Village Marine LTM-500

Part Number: 95-0023 REV C

LTM Series Modular Watermakers

145 - 1,800 GPD
540 - 6800 LPD

Installation, Operation & Maintenance

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

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The following are the types of flags used in this technical manual. They designate safety related items and important operational instructions and should be given special attention when they appear in the text:

WARNING Text formatted in this manner concerns an operating procedure or practice that, if not strictly observed, can result in injury to personnel or loss of life.

CAUTION Text formatted in this manner concerns an operating procedure or practice that, if not strictly observed, can result in damage to or destruction of equipment.

NOTE Text formatted in this manner concerns an operating procedure or condition that warrants special attention

MODEL: _____

SERIAL NUMBER: _____

DATE OF PURCHASE: _____

PURCHASED FROM: _____

INVOICE #: _____

VESSEL NAME: _____

INSTALLED BY: _____

DATE OF INITIAL STARTUP: _____

Village Marine LTM Series Modular Watermakers

145 - 1,800 GPD – 530 -6,800 LPD

For Sail Boat and Fishing Vessel Applications

The LTM Series offers high quality Parker Village Marine engineered components with straightforward manual operation. Driven by AC motors, the modular configuration comes in ready to mount modules for flexible installation options. Integral to every LTM unit is a control manifold, which includes a regulator and a bypass valve.

Village Marine LTM-500

Contact Information:

Parker Hannifin Corporation
Water Purification
2630 E. El Presidio Street
Carson, CA 90810

phone 310 608 5600
fax 310 608 5692
waterpurification@parker.com

Website:
www.parker.com/waterpurification

Sales:
waterpurification@parker.com

Tech Support:
watertech@parker.com

Features & Benefits:

Optional salinity monitor and diversion valve system for water quality assurance.

Salinity monitor and diversion valve

P/N 90-0115 110V 500-800 GPD
P/N 90-0116 220V 500-800 GPD
P/N 90-0127 220V 1300-1800 GPD

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Standard Features:

- Powder coated mounting brackets included
- 5-micron cleanable prefilter
- Control manifold pressure regulator ensures consistent pressure and prevents over or under pressurization of the unit. Adjustable to allow operation in brackish or fresh water
- High quality spiral wound TFC reverse osmosis membranes
- Magnetic drive booster pump
- Stainless steel glycerin filled pressure gauges
- High pressure plunger pump with stainless steel 316 head
- Acrylic flowmeter to monitor production

Specifications

Model	Part Number	Electrical Supply Volts/Ph/Hz/Amps	Capacity GPH / LPH	Weight lbs. / kg
LTM-145	90-8200PH 90-8622PH	12/29 24/14.5	6/23	92/42
LTM-300	90-8154PH 90-8596PH	12/34 24/17	12.5/47.3	92/42
LTM-350	90-6009 90-6010	12 VDC/60 24 VDC/30	14.6/55	92/42
LTM-500	90-6019 90-6047 90-6048	110/1/60/18 220/1/60/8 230/1/50/8	21/79	92/42
LTM-800	90-6049 90-6050 90-6051 90-6079	110/1/60/18 220/1/60/9 230/1/50/8 230-460/3/50-60/6-4	33/125	100/45
LTM-1000	90-6052 90-6053 90-6080	220/1/60/12** 230/1/50/12.5 230-460/3/50-60/8-6.5	42/158	133/60
LTM-1300	90-6054 90-6055 90-6082	220/1/60/12** 230/1/50/12.5 230-460/3/50-60/8-6.5	54/205	153/70
LTM-1800	90-6083 90-6056 90-6078 90-6076 90-6077	110/1/50-60/18 220/1/60/12 230/1/50 380/3/50/7.5 460/3/60/7	75/284	168/76

Spares and Consumables

Part Number	Description
85-0050	Pump Oil
33-0117	5 Micron Filter (up to model 800)
33-0052	5 Micron Filter (model 1000 and up)
33-0311	Carbon Flush Filter
33-0238	Membrane Element
85-0103	Preservation Kit

Part Number	Description
90-0005	Filter Housing O-Ring (up to model 800)
33-0271	Filter Housing O-Ring (model 1000 and up)
90-2512	Membrane O-Ring Kit
40-0241	Salinity Probe
85-0102	Cleaning Kit

Optional Accessories

Part Number	Description	System Capacity (GPD/LPH)	System Voltage Voltage/Hz/phase
90-0215	Manual Fresh Flush, Assembly	All	All
61012010	Kit, Installation, 300-1800 GPD	All	All
V006060001	Sea Strainer, 40 Mesh, Assembly	300-500/47.3-79	All
0421056739	Sea Strainer 3/4 Bronze	800-1800/125-284	All
B016380002	Booster Pump/Motor 12VDC	300/47.3	12VDC
B016380003	Booster Pump/Motor 24VDC	300/47.3	24VDC
V016030001	Booster Pump 110, 220V, 1PH, Assy	500/79	110-220/1/50/60/1
B016080026	Booster Pump Assembly 110/230/50/60/1P	800-1800/125-284	110-230/50/60/1
B016080027	Booster Pump Assembly 208-460/50/60/3P	800-1800/125-284	208-460/50/60/3

Recommended Options – LTM 145-300 12-24 VDC System

Part Number	Description
90-1288	Manual Fresh Flush, Assembly
61012118	Kit, Installation, 145-500 GPD
V016020001	Booster Pump/Motor 12VDC
V016020001	Booster Pump/Motor 24VDC
61012116	Sea Strainer, 40 Mesh, Assembly

To maintain peak performance, always use genuine Parker Village Marine replacement parts.
We reserve the right to change our specifications or standards without notice.

WARNING: This product can expose you to chemicals including Di(2-ethylhexyl) phthalate (DEHP), which is known to the state of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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CONTENTS

Spare Parts List:

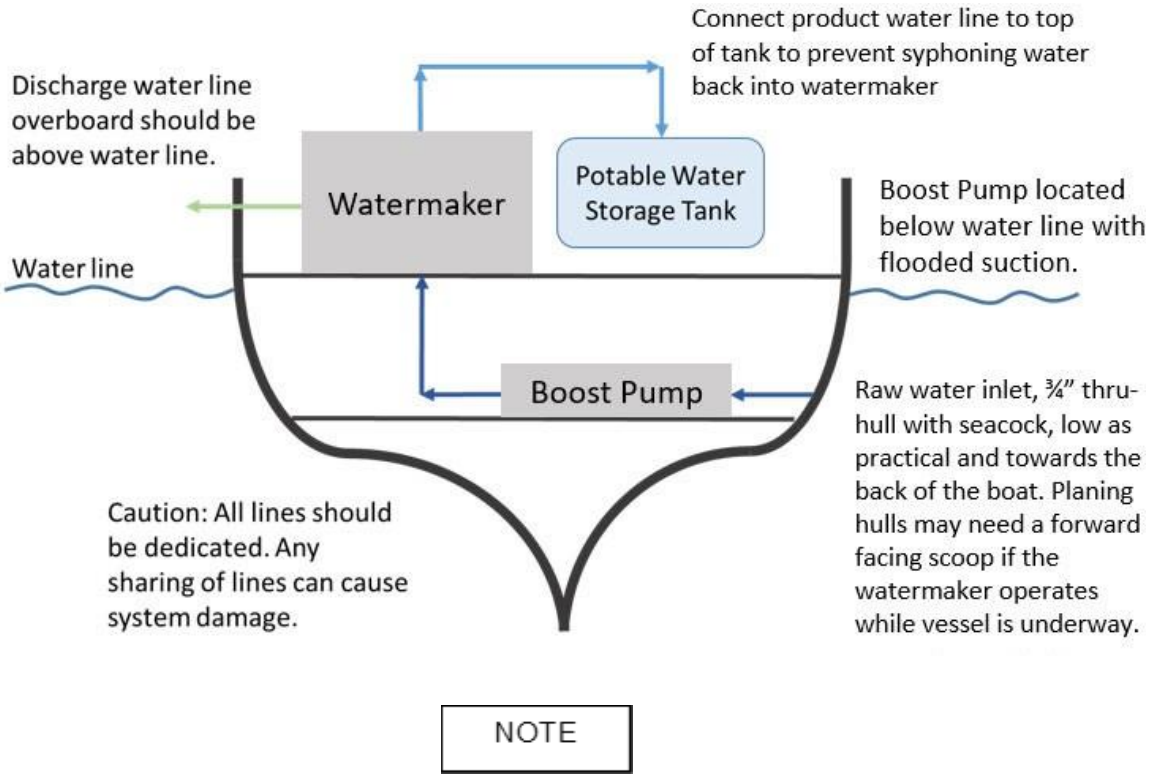
Description	Part No.	Quantity
5-micron Prefilter	33-0117	1
Carbon Filter	33-0311	1
Flush Filter Kit	90-0215	1
Pump Oil	85-0050	1
Cleaning Chemical #1 (Blue Stripe) Cleaning Chemical #2 (Red Stripe)	85-0102	1 each
Preservative Chemical #3 (Green Stripe)	85-0103	1

Membrane information see section 3.4

1. INSTALLATION

The RO unit should be installed in a dry, sheltered location protected from direct weather. Drainage should be provided beneath the RO unit to allow standing water to drain when performing maintenance or repair.

