

LP-Series



LP-700 PICTURED WITH
OPTIONAL FRONT PANEL



LP-700 PICTURED WITH
OPTIONAL FRONT PANEL AND
10" FILTER HOUSINGS



REVERSE OSMOSIS
SYSTEM

USER MANUAL

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Your LP-Series Reverse Osmosis System is a durable piece of equipment which, with proper care, will last for many years. This User 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 feedwater conditions change, please contact your local dealer or distributor to determine the proper recovery for your application.

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

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.

PRIOR TO OPERATING OR SERVICING THE REVERSE OSMOSIS SYSTEM, THIS USER 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.

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

SAFETY AND PRECAUTIONS

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



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.



ELECTRICAL HAZARD: INDICATES STATEMENTS THAT ARE USED TO IDENTIFY HIGH-VOLTAGE AND POTENTIAL SHOCK / ELECTROCUTION.

STATEMENTS IN BOLD AND ALL CAPITALS ARE ADVISORY OR INFORMATIONAL STATEMENTS OF PARTICULAR IMPORTANCE TO THE HEADING UNDER WHICH THEY ARE FOUND.



DO NOT USE WHERE THE WATER IS MICROBIOLOGICALLY UNSAFE OR OF UNKNOWN QUALITY WITHOUT ADEQUATE DISINFECTION BEFORE OR AFTER THE SYSTEM.



ALWAYS TURN OFF THE UNIT, SHUT OFF THE FEEDWATER, RELIEVE PRESSURE, AND DISCONNECT THE ELECTRICAL POWER BEFORE WORKING ON THE UNIT.



PRE-TREATMENT MUST BE SUFFICIENT TO ELIMINATE CHEMICALS, ORGANICS OR INORGANICS THAT COULD ATTACK THE MEMBRANE MATERIAL.



DO NOT OPERATE THE SYSTEM WITH INSUFFICIENT FEED FLOW. NEVER ALLOW THE PUMP TO RUN DRY.



NEVER ALLOW THE UNIT TO FREEZE OR OPERATE WITH A FEEDWATER TEMPERATURE ABOVE 85°F.



DO NOT PERMIT CHLORINE TO BE PRESENT IN THE FEED WATER.

SAFETY AND PRECAUTIONS



DO NOT SHUT DOWN THE SYSTEM FOR EXTENDED PERIODS. IT IS BEST TO RUN THE SYSTEM AS MUCH AS POSSIBLE ON A CONTINUOUS BASIS.



ELECTRICAL INSTALLATION SHOULD BE DONE BY QUALIFIED, TRAINED ELECTRICIANS. INSTALLATION SHOULD BE TO LOCAL CODES.

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 or pressure.
- Operate the pump dry.



FEED WATER AND OPERATION SPECIFICATIONS

Nothing has a greater effect on a reverse osmosis system than the feed water quality. 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. Before starting the RO system it is strongly suggested to obtain an up to date water analysis of the water to be treated.



IT IS VERY IMPORTANT TO MEET THE MINIMUM FEED WATER AND OPERATING REQUIREMENTS OUTLINED IN THIS MANUAL. FAILURE TO DO SO WILL CAUSE DAMAGE OR FAILURE OF THE SYSTEM COMPONENTS AND MEMBRANES. DAMAGE TO THE SYSTEM DUE TO OPERATION OUTSIDE OF THE SPECIFICATIONS OUTLINED IN THIS MANUAL WILL VOID THE MANUFACTURERS WARRANTY. CHECK YOUR FEED WATER CHEMISTRY AND, IF NECESSARY, CONSULT WITH YOUR LOCAL DEALER OR DISTRIBUTOR BEFORE START UP OF THE SYSTEM.

OPERATING LIMITS

| | | | |
|---|--|----------------------------------|-----|
| Design Temperature, °F / °C | 77 / 25 | Maximum Turbidity, NTU | 1 |
| Maximum Feed Temperature, °F / °C | 85 / 29 | Maximum Free Chlorine, ppm | 0 |
| Minimum Feed Temperature, °F / °C | 40 / 4 | Maximum TDS, ppm | 500 |
| Maximum Ambient Temperature, °F / °C | 120 / 49 | Maximum Hardness, gpg | 1 |
| Minimum Ambient Temperature, °F / °C | 40 / 4 | Maximum pH (continuous) | 10 |
| Maximum Feed Pressure, psi / bar ^a | 90 / 6 (LP-350,700); 70 / 5 (LP-500) | Minimum pH (continuous) | 4 |
| Minimum Feed Pressure, psi / bar ^a | 70 / 5 (LP-350,700); 45 / 3 (LP-500) | Maximum pH (cleaning 30 minutes) | 12 |
| Maximum Operating Pressure, psi / bar | 90 / 6 (LP-350,700); 100 / 7 (LP-500) | Minimum pH (cleaning 30 minutes) | 2 |
| Maximum Feed Silt Density Index (SDI) | < 1 | | |

A. System pressure is variable due to water conditions



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



DO NOT EXCEED THE MAXIMUM OPERATING PRESSURE.

