

# Reverse Osmosis User's Manual

HT-Series and JT-Series



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## **INTRODUCTION**

Your HT-Series or JT-Series RO System is a durable piece of equipment which, with proper care, will last for many years. This User's Manual outlines installation, operation, maintenance and troubleshooting details vital to the sustained performance of your system.

If your system is altered at the site of operation, or if the feed water conditions change, please contact your local dealer or distributor to determine the proper recovery for your application.



***NOTE: IN ORDER TO MAINTAIN THE MANUFACTURER'S WARRANTY, AN OPERATING LOG MUST BE MAINTAINED AND COPIES WILL NEED TO BE SENT TO YOUR LOCAL DEALER OR DISTRIBUTOR FOR REVIEW.***



***NOTE: PRIOR TO OPERATING OR SERVICING THE REVERSE OSMOSIS SYSTEM, THIS USER'S MANUAL MUST BE READ AND FULLY UNDERSTOOD. KEEP THIS AND OTHER ASSOCIATED INFORMATION FOR FUTURE REFERENCE AND FOR NEW OPERATORS OR QUALIFIED PERSONNEL NEAR THE SYSTEM.***

## **SAFETY**

The Safety section of this User's Manual outlines the various safety headings used throughout this manual's text and are enhanced and defined below:

***NOTE: INDICATES STATEMENTS THAT PROVIDE FURTHER INFORMATION AND CLARIFICATION.***



***CAUTION: INDICATES STATEMENTS THAT ARE USED TO IDENTIFY CONDITIONS OR PRACTICES THAT COULD RESULT IN EQUIPMENT OR OTHER PROPERTY DAMAGE.***



***WARNING: INDICATES STATEMENTS THAT ARE USED TO IDENTIFY CONDITIONS OR PRACTICES THAT COULD RESULT IN INJURY OR LOSS OF LIFE. FAILURE TO FOLLOW WARNINGS COULD RESULT IN SERIOUS INJURY OR EVEN DEATH.***



***DO NOT UNDER ANY CIRCUMSTANCE REMOVE ANY CAUTION, WARNING, OR OTHER DESCRIPTIVE LABELS FROM THE SYSTEM.***



***PLEASE READ THE ENTIRE MANUAL BEFORE PROCEEDING WITH THE INSTALLATION AND STARTUP. YOUR FAILURE TO FOLLOW ATTACHED INSTRUCTIONS OR OPERATING PARAMETERS MAY LEAD TO THE PRODUCT'S FAILURE, WHICH CAN CAUSE PROPERTY DAMAGE AND/OR PERSONAL INJURY.***

- DO NOT USE WHERE THE WATER IS MICROBIOLOGICALLY UNSAFE OR OF UNKNOWN QUALITY WITHOUT ADEQUATE DISINFECTION BEFORE OR AFTER THE SYSTEM.
- PRETREATMENT MUST BE SUFFICIENT TO ELIMINATE CHEMICALS, ORGANICS OR INORGANICS THAT COULD ATTACK THE MEMBRANE MATERIAL.
- ALWAYS TURN OFF THE UNIT, SHUT OFF THE FEED WATER, AND DISCONNECT THE ELECTRICAL POWER BEFORE WORKING ON THE UNIT.
- NEVER ALLOW THE PUMP TO RUN DRY.
- NEVER START THE PUMP WITH THE CONCENTRATE VALVE CLOSED.
- NEVER ALLOW THE UNIT TO FREEZE OR OPERATE WITH A FEED WATER TEMPERATURE ABOVE 100°F.

## **FEED WATER & OPERATION SPECIFICATIONS**

Nothing has a greater effect on a reverse osmosis system than the feed water quality.



**NOTE: IT IS VERY IMPORTANT TO MEET THE MINIMUM FEED WATER REQUIREMENTS. FAILURE TO DO SO WILL CAUSE THE MEMBRANES TO FOUL AND VOID THE MANUFACTURER'S WARRANTY.**

### **OPERATING LIMITS**

#### **Operating Parameters:\***

Feed Temperature	40 - 85°F
System Inlet Pressure	45 - 85 PSIG
Maximum Operating Pressure (@77°F)	150 PSIG (Nominal)

\*If any of the feed water parameters are not within the limits given, consult your local dealer or distributor for assistance.

#### **Feed Water Requirements:\*\***

Maximum SDI Rating	< 3
Maximum Turbidity	1 NTU
Maximum Free Chlorine and/or Chloramines	0 PPM
pH (continuous)	3 - 11
pH (cleaning - 30 min.)	2 - 12

\*\*If any of the feed water parameters are not within the limits given, consult your local dealer or distributor for assistance.



**NOTE: HIGHER TDS AND/OR LOWER TEMPERATURES WILL REDUCE THE SYSTEM'S PRODUCTION.**

## **REJECTION, RECOVERY AND FLOW RATES**

HT-Series and JT-Series Reverse Osmosis Systems are designed to produce RO water at the capacities indicated by the suffix in the system's name under the conditions listed on the previous page. For example, the JT-2000 produces 2000 gallons per day of purified water at the listed operating test conditions.

The amount of total dissolved solids (TDS) rejected by the membrane is expressed as a percentage. For example, a 98.5% rejection rate means that 98.5% of total dissolved solids do not pass through the membrane. To calculate the % rejection, use the following formula:

$$\% \text{ Rejection} = [(\text{Feed TDS} - \text{Product TDS}) / \text{Feed TDS}] \times 100$$

Example:

$$98.5\% = [(550-8.25)/550] \times 100$$



***NOTE: ALL TDS FIGURES MUST BE EXPRESSED IN THE SAME UNITS, TYPICALLY PARTS PER MILLION (PPM) OR MILLIGRAMS PER LITER (MG/L).***

HT and JT-Series Reverse Osmosis Systems are designed to reject up to 98.5% NaCl, unless computer projections have been provided or stated otherwise.

The amount of permeate water recovered for use is expressed as a percentage. To calculate % recovery, use the following formula:

$$\% \text{ Recovery} = (\text{Product Water Flow Rate} / \text{Feed Water Flow Rate}) \times 100$$

Example:

$$50\% = (1.02/2.04) \times 100$$



***NOTE: ALL FLOW RATES MUST BE EXPRESSED IN THE SAME UNITS, TYPICALLY GALLONS PER MINUTE (GPM).***

## **SYSTEM REQUIREMENTS AND OPERATION GUIDELINES**

## PLUMBING

The membranes and high pressure pumps used on HT and JT-Series systems require a continuous flow of water with a minimum feed pressure of 45 psi, not to exceed 85°F.

### FEED WATER CONNECTION

1. Locate the 3/4" FNPT solenoid valve feed water inlet (1" FNPT for JT-Series).
2. Attach the inlet piping to the solenoid valve feed water inlet.
3. Be certain that all of the components of the feed water are soluble at the concentrations attained in the system.



***NOTE: FEED LINE MUST BE MINIMUM 1/2" INCH.***

### PERMEATE (PRODUCT WATER) CONNECTION

The tubing used for the permeate line is 3/8" for the HT-Series and 1/2" for the JT-Series. The tubing can be run to the holding tank or directly to the point-of-use application with PVC fittings, or other FDA approved materials. This is so the material being used does not dissolve into the permeate water. Be certain that all of the components of the feed water are soluble at the concentrations attained in the system. A system operating at 75% recovery, concentrates all impurities by three times the amount.



***CAUTION THE PH OF THE REVERSE OSMOSIS PERMEATE WATER WILL TYPICALLY BE 1 OR 2 PH UNITS LOWER THAN THE FEED WATER PH. A LOW PH CAN BE VERY AGGRESSIVE TO SOME PLUMBING MATERIALS SUCH AS COPPER PIPING.***

### CONCENTRATE (RINSE WATER) CONNECTION

The tubing used for the HT-Series concentrate line is 3/8" and JT-Series concentrate line is 1/2". The tubing should be run to an open drain in a free and unrestricted manner (no backpressure).



***CAUTION: ANY RESTRICTIONS OR BLOCKAGE IN THE DRAIN LINE CAN CAUSE BACKPRESSURE, WHICH WILL INCREASE THE SYSTEM'S OPERATING PRESSURE. THIS CAN RESULT IN DAMAGE TO THE SYSTEM'S MEMBRANES AND COMPONENTS.***

## ELECTRICAL

The motors used on HT-250, 500, 1000, 1500 and 2000 systems are ODP motors. They are available in 110/220 volt 50/60 hertz 1 phase. The motors used on JT- 2000 and 4000 systems are TEFC motors. They are available in 220 volt 50/60 hertz 1 phase or 220 / 460 3 phase.

