

Instruction Manual

Reverse Osmosis Systems **CP / WMXL / WXL / VXL / HXL / HXXL / X**

For file reference, please record the following data:

Model No: _____

Serial No: _____

Installation Date: _____

Installation Location: _____

When ordering replacement parts for your Reverse Osmosis Systems or Accessory, please include the complete Model Number and Serial Number of your unit.

This manual includes the most common components and installation specifications. Please keep in mind that Water Tec of Tucson manufactures many units to customer specifications. If you do not find the information that you are looking for in this manual, please contact your local Water Tec dealer.

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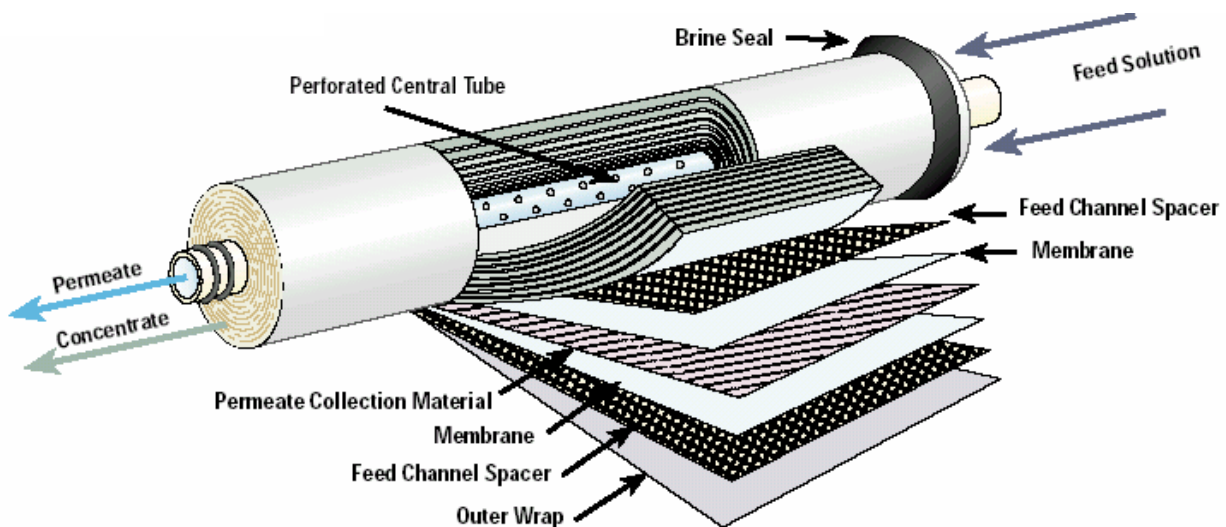
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INTRODUCTION TO REVERSE OSMOSIS

The application of reverse osmosis to the solution of problems in water treatment requires an understanding of the basic mechanisms involved in the process, the limitations of reverse osmosis and the pre-treatment requirements.

HOW REVERSE OSMOSIS WORKS

Reverse Osmosis (RO) is the process in which water is forced by pressure through a semi-permeable membrane. Water passes through the membrane while the dissolved and particulate materials are left behind. When pressure is applied to the concentrated solution, water is forced through the membrane from the concentrated side to the diluted side. The spiral membrane is constructed of one or more membrane envelopes wound around a perforated central tube. The permeate (product water) passes through the membrane into the envelope and spirals inward to the central tube for collection. The concentrate (waste water) passes through the membrane into the envelope and spirals outward to the outer wrap for collection.



The illustration above represents a simplified spiral-wound membrane element. Recovery can be as high as 90% and systems may be capable of chemical cleaning in place (CIP).

THE MEMBRANE

Reverse Osmosis utilizes the unique properties of a semi-permeable membrane to allow fluid to pass while restricting the flow of dissolved ionic material. With pressure applied to impure water on the side of such membrane materials, pure water will pass through, leaving most of the impurities behind. The rejection of the dissolved ionic material is a function of both molecular weight and ionic charge. For example, we can expect a nominal 90% rejection of sodium chloride, which means that the product water passing through the membrane will have a concentration of salt approximately one-tenth that of the feed water. The rejection of calcium carbonate (hardness) will be near 95%, while most metallic salts will be rejected at a rate of approximately 98% to 99%.

The rejection of non-ionic or organic material is primarily by mechanical filtration. Most substances with a molecular weight of over 100 will be completely rejected by an intact reverse osmosis membrane. Low molecular weight organics, such as formaldehyde or phenol, can pass freely through an R.O. membrane, as can most dissolved gasses. Oil, suspended solids and particulate matter are mechanically filtered, as are viruses, bacteria, pyrogen, and larger organic molecules.

To carry the rejected material away from the membrane surface, the feed side of the R.O. membrane is continually flushed with an excess flow, usually two to five times the product flow. This avoids clogging of the membrane surface and reduces the tendency toward scale formation.

FACTORS THAT AFFECT THE OPERATION AND THE USEFUL LIFE OF THE MEMBRANE:

There are five main factors that affect a reverse osmosis membrane:

1. PRESSURE: Excessive pressure tends to deform or compact the membrane. The compaction causes the membrane to become less porous, thus decreasing the amount of product water.
2. HYDROLYSIS: Hydrolysis is the effect of chemicals in the feed water on the membrane. In general, this happens when the water temperature is high and the pH is below 2.5 or above 7. For optimum life of the membrane, the pH should be between 5 and 6.
3. BACTERIA: Bacteria, if allowed to grow on the membrane, will digest the top layer of the membrane and reduce the ability of the membrane to reject salt.
4. TEMPERATURE: Temperatures above 95°F are generally avoided because of the problems in the membrane support structures and the accelerated compaction and hydrolysis rates. Membrane production rates will go up with higher temperatures and down with lower temperatures.
5. SURFACE COATING OR FOULING: Surface Coating or Fouling is one of the most common problems with reverse osmosis. It is the salts (calcium carbonate, etc.) that precipitate on the membrane. These salts plug the pores and channels, reducing the water production rate.

EFFECTS OF TEMPERATURE ON THE REVERSE OSMOSIS UNITS:

In system design, it is very important to consider incoming water temperature. The units are rated for a product flow at 77°F (25°C). The product flow reduces with lower temperatures. On an average, membranes will lose about 1.8% production for every degree below 77°F.

SOME COMMON TERMS AND DEFINITIONS RELATED TO REVERSE OSMOSIS:

FEED WATER - The raw water introduced into the R.O. modules.

PERMEATE WATER - The pure water produced by the R.O. membranes.

CONCENTRATE WATER - The wastewater that will not pass through the membrane and is directed to the drain.

MEMBRANE - Commonly referred to as the R.O. membrane without the membrane housing.

MODULE - Referred to as the complete membrane in the membrane housing.

G.P.D. - (gallons per day) This is the standard at which R.O. systems are sized. Example: a 1,000 GPD R.O. system will produce 1,000 gallons of pure water in a 24-hour period. Systems are generally sized for maximum amount of water used in a 24-hour period.

PPM - (parts per million) The method by which the quality of the R.O. products water is measured.

PERCENT RECOVERY- The amount of water that is recovered by the R.O. membranes. Example: if you introduce 100 gallons of feed water into the membrane and you produce 60 gallons of product water and 40 gallons of reject water, this is known as 60% recovery.

