



INSTALLATION MANUAL

Cooling water/exhaust gas separator

WP-WL & WP-WGS



CONTENTS:

1	GENERAL
1.1	Use of this manual
1.2	Guarantee Specifications
1.3	Quality
1.4	Liability
1.5	Safety
2	TECHNICAL DATA
2.1	Specifications
2.1.1	Specifications Water/Gas Separator WP-WGS
2.1.2	Specifications Water/Gas Separator WP-WL
3	INSTALLATION
3.1	General
3.2	Low backpressure
3.3	Fittings
3.4	Exhaust hose
3.5	Exhaust diameter
3.6	Positioning of the parts
3.7	Length of the hoses.
3.8	Position of the water-outlet.
3.9	Avoid bends
3.10	Heeling of the boat
3.11	Extra muffler
3.12	The North Sea Exhaust
3.13	The one time up and down routing
4	MAINTENANCE & DRAINAGE
4.1	General
4.2	Winter preparations

1 GENERAL

The WP-WL & WP-WGS exhaust components are manufactured and marketed by WhisperPower.

In this manual you will find all the necessary information for the proper installation of the WhisperPower WP-WGS Cooling Water/ Exhaust Gas Separator and WP-WL Waterlock. The installation directives and dimensions given in this manual are valid for WhisperPower Marine generators. The WP-WL & WP-WGS are not suitable for propulsion engines and generators of other brands.

The WhisperPower WP-WL & WP-WGS Waterlock and Water/Gas separator are parts of a "wet exhaust system" of a WhisperPower marine diesel generator set and only for intermittent power installed on board boats and yachts.

When applying a "wet exhaust system", water is injected into the exhaust to cool down the exhaust gas and reduce the exhaust noise. This allows the exhaust hose and other parts to be made of rubber and plastics.



WARNING

The WP-WL & WP-WGS exhaust parts and rubber exhaust hose should never be used in a dry exhaust system and in installations with petrol engines.

1.1 Use of this manual

This manual serves as a guideline for a safe and effective installation. It also gives instructions for draining water from the waterlock

Keep this manual at a secure place!

1.2 Warranty Terms

The period and conditions of the guarantee are laid down in the general conditions of delivery as registered with the Chamber of Commerce and Industries for the North of the Netherlands number 01120025 and are available on request. The guarantee period is two years. Guarantee does not cover failures that are caused by misuse, neglect or a faulty installation.

Faulty installation; the ingress of seawater is the most common cause of damage to combustion engines in boats (both to propul-

sion and generator engines). The entry of water must be avoided under all circumstances. Be aware that the conditions in blue water sailing can be extreme. Refer to this installation manual for instructions but, remember, these are for guidance only as many factors influence the installation of an engine. The ultimate responsibility will always be with the owner to ensure a safe and compliant installation. If in doubt ask!

To prevent the ingress of water under circumstances on sea when the generator is not running, it could be necessary to shut down the valve of the water drain of the water/gas separator. Heavy weather conditions could even make it impossible to use the generator or propulsion engine.



WARNING

A sea cock has to be placed in the pipe that drains the water below the waterline (figure 7, reference 1). On the other hand a shut down valve in the gas pipe (figure 7, reference 2) is very uncommon and very risky. Starting the engine while the valve is closed will cause a huge pressure in the exhaust lines and the WP-WL & WP-WGS parts, the exhaust hose and other parts in the exhaust will burst. Water and exhaust gasses will flow freely into the engine room



WARNING

Water in the cylinders will cause serious damage to the engine. Besides corrosion, a bent piston rod or a cracked cylinder head are possible. In fact water in the cylinders is the main cause of engine damage in pleasure craft



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1.3 Quality

During the production and prior to their delivery, all our products are exhaustively tested and inspected.

1.4 Liability

WHISPERPOWER can accept no liability for:

- Consequential damage due to use of the WP-WL waterlock and the WP-WGSwater/gas separator,
- Possible errors in the manuals and the results thereof.

1.5 Safety

The exhaust system is a critical part of the installation. When leaking or damaged, seawater can enter the boat. Leakages can also bring carbon monoxide into the boat.



WARNING

The exhaust lines must be absolutely free of leak-ages. Exhaust fumes contain carbon monoxide and are extremely dangerous. Carbon monoxide (CO) is an invisible odourless gas. Inhalation produces headache, nausea, or death.