Ensure that the electrical circuit supplying the system is compatible with the requirements of the specific model you are installing.



***NOTE: IT'S RECOMMENDED THAT A LICENSED ELECTRICIAN WIRE YOUR SYSTEM IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES (NEC).***



***WARNING: TO REDUCE THE RISK OF ELECTRICAL SHOCK, THE INCOMING POWER SUPPLY MUST INCLUDE A PROTECTIVE EARTH GROUND.***

## PRE-FILTRATION

HT and JT-Series systems are supplied with a 5 micron sediment filter. Change the cartridge once a month or when a 10-15 psi differential exists between two pre-filter gauges.



***NOTE: THE SYSTEM MUST BE OPERATED ON FILTERED WATER ONLY.***

## PUMP

The pumps used on the HT-Series-500, 1000, 1500, & 2000 systems are low lead brass rotary vane pumps, Stainless steel is provided as an upgrade. The pumps used on the JT-2000 & 4000 systems are cast iron multistage pumps. Both types of pumps are also available in stainless steel. Follow these guidelines to ensure proper operation of the pump:

- The pump must **NEVER** be run dry. Operating the pump without sufficient feed water will damage the pump.
- **ALWAYS** feed the pump with filtered water. The pump is susceptible to damage from sediment and debris.
- If any damage occurs to your system's pump, a re-build kit may be available. Contact your local dealer or distributor and inform them of your system's model and pump size.

## MOUNTING

The system should be mounted or securely fastened in compliance with local regulation standards.

## **MEMBRANE ELEMENTS**

The HT-Series and JT-Series Reverse Osmosis Systems come pre-loaded with Thin Film Composite (TFC) Low Energy Membranes, unless otherwise specified. General membrane element performance characteristics are listed below:

Part Number	Description	Applied Pressure psi (bar)	Permeate Flow Rate gpd (m3/d)	Nominal Salt Rejection (%)
<b>200375</b>	HF1 – 2521	150 (10.34)	400 (1.51)	99.0
<b>200376</b>	HF1 – 2540	150 (10.34)	1000 (3.79)	99.0
<b>200379</b>	HF1 – 4040	150 (10.34)	2500 (9.46)	99.0

<b>FLEXEON Wall Mount Reverse Osmosis Systems</b>							
Model	Production (GPD)	Element Size	Element Qty	Vessel Qty	Membranes Per Vessel	Vessel Array Staging	Motor HP
HT-250	250	2521	1	1	1	1	1/3
HT-500	500	2521	2	2	1	1:1	1/3
HT-1000	1000	2521	3	3	1	1:1:1	1/2
HT-1500	1500	2540	2	2	1	1:1	3/4
HT-2000	2000	2540	3	3	1	1:1:1	3/4
JT-2000	2000	4040	1	1	1	1	1 1/2
JT-4000	4000	4040	2	2	1	1:1	1 1/2

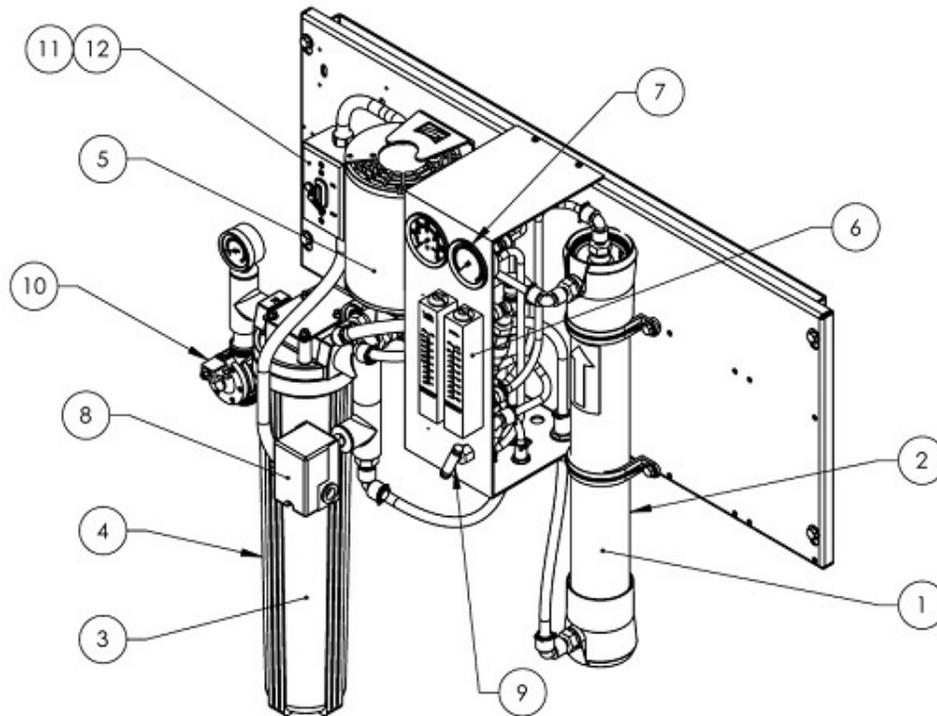
Model	Connections			Dimensions			Weight – Dry (lbs.)
	Feed (FNPT)	Permeate (TUBE)	Concentrate (TUBE)	Depth	Width	Height	
HT-250	3/4"	3/8"	3/8"	10"	38"	38"	60
HT-500	3/4"	3/8"	3/8"	10"	38"	38"	65
HT-1000	3/4"	3/8"	3/8"	10"	38"	38"	70
HT-1500	3/4"	3/8"	3/8"	10"	38"	45"	95
HT-2000	3/4"	3/8"	3/8"	10"	38"	45"	135
JT-2000	1"	1/2"	1/2"	12"	48"	49"	150
JT-4000	1"	1/2"	1/2"	12"	48"	49"	175

HT-Series systems are available with 110V / 220V 50/60 Hz 1 Phase.

JT-Series systems are available with 220V / 380V / 460V 50/60 Hz 1 or 3 Phase.

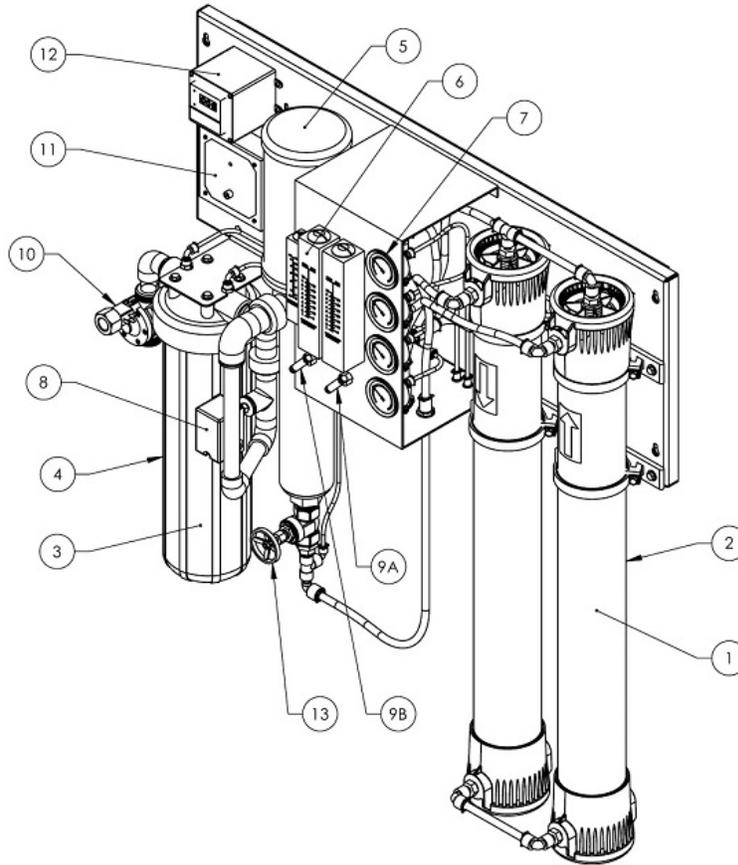
Specifications may vary depending on system design and operation.