PERCENT REJECTION - The amount of salts or chemicals rejected by the R.O. membranes.

THE REVERSE OSMOSIS SYSTEM

The reverse osmosis unit is composed of two major parts: the high-pressure pump (200 PSI max) and the membranes. The initial purified water production rate is measured at 200 PSI.

The system is carefully designed to make certain that minimum flow rates within the membranes are maintained. This factor is important to the efficient operation of the membrane. The reason for this is as follows: as pure water passes through the membrane under pressure, it leaves behind, at the membrane surface, a very high percentage of dissolved substances originally present in the supply water. This "Boundary Layer" becomes more and more concentrated through the system. The membrane tends to reject a constant percentage of "what it sees." For example, if the water in contact with the membrane is 100 PPM, then the purified water going through the membrane at this point will be about 5 PPM (5%). At a location farther into the membrane, the water in contact with the membrane surface could be at 500 PPM. The purified water going through the membrane at that point will be about 25 PPM (5%). By maintaining sufficient feed flow movement around the membrane, suspended matter tends to be carried out of the system more effectively.

It should be noted, as discussed previously, that the less we concentrate the supply water in the reverse osmosis unit, the better the product water quality is. In other words, the lower the operation ratio between water recovery and reject water, the better the product water quality. For some applications, the economic benefits of better product water quality far outweigh the extra cost of the reject water. An example of this is where reverse osmosis water is to be subsequently passed through a de-ionization column for higher purity water. It appears that there are longer-term benefits to be gained by operating at lower percent water recovery, particularly in reducing maintenance to the systems, and minimizing precipitation problems.

It is important to realize that the product water from a reverse osmosis system is delivered essentially at atmospheric pressure, usually to a vented storage tank. In general, the unit cannot be operated by opening and closing a valve at the product water line, unless a special pressure relief is provided. The reason for this is that the high pressure in the system drives the water across the membrane surface. If, for some reason, the product line were closed while the system was operating, the pressure would build up. The product side of the system is not strong enough to withstand these high pressures and would fail, causing irreversible damage to the membrane element! In reality, the plastic tubing on the permeate side normally would not tolerate such high pressure.

Most standard membranes are capable of withstanding 400 PSI of "forward" pressure, i.e., from the high-pressure side across the membrane surface to the product water side. **This system is designed for a maximum of 200 PSI unless otherwise specified on the unit itself.** However, the product water side cannot tolerate "back" pressure, i.e., in the direction from the product water side to the supply water side. The maximum backpressure should be no more than 3 or 4 feet head of water (5 to 6 PSI). In order to prevent damage to the membranes from this source, a check valve is placed, in pressure tank applications, on the product water line, so that when the system shuts down, backpressure is effectively sealed off. **This safety device should never be bypassed.**

When a reverse osmosis system is shut down, the supply water is in a "resting" state over the membranes, i.e., almost no pressure across the membranes. During this time water may bleed through the product side. This water tends to have about the same mineral content as the supply water. As a result, the first water sample obtained after start-up is higher in mineral content, until the system flushes out this water after a few seconds.

The quality of purified water produced by reverse osmosis is roughly a constant percentage of the feed water. For example: when the feed water is entering at 50 PPM, the purified water may be between 2 to 5 PPM (90-95% rejection of dissolved minerals). When the feed water is entering at 500 PPM, the product water would be from 25-50 PPM (90-95% rejection of dissolved minerals). Usually a conductivity meter or "total dissolved solids" meter is used to measure the mineral content of the product water.

PURIFIED WATER STORAGE AND DELIVERY SYSTEM

As previously discussed the R.O. product water is almost always delivered to an atmospheric storage tank. Normally, such a storage tank is sized to provide sufficient water to cope with the number of hours of continuous use, e.g., 8 hours, and 16 hours. In an exactly balanced system, the reverse osmosis unit would be running continuously. However, in practice, demand fluctuates. A liquid level switch, which is provided with the R.O. unit, should be installed at the full line of the tank. The liquid level switch turns off the R.O. when the tank is full. This way the unit only runs when the tank is being emptied. Other types and styles of liquid level switches are available from your authorized Water Tec distributor.

The purified water in the storage tank is distributed to the use points by means of a moderate pressure high capacity centrifugal pump. This pump can be provided with a demand pressure switch, which turns on the pump when it senses a drop in pressure (opening a faucet at the user point). Alternatively, it can be operated continuously, with a pressure relief system to recirculate water back to the tank, when there is no demand. Such distribution systems give very satisfactory service, because it avoids the detrimental repetitive on-off condition for the pump motor. The pumps must never be allowed to run dry, since this will rapidly deteriorate the shaft seal and cause the seal to leak. To prevent this the storage tank should be fitted with a low level switch, which shuts down the distribution pump if the water level in the tank gets dangerously low.

REVERSE OSMOSIS COMPONENT IDENTIFICATION

1. PRE-FILTER PRESSURE GAUGE
0-100 PSI liquid filled panel mount gauge. Standard on all units 30,000 GPD and above. On smaller units this gauge is an option. Located on the front panel. This gauge measures the water pressure in PSI of the incoming feed water before the Pre-Filter on the R.O. A large pressure difference between the Pre-filter Pressure Gauge and the Incoming Pressure Gauge indicates that the filter(s) need to be inspected and possibly changed.
2. INCOMING PRESSURE GAUGE
0-100 PSI liquid filled panel mount gauge. Standard on all units 1500 GPD and larger. Located on the front panel. This gauge measures the water pressure in PSI after the pre-filter(s). (*Minimum pressure: 20 PSI*)
3. SYSTEM PRESSURE GAUGE
0-300 PSI liquid filled panel mount gauge. Standard on all units. Located on the front panel or on pump discharge, this gauge measures the water pressure in PSI that is applied across the membrane.
(*Maximum operating pressure: 180-200 PSI*)

The pressure to this gauge can be adjusted in two ways:

By turning the Waste Valve (5) clockwise the pressure will increase; counter clockwise will decrease pressure.



CAUTION: Do not close this valve completely.

Or

By adjusting the Recycle Valve (8) located on the front control panel, near the Waste Valve. Proper recovery must be set according to unit's application.

4. PERMEATE PRESSURE GAUGE
0-100 PSI liquid filled panel mount gauge. Standard on all units 30,000 GPD and above. On smaller units this gauge is an option. Located on the front panel. This gauge measures the water pressure in PSI after the membranes and before the storage tank. This gauge should be watched closely as a dramatic pressure drop may indicate membrane fouling or scaling.
5. CONCENTRATE FLOW METER
Located on the front panel, this meter is calibrated in gallons per minute. Its purpose is to measure the amount of wastewater so the proper ratio of waste / product water recovery can be set.
6. PERMEATE FLOW METER
Located on the front panel, its purpose is to measure the amount of product water in gallons per minute.
7. RECYCLE FLOW METER
Optional for most units. It would be located on the front panel. Its purpose is to measure the amount of water recycled back into the feed water in gallons per minute.
8. REVERSE OSMOSIS MODULE
This consists of the membrane housing and membrane element. Mounted as follows, depending on the unit: Horizontally on the back of a compact unit / Vertically on the front of a fiberglass wall mount unit / Horizontally on the front of a metal wall mount unit / Vertically on the side(s) of the vertical frame unit / Horizontally on the back of the horizontal frame unit.

