



# **6000L/H RO Water Treatment System**

## **Operation Instructions**

### **Table of Contents**

1. RO Basic Principle.....	2
2. RO System Main Parameters.....	2
3. Water Inlet Requirements.....	2
4. Equipment Installation.....	2
5. RO System Manual Operation.....	2-3
5.1 Preparation Before Startup	
5.2 RO System Manual Start	
6. RO System Automatic Start.....	3-5
6.1 Preparation Before Automatic Startup	
6.2 Operating Parameter Setup	
6.3 Operating Steps	
7. RO System Stop Running.....	5
8. RO Shutdown for Flushing.....	5
9. Maintenance.....	5
10. Common Troubleshooting Methods.....	6-7

## **1. RO Basic Principles**

The reverse osmosis (RO) device separates the solvent (usually water) in the solution through the reverse osmosis membrane (or semi permeable membrane) with enough pressure. This process has no phase change and no heating. It can be used to remove bacteria, colloids and large molecular weight organics while desalting. Which is beneficial for technical and economic advancement.

## **2. RO System Main Parameters**

Applicable temperature: 5-45°C

RO inlet water capacity: 9m<sup>3</sup>/h

RO outlet capacity: 6 m<sup>3</sup>/h

Desalination rate: ≥98%

Voltage: 460V 60HZ 3 phases

## **3. Water Inlet Requirements**

Inlet water PH value: 6-8

Inlet water SDI < 5

Inlet water turbidity < 2NTU

Free residual chlorine concentration < 0.1ppm

## **4. Equipment Installation**

4.1 Equipment is required to be placed on flat ground. There should be more than 50cm channel around the equipment for operation and maintenance.

4.2 Do not place outdoors due to acceleration of aging of mechanical parts.

4.3 Drains should be provided where the equipment is located.

(Max discharge 15T/H)

4.4 Avoid contact with corrosive smoke, dust, and gas.

## **5. RO System Manual Operation**

### ***5.1 Preparation Before Startup***

1. Confirm that the liquid level of the Antiscalant dosing tank is normal and dosing pump is working correctly.
2. Confirm that the pre-treatment system can meet the RO startup requirements.
3. Check and confirm that the precision filter, high pressure pump inlet, outlet valve, concentrate regulating valve, and concentrated return regulating valve are all opened.
4. Meters and pressure gauges should also be checked.