## SYSTEM IDENTIFICATION – HT SERIES



ITEM NO.	DESCRIPTION	P/N	MODEL
1	MEMBRANE, HF1, 2521, DRY, AXEON	200375	HT 250-1000
1	MEMBRANE, HF1, 2540, DRY, AXEON	200376	HT 1500-2000
2	HOUSING, MEMBRANE, PVC, 2521, 3/8" P X 3/8" C FNPT, AXEON	200519	HT 250-1000
2	HOUSING, MEMBRANE, PVC, 2540, 3/8" P X 3/8" C FNPT, AXEON	200520	HT 1500-2000
3	CARTRIDGE, SEDIMENT, POLYPRO, 2.5" X 20", 5 MIC, SDF-25-2005, AXEON	200626	HT 250-2000
4	HOUSING, FILTER, WHT/WHT, 2.5" X 20", SGL O-RING, NPR, 3/4" FNPT, AXEON	207404	HT 250-2000
5	PUMP, VANE, LOW LEAD BRASS, BYPASS, 2.3 GPM, 401, FLUID-O-TECH	207663	HT 250-1000
5	PUMP, VANE, LOW LEAD BRASS, BYPASS, 3 GPM, 601, FLUID-O-TECH	207664	HT 1500-2000
6	METER, FLOW, PM0.2-2 GPM, 1/2" MNPT X 1/2" MNPT, AXEON	200897	HT 250-2000
6	METER, FLOW, PM0.1-1 GPM, 1/2" MNPT X 1/2" MNPT, AXEON	203849	HT 250-500
7	GAUGE, BKM, FLL, 0-300 PSI/BAR, 2.5" DIA, 1/4" MNPT, PUROTECH	200904	HT 250-2000
7	GAUGE, BKM, FLL, 0-100PSI, 2.5 DIA, 0.25 MNPT	204165	HT 250-2000
8	SWITCH, PRESSURE, LOW, N/O 15-30, 1/4" FNPT	200906	HT 250-2000
9	VALVE, NEEDLE, SS 316L, 1/4" FNPT, AXEON	201004	HT 250-2000
10	VALVE, SOLENOID, N/C, UL, 110V, 3/4" FNPT, 3 METER CORD	204911	HT 250-2000
11	SWITCH, ON/OFF, SINGLE POLE, 110V	200862	HT 250-2000

## SYSTEM IDENTIFICATION – JT SERIES



ITEM NO.	DESCRIPTION	P/N	MODEL
1	MEMBRANE, HF1, 4040, DRY, AXEON	200379	JT 2000-4000
2	HOUSING, MEMBRANE, PVC, 4040, 1/2" P X 1/2" C FNPT, AXEON	200527	JT 2000-4000
3	CARTRIDGE, SEDIMENT, POLYPRO, 4.5" X 20", 5 MIC, SDF-25-2005, AXEON	200640	JT 2000-4000
4	HOUSING, FILTER, BLK/GRY, 4.5" X 20", SGL O-RING, NPR, 1-1/2" FNPT, AXEON	207290	JT 2000-4000
5	PUMP, MULTI-STAGE, 1.5HP, 110/220V, 1PH, 10GBC1514QO, GOULDS	200789	JT 2000-4000
6	METER, FLOW, PM, 0.2-2 GPM, 1/2" MNPT X 1/2" MNPT, AXEON	200897	JT 2000
6	METER, FLOW, PM, 1-5 GPM, 1/2" MNPT X 1/2" MNPT, AXEON	200898	JT 2000-4000
7	GAUGE, BKM, FLL, 0-300 PSI/BAR, 2.5" DIA, 1/4" MNPT, PUROTECH	200904	JT 2000-4000
7	GAUGE, BKM, FLL, 0-100PSI, 2.5 DIA, 0.25 MNPT	204165	JT 2000-4000
8	SWITCH, PRESSURE, LOW, N/O 15-30, 1/4" FNPT	200906	JT 2000-4000
9A	VALVE, NEEDLE, SS 316L, 1/2" FNPT, AXEON	201006	JT 2000-4000
9B	VALVE, NEEDLE, SS 316L, 1/2" FNPT, AXEON	201006	JT 2000-4000
10	VALVE, SOLENOID, N/C, UL, 220V, 1" FNPT, 3 METER CORD	204914	JT 2000-4000
11	CONTROLLER, COMPUTER, MNIITROL, 110-220V, 1PH,	200857	JT 2000-4000
12	CONTROLLER, TDS, PANEL MNT, PS-100, HM DIGITAL	200877	JT 2000-4000
13	GLOBE VALVE, SS, 1" FNPT	200995	JT 2000-4000

## **MEMBRANE INSTALLATION, REMOVAL AND REPLACEMENT**

Installing and replacing membranes in the membrane housings is an easy process if you have the proper information and tools at hand. Please refer to the following instructions when removing and replacing membrane elements:



**WARNING: ALL PRESSURE GAUGES MUST READ ZERO BEFORE PROCEEDING. BEFORE ATTEMPTING, DISCONNECT THE POWER FROM THE SYSTEM AND BLEED ALL WATER PRESSURE FROM THE SYSTEM.**

1. Remove the black end cap from the top of the membrane housing. This is done by removing the yellow locking wedge clip and then the white snap ring on the membrane housing end.
2. Remove the replacement membrane element(s) from the shipping box; the membrane(s) should be contained within a plastic oxygen barrier bag.

**NOTE: WEAR GLOVES FOR THE FOLLOWING STEPS IN ORDER NOT TO CONTAMINATE THE MEMBRANE.**

3. Cut the bag open as close as possible to the seal at one end of the bag, so the bag may be re-used if necessary.
4. Make sure that all parts are clean and free from dirt. Examine the brine seal, and permeate tube for nicks or cuts. Replace the o-rings or brine seal if damaged.
5. Flow directions should be observed for installation of each element into their respective pressure vessels.

## REPLACING THE MEMBRANE ELEMENT:



**WARNING: THE BRINE SEAL MUST BE IN THE SAME POSITION FOR EACH MEMBRANE ELEMENT HOUSING. THE BRINE SEAL IS A RUBBER SEAL THAT PROTRUDES ON ONE SIDE OF THE MEMBRANE AND IS ALWAYS ON THE FEED SIDE OF THE MEMBRANE ELEMENT. FOR HT AND JT- SERIES RO SYSTEMS, THE BRINE SEAL SHOULD BE ON THE TOP SIDE OF THE MEMBRANE HOUSING.**

1. Remove one membrane element at a time from the vessel, from the top of each housing. Long nose pliers may be necessary to pull the old membrane element out of the membrane element housing.
2. Lubricate the brine seal and o-rings with a non-petroleum based lubricant, such as Dow Corning® 111. Do not use a petroleum-based lubricant.
3. Install membranes with brine seal location depicted in (Figure 2).
4. With a smooth and constant motion, push the membrane element into the housing so the brine seal enters the housing without coming out of the brine seal groove.
5. Once the membrane has been fully inserted into vessel, reinstall black end plug, white snap ring (ensure that white snap ring is fully sealed all the way around end plug), and yellow locking wedge clip.
6. Reconnect any fittings that may have been disconnected when the membrane pressure vessels were disassembled.
7. To start-up the system, please refer to the **Initial Start-Up** section of this manual.



**CAUTION: WET MEMBRANES ARE SHIPPED IN A PRESERVATIVE SOLUTION. THE MEMBRANES MUST BE FLUSHED FOR AT LEAST 30 MINUTES TO REMOVE THE PRESERVATIVE FROM THE MEMBRANE. DISCARD ALL OF THE PERMEATE, WHICH IS PRODUCED DURING THE FLUSH PERIOD.**

## **SYSTEM PURGING**

Carefully inspect your system before initial start-up. Check that all plumbing and electrical connections are not loose or have not come undone during shipment.



***NOTE: LEAVE THE POWER TO THE SYSTEM OFF FOR THIS PROCEDURE.***

1. Redirect permeate water to the drain for this procedure.
2. Fully open the concentrate valve # 9 (#9A) (Counter Clockwise).
3. For JT only, fully open globe valve #13 (Counter Clockwise).
4. If equipped, fully close the concentrate recycle valve # 9B (Clockwise).
5. Offset the position of the bypass lever on the solenoid valve #10.
6. Turn the feed water on and let the system purge until no visible bubbles appear from concentrate flow meter # 6.

## **INITIAL START-UP**

1. Fully open concentrate valve # 9 (#9A) (Counter Clockwise)
2. For JT only, close globe valve #13 halfway.
3. If equipped, fully close recycle valve # 9B (Clockwise)
4. Return position of bypass lever on the solenoid valve #10.
5. Turn RO system on and adjust bypass screw (HT) or globe valve (JT), concentrate valve and recycle valve to the designed flow and pressure.
6. Inspect for leaks and after one hour shut down system. Re-direct permeate back to tank or POU and then turn system back on.
7. Record readings daily for a week and after a week record readings once a week.