2 TECHNICAL DATA

2.1 Specifications

The WP-WL & WP-WGS parts are developed to fit in the exhaust hose of WhisperPower generator sets but can be used in the installation of generators and propulsion engines of other brands as well. Refer to the installation manual of the manufacturer of any non-WhisperPower equipment for specific instructions.



The Whisper Power WP-WL & WP-WGS parts are made of a polyethylene material. Polyethylene is non-flammable and can be up to certain temperatures.

This is important because in case of malfunctions, wherein the cooling water is blocked, the exhaust parts can stand the dry un-cooled exhaust gases and therefore for a limited time, without this resulting in leaks. During this period should intervene the security system and stop the generator motor or alert the captain, so that he can stop the propulsion engine.

Although the WP-WL & WP-WGS parts can withstand a much higher temperature a wet exhaust system should not exceed a continuous temperature of 40° Celsius (104° F).



WARNING

A wet exhaust system must be protected against running dry by means of a high exhaust temperature alarm (propulsion engines) or a shut down device (generators). All WhisperPower generators are protected with a high exhaust temperature shut down device



WARNING

The exhaust hose applied in a wet exhaust system should comply with ISO 13363.

WATER/GAS SEPARATOR	WATERLOCK
Art. nr. 40230087	Art. nr. 40230083
Art. nr. 40230088	Art. nr. 40230084
See section 2.1.1	See section 2.1.2

2.1.1 Specifications Water/Gas Separator WP-WGS

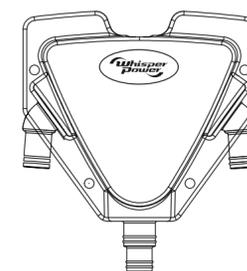


Figure 1: Water/Gas Separator

MODEL WATER/GAS SEPARATOR	40/40/40MM WP-WGS	51/40/51MM WP-WGS
Part number	402300877	40230088
Hose connection size	40-40-40mm (1/5/8" - 1/5/8" - 1/5/8")	51-40-51mm (2" - 1 5/8" 2")
Type of connectors	2x bend, 1x straight	2x bend, 1x straight
Material hose connectors	PE + SST 316	PE + SST 316
Material body	PE	PE
For Whisper generator models	Piccolo	M-GV15
For 3000 rpm Whisper models	M-SC 3.5 / 6 / 8 / 10 / 11	
Voor 1500 rpm Whisper generatoren	M-SQ 6 / 7	M-SQ 8 / 9.5 / 10 / 11 / 12 / 15 / 16
Storage temperature	-40° till 70° Celsius	-40° till 70° Celsius
Operating temperature	0 - 40° Celsius	0 - 40° Celsius
Dimensions WxDxH (incl. fittings)*	375x169x417mm	375x169x417mm
Weight	2.5 kg	2.6 kg

* See figure 1

2.1.2 Specifications Waterlock WP-WL

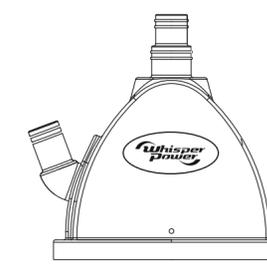


Figure 2: Waterlock WP-WL

MODEL WATERLOCK	40MM WP-WL	51MM WP-WL
Part number	40230083	40230084
Hose connection size	40-40mm (1 5/8")	51-51mm (2")
Type of connectors	1x bocht, 1x recht	1x bocht, 1x recht
Drainplug	PE	PE
Material hose connectors	PE + SST 316	PE + SST 316
Material body	PE	PE
For Whisper generator models	M-GV4 / 8 / 10 / Piccolo	M-GV15
For 3000 rpm Whisper models	W-SC 3.5 / 6 / 8 / 10 / 11	
For 1500 rpm Whisper models	W-SQ 6 / 7	W-SQ 8 / 9.5 / 10 / 11 / 12 / 15 / 16
Storage temperature	-40° till 70° Celsius	-40° till 70° Celsius
Operating temperature	0 - 40° Celsius	0 - 40° Celsius
Dimensions WxDxH (incl. fittings)*	310x210x310mm	310x210x310mm
Watercontent Waterlock	4 liter	4 liter
Weight	2.4 kg	2.4 kg

* See figure 2

3 INSTALLATION

3.1 General

A waterlock is a container that holds the water still in the exhaust line when the engine is stopped, preventing it flowing back into the engine. Therefore the waterlock must be below the engine on the lowest point in the system. When starting the engine again the construction of the waterlock causes the water to be blown out of the container. The exhaust gas lifts the water up to the transom

or hull side. For this reason the "waterlock" is also known as a "water lift" in the USA. The waterlock is also an effective silencer that reduces the exhaust noise.

