

**MANUAL FOR
OPERATION AND MAINTENANCE
OF
CLEANING SKID**

For Models:

**Y-CS20-116, Y-CS20-220
Y-CS20-236, Y-CS20-436**

**APPLIED
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SYSTEM DESCRIPTION

Normal operating flow	:	20 GPM
Operating Pressure	:	40-60 PSI
Tank Size	:	100 Gal
Pump Model		
Y-CS20-116	:	YP1ST1F4B4
Y-CS20-220	:	YP1ST1F4B4
Y-CS20-236	:	YP1ST1F5B4
Y-CS20-436	:	YP1ST1F5B4
Voltage		
Y-CS20-116	:	120/60/1
Y-CS20-220	:	120/60/1
Y-CS20-236	:	208/60/3
Y-CS20-436	:	480/60/3
Flowmeter	:	I-FM40IN
Filter Housing	:	H-H201BBE

COMPONENT IDENTIFICATION

1. **Ball Valve**
Shuts water from entering tank
2. **Flow Meter**
3. **Cleaning Tank**
4. **Ball Valve**
Drains chemical solution from tank.
5. **Cleaning Pump**
6. **Ball Valve**
Shuts feed to cleaning pump.
7. **Filter Housing**
8. **Temperature Gauge**
9. **Ball Valve**
Shuts outlet of cleaning pump.
10. **Check Valve**
Prevents back flow.
11. **Pressure Gauge**
12. **Ball Valve**
Recycles cleaning solution to tank.
13. **Controller**
14. **Low Level Switch**
Shuts motor or heater

MEMBRANE CLEANING PROCEDURE

WATER USED FOR CLEANING MUST BE FREE OF CHLORINE

Use RO permeate water if possible. Whether the system needs acid or alkaline cleaning will depend on the type of fouling suspected. We recommend acid cleaning be performed first even when alkaline cleaning is desired. If system performance recovers with acid cleaning, then alkaline cleaning is not necessary.

CLEANING SYSTEM

Connect cleaning tank and pump system to the membrane system. It may be necessary to clean one tube at a time (see flow requirements below). Pump pressure must not exceed 60 PSI. Permeate and concentrate lines must come back to cleaning tank. Include a 10 micron filter in the return concentrate line to the tank.

ACID CLEANING

1. Preparation of Solution

Slowly add acid cleaner (AM-44 for CA and AM-11 for TFC elements) to cleaning tank water to bring water pH to between 2 and 3 and mix well.

CAUTION

Mix with care and wear protective clothing.

2. Cleaning Procedure

CAUTION

Do not allow the cleaning solution temperatures to exceed 120 DEG F or the flows to exceed 4 GPM for 2 1/2" elements or 12 GPM for 4" elements.
Recirculate solution.

- a. Operate system at 50 PSI for 10 minutes. During this first 10 minutes of the cleaning cycle, the flow rate should be maintained at less than 1 GPM for 2 1/2" elements and less than 3 GPM for 4" elements to allow the foulants to loosen. The flow rate should then be increased to 3 GPM for 2 1/2" elements and 9 GPM for 4" elements for 20 minutes to clear fouling from the system.
- b. Do not let the tank run dry. Add more water and cleaner if necessary.

- c. Discard cleaning solution to drain, diluting with copious amounts of water, then rinse tank well.
- d. Fill tank with clean water and flush system to drain for 10 to 15 minutes. Add clean water as necessary. Rinse the system until the concentrate pH is almost the same as the clean water pH.

ALKALINE AND DETERGENT CLEANING (FOR ORGANIC FOULING)

1. Preparation of solution

Add slowly alkaline (AM33 for CA or AM-22 for TFC elements) to water and bring water to a pH of 8 for CA and 11 for TFC elements. Stir continuously until dissolved.

CAUTION:

Mix with care. Wear a face mask and rubber gloves. Alkaline cleaner can cause severe eye damage.

2. Cleaning Procedure:

Same as in Acid Cleaning.

STORAGE AND FREEZING PROTECTION

To prevent bacterial growth and help maintain flux, it is recommended that elements be immersed in a solution 20.0 percent, by weight, glycerin and 1.0 percent by weight sodium bisulfate.

TO PREPARE SOLUTION

Add about 1 ounce of sodium metabisulfite per gallon of water. Also add about 1.5 lb. of glycerin per gallon of water.