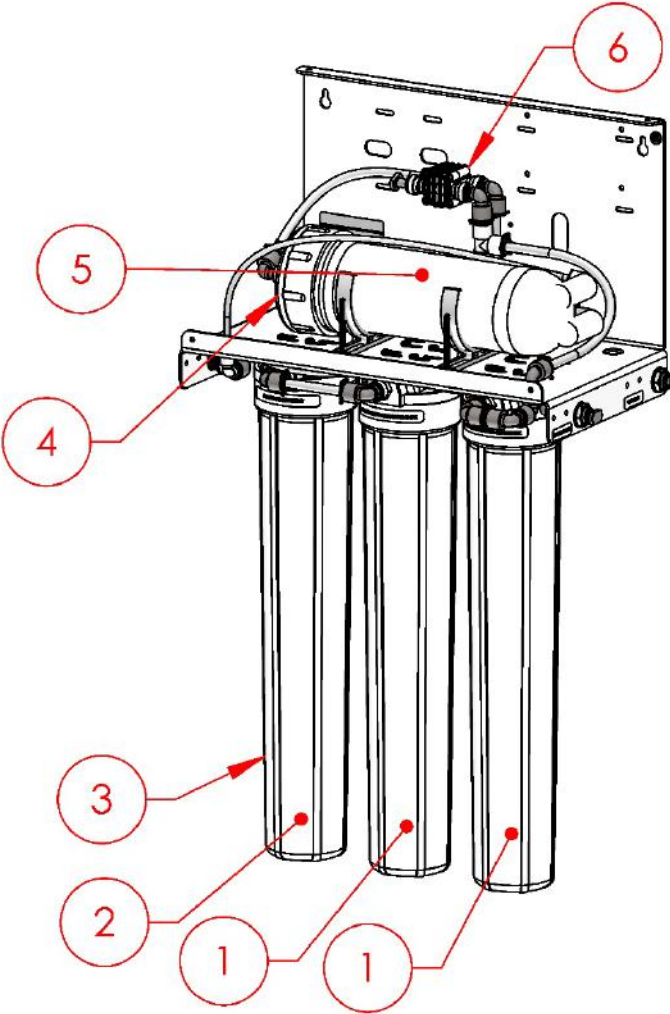
SYSTEM SPECIFICATION CHART

| MODELS | LP-350 | LP-500 | LP-700 |
|--|--|--|--|
| DESIGN | | | |
| Configuration | Single Pass | Single Pass | Single Pass |
| Feedwater Source (ppm) ^B | TDS < 500 | TDS < 500 | TDS < 500 |
| Standard Recovery Rate% | 40 | 46 | 38 |
| FLOW RATES^C | | | |
| Permeate Flow (gpm / lpm) | 0.24 / 0.91 | 0.35 / 1.31 | 0.49 / 1.85 |
| Minimum Feed Flow (gpm / lpm) | 0.66 / 2.50 | 0.76 / 2.88 | 1.33 / 5.03 |
| Maximum feed Flow (gpm / lpm) | 8.00 / 30.28 | 8.00 / 30.28 | 8.00 / 30.28 |
| CONNECTIONS | | | |
| Feed (in) | 3/8 QC | 3/8 QC | 3/8 QC |
| Permeate (in) | 3/8 QC | 3/8 QC | 3/8 QC |
| Concentrate (in) | 3/8 QC | 3/8 QC | 3/8 QC |
| MEMBRANE | | | |
| Membrane Per Vessel | 1 | 1 | 1 |
| Membrane Quantity | 1 | 1 | 2 |
| Membrane Size | 3012 | 3012 | 3012 |
| Nominal TDS Rejection % | 98 | 98 | 98 |
| VESSELS | | | |
| Vessel Array | 1 | 1 | 2 (Parallel) |
| Vessel Quantity | 1 | 1 | 2 |
| PUMP | | | |
| Pump Included | N/A | Yes | N/A |
| Pump Type | N/A | Aquatec 5800 | N/A |
| SYSTEM ELECTRICAL | | | |
| Standard Voltage + Amp Draw ^D | N/A | 110V, 50/60Hz, 1PH 60 HZ 4A | N/A |
| SYSTEM DIMENSIONS | | | |
| Approximate Dimensions ^E L x W x H (in / cm) | 12.00 x 17.00 x 32.00 / 30.48 X 43.18 X 81.28 | 12.00 x 17.00 x 32.00 / 30.48 X 43.18 X 81.28 | 12.00 x 17.00 x 32.00 / 30.48 X 43.18 X 81.28 |
| Approximate Weight (lbs / kg) | 35 / 15.87 | 41 / 18.60 | 38 / 17.24 |
| SYSTEM DIMENSIONS WITH OPTIONAL 10" FILTER HOUSINGS | | | |
| Approximate Dimensions ^E L x W x H (in / cm) | 12.00 x 17.00 x 22.00 / 30.48 X 43.18 X 55.80 | 12.00 x 17.00 x 22.00 / 30.48 X 43.18 X 55.80 | 12.00 x 17.00 x 22.00 / 30.48 X 43.18 X 55.80 |
| Approximate Weight (lbs / kg) | 30 / 13.60 | 36 / 16.30 | 33 / 14.90 |

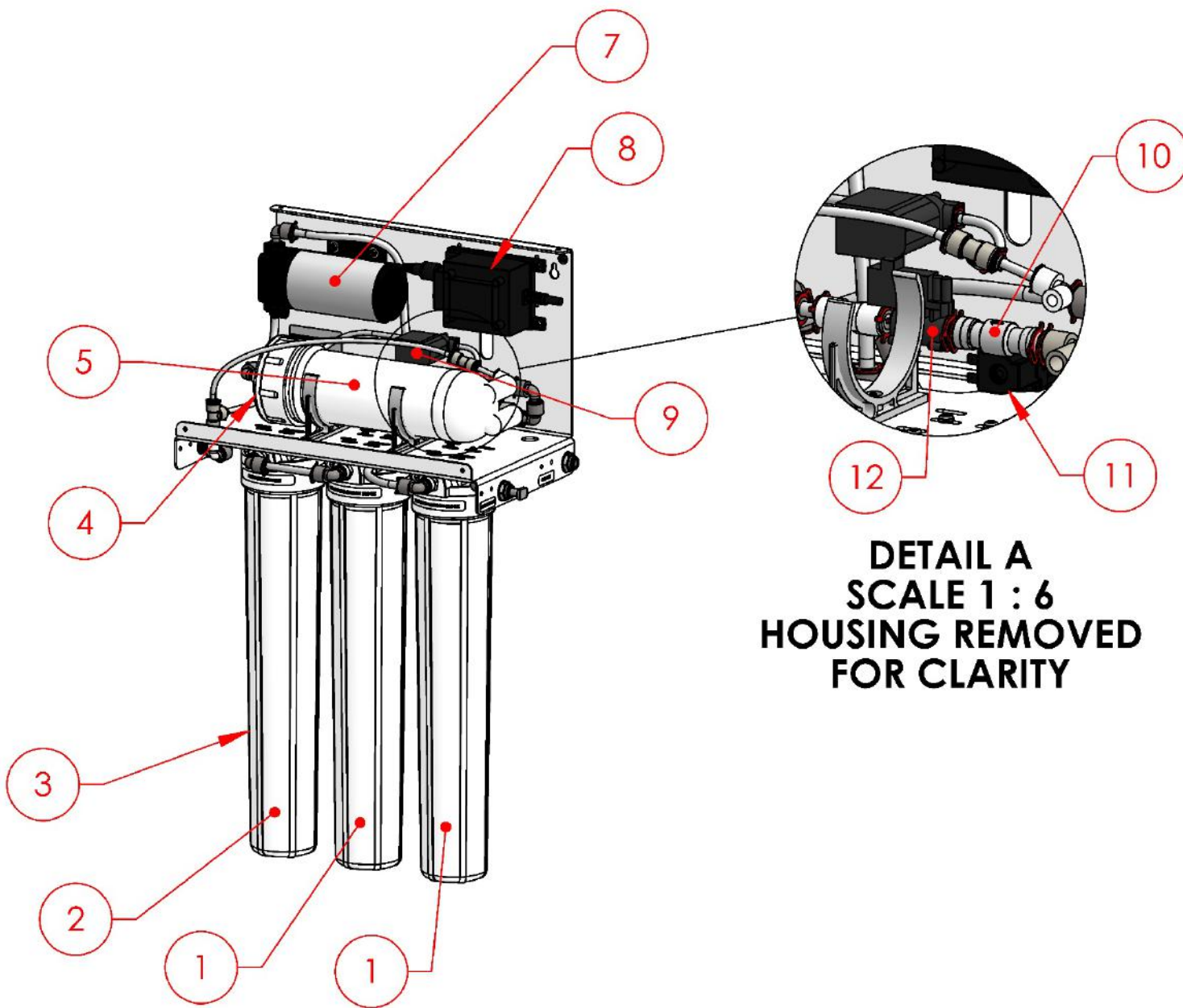
Test Parameters: 500 TDS Filtered (5-micron), Dechlorinated, Municipal Feedwater, 65 psi / 4.50 bar Feed Pressure, 100 psi / 6.8 bar Operating Pressure, 77°F / 25°C, Recovery as stated, 7.0 pH. Data taken after 60 minutes of operation.

- B. Low temperature and feedwater quality, such as high TDS levels will significantly affect the systems production capabilities and performance.
Computer projections must be run for individual applications which do not meet or exceed minimum and maximum operating limits for such conditions.
- C. Product flow and maximum recovery rates are based on feedwater conditions as stated above. Do not exceed recommended permeate flow.
- D. Varies with motor manufacturer.
- E. Does not include operating space requirements.

