User Manual

Modular Control Panels

FLUSH / BOX / HATCH

Operation and Care

Mab Watermaker AB

Contents

1 About this manual and your system

This user manual applies to MAB Watermaker FLUSH, BOX and HATCH with a single selector switch for RUN, 0 and FLUSH.

The manual explains how to operate the system: start water production, monitor operation, shut down and flush the system. It also covers routine care, pickling, winter storage and basic troubleshooting.

Read the safety instructions before use. Keep this manual readily available on board or near the installation.

1.1 Installation and servicing

The system must be installed and commissioned in accordance with the installation and service manual before use.

The installation and service manual contains instructions for mounting, electrical connections, hose connections and initial commissioning, as well as technical specifications and instructions for servicing and component replacement.

1.2 Intended use

MAB Watermaker uses reverse osmosis to desalinate seawater and brackish water. The product water is directed to a sampling outlet for checking or to a water tank.

2 Safety

2.1 Stop the system if a fault occurs

Turn the RUN/FLUSH selector switch to the centre position **0** and disconnect the power supply. Otherwise, the timer can start flushing even when the switch is in position 0.

If water is leaking, also close the water inlet.

Investigate and correct the cause before restarting the system.

2.2 Water and water quality

Do not operate the system in water that contains, or is suspected of containing, oil, fuel, sewage discharges or other chemical contaminants.

Monitoring TDS

Monitor the system's TDS reading together with operating pressure and water production. Compare these with the system's normal readings under similar conditions.

If the TDS reading remains above 500 ppm or rises significantly above its normal level, investigate the cause. An elevated reading does not automatically mean that the water is harmful to health, but it may affect taste and indicate reduced desalination performance.

Dispensing tap

The dispensing tap can be used to fill bottles, take water samples and divert product water during start-up with new membranes or after pickling.

After pickling, carry out the specified rinsing procedure before using the water for drinking. TDS is an operating check and does not replace rinsing.

2.3 Pressure and water supply

Before starting, check that the water inlet is open and that hoses and connections are undamaged. The high-pressure pump requires an adequate water supply during operation. If the water supply fails, stop the system and investigate the cause before restarting.

Do not exceed the system's maximum permitted operating pressure or product water flow rate. Keep the safety relief valve outlet unobstructed.

Stop the system if there are leaks, unusual noises or abnormal pressure readings.

2.4 Electrical safety and work on the system

Disconnect the power supply before servicing or working on pumps, hoses or electrical components. Turning the selector switch to position 0 does not disconnect the power supply.

Close the water inlet and make sure the system is depressurised before opening a hose connection, fitting or filter housing. Motors and pumps may become hot. Allow them to cool before working on them.

2.5 Flushing and storage

Flushing water must be **chlorine-free**. If tank water may contain chlorine, it must pass through the designated carbon filter. Follow the pickling instructions for extended periods of non-use and the frost protection instructions before winter storage.

3 The control panel

FLUSH, BOX and HATCH have the same controls, instruments and functions. The models differ in their enclosure and mounting arrangement.

1. **Hour meter** – displays the system's operating hours.
2. **TDS meter** – displays the product water TDS reading in ppm.
3. **Flushing timer** – sets recurring automatic flushing.
4. **Flow meter** – displays water production in litres per minute (LPM).
5. **Low-pressure gauge** – displays feed pressure from the seawater pump or flushing pump.
6. **High-pressure gauge** – displays operating pressure at the RO membrane.
7. **FLUSH indicator** – lights yellow during flushing.
8. **RUN indicator** – lights green when the seawater pump has started and orange when the high-pressure pump has started.
9. **Needle valve** – regulates operating pressure at the RO membrane.
10. **RUN/FLUSH selector switch** – selects water production (RUN), stops manual operation (0) or selects flushing (FLUSH).

Note: The timer can start automatic flushing even when the selector switch is in position 0.

3.1 Panel versions

BOX For surface mounting. All connections are at the bottom. W 26 × H 25 × D 12 cm.

FLUSH For recessed mounting in a cut-out in a wall or bulkhead. All connections are behind the panel. Panel dimensions W 26 × H 25 cm. Requires approximately 12 cm of clear depth behind the panel.

