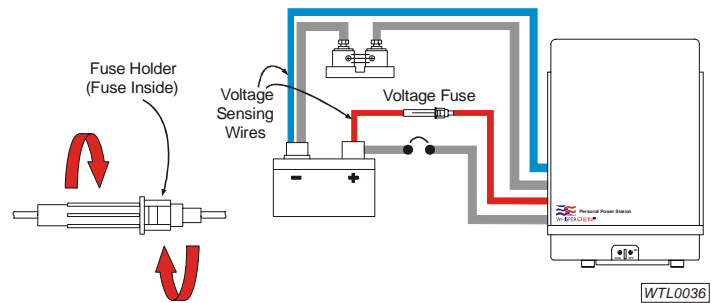
⚠ WARNING Before replacing a fuse, find out the cause of the fault. Otherwise, damage to equipment may occur. If you are unsure of the cause of the fault, contact your authorised WhisperGen™ service agent for assistance.

⚠ WARNING Ensure that the replacement fuse is of a similar type (Ø0.25 x 1.25 inch, or Ø6.35 x 31.75mm) and of the correct current rating (2.00A). It is advisable to keep spare fuses with the WhisperGen™ at all times.

Procedure

To replace the battery bank voltage fuse:

1. Unscrew the fuse holder.



2. Replace the faulty fuse.
3. Fasten the fuse holder.

WhisperGen™ fuses can be obtained from electrical hardware suppliers or your authorised WhisperGen™ service agent.

Replacing Other Fuses

Overview

The WhisperGen™ has fuses that protect against overloading of its electrical circuits. If a circuit is overloaded, the fuse will blow and the WhisperGen™ will shut down with the fault indicated on the control panel.

⚠ WARNING Before replacing a fuse, find out the cause of the fault. Otherwise, damage to equipment may occur. If you are unsure of the cause of the fault, contact your authorised WhisperGen™ service agent for assistance.

⚠ WARNING To prevent unintentional starts of the WhisperGen™, heed the warning given at the beginning of this section.

⚠ WARNING Do not touch surfaces that are labelled as hot

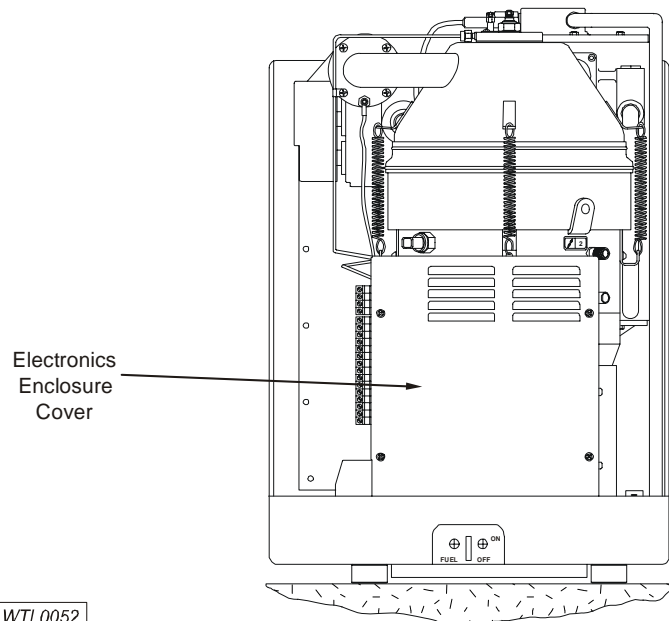
⚠ WARNING Ensure that the replacement fuse is of a similar type and of the correct current rating.

⚠ WARNING It is advisable to keep spare fuses with the WhisperGen™ at all times.

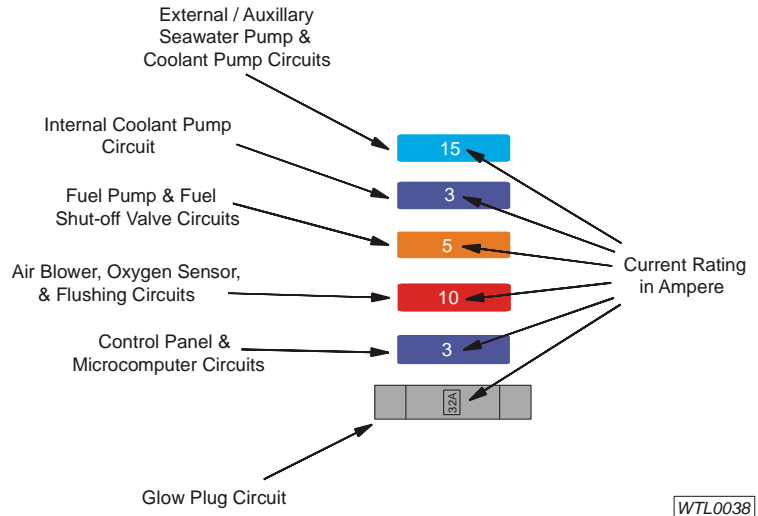
Procedure

To replace a fuse (other than the battery bank voltage fuse):

1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit. Then remove the enclosure lid.
2. Disconnect the WhisperGen™ from the battery bank by opening the circuit breaker.
3. Release the four screws securing the cover of the electronics enclosure and remove the cover.



4. Remove the appropriate fuse and check if it has blown. The fuses are located at the bottom of the electronics enclosure and are marked with their current ratings in Ampere. Error codes displayed on the control panel help identify which circuit and therefore which fuse may possibly have blown.



5. Replace the faulty fuse.
6. Replace the electronics enclosure cover and fasten the four screws.
7. Replace the enclosure lid.
8. Reconnect the WhisperGen™ to the battery bank by closing the circuit breaker.

Note that WhisperGen™ fuses can be obtained from electrical hardware suppliers or your authorised WhisperGen™ service agent.

