

RO-4000 Reverse Osmosis Unit

OPERATING AND MAINTENANCE MANUAL



Puritech compact commercial reverse osmosis system is a durable piece of equipment which, with proper care and maintenance will last for many years. ECO series systems are part of a family of reverse osmosis units designed for operation with fresh and brackish feedwaters having TDS values below 1,500ppm. Models are available with permeate outputs of between 150 and 1,000 litres/hr as shown in the specifications.

Benefits

- Specialized Micro-Computer Controller
- Factory Tested
- 1-Year Limited Warranty
- Manufactured in China

Standard Features

- RO micro-computer controller with permeate TDS readout
- 300PSI stainless steel membrane housing+PE end caps
- Shinge PLD multistage pump for 2000-8000GPD
- 5 micron sediment pre-filter x 1
- Puritech rotameters for permeate and concentrate stream
- Puritech pressure gauges for prefilter feed and RO feed
- High pressure switch
- Concentrate recycling valve (without flow meter)
- Electro-plated SS304 skid frame

Available Options

- RO membranes available with brands of Filmtec, E-Mem, Vontron and Puritech
- Shinge multistage pump

Introduction

This operating manual outlines a general overview, operation, maintenance and troubleshooting details vital to the sustained performance and understanding of your system.

NOTE: Before operating or servicing this system, this must be read and fully understood. Keep it and other associated information regarding this system safe for future use.

Safety Precautions

General Safety Precautions

The system should be operated and maintained by trained personnel. Personnel must comply with this manual as well as the safety measures listed by their own employer. Puritech cannot be held liable for any damages, injury or even death that may result from use of this system.

Safety Headings

The safety section of this manual outlines various safety headings throughout the manuals' text and are identified and defined as below:

- NOTE:** Indicates statements that provide further information and clarification.
- CAUTION:** Indicated statements that are used to identify conditions or practices that could result in equipment or property damage.
- WARNING:** Indicates statements that are used to identify conditions or practices that could result in injury or loss of life. Failure to follow these warnings could result in serious injury or even death.

Labelling

Do not remove any labelling of this system. These labels are used to warn against potential hazards as well as identify components