1. Storing Elements

Mix the solution well. Soak the elements in this solution for 1 hour. Drain and bag them for shipment.

2. Storing RO System

For storing elements in a membrane system, follow this procedure:

- Drain system as well as is practical.
- Attach feed water inlet to any container with 30 gallons of the solution.
- Wait until container is empty.
- Store system until ready to use again.
- To return to service, discard the permeate for 30 minutes to drain.

CAUTION:

Handle all chemicals with care. Wear protective clothing and eye protection.

DISINFECTION AND STERILIZATION OF REVERSE OSMOSIS ELEMENTS

An excellent disinfectant for spiral elements is 0.1 percent **sodium bisulfate solution**. This solution inhibits bacterial growth while maintaining the high flux and salt rejection of elements. It is made by dissolving one ounce of sodium metabisulfite in 8 gallons of water. Elements should be flushed with this solution before storage or at the beginning of long down periods.

Sterilization can be achieved with formaldehyde. However, this reagent should not be used unless the element is first operated for 24 hours. Otherwise, severe flux losses may occur in the membrane. After this initial period, the membrane will tolerate any customary formaldehyde concentration used in sterilization.

Other disinfectants and sterilants can be used. Hydrogen peroxide at 100 to 1000 ppm (0.01 to 0.1 percent) is effective at room temperature. Hydrogen peroxide will damage the membrane at higher temperatures, however. Chloramine, chloramine-T and N-chloroisocyanurates can be used in spiral elements. They are not very effective as sterilants, however. Also, if they are used in combination with an already heavily fouled (biological) test loop or system, flux losses are occasionally experienced from dead bacterial matter in the feed stream depositing on membrane surfaces. Chlorine dioxide, free of hypochlorite or chlorine, may be used as a disinfectant. Both chloramine and chlorine dioxide readily pass through membranes, appearing in the permeate.

Chlorine (hypochlorite) will attack membranes, although up to 2500 hours exposure is possible before loss of salt rejection occurs. Chlorine attack is more noticeable under conditions of high pH, low salinity, and high concentration of divalent cations (calcium, magnesium). Shock chlorination can be practiced, but membrane life will be shortened.

Iodine, quaternary compounds and phenolic disinfectants cannot be used with spiral elements. All three cause severe flux losses.

BIOCIDAL PROTECTION OF REVERSE OSMOSIS ELEMENTS AND MODULES

The interior of a **spiral membrane element**, being dark and moist is an **excellent breeding ground for microorganisms**. When spiral elements are used, tested or operated intermittently, they will probably be exposed to bacteria. During shutdown or storage periods of more than a few days, spiral elements should be disinfected or sterilized by filling the system with a biocidal solution. Up to 40 percent flux loss can occur from biological fouling in elements and modules that have been tested on non-sterile water, then stored on the shelf or in non-operating unit for long periods.

BIOCIDAL PROTECTION PROCEDURE

1. Prepare Solution

Dissolve two pounds (one package) membrane preservative in 30 gallons of clean water.

CAUTION:

Wear eye protection and work only in a well-ventilated area.

If packaged membrane preservative is not available, prepare 0.5 percent sodium bisulfite solution by mixing 5 ounces (142 grams) of sodium metabisulfite in 8 gallons of water.

2. Prepare System

- Drain system as well as is practical.
- Attach feed water inlet to any clean container with a 30 gallon or larger capacity.

3. Operate system until container is nearly empty

4. Store system full of biocide solution.

5. To return to service

- Rinse system with feed for 30 minutes at low pressure.
- Return to service and discard product water for first 30 minutes.

ELECTRICAL DRAWINGS

REFERENCE SECTION

COMPONENT ORDERING INFORMATION
RECOMMENDED SPARE PARTS LIST

	<u>Item Description</u>	<u>Part No:</u>	<u>Qty.</u>
1	Flow Meter	I-FM40IN	1
2	Tank	AT-100	1
3	Pressure Indicator	I-PG100N	1
4	Filter Housing	H-H201BBE	1
5	Ball Valve	YVB10PVC	5
6	Pump		1
	Model: Y-CS20-116	YP1ST1F4B4	1
	Y-CS20-220	YP1ST1F4B4	1
	Y-CS20-236	YP1ST1F5B4	1
	Y-CS20-4236	YP1ST1F5B4	1