

INSTALLATION, OPERATION AND SERVICE MANUAL

Reverse Osmosis System
Condair RO-H

Thank you for choosing Condair

Installation date (MM/DD/YYYY):

Commissioning date (MM/DD/YYYY):

Site:

Model:

Serial number:

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1 Introduction

1.1 First things first

Thank you for choosing the **Condair RO-H Reverse Osmosis System**.

The Condair RO-H Reverse Osmosis System incorporates the latest technical advances and meets all recognized safety standards. Nevertheless, improper use of the Condair RO-H Reverse Osmosis System may result in danger to the user or third parties and/or damage to property.

To ensure a safe, proper, and economical operation of the Condair RO-H Reverse Osmosis System, please observe and comply with all information and safety instructions contained in the present documentation as well as in the separate documentations of the components used together with the Condair RO-H Reverse Osmosis System.

If you have questions after reading this documentation, please contact your Condair representative. They will be glad to assist you.

1.2 About this installation and operation manual

The subject of this manual is the Condair RO-H Reverse Osmosis System.

This manual has been written to ensure the safe use, performance and longevity of the equipment, and is intended for installation and commissioning by engineers and properly trained technical personnel. Please read this manual thoroughly before specifying, designing or installing an RO System from Condair Ltd. Keep for future reference.

As our policy is one of continuous research and development, we reserve the right to amend, without notice, the specifications provided in this document. Condair Ltd. does not guarantee nor accept liability for the accuracy of information in this document.

1.3 Variants

RO-HB: RO-H 4.5 gal Booster
Used with Condair MN

RO-HM: RO-H 6 gal
Used with Condair US (≤ 20 lbs/h)
Condair RS, size S (≤ 23 lbs/h)
Condair Omega Pro, size S (≤ 23 lbs/h)
Condair RM

1.4 Scope of delivery

RO-HM:

- RO-H base
- Pressure tank 6 gal including mounting kit
- Installation kit
- Sediment filter 5 µm
- Granular Active Carbon Filter
- RO Membrane 400 gal
- Wrenches (3x)

RO-HB:

- RO-H base
- Flowthrough tank 4.5 gal including fittings
- Installation kit
- Sediment filter 5 µm
- Granular Active Carbon Filter
- RO Membrane 400 gal
- Wrenches (3x)
- Housing cover

Symbols used in this manual



CAUTION!

The catchword "CAUTION" used in conjunction with the caution symbol in the circle designates notes in this installation manual that, if neglected, may cause **damage and/or malfunction of the unit or other material assets**.



WARNING!

The catchword "WARNING" used in conjunction with the general caution symbol designates safety and danger notes in this installation manual that, if neglected, may cause **injury to persons**.



DANGER!

The catchword "DANGER" used in conjunction with the general caution symbol designates safety and danger notes in this installation manual that, if neglected, may lead to **severe injury or even death of persons**.

Safekeeping

Please safeguard this installation manual in a safe place, where it can be immediately accessed. If the equipment changes hands, the documentation must be passed on to the new operator.

If the documentation gets mislaid, please contact your Condair representative.

Language versions

This manual is available in various languages. Please contact your Condair representative for information or check on our website.

2 For your safety

2.1 Qualification of personnel

Every person working with the Condair RO-H Reverse Osmosis System must have read and understood this installation and operation manual before carrying out any work.

Knowing and understanding the contents of the manual is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly.

All ideograms, signs and markings applied to the components of the Condair RO-H Reverse Osmosis System must be observed and kept in readable state.

All installation work described in this manual **may only be carried out by persons who are well trained and adequately qualified and are authorized by the customer.**

For safety and warranty reasons any action beyond the scope of this manual must be carried out only by qualified personnel authorised by the manufacturer.

It is assumed that all persons working with the Condair RO-H Reverse Osmosis System are familiar and comply with the appropriate regulations on work safety and the prevention of accidents.

2.2 Intended use and not intended use

The Condair RO-H Reverse Osmosis System is intended to be used exclusively for pure water production within the operating conditions as specified in [chapter 5.3](#) and must not be installed/used in explosion hazard areas. Any other use without the written consent of Condair is considered as not conforming with the intended purpose and may lead to the Condair RO-H Reverse Osmosis System becoming dangerous and will void any warranty.

Operation of the equipment in the intended manner requires that all the information contained in this manual are observed (in particular the safety and hygiene instructions).

Not intended use

The pure water (RO water) is not drinking water and must not be connected to any drinking water outlet.

2.3 Hygiene

Please observe the local health and safety executive's technical guidance on the control of Legionellosis in water systems.

The user is responsible for ensuring that the water system complies with local regulations, bylaws and guidelines (such as the HSE ACoP L8, VDI 6022, ISO 22000, HACCP or equivalent). If inadequately maintained, the RO System, can support the growth of microorganisms, including the bacterium that causes Legionnaires' disease.

The RO-H is produced according to best hygiene standards, which means that we have considered all aspects of this equipment to reduce the risk of Legionnaires' disease and other similar conditions. However, the user is responsible for ensuring that the installation, operation and maintenance work on the equipment is performed in a manner, ensuring that the system stays clean!

Any risks or hazards relating to the system, including during installation and maintenance, should be identified by a competent health and safety representative who is responsible for introducing effective control measures.



DANGER!

The RO-H must be installed, operated and maintained in accordance with this manual. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal.



WARNING!

To prevent water stagnation and microbial contamination, the RO-H power supply must be left switched on. If the system is switched off for more than 48 hours, the pipe work and system must be disinfected as per the instructions in [chapter 8](#), and a full risk assessment in case of a Condair MN and Condair US must be undertaken to ensure safe operation.



DANGER!

Risk of electric shock! A person may come in contact with live parts when the pump station/control unit is open. Touching live parts may cause severe injury or death.

Prevention: Before carrying out any work on the system, disconnect power and water supply.



WARNING!

Poorly maintained Condair RO-H Systems may be hazardous.

Prevention: Read, understand and follow maintenance guidelines to ensure your system stays safe.



WARNING!

Water produced from a Condair RO-H System is very aggressive and can cause metals to corrode quickly. The Condair RO-H System should always be connected to piping / equipment suitable for handling RO water.

Prohibited modifications to the unit

No modifications must be undertaken on the Condair RO-H Reverse Osmosis System without the express written consent of the manufacturer.

2.3.1 Guidelines to ensure your system stays clean and prevent the growth of Legionella

- Carry out a risk assessment of the water system using a competent person and implement an appropriate monitoring and control program.
- Initiate procedures for checking the system, cleaning tanks, changing filters, disinfection etc.
- The RO-H must be connected to a clean, potable mains water supply.
- Enter into a service contract that suits you or your company.
- Stop the system if polluted drinking water is found in your area.
- Avoid water temperatures above 77 °F that favor the growth of Legionella. If the water temperature surpasses 86 °F, the RO-H cannot be used in connection with a Condair MN.
- Do not stop the system unless it is faulty or leaking (avoid water stagnation).
- Disinfect the Condair RO-H System at least once a year and after every maintenance or repair. Always carry out a complete system disinfection inclusive humidifier if it has been turned off for more than 48 hours.
- Have water samples taken and tested for harmful bacteria at least once a year.
- Conduct follow-up measurements until the system is clean if bacteria have been detected in the system.

The Condair service team can help. Condair has expert technicians who can provide:

- Bacteriological troubleshooting on site *
- Cleaning and disinfecting
- Preventive maintenance
- Repair and fault finding
- Training and guidance

*Condair uses a quick method for measuring bacterial activity in the water: the approved and patented BactiQuant. Once the water sample has been taken, we can read the bacteriological quality of the water within 30 minutes, and disinfect the system if necessary.

2.4 Ensure safe operation

If it is suspected that safe operation has been compromised, the RO-H should immediately be shut down and secured against accidental power-up.

Shut down the RO-H if:

- Components are damaged, worn or very soiled.
- The RO-H does not work correctly.
- Joints, pipes or hoses are leaking.

No modifications must be made on the RO-H without the manufacturer's consent. All persons working with the RO-H must report any alterations made to the RO-H to the owner immediately. Use only original accessories and spare parts available from your Condair representative.

3 Important notes

3.1 Warranty

The RO-H is covered by a two-year warranty from the invoice date with the exception of the replacement parts listed in the routine maintenance section. Failure to observe the manufacturer's installation and maintenance recommendations and instructions will invalidate the warranty. Condair Ltd. cannot be made liable for damage or injury attributable to failure to observe the manufacturer's installation and maintenance recommendations and instructions.

3.2 Delivery and storage

To ensure consistent quality, each RO-H is tested and preserved before leaving the factory. If put into storage prior to use, the RO-H must be covered and protected from physical damage, dust, frost and rain.

Storage

Until installation, the components of the RO-H must be stored in their original packaging in a place protected from dripping water under the following conditions:

- Room temperature: 41 ... 104 °F
- Room Humidity: 10 ... 75 %rh (non-condensing)

Inspection

Upon receipt, remove the transit packaging and inspect the unit to ensure that no damage has occurred during transit. Any visible damage must be reported to your Condair distributor immediately.

3.3 Disposal

You must observe local laws and regulations when disposing of your RO-H at the end of its working life. The pumps and piping are constructed from stainless steel and plastic which may be fully recycled. This includes all consumables such as the sediment filter, the granular active carbon filter and the RO membrane.

3.4 Disinfection

Depending on the system hygiene, it is advised that preventative disinfection fluid is added to the RO-H at an appropriate frequency, but at least once a year.

Please read the maintenance section for more information on disinfection, [chapter 8](#).

If you are in any doubt about the suitability of water quality, please contact your Condair distributor, who will be happy to support you.

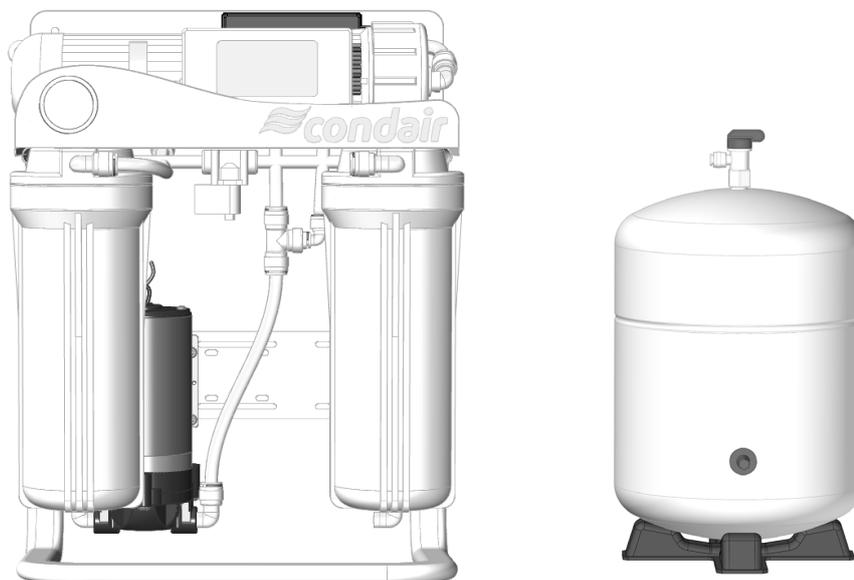
4 Product overview

4.1 Condair RO-H description

Reverse osmosis system (from now on called RO) with reservoir tank for removal (>95 %) of salts and minerals in tap water.