Refer to the Plumbing Diagram for arrangement and connection hose sizes. **All connections up to and including the booster pump must be below water line**. If necessary, the three-way flushing valve may be disconnected from the flushing filter to get the valve below waterline. The Pre-filters, the high-pressure pump and the membrane rack can all be above the waterline as indicated in the diagram below.



NOTE

Figure 1.0: Basic Installation Diagram

Standard maximum head pressure provided by booster pump.
12/24 VDC 10.6 ft. / 4.5 psi/ 3.3 m / 0.31 BAR
110/220 VAC 41 ft. / 17.7 psi / 13 m /1.22 BAR
If more lift is required, please consult with Parker Technical Support.

1.1 PREPARATION FOR INSTALLATION

Locate or create a 3/4" dedicated thru-hull for the feedwater intake of the RO unit. The through-hull must be attached with a ball valve (seacock), and optionally a sea strainer.

CAUTION

The RO unit **SHOULD NOT SHARE** a through-hull feedwater intake. Parker Hannifin recommends the RO unit **HAVE ITS OWN** dedicated thru-hull, to ensure proper operation. Avoid connecting the inlet piping to any water line which services an engine or other equipment. Air could be drawn through the unit causing damage to the RO unit's pumps, as well as **VOIDING** the RO unit's warranty with Parker.

1.1.1 PLUMBING

Refer to the detailed plumbing diagram

LTM 145-350 PLUMBING DIAGRAM (WITH OPTIONAL SALINITY MONITOR)

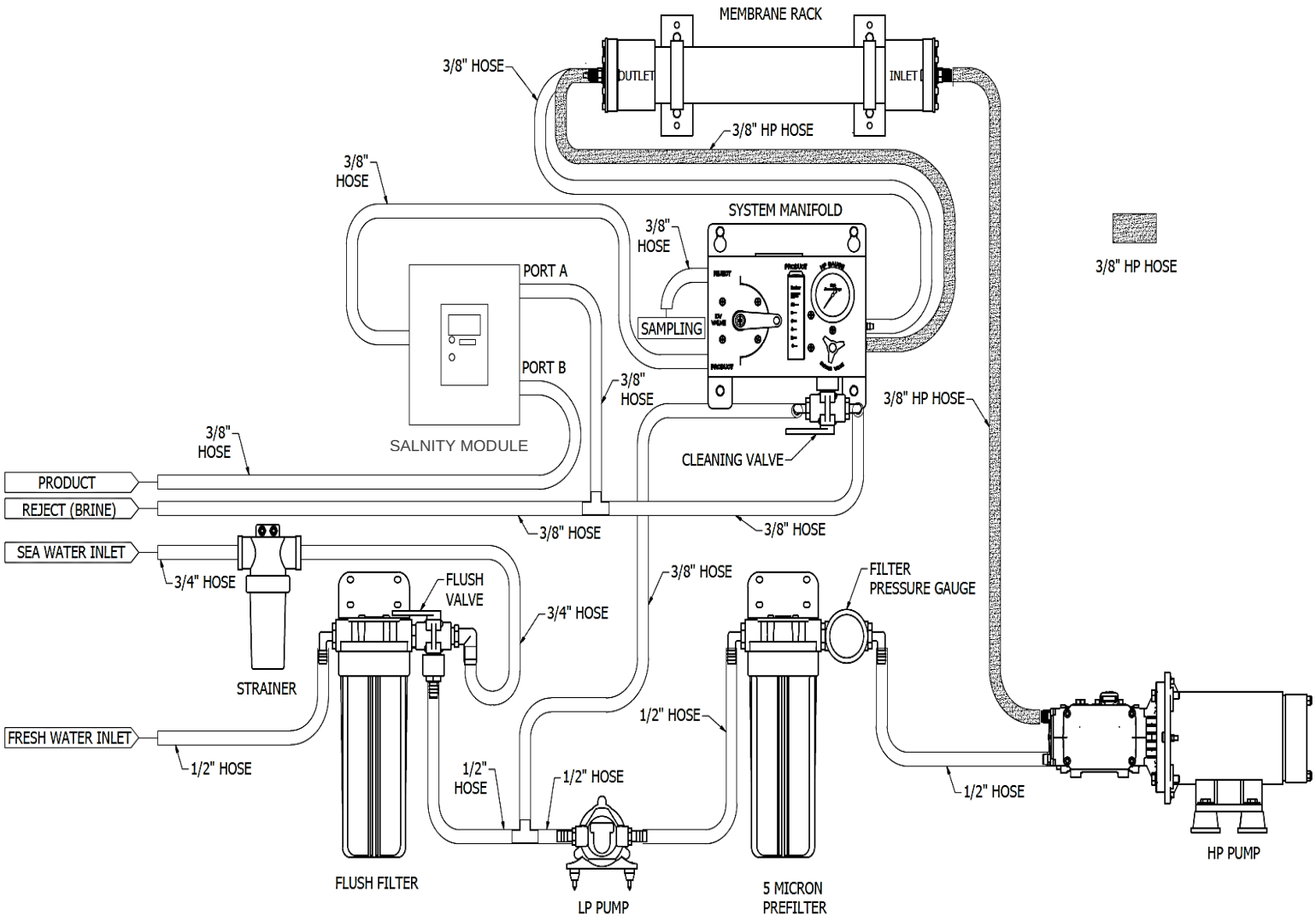


Figure 1.1: Plumbing Diagram LTM 145-350

LTM 500-1800 PLUMBING DIAGRAM (WITH OPTIONALSALINITY MONITOR)

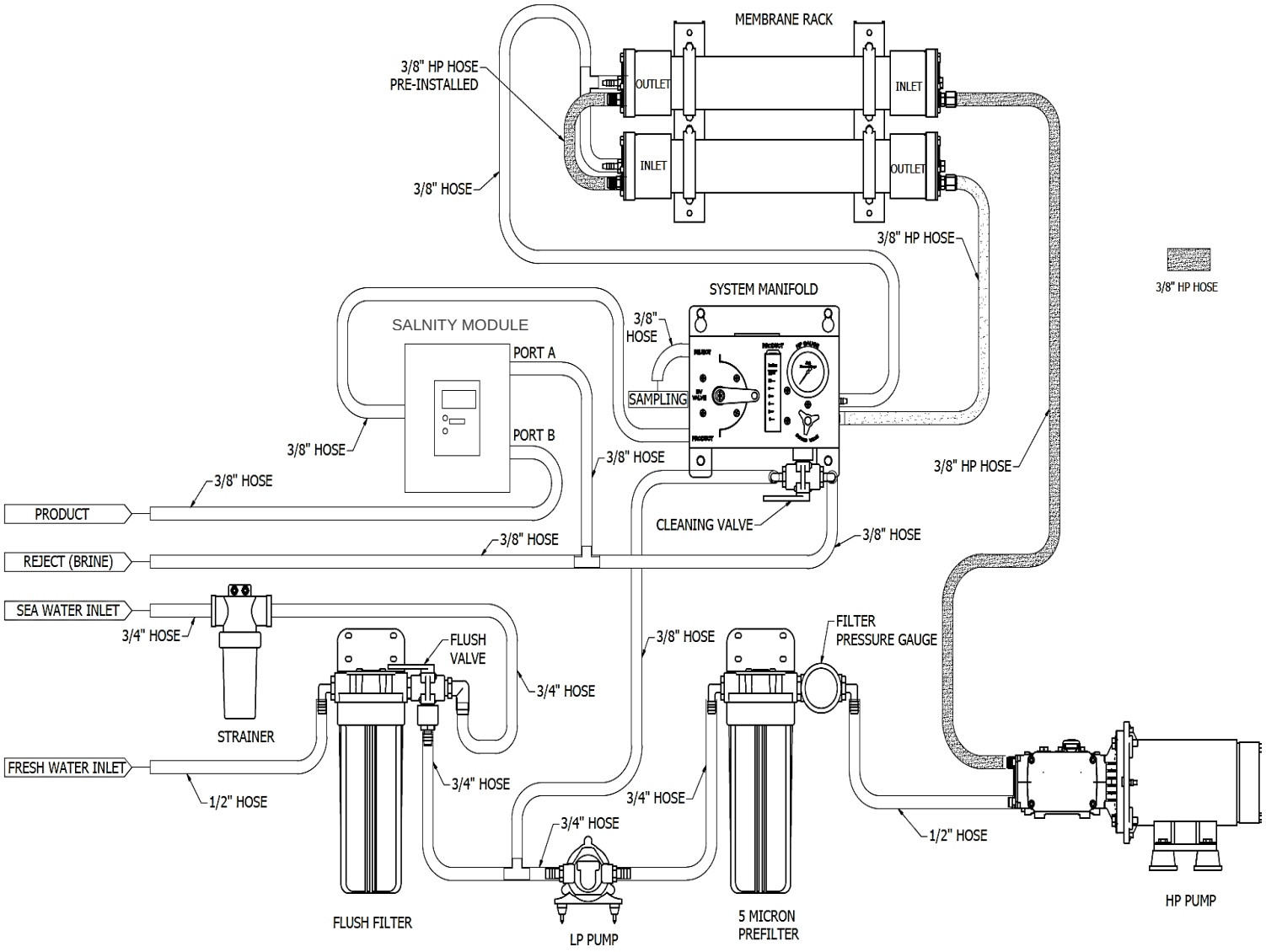


Figure 1.2: Plumbing Diagram LTM 500-1800

LTM 500-1800 PLUMBING DIAGRAM (NO SALINITY MONITOR)

