adrona

Water purification system

Adrona Crystal EX RO/Pure

INSTALLATION & OPERATION MANUAL

Version 5.1 (2018)

ISO 9001
BUREAU VERITAS
Certification

No. LVRIG38118A

Table of Contents

INTRODUCTION

Using This Manual

This is a user manual for Adrona Crystal EX RO and Crystal EX Pure water purification systems. We strongly advise you to read this manual before installing and using the water purification system.

Safety Information

WARNING! Read and understand all sections in this guide before installing or operating the system. The symbols used below are internationally accepted symbols that warn of potential hazards with electrical products.

This HAZARD symbol is used to refer to instructions in this manual that need to be done safely and carefully.

This ATTENTION symbol is used to refer to instructions in this manual that need to be done carefully.

This ELECTRICAL GROUND symbol is used to refer to a position where an electrical ground connection is made.

This ELECTRICAL DANGER symbol means that there are dangerous voltages present within the unit.

This DANGER symbol indicates that it is necessary for the user to refer to the owner's manual, read, understand and follow the instructions.

This UV RADIATION symbol indicates the ultraviolet radiation (UV) danger. Failure to comply with safety instructions may result in personal injury.

Ensure that anyone who operates the water purification system has received instructions in both general safety practices for laboratories and specific safety practices for the instrument.

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PRODUCT OVERVIEW

Crystal Ex Water System General Description

Water purification system Crystal EX RO and Crystal EX Pure produces pure water that complies with ISO 3696 Grade III and Grade II water requirements respectively.

Pure (ISO 3696 Grade III) water applications include, but are not limited to:

- Glassware rinsing;
- Laboratory washers;
- Autoclaves.

Pure (ISO 3696 Grade II) water applications include, but are not limited to:

- Feed for laboratory equipment (washing machines, clinical analyzers, humidifiers, autoclaves, hydrogen gas generators);
- Manufacturing of chemical and biochemical reagents;
- Microbiological media preparation;
- Spectrophotometry.
- Buffer preparation;
- Wet chemistry;
- In some cases - sensitive analytical techniques (e. g. atomic absorption, ICP-OES).

Crystal system combines several water purification technologies (depending on configuration): reverse osmosis, adsorption, deionization (DI), UV-sterilization, photooxidation.
The water storage tank is used for storing Grade III (Crystal EX RO) or Grade II water (Crystal EX Pure).

System Overview

Water Specifications

Purified water specification	Crystal EX RO	Crystal EX Pure
Resistivity at 25 °C	-	>10 MΩ x cm
Conductivity at 25 °C	TDS rejection rate >97%	<0.1 µS/cm

Technical Specifications

Dimensions and weight

	Crystal EX RO	Crystal EX Pure
Dimensions (W*D*H)	40*35*55 cm	40*35*55 cm
System weight	10 kg	12 kg
Operating weight	13 kg	16 kg