Replacing the FID

Overview

Check the condition and vertical position of the Flame Ionisation Detector (FID) if error codes 58, 59, 60, 61, or 62 occur repetitively.

⚠ WARNING To prevent unintentional starts of the WhisperGen™, heed the warning given at the beginning of this section

⚠ WARNING Do not touch the surfaces that are labelled as hot.

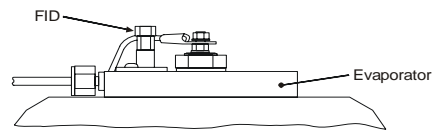
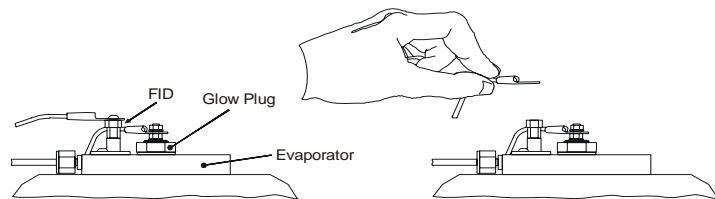
⚠ WARNING It is important not to twist the brass nut on the FID as this may damage the FID.

⚠ WARNING It is advisable to keep a spare FID with the WhisperGen™ at all times.

Procedure

To check and/or replace the FID:

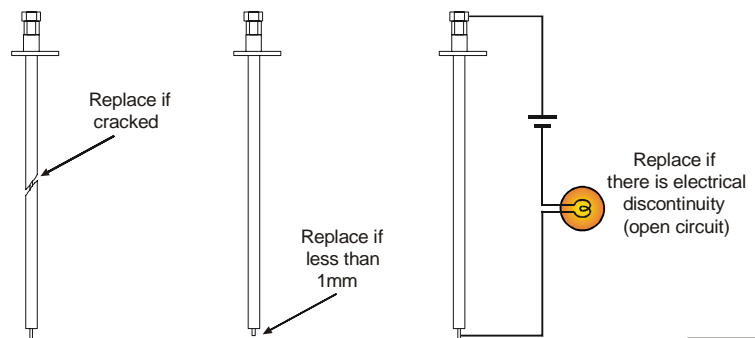
1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit.
2. Remove the enclosure lid and wait for the engine to cool.
3. Undo the screw on top of the FID and detach the wire.



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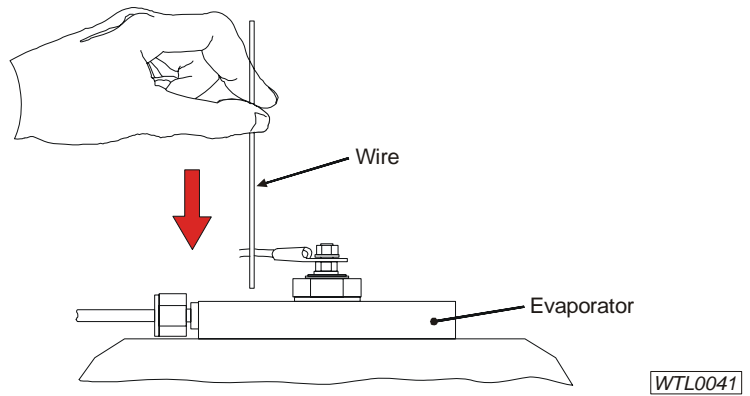
4. Undo the screw that secures the FID clip to the evaporator.
5. Lift the FID out of the evaporator, gripping the FID below the brass nut with a pair of pliers if necessary. Twist the FID from side to side while pulling it straight up.
6. Check the FID for cracks and that the electrode tip at the bottom of the FID is protruding by at least one millimetre.

Also check that there is electrical continuity between the brass nut and the electrode tip. If the FID is cracked, has less than one millimetre of the electrode protruding, or has electrical discontinuity, it should be replaced with a new one. Otherwise, the FID is re-usable.

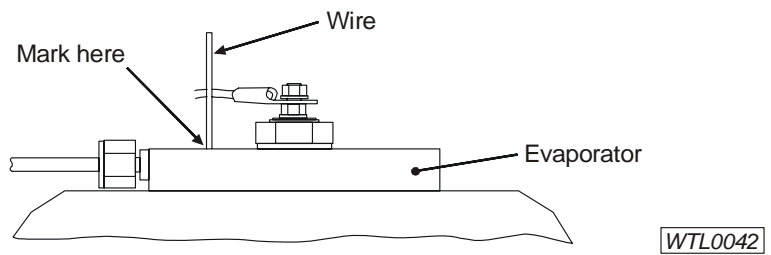


WTL0040

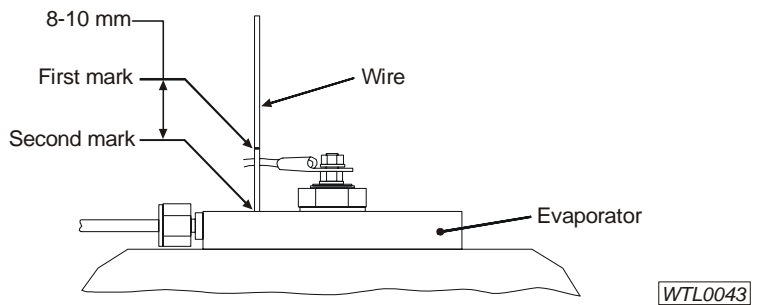
- Insert a straight length of rigid wire vertically into the FID hole. The wire should go down $134 \pm 5\text{mm}$.