5. Check the power supply of each pump, the control and indicator lights of the electric cabinet are normal.

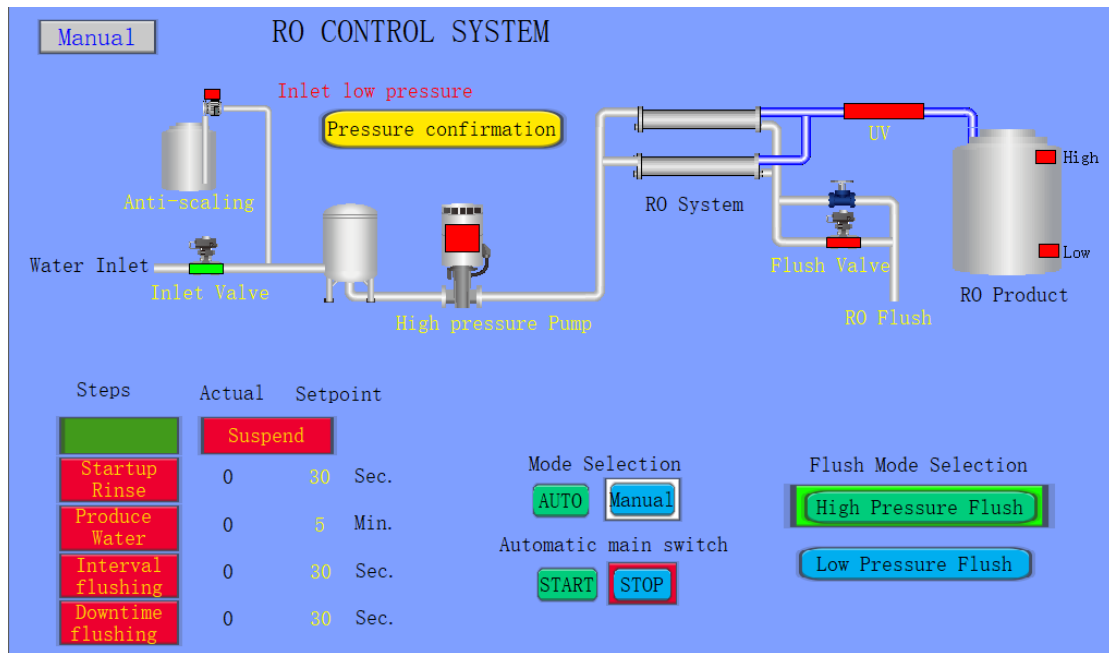
## **5.2 RO System Manual Start**

1. Select the Manual page on the touch screen (HMI).
2. Click "Start" button on inlet water valve and flush valve on the touch screen. After the pre-treatment system starts to supply water and rinse the RO for 2-5 minutes, click the "stop" button on the flush electric valve's touch screen.
3. Wait for the concentrated water flowmeter and the concentrated return flowmeter to have a large amount of water. Click "Start" button of high pressure pump and antiscalant dosing pump on touch screen. Slowly adjust concentrated water regulating valve and concentrated-return regulating valve to adjust the flow rate:
  - The product flowmeter flow is 6000L/H
  - Concentrated water flowmeter is 3000L/H
  - Concentrated-return flowmeter flow is subject to the actual value on site (about 3-5000L/H)
  - When the recovery rate of  $RO \geq 65\%$  is achieved.
  - Complete manual test run. Begin to run the RO in automatic mode.

## **6. RO System Automatic Start**

### **6.1. Preparation Before Automatic Startup:**

1. Confirm the liquid level of raw water tank meets the RO startup conditions.
2. Confirm the instrument's water pumps and dosing pump are all normal.
3. Confirm the opening and closing state of each manual valve meets the RO automatic start-stop requirements. Inlet/outlet valves of each water tank and water pump, as well as the RO product valves are normally open.
4. RO concentrated water regulating valve and concentrated return valve should be in the correct opening position (these valves generally keep the same opening after being adjusted.)
5. Check whether the dosing tank liquid level, dosing pump stroke and frequency are correct.



## 6.2 Operating Parameter Setting

Set the operating parameters on the touch screen first before starting. According to the following parameters.

1. Startup rinse: 60-90 secs
2. Produce water: 120 mins
3. Interval flushing: 60-90 secs
4. Downtime flushing: 60-90 secs

Flush mode selection: Low pressure flush and high pressure flush.

Low pressure flush means the RO membrane is flushed with a pre-treatment booster pump. High pressure flush means the RO membrane is flushed with the high pressure pump.

## 6.3 Operating Steps:

1. Select "Auto" mode on the operating interface of the touch screen, then click the automatic main switch "Start" button.

2. Observe the running status of the flow chart on the touch screen.

During automatic operation, check the running status and parameters are normal on the touch screen and remove any faults in time.

3. After all the devices are put into operation, must check whether the operation of the pumps, each device's flow rate, pressure and other parameters meet the technical requirements. Specifically check whether the operating state of the dosing device is normal.

4. When the system automatically runs normally, it will automatically start and stop the flush according to the product water liquid level.

Note: If there is an alarm signal, find out the reason first and press "Reset" button after timely processing, so that the system continues to operate automatically. If the problem cannot be dealt with, the system should be stopped for maintenance in time.

5. The operating parameters and any possible malfunction of the equipment should be recorded.

Remark:

1. The RO product tank liquid level determines whether the system has started or stopped.
2. Observe whether the RO automatic flushing is working normally after shutdown.
3. It is highly recommended to use the automatic operation mode because it has an over-pressure protection system, which is conducive to the safe operation of the equipment.

## ***7. RO System Stop Running***

1. Stop high pressure pump.
2. Close water inlet electric valve. No need to close the manual valves of the system, keep them open normally. When the concentrated regulating valve is adjusted, it generally does not need to adjust again to facilitate the next start.