The systems are designed by Condair Ltd. with focus on reliable and hygienically correct solutions. The system uses a separation process in which water molecules can pass through a membrane, while the majority of salts and minerals are retained and thereafter flushed out to drain.

From the inlet, the water passes through a two steps of filtering before reaching the RO membrane. First step is an activated carbon filter to remove any residual free Chlorine in the inlet water. Second filter step is a sediment filter to remove particles above a size of 5 µm.



4.2 Inlet water quality requirements

The quality of the water being used in the Condair RO-H System should be checked prior to system commissioning. The RO-H system must be connected to a clean, potable drinking water quality mains. If the inlet water does not meet the quality specified in the preconditions table in [chapter 4.3](#), it may be necessary to install additional water treatment.

4.3 Installation considerations

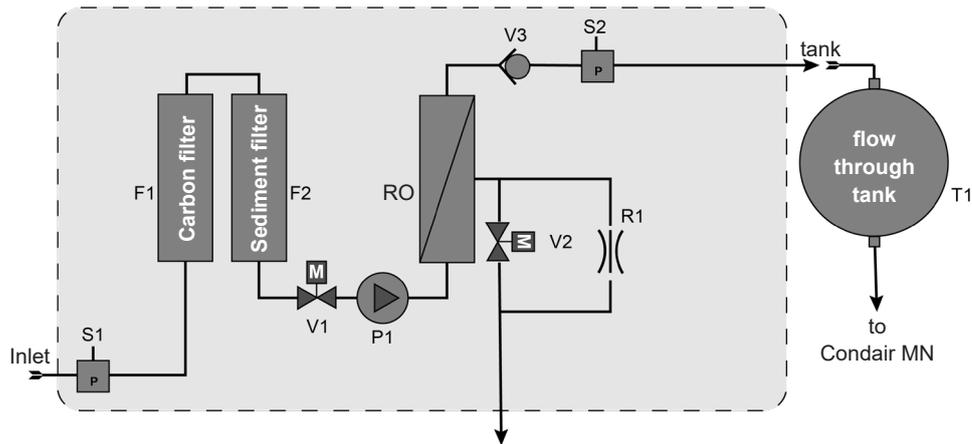
Do not install the RO-H in a room that often surpasses an air temperature of 77 °F. Also keep installation away from heat producing applications, such as boiler, central heating etc.

Observe the following restrictions concerning length of piping:

- Junction from tap water line to RO inlet: max. 6.5 ft
- RO to tank: max. 6.5 ft
- Tank to product inlet: max. 9.8 ft
- RO to drain siphon: max. 16.4 ft

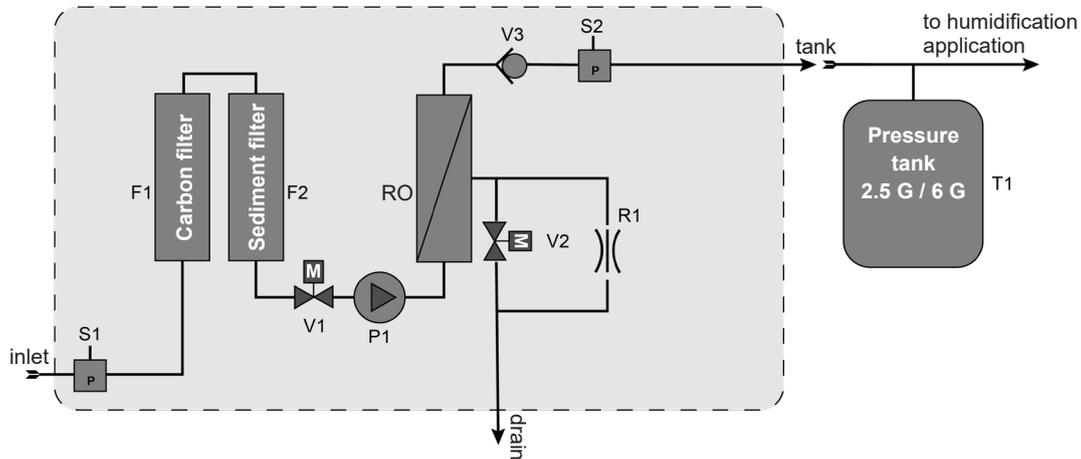
Preconditions for Condair RO-H water treatment:			
Water supply	Tap water / drinking water quality, no pathogens allowed		
Incoming dynamic pressure @ max. flow	8–50 psi * ¹⁾		
Min. flow requirement @ min. dynamic pressure of inlet water connection	52.8 gal/h		
* ²⁾ Water temperature (**)	41–77 °F * ³⁾		
* ²⁾ pH max.	8.0		
	pH in incoming water		
	pH 6.5–7.0	pH 7.1–7.5	pH 7.6–8.0
* ²⁾ Max. US hardness	31 gpg	18 gpg	10 gpg
* ²⁾ Max. conductivity incoming @ pH:	1300 µS/cm	750 µS/cm	600 µS/cm
* ²⁾ Max. TDS incoming @ pH:	210 ppm/l	130 ppm/l	100 ppm/l
Silt index:	max. 3		
Cl ₂ – Residual Chlorine	max. 1.0 ppm		
NTU:	max. 1.0		
<p>*¹⁾ If the pressure exceeds 50 psi, it is mandatory to install a pressure reducer upstream of the RO-H in the supply line, which is set to 50 psi max. pressure. A suitable pressure reducer is available from Condair (2600230).</p> <p>*²⁾ If any of these values are higher, a water softener should be installed in front of the RO-H.</p> <p>** When used with Condair MN max. 68 °F</p> <p>*³⁾ The RO-H may only be connected to a cold water line.</p>			

Flow diagram for RO-HB



- F1: Carbon filter (free chlorine removal)
- F2: Sediment filter, 5 μm
- P1: Pressure pump in front of RO cartridge, 24 VDC, max. 70 psi
- RO: RO cartridge, size 400 gpd
- R1: Flow restrictor 0.18 gpm
- S1: Low pressure switch 8 psi
- S2: High pressure switch 32 ... 44 psi, adjustable
- T1: Flow through tank, steel, 4.5 gal (effective)
- V1: Inlet on/off valve 24 VDC
- V2: Auto-flush valve 24 VDC
- V3: Backflow preventer after RO cartridge

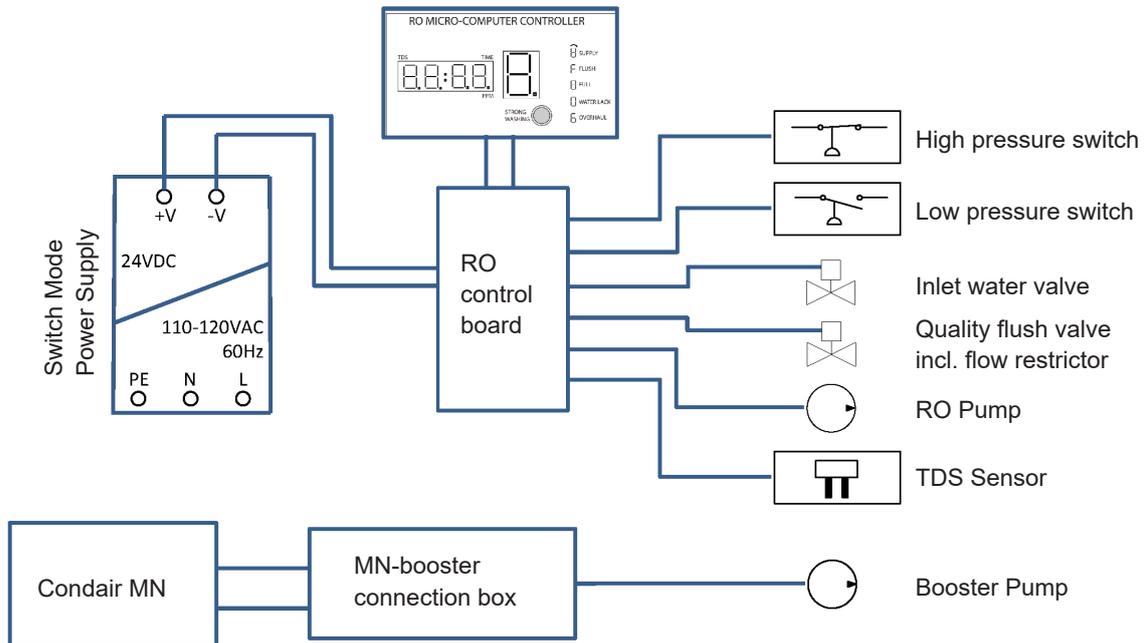
Flow diagram for RO-HM



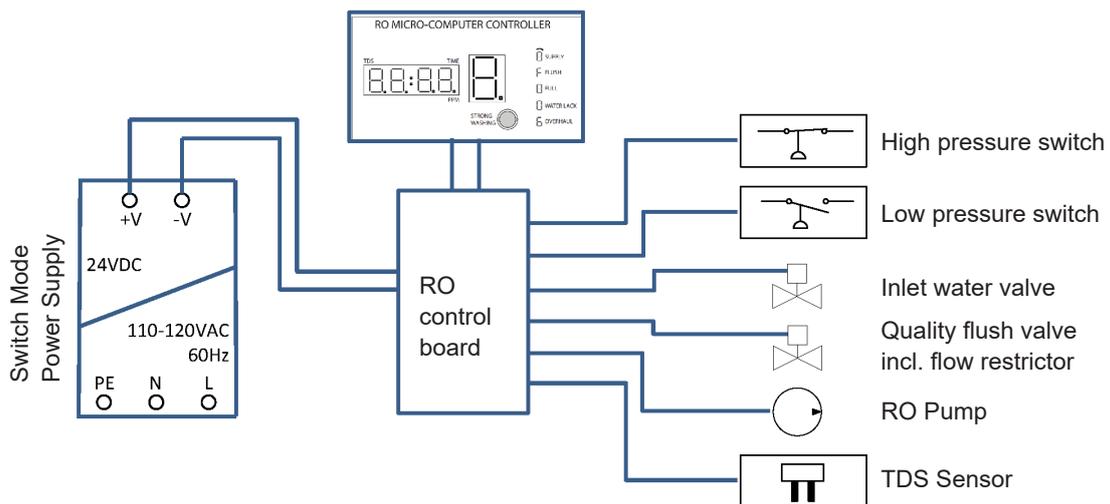
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- P1: Pressure pump in front of RO cartridge, 24 VDC, max. 70 psi
- RO: RO cartridge, size 400 gpd
- R1: Flow restrictor 0.18 gpm
- S1: Low pressure switch 8 psi
- S2: High pressure switch 32 ... 44 psi, adjustable
- T1: Pressure tank 2.5 or 6 gal, steel
- V1: Inlet on/off valve 24 VDC
- V2: Auto-flush valve 24 VDC
- V3: Backflow preventer after RO cartridge

4.4 Electrical schematic diagrams

Electrical wiring with Condair MN



Electrical wiring with all other applications



5 Installation Condair RO-H

5.1 Important notes on installation



WARNING!