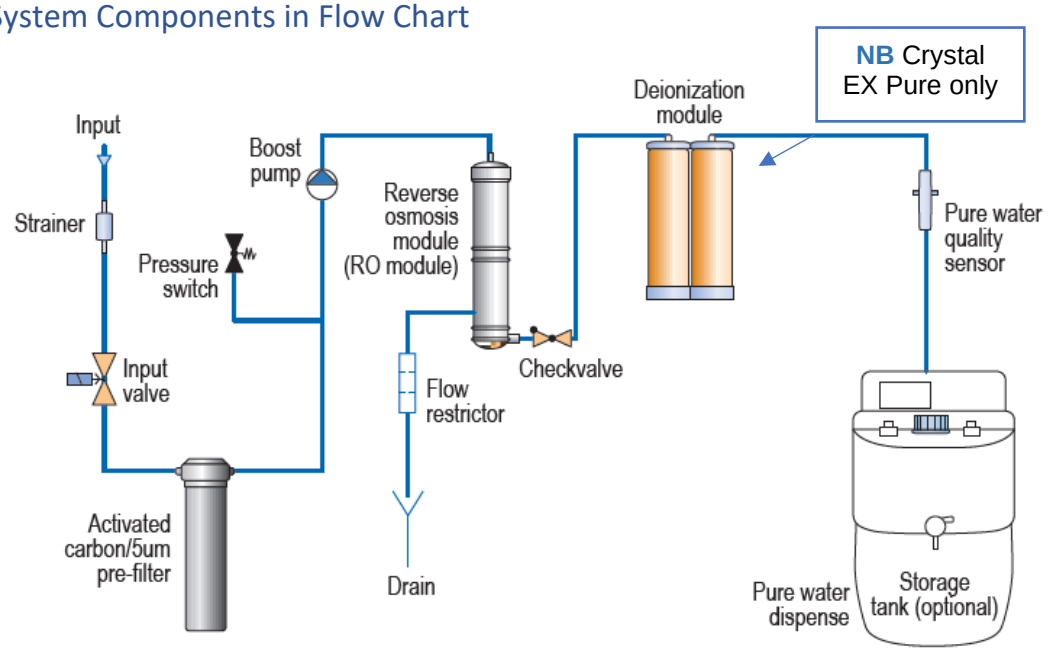
Noise level

Water purification system Crystal EX can generate a maximum sound pressure level of 45 dB at 1 m distance from the system.

Electrical requirements

The water purification system is configured for 230 V ± 5%, 600 mA max.
In areas where the supplied power is subject to voltage fluctuations exceeding 10% of the nominal volume, a power line regulator may be required.
Power supply receptacle should be within 1.5 meters from the installation site.

System Components in Flow Chart



Principle

The hydraulic diagram of the Crystal EX water purification system is shown above.

The solenoid valve controls intake of the feed water from the tap. The first stage consists of the water purification through the pre-filter (part no. 10320) having sediment filter and activated carbon filter intended to remove particles, free chlorine, organics and colloids. The pressure switch controls the feed water pressure.

The boost pump is used to maintain pressure at the level necessary for the efficient operation of the reverse osmosis membrane. The feed water flows to the membrane where it splits into two parts: the permeate water, diffused through the membrane, and the concentrate which passes over the membrane, carrying away contaminants to drain. The permeate water flows to the tank (EX RO configuration) or to the third purification step – to the deionization module (part no. 10310) where the remaining ions are removed.

Before entering the tank, the water is sterilized by optional UV lamp (if present, part no. 10102); water quality is controlled by the water conductivity sensor.

The LCD display provides information about the system status.

The tank stores Grade III or Grade II water.

PRE-INSTALLATION

Make sure the pre-installation requirements are met before installing the system.

Feedwater requirements

Feedwater should be filtered with 1 µm sediment filter. **If the filter is not installed, the input strainer may become clogged thus blocking the water flow**.

Check if sediment filter is installed in tap water supply line. There should be at least one sediment filter (pore size 1 µm). The sediment filter is usually available from a local plumbing store.
If you cannot obtain a sediment filter locally, you can order tap water line pre-filter set from Adrona (see picture on the left).
The part number is 10170 (carbonpp/ PP 1 µm) or 10171 (polyphosphate/carbonpp/1 µm).

Feedwater properties:

Type of feedwater	**Potable**
Minimums pressure	≥0.4 bar
Maximum pressure	≤4 bar
Conductivity	<1500 µS/cm
Temperature	5 – 35 °C
pH	4 – 10
Fouling Index	<10
Iron	<0.1 ppm as $CaCO_3$
Aluminum	<0.05 ppm as $CaCO_3$
Manganese	<0.05 ppm as $CaCO_3$
Free Chlorine	<1 ppm
Langerier Saturation Index	<+0.2
TOC	<2000 ppb

Feedwater connection

Feed water hardness does affect produced water quality. Operation of the system with hard feed water may result in pre-mature clogging of reverse osmosis membranes and reduced Grade III or Grade II water flow.

Therefore, it is strongly recommended to install a water softener or polyphosphate filter if water hardness is above 160 ppm.

Feed water connection port has to be 1/2” NPTF (male) thread. The system is equipped with feed water tube (1/4” OD) and adapter for 1/2” NPTF (female) water supply connection. The feed water tube should be connected to the 1/4” John Guest port of the adapter. Feed water connection port should be equipped with a valve allowing shutting off water supply.

Drain pipe should be lower that the level of the instrument and the level of the “OVERFLOW” port of the tank. The water purification system has 1/4” OD drain pipe. The “OVERFLOW” port of the tank is intended for 3/8” OD pipe with stem elbow 3/8”.

Feed water supply connector and drain should be within 3 meters from the installation site.