LP-350 SYSTEM

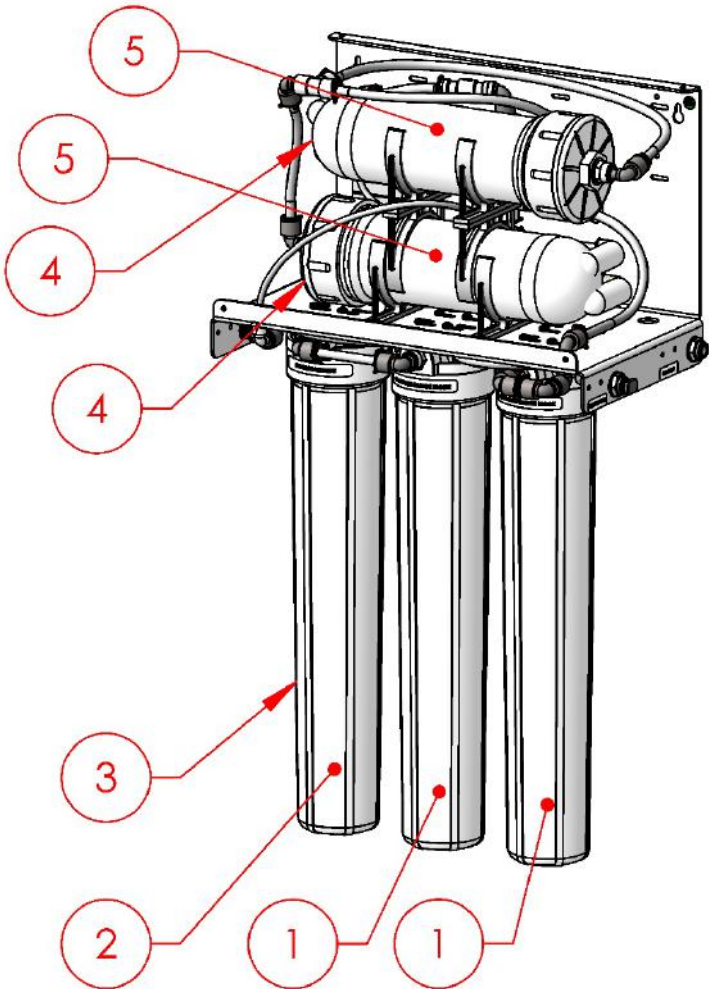


LP-500 SYSTEM



DETAIL A
SCALE 1 : 6
HOUSING REMOVED
FOR CLARITY

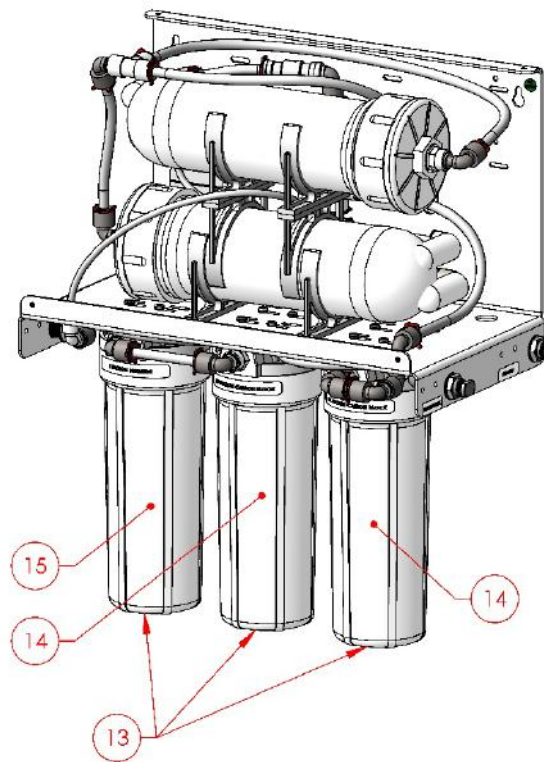
LP-700 SYSTEM



COMPONENT IDENTIFICATION

| ITEM NUMBER | PART NUMBER | DESCRIPTION | MODEL |
|-------------|-------------|--|--------------|
| 1 | 200659 | CARTRIDGE, CARBON BLOCK, 2.5" X 20", 10 MIC | LP 350 – 700 |
| 2 | 200626 | CARTRIDGE, SEDIMENT, POLYPRO, 2.5" X 20", 5 MIC | LP 350 – 700 |
| 3 | 207295 | HOUSING, FILTER, WHT/WHT, 2.5" X 20", SGL O-RING, NPR, 3/8" FNPT | LP 350 – 700 |
| 4 | 208438 | HOUSING, MEMBRANE, 3012, WHT, ANGLE 3/8" FNPT, AXEON | LP 350 – 700 |
| 5 | 208802 | MEMBRANE, TF, 3012, 500 GPD, DRY, AXEON | LP 350 – 700 |
| 6 | 211270 | VALVE, SHUT OFF, FLOW THROUGH, WHITE, 3/8" QC, FLUXTEK | LP 350, 700 |
| 7 | 207442 | PUMP BOOSTER, 5800, 1.0 GPM, 24 VAC 2AMP, AQUATEC | LP 500 |
| 8 | 207917 | TRANSFORMER, 110V 60HZ 24VAC, 4.0 AMP, TDC | LP 500 |
| 9 | 200772 | RESTRICTOR, FIXED, 800 ML/MIN, AUTO FLUSH, 1/4" QC, AQUATEC | LP 500 |
| 10 | 200962 | VALVE, CHECK, ACETAL, 3/8" QC X 3/8" QC, JG | LP 350 – 700 |
| 11 | 207974 | VALVE, SOLENOID, 3/8" QC, 24V, INTERELEKTRIK | LP 500 |
| 12 | 200771 | SWITCH, TANK, PRESSURE, 20-40 PSI, 3/8" QC, AQUATEC | LP 500 |

LP-700 WITH OPTIONAL 10" FILTER HOUSINGS



| ITEM NUMBER | PART NUMBER | DESCRIPTION | MODEL |
|-------------|-------------|---|--------------|
| 13 | 210272, | OPTION, RO, LP-700, HOUSING, FILTER, 10" | LP 350 – 700 |
| 14 | 200658 | CARTRIDGE, BLOCK, CARBON, 2.5" X 10", 10 MIC, CBF-25-1010, AXEON | LP 350 – 700 |
| 15 | 200621 | CARTRIDGE, DEPTH FILTER, POLYPROPYLENE, 2.5" X 10", 5 MIC, SDF-25-1005, AXEON | LP 350 – 700 |

PRE-FILTRATION

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



FILTER HOUSINGS

The LP-Series comes with two housings one for the 5 micron sediment filter and the second one is for the 10 micron carbon filter.

MEMBRANE

The TF-3012 RO membrane utilizes advanced manufacturing processes of the industry's leading film technology allows these elements to deliver consistent results that equipment suppliers and water treatment dealers have come to rely on.



TRANSFORMER

Transforms incoming voltage to 24VAC to power R.O. motor/pump and system.

BOOSTER PUMP

The LP-500 uses an Aquatec 5800 pump to increase pressure when required.



NEVER RUN PUMP DRY. OPERATING PUMP WITHOUT SUFFICIENT FEED FLOW WILL CAUSE DAMAGE OR FAILURE.