Do not retighten/unscrew hoses while the system is pressurized!



CAUTION!

Do not use oil, grease, glue, silicon, O-ring lubrication, etc. when assembling pipes or hose connections. All of the above products can act as food for bacteria and are thus pose health risks. Only approved lubricant: Liquid dish soap.

Wash your hands before or wear clean gloves while assembling parts in direct contact with water. Keep dust covers on pipes and hoses until just before assembly.



CAUTION!

Do not fasten the pump station or hoses/pipes to vibrating installations.

5.1.1 Qualification of personnel

All installation work must be performed only by persons familiar with the Condair RO-H System and sufficiently qualified for such work. All work on electric installations must only be performed by adequately qualified electricians.

In addition, when installing the Condair RO-H in conjunction with a Condair MN with DGUV certification, it is essential that the personnel have completed training in accordance with VDI 6022, Sheet 1:

- Category B for installation, maintenance, inspection
- Category A for hygiene-relevant tasks in planning, construction, commissioning and hygiene inspections

5.1.2 Safety

The pump station and any control units may only be connected to the mains after all installation work has been completed. All statements relating to correct positioning and installation must be followed and complied with. When installing components of the RO-H, use the materials and hoses supplied with the unit. In case of doubt, please contact your Condair supplier.

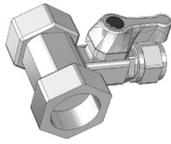
5.2 Delivered packages

The Condair RO-HM package consists of:

- 1 Reverse Osmosis System
- Wall mount RO
- 1 Pressure Tank and Bottom Stand
- Hood
- Installation pack (see fittings below)

The Condair RO-HB package consists of:

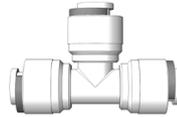
- 1 Reverse Osmosis System
- Wall mount RO
- 1 Flow Through Tank + fittings
- Hood
- Installation pack (see fittings below)



[1] [2]



[3]



[4]



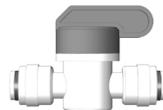
[5]



[6]



[7]



[8]

5.3 Installation of Condair RO-HM

Before positioning the RO-H pump and tank, it is important to consider the position of the equipment in the room prior to installing the RO-H unit.

Depending on the type of humidifier connected, different tank sizes are needed. Please see table below.

Voltage	AC 110–120 V, 60 Hz			
Power rating	90 W			
Suitable water pressure	8...50 psi			
Operating pressure	max. 116 psi			
Inlet temperature	41–77 °F			
Max. inlet water TDS value	See preconditions for water supply			
Max. pure water production	0.22 gpm			
Tank size	Size depends on application:			
		Eff. Volume	Tank size	Tank type
	Condair MD	1.7 gal	2.5 gal	Pressure
	Condair MN	2.4 gal	4.5 gal	Flow through
	Condair Omega	3.6 gal	6 gal	Pressure
	Condair RM	3.6 gal	6 gal	Pressure
	Condair RS	3.6 gal	6 gal	Pressure
	Condair Omega Pro	3.6 gal	6 gal	Pressure
	Condair US	3.6 gal	6 gal	Pressure
With the pressure tank type, the effective volume is smaller than the tank size due to the pressure bubble in the tank.				
Suitable water quality	Municipal tap water according to the local drinking water regulations.			

5.3.1 Please observe the following on positioning and Installation

- The room temperature should be between 45 °F and 86 °F all year round and the air humidity between 15 %rh and 50 %rh (non-condensing) and the room should be ventilated.
- The Condair RO-H System can only be installed in a location with a floor drain.
- The site must be freely accessible with sufficient space for convenient operation and maintenance. The lateral and vertical spaces can be determined from the figure below. To the front, the minimal free space is 11.8 in.
- The system is designed for operation in a frost-free and dry environment, always indoors.
- The installation site must not be exposed to direct sunlight and must be sufficiently far away from other heat sources.
- Do not install the Condair RO-H System in exposed locations or locations with heavy dust loads.
- When installing the RO-H with a HumiLife product such as Condair MD, a wall mount of the System is mandatory. For any other application, floor or wall mount is possible.
- When installing the RO-HB variant, a wall mount of the tank is mandatory. For RO-HM the water tank can either be placed on the floor or mounted on the wall

5.3.2 Water connection



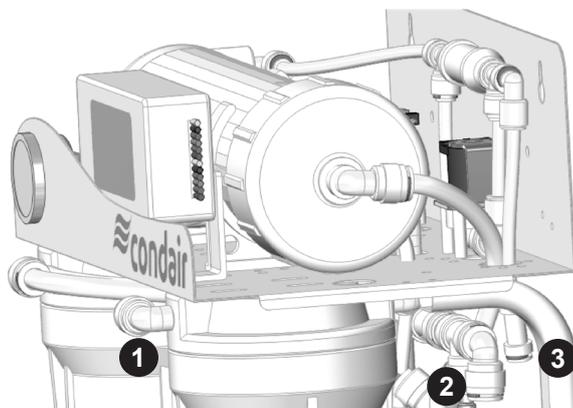
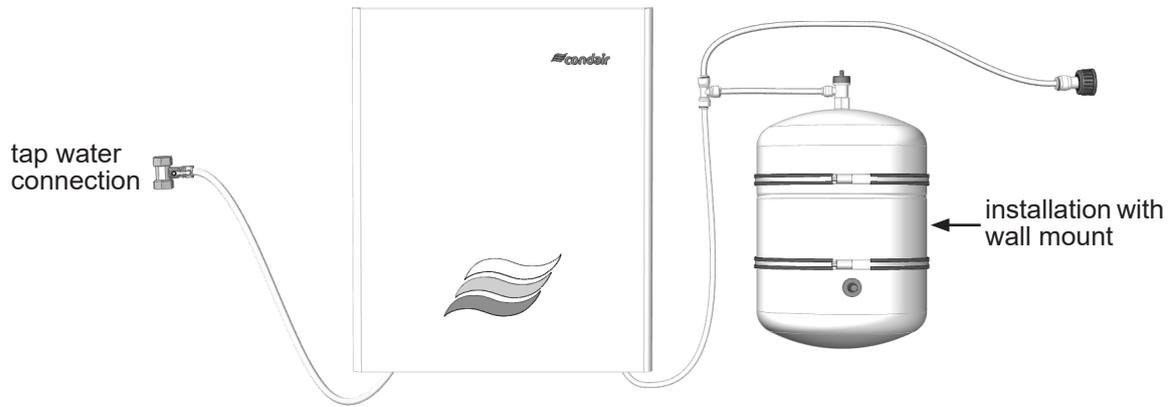
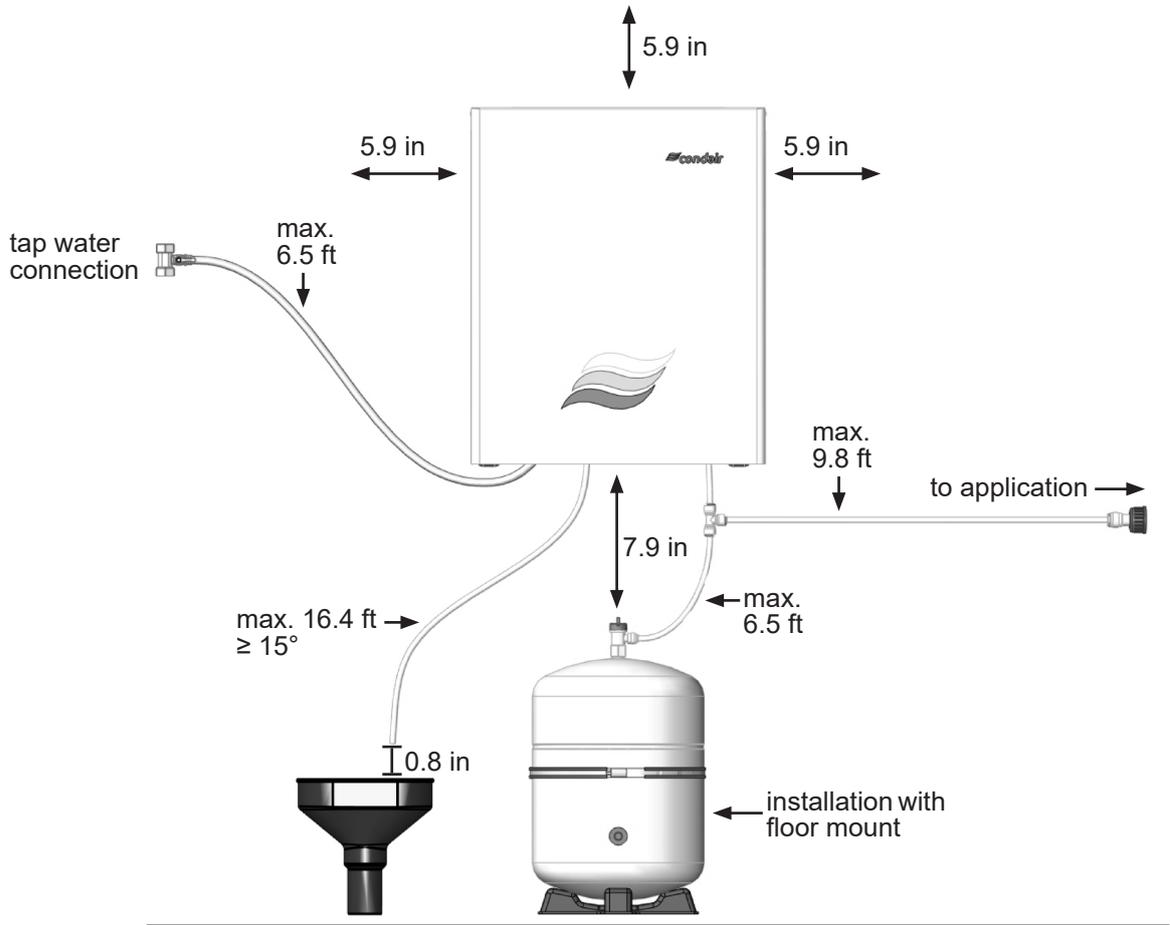
WARNING!

Do not open and fill hoses, pumps, filters or tanks with water if the system is not to be started immediately after installation (48 hours). Stagnant water acts as a breeding ground for potentially dangerous micro-organisms.