The water/gas separator separates the water from the exhaust fumes to drain it below the waterline. The fumes are released above the waterline. In this way there are no splashing or gurgling noises. The separator also has the function of a goose neck and should therefore be mounted 60 cm above the waterline. In addition the water gas separator is a silencer that reduces the exhaust noises even further.

3.2 Low backpressure

To understand the installation instructions it is important to know that the transport of the cooling water by the exhaust gas causes backpressure. When the backpressure is too high this brings trouble for the engine. To keep the backpressure within acceptable limits the length and the height of the up going exhaust line (lift) must be kept within the specifications of the engine manufacturer. The specifications mentioned below refer to Whisper Generating Sets and are similar to the specifications of other manufacturers. Most of the warnings and instructions below (for example to avoid bends) are intended to achieve a reduction of backpressure in the system.

3.3 Hose connection size

The WP-WL & WP-WGS parts are equipped with snap-in fittings that make the installation an easy job. The straight and bent fittings can be rotated. In this way the best routing of the hoses can be achieved.

- The turning parts needs to be turned till the end!
- After this the turned parts may rotate maximum 180° one time.
- The hoses must be fixed with hoseclamps at the location of stainlesssteel inserts.
- Approx. 40cm from the turning parts the hoses must be fixed with a pall relief.

Besides the WP-WL & WP-WGS parts, Mastervolt supplies all necessary accessories to install generator-sets such as stainless-steel hose clamps, elbows, and rubber exhaust hoses (in accordance with ISO 13363) These accessories are available in individual items or in complete kits.

The hose clamps supplied by WhisperPower in the exhaust installation kits are of a high quality stainless steel and designed one clamp to hold the hose in all circumstances. However ABYC and CE standards prescribe the use of 2 clamps for each connection when the connection is below the waterline. See our web page www.whisperpower.eu for an extensive overview of all kinds of generator parts.

3.4 Uitleaatslang

It is absolutely necessary to use proper exhaust hose of good quality.



WARNING

The exhaust hose applied in a wet exhaust system should comply with ISO 13363

WhisperPower strongly recommend the use of corrugated hose that is flexible and internally smooth. The hose should be routed in a way that no stress is transferred to the connectors of the exhaust parts. Exhaust hose supplied by WhisperPower is a very flexible corrugated hose that complies with ISO13363 and is certified by LR and DNV.

3.5 Exhaust diameter



WARNING

Only use exhaust hose and fittings with correct diameter as specified by the engine (generator) manufacturer

The WP-WL & WP-WGS series are available for exhaust diameters as specified in section 2.1 and following. Do not reduce any of these hose diameters. Sometimes plastic transoms, fittings and valves as used on aluminum boats have a much smaller inner diameter. In this case one should select oversized fittings to compensate for the smaller inner diameter. Too small a diameter will cause a too high back pressure.

Using too wide a hose causes the emulsion of gas and water to break down. Then the gas goes up and the water drops down to build up in the hoses and waterlock. The gas is then forced through the water and the result is too a high back pressure. When the system is filled up with water, water can get back into the outlet ports of the engine when the engine is stopped. This water will damage the exhaust valves and valve seats. Too high back pressure will also reduce the power of the engine, it causes overheating of the engine and can cause the exhaust to be choked by carbon deposits (soot).

3.6 Positioning of the parts



WARNING

All dimensions should be calculated with a fully loaded boat being valid in all circumstances. Else extra valves must be installed in the exhaust system to protect the engine in extreme circumstances.

The waterlock must be installed just below the generator or engine, but not too low, because when the waterlock is positioned too low, the way up again is also longer and that means extra backpressure. On the other hand the waterlock may not be positioned too high, else water might run from the waterlock back into the outlet of the engine when the ship heels. Refer to section 3.10.