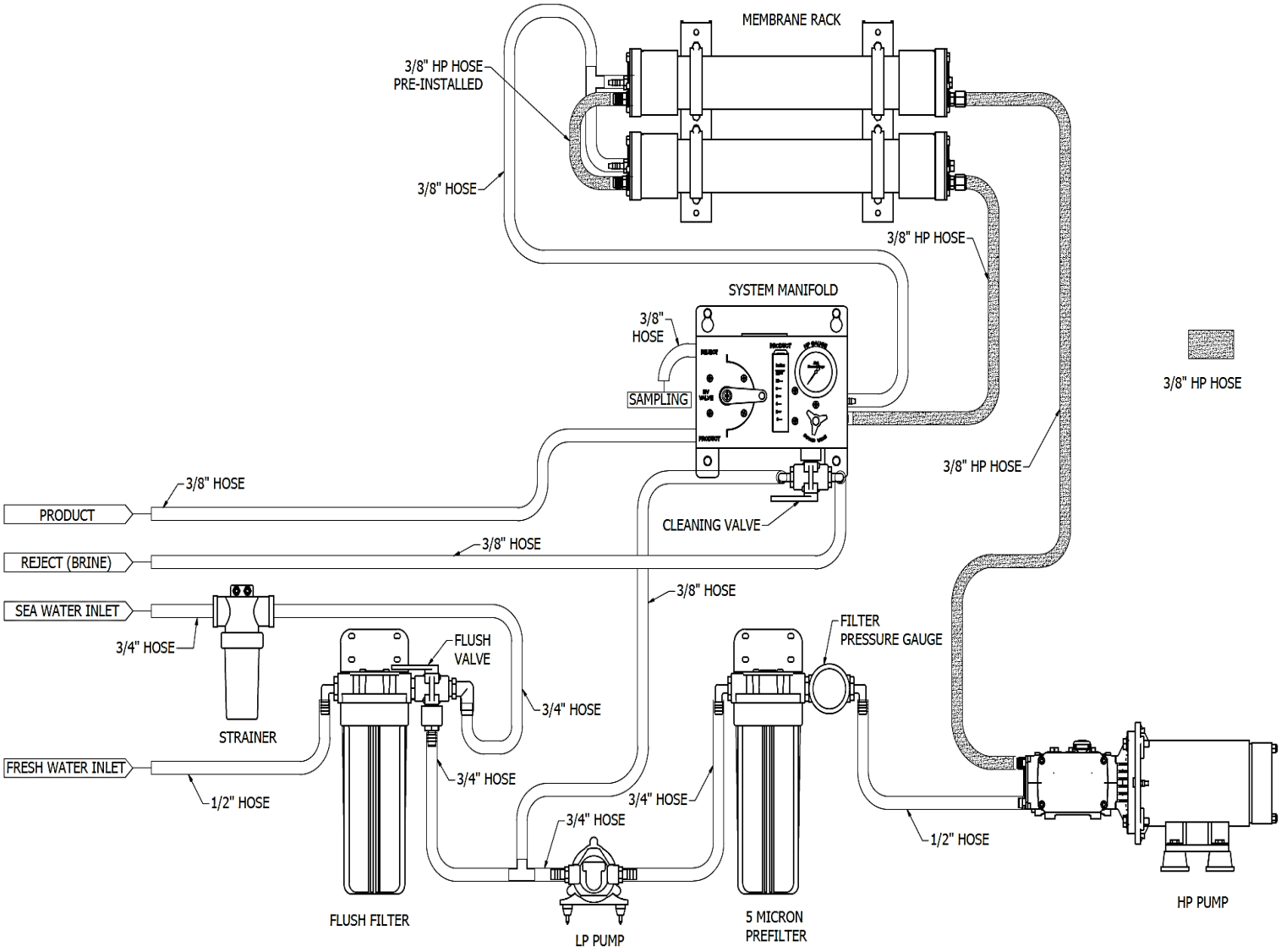


Figure 1.3: Plumbing Diagram 500-1800 (NO SALNITY MONITOR)

1.2 MOUNT COMPONENTS

CAUTION

Inlet and discharge interconnecting lines should be constructed of a NON-FERROUS material. Examples of some suitable materials are PVC, copper-nickel, 316 stainless steel pipe or a reinforced non-collapsing hose. Ferrous piping introduces iron that will foul the membranes prematurely.

1) Parker recommends mounting a sea strainer **BELOW** the vessel's waterline.

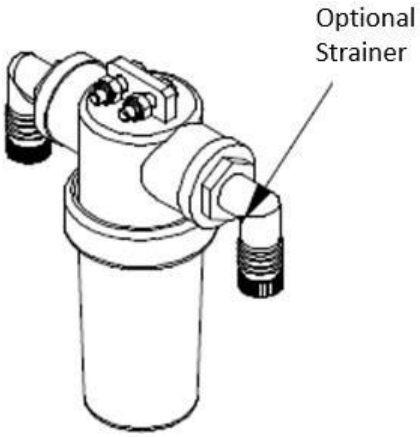


Figure 1.4: Optional Strainer

2) Mount the three-way manual Freshwater Flush Valve (attached to Fresh Flush Filter Housing) BELOW waterline. Refer to Figure 1.3 for a view of the flush filter and freshwater flush valve.

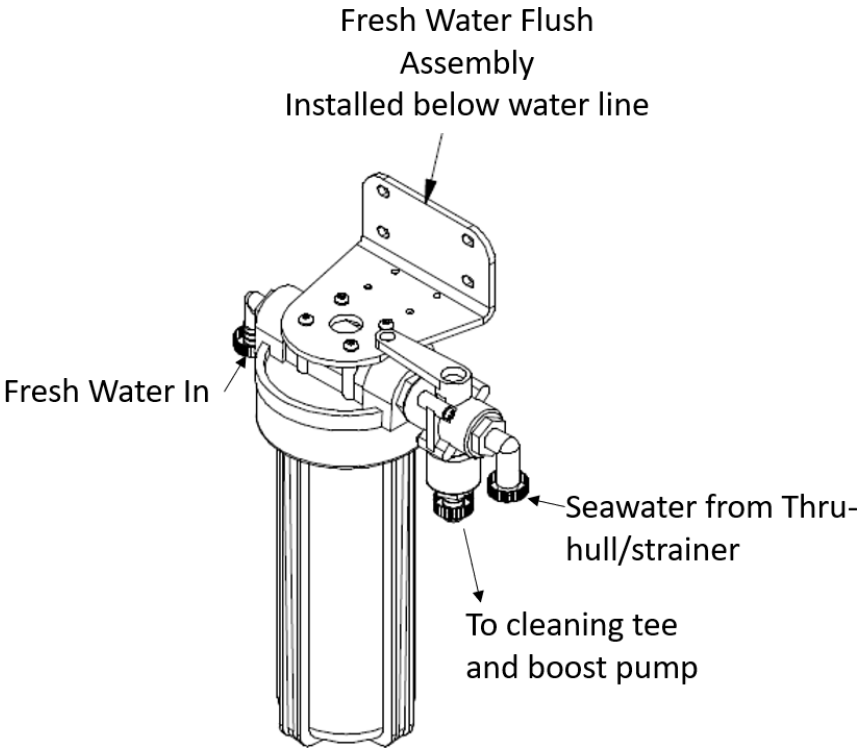


Figure 1.5: Freshwater Flush Assembly

NOTE

Parker Hannifin recommends the Manual Freshwater Flush Assembly be installed BELOW waterline. However, the three-way valve can be removed from the filter housing and relocated below waterline, leaving the freshwater flush filter housing ABOVE waterline. A hose can be plumbed from the freshwater flush filter housing to the three-way valve. This ensures the seawater feed does not go above waterline to avoid trapping air and creating a priming problem.