Measures on site

- A class 2 backflow preventer must be installed near the "tap water connection" (see figure on page 18).
- A siphon must be available for the discharge of the concentrate water. The siphon as well as the drain pipe on the building side must be dimensioned in such a way that the drainage of the condensate water
 - max. 1.2 gpm during flushing for 30 s after switching on the RO-H
 - max. 0.4 gpm in regular operation

is guaranteed.



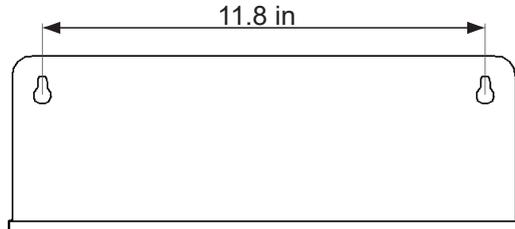
1. Inlet (3/8" push fit)
2. Pure water (3/8" push fit)
3. Drain (1/4" push fit)

5.3.3 Installation of Condair RO-H system

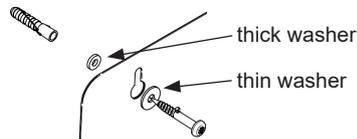
The RO-H is mounted to the wall, using the enclosed wall mount set (SAP No). Consider that the wall needs to have a holding capacity of 40 lbs. Do not mount the RO-H on plywood, dry plaster or sheetrock walls.

Procedure:

1. Draw drilling pattern (see figure below) on wall, drill holes.



2. Insert dowels
3. Correctly arrange screw and spacer and washers.



4. Insert and tighten the screws so that a gap of approx. 0.2 in is still open between the damper and the screw head.
5. Lift up and hang the RO-H to the wall so that the holes in the backside of the RO are in between the screw head and the damper.
6. For the RO-HB variant, tighten the screws so that an overall gap of 0.1 in is retained between the back wall of the RO-H and the wall. The remaining gap is needed to attach the RO-H hood. With the RO-HM variant, the gap is not needed, screw the RO to the wall completely.

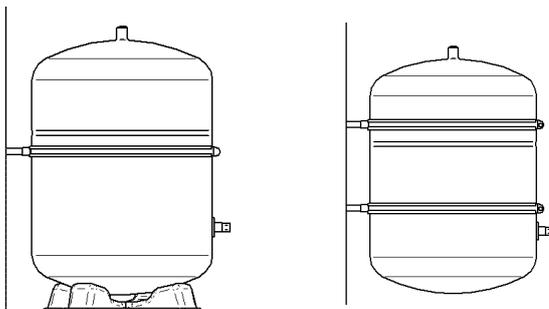
5.3.4 Installation of tank

The tank can be either placed on the floor, using the floor stand and secured with one bracket. Alternatively, it can be mounted to the wall, using two brackets. Consider that the wall needs to have a holding capacity of

- 40 lbs with the tank shipped with the RO-HM

Do not mount the RO-H tank on plywood, dry plaster or sheetrock walls.

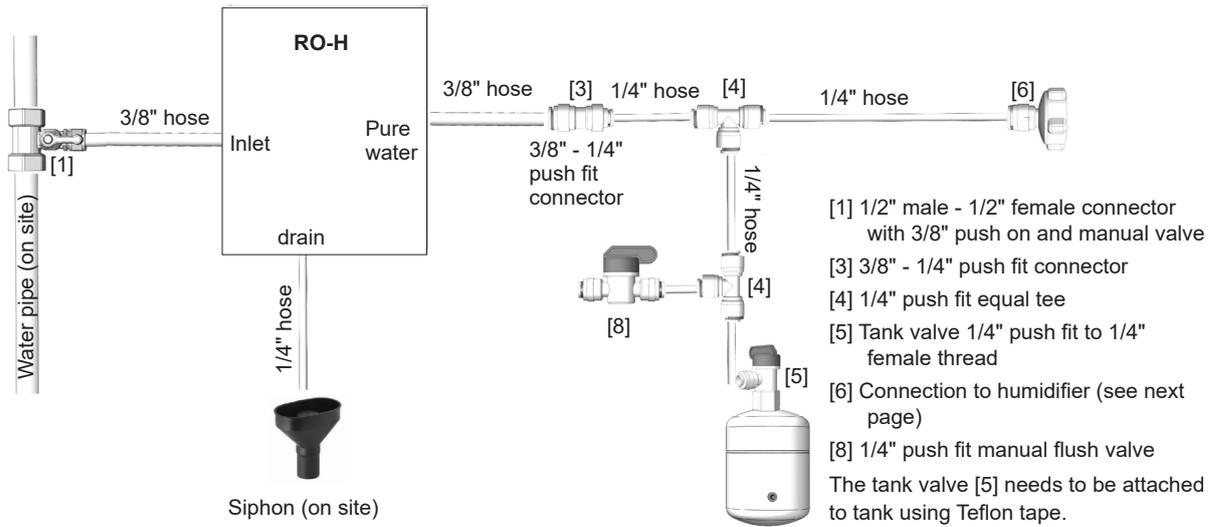
Two brackets are included in the installation pack. The second bracket can be discarded if floor mount is chosen.



Bottom mount / wall mount of RO-H tank

5.3.5 Water piping and connections

The following flow diagram shows the needed fittings and their placement. Please follow the information strictly.



Use [1] (1/2" thread) to connect the RO-H to a drinking water line. If the RO is the last tapping point in the line, use the blind cap [2]. The cap is screwed on using Teflon tape (not included in the shipment). Use the white 3/8" hose to connect the push-on outlet of [1] to the inlet of the RO-H (max hose length is 2m). Please make sure that the push-on cap is screwed tight on [1] and that the hose is securely pushed-in on the side of the RO. To test the latter, after pushing the hose in as far as it will go, try to pull it out. If the hose withstands the pull, it is secure. Close the manual valve on the fitting.



Use an appropriate length of 1/4" hose to connect the drain of the RO to a suitable water drain (maximal length of hose is 16.4 ft).

- In order to avoid stagnating water and thus possible stagnation contamination of the unit, the hose must have a downward slope of >15° over its whole length.
- The drain water must flow into a siphon. The end of the hose must have a distance of approx. 0.8 in from all walls and the floor.
- The hose must be positioned in such a way that no water splashes out of the siphon or the siphon overflows even with a brief water flow of 1 gpm.

To connect the RO to the tank and further to the humidification application, follow the diagram on this page. With all push-fit connections, make the security test described at the beginning of this section to avoid leaks.

All push fit connectors have blue security rings. These rings must be removed before attaching a hose to the connectors and afterwards applied again.

Ascertain yourself that the cut of the hose is clean and the hose is neither damaged nor buckled.

1. The tank valve [5] must be tightened using teflon tape.
2. Use connector [6] to connect the RO-H to the following humidifier applications:
 - Condair MD
 - Condair RS
 - Condair Omega
 - Condair Omega Pro
 - Condair RM

If you have purchased the RO-H with an ultrasonic humidifier (US), use the second 1/4" - 3/8" pushfit adapter [3] as well as the 3/8" pushfit to 1/2" NPT male thread adapter to connect to this humidifier.

Do not connect the hose to the humidifier inlet yet. This will be done during commissioning.

5.4 Installation of Condair RO-HB

Before positioning the RO-H pump and tank, it is important to consider the position of the equipment in the room prior to installing the RO-H unit.

The RO-HB is shipped with a 4.8 gal flow through tank. For further technical details regarding the installation, please refer to the table below:

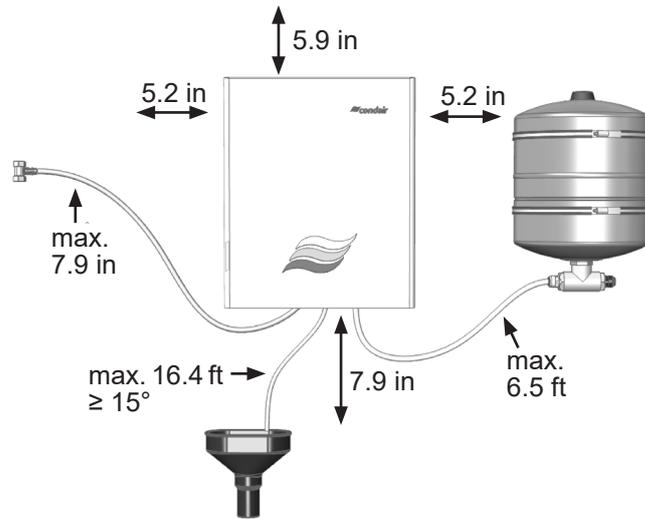
Voltage	AC 110–120 V, 60 Hz
Power rating	90 W
Suitable water pressure	8...50 psi ^{*1)}
Operating pressure	max. 116 psi
Inlet temperature	41–68 °F ^{*2)}
Max. inlet water TDS value	See preconditions for water supply
Max. pure water production	0.22 gpm
Suitable water quality	Municipal tap water according to the local drinking water regulations.

^{*1)} If the pressure exceeds 50 psi, it is mandatory to install a pressure reducer upstream of the RO-H in the supply line, which is set to 50 psi max. pressure. A suitable pressure reducer is available from Condair (2600230).

^{*2)} The RO-H may only be connected to a cold water line.

5.4.1 Please observe the following on positioning and Installation

- The RO System can only be installed in a location with a floor drain.
- The site must be freely accessible with sufficient space for convenient operation and maintenance. The lateral and vertical spaces can be determined from the figure below. To the front, the minimal free space is 11.8 in.
- The system is designed for operation in a frost-free and dry environment, always indoors.
- The installation site must not be exposed to direct sunlight and must be sufficiently far away from other heat sources.
- Do not install the RO System in exposed locations or locations with heavy dust loads.
- Wall mount of the System is mandatory.
- When installing the RO-H with the HumiLife product Condair MN, a wall mount of the tank is mandatory.



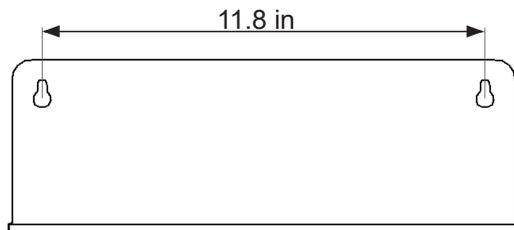
5.4.2 Installation of Condair RO system

The RO-H is mounted to the wall, using the enclosed wall mount set (dowels, screws, spacers, dampers). Consider that the wall needs to have a holding capacity of 18 kg. Do not mount the RO on plywood, dry plaster or sheetrock walls.

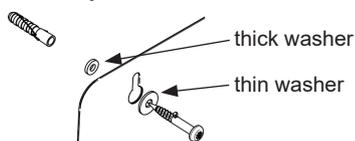
The correct arrangement of the dampers are necessary in order to minimize the transmission of vibrations from the RO to the wall.

Procedure:

1. Draw drilling pattern (see figure below) on wall, drill holes.



2. Insert dowels
3. Correctly arrange screw and spacer and damper. The correct arrangement of the dampers are necessary in order to minimize the transmission of vibrations from the RO to the wall.