General Plant Description

Purpose

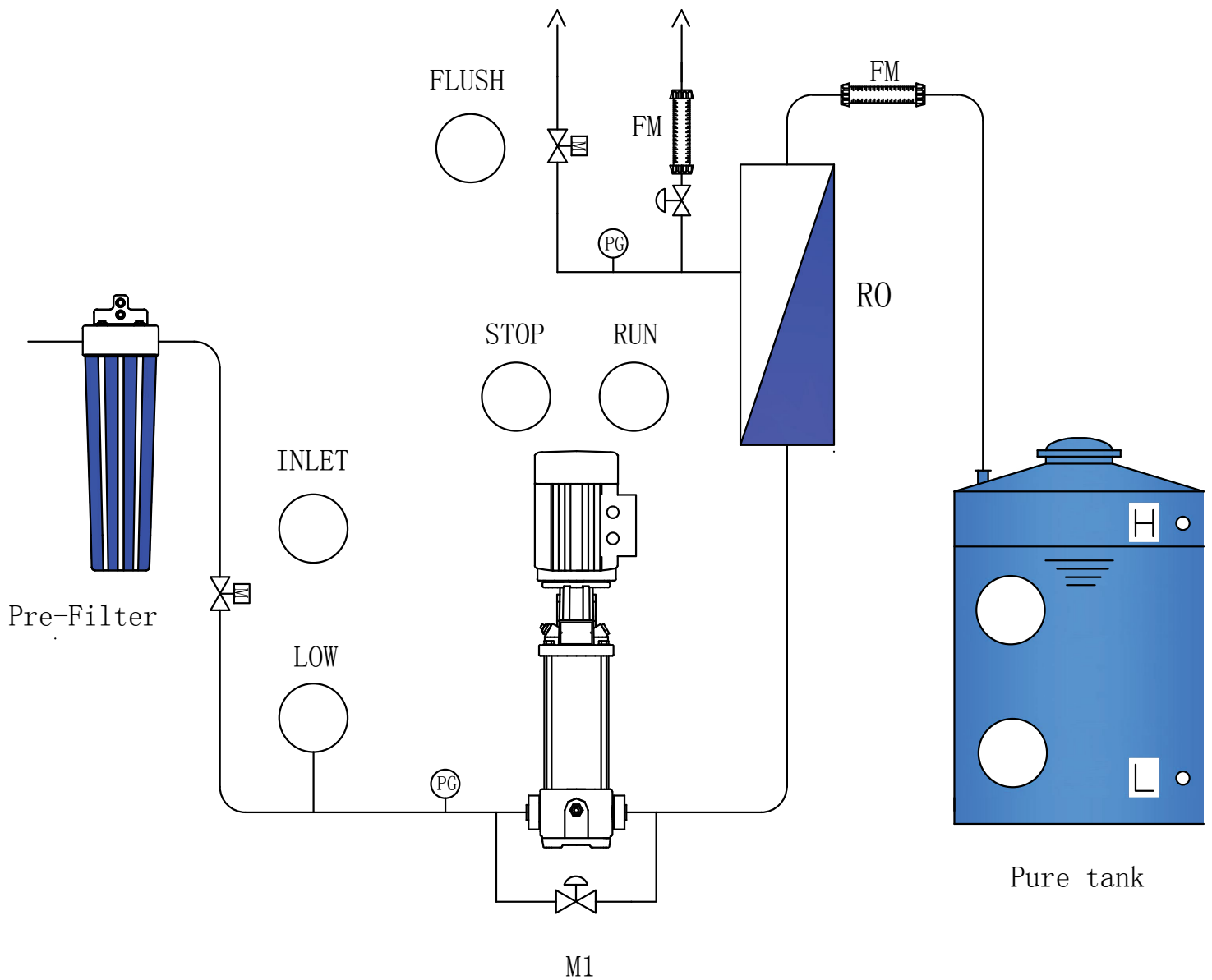
To reduce dissolved salt content of raw water for later use.

Principle Process

Reverse Osmosis (RO) is a form of high pressure hyper filtration where dissolved solids are removed from the supply stream to produce treated water (permeate) and waste water (concentrate). This is a continuous process running at a fixed flow rate.

Process Flow

Water is fed from a saline supply with minimal suspended matter, i.e. Pre-treated water, to the filter cartridge before being pumped through the reverse osmosis (RO) stage of the system where the dissolved salt content is reduced. The treated water (permeate) is fed into a holding tank and the concentrate to drain.



Process Description

Pre-Filtration

Raw water is fed through a pressurised line into the water treatment system.

The filtration stage of the system consists of a cartridge filter in which suspended matter larger than 5 micron is removed.

A solenoid valve is used to shut off the supply line when the holding tank has reached its top level or when the system is turned off.

Reverse Osmosis (RO)

Pre-filtered water is fed to the RO system by means of the horizontal centrifugal pump. The pump is controlled by the following parameters, namely:

- Product tank high level, indicated by a float level switch
- Raw supply tank low level, indicated by a float level switch.
- Low pressure condition, indicated by the pressure switch
- Timer unit contact.

The RO system generates two streams of water, a purified stream (permeate) is directed to the product tank while the concentrated stream is directed to the drain. A ball valve on the concentrate line allows for manual flushing of the RO system. Pressure indicators are fitted at strategic points to illustrate the systems operating pressure. Flow rate through the system can be monitored by the inline rotameters on both the permeate and concentrate lines.