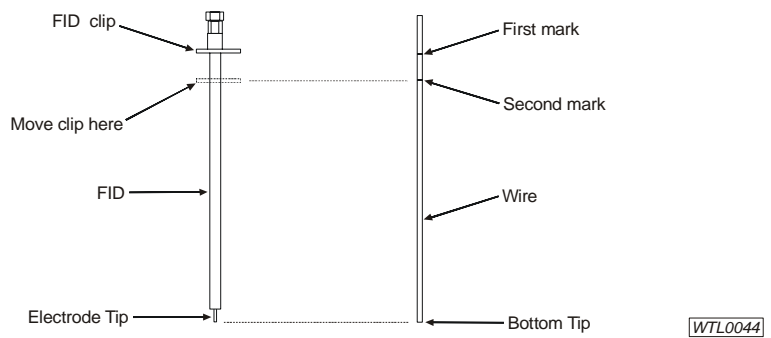
- With the wire touching the base of the FID hole, mark on the wire the top level of the evaporator.



- Lift the wire up by 8-10mm (no less than 8mm and no more than 10mm) and put a second mark on the wire at the top level of the evaporator.



- Remove the wire from the evaporator and move the FID clip so that the distance from the clip to the electrode tip is the same as the distance from the second mark on the wire to the bottom tip of the wire. To move the clip, wedge it open slightly with a screwdriver.



11. Without shifting the vertical position of the clip, insert the FID into the FID hole, gripping the FID below the brass nut with a pair of pliers if necessary. Twist the FID from side to side while pushing it straight down.
12. Fasten securely the FID clip to the evaporator, and the wire terminal to the FID.
13. Replace the enclosure lid.

The WhisperGen™ may now be started as required.

Replacing the Oxygen Sensor

Overview

Replace the oxygen sensor if error codes 14, 56, 60, 61, 62, or 76 occur repetitively. In general, you should check the FID for error codes 60, 61, and 62 before deciding to replace the oxygen sensor.

⚠ WARNING To prevent unintentional starts of the WhisperGen™, heed the warning given at the beginning of this section.

⚠ WARNING Do not touch the surfaces that are labelled as hot.

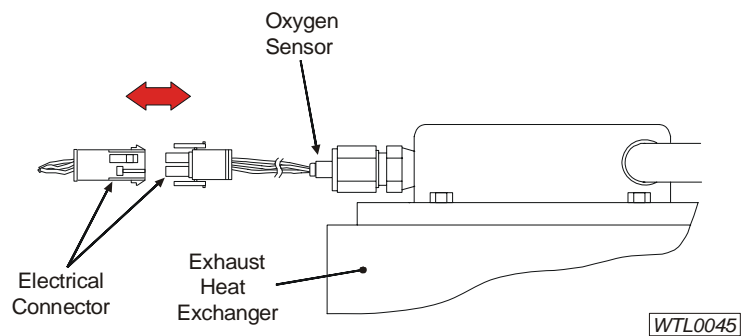
⚠ WARNING Do not touch the sensing tip of the oxygen sensor, as this will shorten its life span.

⚠ WARNING It is advisable to keep a spare oxygen sensor with the WhisperGen™ at all times

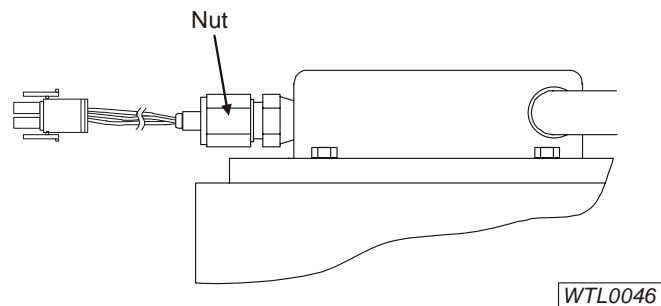
Procedure

To replace the oxygen sensor:

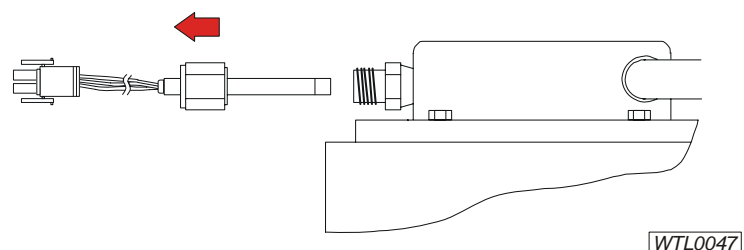
1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit.
2. Remove the enclosure lid and wait for the engine to cool.
3. Detach the electrical connector of the oxygen sensor by squeezing the two side clips.



4. Undo the nut that holds the oxygen sensor in place.

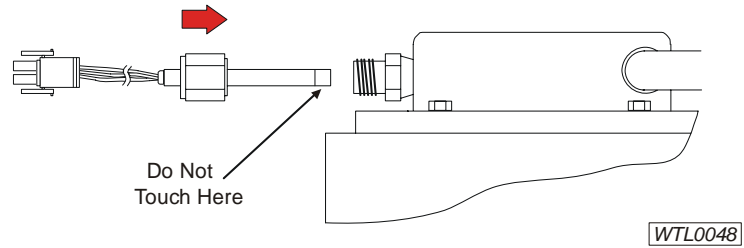


5. Remove the oxygen sensor.



6. Insert a new oxygen sensor into the oxygen sensor hole.

Note: the ferrules should already be set in position on the oxygen sensor. The ferrules should be distanced 60mm from the sensing tip of the oxygen sensor.



7. Finger tighten the nut that holds the oxygen sensor in place. Using a spanner tighten $1\frac{1}{4}$ turns only.
8. Re-fit the electrical connector.
9. Replace the enclosure lid.

The WhisperGen™ may now be started as required.

Replacing the Evaporator Wick

Overview

Replace the evaporator wick if error codes 58, 59, 60, 61, or 62 occur repetitively for ignition or flame failures respectively. You should check and replace evaporator wick as needed before deciding to replace the FID. Replace the evaporator wick every 500 hours of operation for optimal running.