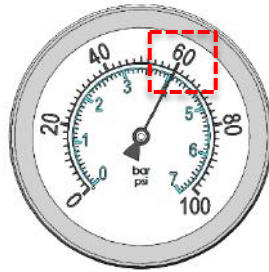
IF THE SYSTEM PRESSURE IS FLUCTUATING, TURN THE SYSTEM OFF AND ENSURE THAT PROPER FEED WATER FLOW AND PRESSURE ARE BEING SUPPLIED TO THE SYSTEM.

PRE-FILTER PRESSURE GAUGES (OPTIONAL)

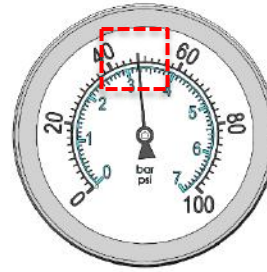
These gauges measure the feed water pressure when it enters and exits the pre-filter. A pressure differential of 10–15 psi or more between the two pressure gauges indicates that the pre-filters require replacement.

EXAMPLE: If the inlet pressure is 60 psi, the filter should be changed when the outlet pressure is 50 psi or below.

Note: A "FILTER IN" pressure gauge is not included with the system. Please have a qualified person install this gauge.



(not included)



FILTER OUT

MEMBRANE INFORMATION

The LP-Series Reverse Osmosis Systems are equipped with AXEON TF-Series Membrane Elements. General membrane element performance characteristics are listed below.

MEMBRANE ELEMENT SPECIFICATIONS AND OPERATING LIMITS

TF-Series Membranes (Standard)

Membrane Type: Polyamide Thin-Film Composite

pH Range, Short Term Cleaning (30 Min.): 2–11

Maximum Operating Temperature: 113°F (45°C)

Maximum Feed Silt Density Index (SDI): 5

Maximum Operating Pressure: 150 psi (10 bar)

Chlorine Tolerance: 0 ppm

pH Range, Continuous Operation^F: 2–11

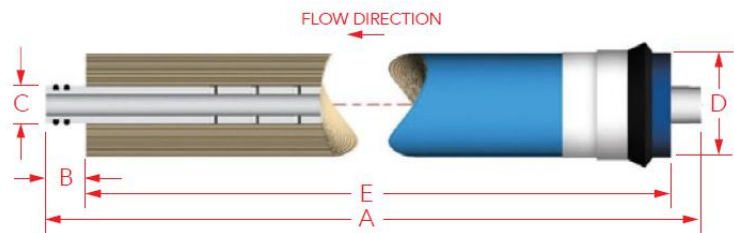
Maximum Feed Flow Rate (gpm / lpm): 2.50 / 9.50

F. Maximum temperature for continuous operations above pH10 is 95°F (35°C).

| Product Specifications | | | | |
|------------------------|-------------|-------------------------------|---------------------------------|-------------------------------|
| Part Number | Description | Applied Pressure psi / bar | Permeate Flow Rate gpd / lpd | Nominal Salt Rejection (%) |
| 208802 | TF-3012-500 | 70.00 / 4.80 | 500.00 / 1892.71 | 98 |

Warranty Evaluation Test Conditions: Permeate flow and salt rejection based on the following test conditions—250 ppm, filtered and dechlorinated municipal tap water, 77°F / 25°C, 15% recovery and the specified operating pressure. Minimum salt rejection is 96%. Permeate flows for warranty evaluation may vary +/-20%. Maximum pressure drops at 13 psi / 0.9 bar.

| Dimensions (in / mm) | | | | |
|----------------------|-----------------|-----------------|-----------------|-------------------|
| A | B | C | D | E |
| 11.75 / 298.45 | 0.75 / 19.05 | 0.67 / 17.02 | 2.90 / 73.66 | 10.50 / 266.70 |



Under certain conditions, the presence of free chlorine, chloramines and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, the manufacturer recommends removing all oxidizing agents by pretreatment prior to membrane exposure. Please contact the manufacturer or your supplier for more information.

It is recommended that systems using these elements rinse the elements for 24 hours, prior to first use, to meet NSF/ANSI 58 Standard. The first full tank of permeate must be discarded. Do not use this initial permeate for drinking water or food preparation. Keep elements moist at all times after initial wetting. To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in M-100 preservative solution. Rinse out the preservative before use. For membrane warranty details, please contact the manufacturer or your supplier for more information.

If operating limits and guidelines given in this product specification sheet are not strictly followed, the warranty will be null and void. The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements. Use of any such chemicals or lubricants will void the warranty. These membranes may be subject to drinking water application restrictions in some countries: please check the application status before use and sale. These elements have not been through the French approval process for use in potable water. The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

No freedom from infringement of any patent owned by the manufacturer or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, customer is responsible for determining whether products and the information in this document are appropriate for customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. The claims made may not have been approved for use in all countries. The manufacturer assumes no obligation or liability for the information in this document. AXEON reserves the right to update this information periodically for the purposes of quality and accuracy. **NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.**

LP-Series Reverse Osmosis Systems are designed to produce up to 700 GPD at 77°F (nominal) of permeate water per membrane at 98% rejection under the proper conditions. For example, the LP-700 produces 700 gallons per day of permeate water at the listed operating test conditions.

REJECTION

The amount of total dissolved solids (TDS) rejected by the membrane is expressed as a percentage. LP-Series reverse osmosis systems are designed to reject up to 98% NaCl depending on feed water chemistry. A 98% rejection rate means that 98% of total dissolved solids do not pass through the membrane. To calculate the percent of rejection, use the following formula:

$$\% \text{ REJECTION} = \frac{\text{FEED TDS} - \text{PERMEATE TDS}}{\text{FEED TDS}} \times 100$$

Example:

$$\frac{430 \text{ TDS} - 8.25 \text{ TDS}}{430 \text{ TDS}} \times 100 = 98\% \text{ REJECTION}$$

RECOVERY

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

$$\% \text{ RECOVERY} = \frac{\text{PRODUCT WATER FLOW RATE}}{\text{FEED WATER FLOW RATE}} \times 100$$

Example:

$$\frac{5.55 \text{ GPM}}{8.55 \text{ GPM}} \times 100 = 65\% \text{ RECOVERY}$$



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

MOUNTING

The free standing system should be bolted down or securely fastened in compliance with local regulation standards. The system comes standard with a rubber bumper kit. Casters and levelers are available, but optional.

PLUMBING

The membranes and high pressure pumps used on LP-500 systems require a continuous flow of water with a minimum feed pressure of 45 psi.

Be certain that all of the components of the feedwater are soluble at the concentrations attained in the system.

1. Inspect the system for any damage that could have occurred during shipment. Although the system has been individually inspected, complete a quick inspection of the fittings, tubing and other components.
2. Please provide a reasonable amount of space for installation and leave six inches of space below the filter housings for ease of maintenance.



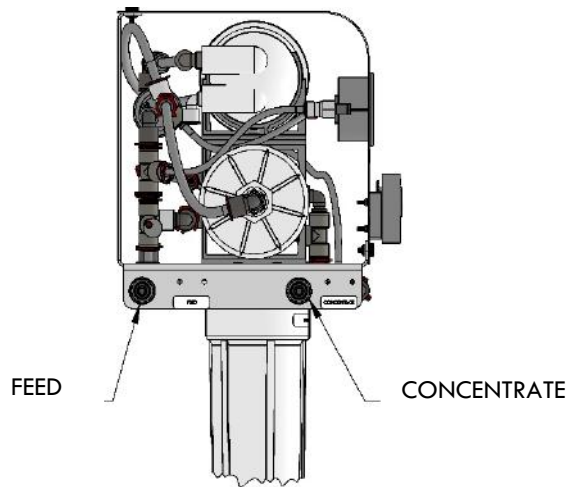
THE REVERSE OSMOSIS SYSTEM SHOULD BE INSTALLED IN AN AREA THAT IS NOT IN DIRECT SUNLIGHT OR EXTREME COLD.