4. Insert and tighten the screws so that a gap of approx. 0.2 in is still open between the damper and the screw head.
5. Lift up and hang the RO-H to the wall so that the holes in the backside of the RO are in between the screw head and the damper.
6. Tighten the screws so that an overall gap of 0.1 in is retained between the back wall of the RO and the wall. The remaining gap is needed to attach the RO-H hood.

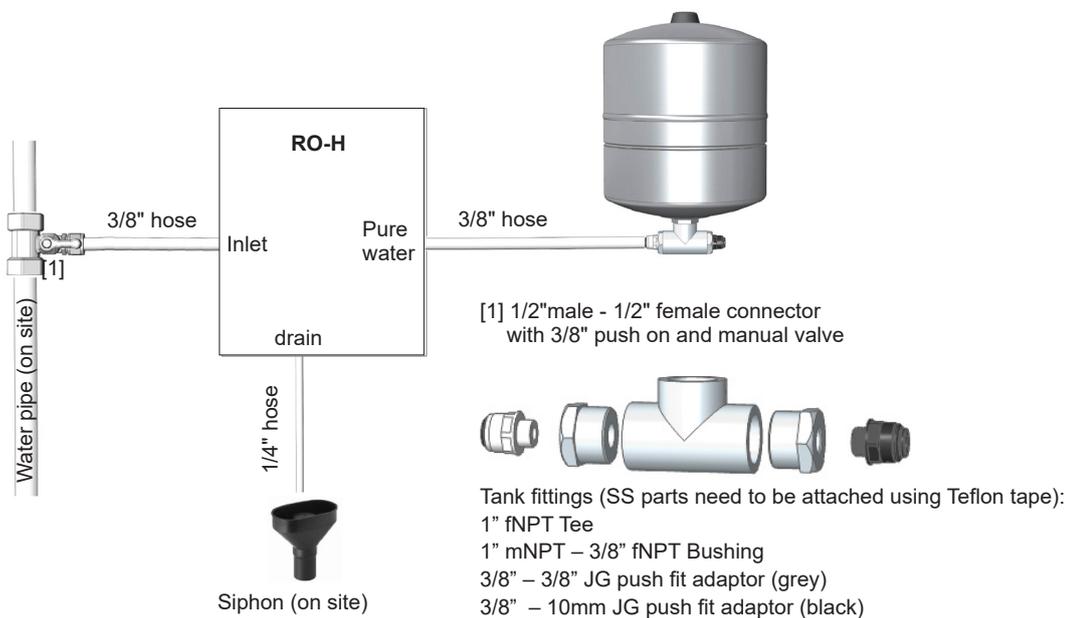
5.4.3 Installation of tank

The tank is installed to the wall using the two brackets and the dowels / wood screw from the installation package. Consider that the wall needs to have a holding capacity of 40 lbs. Do not mount the RO-H tank on plywood, dry plaster or sheetrock walls.



5.4.4 Water piping and connections

The following flow diagram shows the needed fittings and their placement. Please follow the information strictly.



Use [1] (1/2" thread) to connect the RO-H to a drinking water line. If the RO is the last tapping point in the line, use the blind cap [2]. The cap is screwed on using Teflon tape (not included in the shipment). Use the white 3/8" hose to connect the push-on outlet of [1] to the inlet of the RO-H (max hose length is 6.5 ft). Please make sure that the push-on cap is screwed tight on [1] and that the hose is securely pushed-in on the side of the RO. Close the manual valve on the fitting.



To test the latter, after pushing the hose in as far as it will go, try to pull it out. If the hose withstands the pull, it is secure.

Use an appropriate length of 1/4" hose to connect the drain of the RO to a suitable water drain (maximal length of hose is 16.4 ft).

- In order to avoid stagnating water and thus possible stagnation contamination of the unit, the hose must have a downward slope of >15° over its whole length.
- The drain water must flow into a siphon and the hose must end approx. 0.8 in above the siphon (open drain).
- The hose must be positioned in such a way that no water splashes out of the siphon or the siphon overflows even with a brief water flow of 1.2 gpm.

To connect the RO to the tank, follow the diagram at the beginning of this chapter. With all push-fit connections, make the security test described at the beginning of this section to avoid leaks.

5.5 Electrical installation



DANGER!
Danger of electrical shock!

Connect the RO-H to a 110–120 VAC socket, according to local standards.
High voltages, danger of electric shock! Touching live parts may cause severe injury or death.

Make sure to have a power socket within 3.3 ft of the RO-H application.

5.6 Installation of filters and RO membrane



WARNING!

The system start-up must be carried out or monitored by persons approved and trained by Condair. Errors in the start-up phase may ultimately result in illness, injury and death of humans.



CAUTION!

When fitting water filters, RO membranes, hoses and other components in direct contact with water please, wear sterile gloves or touch only the packing paper to keep the filter bacteria-free.
Remember to wash your hands!



CAUTION!

Commissioning of the pump should be the last thing performed at an installation site. When the pump has run with water and the preservation fluid (windscreen wash) has been flushed out, it should always be kept on (summer and winter) in order to keep the system hygienically clean by allowing it to run its automatic flushing.

5.6.1 Commissioning work

Disconnect the power before starting any commissioning work.

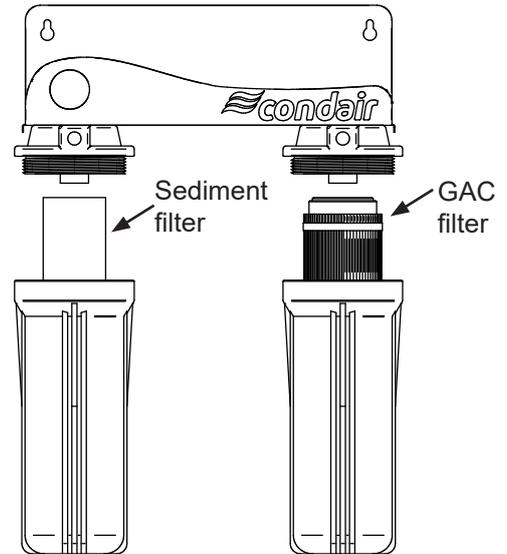
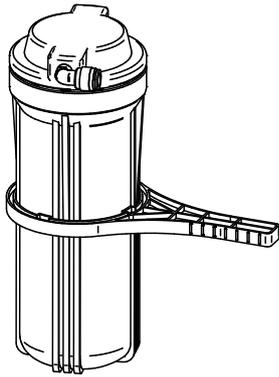
Install filters

The filters are already packaged inside their housings.

Note:

The front right filter will house the granular active carbon (GAC) filter, the front left filter will house the silt filter. Check the configuration before installation. See picture.

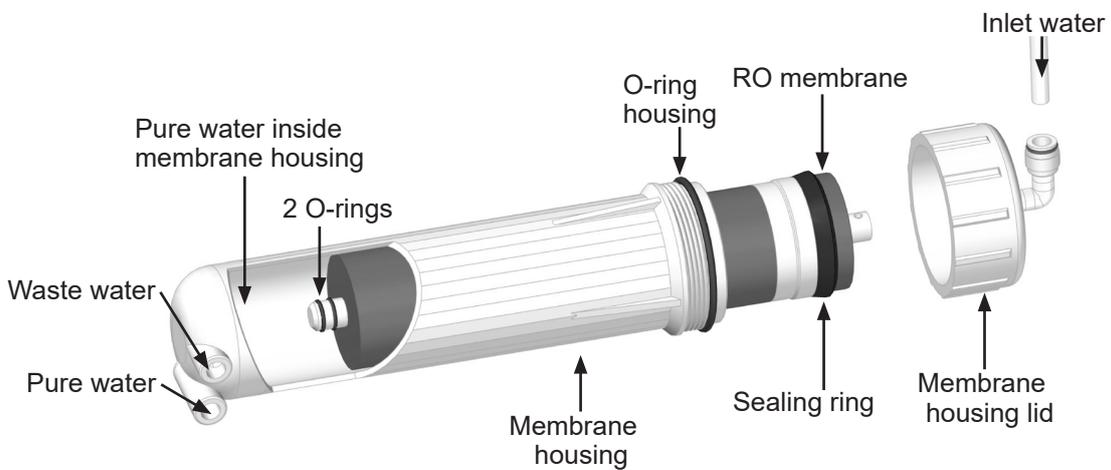
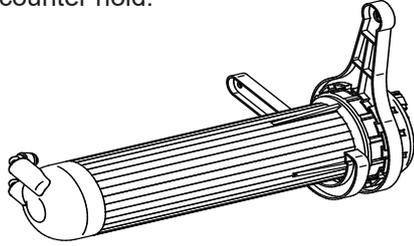
1. Remove the housings from the filter heads.
2. Take off the plastic covers.
3. Remove the plastic packaging from the filter elements.
4. Place the filters back into their housings.
5. Screw the housings back into their heads and tighten with the wrench.



5.6.2 Install RO membrane

The RO membrane is part of the accessory kit.

1. Disconnect the pipe from the push-fit connector on the right side of the RO membrane housing.
2. Lift up the right side of the membrane housing from its holder.
3. Unscrew the lid. If it sits tight, use the black wrench to unscrew the lid and the white wrench to counter hold.



Warning:

When installing the RO membrane, you should pay attention to the direction of the membrane. Put the end with the two O-rings into the housing first. When installing correctly you only need a little force to put the reverse osmosis membrane into the housing. If you encounter too much resistance, please do not force installation. Doing so may cause permanent damage to the membrane shell or membrane components.

4. Remount the lid. Tighten it using the wrenches.
5. Reconnect the water inlet pipe to the push fit.

5.6.3 RO membrane flush and startup, RO-HM



CAUTION!

The first time a new RO membrane is to be used, it is important to flush out any preservation fluids so that they do not end up in the system.

After confirming that the water route connections are correct, confirm that inlet water, power supply, drain and connection to the application are installed. The latter should not be connected yet. Then follow these steps to commission/troubleshoot the unit (see graphic [chapter 5.3.5](#)):

1. Open the tap water inlet valve [1], close the storage tank valve [5] and plug in the power source. An automated, 30-second flushing process starts; water will start to drain through the discharge outlet. Do not connect to humidifier yet!
2. Wait for the water treatment system to operate stably (about 5–10 seconds), check each connection to make sure it is secure, see if there is any leakage from the membrane shell, filters, etc.
3. Connect the RO line to the humidifier unit. Make sure the inlet valve of the unit is closed. Wait approximately 30 seconds, check whether the RO stops producing water.

Open the application's inlet valve. If no water is flowing after 5–10 s, check if

- the water line is open.
- the RO is powered on.
- concentrate water is flowing.

4. Close the RO inlet valve [1]. After a short time observe whether the RO has stopped operating. Open the RO inlet valve [1] again.
5. Flush the RO unit for at least 10 min before using any water for humidification. Reason: the reverse osmosis membrane element package contains a small amount of protective solution and the post-activated carbon filter will emit activated carbon powder the first time it is used. Now close valve [8].
6. Before starting the commissioning of the humidifier unit, open the tank valve [8] and let the tank fill (15 min for 4.5 gal tank, 18 min for 6 gal tank).

