INSTALLATION & OPERATING INSTRUCTIONS

Bilge Filter Systems

www.waveinternational.co.uk

Wavestream Bilge Water Discharge Filters (Models WMS, WSS1–3, ERFU 94#) by Wave International Ltd are designed to remove hydrocarbons from bilge water to <15 ppm, supporting compliance with RCD 2013/53/EU Annex I, Clause 5.8. Approved under Lloyd's Register LR2096265TA, meeting ISO 15083:2020 and ISO 16387:2004, and recognised under ERFU 94#, these units must be installed and maintained as per these instructions for use in RCD-covered recreational craft.

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Section 1. Introduction

1.1 Important

It is important to us that this product works as advertised and that you enjoy the extra peace of mind that Wavestream™ offers by protecting the environment. If you have any queries that can not be answered by your supplier or engineer, please contact us direct on +44 (0) 1476 861717 or e-mail info@waveinternational.co.uk

1.2 What it does

CAUTION
This filter system is designed to remove trace oils. Heavy oil contamination in the bilge should be removed first using absorbent pads or other means.

- The Wavestream™ oil from bilge water filter system removes trace oils from the bilge water when being pumped overboard. Water collects in the bilge and can mix with fuel, grease and any oils that drip from the engine, gearbox, fuel lines, fuel tanks and greasing points in your boat.

- Wavestream™ is designed for use in all sizes of boat and can be used as a secondary filter after oil water separators on larger boats and Superyachts. The filters can be installed in multiples in series if the oil contamination is high. Although very low differential pressures are caused by installing a Wavestream™, bilge pumps can be very low pressure output and must be installed correctly, see **Section 1.4** Check with Wave International technical department if in doubt.

- If you pump oily bilge water overboard and there is a visible sheen left on the water at the point of discharge then you most likely are pumping water over the legal limit for discharge and polluting the environment. A Wavestream™ system was rigorously tested to achieve Lloyds register of Shipping Type Approval so when properly maintained you can prevent this occurring, preserving marine and aquatic life and avoid attracting costly fines.

1.3 About these instructions

The panels on the left of the pages draw attention to SAFETY CONSIDERATIONS of the adjacent text in accordance with the conventions of the EU Recreational Craft Directive.

DANGER

- DANGER. Indicates a hazard that could easily result in death or serious injury if proper precautions are not taken. If you have any doubts about what precautions to take, you should seek expert advice.

WARNING

- WARNING. Indicates a hazard that could result in death or serious injury if proper precautions are not taken. If you have any doubts about what precautions to take, you should seek expert advice.

CAUTION

- CAUTION. Indicates a hazard that could result in personal injury or damage to your boat or its equipment if suitable care is not taken.

NOTE

- NOTE. Contains additional information that may be of help.

1.4 Before you begin

CAUTION
If you have any doubts at any time about installing this equipment, please consult a qualified person or call Wave International for advice.

WARNING
Particulate material, sand and paint chips could block the filter and stop the discharge of bilge water. Take care when leaving the boat on an automatic pump

WARNING
If the bilge water system is to be left unattended during periods where water in the filter housing could freeze the system should be drained.

- Before you start, please read through these instructions carefully. Fitting the Wavestream™ involves:
- Cutting in to a section of flexible hose or bilge water discharge pipe after the bilge pump.
- Installing the Wavestream™ filter in to the flexible hose or bilge water discharge pipe after the bilge pump with hose tails and clamps, screwing in to a threaded section of pipe or using a flanged and bolted fitting.
- Mounting the Wavestream™ filter by bolting or screwing the mounting bracket to a solid fixing point.
- The position you mount the Wavestream™ in must allow for the bowl to be removed for cartridge replacement. Do not mount in direct sunlight.
- If your bilge contains particulate contamination such as sand, mud, paint chips and rust then there should be a strainer fitted at the bilge pump to stop the debris coming through to the Wavestream™ filter where it could cause blockage.
- **Some consideration must be given at this time to the bilge pump installation, the following all affect pump performance:**
- Hose length, too long causes high friction losses.
- Hose diameter, too small for pump.
- Hose construction, should be smoothbore.
- Outlet and or filter too high, giving too much head from the pump should be < 1000 mm
- Angles and fittings in hose, all cause a reduction in pump efficiency.
- A non-return valve in the system can reduce pump performance drastically.
- State of the battery and length and diameter of the electrical cable and incorrect cable all affect the voltage to the pump and therefore its speed.
- Check for airlocks in the line and the filter, the filters all have a bleed valve to release trapped air
- The closer the pump to the filter and outlet with smoothbore correctly sized hose with no extra fittings, such as elbows and right angle bends, in the hose the better. Always check with the Wave International Technical Department if in doubt.