FEED WATER CONNECTION

Connect a 3/8" tube from an incoming water source to the 3/8" QC bulkhead labeled "FEED". Best practice to use a 1/2" tubing for the feed and reduce to 3/8" tubing near the incoming 3/8" feed bulkhead.

CONCENTRATE CONNECTION

Connect 3/8" tubing from the 3/8" QC bulkhead labeled "CONCENTRATE" to drain (waste). Run the concentrate line to an open drain in a free and unrestricted manner (no backpressure).



*SYSTEM SHOWN WITH OPTIONAL PANEL.

CAUTION

DO NOT OPERATE AT A PRESSURE EXCEEDING 100 PSI.

Note: The LP-500 system has been designed with an auto-flush restrictor. This restrictor automatically flushes the reverse osmosis system for 30 seconds every time it starts up and 15 seconds once every hour when the system is producing water.

HOLDING TANK CONNECTION

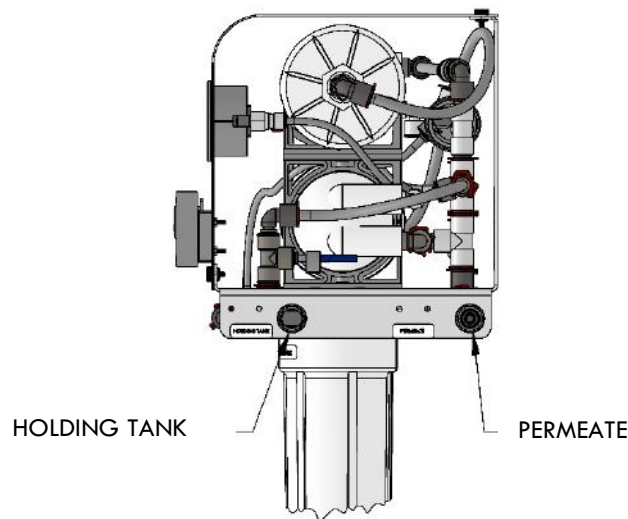
This system has been designed to operate together with an external bladder or atmospheric tank. Connect 3/8" tubing from the 3/8" QC bulkhead labeled "HOLDING TANK" to a permeate storage tank.

Note: The permeate water must be directed to drain for the first 30 minutes of use. Do not fill storage tank until the system has been flushed for 30 minutes.

THE TANK HIGH PRESSURE SWITCH WILL SHUT THE SYSTEM OFF AUTOMATICALLY WHEN THE BLADDER TANK IS FULL.

PERMEATE CONNECTION

Connect 3/8" tubing from the 3/8" QC bulkhead labeled "PERMEATE" to the final point-of-use (i.e. faucet). Ensure that the permeate water can flow freely with no backpressure. Backpressure can cause irreversible damage to the membrane elements.



*SYSTEM SHOWN WITH OPTIONAL PANEL.

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



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

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

MEMBRANE INSTALLATION

Installation and replacing membranes in the pressure vessels 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:



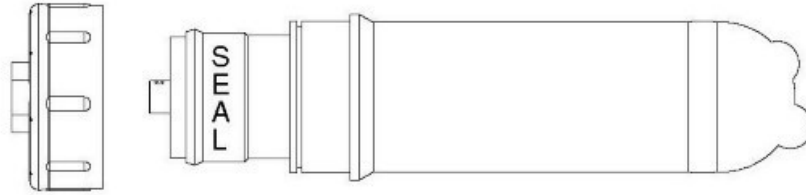
ALL PRESSURE GAUGES MUST READ ZERO BEFORE PROCEEDING. BEFORE ATTEMPTING, DISCONNECT THE POWER FROM THE SYSTEM AND BLEED ALL WATER PRESSURE FROM THE SYSTEM.

1. Disconnect the tubing from the pressure vessel end cap. Unthread the end cap by turning it counter-clockwise.
2. Remove the replacement membrane element(s) from the shipping box; the membrane(s) should be contained within a plastic bag.

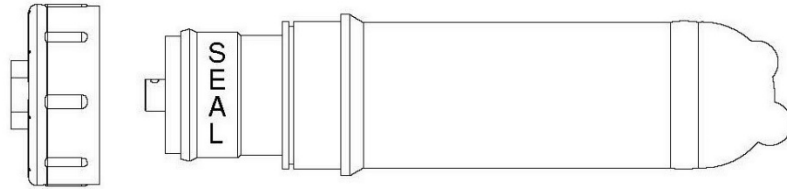


WEAR GLOVES FOR THE FOLLOWING STEPS IN ORDER NOT TO CONTAMINATE THE MEMBRANE.

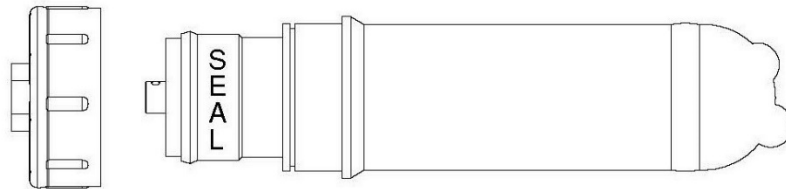
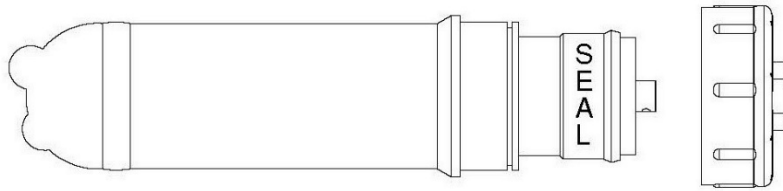
3. Cut the bag open as close as possible to the seal at one end of the bag, so the bag may be re-used if necessary.
4. Make sure that all parts are clean and free from dirt. Examine the brine seal, and permeate tube for nicks or cuts. Replace the O-rings or brine seal on the end plug if damaged.
5. Flow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



LP-350



LP-500



LP-700

REPLACING THE MEMBRANE ELEMENT:



THE BRINE SEAL MUST BE IN THE CORRECT POSITION FOR EACH PRESSURE VESSEL. THE BRINE SEAL IS A RUBBER SEAL THAT PROTRUDES ON ONE SIDE OF THE MEMBRANE. FOR LP-SERIES REVERSE OSMOSIS SYSTEMS THE BRINE SEAL SHOULD BE ON THE SAME SIDE AS THE PRESSURE VESSEL END CAP.

1. Remove one membrane at a time from the pressure vessels. Long nose pliers may be necessary to pull the old membrane out of the pressure vessel.
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 Page 24.
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. Re-install the end cap by twisting in a clockwise direction until firmly tightened. Ensure that you do not pinch or fatigue any O-rings while re-installing the end cap(s).
6. Reconnect any fittings that may have been disconnected when the pressure vessels were disassembled.
7. To start-up the system, please refer to the Initial Start-Up section of this User Manual.



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.

LP-350 AND LP-700 SYSTEMS

Direct the permeate water line to drain.

