RO-2000型反渗透处理系统

RO-2000 Reverse osmosis treatment system

(单级RO工艺)

(Single stage RO process)

使 用 说 明 书

Operation Instruction

RO-2000 single-stage reverse osmosis treatment apparatus is a reverse osmosis water treatment apparatus that is applied to conduct the water quality pretreatment and reverse osmosis process with the municipal water as raw water. It can be widely used in pure water treatment including the purified water, tea drinks allocating water, drinking water, brackish water desalination in residential areas, hospitals, hotels, chemicals, and enterprise and public institution and so on.

This product is intended for the preparation of drinking deployment water. In order to improve the reliability stability and advancement of the equipment operation, the membrane element as the key component is made of the advanced low pressure reverse osmosis membrane. With the reverse osmosis water treatment equipment produced by our company and in strict accordance with the instructions provided for installation, commissioning, operation and maintenance management, the purified water could reach the water quality hygiene requirements set forth by Ministry of Health in "drinking water health and safety and functional assessment of the processor specification - reverse osmosis treatment device "(2001).

Ⅱ. The water treatment process

Water → raw water booster pump (electromagnetic valve) → quartz sand filter →activated carbon filter → Security filter → high-pressure pump (dosing scale inhibitors) → reverse osmosis unit → tank

Ⅲ. The equipment composition

This set of water treatment equipment is composed of the raw water booster pump, quartz sand filters, activated carbon filter, security filters, automatic dosing devices, high pressure pumps, reverse osmosis systems, pure water tank, pressure switches, pressure gauges, flow meters, conductivity rate instrument components and so on.

Ⅳ.The main technical parameters

1. Pretreatment system

1.1 Applicable water source: municipal tap water;

1.2 Inlet pressure: 0.3 MPa;

1.3 Influent flow: 6m3 / h;

1.4 Water temperature 5-35 °

. 2. Reverse osmosis treatment system

2.1 Inflow conditions

进水压力 0.3MPa

Inflow water pressure 0.3MPa

Surplus chlorine <0.1mg / L

Turbid degree <1.0NTU

Pollution Index (FI) <4

Conductivity <500us / cm

2.2 Working pressure 1.0-1.5MPa

3. The water flow 3m3 / h, rated net total at 33360m3

4. Effluent quality should be consistent with the water quality hygiene requirements set forth by the Ministry of Health in the "drinking water processor health and safety and functional assessment specification - reverse osmosis treatment device" (2001).

Ⅴ. On-site installation and connection

1. The equipment is shipped to the customer an opened on the site, and then the device is placed in a pre-designed water treatment plant location.

2. Check the condition of the entire device, and remove the export and import joint, nozzle of the device and the protective material of the instrument package.

3. In accordance with the design process, the equipment is arranged and positioned in place, the device should be adjusted for each unit support point, so that the device is in a substantially horizontal position and perpendicular to the ground.

3.1. The raw water booster pump is fixed on the level ground next to a mechanical filter;

3.2. Quartz sand filter is placed on the flat ground to ensure its balanced load;

3.3. Activated carbon filter is placed on the flat ground to ensure its balanced load;

3.4. Ultra filter is fixed on the level ground;

3.5. The metering pump and dosing tank are placed beside the reverse osmosis processing;

3.6. The reverse osmosis processing device is placed flat on level ground;

3.7. The pure water tank should be placed on flat ground to ensure their balanced load;

3.8. The entire device is preferably placed straight on the same plane for operation and monitoring. In general, each unit device does not need anchor bolts to fix.

3.9. The water treatment plant is necessarily equipped with disposal sewerage open trench.

4. According to the design process, pipe valve is applied to combine and connect each single device.

5. Quartz sand filter media are filled: after each single filter is assembled, it can be started to load the filter material. The filter should be checked before installation whether it has been maintained in a vertical position with the ground, and then the inlet bolt and cover are removed, in turn on the basis of the principle " the thick up and the fine down" and put into the filter according to the matching ratio and tighten up the cover, and check if the inlet and outlet are tightened. Be debugged.

6. Activated carbon filter material is filled: the installation sequence is basically the same as the quartz sand filters, filled with 100 kg of the shell activated carbon. When loading is completed, tighten the cap up to ensure that the seal does not leak. Be debugged.

7. The installation of the ultra filter. At the factory, the filter element has been installed; check and tighten up all the flange seal.