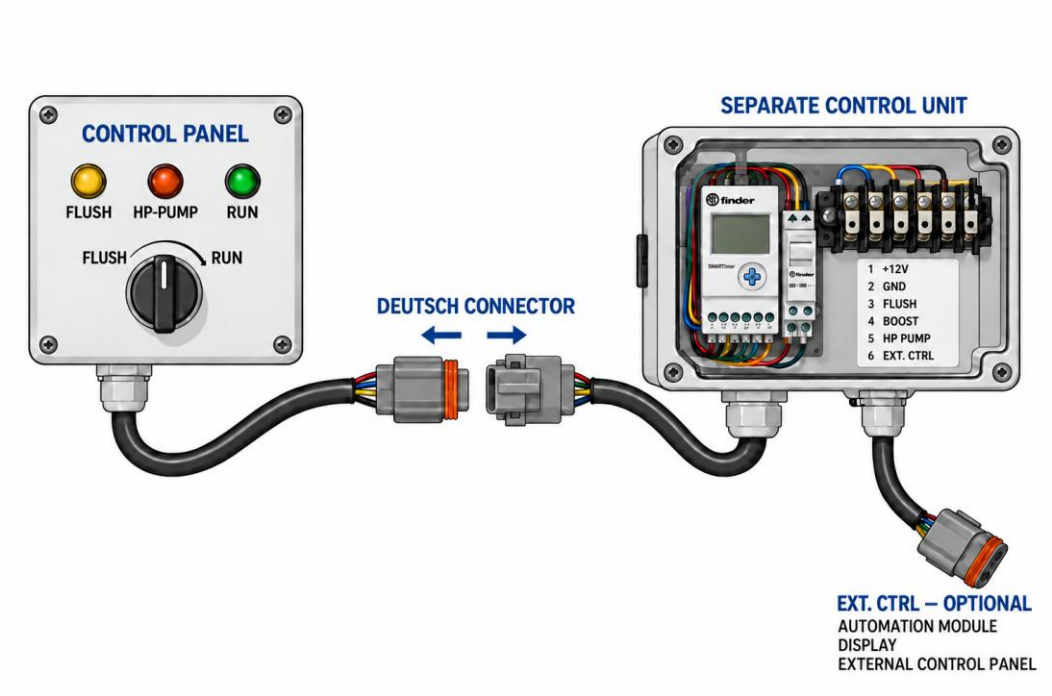
HATCH For recessed mounting, with a hatch in front of the panel. All connections are behind the panel. Overall frame dimensions W 35 × H 39 cm. Requires approximately 12 cm of clear depth behind the panel.

3.2 Control unit

The system is controlled by a programmable Finder relay and a terminal block housed in a separate control unit. The control panel connects to the control unit via a robust Deutsch connector.

The control unit also has a connection labelled EXT. CTRL for external control. This can be used to connect, for example, an automation module or a simple remote control panel. It allows additional functions to be added or the system to be operated from another location on board.

Mounting and electrical connections are described in the installation and service manual.



3.3 RUN, 0 and FLUSH

A single selector switch controls water production, stopping and flushing.

Position	Function
RUN	Starts water production. The seawater pump starts, and the panel's start-up and pressure protection functions control the high-pressure pump.
0	Stops manual operation. Flushing programmed through the timer can still start.
FLUSH	Starts manual flushing with chlorine-free fresh water.

Note: Position 0 does not disconnect the power supply. Disconnect the power supply before servicing and if a fault occurs, so that the timer cannot start the system.

Needle valve: Turn clockwise to increase operating pressure and anticlockwise to reduce it.

3.4 Reading the flow meter

The flow meter has two scales. Use the scale marked **LPM**, which shows litres per minute. Take the reading at the widest part of the float.

Example: **1.0 litre per minute equals 60 litres per hour.**

3.5 Dispensing tap and product water valve

The product water valve selects whether the water produced is directed to the dispensing tap or to the water tank.

The dispensing tap can be used to fill bottles, take water samples and divert product water during start-up with new membranes or after pickling.

3.6 Recurring flushing with the timer

The panel's Sinotimer is included as standard and can be set to flush the system automatically during short periods of non-use. Flushing helps reduce deposits in the membranes and hoses.

