



## Ultrafiltration device

### Outline:

Ultrafiltration technology with ultrafiltration membrane as the core has developed very rapidly in recent years, and its application range is becoming wider and wider. It is a very promising membrane separation technology.

The hollow fiber ultrafiltration device produced by our factory is mainly composed of BS Series hollow fiber ultrafiltration components, attached



with liquid transfer pump, non-toxic and corrosion-resistant ABS engineering plastic pipeline, valve, pressure gauge, flowmeter, pre filtration and other components. Compared with other types of devices, the hollow fiber ultrafiltration device has compact structure and is suitable for large-scale continuous and stable production because of the high filling density of fiber membrane and large filtering area per unit volume of ultrafiltration module. BS Series hollow fiber ultrafiltration device is mainly applicable to the process of water separation, clarification and purification for the purpose of removing bacteria, particles, colloids, pyrogen and macromolecular organics in water. It has the advantages of simple structure, no phase transition, no secondary pollution and so on. The utility model has the advantages of convenient operation, high separation efficiency, low production cost, low energy consumption, easy control and maintenance, etc.

### Working principle:

Reverse osmosis (RO), ultrafiltration (UF) and microporous filtration (MF) are membrane processes for solute separation under the driving force of static pressure difference. The three constitute a membrane separation process that can separate ions from micro particles. Ultrafiltration is a membrane process to achieve separation through the screening of micropores on the membrane surface. It can intercept substances with molecular weight of 300-300x103. The micropore diameter is 10a-0.1um, the operating pressure is generally 0.5mpa-0.4mpa, and the water flux is determined according to the performance index of the membrane.

### Scope of application:

- a. In the water storage preparation process of the electronic industry, the pre-treatment (RO protection device) and terminal security filtration, etc.
- b. The pharmaceutical industry prepares sterile pyrogen storage water (equivalent to water for injection, such as distilled water for fine washing bottles), as well as bacteria removal and clarification of traditional Chinese medicine liquid and oral liquid.
- c. The maximum recovery rate and the shortest treatment time of these active substances

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can be obtained by replacing the original processes such as concentration, separation, purification and desalination of biochemical preparations and biological products in bioengineering.

d. Textile, chemical, environmental protection and other industrial wastewater treatment and recycling of useful materials. Such as electroplating, electrophoresis, wastewater treatment and recovery, dye recovery and advanced treatment of reclaimed water.

#### Startup of ultrafiltration:

After the above preparations are completed, the test start can be carried out first, that is, turn on the power supply, open the water inlet valve, stop immediately after starting the pump, observe whether the rotation direction of the water pump



impeller is correct, and check whether there is abnormal noise when the water pump is started, so as to judge whether the water pump can operate normally. For the fully automatic control device, the operation program must be set in advance to enter the normal sequence operation after startup.

#### Operation of ultrafiltration:

a. Boost: after the water pump rotates, gradually open the water inlet valve of the ultrafiltration system and adjust the concentrated water outlet valve accordingly to boost the system and maintain the flow of concentrated water. Generally, the valve should be rotated slowly to rise to the required working pressure within about 1 minute, which is conducive to the protection of equipment and membrane.

b. Monitoring and recording: pay attention to the change of pressure difference at the inlet and outlet of ultrafiltration equipment. The inlet pressure should be operated according to the design value. However, with the extension of operation time, the pressure at the outlet will gradually decrease, that is, the pressure difference will gradually increase. When this pressure difference is higher than the initial installation value of 0.05Mpa, it indicates that there is blockage, and corresponding measures should be taken, that is, physical or chemical cleaning. During operation, the water quality of water supply and ultrafiltration water shall be analyzed regularly. If any sudden change is found, measures shall be taken immediately. When the inlet water quality is unqualified, the pretreatment process shall be strengthened. If the permeated water is unqualified, it shall be cleaned and regenerated. If it still has no effect after treatment, it shall be considered to replace a new membrane module.

c. Recovery ratio and adjustment: observe the discharge and permeability of concentrated water during operation, and always operate within the allowable recovery ratio range. Too large or too small recovery ratio is unfavorable to the normal operation of ultrafiltration membrane. Because the recovery ratio is too large, it is easy to produce membrane



concentration polarization and affect the water production quality. If the recovery ratio is too small, the flow rate is too large, which will also promote the decline of the membrane, increase the pressure drop and affect the water production.