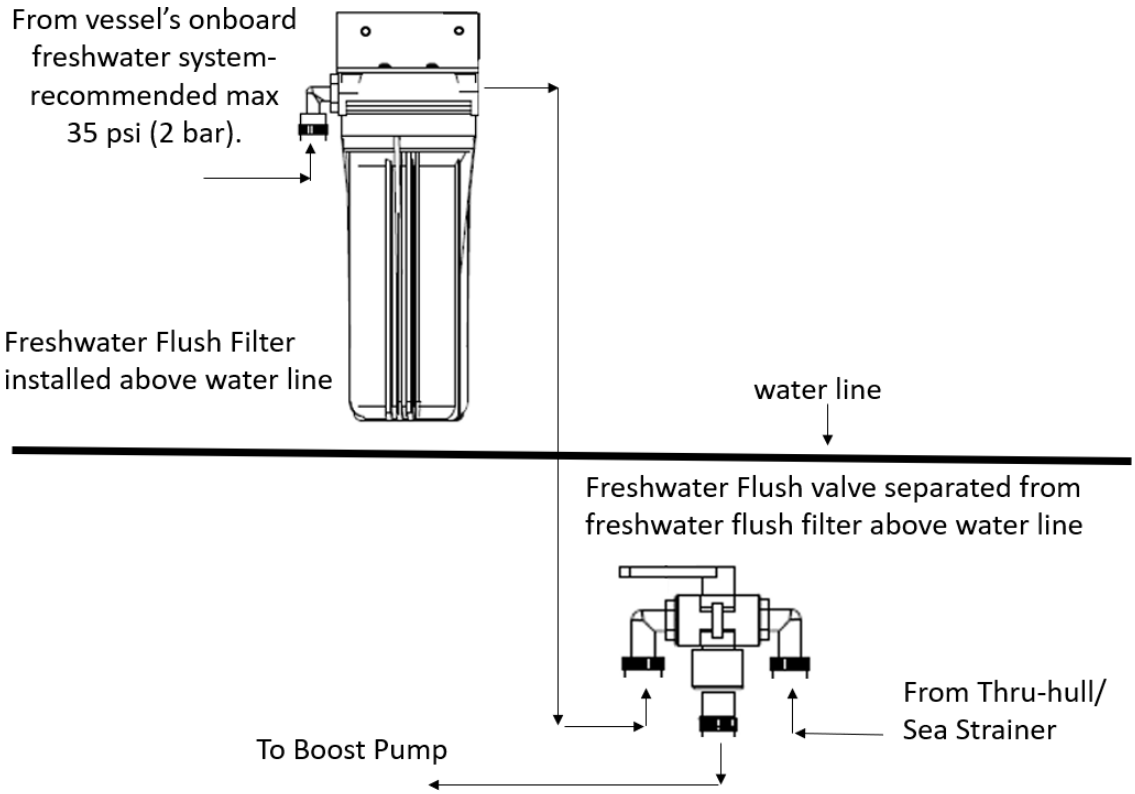


Figure 1.6: Freshwater Flush Assembly with fresh flush valve separated

3) Alternate Configuration see Figure 1.4: Connecting the Freshwater Flush Filter Outlet to the separated Freshwater Flush Valve. Connect PVC hoses to all the feed water components up to the high- pressure pump. For detail on sizing the hosing for your LTM system, refer to the Plumbing Diagrams on pages 8-10.

4) Mount booster pump (LP) below the water line.
Note: Figure 1.7 is shown for reference only (LTM-145 booster pump), bigger units will have bigger boost pumps.

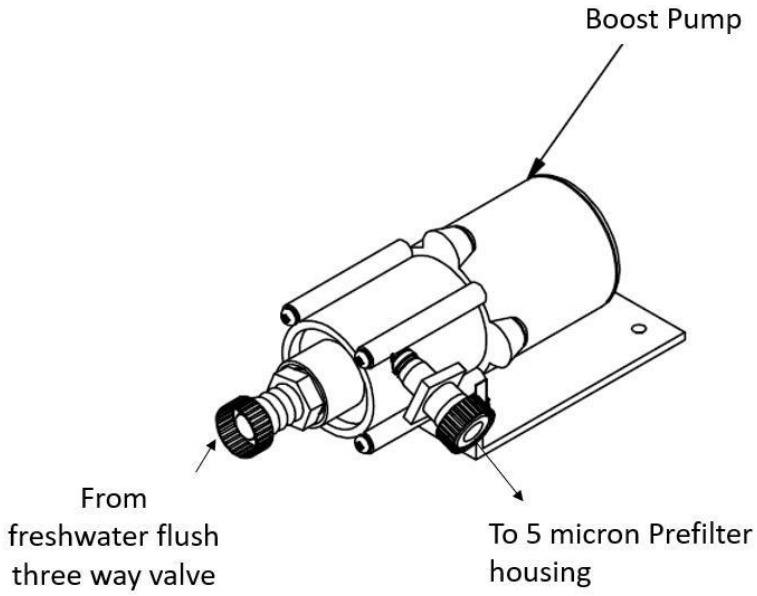


Figure 1.7: Booster Pump Assembly (LP)

5) Mount 5-micron prefilter housing assembly in convenient location for the operator to change filters.

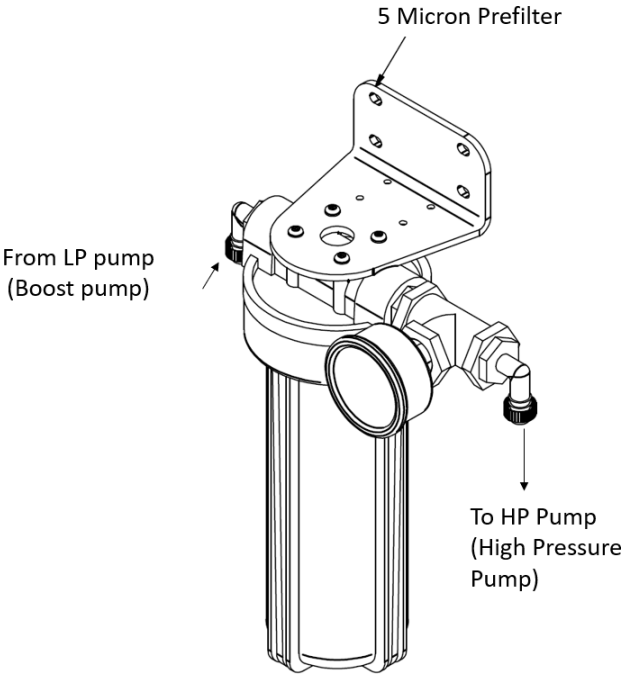


Figure 1.8: 5-Micron Prefilter Assembly

6) Mount System Manifold in convenient location for the operator.

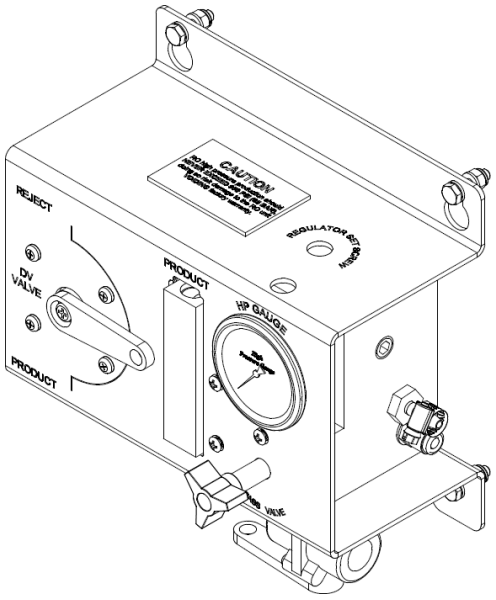


Figure 1.9: System Manifold

7) Mount vessel assembly. Locate within distance for high pressure hose to end from the high-pressure (HP) pump and vessel assembly. If longer lengths are required, please contact Parker technical support. Figure 1.10 is shown as reference.

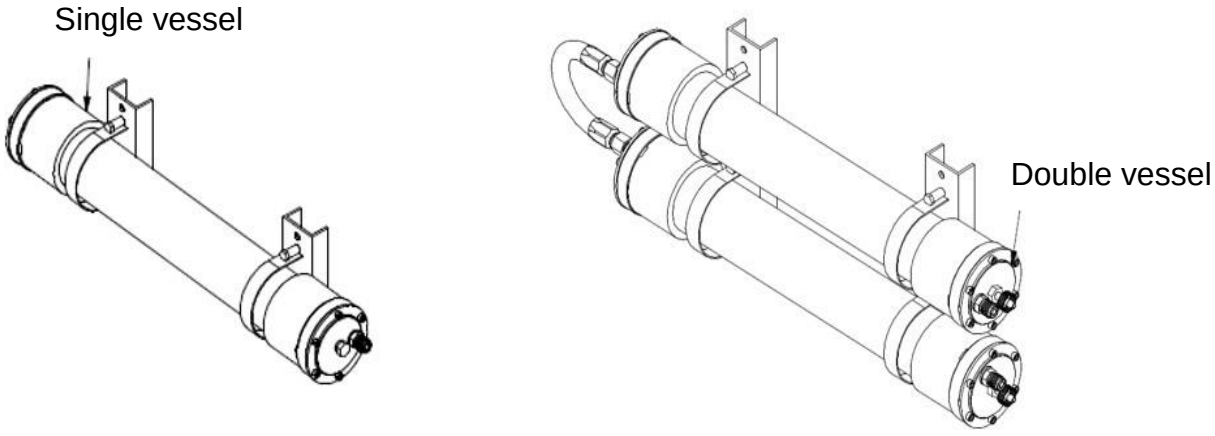


Figure 1.10: Vessel Assembly

8) Mount pump and motor assembly.