Use the timer as required. This function requires the power supply to remain connected, chlorine-free flushing water to be available and the system to be configured for flushing in accordance with the flushing instructions.

Programmed flushing can start even when the selector switch is in position 0.

For extended periods of non-use, pickle the system as described in the pickling section.

4 Starting and producing water

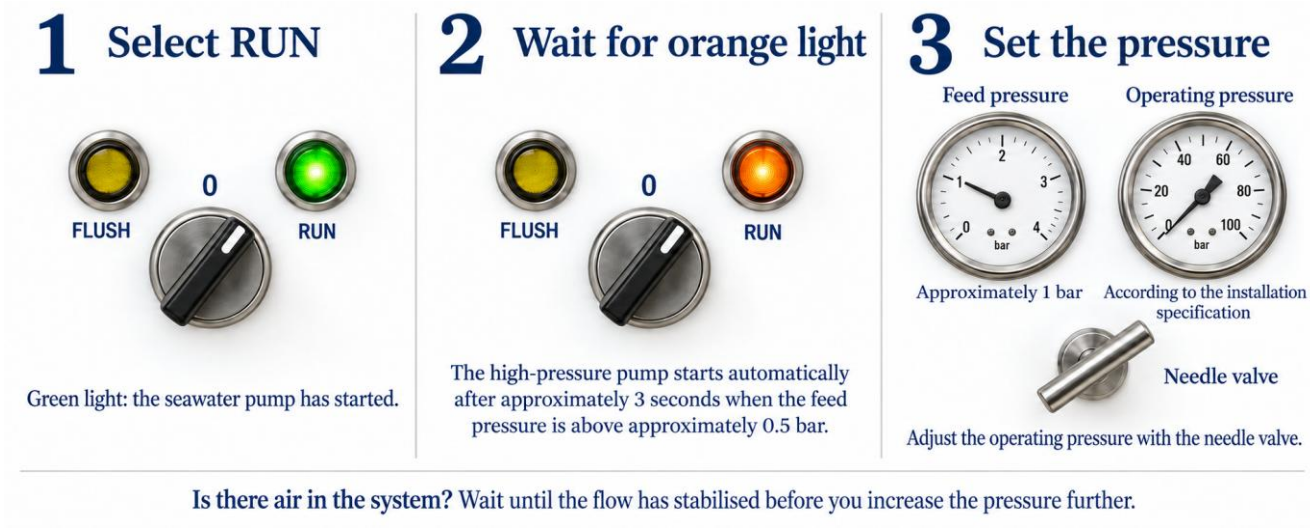
4.1 Before starting

This procedure applies to a fully installed and commissioned system. When starting for the first time with a new membrane, or after pickling, direct product water to the dispensing tap until the system has been rinsed and the TDS reading has stabilised.

1. Check that the raw water is suitable and that the water inlet is open.
2. Check that filters, hoses and connections are undamaged and that there are no water or oil leaks.
3. Check that the brine outlet is unobstructed and that the water tank has room for the water produced.
4. Set the product water valve to direct water to the dispensing tap.
5. Check that the needle valve is open so that the system starts without high operating pressure.

4.2 Starting and adjusting production

1. Turn the selector switch from 0 to RUN.
2. The green indicator lights to show that RUN is activated and the seawater pump has started. The high-pressure pump has not yet started.
3. After a delay of approximately 3 seconds, the high-pressure pump starts automatically, provided the feed pressure is above approximately 0.5 bar. This delay allows the water flow to stabilise before the pump starts.
4. When the high-pressure pump starts, the indicator changes from green to orange. Set the required operating pressure using the needle valve. If air bubbles are visible in the flow meter, wait until they disappear and the flow stabilises before increasing the pressure further.
5. Check the low-pressure gauge to confirm that the seawater pump feed pressure is approximately 1 bar. If the pressure is higher, reduce it using the seawater pump's bypass valve. This provides smoother operation, lower power consumption and less heat generation.
6. Check that the TDS reading is at its normal level. If it exceeds 500 ppm or differs significantly from normal, direct product water to the dispensing tap until the reading stabilises. If the abnormal reading persists, investigate the cause before directing water to the tank.