Section 2. Tools and Fasteners

NOTE
Take care if using a sharp knife to cut flexible hose.

The Wavestream™ can be installed in to a flexible discharge hose with the average DIY toolkit. You will also need:

- A sharp knife or hacksaw to cut existing flexible bilge water discharge hose.
- The correct hose tails to fit the bilge pump flexible discharge hose.
- Spanners to fit the hose tail connections to the Wavestream™ head unit.
- A flat blade screwdriver for the hose clamps and Phillips head screwdriver for the bracket screws.
- Thread tape or thread sealing compound.

Section 3. Basic Components

NOTE
Hose tails and hose clamps are not supplied and will need to be obtained prior to fitting. See **Section 4**. for thread size.

- Before you start, please check that your system kit contains the following components. If you think you are short of any items, please call us immediately.

Wavestream™ Micro System

- 1 x Wavestream™ Micro System filter housing bowl and head unit.
- 1 x Wavestream™ oil removing cartridge already installed in the filter unit.
- 1 x Wavestream™ Micro System stainless steel mounting bracket.
- 1 x set of instructions.

Wavestream™ System 1

- 1 x Wavestream™ System 1 filter housing bowl and head unit.
- 1 x Wavestream™ oil removing cartridge already installed in the filter unit.
- 1 x Wavestream™ System 1 stainless steel mounting bracket.
- 1 x plastic bag containing 4 head to bracket fixing stainless screws.
- 1 x set of instructions.

Wavestream™ System's 2 & 3

- 1 x Wavestream™ System 2 or 3 filter housing bowl and head unit.
- 1 x Wavestream™ oil removing cartridge already installed in the filter unit.
- 1 x Wavestream™ System 2 or 3 stainless steel mounting bracket.
- 1 x plastic bag containing 4 head to bracket fixing stainless screws.
- 1 x plastic filter bowl removing spanner
- 1 x sachet of filter bowl O ring lubricant
- 1 x set of instructions.

Section 4. Wavestream™ Filter System Specifications

Wavestream™ Micro System WMS & WMSNPT	Wavestream™ System 1 – WSS1
FLOW RATE: 1- 40 Liters per min. MAX. PRESSURE: 8 bar. MAX. DIFF. PRES: 2 bar. MAX. TEMP: 45 deg. C. MIN. TEMP: 1 deg. C. CONNECTIONS: ¾" BSP (Note – WMSNPT supplied with ¾" NPT) CARTRIDGE: WS-CM DIMENSIONS: 169 X 133 mm Leave a minimum of 25 mm below the filter housing to allow cartridge removal.	FLOW RATE: 1- 40 Liters per min. MAX. PRESSURE: 6.2 bar. MAX. DIFF. PRES: 2 bar. MAX. TEMP: 45 deg. C. MIN. TEMP: 1 deg. C. CONNECTIONS: ¾" BSP CARTRIDGE: WS-C1 DIMENSIONS: 315 X 130 mm Leave a minimum of 25 mm below the filter housing to allow cartridge removal.
Wavestream™ System 2 – WSS2	**Wavestream™ System 3 WSS3 & WSS3-01**
FLOW RATE: 1- 265 Liters per min. MAX. PRESSURE: 6.8 bar. MAX. DIFF. PRES: 2 bar. MAX. TEMP: 37 deg. C. MIN. TEMP: 1 deg. C. CONNECTIONS: 1 ½" BSP CARTRIDGE: WS-C2 DIMENSIONS: 350 X 180 mm Leave a minimum of 50 mm below the filter housing to allow cartridge removal.	FLOW RATE: 1- 265 Liters per min. MAX. PRESSURE: 6.2 bar. MAX. DIFF. PRES: 2 bar. MAX. TEMP: 37 deg. C. MIN. TEMP: 1 deg. C. CONNECTIONS: 1½" BSP (Note – WSS3-01 supplied with 1" BSP) CARTRIDGE: WS-C3 DIMENSIONS: 606 X 180 mm Leave a minimum of 50 mm below the filter housing to allow cartridge removal.

WARNING
Wavestream System's required to be used with minimum 4 meter head pumps.