⚠ WARNING You must remove the FID before you remove the evaporator. Removing the evaporator with the FID in place will damage the FID.

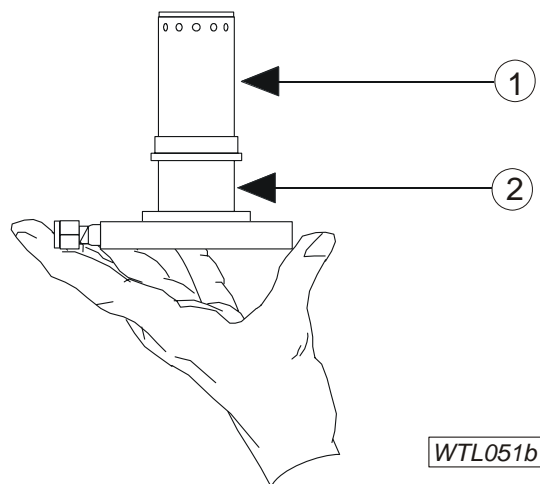
⚠ WARNING Only replace the gasket with a genuine WhisperGen™ gasket. Do not use other gasket material.

⚠ WARNING It is advisable to keep a spare evaporator wick with the WhisperGen™ at all times.

Procedure

To replace the evaporator wick:

1. Remove the FID. Inspect the FID for wear or damage.
2. Remove the glow plug. Inspect the glow plug for wear or damage.
3. Turn off the WhisperGen™ fuel valve.
4. Unscrew the fuel line fitting on top of the burner.
5. Undo the four screws on top of the evaporator with a 4mm allen key.
6. Lift the evaporator out of the burner.
7. Remove the evaporator gasket. Replace it if it is not flexible or if it is damaged.
8. Remove the evaporator sleeve (1) from the evaporator body (2) using a bearing puller if the sleeve is too tight to remove by hand.



9. Remove the wick and discard. Remove all carbon build up on the evaporator body using a wire brush or sand paper. Use a small screwdriver to remove deposits on the wick cavity.
10. Fit a new wick onto the evaporator body and not into the evaporator sleeve. Note that incorrectly fitting a wick into the sleeve blocks the sleeve holes and restricts the flame.

11. Place the evaporator sleeve on the evaporator body.
12. Place the evaporator gasket on the evaporator, ensuring that all the holes line up.
13. Insert the evaporator with the gasket into the burner and secure the four screws.
14. Check that the FID slides freely into the burner. Readjust the positioning of the evaporator as needed.
15. Refit the glow plug. Replace the glow plug if badly worn or damaged to ensure optimal running.
16. Reconnect the fuel line to the evaporator. Finger tighten the nut then tighten 3/4 turn using a spanner. Ensure that there is no leakage.
17. Refit the FID. Carefully the procedure in this manual entitled Replacing the FID to ensure correct FID positioning for optimal running.
18. Replace the enclosure lid.
19. Turn on the WhisperGen™ fuel valve.

The WhisperGen™ may now be started as required.

Replacing the Evaporator

Overview

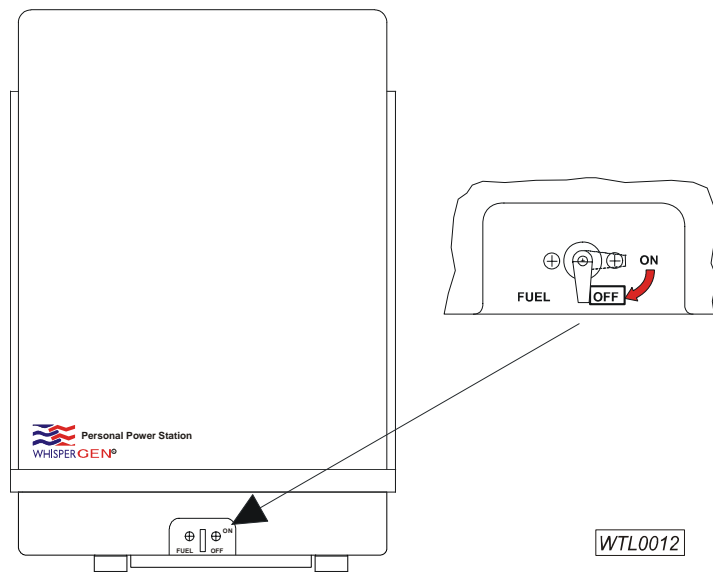
Replace the evaporator if error codes 58, 59, 60, 61, or 62 occur repetitively. In general, you should check and/or replace the FID and oxygen sensor before deciding to replace the evaporator. Only replace the evaporator after replacing the evaporator wick to reduce your maintenance costs. See the previous procedure to replace this.

⚠ WARNING It is advisable to keep a spare evaporator with the WhisperGen™ at all times.

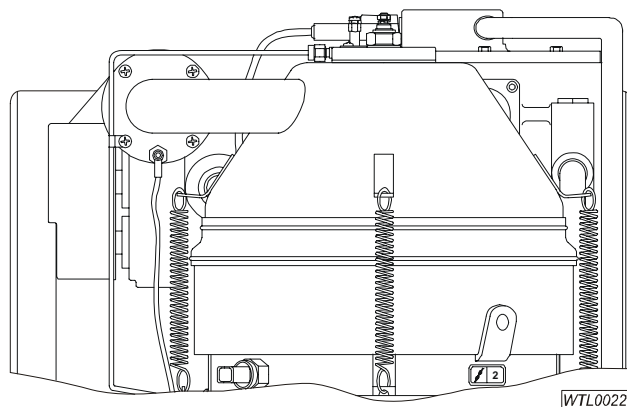
Procedure

To replace the evaporator:

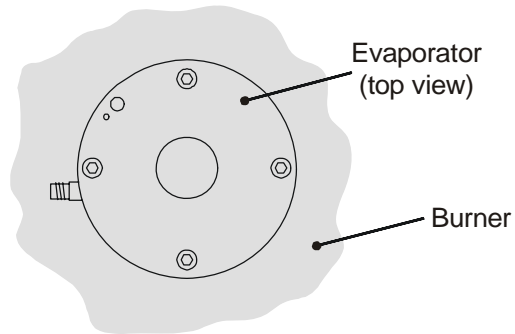
1. Remove the FID.
2. Remove the glow plug.
3. Turn off the WhisperGen™ fuel valve.