4.3 During operation

Monitor feed pressure, operating pressure, product water flow rate and TDS. Also check for leaks and unusual noises.

Water production depends on water temperature and salinity. In colder water, a higher operating pressure may be needed to maintain the required output. Adjust operating pressure to suit the water conditions and monitor the flow meter. Do not exceed the system's maximum permitted operating pressure or the membrane's maximum permitted product water flow rate.

Stop production before the water tank is full. This manual does not cover automatic tank shut-off.

If feed pressure is lost during operation

The high-pressure pump stops immediately if feed pressure becomes too low. The seawater pump continues running for up to approximately 20 seconds to restore pressure.

If adequate feed pressure returns, above approximately 0.5 bar, the high-pressure pump restarts automatically. If pressure is not restored within this time, the seawater pump also stops.

Turn the selector switch to 0 and check the water inlet, filters, hoses and for air in the system. Correct the cause before attempting another start. Disconnect the power supply before working on the system, as the timer can start flushing even in position 0.

5 Stopping and flushing

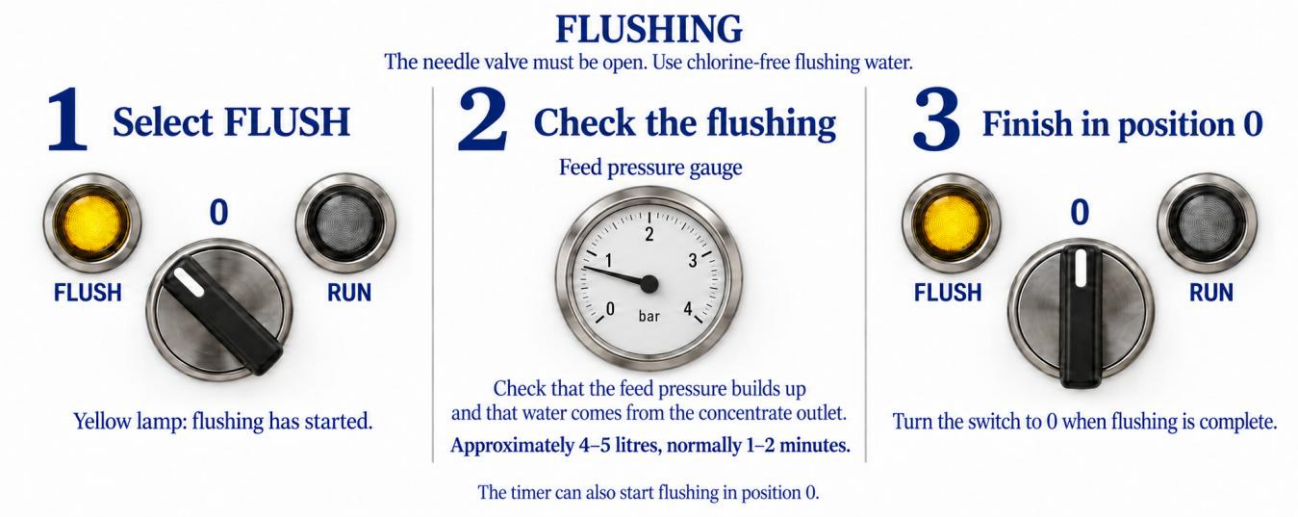
5.1 Normal shutdown

1. Open the needle valve to reduce operating pressure.
2. Turn the RUN/FLUSH selector switch to 0. Manual operation stops.
3. Flush the system using the procedure below.

5.2 Flushing after use

Flushing replaces the seawater in the hoses and membrane pressure vessel with chlorine-free fresh water. This reduces the risk of deposits and microbial growth. Flushing does not replace pickling for extended periods of non-use.

1. Check that the needle valve is open. This allows flushing water to pass through the system and leave through the brine outlet.
2. Check that chlorine-free flushing water is available. If tank water may contain chlorine, it must pass through the carbon filter.
3. Turn the selector switch from 0 to FLUSH. The FLUSH indicator lights and the flushing pump starts.
4. Check the low-pressure gauge to confirm that feed pressure builds up and that water flows from the brine outlet.
5. Normally flush approximately 4–5 litres of water through the system, which usually takes 1–2 minutes.
6. Turn the selector switch to 0 when flushing is complete.