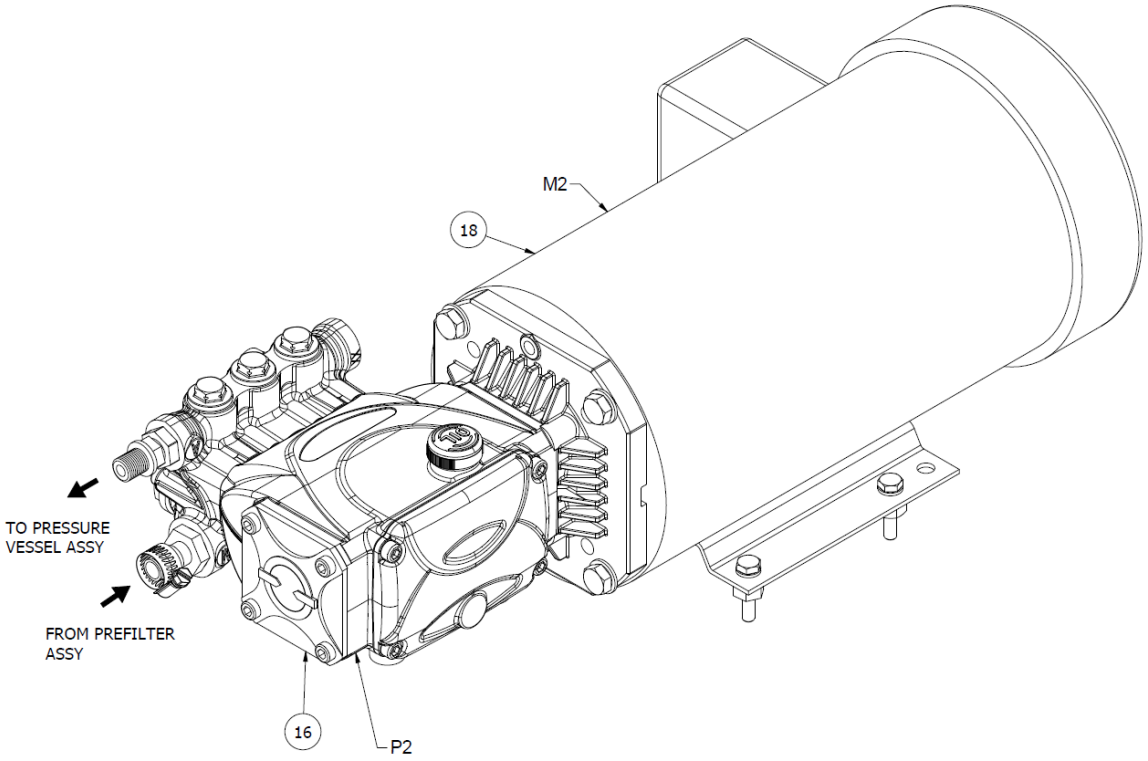


Figure 1.11: High Pressure Pump and Motor Assembly

1.3 PLUMB SYSTEM

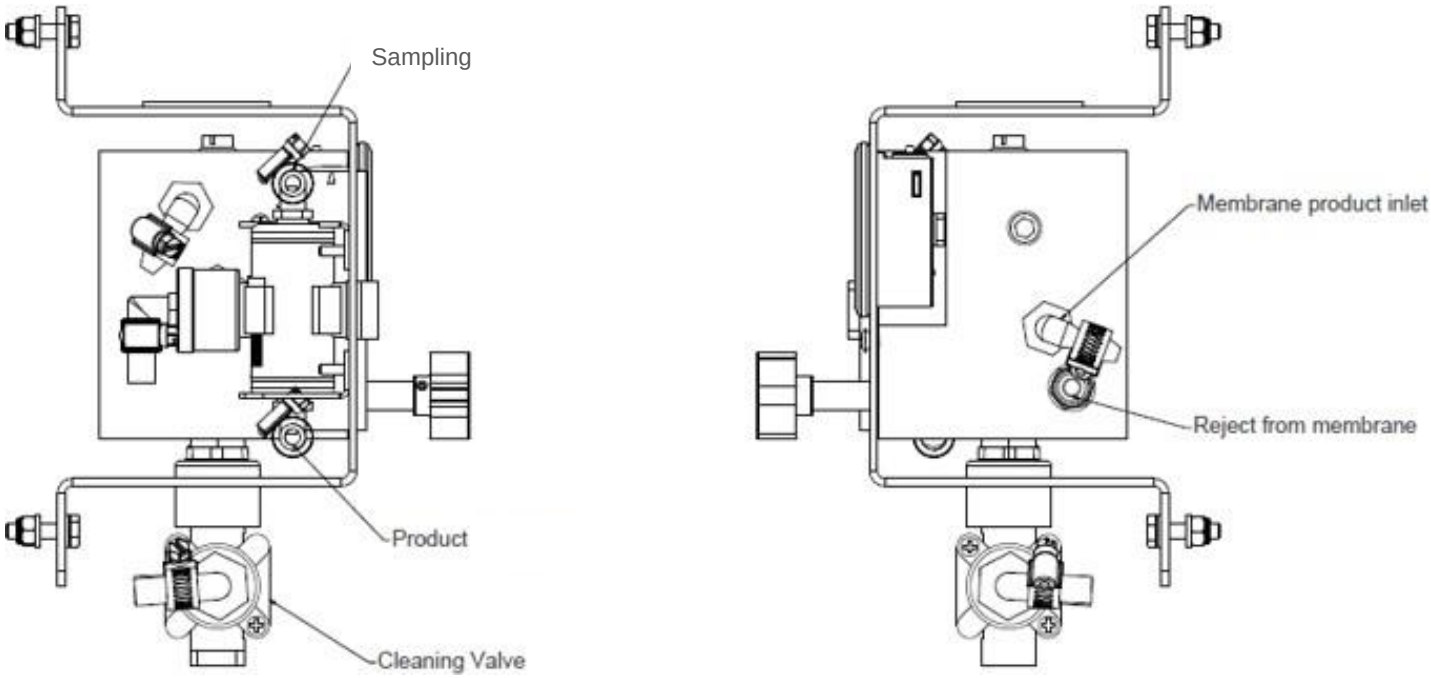


Figure 1.12: Side View System Manifold Connections

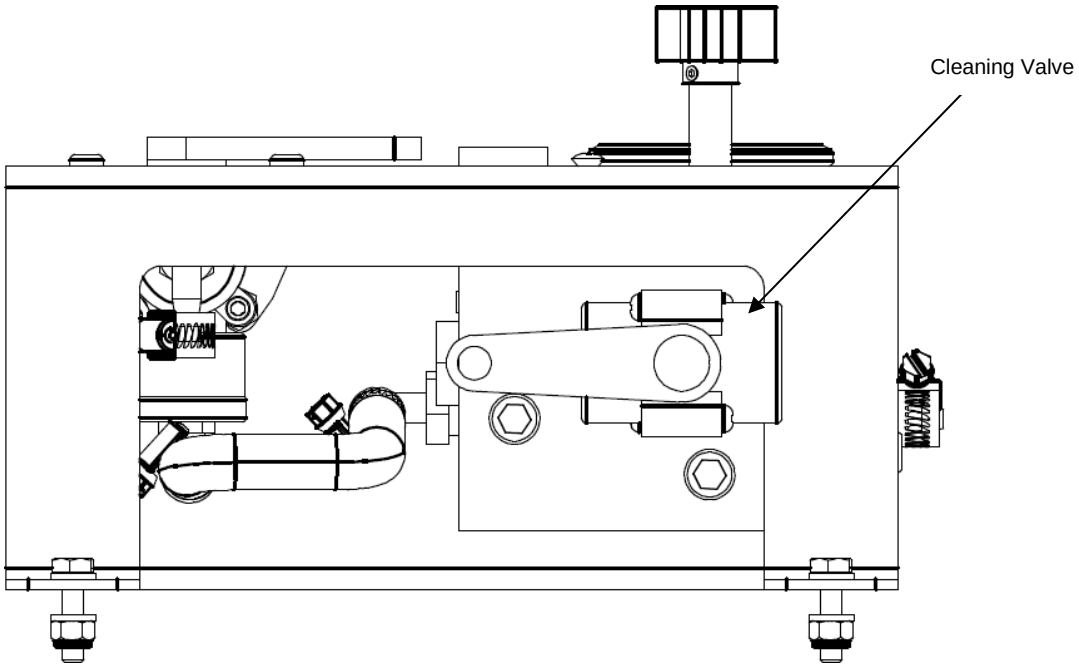


Figure 1.13: Bottom View System Manifold Connections

NOTE

See plumbing sizes on plumbing diagrams on pages 8-10.

