

Claims

1. A fresh water producing apparatus to produce fresh water from solute-containing raw water which comprises a first semipermeable membrane unit and a second semipermeable membrane unit, wherein a first raw water feed line for feeding raw water is connected to the first semipermeable membrane unit, while a second raw water feed line for feeding ~~athe~~ raw water is connected to the second semipermeable membrane unit, and wherein the first semipermeable membrane unit and the second semipermeable membrane unit are connected together with a concentrated water line that feeds concentrated water from the first semipermeable membrane unit to the second semipermeable membrane unit.

~~2. The fresh water producing apparatus according to claim 1, wherein the raw water to be fed to the first raw water feed line and the second raw water feed line is a mixture of at least two types of raw water having different compositions.~~

~~3~~2. The fresh water producing apparatus according to claim 1, wherein a booster pump or a non-powered pressurization unit is provided at a position in the second raw water feed line located midway between a merger point of the second raw water feed line connected to the second semipermeable membrane unit and the concentrated water line attached to the first semipermeable membrane unit and the second semipermeable membrane unit.

~~4~~3. The fresh water producing apparatus according to claim 1, further comprising a common auxiliary semipermeable membrane unit capable of operating in parallel with both the first semipermeable membrane unit and the second semipermeable membrane unit.

~~5~~4. The fresh water producing apparatus according to claim 1, further comprising an auxiliary semipermeable membrane unit capable of operating in parallel with the first

semipermeable membrane unit and/or an auxiliary semipermeable membrane unit capable of operating in parallel with the second semipermeable membrane unit.

5 | ~~6. The fresh water producing apparatus according to claim 5, wherein the auxiliary semipermeable membrane unit capable of operating in parallel with the second semipermeable membrane unit is fed with different raw water from the raw water fed to the first semipermeable membrane unit and the second semipermeable membrane unit.~~

10 | ~~7. The fresh water producing apparatus according to claim 1, wherein at least part of the permeated water of the second semipermeable membrane unit is mixed into the raw water for the first semipermeable membrane unit.~~

15 | ~~85. The fresh water producing apparatus according to claim 1, wherein the water permeability of the first semipermeable membrane unit is higher than the water permeability of the second semipermeable membrane unit.~~

20 | ~~96. The fresh water producing apparatus according to claim 1, wherein the pressure resistance of the first semipermeable membrane unit is lower than the pressure resistance of the second semipermeable membrane unit.~~

| ~~407. The fresh water producing apparatus according to claim 1, wherein the corrosion resistance of the first semipermeable membrane unit is lower than the corrosion resistance of the second semipermeable membrane unit.~~

25 | ~~418. An operation method for the fresh water producing apparatus described in any of claims 1 to 407, wherein the flow rate of the raw water in the first raw water feed line connected to the first semipermeable membrane unit and the flow rate of the raw water in the second raw water feed line connected to the second semipermeable membrane unit are controlled so as to keep the feed pressure of raw water to the first semipermeable~~
30 | ~~membrane unit and/or the concentrations of solutes contained in the permeated water of the first semipermeable membrane unit within set values.~~

429. An operation method for the fresh water producing apparatus described in claim 43, wherein using or not using of the common auxiliary semipermeable membrane unit and the flow rate of its feed water are controlled according to the flow rate of the feed water in the first raw water feed line connected to the first semipermeable membrane unit and the flow rate of the feed water in the second raw water feed line connected to the second semipermeable membrane unit.

4310. An operation method for the fresh water producing apparatus described in claim 54, wherein using or not using of the auxiliary semipermeable membrane units capable of parallel operation and the flow rate of their feed water are controlled so as to keep the feed pressure of the feed water for the first semipermeable membrane unit and the feed pressure of the feed water for the second semipermeable membrane unit within set values.

4411. The operation method for a fresh water producing apparatus according to any of claims 418 to 4310, wherein a line to mix at least part of the permeated water of the second semipermeable membrane unit into the feed water for the first semipermeable membrane unit is provided and at least part of the permeated water of the second semipermeable membrane unit is mixed into the feed water for the first semipermeable membrane unit so as to keep the water quality of the treated water within set values.

4512. The fresh water producing apparatus according to ~~any one of claims 5 to 7~~ 4, wherein at least either the concentrated water from the first semipermeable membrane unit and the second semipermeable membrane unit or the concentrated water from the parallel auxiliary semipermeable membrane unit is mixed into the feed water for any of the other semipermeable membrane units.

13. A fresh water producing apparatus to produce fresh water from solute-containing raw water which comprises a first semipermeable membrane unit and a second semipermeable membrane unit, wherein a first raw water feed line for feeding raw water is connected to the first semipermeable membrane unit, while a second raw water feed line for feeding the raw water is connected to the second semipermeable membrane unit, a first booster pump feeds the raw water to the first and second raw water feed line, wherein the first semipermeable membrane unit and the second semipermeable membrane unit are connected together with a concentrated water line and a second booster pump feeds concentrated water from the first semipermeable membrane unit to the second semipermeable membrane unit.

14. A fresh water producing apparatus to produce fresh water from solute-containing raw water which comprises a first semipermeable membrane unit and a second semipermeable membrane unit, wherein a first raw water feed line connected to the first semipermeable membrane unit includes a first booster pump that feeds the raw water to the first semipermeable membrane unit, while a second raw water feed line connected to the second semipermeable membrane unit includes a second booster pump that feeds the raw water to the second semipermeable membrane unit, and wherein the first semipermeable membrane unit and the second semipermeable membrane unit are connected together with a concentrated water line that feeds concentrated water from the first semipermeable membrane unit to the second semipermeable membrane unit.