9. WASTE VALVE

This valve is located on the front panel of units 1500 GPD and larger, and on other various locations of smaller units. Ex. the valve is located on the membrane housing of the compact unit. Its purpose is to meter or restrict the flow of concentrate water exiting the module, thus creating the necessary pressure inside the module so that the raw water will be forced through the membrane, creating the effect of reverse osmosis.

Turning the knob of the valve controls the waste / product water ratio. Turning clockwise will increase the pressure setting within the module and reduce the amount of wastewater. Turning counter clockwise will reduce the pressure in the module and increase the wastewater. If this valve cannot attain a desired pressure / waste / product ratio, then set the desired waste / product ratio at a lower pressure setting and adjust the pressure with the recycle valve.



CAUTION: The Waste Valve should never be closed completely.

CAUTION: Do not exceed the recommended 200 PSI setting.

10. RECYCLE VALVE

Located on front panel of 1500 GPD and larger, this valve takes a portion of the wastewater from the reverse osmosis module and feeds it back into the feed side of the high-pressure pump. It is used to fine tune and adjust the pressure of the high-pressure pump.

11. PRE-FILTER

This filter will vary in size and quantity depending on the size of the R.O. You must open the housing in order to determine if you have a single cartridge pre-filter or a multi-cartridge pre-filter. The standard micron rating for the R.O. pre-filter is 5 microns. This filter is used to catch any particles that may have been missed by the Pre-Treatment or any particles that may be released by faulty Pre-Treatment. Leaving a dirty filter cartridge in the R.O. can cause pressure loss and inefficient pre-filtration. See page 10 for the standard filtration series of the Compact Unit.



WARNING: At no time should this filter be used as the sole source of Pre-Treatment for the R.O.

12. HIGH PRESSURE PUMP

This pump is responsible for creating the necessary high pressure needed for efficient reverse osmosis operation. Pressure is adjusted by the Waste Valve and the Recycle Valve.



CAUTION: Do not run pump dry.

CAUTION: Do not exceed the maximum output pressure (200 PSI)

13. MOTOR CONTACTOR

Located in the electrical system control box. A heavy duty rated contactor to start and stop the high-pressure pump motor.

14. ON-OFF SWITCH

Located on the electrical system control box on all models except the compact. This switch controls the electrical supply to the RO unit.

15. LOW PRESSURE SWITCH

Located on the electrical system control box. This switch is fed from the feed water before going into the high-pressure pump. Should the feed water drop below 10 PSI, the contacts in this switch would open and shut down the RO unit. When the feed water pressure returns, the RO unit will automatically restart. This switch is adjustable from 0-90 PSI. Recommended setting is 12-15 PSI.



CAUTION: Do not bypass this switch.

16. TDS PANEL MOUNT METER

Located on the electrical system control box. Total Dissolved Solids Meter. Standard on all units 30,000 GPD and larger. This is an option for units smaller than 30,000 GPD, and larger than 1500 GPD. All X frame units include a dual switch to read the pre-membrane TDS and the post-membrane TDS.

17. TIME DELAY

Located inside of electrical system control box. The time delay is adjustable from 6-30 seconds. Its purpose is threefold:

- 1) When the on-off switch is turned to "on" the time delay starts after the feed water pressure is sensed at the low pressure switch and allows water to reach the high pressure pump before it turns on.
- 2) In the event of a momentary low-pressure condition, the R.O. unit will not cycle. The pump will turn off and remain off until adequate pressure is restored.
- 3) If a true low feed condition should exist, the time delay will allow the existing pressure in the system to bleed off and allow the low-pressure switch to activate before the R.O. unit cycles. Recommended setting is 15-30 seconds.

18. FUSE

Located on the electrical system control box. In units 30,000 GPD and above the fuse is located inside the electrical system control box. Inlet line voltage routed through a 5 amp fuse and a 15 amp fuse for compacts.

19. LIQUID LEVEL CONTROL RELAY AND SWITCH

Connection leads are outside of the control box on the top or on the side. Its purpose is to automatically start and stop the R.O. unit by a signal from the product water storage tank switch. This switch is included with the R.O. unit. Many types and styles of liquid level switches are available at an extra cost.

NOTE: On single level control systems float operates off of the time delay relay.

Depending on the size of each piece of equipment, the system may have a solenoid valve or an electronically actuated ball valve.