1) Reject discharge overboard - Locate a convenient spot in the boat to install an overboard discharge through-hull with an 3/8" diameter. Discharge line is required to be ABOVE waterline (refer to figure 1.6). If connecting to a common drain, tee in from above so that backflow or syphoning to the watermaker from other drains is not possible.
2) Product to tank - Connect a PVC hose (or potable water hose) from the "product" (see figure 1.12) on the system manifold assembly to product storage tank.
3) Product sampling - Connect a PVC hose (or potable water hose), for product water "sampling" (see figure 1.12).

NOTE

If a fitting connection cannot be made to the top of the Freshwater Tank, tee into the Deck Water Fill.

NOTE

Leave enough hose length to RUN the sample hose portion to a sink, bilge, or overboard, to sample the water. Parker Hannifin recommends running the sample line to a galley sink and installing a dedicated water spigot, free flowing, always open (i.e. a 'cane shaped' fixture as used in a manual galley pump). This allows easy sampling at a sink, a drain overboard and the capability to fill extra water bottles, while your RO unit produces water for all purposes.

4) Membrane Product Inlet - Connect a PVC hose (or potable water hose), from membrane to manifold (SEE MEMBRANE PRODUCT INLET on figure 1.10).

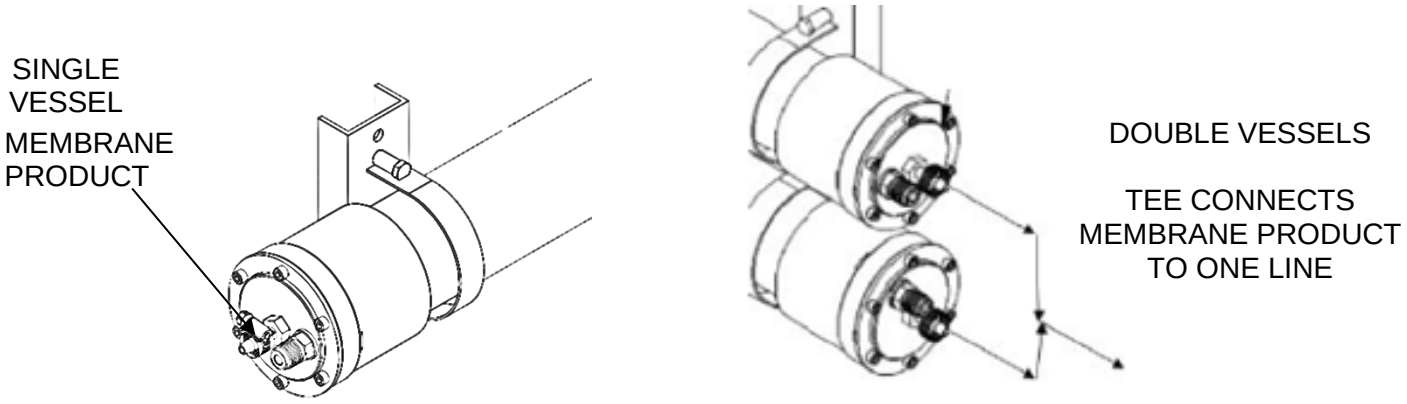


Figure 1.14: Product vessel Connections

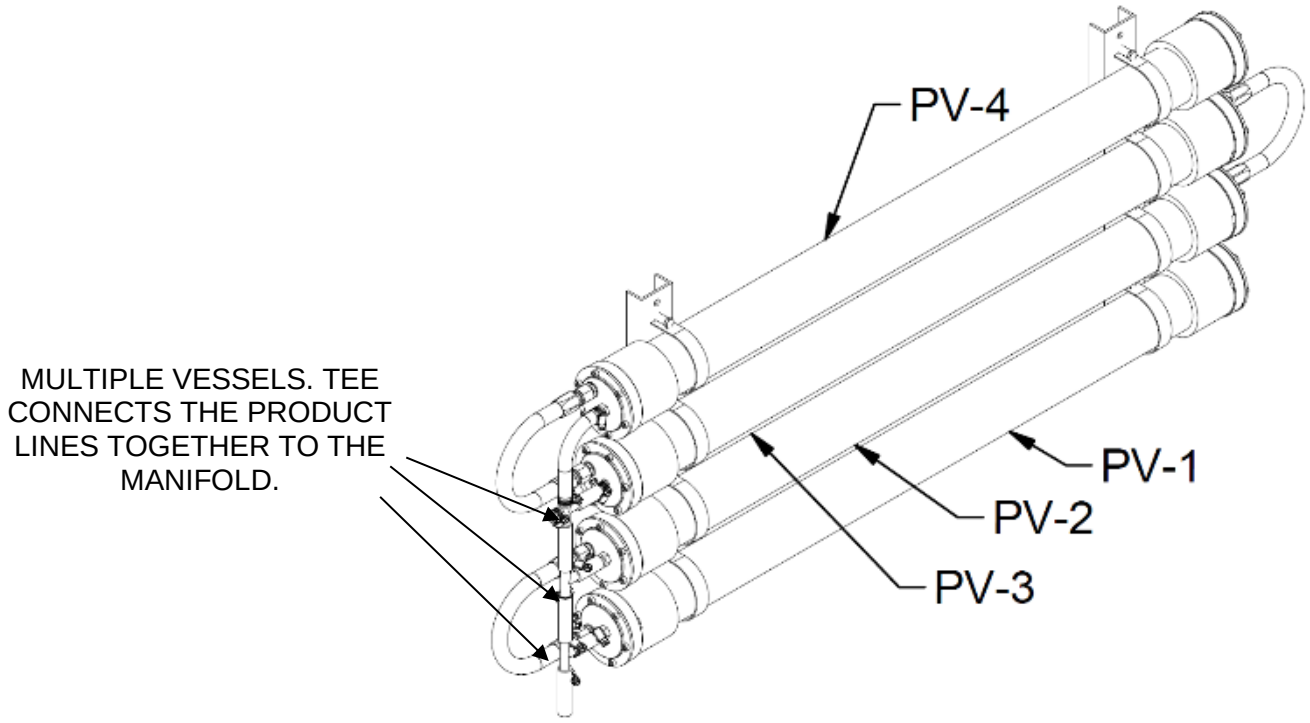


Figure 1.15: Product vessel Connections

5) Reject from Membrane - Connect High Pressure hose from membrane to manifold.

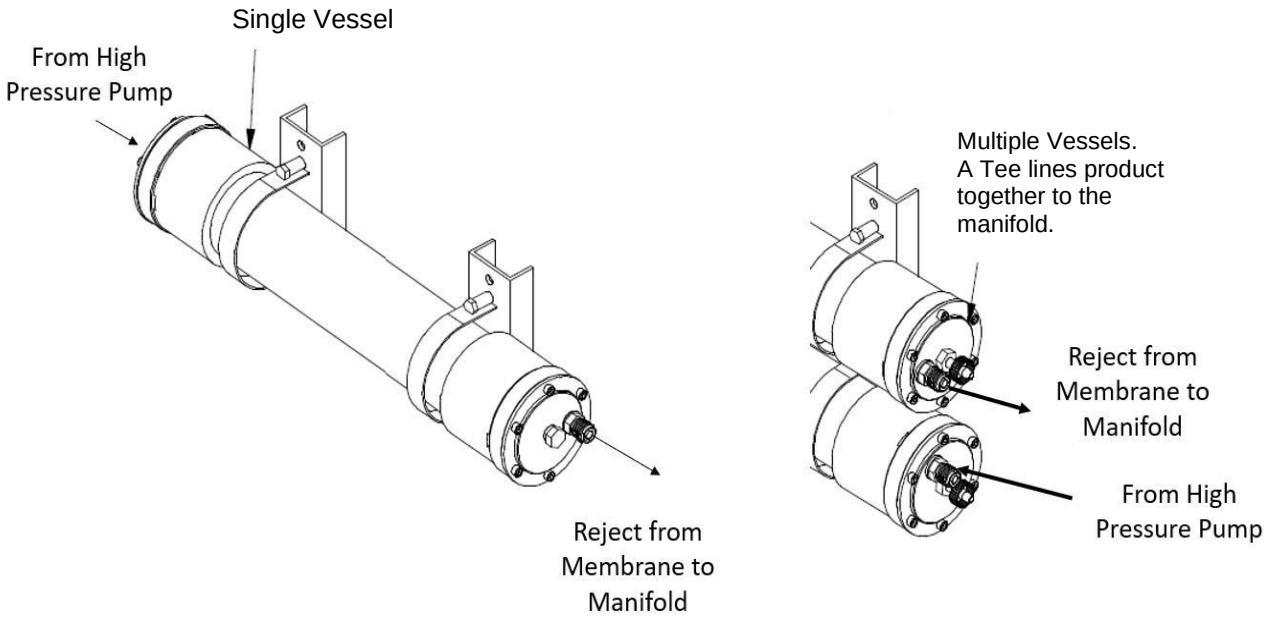


Figure 1.16: HP Pump and Reject hose vessel Connections

6) High Pressure Pump Hose - Connect High Pressure hose from HP Pump to membrane vessel. See Figures 1.1-1.3 &1.16.
7) Discharge 5-Micron Prefilter Hose - Connect 5-micron prefilter to hose from HP Pump to prefilter vessel. See Figure 1.8.
8) Inlet 5-Micron Prefilter Hose - Connect 5-micron prefilter to hose from LP Pump to prefilter vessel. See Figure 1.7 and Figure 1.8.
9) LP Pump (Booster Pump) Hose - Connect hose from LP to fresh water flush three-way valve. See Figure 1.5, 1.6 and Figure 1.7.
10) Strainer (Optional) Hose - Connect fresh water flush three-way valve hose to strainer. See Figure 1.4, 1.5 and Figure 1.6.
11) Seawater inlet hose – Connect seawater from seacock to freshwater flush three-way valve or strainer. See Figure 1.4, 1.5 and figure 1.6.
12) Fresh water inlet hose – Connect freshwater from pressurized fresh water supply to freshwater flush filter. Tap into your boat's freshwater pressure system (Tee into the cold pressurized side). See Figure 1.5 and figure 1.6.