8. Connect the metering pump inlet and the chemical dosing box pipeline, and connect the metering pump outlet and the pipe;

9. The reverse osmosis unit should be placed in a horizontal state.

10. The installation of the reverse osmosis membrane element: the installation of the reverse osmosis membrane elements is the most critical part of the operation in the commissioning of the project. Whether it is successfully installed or not is directly related to the quality of water. Therefore, for special attention! Specific operations are as follows:

A. Unload the head ends of RO membrane shell and the clean water is used to wash the inner wall of the membrane shell.

B. Each RO membrane surface is marked with an arrow indicating the direction of flow. When installing the membrane, it should be consistent with the direction of the arrow of the high pressure shell of the membrane. Before loading the membrane, the lubricating fluid can be applied to smear the black O-ring on the RO membrane end, and then in a horizontal state, it is loaded slowly into the high pressure membrane shells.

C. When the RO membrane is inserted into the membrane shell in the half position, the special connector of the membrane should be coated with lubricating fluid before it is inserted into the RO membrane. In the second step, the second branch of membrane is inserted into the dedicated connector and in a horizontal state slowly loaded into the membrane shell. Special Note: The arrow direction of two membranes should be the same and so do other membrane components. The installation of the single core membrane should be without having to repeat the second step.

D. Loading the membrane is completed, the two end caps are sealed with the O-ring is coated with the lubricating fluid, the head of the membrane mounted, and the shell should be tightened so as to protect the RO membrane element from damaging by the hammer force.

11. The main power and the ground electrode are connected and strict check should be conducted on the entire device circuitry, ensuring the normal working condition.

12. The main power should be got through with the power supply for three-phase 380V, 50HZ; it is supposed to check whether the water pump is working properly. The counterclockwise rotation direction of motor should be the normal operating position, ensuring each pump motor a good ground connection.

Ⅵ The operation of the equipment

1. Debug

Confirm that all pipe valves mounting connection is correct, tight and the electrical connections are correct before you open the inlet valve, the main power. Then the operations are as follows:

Step one: clean the quartz sand filter

a backwash: First, the original water tank is filled with water and the backwash mode (that is, the quartz sand filter backwash handle hit state) of the mechanical valve filter should be regulated well. The raw water booster pump should be started to fill the water into the filter. The water will be filtered out from the sewage outfall when the filter is filled with water. Before starting out, the pump bleeder screw should be loosened to exhaust all of the air inside the pump.

b. positive pressure wash: at the interval of 1 to 2 minutes of the backwash, the valve should be switched to the washing mode (ie quartz sand filter handle hits the flushing state). The positive pressure wash and the backwash should be frequently switched to operate until the water production of the filter is visually washed out, the contributing water is clear and the SDI index ≤4 after being tested when it can be put into operation. The first cleaning takes about 30 minutes, usually about 5 to 10 minutes for cleaning.

Step two: Clean the active filter

a backwash: regulate the activated carbon filter at the backwash mode valve (ie activated charcoal filter handle hits backwash state). The mechanical filter is opened to make the contributing water inject to an activated carbon filter. Activated carbon filter is filled with water before is flows out from the sewage outfall.

b positive pressure washing: at the interval of 1 to 2 minutes of the backwash, the valve should be switched to the washing mode (i.e. open the activated carbon filter inlet valve and the lower valve as well as close the backwash valve, the discharge valve and the capacity valve). The positive pressure wash and the backwash should be frequently switched to operate until the water production of the filter is visually clear and the SDI index ≤0.1ppm after being tested when it can be put into operation.

Step three: when finishing cleaning the quartz sand filters and the activated carbon filter, the activated carbon filter producing water valve and the fine filter exhaust valve should be open. The exhaust valve should be closed when being filled with water. Water enters the reverse osmosis treatment plant.

Step four: as the ultra filter is filtering product, when turned on, please open the exhaust valve to drain the air.

Step five: osmosis host debugger. Respectively, before starting, please test the pretreated water (ie RO host water) when the water meets the host RO water requirements, it can enter the RO system.