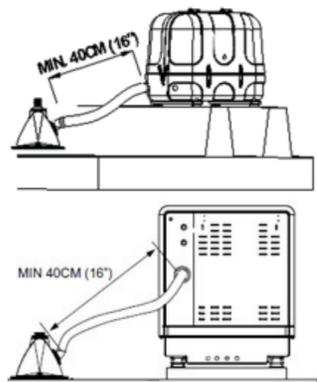


Fig 5. Waterlock min. 40cm (16") from the generator.

See figure 5. Mount the waterlock at a distance (minimum 40 cm or 16") from the generator to keep the water away from the outlet of the engine. When too close, strong movements of the ship or even condensation can cause water still being in the waterlock to get into the outlet ports of the engine.

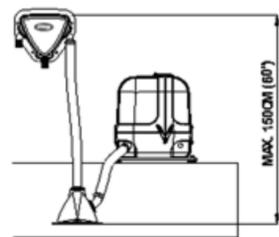


Figure 6. Maximum lift of the water/gas emulsion: 150cm (60")

See figure 6. The water/gas separator must be installed vertically. The separator replaces the goose neck that prevents water from the outside to enter into the exhaust.

The highest point of the water gas separator must be at least 60 cm (24") above the waterline.

The total lift from the bottom of the waterlock to the top of the separator should not be more than 150 cm (60").

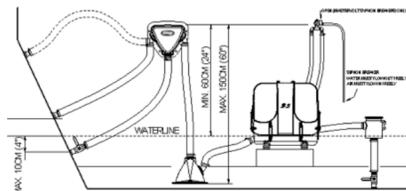


Figure 7. Overview Water/Gas separator and Waterlock system

3.7 Length of the hoses.

The length of the hoses should be according to the instructions and drawings below. The hose before the water gas separator should be as short as possible, and no more than 3 m (10') long in total (A-B in Figure 8).

The hoses after the water/gas separator sloping down can be up to 7m (21') long. When sloping down the transport of the water will cost less energy and length is less critical.

Long hoses containing water will be heavy and must be supported by brackets. The hoses should be prevented from swinging caused by the movements of the boat.

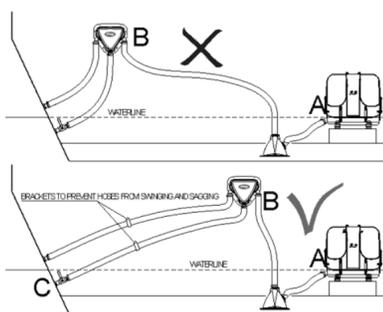


Figure 8. Keep hose between generator and Water/Gas separator as short as possible! Max. length of line between A and B is 3 meter (10'). BC may be much longer up to 7meter (21').

3.8 Position of the water-outlet

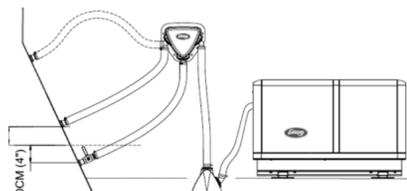


Figure 9. Water outlet max. 10cm (4") below the waterline.

See figure 9. The hose that drains the water should not be too far below the waterline. When deeper than 10cm below the waterline, the water will possibly not flow out fast enough from the water outlet, and will find its way out via the exhaust-gas-outlet. Much depends on the position of the outlet in the hull and the shape of the hull. As long as no water comes with the gas the system works well. No thrust pressure must be allowed to accumulate. If it does, water from the outside flow into the drain and could get into the engine.

3.9 Avoid bends

See figures 10 and 11. To ensure the proper drainage of the exhaust, the hose between the generator and the waterlock must be installed with a slope downwards.

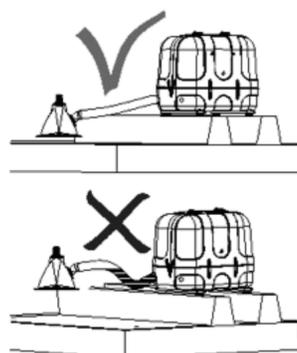


Figure 10. Let exhaust hoses from generator to waterlock run downwards only.

Bends and especially those that go up forming a 'U' or hanging bend cause extra backpressure. In a hanging bend water will collect after stopping the engine and could possibly flow back into the engine due to movements of the ship.

Water in a hanging bend of the gas outlet hose will block this outlet and cause a too high backpressure.

