H2O DESAL
ELYSATOR Eng. AG™

Operating instructions
H2O DESAL master

Installation
Function
Operation
Service





ELYSATOR
engineering water

swiss made

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1. Safety instructions



Not drinking water



Maximum 40 °C



Minimum pressure 3 bar (flow pressure)



Maximum pressure 5.7 bar (not constantly)



Membrane:
Disposal with household waste



Device:
Recyclable



Operation under supervision



Min. flow rate 20 l/min at 3 bar



Optimum flow rate 30 l/min at 4-5.7 bar

2. Function

The H_2O DESAL® master treats water for technical applications in closed systems according to the latest standards (VDI 2035, SWKI BT 102-01, Ö H5195).

The H_2O DESAL® master works on the basis of reverse osmosis (RO).

Thanks to the special low pressure membrane, an exceptionally high filtration speed is achieved. No power supply is required. The H_2O DESAL® master simply needs a drinking water supply line with sufficient throughput (ideally ~30 l/min) and pressure (> 3 bar).

With an inlet pressure of 5.7 bar and a raw water temperature of 15 °C, the throughput can reach up to 10 l/min, which is almost 600 litres per hour (and even at 4 bar and 15 °C, the throughput is still approx. 6 l/min).

The H_2O DESAL® master pushes raw water through a filter membrane with a gauge width of less than one nanometre – this equates to one millionth of a millimetre. This holds back all dissolved solids and only pure water molecules pass through the membrane. The hyper filtered water is particularly suitable for technical applications since dissolved minerals, heavy metals and pesticides, as well as bacteria and organic matter, are removed from the water.

The membrane can be replaced when it is spent or if it no longer allows sufficient throughput. The old membrane can be disposed of as household waste.

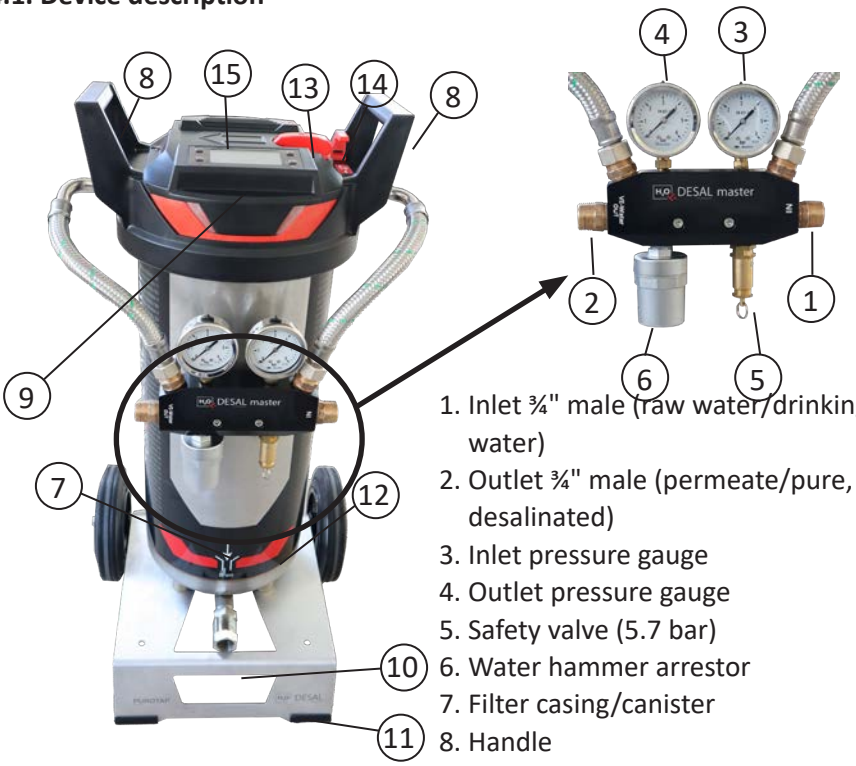
3. Standard delivery

- H_2O DESAL® master
- PUROTAP® trolley (in kit form)
- Operating instructions

The H_2O DESAL® M45 membrane must be ordered separately

4. Specification

4.1. Device description

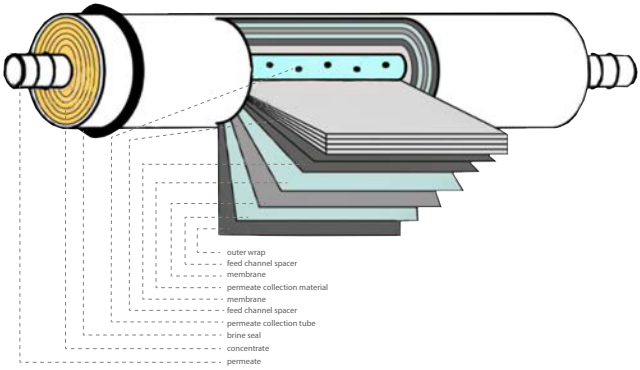


1. Inlet ¾" male (raw water/drinking water)
2. Outlet ¾" male (permeate/pure, fully desalinated)
3. Inlet pressure gauge
4. Outlet pressure gauge
5. Safety valve (5.7 bar)
6. Water hammer arrestor
7. Filter casing/canister
8. Handle