### Protection and cleaning of ultrafiltration:

For membrane cleaning, the principles for judging whether the ultrafiltration membrane needs cleaning are as follows:

a. According to the change of pressure drop at the inlet and outlet of ultrafiltration device, in most cases, the pressure drop exceeds the initial value of 0.05Mpa, indicating that the fluid resistance increases significantly. As a daily management, constant pressure and large flow flushing can be used for flushing. If it is ineffective, chemical cleaning method can be used;



b. According to the change of water permeability or water permeability quality, when the water permeability or water permeability quality of the ultrafiltration system decreases to an unacceptable level, it indicates that the water flow path is blocked, or the separation performance of the membrane is affected due to concentration polarization. In this case, the physical-chemical combined cleaning method is mostly used, that is, the physical method is used to quickly wash away a large amount of pollutants, Then clean it with chemical method to save chemicals.

c. Regular cleaning: the ultrafiltration system in operation can adopt periodic regular cleaning according to the law of membrane pollution. It can be cleaned manually. For large industrial devices, it is advisable to set the time in sequence and clean regularly through the automatic control system.

(a). Isobaric hydraulic flushing method: isobaric flushing method is one of the effective methods for ultrafiltration device. The specific method is to close the ultrafiltration outlet valve and fully open the concentrated water outlet valve. At this time, the pressure inside and outside the hollow fiber gradually tends to be equal. Due to the pressure difference, the dirt attached to the membrane surface is loose and the flow is increased to flush the surface, which is effective for removing a large number of soft impurities on the membrane surface;

(b). Water vapor mixing cleaning method: the purified compressed air and water flow will enter the ultrafiltration membrane together, and the water air mixture will stir and transport violently on the membrane surface to remove solid impurities. The effect is good, but pay attention to the pressure and flow of compressed air;

(c). Hot water and water storage flushing method: wash the membrane surface with hot water (30 °C ~ 40 °C) to remove viscous and hot-melt impurities. Pure water has strong solubility, and the effect of pure water circulating flushing is relatively good;

(d). Negative pressure back flushing method: it is a method of flushing from the negative side of the membrane to the positive side. It is more suitable for hollow fiber or capillary ultrafiltration membranes with dense layers inside and outside. This is an effective



method but often coexists with risks. Once the operation is wrong, it is easy to crack the membrane or damage the bonding surface between hollow fiber or capillary and binder to form leakage.

#### Model and specification of ultrafiltration device:

Model	No. of membrane modules	Water yield T/H	Membrane area m <sup>2</sup>	Overall dimension (cm)	Connecting pipe diameter		
					Drain pipe	Inlet pipe	Fresh water pipe
CR/UF-0.5	2	0.5	4x2	75x60x160	DN20	DN20	DN15
CR/UF-1	4	1	4x4	105x60x160	DN25	DN25	DN25
CR/UF-2	8	2	4x8	105x85x160	DN32	DN32	DN32
CR/UF-3	11	3	4x11	135x85x160	DN32	DN32	DN32
CR/UF-4	15	4	4x15	165x85x160	DN40	DN40	DN40
CR/UF-5	18	5	4x18	135x110x160	DN50	DN50	DN50
CR/UF-6	22	6	4x22	165x75x160	DN50	DN50	DN50
CR/UF-7	29	7	4x25	165x100x160	DN50	DN65	DN45
CR/UF-8	30	8	4x29	175x90x130	DN60	DN65	DN40
CR/UF-9	32	9	4x32	178x100x150	DN60	DN65	DN40
CR/UF-10	36	10	4x36	180x100x160	DN65	DN70	DN40