***WARNING: NEVER EXCEED THE MAXIMUM PRESSURE RATING OF YOUR PRESSURE VESSELS.***

## **OPERATING DO'S AND DON'TS**

### **DO:**

- Change the cartridge filters regularly
- Monitor the system and keep a daily log
- Run the system as much as possible on a continuous basis
- Adjust the system recovery to the recommended value
- Always feed the pump with filtered water

### **DON'T**

- Permit chlorine to enter or be present in the feed water
- Shut down the system for extended periods
- Close the throttle valve completely
- Operate the system with insufficient feed flow
- Operate the pump dry

## **DESIGN BASIS FOR HT & JT SERIES**

<b>Product Specifications</b>							
	<b>HT-250</b>	<b>HT-500</b>	<b>HT-1000</b>	<b>HT-1500</b>	<b>HT-2000</b>	<b>JT-2000</b>	<b>JT-4000</b>
<b>Design</b>							
<b>Configuration</b>	Single Pass	Single Pass	Single Pass	Single Pass	Single Pass	Single Pass	Single Pass
<b>Feed Water Source (TDS)</b>	TDS<2000 ppm	TDS<2000 ppm	TDS<2000 ppm	TDS<2000 ppm	TDS<2000 ppm	TDS<2000 ppm	TDS<2000 ppm
<b>System Recovery *</b>	26%	26%	41%	41%	63%	50% - 75%	50% - 75%
<b>Rejection and Flow Rates</b>							
<b>Nominal Salt Rejection</b>	98.5%	98.5%	98.5%	98.5%	98.5%	98.5%	98.5%
<b>Permeate Flow Rate*</b>	0.17 gpm	0.34 gpm	0.69 gpm	1.00 gpm	1.38 gpm	1.38 gpm	2.77 gpm
<b>Concentrate Flow Rate (Minimum)</b>	1.00 gpm	1.00 gpm	1.00 gpm	1.00 gpm	1.00 gpm	3.00 gpm	3.00 gpm
<b>Concentrate Recycle</b>	N/A	N/A	N/A	N/A	N/A	Up to 5.00 gpm	Up to 5.00 gpm
<b>Membranes</b>							
<b>Membranes Per Vessel</b>	1	1	1	1	1	1	1
<b>Membrane Quantity</b>	1	2	3	2	3	1	2
<b>Membrane Size</b>	2521	2521	2521	2540	2540	4040	4040
<b>Vessels</b>							
<b>Vessel Array</b>	1	1:1	1:1:1	1:1	1:1:1	1	1:1
<b>Vessel Quantity</b>	1	2	3	2	3	1	2
<b>Connections</b>							
<b>Feed Connection</b>	3/4" FNPT	3/4" FNPT	3/4" FNPT	3/4" FNPT	3/4" FNPT	1" FNPT	1" FNPT
<b>Permeate Connection</b>	3/8" Tube	3/8" Tube	3/8" Tube	3/8" Tube	3/8" Tube	1/2" Tube	1/2" Tube
<b>Concentrate Connection</b>	3/8" Tube	3/8" Tube	3/8" Tube	3/8" Tube	3/8" Tube	1/2" Tube	1/2" Tube
<b>System Dimensions</b>							
<b>Approx. Dimensions (L x W x H)</b>	38" x 38" 10"	38" x 38" 10"	38" x 38" 10"	38" x 45" 10"	38" x 45" 10"	48" x 49" 12"	48" x 49" 12"
<b>Approx. Weight</b>	60 lbs	65 lbs	70 lbs	95 lbs	105 lbs	125 lbs	150 lbs
<b>Pumps</b>							
<b>Pump Type</b>	Rotary Vane	Rotary Vane	Rotary Vane	Rotary Vane	Rotary Vane	Multi-Stage	Multi-Stage
<b>Motor HP</b>	1/3	1/3	1/2	3/4	3/4	1½	1 ½
<b>RPM @ 60 HZ</b>	1725	1725	1725	1725	1725	3450	3450
<b>Electrical</b>							
<b>Standard Voltage</b>	110V 1PH 60Hz	110V 1PH 60Hz	110V 1PH 60Hz	110V 1PH 60Hz	110V 1PH 60Hz	220V 1PH 60Hz	220V 1PH 60Hz

\* Product flow rates and recovery are based on a feedwater temperature at 77°F and ppm TDS. Treatment ability of the RO system is dependent on feed water quality. Lower temperatures and/or higher TDS will reduce product flow.

## **OPERATION AND MAINTENANCE**

The reverse osmosis process causes the concentration of impurities. The impurities may precipitate (come out of solution) when their concentration reaches saturation levels.



**NOTE: PRECIPITATION CAN SCALE OR FOUL MEMBRANES AND MUST BE PREVENTED.**

Check your feed water chemistry and pre-treat the water and/or reduce the system's recovery as required. If necessary, consult with your local dealer or distributor.

### **PRE-FILTER PRESSURE GAUGES**

These gauges measure the feed water pressure when it enters and exits the pre-filters. A pressure differential of 10 - 15 psi or more on the two pressure gauges indicates that the pre-filters require servicing. For example, if the inlet pressure is 40 psi, the filter should be changed when the outlet pressure is 30 psi or below.

### **PERMEATE (PRODUCT) FLOW METER AND CONCENTRATE (RINSE) FLOW METER**

These flow meters indicate the flow rates of the permeate and concentrate water. The measurements, when added together, also indicate the feed water flow rate or (total flow rate); if the system is not equipped with a concentrate recycle valve.



### **LOW PRESSURE SWITCH**

The low pressure switch shuts off the system when the feed water pressure drops below 15 PSI, preventing damage to the pump. The system restarts automatically when there is a constant pressure of 30 psi or more.



## **PUMP BYPASS VALVE**

This is a standard feature on the HT-250, 500, 1000, 1500, & 2000 reverse osmosis systems. It provides an adjustment for pump pressure, which will vary as the required system pressure changes. As the feed water temperature decreases, and/or the feed water TDS increases, the system will require a higher operating pressure to produce the specified permeate flow.

## **GLOBE VALVE (THROTTLE)**

This is a standard feature on the JT-2000 & 4000 reverse osmosis systems. It provides an adjustment for pump flow and pressure, which will vary as the required system pressure changes. As the feed water temperature decreases, and/or the feed water TDS increases, the system will require a higher operating pressure to produce the specified permeate flow.

## **FLUSHING THE SYSTEM**

The system should be flushed weekly to remove sediment from the surface of the membranes. To manually flush the system, follow the preceding steps:

1. The system must be running during the flushing procedure.
2. Fully open the concentrate valve.
3. Allow the system to run for 10 to 20 minutes.
4. After 10 to 20 minutes, close the concentrate valve to its previous position, raising the operating pressure to 150 psi. Ensure the proper concentrate flow rate is going to the drain.
5. The system is now ready to operate.

## **PREPARING UNIT FOR STORAGE OR SHIPMENT**



**Prior to shipping or storing your system, the system should be cleaned with an appropriate cleaner, flushed with water and protected from biological attack with an appropriate solution for membrane elements. The membrane housing(s) and plumbing lines of the system must be completely drained. Any water remaining in the plumbing of a system may freeze, causing serious damage.**

Preparing system for storage:

1. Totally immerse the elements in the membrane housing in a solution of 2% M-100 solution, venting the air outside of the membrane housings. Use the overflow technique: circulate the M-100 solution in such a way that the remaining air in the system is minimized after the recirculation is completed. After the housing is filled, the M-100 solution should be allowed to overflow through an opening located higher than the upper end of the highest membrane housing being filled.
2. Separate the preservation solution from the air outside by closing all valves. Any contact with oxygen will oxidize the M-100 solution.
3. Check the pH once a week. When the pH becomes 3 or lower, change the preservation solution.
4. Repeat this process at least once a month.

During the shutdown period, the plant must be kept frost-free, or the temperature must not exceed 113°F (45°C).

Preparing unit for shipment:

1. Disconnect the inlet, concentrate, pre-filter, and permeate plumbing.
2. Drain all water from the pre-filter cartridge housings by unscrewing the housings, removing the pre-filter cartridges, and drain the water from the housings.
3. Disconnect the tubing from the connector on the permeate and concentrate inlets and outlets.
4. Fully open the concentrate valve.
5. Drain the flow meters by disconnecting the tubing from the bottom fitting of each meter.

6. Allow the system to drain for a minimum of eight hours or until the opened ports quit dripping.
7. After draining is complete, reconnect all of the plumbing.