Site requirements

The system requires up to 400*350*550 mm (W*D*H) space on the bench. If the system is equipped with the tank, allow enough space for the tank. The tank can be placed under the bench.

Environmental requirements

The water purification system is intended for indoor use only, in an environment that has nonconductive pollutants only.

Ensure that the site is maintained under the following conditions:

Condition	Acceptable range
Temperature	15 to 30 °C (59 to 86 °F)
Humidity	20% to 80% relative humidity, noncondensing

Water leakage safety

Make sure that all water connection tubes are kink-free.

Make sure that all water connections are tight.

When installing the tank, connect the fitting marked “OVERFLOW” to the drain. Make sure that the drain level is lower than the “OVERFLOW” fitting level. This will prevent water leakage in case of tank level sensor failure.

A 1 µm sediment filter has to be installed in the feedwater supply line. Failure to install the filter may result in clogging of the strainer inside the system and water flow blockage.

Additional equipment

Water purification system Crystal EX (RO/ Pure) is not equipped with internal tank.
Therefore, you may need to order external tank for purified water storage additionally. See Price list for further order information.

UNPACKING

Remove packing materials carefully and retain for them future shipment or storage of the unit. Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage.

Caution! Due to the unit’s weight its unpacking and installing is to be carried out by two persons.

When opening the shipping box, we advise to compare received parts with the Packing List included.

Contact Adrona if any part is missing!

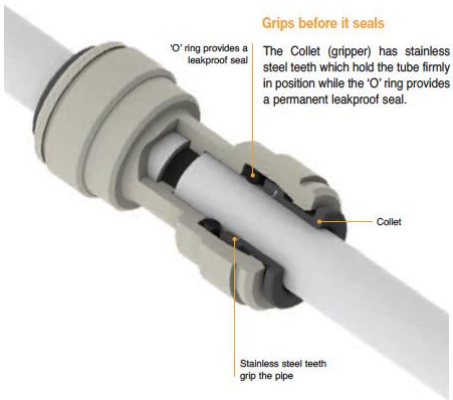
INSTALLATION

Preparation of the System

Review “Pre-installation requirements” chapter above.
Unpack the water purification system and place it on the laboratory bench.
Remove the protective packing materials

Introduction to John Guest tubing system

Adrona water purification systems are equipped with John Guest push-fit fittings and tubes. We will use abbreviation JG for John Guest parts in further text.



To make a connection, the tube is simply pushed in by hand; the unique patented John Guest collet locking system then holds the tube firmly in place without deforming it or restricting flow

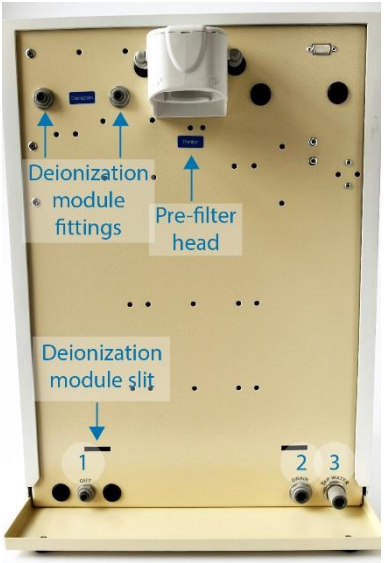
Push the tube into the fitting, to the tube stop

Pull on the tube to check it is secure. Test the system before use

To disconnect, ensure the system is depressurized, push the collet square against the fitting. With the collet held in this position the tube can be removed

Rear and side panel

Look at the rear panel of the Crystal EX water purification system and locate pre-filter and deionization module installation sites as well as inlet and outlet fittings.



Rear panel

1 – “OUT” 1/4” connection
2 – “DRAIN” 1/4” connection
3 – “TAP WATER” 1/4” connection

Side panel

1 – Information about system & location of the serial number
2 – Electric cable plug
3 – Power switch
4 – “TANK LEVEL” connection

Pro tank

The “Pro” 30 l tank with level sensor, base and tap (part no. 11015) is an optimal solution for purified water storage. There are available other tanks with different volume. See price list for further information.