4. Unscrew the fuel line fitting on top of the burner.

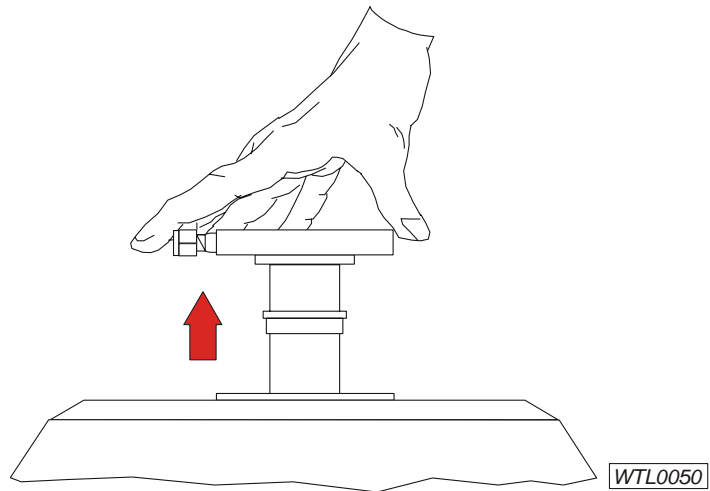


- Undo the four screws on top of the evaporator.



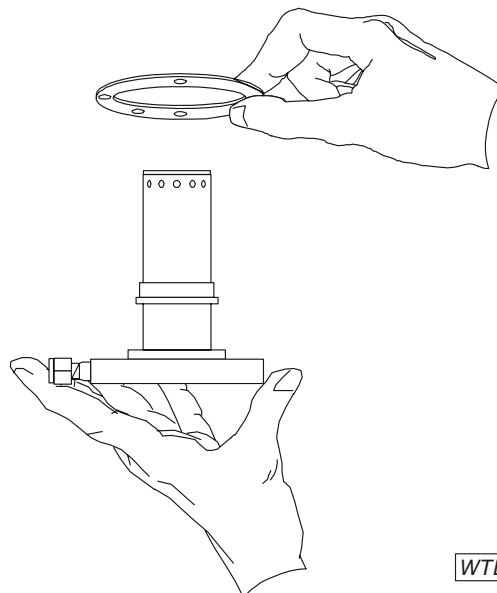
WTL0049

- Lift the evaporator out of the burner.



WTL0050

- Place the evaporator gasket on the new evaporator, ensuring that all the holes line up.



WTL0051

- Insert the new evaporator with the gasket into the burner and secure the four screws.
- Check that the FID slides freely into the burner. If necessary, loosen the four evaporator screws and readjust the position of the evaporator before re-tightening them.
- Refit the glow plug

11. Reconnect the fuel line to the evaporator. Finger tighten the nut against the shoulder. Using a spanner tighten $\frac{3}{4}$ turn only.
12. Ensure that there are no leakages.
13. Refit the FID.
14. Bleed the fuel line. Refer to section entitled - Bleeding the Fuel Line.
15. Replace the enclosure lid.
16. Turn on the WhisperGen™ fuel valve.

The WhisperGen™ may now be started as required. The old evaporator can be returned to your authorised WhisperGen™ service agent for servicing.

Flushing the Exhaust Heat Exchanger

Overview

Keep the exhaust heat exchanger free from blockages to ensure optimum performance of the WhisperGen™.

⚠ WARNING *If the exhaust heat exchanger becomes blocked, the performance of the WhisperGen™ will decrease.*

Procedure

To flush the exhaust heat exchanger:

1. Stop the WhisperGen™ and wait until the **STANDBY** indicator on the control panel is lit. Refer to the section entitled Stopping the WhisperGen™.
2. Access the Main Menu on the control panel. Access the default display on the control panel by pressing **Left Arrow** repeatedly.



Battery Watts

3. Press **Right Arrow** to display the first item on the main menu, the **User Menu**.



User Menu

4. Press **Down Arrow** to scroll down to **Installation Menu**.



Installation Menu

5. Press **Right Arrow** to display the first item on the installation menu.
6. Press **Down Arrow** to scroll down to **Hx Nozzle Bleed**.



Hx Nozzle Bleed

7. Press **Right Arrow** to begin editing the heat exchanger bleed setting.
8. Press **Up Arrow** to select **ON**, then press **Left Arrow** to begin flushing the exhaust heat exchanger. Flushing will continue for 10 seconds.



Hx Nozzle Bleed ON

9. Once the heat exchanger bleed shows **OFF** repeat steps 6 and 7 two more times.



Hx Nozzle Bleed OFF

This flushes the system a total of 3 times.

10. Optional: press **Left Arrow** repeatedly to return to the default display. You can also let the default display re-appear automatically by allowing a few minutes of inactivity on the control panel.



Battery Watts

The WhisperGen™ may now be started as required.

Winterising the WhisperGen™

Overview

Ensure you winterise your WhisperGen™ if you are not going to be using your boat and your WhisperGen™ in cold or freezing conditions.