## ***8. RO Shutdown for Flushing***

*Purpose of shutdown for cleaning:*

When the RO system stops running, as the water inside the membrane is already in a concentrated state, it is easy to be polluted in the static state, so pure water is needed to rinse the membrane surface to prevent the deposition of pollutants, thus affecting the performance of the membrane.

*Steps:* Open RO flush valve and RO inlet valve, start the pre-treatment booster pump to rinse. Stop the pump and close the valves after two minutes.

## ***9. Maintenance***

1. Short Time Shutdown:

If the system stops for 5-30 days, it should run 1-2 hours every two days in Summer and 1-2 hours every three days in Winter. The system must be cleaned after each operation to replace the concentrated water.

2. Shut down for more than one month:

2.1 Adopts HCL solution with PH of 2-4 to wash the RO system. Clean the system with RO product water until it is cleaned.

2.2 Inject 1% NaHSO<sub>3</sub> protection liquid into the RO device according to the same method. When it is full, stop the pumps and all valves to prevent air from entering the system.

2.3 Replace the protective liquid every six months.

2.4 1% NaHSO<sub>3</sub> is recommended to be used as protective solution when the ambient temperature is 0-33°C.

Note: All the above cleaning liquid and protection solution should be prepared with RO product water.

### 3. RO Membrane Replacement

#### 3.1 Precautions when replacing:

- The water production and pressure difference of the replaced membrane are almost the same.
- All components are in the same position within the same section of the assembly should be replaced
- There should be professional technicians on the scene to guide or trained operators are responsible during replacing.

#### 3.2 RO Membrane Replacement Basis:

- When the pressure difference of inlet water and concentrated water between the two ends of RO membrane is greater than the initial 15%
- If the RO produced water capacity is less than the initial 15%
- RO produced water desalination rate is still lower than the initial 15% after cleaning, the membrane element should be replaced.

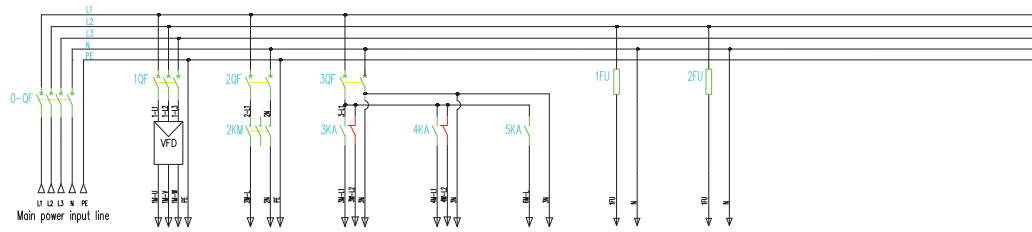
## ***10. Common troubleshooting methods***

If the high pressure pump can not absorb water:

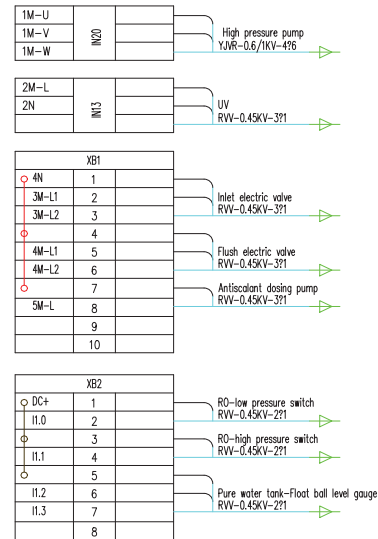
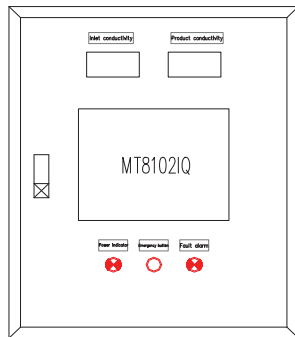
- Check whether the rotation direction of the high pressure pump is reversed, if so, the three power connectors of the pump will be replaced by two, if not, open the pump exhaust valve to vent or fill with water.
- High pressure pump can not start
- Check whether the VFD docking with the high pressure pump is working and weather the wiring plug is loose or falling off. In order not to damage the high pressure pump by idling, the low pressure protection switch is used to cut off the pump power supply to protect it.
- If sufficient water supply is provided to make sure the switch pressure reaches the set, the high-pressure pump will be able to start again.
- Regulating of membrane working pressure
- The ball valves on the product flowmeter and concentrated flowmeter control the total output capacity and system recovery rate (Product recovery rate is about 65%). When output water decreases, the membrane working pressure will increase.
- The Regulating valves at the inlet and outlet of the high-pressure pump is also used to adjust membrane working pressure. (The Max. Membrane working pressure 1.5Mpa). Making water with over-pressure will soon damage the membrane and other accessories.
- Abnormal sound from high pressure pump
- Check weather the high-pressure pump is idling. Sometimes the high-pressure pump will make some abnormal noise when the water is not completely entering, it will disappear automatically within 1-3 mins. If it does not disappear, open the exhaust valve of the high-pressure pump to vent or inject water.
- Fine white or black suspended particles appear in the purified water