Notes on commissioning

1. The major components of the RO membrane are plastic. When using the product always observe the integrity of the water treatment unit to ensure safe use.
2. When you start operating the water treatment system the pure water TDS value may be a little high. After running for some time the TDS value for pure water will gradually decrease until it is stable.
3. Once the RO has been installed, the inlet ball valve should never be closed except for short periods of maintenance work. If the ball valve is closed for longer periods, bacterial contamination will happen in the pipes (bacterial contamination on standstill) which may cause serious bodily harm when the water thereafter is used for humidification. When the RO is not in use, the high-pressure switch will automatically cut off the water supply automatically.

In these “usage methods”, “usage” refers to when the power supply is connected and/or the inlet water ball valve is open so the water treatment system is in a working condition.

5.6.4 Equipment protection

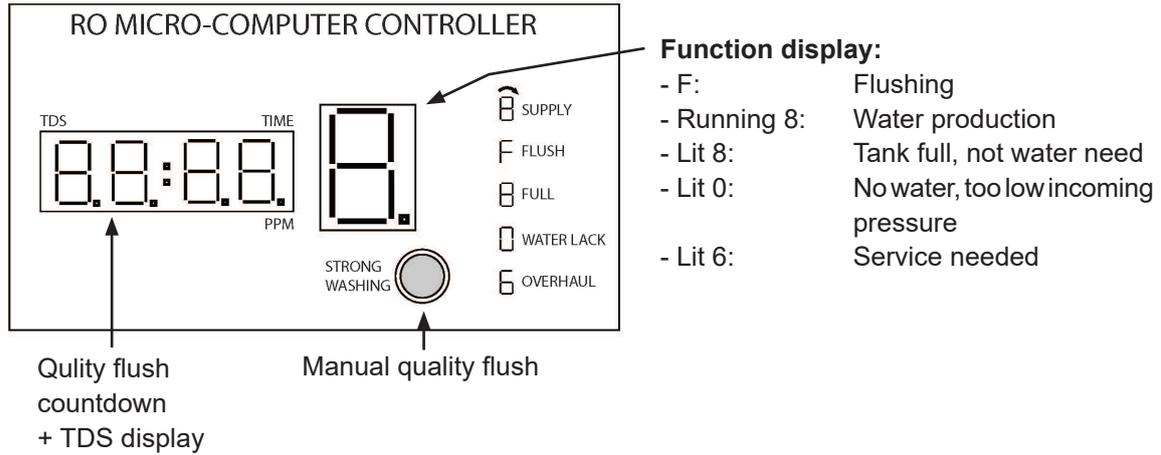
Pressure switch (inlet water)

The RO-H has a pressure switch, which monitors the inlet water pressure.

If the inlet water pressure drops, the controller will stop the pump, thus protecting it against dry running. If the water pressure drops, the starter screen will display a zero, equalling 'PM Water pressure too low'.

5.6.5 Controller menu

The computer box controls the working status, to ensure the machine work normally, and the RO membrane is in good working condition.



Letter state	Display instructions
8 (dynamic rotation) means water production	When the high-pressure switch detects that the water pressure in the tank is lower than the set value, the water purifier enters the water production process.
F means flushing	Flushing of RO either at startup or when the "strong washing" button has been pressed. If there has not been any pure water production within 12 h, the function is triggered automatically.
8 (static display) means the water tank is full and there is no water demand	When the high-pressure switch detects that the water pressure in the tank reaches the set value, the RO will stop production.
0 means lack of water	When the low-pressure switch detects that the inlet water pressure is lower than 8 psi, the water purifier will stop working and the buzzer sounds.
6 means maintenance	The buzzer sounds. A service (filter, RO membrane change) is necessary. Please contact Condair Service.

6 Maintenance

6.1 Important notes on maintenance

Qualification of personnel

All maintenance work must only be carried out by qualified and trained personnel authorized by the owner. Maintenance and repair of the electrical installation of the RO-H must only be carried out by qualified personnel who are aware of possible dangers and implications. It is the owner's responsibility to verify proper qualifications of the personnel.

General note

The instructions and details for maintenance work must be followed.

Only maintenance work described in this documentation may be carried out.

Use only original Condair spare parts to uphold the system warranty.

Safety

Before maintenance is initiated, the RO-H must be taken out of operation in accordance with instructions in the section "Taking the system out of service. The RO-H must be serviced at the intervals described in this manual and cleaning and disinfection must be performed by trained and instructed personal.



WARNING!

A poorly maintained RO system may endanger health if used to supply an adiabatic humidification system. Therefore it is mandatory to observe the specified maintenance intervals and to carry out maintenance and cleaning in strict accordance with the instructions.

6.2 Optical inspection

During operation, the RO-H has to be inspected weekly. On this occasion, check the following:

- Entire system for leakage
- Electric installation for damage
- Operating display for warning or error messages
- Carbon filter, softener and optional water treatment system in front of the RO.

Condair Ltd. recommends to perform the visual inspection on a weekly basis.

If the inspection reveals any irregularities (e.g. leakage, error indication) or any damaged components take the RO-H out of operation. Have a qualified specialist or Condair service technician correct the damage or malfunction.

6.3 Maintenance work

To ensure safe, hygienic and economic operation of the RO-H, vital components must be checked and maintained periodically according to the table below. The maintenance intervals and maintenance work stated below are guideline values. Local conditions, quality of the water, etc. could influence the maintenance intervals. The relevant personnel is responsible for any maintenance work carried out.

Service, to be carried out	Service interval [months]
Control weekly monitoring checklist (chapter 6.5)	12
Check the condition of the pump (pressure & noise) pressure should be min. 60 psi above inlet water pressure – if pressure is unstable – replace filters and test again.	12
Functional testing of pressure switch. Close inlet water and check that system stops – Close pressure tank valve and check that RO system stops. “8” should be shown in display.	12
Leak testing (check for leaks).	6
Disinfection / cleaning of tank	12
Control units	
Test display for errors (visual inspection)	6
Hygiene	
Disinfection/cleaning of the system	12

6.3.1 Maintenance work to be carried out on the Condair RO-H

When maintenance is due, carry out the following maintenance work:

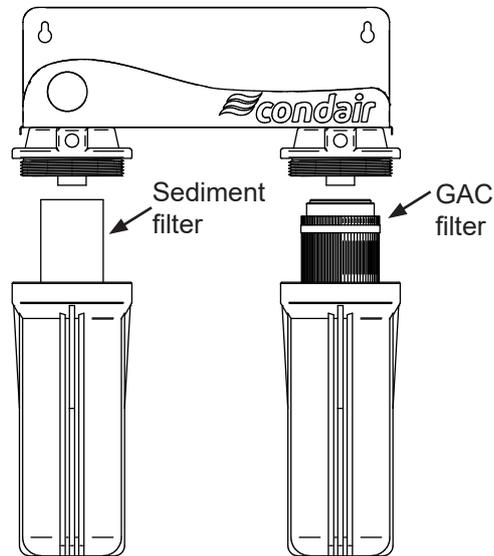
- Replace the filter cartridge of the integrated filter (see [chapter 6.3.2](#)).
- Disinfect the water system incl. external pure water tank (by Condair service technician)

6.3.2 Replacing the filter cartridge



WARNING!

Always wear disposable protective gloves when handling filters to prevent infection due to opportunistic pathogens!



To replace the filter cartridges proceed as follows (also see [chapter 5.3.5](#) and [chapter 5.4.4](#)):

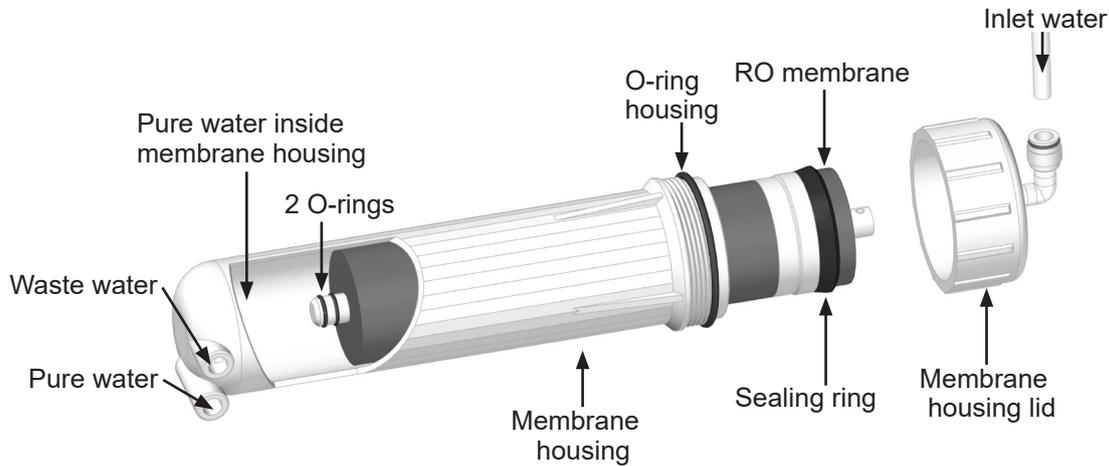
1. Set the Condair RO-H system out of operation by unplugging from mains supply cable to unit.
2. Close the inlet water valve [1].
3. Plug in the RO-H to the mains power supply for 5 seconds, to release pressure from the water line.
4. Place a bucket (min. 2.5 gal) underneath the filter.
5. Turn filter housing counterclockwise and remove filter housing. If the housing sits tight, use the wrench to unfasten.
6. Remove filter cartridge and O-ring from housing.
Note: Filter cartridge can be disposed with the household waste.
7. Wash filter housing and O-ring with a lukewarm soap solution and rinse filter housing and O-ring well with tap water before remounting.
8. Check if O-ring is placed correctly in the housing. Insert O-ring into the groove inside the filter housing.
9. Carefully take new filter cartridge out of its packaging and remove plastic foil without damaging the filter cartridge.
10. Insert filter cartridge into the filter housing. Centrally align filter cartridge inside the housing and ensure the sealing of the filter cartridge is correctly placed.
11. Screw tight the housing.

Replacing the membrane(s):



WARNING!

Always wear disposable protective gloves when handling filters to prevent infection due to opportunistic pathogens!