If the primary system is not treated with anti-freeze and corrosion-inhibitor then it must be completely drained. If the system is treated with anti-freeze and corrosion-inhibitor then it can be left filled, provided it has been treated with anti-freeze and corrosion-inhibitor for any cold temperatures expected.

- After draining primary coolant, refill the coolant system through the header tank with pre-mixed distilled water and coolant using a marine-grade anti-freeze and corrosion-inhibitor, following the manufacturer's recommendations. Follow the procedure entitled checking the coolant.

You must also disconnect and drain the fresh water supply systems to the WhisperGen™, and you must also ensure that the secondary system is drained of all raw water. The fresh water is normally plumbed into the pressurised water supply to a fresh water connector on the WhisperGen™.

Drain any water in the condensate trap and condensate drain. Do this for all condensate drains that may be in the exhaust system.

- Unscrew the freshwater inlet on the back of the WhisperGen™ and drain any water in the loop attached to the condensate drain to avoid any pressure on the freshwater inlet from freezing expanding the pipe.

⚠ WARNING Any untreated water in the coolant pipes, fresh water flushing hose, the condensate drains or the WhisperGen™ may burst pipes and cause serious damage to the WhisperGen™ if any such water freezes.

⚠ WARNING The cooling system of the WhisperGen™ is vital to its performance. If the coolant level is not maintained, damage may occur.

⚠ WARNING Glycol can be harmful if swallowed or inhaled. Do not store it in open / unlabelled containers. Wash your hands thoroughly after handling it.

Trouble Shooting

Procedures

The WhisperGen™ automatically alerts you to most errors. Errors may be faults or warnings. If a fault occurs, the WhisperGen™ automatically clears the fault and attempts to restart. By default, the WhisperGen™ attempts to restart once. If you wish to change this setting, contact your authorised WhisperGen™ agent.

This section outlines faults and warnings that you may encounter and need to correct. After a fault is physically corrected, the error message displayed on the control panel needs to be cleared before normal operation may be resumed.

Although a warning can be cleared without the physical cause being removed, it is recommended that the cause be determined and removed at the earliest opportunity. Refer to section entitled Clearing Faults and warnings for more information.

If you need assistance, please contact your authorised WhisperGen™ service agent.

⚠ WARNING *You should read and understand all safety precautions before operating or maintaining your WhisperGen™.*

⚠ WARNING *If service checks are not performed by an authorised WhisperGen™ service agent every 12 months or 500 hours of operating time from the date of commissioning, the warranty on the WhisperGen™ will be void.*

⚠ WARNING *When performing any maintenance work on the WhisperGen™, refer to the applicable sections when removing or replacing parts and stopping or starting the WhisperGen™.*

The following procedures may need to be carried out if faults develop:

Procedure	How	When
Bleeding the fuel line.	See section - Bleeding the fuel line.	When there is air trapped in the fuel line. After a fuel run-out occurs. After the fuel filter is cleaned.
Cleaning the fuel pump filter.	See section - Cleaning the fuel pump filter.	When fuel supply faults arise. When the power output is constantly low.
Bleeding the coolant circuit.	See section - Bleeding the coolant circuit.	When there is a block over temperature fault.
Replacing the glow plug.	See section - Replacing the glow plug.	When a glow plug circuit fault arises and the glow plug fuse is not blown.
Replacing fuses.	See section - Replacing fuses.	When fuses are blown.
Replacing the FID.	See section - Replacing the FID	When ignition or flame faults occur repetitively.
Replacing the oxygen sensor.	See section - Replacing the oxygen sensor.	When oxygen sensor faults arise. If burner or flame faults occur despite FID replacement.
Replacing the evaporator.	See section - Replacing the evaporator.	If burner, ignition, or flame faults occur despite FID and/or oxygen sensor replacement.

For all WhisperGen™ faults and maintenance procedures not listed in this manual, please contact your authorised WhisperGen™ service agent for assistance.

⚠ WARNING *When maintaining or troubleshooting the WhisperGen™, only perform the procedures recommended in this manual. If you perform other procedures, you may cause injury or equipment damage, and the warranty on the WhisperGen™ will be void.*

Correcting Faults

⚠ WARNING When remedying WhisperGen™ faults, please follow the recommendations in this manual. Otherwise you may injure yourself and void the warranty. If the recommended action does not remedy the fault, contact your authorised WhisperGen™ service agent.

Code	Error Message	Likely Cause and Recommended Action
2	Exh overtemp	Likely cause: Low gas pressure and/or burner seal has failed. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
4	Block overtemp	Likely cause: Insufficient cooling of the engine block. Recommended Action: Check coolant level. Check for obstructions in coolant and seawater circuits. Allow engine to cool and restart.
6	Heatsink overtemp	Likely cause: Excessive power loss in electronic assembly, or poor air-cooling within electronics enclosure. Recommended Action: Ensure ambient temperature is below 40°C. Ensure airflow from the base of the enclosure through to the electronics heat sink is not blocked. Ensure the enclosure lid is fitted and well sealed. Restart.
7	Electronics too hot	See 6.
12	Air supply fail	Likely cause: Air blower tachometer signal out of range, obstruction of impeller, or electrical fault. Recommended Action: Check connections and presence of any obstructions. Restart.
14	O2 sensor failure	Likely cause: Absence of normal signal from oxygen sensor, or faulty oxygen sensor. Recommended Action: Check connections. Replace the oxygen sensor if fault continues. Restart.
16	Fuse/Daisy Ch fail	Likely cause: Electrical or thermal fuse blown, or break in burner safety circuit. Recommended Action: Check for high water temperature and high internal temperature. Check for blown fuses and restart. If restarting fails, check coolant level and allow engine to cool before restarting.
18	Low batt volts	Likely cause: Insufficient voltage to start the WhisperGen™. Recommended Action: Check condition of battery bank and terminals. If restarting fails, check the batteries. Replace faulty batteries and restart.
19	High batt volts	Likely cause: Battery higher than 18 or 36 volts. Recommended Action: Check condition of battery bank and terminals.
20	Bus not charged	Likely cause: Fault in electronics assembly or in battery bank voltage sensing wires. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
24	Isolator open	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
30	Low batt volts	See 18.
32	Bus not charged	See 20.