En route to the product tank, permeate passes a conductivity probe, which reads conductivity of the product water

Technical Data

Equipment Details

Reverse Osmosis Pump	Tag	: P-1
	Qty	: 1
	Model	: Shimge PLD2-9
	Duty	: 2000L /hr @10 bar
	Power	: 1,8 kW
Cartridge Filter	Tag	: CF-1
	Qty	: 1
	Material	: Polypropylene
	Dimensions	: Ø 2.5" x 20" L
	Elements	: 5 µm, MeltBlown
Solenoid Valve	Tag	: SV-1
	Qty	: 2
	Model	: ZS1DF13N4D16
	Actuated	: Electrically, DC24V
	Pipe	: ½" Orifice, 16mm
Reverse Osmosis Vessel	Tag	: RO-1
	Qty	: 2
	Model	: 2.5", 1 Element, 300 PSI
	Port Position	: End Port
	Element	: 4.0" x 40"
Rotameter	Tag	: FLM-1
	Qty	: 1
	Range	: 100-1000l/hr
	Thread	: ½" F BSP

Rotameter	Tag	FLM-2
	Qty	1
	Range	16-160 l/hr
	Thread	½" F BSP
Pressure Switch	Tag	: PS-01
	Qty	: 1
	Model	: MPCo6
	Range	: -0.5-6bar
Pressure Indicator	Tag	: PI-01
	Qty	: 1
	Model	: 63mm, ¼" BSP, Bottom Entry
	Range	: 0-10 bar
Pressure Indicator	Tag	: PI-02
	Qty	: 1
	Model	: 63mm, ¼" BSP, Rear Entry
	Range	: 0-10 bar
Conductivity Meter	Tag	: Conductivity Meter
	Qty	: 1
	Model	: CM-230
	Range	: 0-199.9µS/cm

Operating Parameters

Cartridge Filtration

Service Flow Rate	: 0.625m ³ /hr
Max Operating Pressure	: 6 bar
Element	: 5 Micron (Ø4.5" x 10" L)
Replacement Intervals	: When required (Minimum once a month)

Reverse Osmosis

Service Flow Rate	: 0.125 m ³ /hr (permeate)
Max Operating Pressure	: 10 bar
Element	: 4040 x2
Replacement intervals	: When required

System Requirements

Plumbing

System connections are as follows:

- From raw supply to system inlet : ¾" PVC
- From permeate outlet to product tank : ½" PVC
- From concentrate outlet to drain : ½" PVC

- NOTE:** Ensure the diameter of pipeline can supply adequate flow with minimal head loss relative to pipe length.
- NOTE:** All municipal drain connections should not be connected together in a closed drain with any backpressure. i.e. drainage must be free flowing.
- NOTE:** The Brine from the RO has a high mineral content and should be delivered to drain or evaporation dam.
- NOTE:** We recommend that a qualified plumber installs the plumbing lines to and from the system
- WARNING:** The plumbing of this system is constantly under pressure during operation. Incorrect installation or operation of the system could result in serious injury or even death.

Electrical

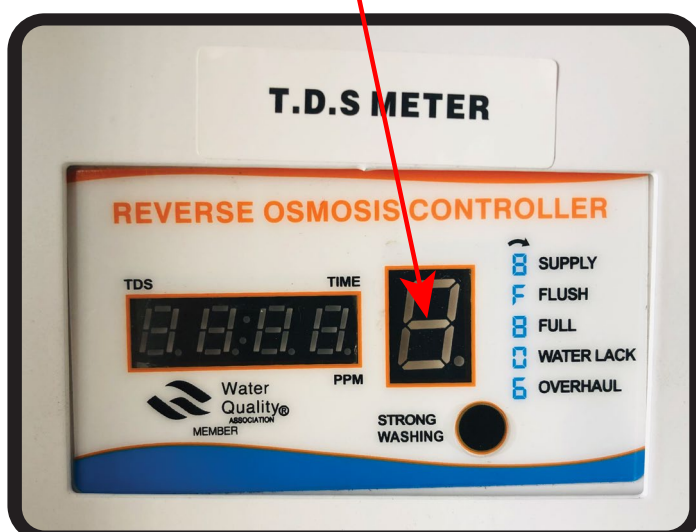
The electrical supply required for the plant is 220V, 5A, 50Hz, single phase with Neutral and Earth.