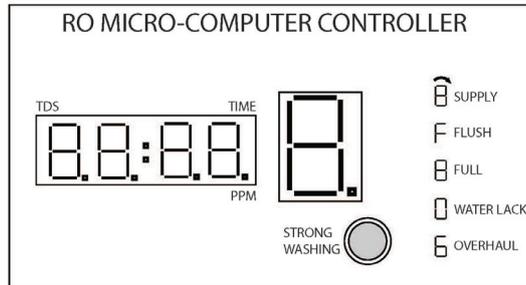


To replace the membrane(s) proceed as follows:

1. Make sure the Condair RO-H is disconnected from mains and pressure is released from water line.
2. Close the inlet water valve [1].
3. Plug in the RO-H to the mains power supply for 5 seconds, to release pressure from the water line.
4. Place a bucket (min. 2.5 gal) underneath the unit. Disconnect hose from inlet water.
5. Lift up the membrane housing from its holder and unscrew the housing cover.
6. Remove the old membrane, by using a small screwdriver to lift out the membrane.
7. Inspect inside of the housing for dirt and biofilm. If cleaning is required:
 - Wash the membrane housing, O-rings and shell cover using warm water, soap and a lint-free cloth.
 - Put on disposable gloves, then carefully take new membrane out the packaging and remove plastic foil without touching or damaging the membrane.
8. Follow the instruction in [chapter 5.6.2 Install RO membrane](#), then
 - Reconnect water pipe to “inlet water” in membrane housing and place the membrane shell in its holders.
 - When all maintenance work is completed, connect the RO-H to water and mains supply.

6.3.3 Membrane Flushing

1. Membrane Flushing: After installation of a new membrane, it is important to flush the membrane. The RO-H automatically flushes for 30 seconds at start up, but this might not be sufficient when a new membrane is installed.
2. Press “Strong Washing” on the display and observe the TDS. When it is below 10–15 ppm, the units can be set into normal operation.



6.3.4 Disinfection

If the system is part of a DGUV approved system, the RO-H must be disinfected every 6 month, by Condair Service team. Please refer to [chapter 8](#) for the disinfection of the system.

6.4 Preventive spare parts chart

Defined preventive replacement of spare parts in connection with service

Products	Carbon filter	Sediment filter 5 micron	RO cartridge	RO pump	Booster pump	Inlet valve	Quality valve	Low pressure switch	High pressure switch
Condair MN	1yr *	1yr *	2yr	replace	replace	repair	repair	repair	repair
Condair Omega	1yr	1yr	1yr	replace	--	repair	repair	repair	repair
Condair RM	1yr	1yr	1yr	replace	--	repair	repair	repair	repair
Condair RS	1yr	1yr	1yr	replace	--	repair	repair	repair	repair
Condair Omega Pro	1yr	1yr	1yr	replace	--	repair	repair	repair	repair
Condair US	1yr *	1yr *	2yr	replace	--	repair	repair	repair	repair

* Depending on Condair service cycle.

Replace = If defect, RO needs to be completely replaced.

Repair = If defect, the part can be replaced by qualified technical personnel.

7 Troubleshooting

7.1 Qualification of personnel

Problems occurring during operation of the RO-H must always be eliminated by qualified and trained personnel. Malfunctions caused by the electrical installation must only be repaired by authorized personnel (e.g. electrician).

7.2 Issue indication and resolution

When working on the system, the RO-H must be taken out of operation and prevented from further inadvertent operation.

Make sure the power supply to the RO-H is disconnected and that the water supply is cut off.

Fault indication	Cause of the problem	Indication	Resolution
RO not starting	Power off	Lights off on RO Detected by humidifier – low water pressure	Plug power. Check power supply.
	No water	Status of RO = “0” Detected by humidifier – low water pressure	Check inlet valve.
	Too low water pressure		Check raw water pressure.
	High/low pressure switch damaged		Switch needs replacement. Call Condair support.
No pure water production / no visible drain water	Inlet valve failed to open or clogged	No drain/pure water on RO. Detected by humidifier – low water pressure	Inlet valve needs replacement. Call Condair support.
	Check valve blocked.	No pure water, only drain water on RO. Detected by humidifier – low water pressure	Check valve needs replacement. Call Condair support.
	Check valve defect.		
	RO membrane clogged or scaled	Very little pure water on RO. Detected by humidifier – low water pressure	Replace RO membrane, check incoming water quality and drain valve.
RO starts over repeatedly	Flow-through / pressure tank defect	Detected during optical inspection of RO. Detected by humidifier – low water pressure.	Replace tank.
	System loses pressure (possible leak)	Insufficient water production. Detected by humidifier – low water pressure.	Call Condair support. Locate leak and replace defect part(s).
	High pressure switch defect	Insufficient water production. Detected by humidifier – low water pressure.	Switch needs replacement. Call Condair support.
Permeate quality decreases	Membrane defect	TDS meter in RO display will indicate high value. Detected by humidifier – filter exhausted.	Replace membrane.
Permeate flow decreases (below 5.3 gal/h)	Membrane scaled or clogged	Detected by humidifier – low water pressure.	

8 Disinfection

The disinfection of the RO-HB variant is described in in the Installation and Operation Manual of the Condair MN and is part of it's standard service.

Before starting disinfection, the connected humidifier must be switched off and secured against being switched on again unintentionally.

8.1 Disinfecting the RO-HM

Combined instruction for Condair service and for private end users:

Condair Ltd. recommends that these work steps are only carried out by well-trained personnel.

Protective clothing: Plastic gloves and goggles

Warning notice: Disinfectants can cause serious skin and eye damage. Always wear protective gloves and eye protection when working with disinfectants. Read the safety data sheet for complete safety instructions.

Disinfectants: RO-H disinfection connector set (SAP No. 2600112)
HaloMist HM10 Ag 5 % Qt (SAP No. 2300001)

Further material: Bucket, min. 2 gal / absorbent cloth

*If this disinfection liquid is not available in your country, please contact Condair Support for an alternative, approved disinfection liquid.

The following time should be scheduled for the entire procedure:

1. active work on the system 30 - 45 min
2. exposure time of the chemical 30 min

Note on the correct handling of John Guest hose connectors

Please make sure that the hoses are always fully inserted into the push fit connectors. To test proper fit, try to pull the hose out again after you have pushed it all the way in. If the hose can withstand the pull, it will sit securely and leak free in the connector.

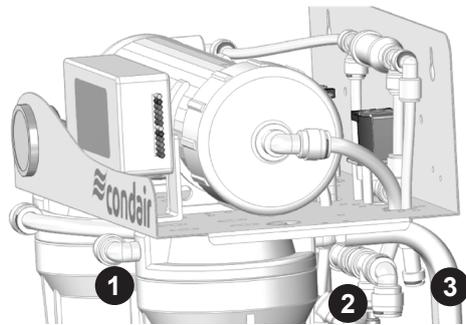
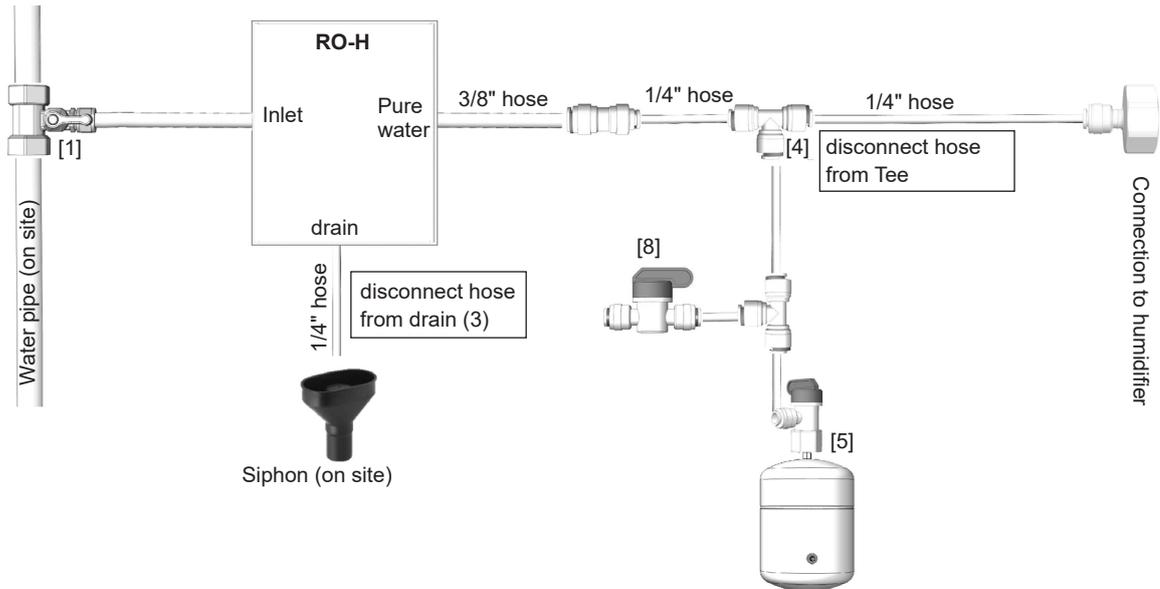
If you need to shorten hoses, always use a hose cutter suitable for PA material. The cut edge must always be at right angle to the hose direction and smooth. The hose end must never be squeezed or kinked.

8.1.1 Preparations for disinfection

All instructions in the text refer to the sketches in this chapter.

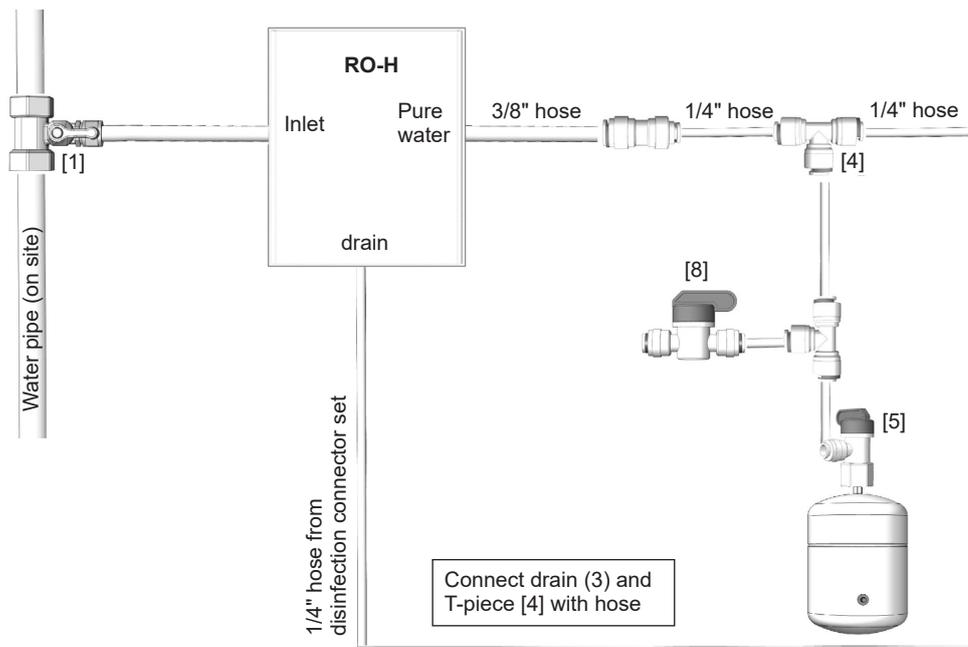
1. Close inlet water [1] and unplug the RO-H from the power outlet.
2. Wait a few seconds and plug in the RO-H in again until an acoustic signal is heard. Unplug the RO-H again.
3. Close the tank valve [5].
4. Place the bucket under the flush valve.
5. Release the pressure by opening the manual flush valve [8].
6. Empty the pressure vessel completely by slowly opening the tank valve [5].