34	Isolator stuck on	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
35	Low batt volts	See 18.
36	Glowplug cct fault	Likely cause: Glow plug faulty and/or glow plug fuse blown. Recommended Action: Check glow plug fuse. If the fuse is intact, replace the glow plug and restart. If the fuse is blown, replace both the glow plug and fuse.
38	Bus not charged	See 20.
40	Isolator open	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
44	Fuel sense fail	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
46	Flame sense fail	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart, contact an authorised WhisperGen™ service agent if problem reoccurs.
48	Drive bridge fail	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
52	Fuel supply fail	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
54	Flame sense fail	See 46.
56	O2 sensor fail	Likely cause: Oxygen sensor signal not within expected range. Recommended Action: Check connectors and restart. Replace oxygen sensor if fault continues.
58	Ignition failure	Likely cause: No proper flame signals within two minutes after ignition. Recommended Action: Check fuel level, fuel valve, and fuel filter. Restart. Replace FID if fault continues. Restart. Replace evaporator if fault continues.
59, 60, 61, 62	Flame failure	Likely cause: Loss of flame after ignition. Recommended Action: Check fuel level, fuel valve, and fuel filter. Restart. Replace FID if fault continues. Restart. Replace oxygen sensor if fault continues. Restart. Replace evaporator wick if fault continues.
64	Heatup failure	Likely cause: Failure to reach cranking temperature within eight minutes. Thermocouple failure or poor flame strength. Recommended Action: Check fuel level, fuel valve, and fuel filter. Check exhaust for blockage. Attempt to restart, contact an authorised WhisperGen™ service agent if problem reoccurs.
66	Crank failure	Likely cause: Unsuccessful crank attempt, probably due to an electrical fault. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.

68	Engine sluggish	Likely cause: Low power output after cranking, possibly due to low gas pressure. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
72	Drive bridge fail	Likely cause: Abnormal electrical condition. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
74	Low engine power	Likely cause: Low power output, possibly due to low gas pressure. Low fuel flow. Recommended Action: Check fuel level, fuel valve, and fuel filter. Check exhaust for blockage. Flush heat exchanger. Restart. If the problem reoccurs contact an authorised WhisperGen™ service agent.
76	O2 sensor OOL	Likely cause: Oxygen sensor reading out-of-limits, possibly resulting in poor combustion. Recommended Action: Check connector and restart. Replace oxygen sensor if fault continues.
80	Clamp failed on	Likely cause: Abnormal electrical condition. Recommended Action: Contact authorised WhisperGen™ service agent.
82	Excess volt drop	Likely cause: Too high electrical resistance between the WhisperGen™ and battery bank. Recommended Action: Check battery bank connections and battery bank voltage sensing wires. Restart. Battery cables may be too small or too long. Check battery cable dimensions.
83	Battery overtemp	Likely cause: Battery bank temperature too high for safe charging. Recommended Action: Check battery bank connections and ventilate battery bank compartment. Restart.
84	Clamp failed off	Likely cause: Abnormal electrical condition, possibly resulting in raised battery voltage. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
85	High batt volts	Likely cause: Battery bank voltage above normal charging limits. Recommended Action: Check settings of any parallel charger connected to the battery bank. Restart.
90	Clamp control flt	Likely cause: WhisperGen™ unable to maintain correct battery charging voltage. Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.
92	ParChg V too high	Likely cause: WhisperGen™ operating voltage has gone too high, in an effort to avoid conflict with a parallel charger. Recommended Action: Check voltage settings of other chargers connected to the battery bank. Restart.

Correcting Warnings

Although a warning can be cleared without the physical cause being removed, it is recommended that the cause be determined and removed at the earliest opportunity. Warnings are indicated by a flashing **FAULT** indicator. No error message is displayed.

⚠ WARNING When remedying WhisperGen™ warnings, please follow the recommendations in this manual. Otherwise you may injure yourself and the warranty will be void. If the recommended action does not remedy the warning then contact your authorised WhisperGen™ service agent.

Code	Likely Cause and Recommended Action
102	<p>Likely cause: Exhaust gas hotter than normal, possibly due to low engine gas pressure.</p> <p>Recommended Action: Attempt to restart. Contact an authorised WhisperGen™ service agent if the problem reoccurs.</p>
104	<p>Likely cause: Engine coolant hotter than normal.</p> <p>Recommended Action: Check coolant level. Check coolant and seawater circuits for obstructions. Check pumps for operation.</p>
107	<p>Likely cause: Temperature in electronics enclosure abnormally high.</p> <p>Recommended Action: Ensure ambient temperature is below 40°C. Ensure airflow from the base of the enclosure through to the electronics heat sink is not blocked. Ensure the enclosure lid is fitted and well sealed</p>
126	<p>Likely cause: Controller is reset while engine is running or engine is hot. This could be the result of a bad contact between the WhisperGen™ and the control panel.</p> <p>Recommended Action: Fit a new cable.</p>
135	<p>Likely cause: Low battery bank voltage.</p> <p>Recommended Action: Check battery bank connections and battery bank voltage sensing wires. Set a higher value for Max Run Hours and/or turn Auto-charge option ON.</p>
182	<p>Likely cause: Excessive voltage drop in cabling to battery bank.</p> <p>Recommended Action: Check battery bank connections and cables.</p>
183	<p>Likely cause: Battery bank temperature is high.</p> <p>Recommended Action: Check battery bank connections and ventilate battery bank compartment.</p>
190	<p>Likely cause: Battery bank voltage is unstable during charging.</p> <p>Recommended Action: Check battery bank connections and cables.</p>
195	<p>Likely cause: Battery bank is discharged below a preset level.</p> <p>Recommended Action: Start the WhisperGen™ if it is not operating. Reduce electrical load on the battery bank. Set a higher value for Max Run Hours and/or turn Auto-charge option ON.</p>

Resetting the WhisperGen™

Resetting the Control Panel

Due to unusual circumstances, the control panel may sometimes display an incoherent message. If this happens, the control panel should be reset.