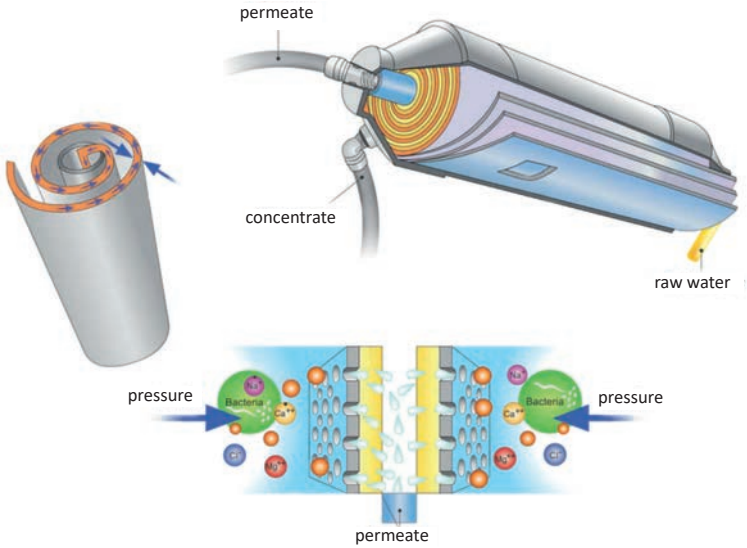
9. Information screen
10. Waste water ¾" fem. (concentrate/waste water, must be drained)
11. PUROTAP® trolley
12. The H_2O DESAL® internal M45 membrane must be ordered separately
13. Shut-off valve
14. Release lever
15. Battery compartment

Properties of the H_2O DESAL® M45 membrane

- The membrane has very little effect on the pH value: pH value before treatment ~ pH value after treatment The demineralised water remains approximately neutral (the pH value is usually slightly lower after treatment).
- The membrane technology is not compatible with system flushing (using old heating water already present). The contaminated water would immediately clog the membrane and make it unusable.
- Once the membrane has been inserted, it is "used". If the membrane does not remain in use, it may become damaged due to bacterial, fungal or algal growth. It is quite possible that after just six months, the membrane becomes fully contaminated or too dry to use (tearing of the thin membrane).
- The first 20-50 litres must always be discarded, because TOCs may be released due to the membrane manufacturing process
- The first few litres after each use must also be discarded (due to fungal and algal growth, etc...)
- Osmosis systems require a "breaking-in" period to allow the membrane to reach peak performance. It does not perform optimally/constantly from the 1st litre



- The membrane cannot filter out carbon dioxide (CO_2)
- In addition, the CO_2 affects the pH value.
- Chlorine and chlorinated water must be avoided, because the membrane is



made of polyamide, which can disintegrate at concentrations of > 0.25 ppm

- If the raw water has a high level of conductivity, so will the permeate. Membranes have a linear effect.
- Salt retention rate: 93-96 %
- Ratio (for a new membrane): permeate to concentrate = 60:40
- At higher water temperatures, membranes are more efficient, produce less concentrate, but then also their service life is shorter. The optimum operating temperature is between +20 °C and +35 °C.
  With every degree less, performance drops significantly.
  For example, if the raw water inlet temperature is only +10 °C, the output can drop by 40 % or more.

Storing the membrane



Version a) The best way to preserve the membrane for storage is to sterilise it with sulphite solution or a 3 % hydrogen peroxide solution. Store the still damp membrane in an airtight container in a cool, dark place.

Version b) Leave the membrane in the device, with the device filled with water (risk of frost!)

Version c) Remove the membrane, seal it airtight in a plastic bag, and store it in a cool, dark place.

The used membrane must never be allowed to dry out.