- Remove the drain hose on the RO-H side (the drain hose is connected to the drain (3)).



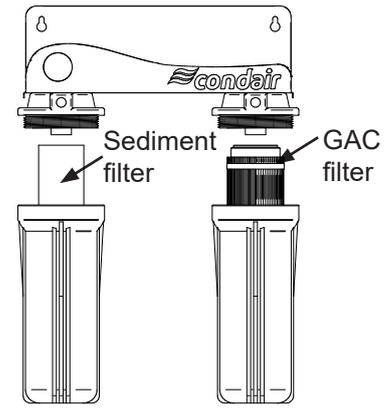
- Inlet (3/8" push fit)
- Pure water (3/8" push fit)
- Drain (1/4" push fit)

- Remove the connecting hose to the humidifier at the T-piece [4].
- Connect the hose from the RO-H disinfection connector set to the T-piece [4] on the one side and to the drain (3) on the other side as shown in the graph below.



8.1.2 Cleaning and disinfection

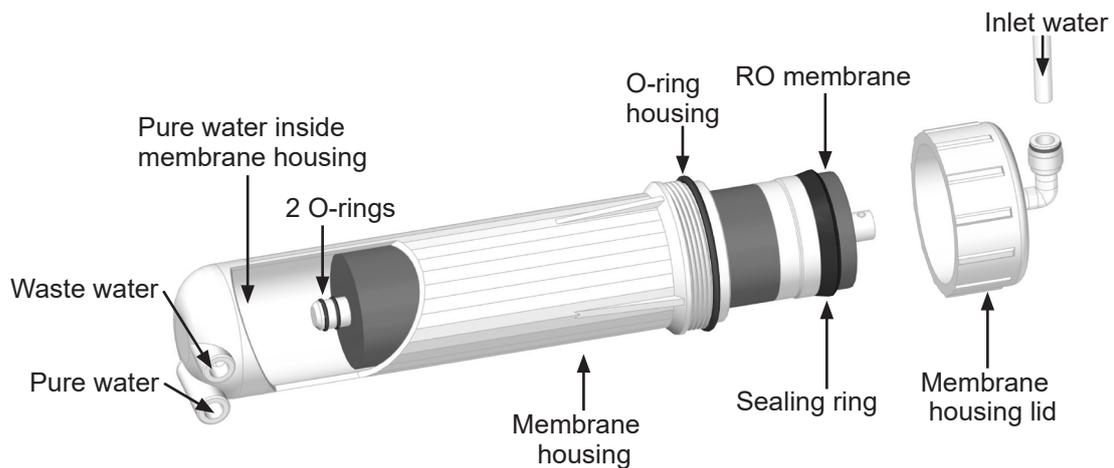
10. Remove the active carbon filter (GAC) and sediment filter housings.
11. Clean the filter housings with lukewarm water, soap and a sponge.
12. Fill 1 liter of disinfectant into each of the filter housings and mount them again (instructions see [chapter 5.6.1](#), step 5).
13. Open the RO membrane housing and remove the RO membrane. Clean the membrane housing analogous to the filter housings (instructions see [chapter 6.3.2](#)). Put an absorbent cloth underneath the membrane housing catch dripping water.



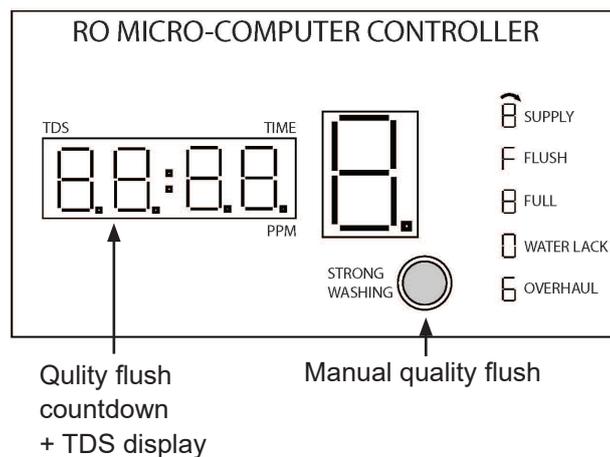
14. Check the correct fit of the O-ring on the housing thread (see diagram, page 38). Mount the lid back on the membrane housing and insert the hose.
15. Place the bucket under the flush valve [8]. Close the tank valve [5] and open the flush valve.
16. Open the inlet valve [1] to the system.
17. Wait approx. 1 min and then plug the RO-H into the power outlet.
18. Wait until approx. 0.3 gal of the water/disinfectant mixture has flowed out through the flush valve [8].
19. Close the flush valve [8] and open the tank valve [5]. The tank fills up.
20. Wait about 2min and unplug the RO-H from the power outlet.
21. Close the inlet valve [1].
22. Exposure time of the chemical: wait approx. 30 minutes.

8.1.3 Flushing and transition to control operation

23. Place the bucket under the flush valve. Open the tank valve [5] and then the flush valve [8] and empty the tank into the bucket.
24. Check that there is no visible dirt or particles Empty the bucket into the normal drain.
25. Remove the hose from the disinfection connector set from the T-piece [4] and the drain (3) (page 37).
26. Reconnect the waste water hose to the drain (3) ([chapter 8.1.1](#)).
27. Reconnect the hose to the humidifier to the T-piece [4].
28. Plug the RO-H again into the power outlet and wait until an acoustic signal sounds. Unplug again the RO-H.
29. Close the flush valve [8] and the tank valve [5].
30. Unscrew the filter housing and empty the remaining liquid into the bucket. Insert new filters. Follow the instructions in [chapter 6.3.1](#).
31. Open the membrane housing. Empty it carefully and completely into the bucket. Insert a new membrane. Follow the instructions in [chapter 6.3.2](#). Make sure that the O-ring is correctly seated on the thread of the membrane housing before screwing on / tightening the lid. Reconnect the hose of the water inlet to the cap.



32. Place the bucket under the flush valve [8] and open it.
33. Open the inlet valve [1]. The filter housings are now filled and the system is pressurized.
34. Check for leakage.
35. Plug the RO-H again into the power outlet.
36. The plant rinses for 30 seconds before permeate production starts. A countdown is shown on the display. Then check the TDS display (see sketch, page 39). If the displayed value is > 30 after rinsing, press the "Strong Wash" button to trigger another rinse. Repeat this until the value in the display is <30.



37. Close the flush valve [8] and open the tank valve [5].
38. After 2 minutes, unplug the RO-H from the power outlet.
39. Place the bucket under the flush valve [8] and open it. The tank empties into the bucket. Close the flush valve [8] again.
40. Plug the RO-H again into the power outlet. The pressure tank is filled after approx. 10 minutes. The humidifier can then be switched on and put into regular operation.

This concludes the disinfection procedure.

9 Product Data

Technical parameters	Unit	Value
Voltage / frequency; protection	VAC / Hz	110–120 / 60 * ¹⁾
Power Rating	W	90
Incoming water quality		Tap water
Incoming conductivity (see page 12)	μS/cm	150–1000
Incoming TDS	ppm	95–700
Incoming pressure (see page 12)	psi	8–50 * ²⁾
max. permissible operating pressure	psi	116
Incoming water temperature	°F	41–77 * ³⁾
RO permeate capacity @ 5° C	gal/h	4.5
Salt rejection	%	95–98
Water efficiency	%	≈ 50/50
Output pressure	psi	43.5–87.0
Prefilter 1		Act. Carbon
Prefilter 2	Micron	5
Low pressure switch trigger	psi	8
High pressure switch trigger	psi	32.0–43.5
Tank sizes and types	gal	4.5 Flow through tank 6 Pressure tank
Noise	dBA	<50
Connection inlet		JG 3/8" push fit
Connection pure water		JG 3/8" push fit
Connection drain		JG 1/4" push fit
Outer dimensions RO (HxLxW)	inch	18.3 x 14.0 x 8.5
Outer dimensions hood (HxLxW)	inch	18.5 x 15.2 x 9.8
Outer dimensions tank 4.5 gal DxH	inch	11.0 x 14.5
Outer dimensions tank 6 gal DxH	inch	11.0 x 16.7
Weight RO	lbs	18.7
Weight hood	lbs	8.8
Weight tank 4.5 gal	lbs	10.0
Weight tank 6 gal	lbs	9.0

*¹⁾ The Condair RO-H is energized by 24 VDC from an UL listed class 2 power source. The system needs to be protected by a ground fault circuit interruptor ≥ 5 A.

*²⁾ If the pressure exceeds 50 psi, it is mandatory to install a pressure reducer upstream of the RO-H in the supply line, which is set to 50 psi max. pressure. A suitable pressure reducer is available from Condair (2600230).

*³⁾ The RO-H may only be connected to a cold water line.

10 Spare parts and Consumables

10.1 Spare parts

SAP No.	Description
2600097	Low/high pressure switch, set
2600098	Inlet/drain valve, set
2601021	SP Flow-through tank 4.5G, FT18
2601023	SP Worm drive bracket 260-280/12, Set
2601024	SP Housing cover RO-H
2501660	Hydraulics Installation set
2601025	SP Reverse Osmosis System RO-H
2599774	Booster pump 5bar/72.5psi, 3/8" female

10.2 Consumables

SAP No.	Description
2599771	RO membrane 3013 400G
2600099	GAC/Sediment filter set
2600112	Disinfection fittings set, RO-H
2300001	Disinfection HaloMist HM10 Ag, 5 % – Qt
2600525	Flow-through tank 4.5G, FT18

11 Declaration of conformity



EC

Konformitätserklärung

Declaration of conformity

Déclaration de conformité

Wir,
Condair Group AG
CH-8808 Pfäffikon SZ
erklären in alleiniger Verantwortung,
dass das Produkt

We,
Condair Group AG
CH-8808 Pfäffikon SZ
declare under our sole responsibility, that
the product

Nous,
Condair Group AG
CH-8808 Pfäffikon SZ
déclarons sous notre seule
responsabilité, que le produit

Condair RO-H

auf das sich diese Erklärung bezieht,
mit den folgenden Normen oder
normativen Dokumenten
übereinstimmt

to which this declaration relates is in
conformity with the following standards or
other normative standards

auquel se réfère cette déclaration est
conforme aux normes ou autres
documents normatifs

EN 60335-1
EN 60335-2
EN 60335-3
EN 61000-3-2
EN 61000-3-3

und den Bestimmungen der folgenden
Richtlinien entspricht

and is corresponding to the following
provisions of directives

et est conforme aux dispositions des
directives suivantes

2014 / 35 / EU
2014 / 30 / EU
2014 / 68 / EU

2599874 DE/EN/FR 2008

Pfäffikon, August, 2020

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