Front view

Rear view

Top close view

1 – “TANK LEVEL” connector
2 – “OVERFLOW” tube output
3 – A lid
4 – Air filter
5 – Water tap

Rear close view

6 – “REC IN” tank input
7 – “REC OUT” (not used for Crystal EX RO/Pure; for systems with recirculation only)

Installation of filter

[1]

Remove protective cap from pre-filter

[2]

Place pre-filter in the filter holder (i. e. filter head)

[3]

Install pre-filter at the rear panel of the water purification system. To install the pre-filter, fit it into the filter holder and turn it one quarter of a turn

Installation of the deionization module

This section refers to Adrona Crystal EX Pure only.

[1]

Remove both protective 1/4” JG plugs from DI module

Option 1.

You need to push the little ring down and you will be able to take out the plug (see the principle in chapter ”Introduction to John Guest tubing system”)

[2]

You can use Adrotool for more convenient removal. See Adrotool close view picture on the left

[3]

Option 2.

Protective 1/4” JG plug removal from DI module using Adrotool.
You need to push the little ring down with Adrotool and you will be able to take out the plug

[4]

Locate connectors for deionization module (JG stem elbow with 1/4” tubes)


[5]

Insert connectors in the module fittings.
Make sure they are properly attached


[6]

Place deionization module in the slit


[7]

Place connector tubes in slots.
Make sure that connectors are properly attached

Connection of tubing

[1]

Locate three 1/4” tubes included in the Crystal EX set that are used for:

- “TAP WATER” connection;
- “DRAIN” connection;
- “OUT” connection

[2]

Locate the 1/2” NPT thread adapter that is used for “TAP WATER” connection

[3]

1. Connect the JG 3/8”-1/4” elbow adapter to feed water 1/4” JG tube;
2. Place it in the connection marked “TAP WATER”;
3. Connect the other end of 1/4” JG tube to the 1/2” NPT thread adapter [pic. 2]
4. Install 1/2” NPT thread adapter to the tap water supply line

[4]

Connect the 1/4” JG fitting marked “DRAIN” to the drain using the 1/4” JG plastic tube

[5]

Connect the 1/4” JG fitting marked “OUT” to the purified water storage tank inlet marked “REC IN”

[6]

Connect the 1/4” JG fitting marked “OUT” to the purified water storage tank inlet marked “REC IN”

[7]

To prevent water overflow from the system, locate the JG 3/8” feed water tube with JG elbow adapter (3/8”-1/4”)

[8]

Connect the JG 3/8” feed water tube with JG elbow adapter (3/8”-1/4”) to the tank connection marked “OVERFLOW”

When installing the tank, connect the fitting marked “Overflow” to the drain. Make sure that the drain level is lower than the “Overflow” fitting level. This will prevent water leakage in case of tank level sensor failure.

In case if submergible tank pump is installed, do not operate it if there is no water in the tank. Tank pump may fail if it is run dry.

[9]

Locate the tank cable

[10]

Connect the tank cable to the “TANK LEVEL” connector that is located on the top of the tank

[11]

Connect the tank cable to the “TANK LEVEL” connector that is located on the side panel of the system

[12]

For the pure water systems **without tank**, connect the tank plug the connector marked “TANK LEVEL” on the side panel of the system

[13]

Note:

- If **nothing** is connected to the “TANK LEVEL” connector, the system will not run but it will always show message **“TnkFull”**;
- If the tank plug is connected connected to the “TANK LEVEL” connector, the system will always show message **“Low level”**


[14]

Locate the power cable

[15]

The system is connected to the power supply and disconnected from the power supply using the electrical switch, located on the side panel of the unit

Connect the power cable. Make sure the system is properly grounded.

The water purification system is connected to the main supply via electric cable that is supplied with the unit.

In case the supply cord is damaged, it should be replaced with an equivalent cord, in accordance with manufacturer’s specifications.

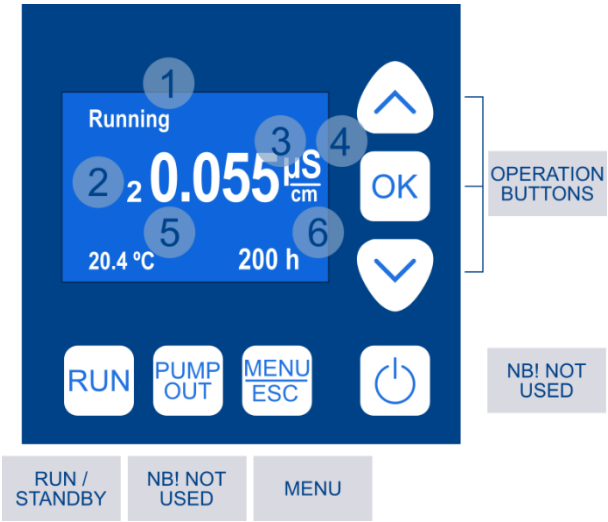
Calibration

Adrona water purification systems are already calibrated. Additional calibration is not needed.