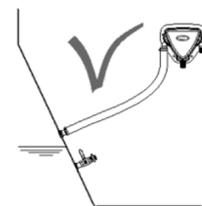


Figure 11. Water will collect in the hanging bend of the exhaust gas hose and will cause back pressure.

3.10 Heeling of the boat

See figure 12. When heeling the water/gas separator can get below the waterline and water may enter the engine. By mounting the water/gas separator close to the centre of the boat it will be above the waterline in all circumstances.

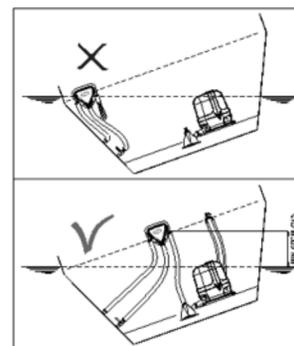


Figure 12. Siphon Breaker and Water/Gas separator min. 60cm (24") above the waterline in all circumstances.



WARNING

Prevent water getting into the engine.

Water can enter the engine from the waterlock into the exhaust outlet ports for example due to rolling, or pitching heavily

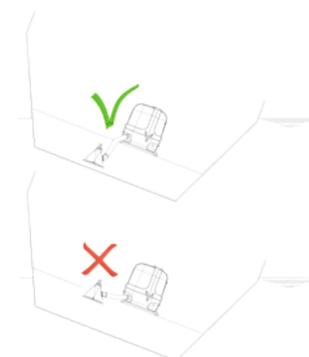


Figure 13. When heeling, the waterlock should still be below the generator to prevent water flowing back into the engine.

3.11 Extra muffler

In general the combination of a waterlock and a water/gas separator gives an almost noiseless exhaust. However in some occasions specific combinations of sections of hoses can produce an interference of sound waves that results in too high exhaust noise. Here an extra muffler can help.

When applying an extra muffler this must be installed in the hose that slopes downwards and not in the rising line.

See figure 14. When the result is still unsatisfactory one should contact WhisperPower customer service for an expert advice.

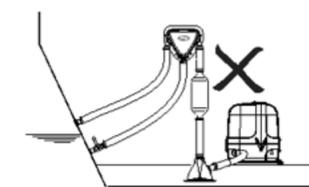


Figure 14. Place an extra muffler in the downwards sloping hose only.

3.12 The North Sea Exhaust

The gas outlet of installations near the waterline in the hull side could, in long passage, be below the waterline for too long a period. A possible solution is the use of a two way gas outlet also known as a North Sea Exhaust. See figure 15.

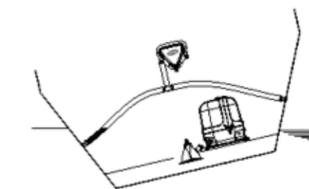


Figure 15. North Sea Exhaust

3.13 The one time up and down routing

Most water/gas separators on the market have the gas outlet pointing down. See figure 16. Many times the connection is only little above the waterline while the hose should not go up again because the gas will be blocked by water collected in the bend.

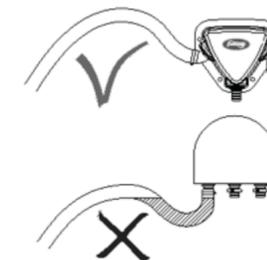


Figure 16. The WhisperPower Water/Gas separator has a higher position of the exhaust/gas outlet than most other brands.

This feature of the water/gas separator makes it possible to let the gas hose go up one time to pass a high object or bulkhead and even to bring the outlet into the stern of the ship. See figure 17.

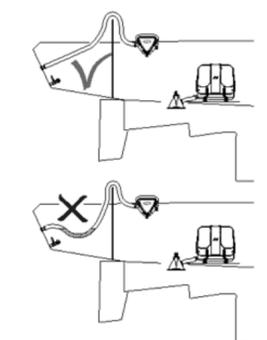


Figure 17. The gas outlet hose may go up once and then should slope down.

4 MAINTENANCE & DRAINAGE

4.1 General

The Waterlock and Water/Gas separator do not need maintenance. The fittings are lubricated with a long lasting silicon-grease.

4.2 Winter preparations

A method is to fill the system with anti freeze. The WP-WL & WP-WGS components are resistant to many chemicals including alcohols as used in coolants and anti freeze.