1. Turn feed source on with a recommended water pressure of 70–90 psi.
2. Run system while permeate and concentrate lines feed to the drain for 30 minutes to flush out preservative and any trapped air.

3. After 30 minutes, shut down the system and re-direct the permeate line back to final use location (i.e. faucet).
4. Your start up is now complete. Make sure that the system pressures and flows are matching up with that of your specific system model, located on the System Specification (Page 10) of this manual. Record the readings daily for a week and after a week record the readings once a week. This will assist you to determine when component maintenance and/or replacement is necessary.

LP-500 SYSTEM

Direct the permeate water line to drain.

1. Turn feed source on with a recommended minimum pressure of 45 psi.
2. Plug system into proper electrical outlet.
3. Run system while permeate and concentrate lines feed to the drain for 30 minutes to flush out preservative and any trapped air.
4. After 30 minutes, shut down the system and re-direct the permeate line back to final use location (i.e. faucet).
5. Your start up is now complete. Make sure that the system pressures and flows are matching up with that of your specific system model, located on the System Specification (Page 10) of this manual. Record the readings daily for a week and after a week record the readings once a week. This will assist you to determine when component maintenance and/or replacement is necessary.

TEMPERATURE FACTOR FOR MEMBRANES

A membrane's stated permeate production rate is based on a water temperature of 77°F degrees Fahrenheit. Temperatures above or below 77°F will increase or decrease the membrane's production rate. Find the temperature correction factor (TCF) for your water temperature on the table located on the next page. Divide the rated permeate flow by the temperature correction factor. The result is the nominal permeate flow rate the system should achieve at actual water temperature. 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.

Example:

$$5 \text{ GPM at } 59^\circ\text{F} \rightarrow \frac{5 \text{ GPM}}{1.422} = 3.52 \text{ GPM}$$

$$5 \text{ GPM at } 77^\circ\text{F} \rightarrow \frac{5 \text{ GPM}}{1} = 5 \text{ GPM}$$

$$5 \text{ GPM at } 84^\circ\text{F} \rightarrow \frac{5 \text{ GPM}}{.892} = 5.62 \text{ GPM}$$

TEMPERATURE CORRECTION FACTORS

TEMPERATURE CORRECTION TABLE

| Temperature °F (°C) | TCF | Temperature °F (°C) | TCF | Temperature °F (°C) | TCF | Temperature °F (°C) | TCF | Temperature °F (°C) | TCF |
|---------------------|-------|---------------------|-------|---------------------|-------|---------------------|-------|---------------------|-------|
| 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 |

$^{\circ}\text{F}=(^{\circ}\text{C} \times 9/5) + 32$

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

OPERATING LOG

- Company Name _____

- Day of Start Up _____

- Location _____

- Date of Last Cleaning _____

- Week Of _____

- System Serial No. _____

| | | | | |
|-----------------------------------|--|--|--|--|
| Date | | | | |
| Time | | | | |
| Hour of Operation | | | | |
| Filter Inlet Pressure (PSI) | | | | |
| Filter Outlet Pressure (PSI) | | | | |
| Concentrate Pressure (PSI) | | | | |
| Pump Discharge Pressure (PSI) | | | | |
| Feed Flow (GPM) | | | | |
| Permeate Flow (GPM) | | | | |
| Concentrate Flow (GPM) | | | | |
| Recycle Flow (GPM) | | | | |
| Recovery % | | | | |
| Feed Temperature | | | | |
| Feed TDS (PPM) | | | | |
| Permeate TDS (PPM) | | | | |
| Rejection % | | | | |
| Feed pH | | | | |
| Permeate pH | | | | |
| Scale Inhibitor Feed (PPM) | | | | |
| Iron (mg/L) | | | | |
| Free Chlorine (mg/L) | | | | |
| Hardness (GPG CaCO ₃) | | | | |

TROUBLESHOOTING

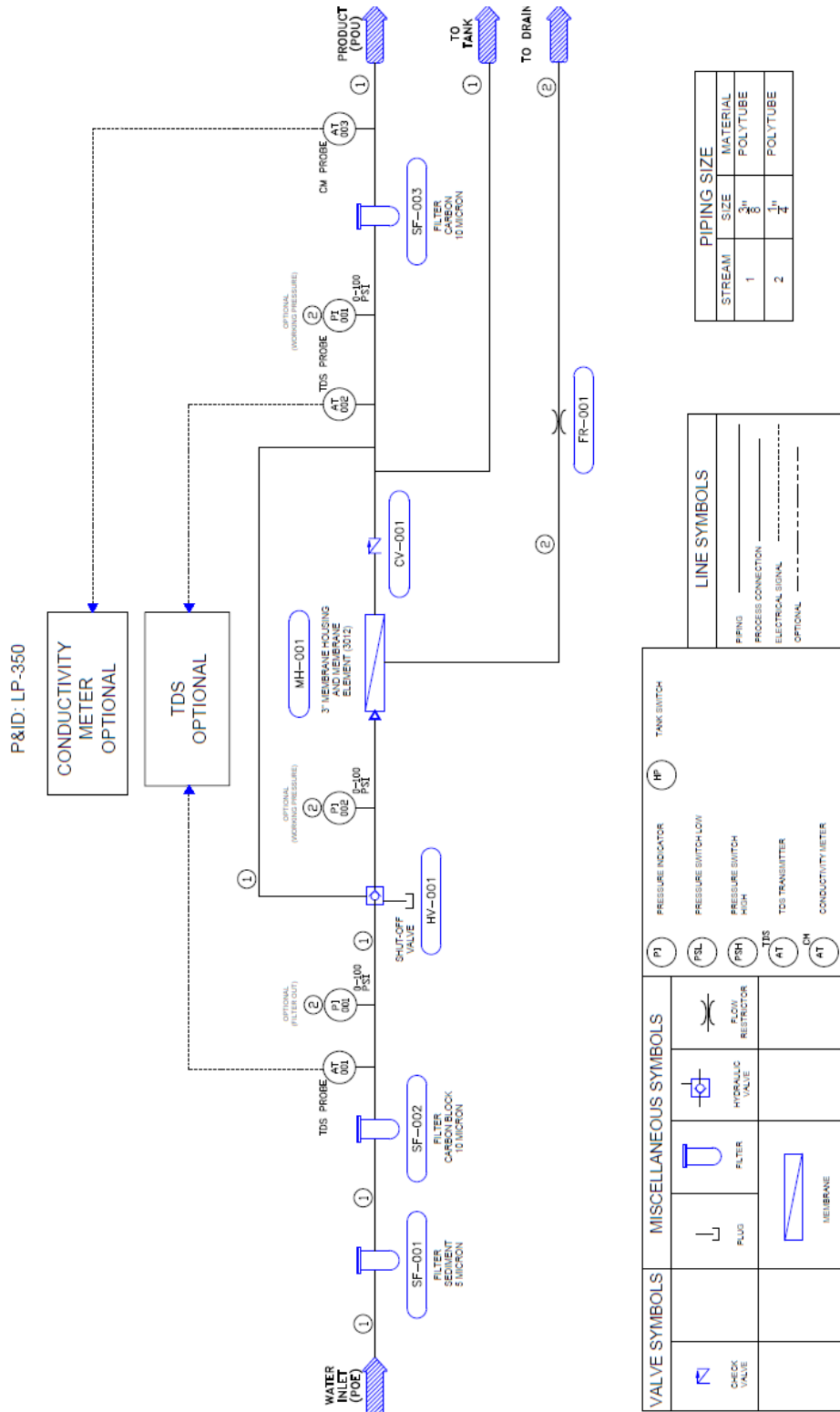
| SYMPTOMS | POSSIBLE CAUSES | CORRECTIVE ACTION |
|-----------------------|---|---|
| Low Inlet Pressure | Low supply pressure | Increase inlet pressure |
| | Cartridge filters plugged | Change filters |
| | Solenoid valve malfunction | Replace solenoid valve (LP-500) |
| | Leaks | Fix any visible leaks |
| Low Permeate Flow | Low inlet flow | Inspect flow restrictor, clean or replace if necessary |
| | Cold feedwater | 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/Replace |
| High Permeate Flow | Damaged product tube o-rings | Inspect and/or replace |
| | Damaged or oxidized membrane | Replace membrane |
| | Exceeding maximum feedwater 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 anionic cleaners |
| | Scaling (CaSO ₄ , CaSO ₃ , BaSO ₄ , SiO ₂) | Increase acid addition and antiscalant dosage for CaCO ₃ and CaCO ₄ . 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 another pretreatment. Clean with high pH cleaner |
| | Abrasion of membrane by crystalline material | Improve pretreatment. Check all filters for media leakage |