5.3 Recurring flushing with the timer

For short periods of non-use, the Sinotimer can be set for recurring automatic flushing, for example once a week. For extended periods of non-use, pickle the system.

Before automatic flushing: Leave the needle valve open, check that chlorine-free flushing water is available and leave the power supply connected. The timer can start flushing even when the RUN/FLUSH selector switch is in position 0. Disconnect the power supply before servicing or working on the system.

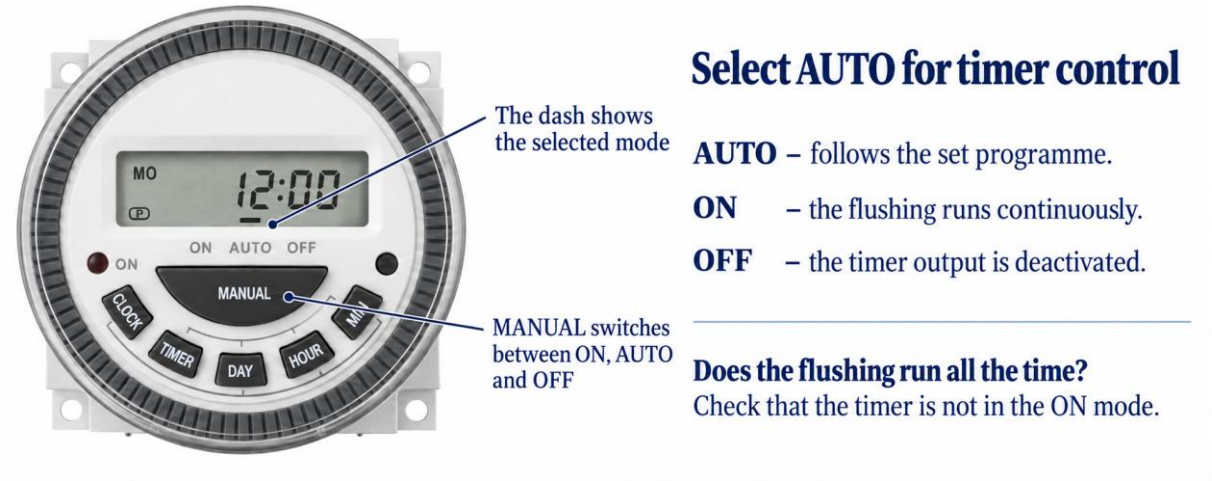
Setting automatic flushing

1. **Set the clock.** Hold CLOCK and set the current time using HOUR and MIN. Select the current day of the week using DAY.
2. **Select the start time.** Press TIMER until 1 ON is displayed. Select the required day or group of days using DAY and the start time using HOUR and MIN.
3. **Select the stop time.** Press TIMER again to display 1 OFF. Select the same day or group of days and set the stop time using HOUR and MIN.
4. **Return to the clock.** Press CLOCK.
5. **Activate the programme.** Press MANUAL until the small marker at the bottom of the display is above AUTO. The marker shows the selected mode: ON, AUTO or OFF.

Example: Starting at 12:00 on Monday and stopping at 12:02 on Monday gives two minutes of flushing once a week. Adjust the duration so that approximately 4–5 litres of flushing water pass through the system.

Disable programmed flushing: Press MANUAL until the marker is above OFF.

Check the timer mode. AUTO follows the programmed schedule. ON keeps the timer output activated, so flushing runs continuously. OFF switches off the timer output. If flushing does not stop, first check that the timer is not set to ON.



Setup video: youtu.be/T8vbaslK1xQ

5.4 After use

Check that the RUN/FLUSH selector switch is in position 0 and that there are no water leaks.

6 Routine care

You may wish to record filter changes, pickling and servicing on the last page or in the boat's logbook. Use parts and consumables intended for your system.