RO system: open the RO inlet valve, fully open the RO concentrated water discharge valve and RO product water discharge valve, close the RO permeate valve, turn on the power, start the high-pressure pump, firstly making the high-pressure pump at low pressure (0.30 ~ 0.5MPa) to wash the RO membrane for 15 minutes, completely clearing the RO membrane protection liquid; and check and confirm the high and low pressure pipelines, valves without leakage; pressure gauges work properly. Then adjust the RO concentrated water discharge valve in accordance with the RO concentrate water discharge valve gradually small, gradually increasing the production of the flow of water, concentrated water discharge flow gradually reducing and the system pressure gradually increased, when reaching 1.0 ~ 1.5MPa when the pressure stabilized, please check the RO contributing water and RO concentrated water discharge flow, and by adjusting the appropriate valve to make the water flow and recovery rate and desalination meet the design requirements of the device. By adjusting the inlet valve and RO concentrated water discharge valve, the water production and concentrated water discharge flow ratio is of (4: 6); at the normal operating pressure range of 1.0-1.5MPa; permeate flow at 3000L / h; yield water desalination rate ≥97%; and check and confirm again the high and low pressure pipe road whether there is leakage; the pressure gauge is working correctly. If the RO meets with the requirements, please open the RO product water valve and close the RO product water discharge valve. Until then, this apparatus can be put into normal operation. Special Note: when running the RO, it is never allowed to close the RO product water valve and RO contributing water discharge valve.

During normal operation, the measurement scale inhibitor dosing pump must be interlocked with the high-pressure pump, whether the high-pressure pump is synchronous of the dosing pump.

Step Six: Halt

A. the reverse osmosis unit should be unloaded the pressure before each of its shutdown; first, slowly turn up the RO concentrated water discharge valve with the inner working pressure reduced to about 0.6MPa lasting for one minute. When the working pressure drops to about 0.3MPa, please continue to run for 1 minute before turning off the high-pressure pump; it is prohibited to suddenly shut down the high-pressure pump for which will cause sudden depressurization, reflux and damage to the reverse osmosis membrane elements and systems.

B. Please turn off the raw water booster pump.

C. Please turn off the quartz sand filter inlet valve.

D. Please switch off the main power.

E. Non-normal shutdown.

In cases of sudden power failure, water cut-off or other unforeseen circumstances, please first turn off the high-pressure pump, raw water booster pump, and then turn off the main power and other valves.

Ⅶ Operation Management and Maintenance

1. Multi-media filter (sand filter)

When the mechanical filter runs for a period of time (about a week), due to the suspended solids in the water are trapped by the filter media, resulting in the filter resistance gradually increasing, and thus during the operation, please observe the working pressure of the filter every day. If the differential pressure is higher than 0.04MPa, please conduct backwash and well- wash on the filters with the washing time for about 15 minutes at a time;

Operations strategy: two minutes for backwash and then switch to one minute well-wash, if so repeatedly, it will be the better. After cleaning, please conduct well-wash rfor1 minute before it is put into use.

Rinse Procedure:

1.1 Backwash

a. open the filter handle to backwash state

b. open the booster pump to backwash, which normally takes about 10 minutes. Note: When in the operation, please prevent excessive backwash flow and pressure causing loss of the filter material. If the water from the blow-down valve becomes clear, please end the backwash.

1.2 Positive pressure wash

a. Open the filter inlet valve;

b. Please open the handle to the washing positive pressure wash;

c. With the positive pressure wash lasting for five minutes, the work is continued.

Operating strategy: the cleaning should be positive and negative alternately and frequently to be operated! Filters work pressure is at 0.15 ~ 0.35Mpa.

2. Activated carbon filter (carbon filter)

When the activated carbon filter has run for a period of time (about a week), because the organic compounds and heavy metal ions in water are adsorbed, the internal filter is gradually contaminated worse, and thus during the operation, the filter should be regularly carried out positive and negative washing, cleaning once lasting for about 10 minutes; operations strategy: two minutes for backwash and then switch to one minute for positive pressure wash, so repeatedly,

it is the better. After cleaning, please carry out positive pressure wash for 1 minute before it is put into operation.

Rinse Procedure:

2.1 Backwash

a. Open the filter handle to backwash state

b. Open the booster pump to backwash, which normally takes about 6 minutes. Note: When in the operation, please prevent excessive backwash flow and pressure causing loss of the filter material. If the water from the upper blow-down valve becomes clear, please end the backwash.

2.2. Positive pressure wash

a. Please open the filter handle to the positive pressure wash;

b、With the positive pressure wash lasting for three minutes, it come an end. Please open the water production valve and turn off the lower blow-down valve for continuous work.

Operating strategy: the cleaning should be positive and negative alternately and frequently to be operated! Filters work pressure is at 0.15 ~ 0.35Mpa.

3. Ultra filter (security filter)

Ultra filter filtration accuracy is at 5 ~ 10um, after running for some time, blocked by the powder leaking from the front-activated carbon filter and the water residue suspended solids, which result in hydraulic pressure of import and export of the ultra filter gradually increasing. When the pressure is higher than 0.05MPa, please turn on the filters to remove the filter element, and then wash its surface, and finally install again for usage; if wash can not work or it has been used for three months, please consider replacing the filter element.