4.2. Dimensions

H_2O DESAL® master	**Dimension**
Overall height (incl. trolley)	82 cm
Width	47 cm
Depth	42 cm
Weight empty (without membrane)	22.5 kg
Membrane weight	9.5 kg
Top connections	2 × ¾" male
Bottom connection	1 × ¾" female

4.3. Performance data

H_2O DESAL® master	**Dimension**
Max. desalination capacity #	10 l/min (at a raw water temperature of 15 °C)
Min. inflow rate	20 l/min
Optimum inflow rate	30 l/min
Pmin	3 bar
Pmax	5.7 bar
Tmax – inflow *	+40 °C
Feed	Drinking water quality
Retention rate	93-96 %
pH range	pH 3-10
Nearly pH-neutral filtration	pH before treatment ~ pH after treatment
Membrane service life **	Approx. 50,000 l

The higher the pressure, the higher the permeate output, and the higher the water required (consumption).

The desalination capacity depends on the salt content of the raw water. The higher the salt content, the lower the throughput. The inlet pressure and the inflow rate also have a significant impact. Performance will gradually decrease over the service life of the membrane. The higher the system backpressure, the lower the output.

* Similarly, the inlet temperature of the raw water also has a significant impact on the desalination capacity of the device. (ideal T = +25 °C). If the raw water is only at +10 °C inlet temperature, the output can drop by 40 % or more.

** The service life of the filter membrane depends on the contamination level of the raw water. Contaminants shorten the service life of the filter

membrane. The storage and care of the membrane (against bacterial, fungal or algal growth) also have an impact on its service life.



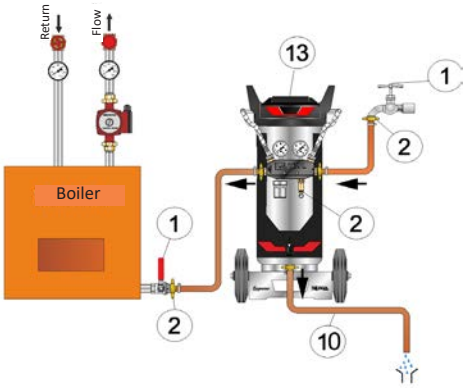
5. Operation

5.1. H_2O DESAL® M45 membrane

To operate, the H_2O DESAL® master requires a H_2O DESAL® M45 membrane (see 5.3. for insertion instructions).

5.2. Commissioning

Connect the device to the raw water at the raw water inlet (1) using an adequately sized hose. Connect the permeate outlet (2) to the system to be filled, also using a hose. Use a hose to route the waste water/concentrate outlet (10) to a drain. The device is fitted with a non-return valve that prevents any throughput in the wrong direction.



For a flow pressure of 3 bar, the water supply rate must be at least 20 l/min.
We recommend the installation of a prefilter (see "Options" – Case with filter set – item No.: 102 483).

1. Open the water supply.
2. Make sure that the shut-off valve (13) is open in the direction of flow.
3. Observe the pressure at the permeate outlet (4).

5.3. Inserting and replacing the H_2O DESAL® M45 membrane



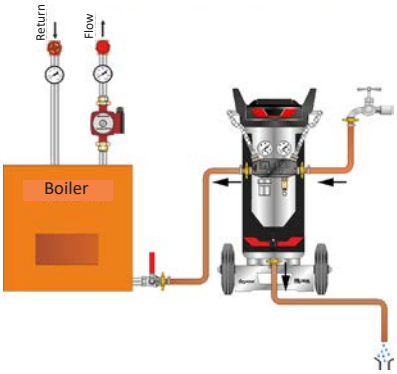
1. Stop the water supply.
2. Release the pressure.
3. Disconnect the reinforced hose from the head.
4. Unlock the cover with the release lever (14), open it with a ¼ turn anti-clockwise and remove it.
5. Remove the spent H_2O DESAL® M45 membrane (tilt the device if necessary)
6. Make sure that the lip seal on the tank base is seated properly.
7. Insert new H_2O DESAL® M45 membrane, with connector pointing upwards
8. If necessary, lubricate the O-rings with suitable grease. (silicone-compatible)
9. Replace the cover and close it with a ¼ turn clockwise.

Check for damage and ensure the seals are seated correctly. Restart the water supply.

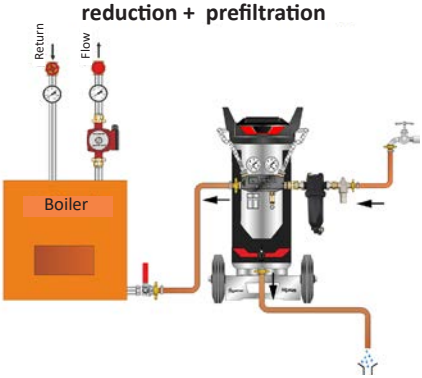
The spent H_2O DESAL® M45 membrane can be disposed of as household waste.