⚠ WARNING When performing trouble shooting tasks on the WhisperGen™, refer to the applicable sections(s) when removing or replacing parts.

To reset the control panel:

- Hold down **Left Arrow** for at least six seconds. A beep will be heard and the control panel will return to the default display, indicating normal operation.



Resetting the Electronics Hardware

Overview

In some cases, extreme electrostatic interference may cause the WhisperGen™ to become unresponsive to key presses on the control panel. If this happens, the WhisperGen™ electronics hardware should be reset as soon as possible to ensure that the battery bank is kept charged.

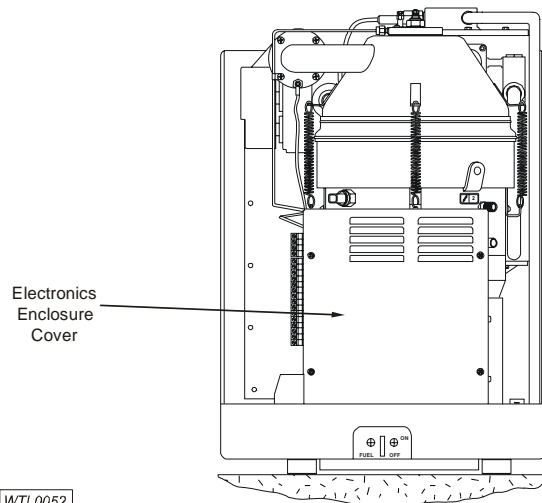
⚠ WARNING Do not touch the surfaces that are labelled "Hot Surface".

⚠ WARNING Ensure that the replacement fuse is of a similar type and of the correct current rating.

Procedure

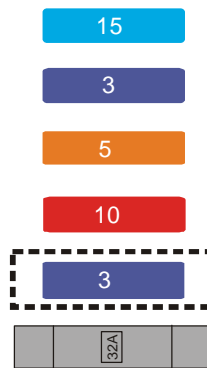
To reset the WhisperGen™ electronics hardware:

1. Remove the enclosure lid.
2. Remove the four screws in front of the electronics enclosure. Then remove the electronics enclosure cover.



WTL0052

- Unplug and then re-plug in the second fuse from the bottom - the fuse that has a current rating of 3A.



WTL0053

- Check that the WhisperGen™ is responsive to key presses on the control panel. If the control panel display was completely blank, it may be that the fuse was blown. In such a case, check the fuse and if it has blown, replace it with a new one.
- Replace the electronics enclosure cover and fasten the four screws.
- Replace the enclosure lid.

Service Log

Service Log (500 hour services)

Date / Hours	Description of Work Done	Agent's Stamp
DD MM YY / /		
500 Hour Meter Reading		
DD MM YY / /		
1500 Hour Meter Reading		
DD MM YY / /		
2500 Hour Meter Reading		
DD MM YY / /		
3500 Hour Meter Reading		

Service Log (1000 hour services)

Date / Hours	Description of Work Done	Agent's Stamp
DD MM YY / /		
1000 Hour Meter Reading		
DD MM YY / /		
3000 Hour Meter Reading		
DD MM YY / /		
5000 Hour Meter Reading		

Service Log (2000 hour services)

Date / Hours	Description of Work Done	Agent's Stamp
DD MM YY / /		
2000 Hour Meter Reading		
DD MM YY / /		
4000 Hour Meter Reading		
DD MM YY / /		
6000 Hour Meter Reading		

Compliance Information

Responsibility for compliance

It is the responsibility of the person(s) installing the WhisperGen™ and its systems to ensure that it is installed in compliance with all laws, standards, and regulations that apply in the country where the WhisperGen™ is installed. The installer must determine what laws and regulations apply.

European CE mark

The WhisperGen™ is CE marked for applications where it is installed in recreational craft. This means that in such an installation the WhisperGen™ complies with the Essential Health and Safety Requirements of the relevant European Commission Directives, which are:

- Machinery Directive 98/37/EC
- Electro Magnetic Compatibility Directive 2004/108/EC
- Pressure Equipment Directive 97/23/EC
- Waste Packaging Directive 94/62/EC

The installation of the WhisperGen™ must comply with the Recreational Craft Directive 94/25/EC and the Amending Directive 2003/44/EC. The Recreational Craft Directive harmonised standards relevant to the installation of the WhisperGen™ are:

- ISO 7840:2004 Small craft – Fire resistant fuel hoses
- ISO 9093-1:1994 Small craft – Seacocks and through hull fittings, metallic
- ISO 9093-2:2002 Small craft – Seacocks and through hull fittings, non metallic
- ISO 9094-1:2003 Small craft – Fire protection for a hull up to 15 m in length
- ISO 10088:2001 Small craft – Permanently installed fuel systems and fixed fuel tanks
- ISO 10133:2000 Small craft – Electrical systems – Extra low voltage DC installations
- ISO 10240:1995 Small craft – Owners manual
- ISO 16147: 2002 Small craft – Inboard diesel engines – engine mounted fuel & electrical components
- ISO 8528-10:1998 Noise – (meets specification of 50dBA at 7m)

Explosive environments

The WhisperGen™ is not suitable for installation in spaces or compartments that require ignition-protected equipment.