1.4 ELECTICAL CONNECTIONS

WARNING

DISCONNECT ELECTRICAL POWER TO THE RO UNIT PRIOR TO CONNECTING OR SERVICING TO THE RO UNIT. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH TO PERSONS HANDLING THE UNIT.

CAUTION

Strictly observe all applicable electrical codes and regulations governing the installation and wiring of electrical equipment. Typical codes specify the type and size of conduit, wire diameter and class of wire insulation depending upon the amperage and environment. The power supply should always be of a greater service rating than the requirements of the RO unit. Never connect the RO unit to a line that services another electrical device, the RO unit should have its own breaker. PARKER recommends adding a switch for booster pump (LP) and a switch for high pressure pump (HP).

THE RO UNIT SHOULD HAVE ITS OWN INDEPENDENT POWER SUPPLY.

NOTE

The power supply should always be of greater service rating than the requirements of the RO unit. This will assure proper voltage even if power supply voltage is slightly less than required.

NOTE

110 VAC 60 hertz units need a three-wire supply, black, white and green for hot, common and ground respectively.

220 VAC 1PH 60 hertz units need a three-wire supply, black, white and green for hot, common and ground respectively.

220 VAC 60 hertz units need a four-wire supply, black, blue, white and green for hot, hot, neutral and ground respectively - bring a separate neutral from the generator if necessary.

230 VAC 50 hertz units need a three-wire supply, black, white and green for hot, hot, and earth respectively. Connect power to the main terminal block in the electrical enclosure following the above wire colors.

1) Before connecting electrical power to the watermaker. Select the circuit breaker size of at least 50% more than the operating amps shown on the serial number tag.
2) Verify all power switches and power sources are in the ***OFF*** position.
3) **DC POWERED 12V & 24V RO Unit:** VDC units require an appropriate size wire and amp fuse or circuit breaker. Connect RO unit motor to vessel circuit breaker. See 1.0 table for appropriate wire sizing.

Wire distance at Maximum Voltage Drop 10% & 5% (ft)		Wire size for system current (amps)								
10%	5%	5A	10A	20A	30A	40A	50A	60A	70A	80A
< 25 ft	< 10 ft	16 AWG	16 AWG	14 AWG	10 AWG	8 AWG	6 AWG	6 AWG	6 AWG	4 AWG
30	15	16 AWG	14 AWG	12 AWG	10 AWG	8 AWG	6 AWG	6 AWG	6 AWG	4 AWG
50	25	14 AWG	12 AWG	10 AWG	8 AWG	6 AWG	6 AWG	4 AWG	4 AWG	4 AWG
60	30	14 AWG	12 AWG	8 AWG	6 AWG	6 AWG	4 AWG	4 AWG	2 AWG	2 AWG
70	35	12 AWG	10 AWG	6 AWG	6 AWG	4 AWG	4 AWG	2 AWG	2 AWG	2 AWG
100	50	12 AWG	10 AWG	6 AWG	4 AWG	4 AWG	2 AWG	2 AWG	1 AWG	1 AWG
125	65	10 AWG	8 AWG	6 AWG	4 AWG	2 AWG	2 AWG	1 AWG	0 AWG	0 AWG
150	75	10 AWG	6 AWG	4 AWG	2 AWG	2 AWG	1 AWG	0 AWG	2|0 AWG	3|0 AWG
200	100	10 AWG	6 AWG	4 AWG	2 AWG	1 AWG	0 AWG	2|0 AWG	3|0 AWG	3|0 AWG

Table 1.0: Wire size for length and current

4) **AC POWERED 110V/220V/440V:** Connect the RO unit motor to a vessel circuit breaker. Parker recommends sizing an appropriate amp fuse or circuit breaker. Use the table below to determine the amperage of your unit.

Model	Part Number	Electrical Supply Volts/ Ph/Hz/Amps
LTM-145	90-8200PH 90-8622PH	12/29 24/14.5
LTM-300	90-8154PH 90-8596PH	12/34 24/17
LTM-350	90-6009 90-6010	12 VDC/60 24 VDC/30
LTM-500	90-6019 90-6047 90-6048	110/1/60/18 220/1/60/8 230/1/50/8
LTM-800	90-6049 90-6050 90-6051 90-6079	110/1/60/18 220/1/60/9 230/1/50/8 230-460/3/50-60/6-4
LTM-1000	90-6052 90-6053 90-6080	220/1/60/12** 230/1/50/12.5 230-460/3/50-60/8-6.5
LTM-1300	90-6054 90-6055 90-6082	220/1/60/12** 230/1/50/12.5 230-460/3/50-60/8-6.5
LTM-1800	90-6083 90-6056 90-6078 90-6076 90-6077	110/1/50-60/18 220/1/60/12 230/1/50 380/3/50/7.5 460/3/60/7

NOTE

The amperage is calculated by the equation A = W/V. The Current (A or amps) equals watts (W) divided by voltage (V). For instance, to size a breaker for the LTM-500, divide the system wattage 1500 W (1.5 kW) by 110 Volts, the result will be 13.6 amps. This system will require a breaker that supports at least 13.6 amps. Keep in mind you must consider the booster pump amperage as well. For more information on your alternating-current system and booster pump power requirements, see tables 1.1 & 1.2 below.

System Wattage/Horsepower – AC Units					
Hz	LTM-500	LTM-800	LTM-1000	LTM-1300	LTM-1800
60 Hz	2 HP/1.5 kW	2 HP/1.5 kW	2.5 HP/1.9 kW	2.5 HP/1.9 kW	2.5 HP/ 1.9 kW
50 Hz	1.75 HP/1.3 kW	1.75 HP/1.3 kW	2 HP/1.5 kW	2 HP/1.5 kW	2 HP/1.5 kW

Table 1.1: LTM-500 to LTM-1800 Main Power Requirement

BOOSTER PUMP Wattage/Horsepower – AC UNITS					
Hz	LTM-500	LTM-800	LTM-1000	LTM-1300	LTM-1800
60 Hz	0.2 HP/150 W	0.2 HP/150 W	0.2 HP/150 W	0.5 HP/368 W	0.5HP/ 368 W
50 Hz	0.175HP/130 W	0.175 HP/130 W	0.175 HP/130 W	0.44 HP/322 W	0.44 HP/322 W

Table 1.2: LTM-500 to LTM-1800 Booster Pump Power Requirement

5) Connect the booster pump motor wires, HP motor, and any other electrical unit components to the vessel circuit breaker.

NOTE

The amperage fuse/circuit breaker should be at minimum 20% greater than the RLA (Run Load Amps) and must be appropriately sized for the wire AWG. Alternate Current breakers often have an efficiency that is 80% of their rating. Example: A 20-amp breaker is good for a maximum continuous rating at 16-amps, please check the breaker specifications for an accurate assessment.

2. COMMISSIONING AND OPERATING PROCEDURE

2.1 COMMISSIONING

2.1.1 Load 5-Micron Filter. (If required) See 5-mircon filter change out procedure in the Maintenance Section of this manual.

2.1.2 Load Fresh Flush Filter. (If required) See Fresh Flush filter change out procedure in the Maintenance Section of this manual.

2.1.3 Add Oil to Pump (If required). See oil change out procedure in the Maintenance Section of this manual.

2.1.4 Install membrane (If required) See Membrane Change Out procedure in the Maintenance Section of this manual.

2.2 OPERATION

1) Check the HP pump oil level by observing sight gauge located on the pump. Fill with oil to sight level indicated. Oil Part No. 85-0050.

CAUTION

Do not run pump without oil in the crankcase. Permanent damage to pump will occur.