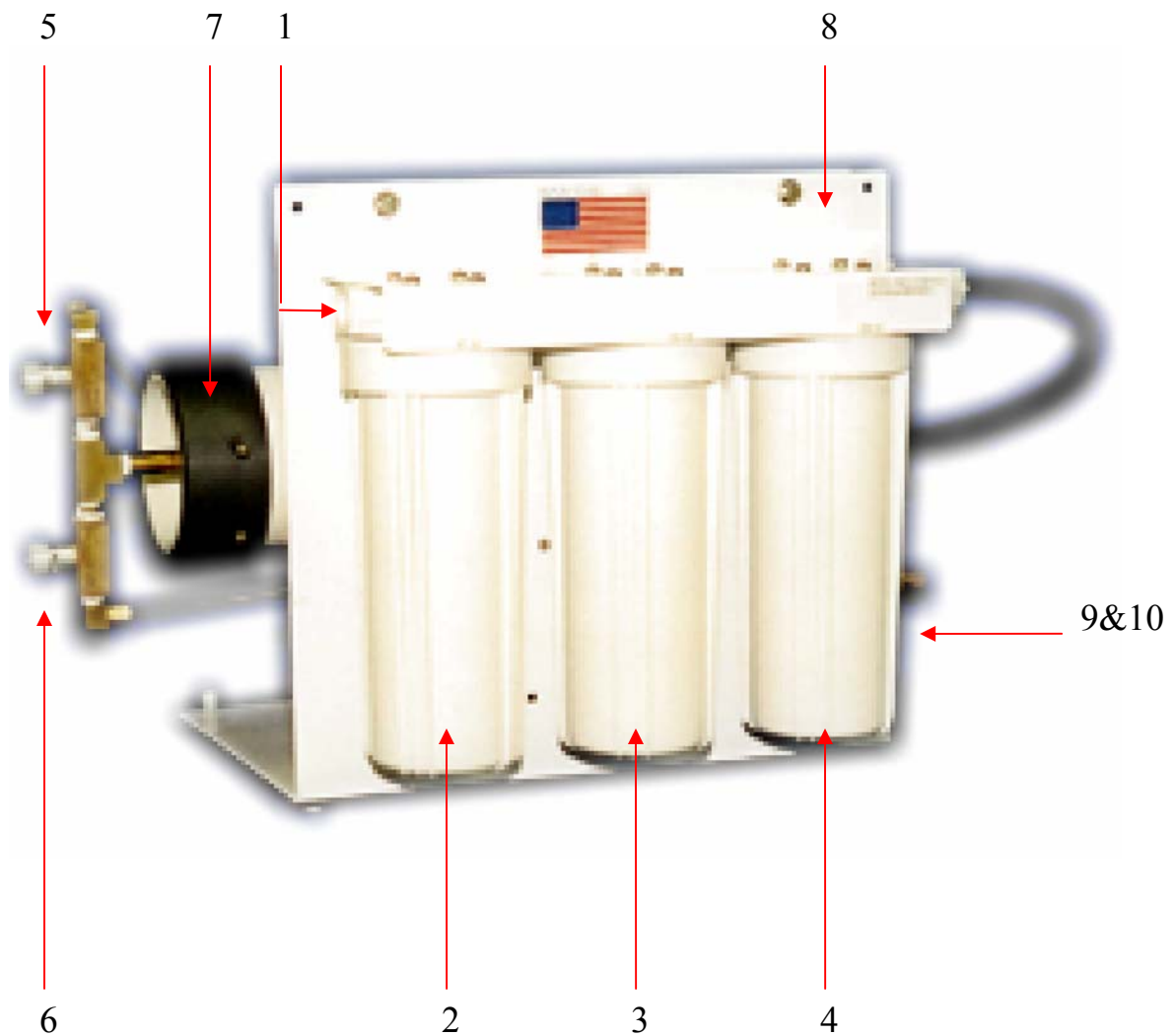
20a. INLET SOLENOID VALVE

This is a normally closed solenoid valve. This valve is located on the feed side of the pressure pump. Its purpose is to shut off the feed supply when the unit is in the non-operating mode. If electrical power should fail this valve will close, thus shutting off the feed water.

20b. ELECTRIC BALL VALVE

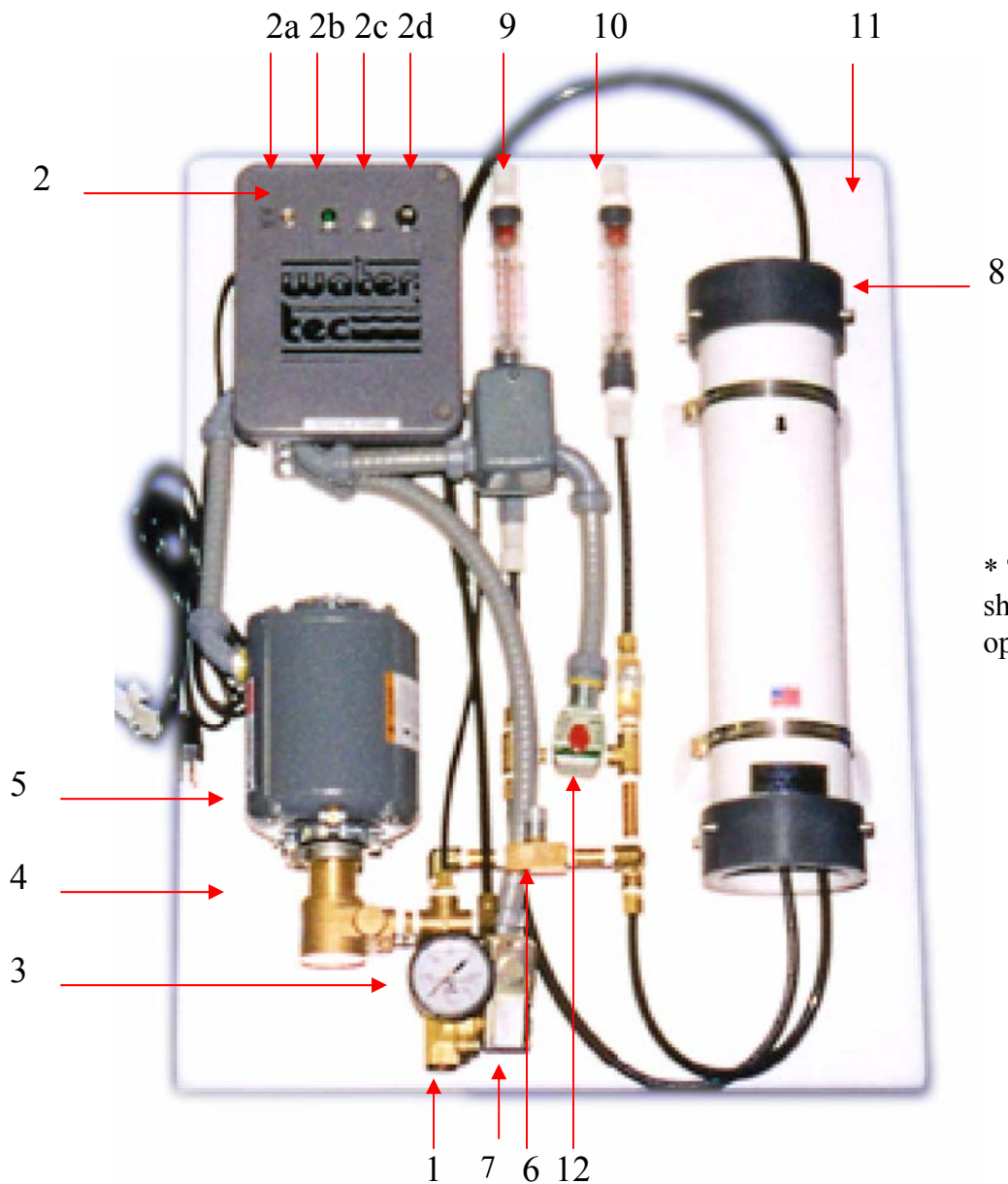
This is a normally closed electric ball valve. This valve is located on the feed side of the pressure pump. Its purpose is to shut off the feed supply when the unit is in the non-operating mode. If electric power should fail this valve will not close.

GENERAL SYSTEM DIAGRAMS (CP)



1. Incoming Feed Water
2. #10 PS05-10 Pre-Filter
3. #10 C1 Pre-Filter
4. #10 CB10-10 Pre-Filter
5. Recycle Needle Valve
6. Waste Needle Valve
7. Module – R.O. membrane and Housing
8. Powder Coated Steel Frame
9. Electrical Control Box (not shown)
10. Rotary Vane Pump and Motor (not shown)

GENERAL SYSTEMS DIAGRAM (WM)