USING THE SYSTEM

Display

All functions are accessible via control buttons at the front panel.
The LCD screen displays information regarding water quality, operation status, errors and button functions.



Description:

1 – Operation status/ Error messages
2 – Conductivity sensor
3 – Water quality
4 – Measurement unit
5 – Water temperature
6 – Filter life

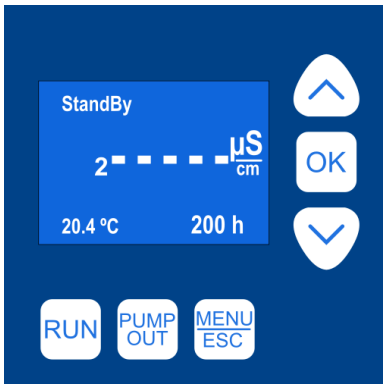
Detailed description of each line can be found in the table below:

No.	Line	Description
1	Operation status	Shows current status. Possible messages are: - "LowPres" – no feed water pressure; - "TnkFull" – tank is full or disconnected; - "Running" – the unit is filling the tank
1	Error messages	Errors occurred during operation. Possible errors are: - "DI Err" – deionization module has to be replaced; - "Filter" – pre-filter has to be replaced; - "TankS" – tank sensor may have failed
2	Conductivity sensor	Shows active water quality sensor
3	Water quality	Displays quality of water filling the tank (Grade II)
5	Water temperature	Displays water temperature. Water temperature measurement is necessary for accurate water quality measurement
6	Filter life	Shows time left till pre-filter replacement. Please note that in case of poor feed water quality, pre-filters may be clogged before the counter reaches zero

Obtaining the water

[1]

Switch on the system with the power switch. The unit is switched on and off with the main switch at the side panel of the unit



[2]

The display indicates the status window after few seconds.
To actuate a button, press and hold it for **2 seconds**

[3]

Status window indicates the system status, button functions and temperature. There is also indication of water quality

However, the precise indication can be obtained only when the system is in “Running” mode

[4]

To fill the tank with purified water, press the “Run” button (press and hold the button for 2 seconds)

[5]

- Now the Crystal system is filling the tank with Grade II (Crystal EX Pure) or Grade III (Crystal EX RO) water.
- As soon as the tank is full, the system shuts down the water supply and shows the "TnkFull" message


[6]

To dispense some Grade II water from the tank, use the stopcock

Rinsing the system

Press "Run" button to start operation. Check that the connectors were not loosened during the transportation and that there are no water leaks. Leave the system running for 2 hours.

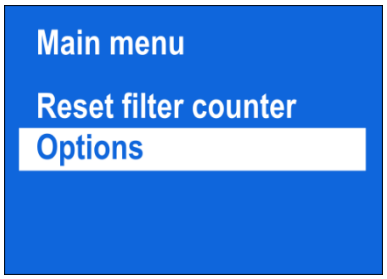
Check water flow in OUT and Drain tubes. The water flow in the Drain pipe should be 2-5 times higher than in the OUT pipe. If the water flow in the OUT pipe is higher than in Drain, the RO membrane is damaged.

Operating modes

[1]

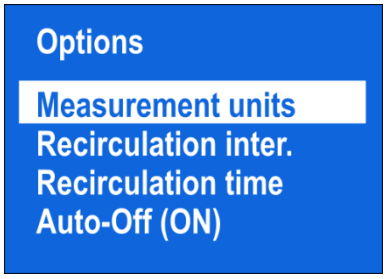
To enter the Menu, press the “MENU” button. The display will show menu, consisting of a “Reset filter counter” and an “Options” menu.