- **<u>It is recommended that the Wavestream Systems are used with bilge pumps rated at not less than 4 meter head (0.5 bar).</u>**

Section 5. Installing the Components

5.1 Fitting Wavestream™ (flexible bilge pump hose installation). See Fig 1.

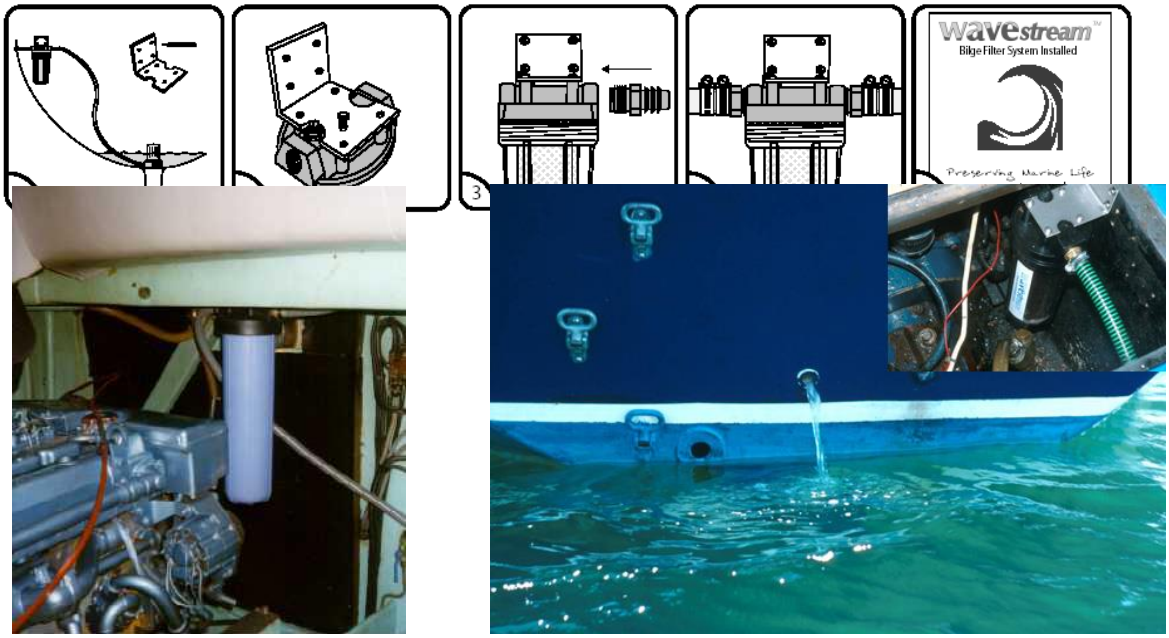
WARNING
Before fitting the filter ensure the bilge pump is not running.

WARNING
It is advisable to use two hose clamps on each hose tail, so each connection is double clamped.

NOTE
If installing in a hard piped system refer to the BSP thread data in **Section 4**

- Locate a suitable position, refer to **Section 1.4** and **Fig.1**, and fix the mounting bracket. The bracket is different with the Micro System compared with all the other units but the same tools and installation guidelines apply.
- Attach the filter housing to the mounting bracket using the screws provided, ensuring the flow direction is correct; there is an arrow on the top of the unit. The arrow must point in the direction of flow from the bilge pump towards the through hull fitting.
- Screw two hose tails in to the filter head using thread tape or compound to ensure a watertight seal. The hose tails are to be the corresponding size to match the flexible bilge water discharge hose
- Cut the flexible bilge water discharge hose immediately before and after the filter.
- Slide the two ends of the flexible supply hose over the hose tails on the filter head, check again the direction of flow and fit the hose clamps.
- It is preferential the Wavestream™ filter is vertical and it is required to have enough space below the filter unit to remove the filter bowl when changing the Wavestream™ filter cartridge, check the system specifications at **Section 4** above.
- Tighten the hose clamps, using two on each hose connection.
- Remove the filter bowl and check the 'O' ring is in position and the filter cartridge in place, tighten the bowl by hand. A plastic wrench is supplied for removing the bowl on the System 2 & 3 models, the wrench must only be used to remove the bowl not to tighten it.
- Run the bilge pump and bleed any air out of the filter housing using the bleed screw or button on the top of the unit.
- If the bilge pump overboard outlet is close to the waterline ensure water cannot flow back in to the bilge through the filter and bilge pump.

Fig 1.