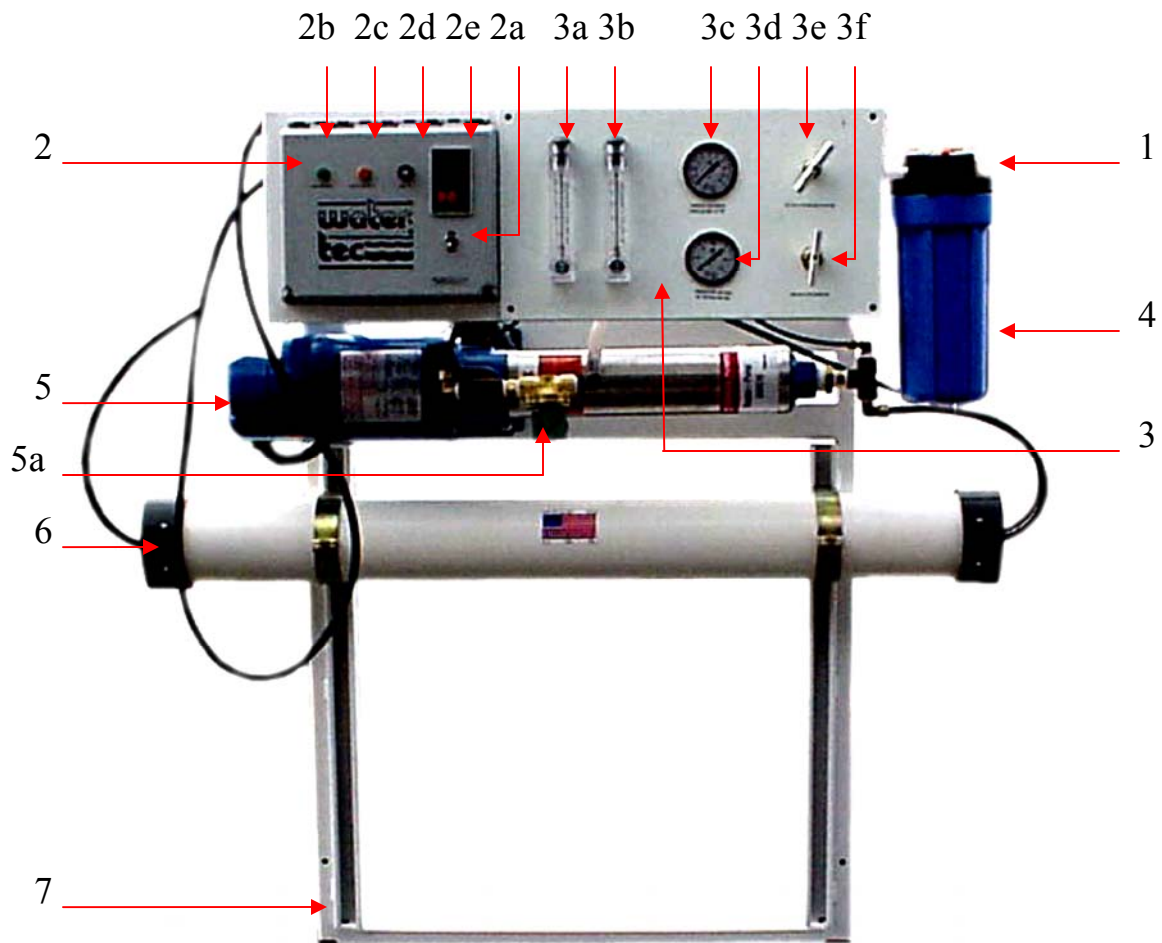


* This photo is shown with options.

1. Incoming Feed Water
(Pre-Filter supplied, but not shown)
2. Electrical Control Box
 - 2a: On/Off Switch
 - 2b: Power On Indicator
 - 2c: Low Pressure Indicator
 - 2d: 5amp Fuse
3. System Pressure Gauge
4. Motor

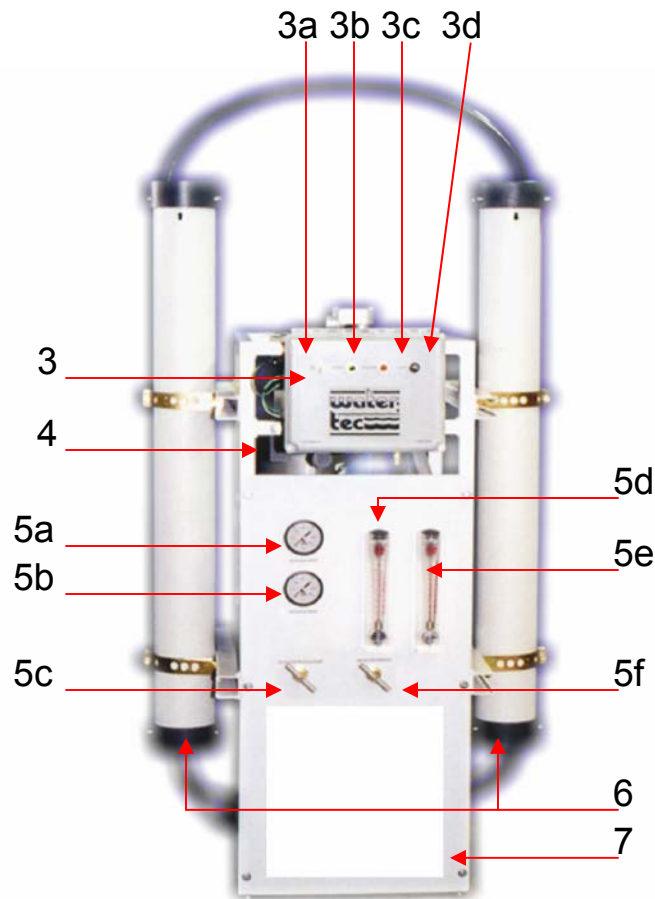
5. Rotary Vane Pump
6. Recycle Needle Valve
7. Solenoid Valve
8. Module – R.O. Membrane & Housing
9. Permeate Flow Meter
10. Concentrate Flow Meter
11. Fiberglass Panel/Frame
12. Pressure Tank (Optional)

GENERAL SYSTEM DIAGRAM (WMXL)



- | | |
|-------------------------------|-----------------------------------|
| 1. Incoming Feed Water | 3d. System Pressure Gauge |
| 2. Electrical Control Box | 3e. Recycle Control Valve |
| 2a. On/Off Switch | 3f. Waste Control Valve |
| 2b. Power On Indicator | 4. Single Cartridge Pre-Filter |
| 2c. Low Pressure Indicator | 5. High Pressure Multistage Pump |
| 2d. 5amp Fuse | 5a. Solenoid Valve |
| 2e. OPTION: Digital TDS Meter | |
| 3. Control Panel | 6. Module-R.O. Membrane & Housing |
| 3a. Permeate Flow Meter | 7. Powder Coated Steel Frame |
| 3b. Concentrate Flow Meter | |
| 3c. Incoming Pressure Gauge | |

GENERAL SYSTEM DIAGRAM (VXL)



1&2. Incoming Feed Water and
Pre-filter (not shown)