5.4. Connection version for system filling

Connection version 1
System filling without prefiltration

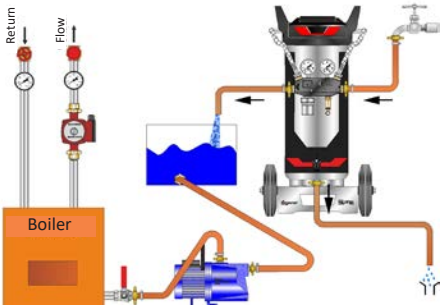


Connection version 2
System filling with pressure reduction + prefiltration



Connection version 3
Non-pressured system filling via an open tank

This gives the master's highest output, because the back pressure from the heating system is overridden by the pump



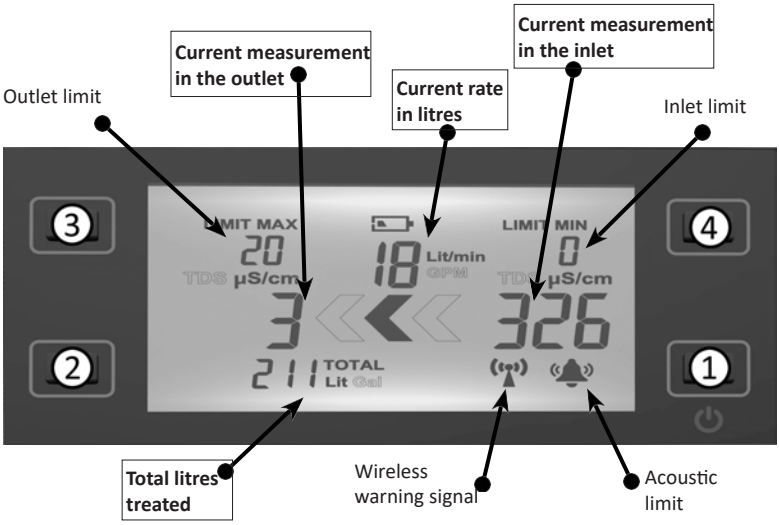
These connection versions are suitable for filling heating systems with demineralised water.
Connection versions 1 and 2 are not suitable in systems with surface heating systems, which can only be vented by means of flushing. The capacity of the H_2O DESAL® master is not sufficient to expel air from a horizontal line.
The equipment includes a non-return valve. If the connection is incorrect/ reversed, the raw water cannot flow through the device.

Where DIN EN 1717 is applicable, a pipe separator must also be installed upstream of the filling station. Observe the water supply utilities' regulations.
H_2O DESAL® master does not contain any mechanism for automatic shut-off when the required pressure is reached. If system filling is not continuously monitored, a pressure reducing valve must be connected upstream to prevent damage to the heating system due to overpressure at the end of filling.
Always use sufficiently pressure and temperature resistant hoses (e.g. reinforced hoses).
H_2O DESAL® master may only be pressurised for the duration of the filling process. Temp. max. +40 °C, pressure max. 5.7 bar.

5.5. System flushing

This device is NOT compatible with system flushing or circuit desalination.

5.6. Information and control unit



On the H_2O DESAL® master, only the following indicators are used:

- Measurement in the outlet = conductivity value of the permeate/pure water
  Nominal: 4-7 % of the raw water
- Measurement in the inlet = conductivity value of the raw water/drinking water
- Rate in litres = permeate/pure water output in l/min
- Total litres = quantity of filtered permeate/pure water in litres or gallons

All other functions/indicators are only required for the PUROTAP® leader.

① Switch on the control unit: press briefly once.
Wireless signal on/alarm signal on/wireless signal off/alarm signal off: press briefly again.
Switch off the control unit: press and hold for 3 seconds.
Restarting the device switches off all alarm functions. It also activates the backlight or interrupts an alarm. After 3 hours with no water throughput, the device switches off automatically.

② Tapping key 2 switches between the overall total and the running total ("JOB") for water treatment. Pressing the key for 3 seconds deletes the total shown.

③ Each time this key is tapped, the limit for measurements at the H_2O DESAL® master "outlet" is increased by one unit. Hold the key for 3 seconds to reset the limit to zero. Programming the limit at the outlet ensures that a warning is issued when the ion exchange resin is spent. This function is not used on the H_2O DESAL® master.

④ Each time this key is tapped, the limit for measurements at the PUROTAP® leader "inlet" is increased by one interval of 10 µS or 2 TDS. Hold the key for 3 seconds to reset the limit to zero. Programming the limit at the inlet ensures that feedback is provided when the target value in the system water is reached (with system flushing). This function is not used on the H_2O DESAL® master.