- NOTE:** We recommend that a qualified electrician installs the electrical supply to the system.
- WARNING:** To reduce the risk of electrical shock, the incoming electrical supply must include a protective earth connection. Electrical shock can result in serious injury or even death. Ensure the system is isolated from the supply before any electrical work commences.
- WARNING:** Incorrect installation of the electrical supply can result in serious damage to the equipment but can also result in serious injury or even death

Operating Procedures

System Overview

TDS Monitor



START UP MACHINE PROCEDURE

When the system is at the installation site, please remove all packaging. The first step then is to connect the local water pipe and local power.

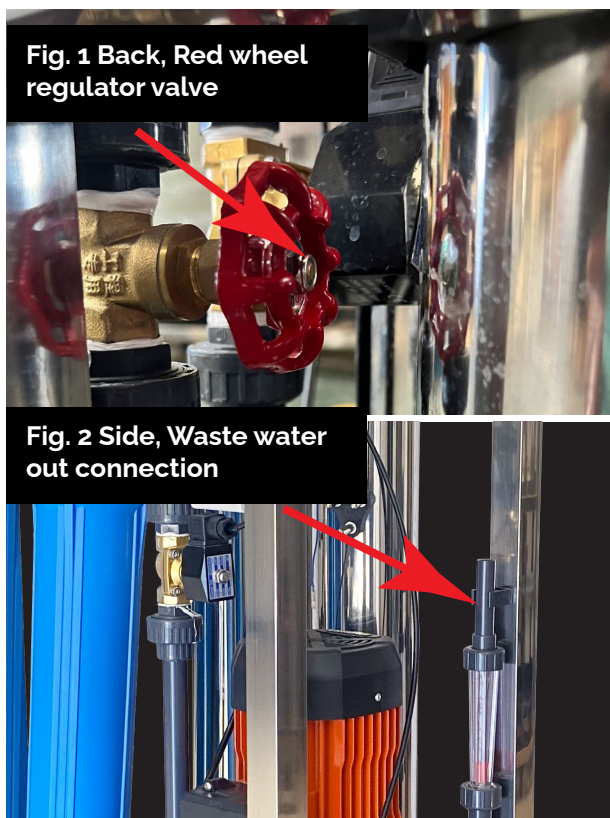
WATER PIPE CONNECTIONS (NB: there are 3 of them)



Feed water inlet connection from the 20" blue filter inlet solenoid i.e., the arrow in red above:

Wastewater connection is from the pipe with the red wheel regulator valve, see back bottom of machine Fig. 1 and back of machine Fig. 2 which must be connected to the drain as it is concentrate/ waste water and please refer to the picture below:

Pure water connection pipe (see red arrow) that comes from the permeate flow meter (see front side of machine) which must be connected to the pure water tank and please refer to the picture below:



Electrical/ Power Connection



1. The electrical connection is simple and what's needed is only to put the plug (see red arrow in pic below) into the socket and note that the voltage is 220V.50HZ.1P.
2. After point 1 is complete, please connect the water pipe connection and power and make sure that there is enough inlet feed water supply.