## **REVERSE OSMOSIS TROUBLESHOOTING**

<b>SYMPTOMS</b>	<b>POSSIBLE CAUSES</b>	<b>CORRECTIVE ACTION</b>
Low Inlet Pressure	Low supply pressure	Increase inlet pressure
	Cartridge filters plugged	Change filters
	Solenoid valve malfunction	Replace sol. valve and/or coil
	Motor may not be drawing correct current	Use clamp-on amp meter to check the motor amp draw.
	Concentrate valve might be damaged	Replace needle valve
	Leaks	Fix any visible leaks
Low Permeate Flow	Low inlet flow	Adjust concentrate valve
	Cold feed water	See temperature correction sheet
	Low operating pressure	See low inlet pressure
	Defective membrane brine seal	Inspect and/or replace brine seal
	Fouled or scaled membrane	Clean membranes and/or replace
High permeate flow	Damaged product tube o-rings	Inspect and/or replace
	Damaged or oxidized membrane	Replace membrane
	Exceeding maximum feed water temperature	See temperature correction sheet
Poor permeate quality	Low operating pressure	See low inlet pressure
	Damage product tube o-rings	Inspect and/or replace
	Damaged or oxidized membrane	Replace membrane
Membrane fouling	Metal Oxide Fouling	Improve pretreatment to remove metals. Clean with acid cleaners.
	Colloidal Fouling	Optimize pretreatment for colloid removal. Clean with high pH alkaline cleaners.
	Scaling (CaSO <sub>4</sub> , CaSO <sub>3</sub> , BaSO <sub>4</sub> , SiO <sub>2</sub> )	Increase acid addition and antiscalant dosage for CaVO <sub>3</sub> and CaCO <sub>4</sub> . Reduce recovery. Clean with acid cleaners
	Biological Fouling	Shock dosage of Sodium Bi-Sulfate. Continuous feed of Sodium Bi-Sulfate at reduced pH. Chlorination and de-chlorination. Replace cartridge filters.
	Organic Fouling	Activated Carbon or other pretreatment. Clean with high pH cleaner.
	Chlorine Oxidation	Check Chlorine feed equipment and de-chlorination system.
	Abrasion of membrane by Crystalline Material	Improve pretreatment. Check all filters for media leakage.

## ABNORMAL PERMEATE FLOW

Permeate flow should be within 20% of the rated production, after correcting the feed water temperatures above or below 77°F. Check your permeate flow meter to determine the permeate flow rate.



If a system is rated to produce 5 gpm of permeate water @ 77° F, the same system will produce more water at a higher temperature. It will also produce less water at a lower temperature. Use the temperature correction table to obtain the correct flow.

### Example:

5 gpm @ 59° F ( $5 \div 1.42 = 3.52$  gpm)

5 gpm @ 77° F ( $5 \div 1 = 5$  gpm)

5 gpm @ 84° F ( $5 \div 0.89 = 5.62$  gpm)

## TEMPERATURE CORRECTION FACTORS FOR MEMBRANE

Find the temperature correction factor (TCF) from the table below. Divide the rated permeate flow at 77°F by the temperature correction factor. The result is the permeate flow at the desired temperature. (See example on the next page)

Temperature °F (°C)	Temperature Correction Factor								
50.0 (10.0)	1.711	57.2 (14.0)	1.475	64.4 (18.0)	1.276	71.6 (22.0)	1.109	78.8 (26.0)	0.971
50.2 (10.1)	1.705	57.4 (14.1)	1.469	64.6 (18.1)	1.272	71.8 (22.1)	1.105	79.0 (26.1)	0.968
50.4 (10.2)	1.698	57.6 (14.2)	1.464	64.8 (18.2)	1.267	72.0 (22.2)	1.101	79.2 (26.2)	0.965
50.5 (10.3)	1.692	57.7 (14.3)	1.459	64.9 (18.3)	1.262	72.1 (22.3)	1.097	79.3 (26.3)	0.962
50.7 (10.4)	1.686	57.9 (14.4)	1.453	65.1 (18.4)	1.258	72.3 (22.4)	1.093	79.5 (26.4)	0.959
50.9 (10.5)	1.679	58.1 (14.5)	1.448	65.3 (18.5)	1.254	72.5 (22.5)	1.090	79.7 (26.5)	0.957
51.1 (10.6)	1.673	58.3 (14.6)	1.443	65.5 (18.6)	1.249	72.7 (22.6)	1.086	79.9 (26.6)	0.954
51.3 (10.7)	1.667	58.5 (14.7)	1.437	65.7 (18.7)	1.245	72.9 (22.7)	1.082	80.1 (26.7)	0.951
51.4 (10.8)	1.660	58.6 (14.8)	1.432	65.8 (18.8)	1.240	73.0 (22.8)	1.078	80.2 (26.8)	0.948
51.6 (10.9)	1.654	58.8 (14.9)	1.427	66.0 (18.9)	1.236	73.2 (22.9)	1.075	80.4 (26.9)	0.945
51.8 (11.0)	1.648	59.0 (15.0)	1.422	66.2 (19.0)	1.232	73.4 (23.0)	1.071	80.6 (27.0)	0.943
52.0 (11.1)	1.642	59.2 (15.1)	1.417	66.4 (19.1)	1.227	73.6 (23.1)	1.067	80.8 (27.1)	0.940
52.2 (11.2)	1.636	59.4 (15.2)	1.411	66.6 (19.2)	1.223	73.8 (23.2)	1.064	81.0 (27.2)	0.937
52.3 (11.3)	1.630	59.5 (15.3)	1.406	66.7 (19.3)	1.219	73.9 (23.3)	1.060	81.1 (27.3)	0.934
52.5 (11.4)	1.624	59.7 (15.4)	1.401	66.9 (19.4)	1.214	74.1 (23.4)	1.056	81.3 (27.4)	0.932
52.7 (11.5)	1.618	59.9 (15.5)	1.396	67.1 (19.5)	1.210	74.3 (23.5)	1.053	81.5 (27.5)	0.929
52.9 (11.6)	1.611	60.1 (15.6)	1.391	67.3 (19.6)	1.206	74.5 (23.6)	1.049	81.7 (27.6)	0.926
53.1 (11.7)	1.605	60.3 (15.7)	1.386	67.5 (19.7)	1.201	74.7 (23.7)	1.045	81.9 (27.7)	0.924
53.2 (11.8)	1.600	60.4 (15.8)	1.381	67.6 (19.8)	1.197	74.8 (23.8)	1.042	82.0 (27.8)	0.921
53.4 (11.9)	1.594	60.6 (15.9)	1.376	67.8 (19.9)	1.193	75.0 (23.9)	1.038	82.2 (27.9)	0.918
53.6 (12.0)	1.588	60.8 (16.0)	1.371	68.0 (20.0)	1.189	75.2 (24.0)	1.035	82.4 (28.0)	0.915
53.8 (12.1)	1.582	61.0 (16.1)	1.366	68.2 (20.1)	1.185	75.4 (24.1)	1.031	82.6 (28.1)	0.913
54.0 (12.2)	1.576	61.2 (16.2)	1.361	68.4 (20.2)	1.180	75.6 (24.2)	1.028	82.8 (28.2)	0.910
54.1 (12.3)	1.570	61.3 (16.3)	1.356	68.5 (20.3)	1.176	75.7 (24.3)	1.024	82.9 (28.3)	0.908
54.3 (12.4)	1.564	61.5 (16.4)	1.351	68.7 (20.4)	1.172	75.9 (24.4)	1.021	83.1 (28.4)	0.905
54.5 (12.5)	1.558	61.7 (16.5)	1.347	68.9 (20.5)	1.168	76.1 (24.5)	1.017	83.3 (28.5)	0.902
54.7 (12.6)	1.553	61.9 (16.6)	1.342	69.1 (20.6)	1.164	76.3 (24.6)	1.014	83.5 (28.6)	0.900
54.9 (12.7)	1.547	62.1 (16.7)	1.337	69.3 (20.7)	1.160	76.5 (24.7)	1.010	83.7 (28.7)	0.897
55.0 (12.8)	1.541	62.2 (16.8)	1.332	69.4 (20.8)	1.156	76.6 (24.8)	1.007	83.8 (28.8)	0.894
55.2 (12.9)	1.536	62.4 (16.9)	1.327	69.6 (20.9)	1.152	76.8 (24.9)	1.003	84.0 (28.9)	0.892
55.4 (13.0)	1.530	62.6 (17.0)	1.323	69.8 (21.0)	1.148	77.0 (25.0)	1.000	84.2 (29.0)	0.889
55.6 (13.1)	1.524	62.8 (17.1)	1.318	70.0 (21.1)	1.144	77.2 (25.1)	0.997	84.4 (29.1)	0.887
55.8 (13.2)	1.519	63.0 (17.2)	1.313	70.2 (21.2)	1.140	77.4 (25.2)	0.994	84.6 (29.2)	0.884
55.9 (13.3)	1.513	63.1 (17.3)	1.308	70.3 (21.3)	1.136	77.5 (25.3)	0.991	84.7 (29.3)	0.882
56.1 (13.4)	1.508	63.3 (17.4)	1.304	70.5 (21.4)	1.132	77.7 (25.4)	0.988	84.9 (29.4)	0.879
56.3 (13.5)	1.502	63.5 (17.5)	1.299	70.7 (21.5)	1.128	77.9 (25.5)	0.985	85.1 (29.5)	0.877
56.5 (13.6)	1.496	63.7 (17.6)	1.294	70.9 (21.6)	1.124	78.1 (25.6)	0.982	85.3 (29.6)	0.874
56.7 (13.7)	1.491	63.9 (17.7)	1.290	71.1 (21.7)	1.120	78.3 (25.7)	0.979	85.5 (29.7)	0.871
56.8 (13.8)	1.486	64.0 (17.8)	1.285	71.2 (21.8)	1.116	78.4 (25.8)	0.977	85.6 (29.8)	0.869
57.0 (13.9)	1.480	64.2 (17.9)	1.281	71.4 (21.9)	1.112	78.6 (25.9)	0.974	85.8 (29.9)	0.866