③ Pressing keys 3 and 4 together for 2 seconds switches
④ from EU to US units of measurement and vice versa.

① The following key combination activates a DEMO mode for the
③ information unit: the information unit must be off. Then press and hold key 3 and tap key 1. Release all keys and the DEMO mode simulates water treatment.
Tapping key 3 switches between DEMO modes for "system filling" and "system flushing". The DEMO mode must not be activated when water treatment is running, as otherwise monitoring is not ensured.
Front lights switch colour from blue to red when values exceed or fall below the selected limits.



With reverse osmosis, the conductivity does not increase as the H_2O DESAL® membrane is used. The conductivity slowly decreases to zero when the permeate output drops below 3 l/min.

6. Maintenance

6.1. Replacing the H_2O DESAL® M45 membrane
See 5.3.

6.2. Draining the water
To reduce the weight for transportation, we recommend draining the water after use.



At colder times of year, it is essential to fully drain the water from the tank and store the H_2O DESAL® membrane in a frostproof location, as otherwise frost damage could occur.

6.3. Replacing the batteries
1. Undo the two screws on the battery compartment.
2. Lift off the cover.
3. Insert four new C/LR14 1.5 V batteries.
4. Check the seal of the battery compartment.
5. Refit the cover and secure with the screws. Check the device is working correctly.

7. Spare parts

Item no.	Designation
102 482	H_2O DESAL® master, complete head
101 870	PUROTAP® leader/master, O-ring seal
102 356	H_2O DESAL® master, red lip seal for canister base
102 405	H_2O DESAL® master, black lip seal "2" for canister base (seal is 1 mm lower)

102 255	DN16 reinforced hose with ¾" union nut at both ends, l = 30 cm
102 253	0-6 bar pressure gauge for connections ③ + ④
102 257	Volume regulator ¾" female ⑩
102 254	Pressure limitation valve ⅜" male thread ⑤
102 252	Water hammer arrestor ½" male thread ⑥

8. Consumables

Item no.	Designation
102 057	H_2O DESAL® M45 membrane

9. Options

Item no.	Designation
102 483	Case with filter set for H_2O DESAL® master

10. FAQ H_2O DESAL® master

Water is not filtered (measured conductivity value is too high)

- Does the membrane appear to be in good condition?
- Are either of the O-rings on the connector damaged or brittle?
- Is the device sealed correctly?
- Is the lip seal fitted at the filter casing/canister base?
- Is the filter casing cover fitted correctly?
- Is the membrane spent? Poss. contaminated? Poss. clogged up?
- Depending on the raw water properties, I am checking the conductivity

values of other substances (elements).
- The membrane cannot filter out carbon dioxide (CO_2). Carbon dioxide (CO_2) causes the osmosis water to become measurably conductive. In addition, the CO_2 affects the pH value.

Throughput is too low
- Is there a filter in the inlet line? If so, is the throughput after the filter satisfactory?
- Is the throughput volume sufficient? Nominal: At least 20 l/min inflow and min. 3 bar flow pressure.
- Is the water being filtered heavily contaminated?
- Is there visible residue on the membrane?
- Is there back pressure on the permeate (pure water) side (e.g. system almost full, etc.)?
- Is the membrane spent?
- How was the membrane stored?
  - Without packaging, exposed to dust = poss. clogged up
  - Humidity in packaging = poss. contaminated
  - Dry membrane = is membrane torn (due to drying out)?
- At higher water temperatures, membranes are more efficient, produce less concentrate, but then also their service life is shorter. The optimum operating temperature is between +20 °C and +35 °C.
  With every degree less, performance drops significantly.
  For example, if the raw water inlet temperature is only +10 °C, the output can drop by 40 % or more.

Leakage/difficulty installing the head on the tank:
- When cold: allow several minutes to come to room temperature. The material and the seals are rigid.
- Briefly increase the pressure to 4-5 bar (max. 5.7 bar) so that the seal is pressed outwards, forcing it into the correct position again.
- If the parts are stiff: lubricate with suitable grease/oil, e.g. Innotec High-Tef Oil, which is PTFE-based (do not use oils or sprays that contain silicone).

- Dirt (at the top on the tank edge, and at the bottom at the red/orange lip seal) prevents a clean seal!

Display:

- Does not come on:	Switch off, then on again
- Is intermittent:	Switch off, then on again
- Display remains "frozen":	Switch off, then on again
- Unusual/incorrect value:	Due to the automatic temperature compensation (ATC) function, it can take several minutes, or up to 200 l, until the value displayed is correctly adjusted/stable. Everything must be at the correct temperature!

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The current version can be found at www.elysator.com.