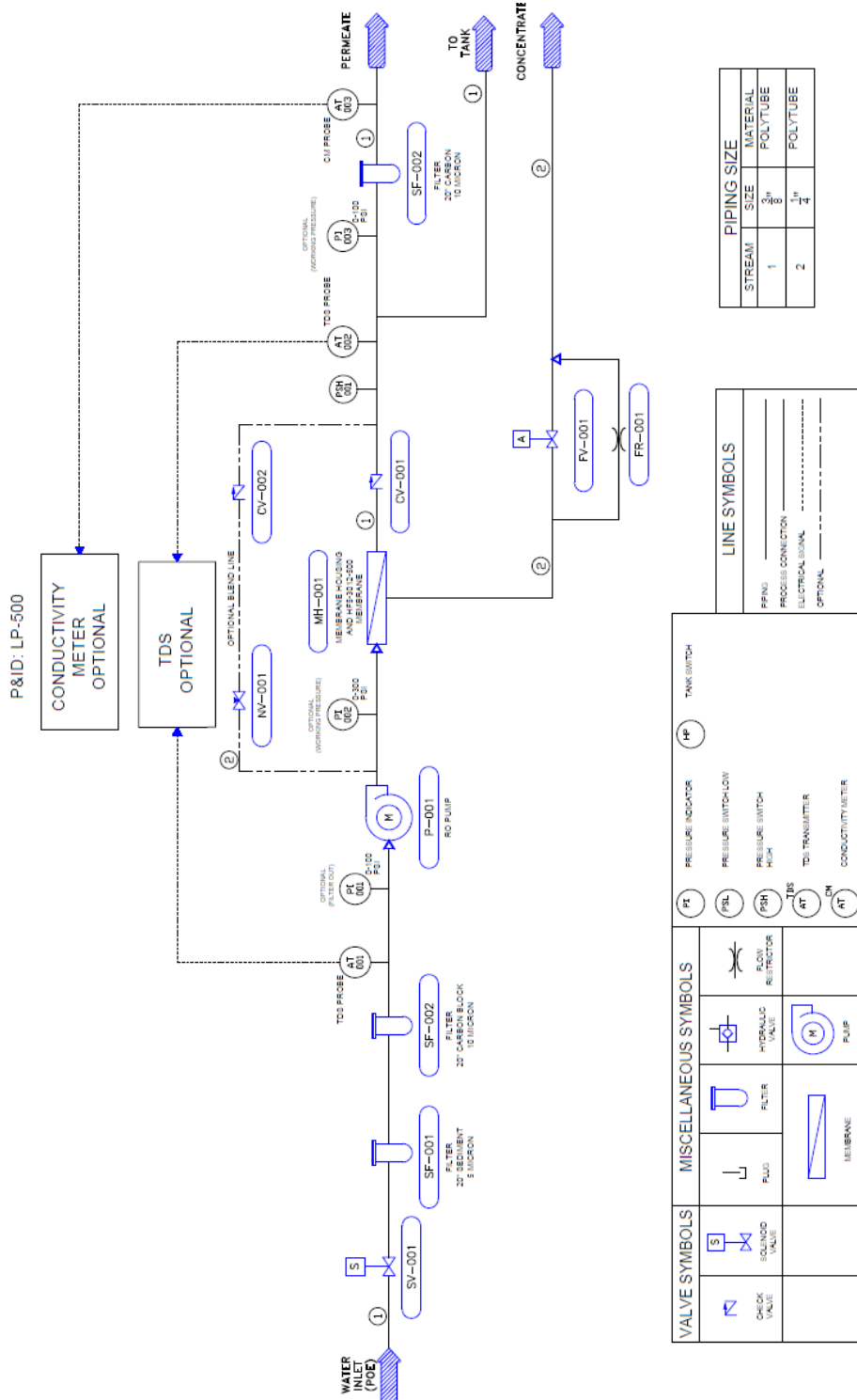
TECHNICAL ASSISTANCE

If technical assistance is required:

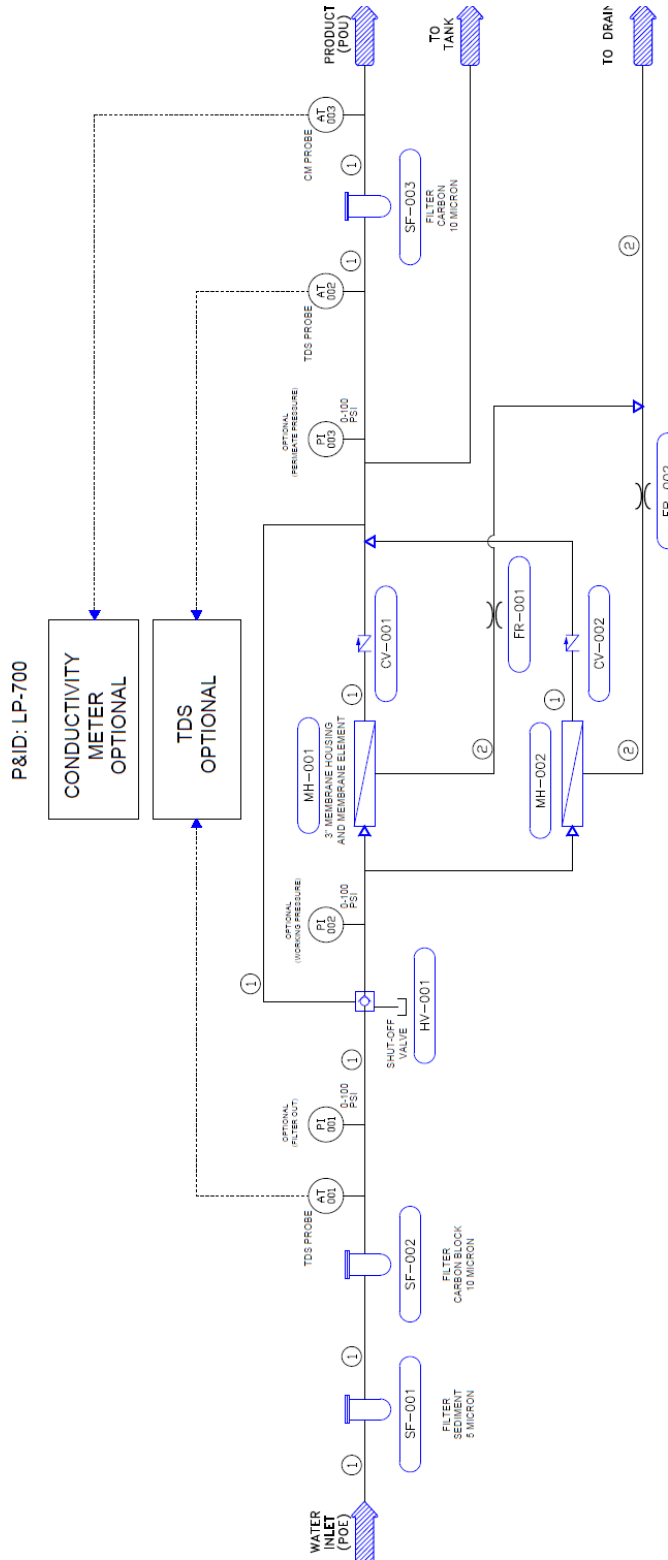
- Contact your local dealer or distributor
- Prior to making the call, have the following information available:
 - System installation date
 - Serial number
 - Daily log sheets
 - Current operating parameters (e.g., flow, operating pressures, pH, etc.)
 - Detailed description of the problem.