3. Electrical Control Box
3a. On/Off Switch
3b. Power On Indicator
3c. Low Pressure Indicator
3d. 5amp Fuse

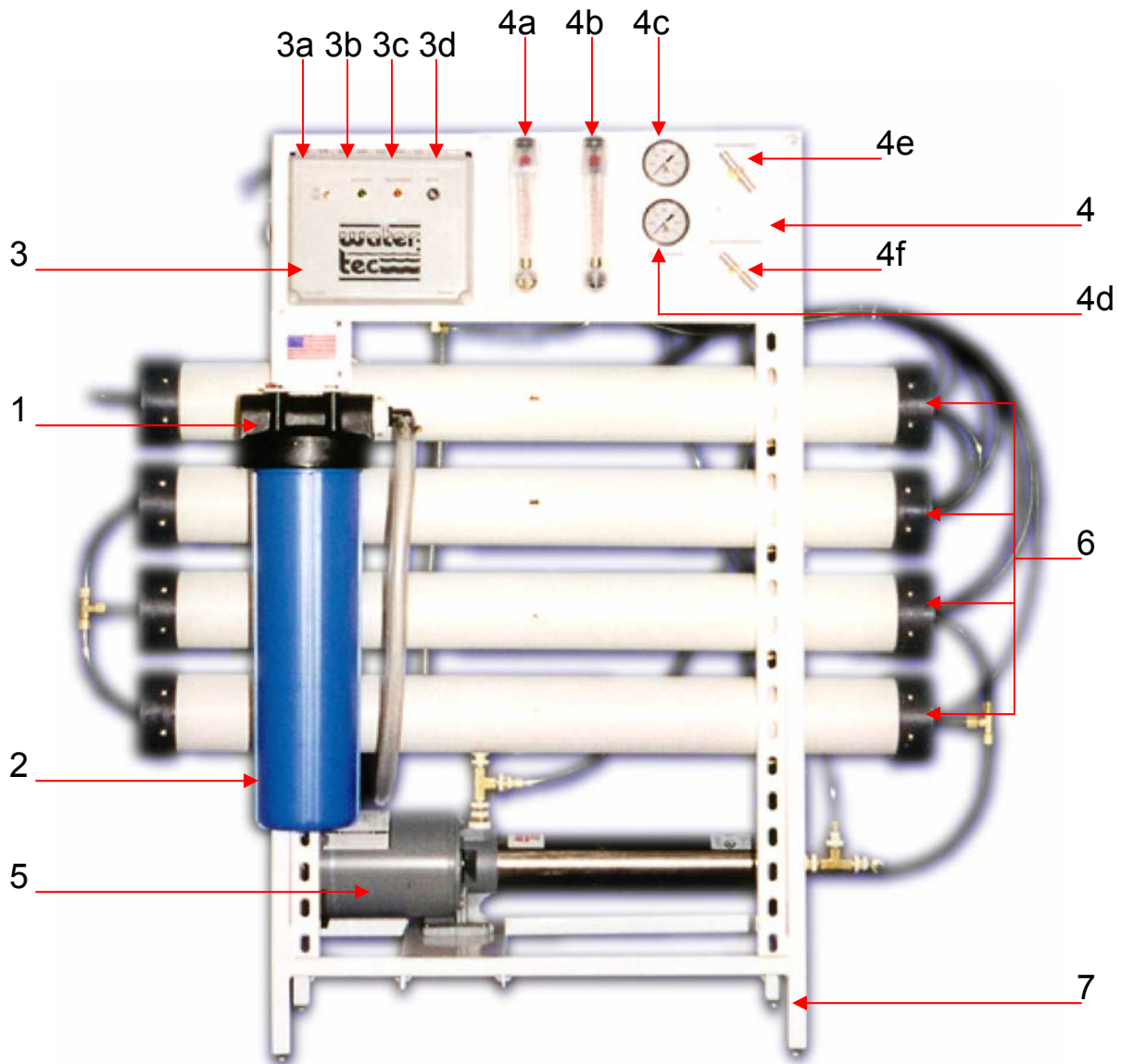
4. High Pressure Pump and Solenoid

5. Control Panel
5a. Incoming Pressure Gauge
5b. System Pressure Gauge
5c. Waste Control Valve
5d. Recycle Control Valve
5e. Concentrate Flow Meter
5f. Permeate Flow Meter

6. Module-R.O. Membrane Housing

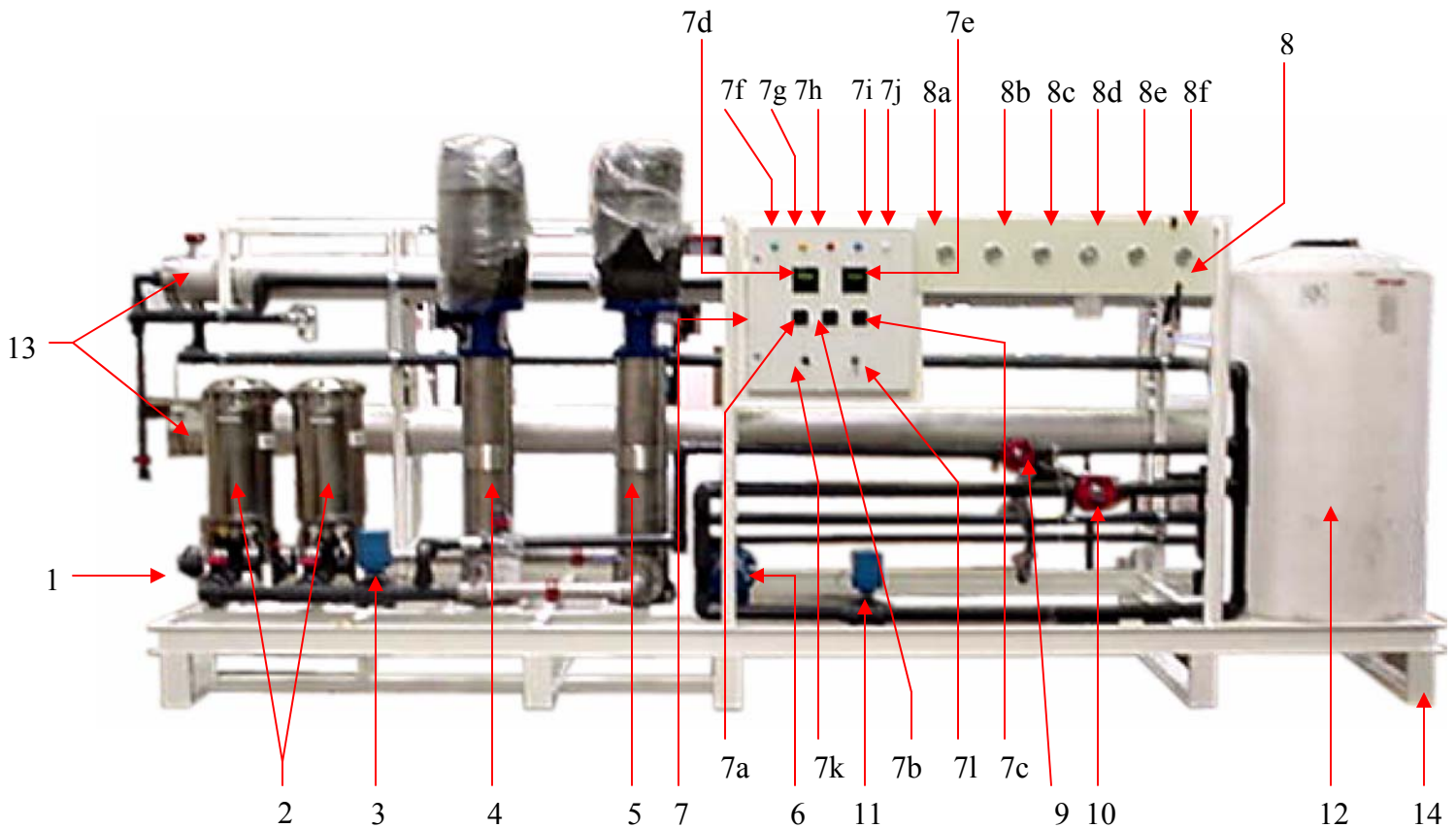
7. Powder Coated Steel Frame

GENERAL SYSTEM DIAGRAM (HXL & HXXL)