In case if the pre-filters are replaced, you need to reset the counter by pressing the “Reset Filter Counter” button



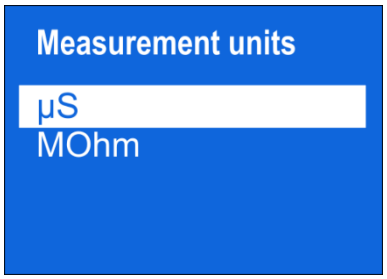
[2]

The operations in “Options” menu are described in further text



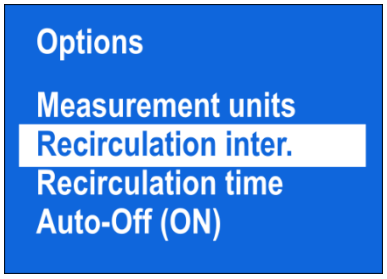
[3]

In the “Options” menu, you can choose the “Measurement units”



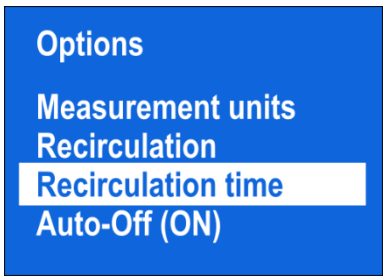
[4]

You can switch between unit MΩ*cm and unit µS/cm



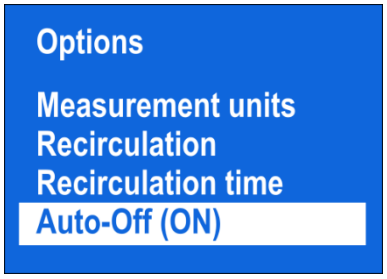
[5]

Option “Recirculation interval” does not correspond to Crystal EX RO or Pure models



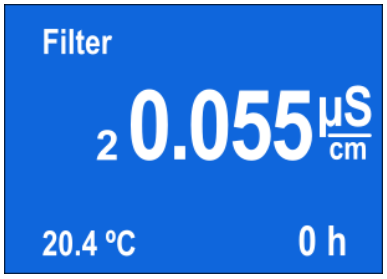
[6]

Option “Recirculation time” does not correspond to Crystal EX RO or Pure models



[7]

The option “Auto-Off” currently in not available



[8]

The Crystal system calculates time left before the pre-filter (part no. 10320 or part no. 10410 for Double Flow) replacement. The time is shown at the right bottom corner of the display.

When the time runs out, the message “Filter” appears in the left top corner

[9]

If the display indicates “LowPres” message, check section TROUBLESHOOTING in this manual for further actions

[10]

If the system indicates “DI Err” message, check section TROUBLESHOOTING in this manual for further actions

[11]

If the system indicates “TankS” message, check section TROUBLESHOOTING in this manual for further actions

Crystal EX can operate for an unlimited amount of time, maintaining Grade II and Grade III water quality, and does not require close observation during operation. However, it is necessary to shut off water supply valve when the system is not under observation.

MAINTENANCE

Maintenance schedule

Only the replacement components that meet the manufacturer's specifications should be used. Components have to be replaced according to the table:

Part number	Description	Replacement interval	Comments
10320	Replacement pre-filter, Crystal EX RO, Pure	When filter life counter is zero or when the filter is clogged	
10310	Replacement deionization module	When "DI Err" error message is shown, or when water conductivity is consistently >0.5 µS/cm	"Pure" system only
10011	Replacement sterilization UV bulb	As required (on average every 2 years)	For the systems equipped with 10102 UV sterilization module
10410	Prefilter for EX20-1002HC	When filter life counter is zero or when the filter is clogged	
	Sanitization of the System/ Tank	Every 2-3 months	Only if sanitization module (part no. 10315 is not installed)

Replacement of pre-filter

You need to replace the pre-filter (part no. 10320) when filter life counter shows zero or when the filter is clogged.

[1]

1 – Turn off the system;
2 – Close tap water valve;
3 – Allow a minute for water pressure to drop in the tubing

[2]

Access the rear panel where pre-filter is located.

To uninstall it, turn the body of pre-filter one quarter of a turn to the left

[3]

Pull the pre-filter down and remove it

[4]

Remove protective cap from pre-filter

[5]

Place pre-filter in the filter holder (i. e. filter head)

[6]

To install the pre-filter, fit it into the pre-filter head and turn it one quarter of a turn

After the pre-filters are replaced, reset the counter by entering the menu and pressing the “Reset Filter Counter” button.