LP-350 SYSTEM



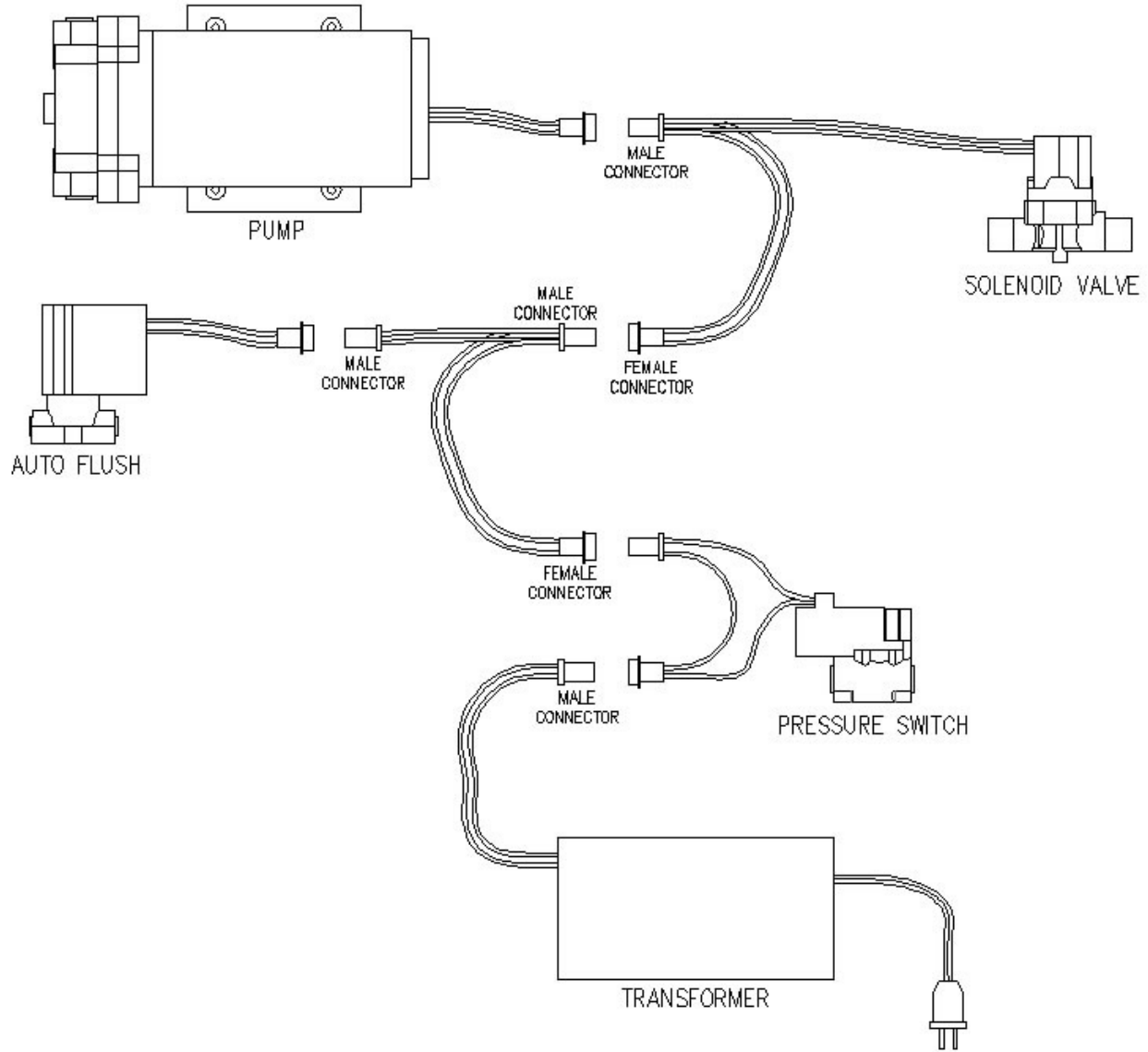


LP-700 SYSTEM



| VALVE SYMBOLS | MISCELLANEOUS SYMBOLS | LINE SYMBOLS | PIPING SIZE | | | | | | | | | |
|---|---|---|--|--------|------|----------|---|------------|----------|---|------------|----------|
| CHECK VALVE HYDRAULIC VALVE FLOW RESTRICTOR FILTER PLUS MEMBRANE | PRESSURE INDICATOR PRESSURE SWITCH LOW PRESSURE SWITCH HIGH TDS TRANSMITTER CONDUCTIVITY METER TANK SWITCH | PIPING _____ PROCESS CONNECTION _____ ELECTRICAL SIGNAL - - - - - OPTIONAL - - - - - | <table border="1"> <thead> <tr> <th>STREAM</th> <th>SIZE</th> <th>MATERIAL</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3" 3/8"</td> <td>POLYTUBE</td> </tr> <tr> <td>2</td> <td>3" 1/4"</td> <td>POLYTUBE</td> </tr> </tbody> </table> | STREAM | SIZE | MATERIAL | 1 | 3" 3/8" | POLYTUBE | 2 | 3" 1/4" | POLYTUBE |
| STREAM | SIZE | MATERIAL | | | | | | | | | | |
| 1 | 3" 3/8" | POLYTUBE | | | | | | | | | | |
| 2 | 3" 1/4" | POLYTUBE | | | | | | | | | | |

LP-500 SYSTEM WIRING DIAGRAM



Warranty Terms

Subject to the terms and conditions set forth hereinafter, the 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.

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 Manufacturer product 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 Manufacturer product 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 the Manufacturer’s manufacturing 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.

Warranty Service

THE 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 the Manufacturer, 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; (6) a description of the type of water and pretreatment equipment which has been utilized in connection with the product, if any. The Manufacturer shall, in the 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, the Manufacturer will (at the Manufacturer’s sole discretion) forward replacement parts to the 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 the 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 \$2,500.00 per day plus associated travel expenses will be incurred by the Customer in providing the Warranty Service at any location other than the 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 the 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 the Manufacturer or an authorized Manufacturer service representative; or, if any replacement parts are not authorized by the 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 the Manufacturer product 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, 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.