- | | |
|--------------------------------|------------------------------------|
| 1. Incoming Feed Water | 4c. Incoming Pressure Gauge |
| 2. Single Cartridge Pre-Filter | 4d. System Pressure Gauge |
| 3. Electrical Control Box | 4e. Recycle Control Valve |
| 3a. On/Off Switch | 4f. Waste Control Valve |
| 3b. Power On Indicator | |
| 3c. Low Pressure Indicator | |
| 3d. 5amp Fuse | |
| 4. Control Panel | 5. High Pressure Pump and Solenoid |
| 4a. Permeate Flow Meter | 6. Module-R.O. Membrane & Housing |
| 4b. Concentrate Flow Meter | The HXXL frame has 80" housings |
| | containing two membranes per |
| | housing. |
| | 7. Powder Coated Steel Frame |

GENERAL SYSTEM DIAGRAM (X)



* Equipment Pictured Shows Many Options Available

- | | |
|---|---|
| 1. Incoming feed water | 7k. Power Switch |
| 2. Pre-Filter 1 and 2 | 7l. Clean/Auto run Keyed Switch |
| 3. Inlet Ball Valve | |
| 4. Pump A | 8. Control Panel |
| 5. Pump B (standard equipment has 1 pump) | 8a. Pre Filter Gauge |
| 6. Pump C (cleaning pump) OPTIONAL | 8b. Post Filter Gauge |
| 7. Control Box | 8c. Pump "A" Pressure Gauge |
| 7a. Pump "A" Hour Meter (option) | 8d. Pump "B" Pressure Gauge |
| 7b. Pump "B" Hour Meter (option) | 8e. Inter Mediate Membrane Pressure Gauge |
| 7c. Pump "C" Hour Meter (option) | 8f. Post Membrane Pressure Gauge |
| 7d. Permeate/Concentrate Flow Meter | |
| 7e. Recycle Flow Meter | 9. Recirculation Valve |
| 7f. Power Light | 10. Concentrate Valve |
| 7g. Low Pressure | 11. Fast Flush Ball Valve (OPTIONAL) |
| 7h. Over Pressure | 12. Chemical Tank (OPTIONAL) |
| 7i. Fast Flush | 13. Module – Membranes and Housing |
| 7j. Cleaning (option) | 14. Powder Coated Steel Frame |

REVERSE OSMOSIS SET-UP SPECIFICATIONS

Inlet Water Supply

This is the inlet to the pre-filter. Sizing can range from ½" to 3" depending on each piece of equipment. General sizing is as follows:

CP Series: 150-800GPD – ½"

WMXL / VXL / HXL Series: 1500-4000 GPD – ¾"

VXL / HXL Series: 10000-12000 – 1 ½"

HXXL Series: 10500-24000 – (2) 1 ½"

X Series: 30000 and larger – 2 –3"

WMXL / VXL / HXL Series: 4500-10000 GPD – 1"

HXL Series: 12000-18000 GPD – (2) 1 ½"

HXXL Series: 26000-28000 GPD – (3) 1 ½"

The inlet pipe size should never be smaller than the equipment inlet.

Product Water Outlet

On smaller systems without flow meters, the permeate is always the center outlet of membrane housing end cap. On most other units the permeate outlet is the outlet of the Product Flow Meter. The location of the permeate outlet on units 30000 GPD or larger is on the right side of the unit.

Waste Water Outlet

On smaller systems without flow meters, reject outlet is the outside port of membrane housing, on opposite end from the raw water high-pressure feed. On most other units the concentrate outlet is the outlet of the Waste Flow Meter. The location of the concentrate outlet on units 30000 GPD or larger is on the right side of the unit.

Electrical Connections and Voltages

All CP and WM Series standard units are 110v/60hz. They have a standard 110v 3 prong plug. WMXL, VXL, and HXL Series units are available in 110v/60hz or 220v/60hz (single or three phase). Please check your electrical requirements carefully. The equipment warranty does not cover burnouts or damage to electrical components due to electrical overcharge or incorrect wiring. The 110v/60hz single-phase units have a standard 110v 3 prong plug. Any 220v/hz or 460v/hz units must be hard wired. HXXL Series units are standard 220v/60hz three-phase. X Series units are available in 220v/60hz three-phase or 460v/60hz three-phase. All 460v/60hz X Series units also require 110v/60hz circuit to be run to the electrical control box. (All systems must be installed to local codes)

System Control Box:

All Water Tec Commercial / Industrial Reverse Osmosis units use 110v control voltage in the electrical control circuit. All 220v systems are converted internally to 110v. 460v units require 110v and 460v hard wired circuits.

Liquid Level Control Connections and Switch

Wiring connections for the Liquid Level Switch are located directly on top or on the side of the electrical control box. The two red wires are connected one to one on the wires from the Liquid Level Switch. When the Liquid Level switch is closed the R.O. will turn on. When the Liquid Level Switch is open the R.O. will shut down.

REVERSE OSMOSIS SET-UP, START-UP AND TESTING PROCEDURES

It is very important to make sure you are aware of all plumbing and electrical codes in your area before you start the installation or set-up of these systems.

As always, please follow proper plumbing and electrical safety procedures while installing and operating this unit.

Set- Up

- ❑ 1. Install the pre-filter (s) into the housing.
- ❑ 2. Install the membrane (s) into the housing. The housings will have an arrow showing direction of flow. The brine seal should always be installed on the same side as the incoming water. See page 18.
- ❑ 3. Open the Waste and Recycle Valves until they are fully open.
- ❑ 4. Connect all the plumbing. Supply / Permeate / Concentrate. Do not open incoming water supply yet.
- ❑ 5. Connect all the electrical connections including the Liquid Level Switch.

Start- Up

- ❑ 1. Be sure all the pre-treatment is operating properly.
- ❑ 2. Turn the Power Switch to On. The Power On Indicator and the Low Pressure Indicator will light.
- ❑ 3. All the pressure gauges should still read 0.
- ❑ 4. Turn on the Incoming Feed Water.
- ❑ 5. The Incoming Pressure Gauge should rise above 20 PSI. When the incoming pressure reaches approximately 20 PSI the Low Pressure Indicator will turn off.
- ❑ 6. After a delay of 15-30 seconds the pump will turn on. After the pump turns on the System Pressure Gauge will start to rise.



NEVER allow the System Pressure Gauge to exceed 200 PSI unless another pressure has been indicated directly on the System Control Panel.

- ❑ 7. Adjust the Waste Valve by closing it slowly, until the Product and Waste Flow Meters show the same values in GPM. If the unit is not supplied with flow meters, product and waste flow rates must be checked manually.



NEVER completely close this valve.

- ❑ 8. Adjust the Recycle Valve by closing it slowly until the System Pressure Gauge shows approximately 190-200 PSI.



NEVER completely close this valve.

- ❑ 9. The reverse osmosis unit is now in operation. Check for leaks. Product water PPM will take about 20 minutes to reach optimum quality. Provided that pre-treatment is in operation

Initial Testing

After about 30 minutes the incoming and product water should be tested with a TDS Meter. There should be no less than a 90% rejection. If the rejection is lower than 90% double check the membrane installation and the brine seal direction consists of pre-treatment

After the quality test you should also test all the electrical equipment. Disconnect the Liquid Level Switch wires and look for these four things:

The pump should automatically shut down.