\*F = (°C x 9/5) + 32

Corrected Flow Rate = (Measured Flow Rate) \* (TCF @ Feed Water Temp.)

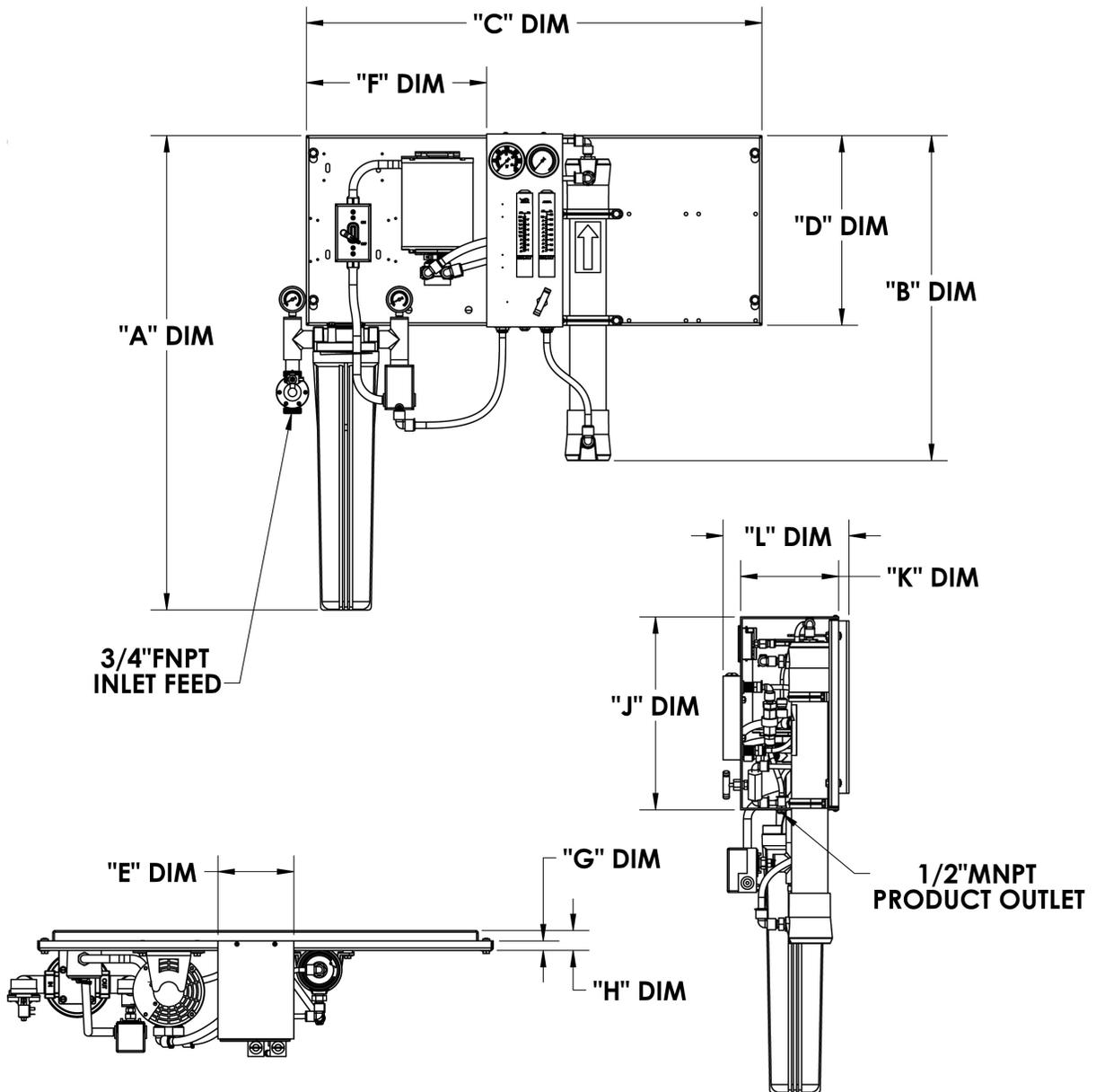
## SERVICE ASSISTANCE

If service assistance is required, please complete the following process:

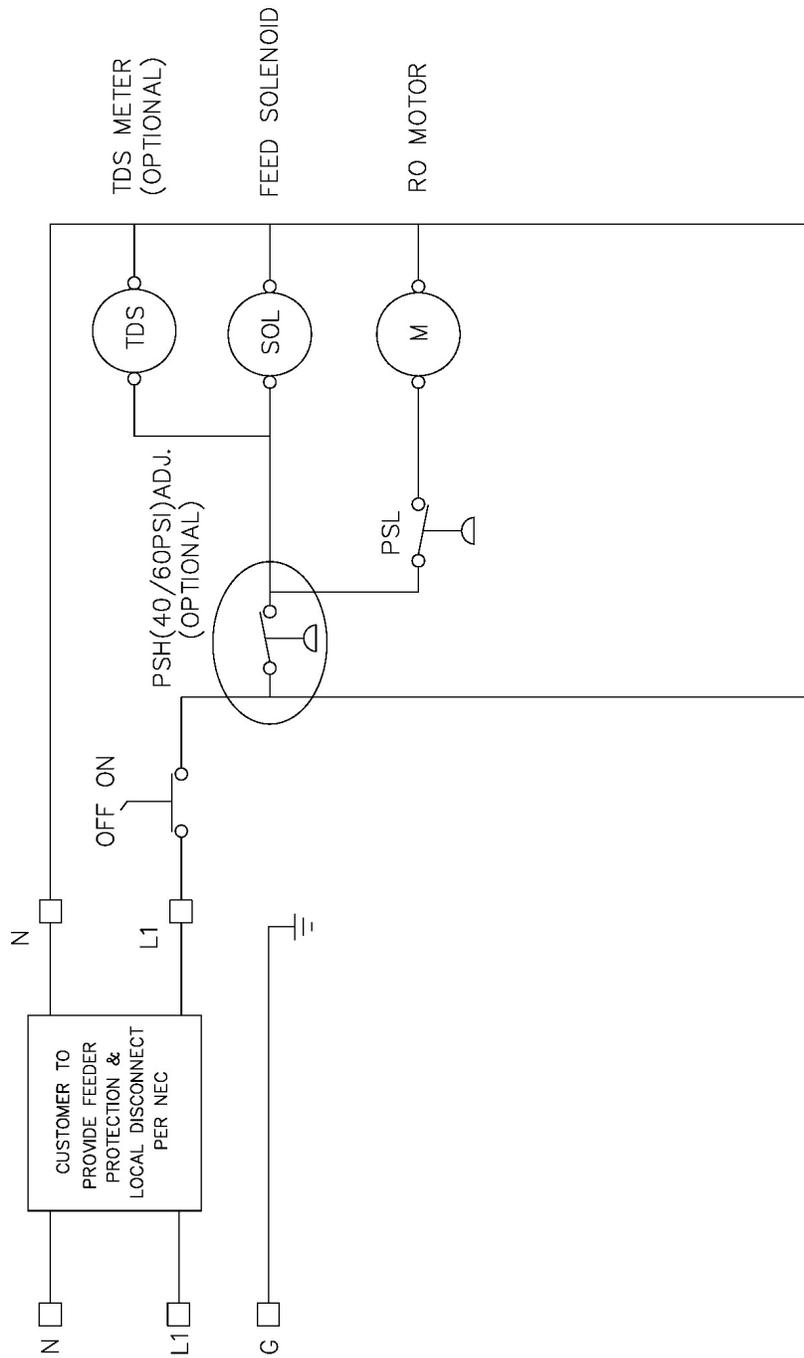
Contact your local dealer or distributor. Prior to making the call, have the following information available: system installation date, serial number, daily log sheets, current operating parameters (e.g. flow, operating pressures, pH, etc.) and a detailed description of the problem.