Replacement of deionization module

This section refers to Adrona Crystal EX Pure only.
You need to replace the deionization module (part no. 10310) when “DI Err” error message is shown, or when water conductivity is consistently >0.5 µS/cm

[1]

1 – Turn off the system;
2 – Close tap water valve;
3 – Allow a minute for water pressure to drop in the tubing


[2]

Access the rear panel where the deionization module is located:

1 – Insert Adrotool in filter connector slot to disconnect Adrona deionization module;
2 – Pull down the tool


[3]

Now you can remove the deionization module from connector tubes and remove the deionization module from the system


[4]

Unpack spare deionization module. Remove both protective 1/4” JG plugs from DI module.

Option 1.

You need to push the little ring down and you will be able to take out the plug (see the principle in chapter ”Introduction to John Guest tubing system”)

[5]

Option 2.

Protective ¼" JG plug removal from DI module using Adrotool.
You need to push the little ring down with Adrotool and you will be able to take out the plug

[6]

Place deionization module in the slit

[7]

Place connector tubes in the deionization module

Calibration

Adrona water purification systems are already calibrated. Additional calibration is not needed.

Empty the tank

[1]

1 – Open the water dispense tap;
2 – Empty the tank

[2]

3 – When the water does not flow anymore, open the “REC OUT” tube;
4 – Pour out the remaining water

Cleaning and Sanitization of the system

Clean the exterior of the system with soft tissue and water. Do not use any chemicals.
The water storage tank should be cleaned and disinfected every 2-3 months.

Prior to cleaning, you need to disconnect the water tank from the system. Place JG plugs in all tube connectors.

Remove storage tank cap and add hydrogen peroxide to the tank. Final solution should be 1% hydrogen peroxide.

30% hydrogen peroxide solution can damage polypropylene components.

Use safety equipment when handling unsafe liquids.

TROUBLESHOOTING

Problem	Solution
No indication on the display, when the unit is switched on	Check the fuse and supply voltage
The unit shows “TnkFull” while the tank is empty	Check tank connection cable. If no tank is connected, then the tank plug should be in the tank socket
“LowPres” and “Running” messages are alternating	Check the input water pressure. If it is <1 bar, messages are alternating. The pre-filter could be clogged
“LowPres” and “Running” messages are alternating	Pre-filter can be clogged. Replace the pre-filter (part no. 10320) or contact Adrona for a solution
“LowPres” and “Running” messages are alternating	Strainer can be clogged. Replace the strainer (part no. 430034) or contact Adrona for a solution
“LowPres”	Pre-filter can be clogged. Replace the pre-filter (part no. 10320) or contact Adrona for a solution
“LowPres”	Strainer can be clogged. Replace the strainer (part no. 430034) or contact Adrona for a solution
“LowPres”	Check if pre-filter is installed. Install the pre-filter (part no. 10320)
“LowPres”	Check the input water pressure. If it is <1 bar, messages are alternating
“LowPres”	Check if solenoid valve is in order. Install the solenoid valve UV (part no. 430020)
“Filter” message	Pre-filters should be replaced (part no. 10320). After filter replacement reset the filter counter
“TankS” message	Tank level switch may be damaged. Check its operation and replace it if necessary
“TankS” message	The system is filling the 30 l PRO tank more than 4 hours. The cause could be RO module low productivity. If water quality satisfies the user, the message could be ignored
“DI Err” message	Restart the purification system. Make sure, water is flowing out of the OUT pipe. If the message appears again, then the DI module (part no. 10310) should be replaced

SPARE PARTS AND CONSUMABLES

Part number	Description
10320	Pre-filter
10410	Pre-filter for Double Flow
10310	Deionization module
430012	Reverse osmosis membrane
10011	UV sterilization bulb
430024	Boost pump
430020	Solenoid valve (input valve)
430027	Pressure switch
430019	Grade II water conductivity sensor
10102	Sterilization module (optional)

To obtain the best performance from Adrona systems, company advises regularly scheduled preventive maintenance operation.

WARRANTY AND CLAIMS

The Manufacturer guarantees the compliance of the unit with the Requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.

Warranty period for the new system is 24 months from installation date but no more than 26 months from the invoice date.

If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local dealer address.

The following information will be required in the event that warranty or post-warranty service comes necessary. Complete and retain for your records.

Model (underline the appropriate system)	**Crystal EX RO / Crystal EX Pure**
Serial number	
Date of sale	