Ultra filter working pressure is of at 0.15 ~ 0.35Mpa.

4. RO system

In order to make the RO system run normally and maintain a good long-term performance of the RO membranes, the maintenance should be done carefully and the management scientifically.

4.1 Strictly control the water quality to ensure the RO system to operate in compliance with the requirements of the influent water index.

4.2 Under the requisite of meeting the requirement of the water flow and water quality, please try to get low operating pressures.

Reverse osmosis treatment equipment working pressure is of at 1.00 ~ 1.6Mpa.

4.3 The ratio of pure water flow and concentrated water flow should be controlled and regulated timely to reach the demand of the recovery of device.

4.4 The equipment can not stop running for a long time so it should run at least 15 minutes a day. (RO membrane is always kept in a wet state)

4.5 before each stop, the sudden shutdown should be prohibited (see VI, sixth) by slowly opening the full-concentrated water discharge valve under low pressure conditions and high flow running for 3 ~ 5min in order to clear the dirt on the surface of the RO membrane water concentration.

Ⅷ Advice

It is prohibited to allow the untrained personnel to operate.

Especially for those enterprises that generate the power themselves, a supply voltage should be stable, and otherwise it will cause damage to the electrical equipment.

Note: all kinds of filters and equipment surfaces should be wiped daily with dry cloth to make sure that the surface does not leave water drops. Otherwise, raw steel surface will rust.

Special Note: 1. please check if the pipeline is smooth before starting the high-pressure pump, and the RO product water valve must be open), no high-pressure pump dry starting and running are allowed!

2. Metering pumps should be connected with the high-pressure pump, and the scale inhibitor concentration should be in taken precisely!

Ⅹ Observation records

To enable the device to run at its best, it is essential to promptly discover the issues and take appropriate measures as well as much attention should be paid to the regular observations of the daily operations. The contents are as follows:

1) The conductivity, chlorine, turbidity of the raw water and product water;
2) Turbidity, chlorine, pollution index of the RO system water;
3) The pressure of each node;
4) The flow of water of the raw water, concentrated water,;
5) Water temperature and so on.

Ⅺ Reverse osmosis membrane cleaning (cleaning device may be provided with this method)

After the last increase of of cleaning in order to ensure the normal operation of the reverse osmosis unit and extend the component life, the production of water flow and the water quality are less than the last wash by dropping 10-15% or RO membrane pressure difference increase by 10-15% of the amount than that of the last wash. Chemical cleaning should be considered to carry out on the RO membrane. (It is recommended acted by the professional and technical personnel)

Cleaning Formulation: 1. 0.2% of the hydrochloric acid solution, PH value at 2-3, an optimum temperature is at 350C (for inorganic fouling)

2. 0.1% of the sodium hydroxide + 0.025% of the sodium dodecyl benzene sulfonate, PH value at 12, optimum temperature is at 300C (for sulfates, organic colloids contamination)

Operation:

1. Prepare cleaning items: 4 bottles of 36% hydrochloric acid (500 g / bottle)
   4 bottles of sodium hydroxide (500 g / bottle)
   Pure water for 100 kilograms (Do not use plus ozone purified water)
   One (1) bag of the PH value paper

2. First please calculate the weight of the cleaning tank plus storing washing water of 2/3, according to the blending ratio, the purified water was added and stirred to completely dissolve sufficiently, and then poured into washing tank, with the preparation of 0.2% hydrochloric acid solution, then the PH value at about 1-2, with PH (1-14) dipstick tested to the standard value of 2-3 (the best conditions that the cleaning liquid temperature should be at 35-400C).

3. Please open the reverse osmosis concentrated water and produced water to enter the circulation valve of the wash tank, close the concentrated water drain valve and the water production enter the water production tank valve of the pure water tank, open the inlet valve between the cleaning tank and cleaning pump, manual electrical control, only to open the cleaning pump for cycling washing for 1-2 hours, observe the cleaning the water in the tank cleaning water, if the water after cleaning is dirty that proves better result, otherwise ineffective, please exhaust the cleaning agent liquid after the agent cleaning. The membrane cleaning should be washed out time within about 1-2 hours. At that time, all of the concentrated water plant and producing water blow down valve should be opened and the sewage cleaning should lasted within 1-2 hours before it is put into use.

Note: Formula 1 is generally used in cleaning, while the cleaning method of the formulation 2 is the same as that of the formulation .