## SYSTEM DRAWINGS

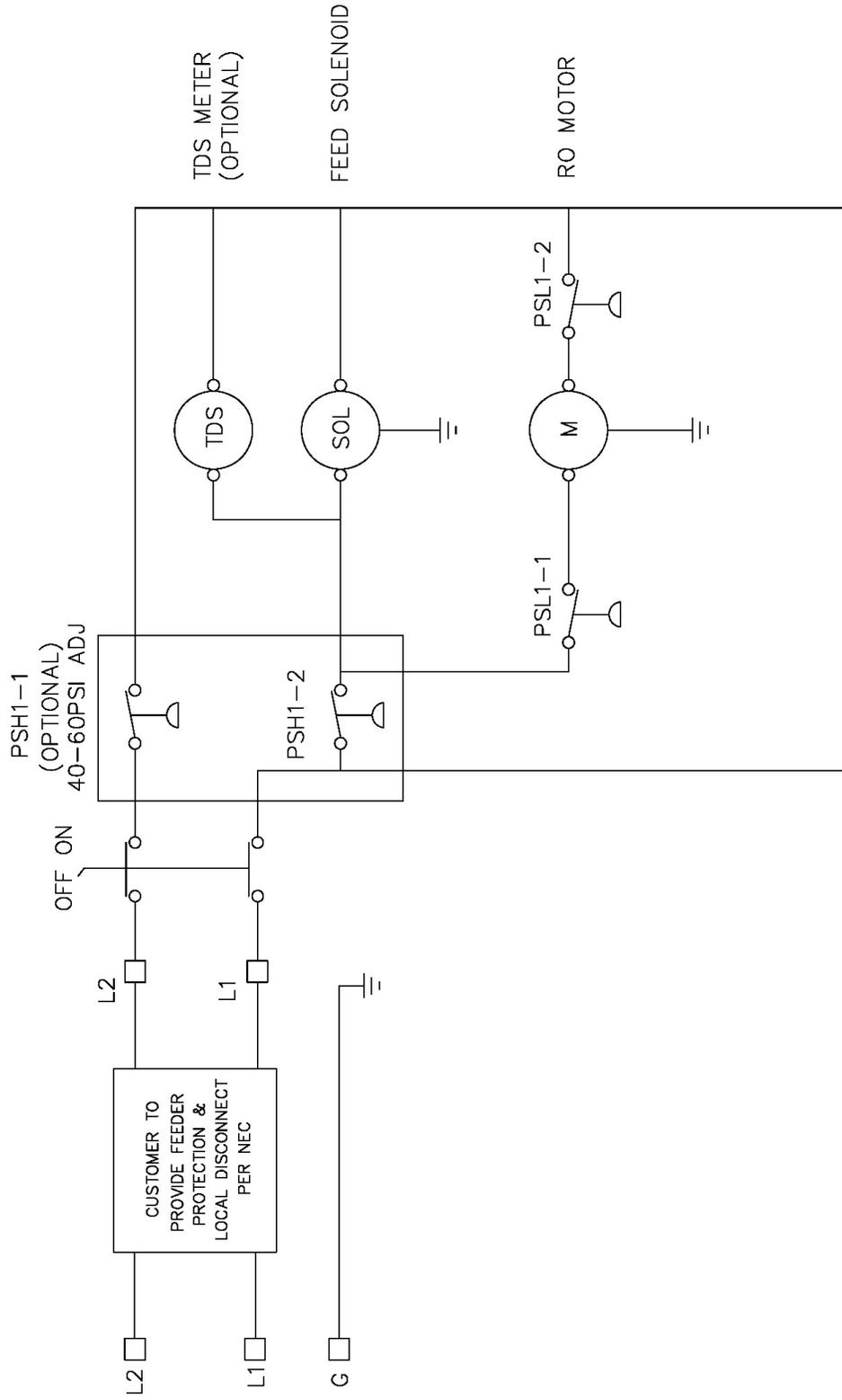
DIMENSIONS	HT-250	HT-500	HT-1000	HT-1500	HT-2000	JT-2000	JT-4000
"A" DIM	37.38	37.38	37.38	37.38	37.38	38.58	38.58
"B" DIM	25.69	25.69	25.69	44.69	44.69	46.69	46.69
"C" DIM	36.00	36.00	36.00	36.00	36.00	44.00	44.00
"D" DIM	15.00	15.00	15.00	15.00	15.00	17.00	17.00
"E" DIM	6.00	6.00	6.00	6.00	6.00	10.00	10.00
"F" DIM	14.25	14.25	14.25	14.25	14.25	18.30	18.30
"G" DIM	.75	.75	.75	.75	.75	1.12	1.12
"H" DIM	1.50	1.50	1.50	1.50	1.50	2.12	2.12
"J" DIM	15.25	15.25	15.25	15.25	15.25	17.25	17.25
"K" DIM	7.75	7.75	7.75	7.75	7.75	10.00	10.00
"L" DIM	9.95	9.95	9.95	9.95	9.95	12.51	12.51