Installation of PP/ Sediment filter and the RO membrane/s

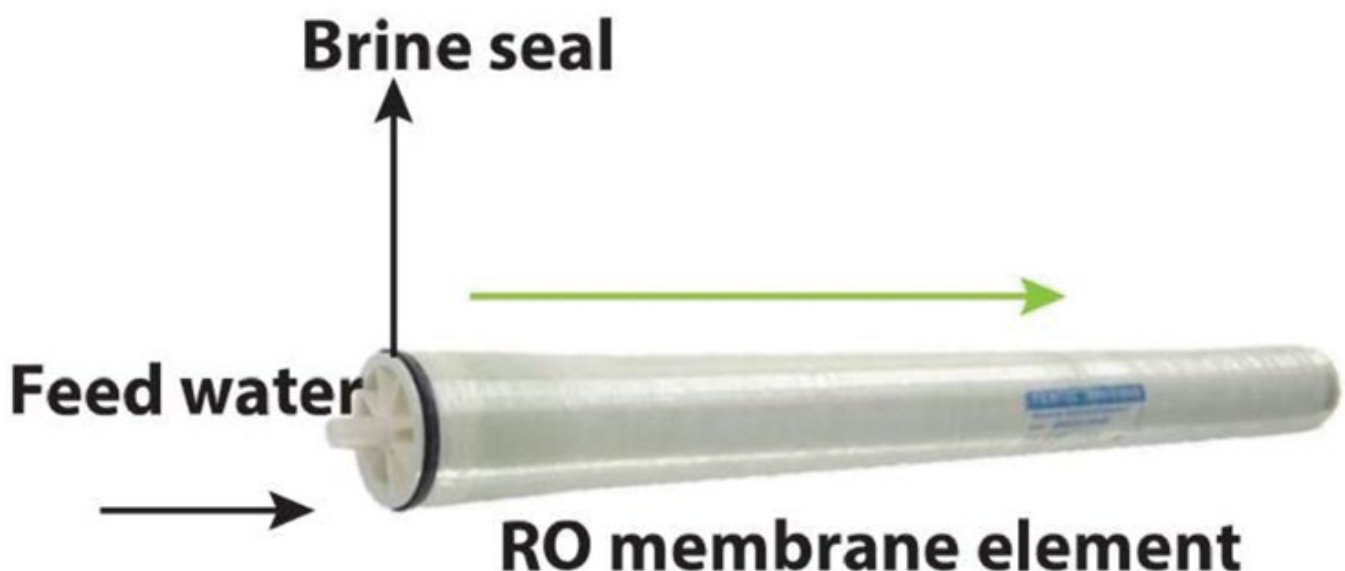
Please firstly open the 20" Slim Housing with the spanner provided, the PP/ Sediment filter, then remove the plastic out of the 20" Slim PP/ Sediment filter and can insert any side (no flow direction) into the 20" Slim housing (NB: Please change this filter every 3 months, however the latest water quality report should dictate this filter change time).

Membrane/s Installation

Please lubricate (use petroleum jelly/ Vaseline unscented) on 1. membrane/s on single O-ring, 2. on the nipples/ pointed ends found on each end of the membrane/s and 3. on the membrane housing/s end caps (two found on either ends of membrane housing).

Inserting Membrane/s

1. Please insert the membrane/s with the seal/ black colored O-ring facing the feed water direction and as the picture refers below:



2. Membrane flow direction following point 1 and please attention to picture 1 and 2 for reference below:



RUNNING THE RO SYSTEM



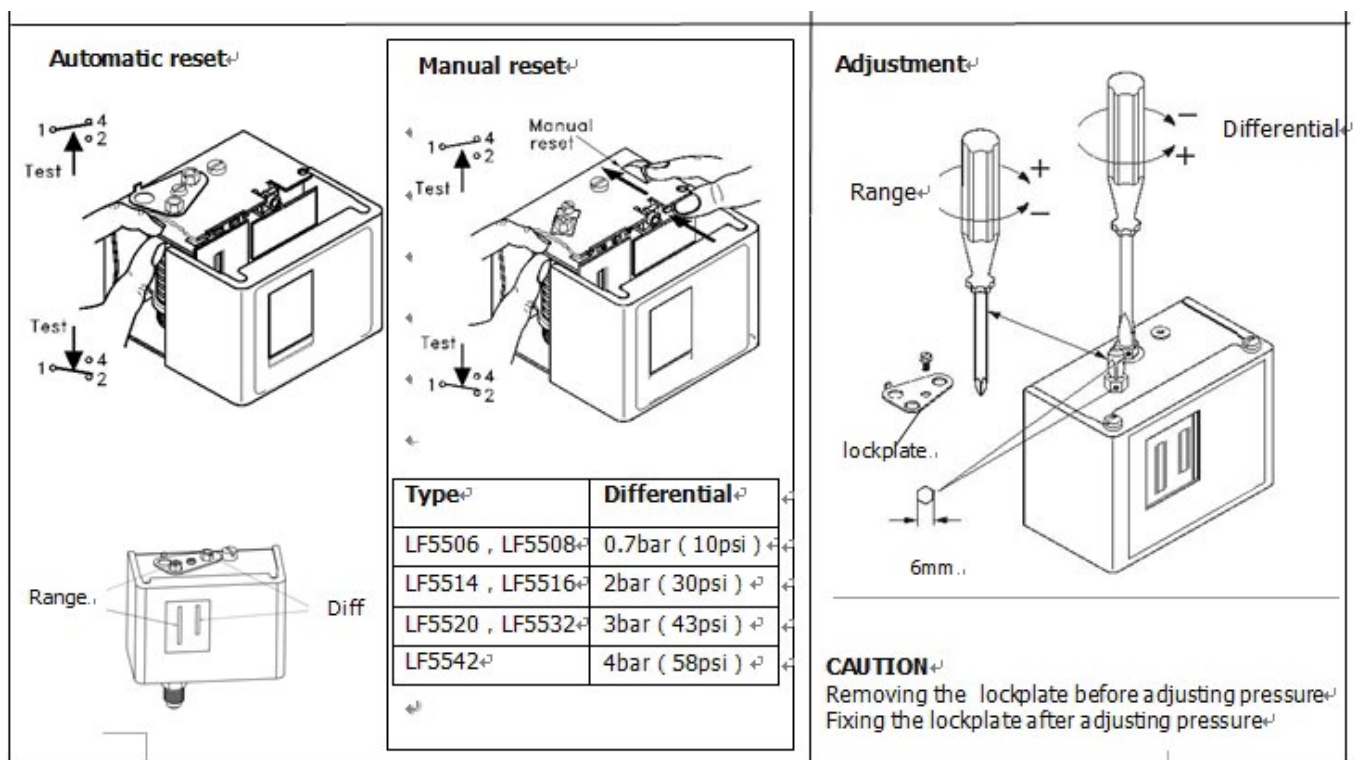
Once the membrane/s are inserted, the next step is to run the RO system, by pressing the red power button, see red arrow for reference above:



when the red power button is pressed it means that there is now power to the RO system, the ROC (Reverse Osmosis Controller) displays/ flashes number 8 (please see picture below) and thereafter continues its flushing cycle/s for about 60-90 seconds, this is indicative that the RO system is running correctly.

RO SYSTEM TROUBLE SHOOTING

1. When the flashing showing 0 on the ROC (Reverse Osmosis Controller) it means there is not enough of a. water supply or b. the pressure is low, then refer to point 3 below to rectify.
2. The RO system needs the correct supply of water all the time from feed/ incoming water supply or raw water tank and also needs the correct supply booster/ pressure pump and should these correct items not be in place then the RO will dry suck due to there being little to no water present in the supply line to RO, and due to this there will an air vacuum will form, and thereby the RO will inevitably malfunction or break down totally due to this.
3. Following for this not to happen, refer to point 2, please be cautious and to continuously check the feed/ incoming water supply or the feed/ supply raw water tank to make sure that there is always enough water to supply the RO so that it receives the correct amount of supply water all the time to function correctly.
4. To make the pressure lower, please adjust the pressure switch, see diagram below:

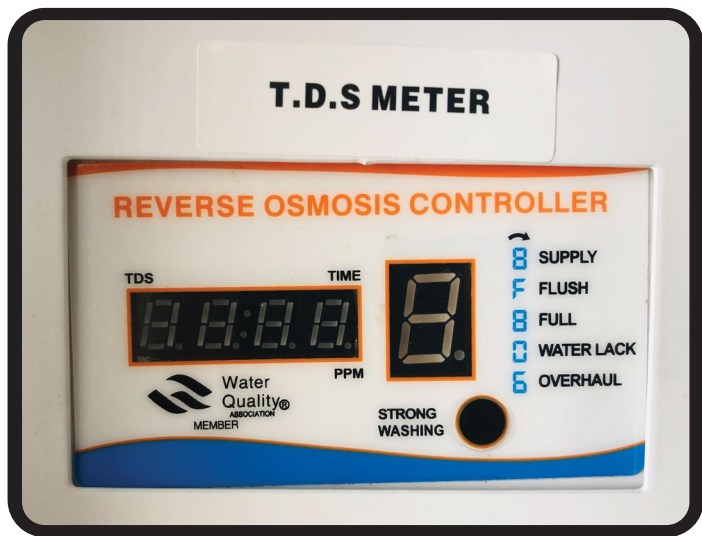


5. When the number 6 flashes on ROC (Reverse Osmosis Controller) it means that the pump has overloaded, to fix replace the fuse with a new inside the pump starter.

RO System Working Capacity

1. Please note should all points below 6-2, 6.3 and 6.4 be found on the RO simultaneously, and continues to increase, it means that membrane/s needs to be replaced.
2. Product water capacity/ flowrate: please check the RO permeate flow meter and should the capacity drop by 10%, it may be normal, but should it continue to decrease then refer to point 6.1.
3. System working pressure: check both the incoming and outlet pressure gauge on the RO main panel, should the pressure increase by 10-15%, it may be normal, but should it continue to increase then refer to point 6.1.
4. Product water TDS: check the Reverse Osmosis Controller (ROC) and if the TDS value increases by 15-20%, it may be normal, but should it continue to increase then refer to point 1.

Fault/s finding and rectification on the Reverse Osmosis Controller (ROC)



Display Description

Display Status	Working Status
F	The controller is in the initial state while controlling the machine to enter the flushing program
8	The machine enters the water production process, and the cycle displays 8
8	Full water level program status, display fixed on 8
0	The source water pressure is too low or no source water, cuts off the power and alarms 10 to inform the user
E	water leakage is detected, the machine stops working, and the maintenance is displayed.

Control Button

Manual Flush: This button may be pressed to initiate a membrane flush cycle while the system is in normal operation. After 60 seconds of membrane flushing, normal system operation will resume.

Pre-programmed Control Process

1. Power-on full display, accompanied by "BI" 1 sound, flush for 30 seconds (low pressure closed), 4 pcs of "8" words display countdown; low pressure switch disconnected, it shows source water storage. The source water shortage recovery delay is judge for 2 seconds, and then flush for 30 seconds.
2. After the flushing is completed, judge whether the high pressure switch is closed. If the high pressure switch is closed, it will enter the water making state, indicating that the accumulated operation is 8 words, and the delay is 5 seconds to display the TDS value (4 zeros are displayed during 5 seconds). When the water is produced, the TDS value shows the ppm value of the purified water in real time. When the high-pressure switch is turned off (after the pure water tank is full), the water is turned off by 0.5 second, and the TDS shows the value of the memory water.
3. The high pressure switch is closed again, and the water production is automatically entered after a delay of 3 seconds. At this time, the TDS is delayed by 5 seconds to display the value (before the period is maintained).
4. Accumulated water for 2 hours, automatic flushing once, the time is 30 seconds; when there is leakage, the detector detects the water leakage, the control box immediately closes the inlet valve to stop the machine, and alarm.
5. The TDS probe is shorted to display E1. TDS detected more than 999ppm, both showed 999.

The wire connection

1. Pressure switch Yellow Color
2. Tank Level Switch Blue Color
3. Flush Solenoid Valve Red Color
4. Booster Pump Green Color
5. Inlet Solenoid Valve Black Color
6. Power Pink & White 220V 50/60Hz

RO SYSTEM 3D DRAWING AND UNIT DIMENSIONS (Millimeters - mm)