- This is because the pipeline is polluted, causing bacteria to grow. The RO membrane needs to be cleaned. If equipped with pipeline sterilizer, it also needs to turn on in time to sterilize.

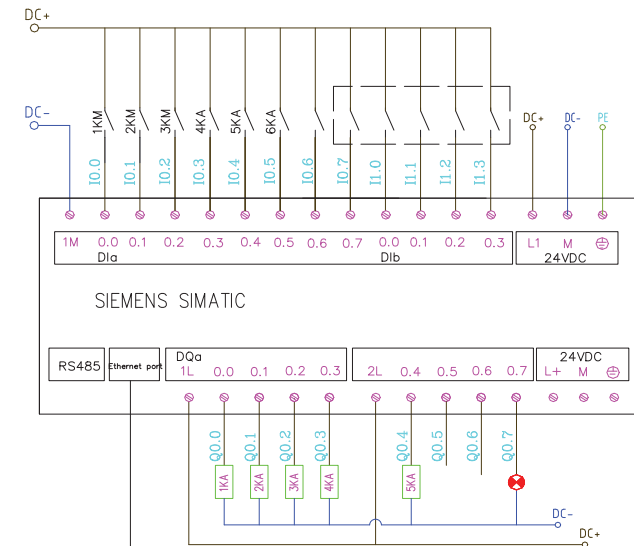




No.	Name	Main power input line	High pressure pump	UV	Inlet electric valve	Flush electric valve	Antiscalant dosing pump	Control circuit/24V power	Conductivity power
	Capacity(KW)	8	7.5	300W	40W	40W	40W		
	Current(A)	15	15	1phase	1phase	1phase	1phase	Power distribution	Power distribution
	QF/FU	IC65N C32A/4P	IC65N D25A/3P	IC65N C10A/1P+N	IC65N C10A/1P+N	IC65N C10A/1P+N	IC65N C10A/1P+N	RT18-32	RT18-32
	KM/KA		LC1D1810-AC380V	LC1D0910-AC220V	LC1D0910-AC220V	LC1D0910-AC220V	LC1D0910-AC220V		
	FR								
	Circuit No.	D-1	D-2	D-3	D-4	D-5			
	Model	YJVR-0.6/1KV-526	YJVR-0.6/1KV-496	RVV-0.45KV-3?1	RVV-0.45KV-4?1	RVV-0.45KV-4?1	RVV-0.45KV-3?1		
	Model	CT/PC25	CT/PC25	CT/PC25	CT/PC25	CT/PC25	CT/PC25		



I0.0	High pressure pump	Operation	I1.0	RO-low pressure switch	Switch
I0.1	High pressure pump	Fault	I1.1	RO-high pressure switch	Switch
I0.2	UV	Operation	I1.2	Pure water tank-Float ball level gauge	High
I0.3	Inlet electric valve	Operation	I1.3		Low
I0.4	Flush electric valve	Operation			
I0.5	Antiscalant dosing pump	Operation			
I0.6		Operation			
I0.7		Operation			



Q0.0	High pressure pump	Control
Q0.1	UV	Control
Q0.2	Inlet electric valve	Control
Q0.3	Flush electric valve	Control
Q0.4	Antiscalant dosing pump	Control
Q0.5		Control
Q0.6		Control
Q0.7	Fault alarm	Control