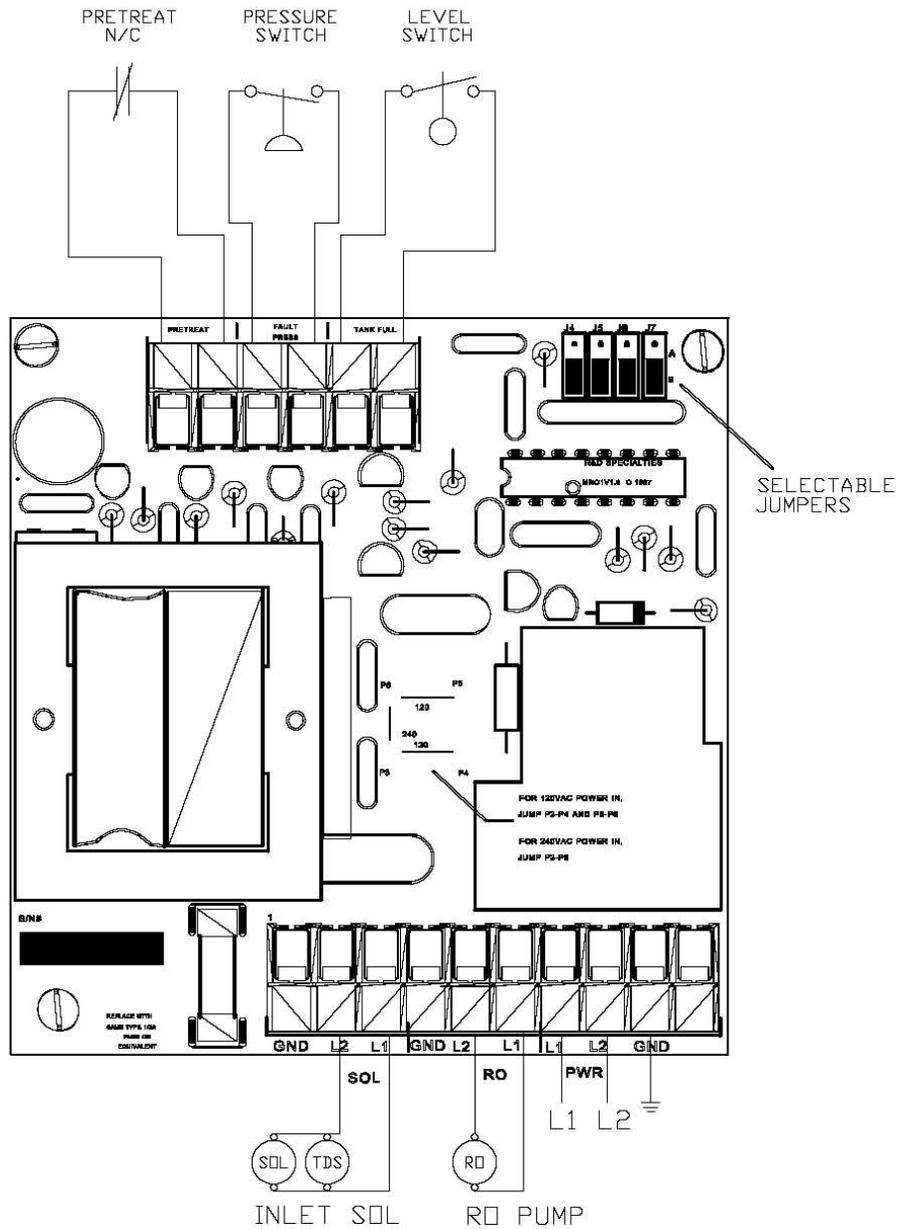
# HT-SERIES 110V ELECTRICAL SCHEMATIC



# **HT-SERIES** **220V ELECTRICAL SCHEMATIC**



# JT-SERIES 110/220V 50/60HZ 1 PH ELECTRICAL SCHEMATIC MINITROL



JUMPER	POSITION B	POSITION A
J4	AUTO RESET DISABLED	* AUTO RESET ENABLED
J5	RETRIES DISABLED	* RETRIES ENABLED
J6	* 2 SEC RESTART	15 MIN RESTART
J7	N.O. SWITCHES	* N.C. SWITCHES

\* = JUMPERS SELECTED

### NOTES

ALL SWITCHES MUST BE DRY CONTACT ONLY!! IF VOLTAGE IS APPLIED TO THESE INPUTS, DAMAGE TO CONTROLLER WILL RESULT FOR POWER WITH NEUTRAL AND HOT LEADS, L1 IS HOT AND L2 IS NEUTRAL



# **REVERSE OSMOSIS SYSTEM WARRANTY**

## **One-Year Limited Warranty**

### **Warranty Terms**

Subject to the terms and conditions set forth hereinafter, Manufacturer (hereafter “Manufacturer”) warrants to the original purchaser (hereafter the “Customer”) that the systems and products manufactured by the Manufacturer are free from defects in material and in workmanship for twelve (12) months from the Warranty Commencement Date (as defined below) only when used strictly in accordance with the applicable operating instructions and within the range of the operating conditions specified by the Manufacturer for each such product.

In order to maintain the manufacturer’s warranty, an operating log must be maintained and copies will need to be sent to your local dealer or distributor for review. This Warranty does not extend to systems, equipment, or components manufactured by others, nor to systems, equipment, or components manufactured by others and distributed by the Manufacturer. This Warranty does not extend to equipment or components manufactured by others which have been incorporated into a product by the Manufacturer but, if allowable, the Manufacturer hereby assigns, without warranty, to the Customer its interest, if any, under any warranty made by the Manufacturer of such equipment or component. This Warranty does not cover disposable items such as fuses, o-rings, regeneration materials/chemicals, or other such disposable items, which must be replaced periodically under the normal and foreseeable operating conditions of the goods warranted hereby.

### **Warranty Commencement Date**

The Warranty Commencement Date for each product by the Manufacturer shall be the later of the date of: (1) receipt by the Customer, or (2) the date of installation at the Customer’s premises provided that such installation must occur within three (3) months of shipment from the Manufacturer’s manufacturing facility. In no event shall the Warranty Commencement Date exceed three (3) months from the shipment from Manufacturer’s facility. The Customer shall provide proof of purchase in order to exercise rights granted under this Warranty. If requested by the Manufacturer, the Customer must also provide proof of the installation date. Proof of installation shall be returned by Customer to the Manufacturer within thirty (30) days after installation by virtue of supplying a Warranty Validation Card supplied with each Manufacturer product fully completed and signed in ink by the Customer and the authorized installer of the product.

### **Warranty Service**

MANUFACTURER’S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT (AT MANUFACTURER’S SOLE DISCRETION) OF ANY PRODUCT, OR COMPONENT THEREOF, PROVED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP WITHIN THE COVERED WARRANTY PERIOD.

The Customer, at the Customer’s risk and expense, shall be responsible for returning such product or component, only after obtaining a Return Goods Authorization (RGA) number from the Manufacturer, arranging for freight prepaid, and in conformance with any special packaging and shipping instructions set forth on the operation documentation or RGA instructions, or as otherwise reasonably required, to Manufacturer’s address, together with (1) RGA number issued by the Manufacturer at Customer’s request; (2) proof of purchase and, if necessary, proof of installation date; (3) a Return Goods Authorization Form; (4) a description of the suspected defects; (5) the serial number of the

Manufacturer product alleged to be defective; and (6) a description of the type of water and pretreatment equipment which has been utilized in connection with the product, if any; (7) an operating log, which can be found in the product manual. Manufacturer shall, in Manufacturer's reasonable discretion, be the sole judge of whether a returned product or component is defective in material or workmanship.

Required or replaced products or components shall be returned surface freight. In genuine emergency situations, Manufacturer will at Manufacturer's sole discretion) forward replacement parts to Customer without waiting for authorized return of the questionable part(s). In such cases, Customer will issue a purchase order or other payment guarantee prior to shipment. If the returned part is found to have been misused or abused, or the defective part is not received by Manufacturer within thirty (30) days; the Customer will be invoiced for the replacement part(s) provided. This Warranty does not cover or include labor and/or travel to the Customer's premise or location or any other location. Charges of \$1500 per day plus associated travel expenses will be incurred by the Customer in providing the Warranty Service at any location other than Manufacturer's main headquarters; that is if the Manufacturer deems that the product is not covered by said Warranty. The manufacturer reserves the right to precondition such travel to Customer's premises upon prepayment of Manufacturer's anticipated costs of attending such premises.

### **Voidability of Warranty**

This Warranty shall be void and unenforceable as to any Manufacturer product which has been damaged by accident, mishandling, abuse or has been repaired, modified, altered, disassembled or otherwise tampered with by anyone other than Manufacturer or an authorized Manufacturer service representative; or, if any replacement parts are not authorized by Manufacturer have been used, or, the product has not been installed, operated and maintained in strict accordance and adherence with the operating documentation and manuals for such product. Any expressed warranty, or similar representation of performance set forth in the operation documentation for media or resin incorporated into a product by the Manufacturer shall be void and unenforceable unless the feed water requirements set forth in the operating documentation for such product are unequivocally and strictly adhered to.

### **Limitations and Exclusions**

THIS WARRANTY AND REMEDIES DESCRIBED HEREIN AND HEREINABOVE ARE EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER WARRANTY OR REMEDIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR OTHER SIMILAR TYPES OF DAMAGES, FOR DAMAGES FOR THE LOSS OF PRODUCTION OR PROFITS, OR INJURY TO PERSON OR PROPERTY. NO PERSON HAS ANY AUTHORITY TO BIND THE MANUFACTURER TO OTHER THAN WHAT IS SET FORTH ABOVE.

THIS WARRANTY GIVES THE CUSTOMER SPECIFIC LEGAL RIGHTS AND THE CUSTOMER MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. THE PARTIES RECOGNIZE AND AGREE, THAT IN ALL RESPECTS THE LAWS OF THE STATE OF CALIFORNIA SHALL APPLY TO AND SHALL GOVERN ANY INTERPRETATION OR LEGAL SIGNIFICANCE OF THIS DOCUMENT.

NO WARRANTY OR OTHER LIABILITY OF THE MANUFACTURER TO CUSTOMER UNDER THIS AGREEMENT OR OTHERWISE WILL IN ANY EVENT EXCEED THE COST OF REPLACEMENT OF THE APPLICABLE MANUFACTURER PRODUCT, PART, OR ACCESSORY THAT IS SUBJECT TO ANY BREACH OF MANUFACTURER'S WARRANTY. MANUFACTURER WILL NOT BE LIABLE FOR ANY DAMAGE TO ANY PROPERTY OF CUSTOMER OR TO CUSTOMER'S CUSTOMERS FOR ANY CONSEQUENTIAL, INCIDENTAL, OR ECONOMIC LOSS OR COMMERCIAL DAMAGE WHATSOEVER. REMEDIES HEREIN PROVIDED ARE EXPRESSLY MADE THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY OR OTHER OBLIGATION HEREUNDER EXPRESS OR IMPLIED OR FROM THE OPERATION OF LAW.