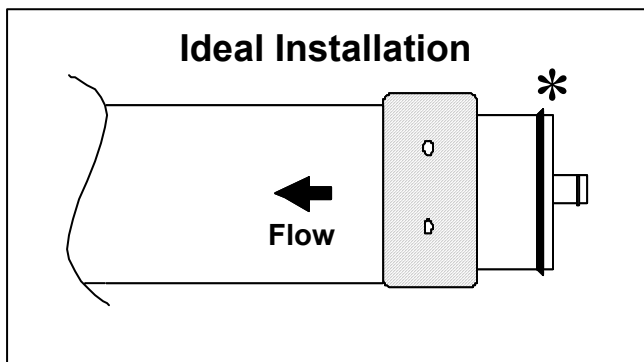
There should be continuous flow from the unit to product and waste as the unit drains.

After the short drain out period the flow should completely stop.

The Power On Indicator should remain on.

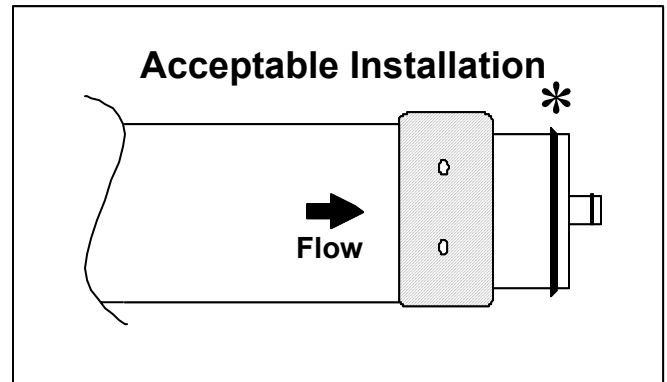
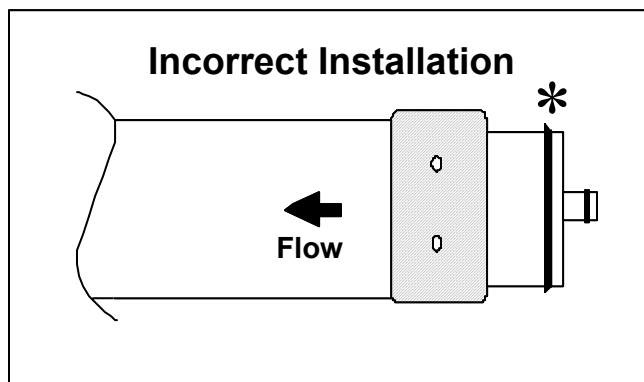
Reconnect the Liquid Level Switch wires. The pump should automatically turn on. Pressure should increase and water should start to flow to product and waste.

MEMBRANE INSTALLATION



The brine seal should always be installed on the same side as the incoming water.

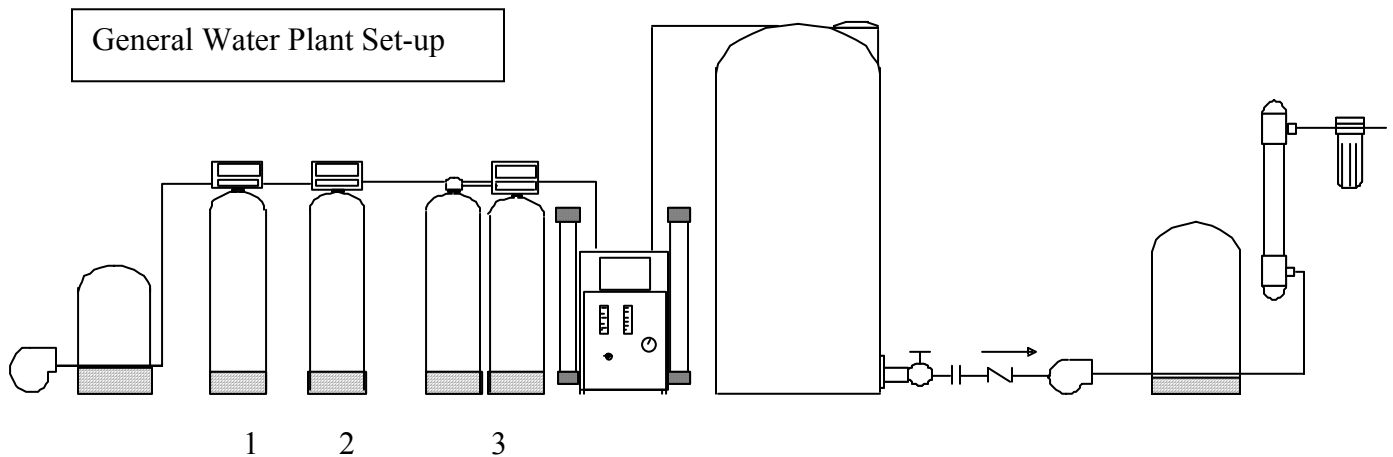
* Note the direction of the brine seal.



TROUBLE SHOOTING GUIDE

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>SOLUTION</u>
RO unit will not start	No electrical power to control circuit On/Off Switch Time delay not operating Fuse Coil in magnetic motor starter burned out Liquid Level Control Relay Pump motor Low Pressure	Check power supply Check power / replace Check power / replace Check / replace Check / replace motor or coil Check for power Check / replace
Low feed pressure	Incoming feed water supply may be off Incoming feed water supply line may be Restricted / under sized Upstream pretreatment Pre-Filter may be clogged / dirty Low Pressure Switch	Check Check / replace line if kinked Check all pretreatment Check / replace Check for power / replace
No high pressure	Reject valve open too far Reject bypass may be open High pressure gauge may be broken Restriction in tubing to gauge Pump impellers may be worn Low water volume to pump	Check / adjust Check / adjust Check / replace Check / replace / replace if kinked Check / replace impellers or pump Check
No waste water	Waste Valve may be closed Clogged drain line	Check / open / adjust Check / replace / replace if kinked
No product water or low Product water	Pump pressure may be too low Waste valve open too far Membranes may be fouled / dirty Water temperature may be low	Check / adjust Check / adjust Check / clean / replace Check
High TDS in permeate water	TDS monitor or probe Low pump pressure Membranes may be clogged / dirty	Check / adjust / replace Check / adjust Check / clean / replace

REVERSE OSMOSIS GENERAL PRETREATMENT



These are standard pieces of equipment necessary to help your reverse osmosis operate correctly. Individual circumstances, configurations and the type of system will determine if all the above equipment is necessary, if more is necessary or if less can be used.

1. **Automatic backwashing sediment filter**

This filter should be used in areas with higher sediment content. Dirty water can clog the pre-filter of the R.O. causing an incoming pressure drop.

2. **Automatic backwashing carbon filter**

The reverse osmosis unit CANNOT tolerate chlorine. It is very important to properly maintain the carbon unit. Doing so maintains the life expectancy of your membranes.

3. **Twin alternating water softener**

Fouling and scaling on the membrane is one of the main reasons a water softener is recommended before an R.O. It is always best to use a twin alternating unit in order to ensure continuous soft water.

Notes.



MEMBER

Manufactured with pride by:

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