Section 6. Cartridge Replacement

WARNING
Before replacing the cartridge ensure the bilge pump is switched off.

WARNING
Only use the plastic spanner provided with system's 2 & 3 to remove the bowl, do not use to tighten. Hand tighten only

- Make the cartridge replacement part of a regular maintenance programme, making sure to replace the Wavestream™ cartridge before it allows oily bilge water to pass. The period between cartridge replacements will depend on the condition of the bilge.
- Ensure you have the correct cartridge for your system.
- Ensure the bilge pump is switched off.
- Unscrew the filter bowl and pour the excess bilge water remaining in the bowl back in to the bilge. For the Wavestream System 2 & 3 there is a plastic spanner supplied
- Remove the saturated cartridge placing it in a suitable receptacle for onward responsible disposal.
- Check the 'O' ring is in the top of the bowl and it is in good condition and the seals on top and bottom of the new cartridge are in also in place. A sachet of filter bowl O ring lubricant is supplied with each WSS2 & WSS3, re lubricate the O ring when replacing the cartridge.
- Locate the new cartridge in the centre of the bowl and then tighten the bowl firmly by hand.
- Turn on the bilge pump and bleed any air from the housing using the bleed screw on the top of the Micro and System 1 and the bleed button on top of the System 2 & 3 and check for any leaks.

Section 7. Functional Checks

7.1 Installation Check

DANGER
If the bilge pump overboard outlet is close to the waterline ensure water cannot flow back in to the bilge through the filter and bilge pump.

- Go over all your work one last time, ensuring that:.
- Ensure the clamps securing the flexible bilge water discharge hose are fully tightened.
- Make sure any other components you disturbed or removed during the fitting process have been refitted correctly.

7.2 With Bilge Pump Running Check

- If fitted check the bilge pump discharge valve is OPEN.
- Check the entire discharge system for leaks.

7.3 Operational / Maintenance Check

WARNING
Check the Wavestream™ cartridge condition regularly and change at least once a year. Debris in the water can affect the performance of the cartridge.

- Make cartridge replacement part of a regular maintenance programme and change at least once a year.
- Replace the cartridge after there has been a heavy spill of oil in the bilge.
- Particulate material in the bilge water may reduce flow and the life of the cartridge.
- Do not pump your bilge if you suspect the cartridge needs changing.
- Ensure the filter bowl O ring is in good condition and lubricated before closing.

Section 8. Code of Practice

8.1 Some points to remember

WARNING
Discharging oily bilge water damages the environment and wild life.

- Make sure engines, fuel lines, connections and other systems that could be a source of oil or fuel contamination have seals and gaskets in good order and are not leaking.
- Use drip trays under engines and separate engine room bilges from the main bilge to reduce the chance of contaminating bilge water with oil.
- Carry absorbent pads or pillows in case of excessive spillage in to bilge due to fuelling, maintenance or other accidental dumping. The Wavestream System is a polisher only to remove the trace amounts from the overboard discharge.
- Prior to pumping inspect bilge to ensure no excessive amounts of oil or fuel are present, if there are use the pads to remove prior to pumping through Wavestream.
- Take ashore in proper containers any Wavestream cartridges, absorbents and sump oils which are to be disposed of at approved facilities at marinas, lock stations or local authority waste disposal sites.
- As far as possible, use biodegradable oils and unleaded fuel.
- Never use detergents or emulsifiers, as these will increase the risk of harming the environment when discharged overboard.

8.2 When refuelling

NOTE
Remember it is an offence to discharge contaminated bilge water into any watercourse. On no account should detergents or emulsifiers be used in bilge water.

- Take care not to spill fuel in to water
- Do not fill to very top, know the volume in your tanks and their total capacity.
- Place an absorbent pad over fuel inlet and under vent to prevent any spillage should there be any blow back or overfilling
- Listen to the filler pipe carefully to anticipate the fill level and prevent splash back
- If a spill occurs stop fuelling immediately.
- If after having taken all reasonable care when fuelling there is still spillage then notify the marina or fuelling point immediately so they can initiate their spill response procedures.
- When filling portable containers do so away from the waters edge and take care not to overfill. Loose containers should be secured safely when on board the vessel.

8.3 Approvals

- Wavestream™ systems are Lloyds Register of Shipping Type Approved and meet the 5ppm discharge requirement within the UK Boat Safety Scheme for the discharge of normal bilge waters.

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Your Local Agent Is:

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