When	Check or action
During each run	Monitor feed pressure, operating pressure, product water flow rate and TDS. Check for leaks.
After each run	Flush the system and check that it has stopped.
If feed pressure drops or filters are dirty	Check the strainer and prefilters. Clean or replace them according to the instructions for each component.
Before extended non-use or freezing conditions	Carry out the specified pickling or frost protection procedure as applicable.

7 Pickling and winter storage

Pickle the system for extended periods of non-use. If it may be exposed to temperatures below freezing, it must also be protected against frost. Prepare containers and connections before starting.

7.1 Pickling with sodium metabisulphite

Use this method when the system will be unused but stored in a frost-free location.

1. Fill a clean bucket or container with 8–10 litres of chlorine-free product water.
2. Add 5 level tablespoons, approximately 75 ml, of sodium metabisulphite. Stir in the container until all the powder has completely dissolved before drawing the solution into the system.
3. Set the product water valve so that any product water goes to the dispensing tap, not to the water tank.
4. Remove the 20-micron and 5-micron prefilters. Refit the empty filter housings.
5. Place the flushing pump's suction hose in the container of pickling solution and set the pickling valve to the correct position.
6. Check that the needle valve is fully open so that high operating pressure cannot build up.
7. Start the flushing pump and check that solution flows from the brine outlet.
8. Run until the pickling solution is almost used up, and stop the pump before it draws in air.

The pickled system can then be stored for up to 6 months. If it will remain unused for longer, flush the system and repeat the pickling procedure.

7.2 Restarting after pickling

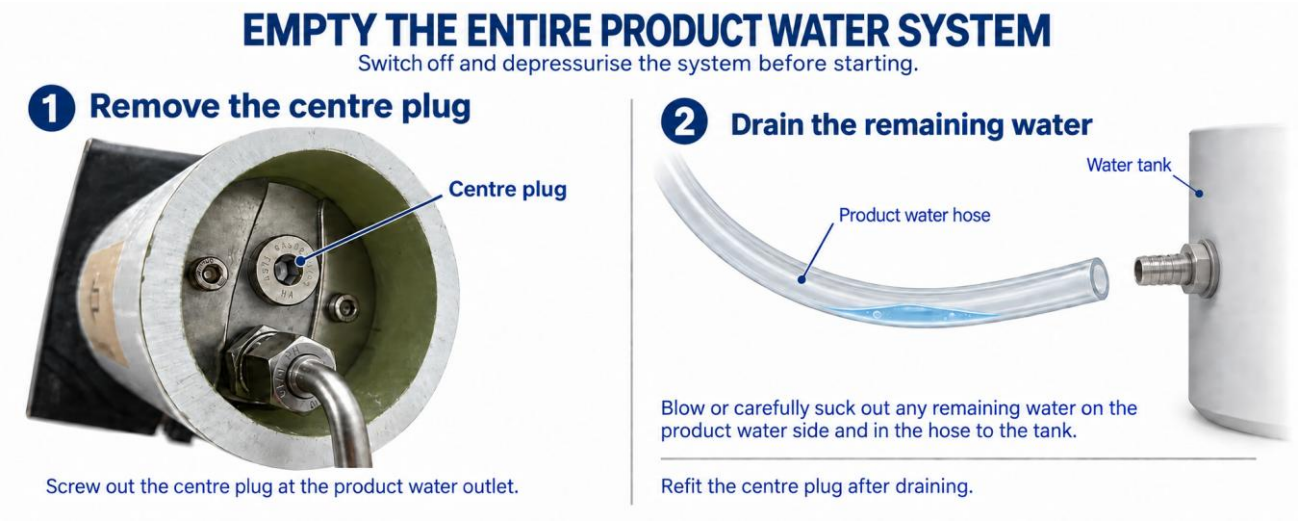
1. Fit new or clean prefilters and return hoses and valves to their normal operating positions.
2. Direct product water to the dispensing tap.
3. Start the system with the needle valve open. Then increase operating pressure to approximately 5 bar.
4. Run for approximately 10 minutes to rinse out the pickling solution. Throughout rinsing, discharge the water to waste, not to the water tank.
5. Continue until the water is clear and free from odour and taste. Then check the TDS reading. Once it is below 500 ppm and stable, product water can be directed to the tank.

7.3 Frost protection with propylene glycol

Use this method if the system may be exposed to temperatures below freezing. Use only propylene glycol, preferably food grade. Never use ethylene glycol, which is toxic.

1. Prepare a total of 8–10 litres of propylene glycol and chlorine-free water, mixed according to the manufacturer's instructions for the required level of frost protection.
2. Set the product water valve so that any product water goes to the dispensing tap, not to the water tank.
3. Place the flushing pump's suction hose in the container of glycol mixture and set the pickling valve to the correct position.
4. Check that the needle valve is fully open so that high operating pressure cannot build up.
5. Start the flushing pump. Check that the glycol mixture is drawn in and flows from the brine outlet.
6. Run until the glycol mixture is almost used up, and stop the pump before it draws in air.
7. Disconnect the product water hose between the membrane pressure vessel and the water tank. Unscrew the centre plug at the product water outlet. Gently blow or draw out any remaining water from the product water side and the hose to the tank. Refit the centre plug after draining.

8. Unscrew the carbon filter bowl, remove the carbon filter and drain the water. Disconnect the quick-release couplings directly on the seawater pump and let the water drain out. Also drain any low points in the hoses.



7.4 Restarting after winter storage

1. Check that hoses, plugs, filter housings and connections have been correctly refitted. Fit new filters.
2. Direct product water to the dispensing tap.
3. Start the system with the needle valve open. Then increase operating pressure to approximately 5 bar.
4. Run for approximately 10 minutes and discharge all rinsing water to waste, not to the water tank.
5. Continue until all glycol has been rinsed out and the water is clear and free from odour and taste.
6. Check the TDS reading. Once it is below 500 ppm and stable, product water can be directed to the tank.

8 Troubleshooting and support

Turn the RUN/FLUSH selector switch to 0 before investigating a fault. Disconnect the power supply and depressurise the system before working on components.

Symptom	Checks and initial action
Nothing starts in RUN	Check the power supply and the system's fuses. If a fuse blows again, investigate the cause before restarting.
Seawater pump runs but high-pressure pump does not start	Check that the water inlet is open, the strainer and prefilters are clean, hoses are not kinked and there is no air in the system. The high-pressure pump requires feed pressure above approximately 0.5 bar to start.
High-pressure pump stops during operation	If feed pressure is too low, the high-pressure pump stops immediately. The seawater pump has approximately 20 seconds to restore pressure; if pressure does not return, it also stops. See Chapter 4. Turn to 0, check the water supply, filters and for air ingress, and correct the fault before restarting.
Low product water output	Check water temperature, salinity, feed pressure, operating pressure and filters. Cold water normally reduces production and may require a higher operating pressure.
TDS reading is higher than normal	Direct product water to the dispensing tap. Check operating pressure and product water flow rate. If the reading remains above 500 ppm or continues to rise, contact MAB Watermaker.
No flushing	Check the flushing water supply, carbon filter, valve positions and flushing pump. Stop if the pump is not receiving water.
Leaks or unusual noises	Stop the system. If there is a leak, close the water inlet and disconnect the power supply before investigating the fault.
Flushing runs continuously	Check the Sinotimer. ON causes continuous flushing. Select AUTO for programmed flushing or OFF to switch off the timer output. If flushing continues, disconnect the power supply and investigate the cause.

8.1 Contacting MAB Watermaker

State the model, membrane, pump and supply voltage. Describe the fault and when it occurs. If possible, include photos of the panel and readings for feed pressure, operating pressure, product water flow rate and TDS.

Email: info@mabwatermaker.se
Telephone: +46 709 769 508

9 Operating readings and service notes

This page is optional. Recording readings when the system is working well makes comparison and troubleshooting easier. Record major work here or in the boat's logbook; there is no need to make an entry after every run.

9.1 My normal operating readings

Item	Notes
Date and operating hours	
Water area and water temperature	
Feed pressure (bar)	
Operating pressure (bar)	
Product water flow (L/min) and TDS (ppm)	

9.2 Filter changes and servicing

Date	Operating hours	Work carried out or observation

9.3 Document details

MAB Watermaker AB
User manual for FLUSH, BOX and HATCH with a single RUN/FLUSH selector switch.
Working version 2026-09-13