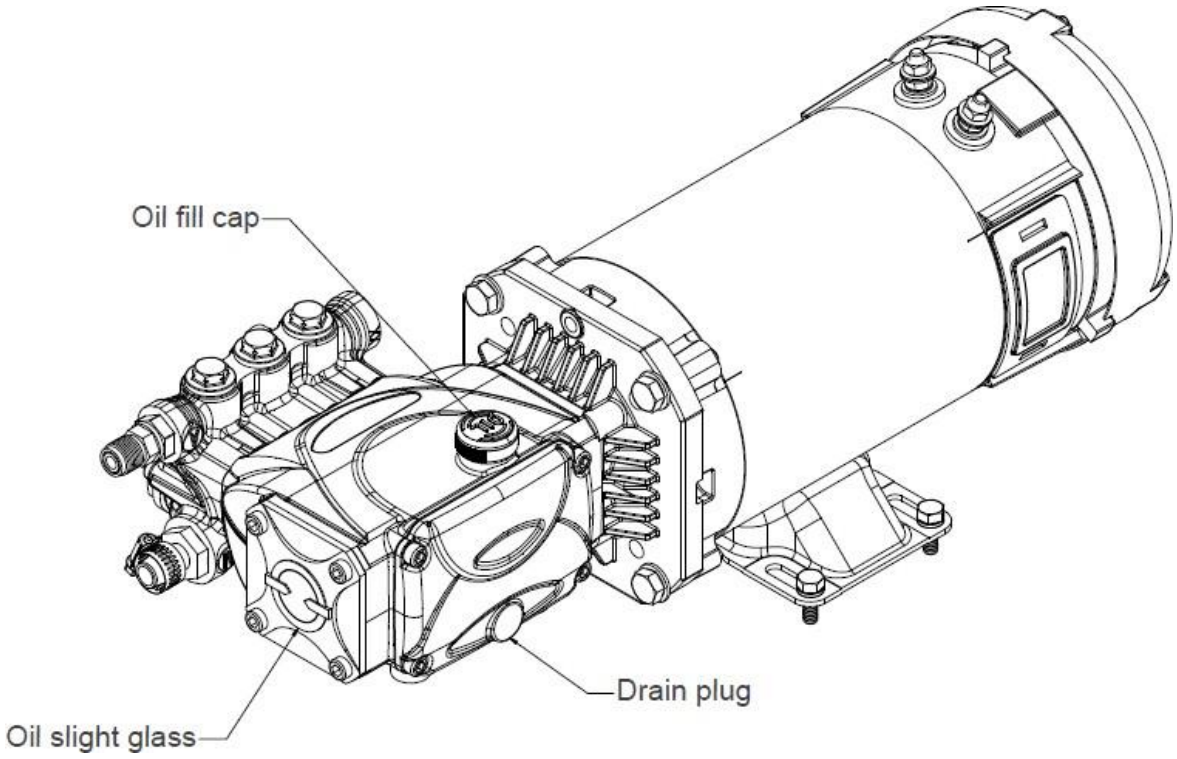


Figure 2.0: HP Pump Oil Level

2) Ensure that the three-way fresh flush valve is in the saltwater position with the valve handle pointing away from the fresh flush filter.

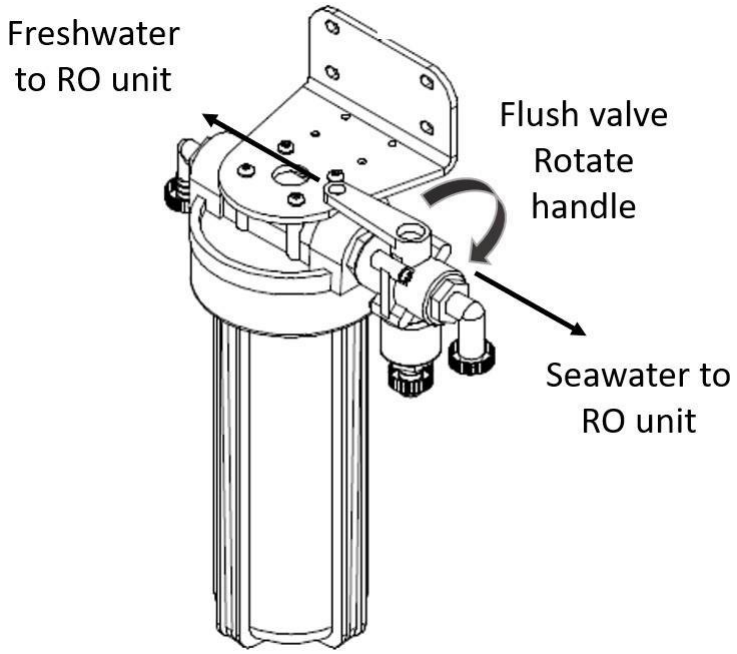


Figure 2.1: Fresh Flush Valve

3) Ensure the diversion valve (DV) should be in the “reject” position, not directed to the “Product” tank.
4) Ensure the cleaning valve is directed to the discharge overboard reject (brine) line.

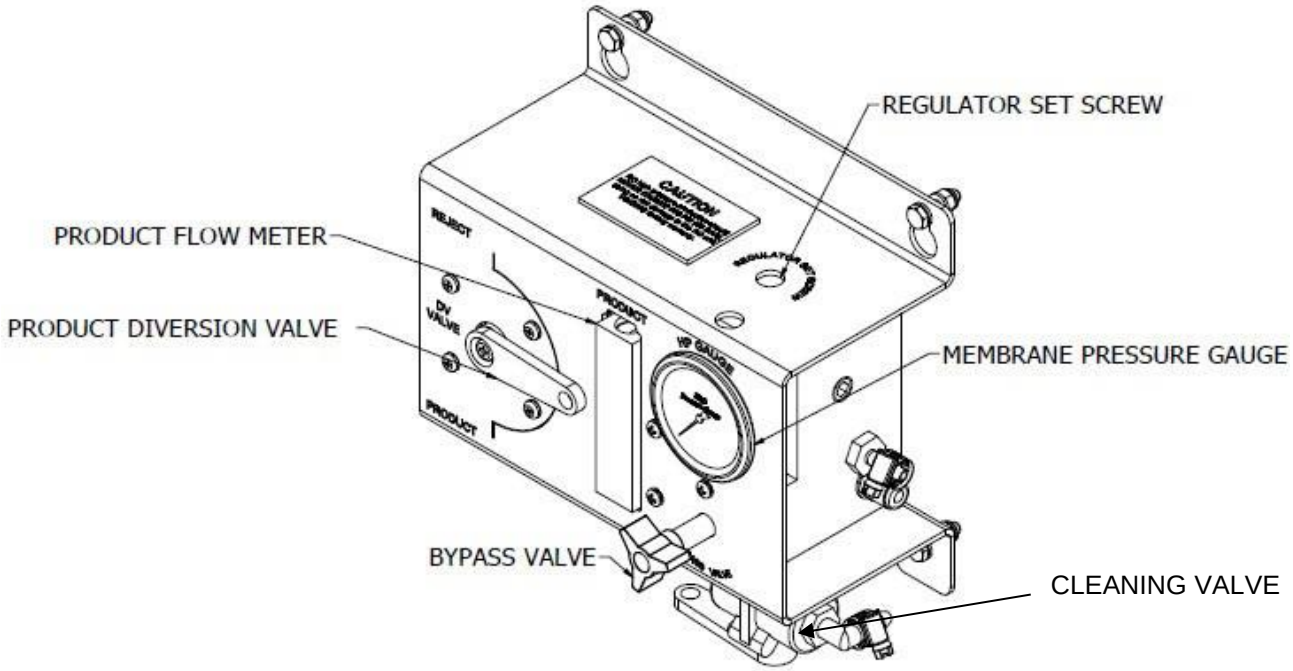


Figure 2.2: System Manifold

5) Verify the bypass valve (black handle) is open, counterclockwise.
6) Open the seawater supply to the unit.
7) Start the LP pump, verify the filter pressure gauge is above 5 psi (0.4 BAR) indicating the system is primed with water.

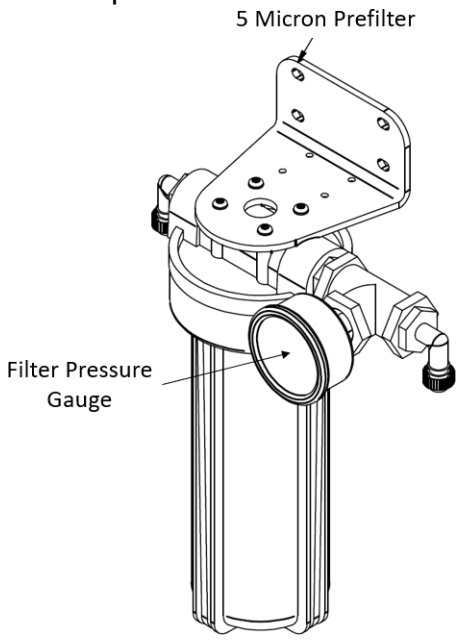


Figure 2.3: Filter Pressure Gauge

8) Start the HP pump. Water should now be flowing through the system and discharging through the overboard reject (brine) line. Often installations will connect both LP and HP pumps to the same circuit breaker. This arrangement is acceptable; however, it is still prudent to confirm the pumps are primed and running correctly.

CAUTION

Pump will be damaged if ran dry.

9) Slowly close the bypass valve and confirm that the membrane pressure gauge registers 800 psi (56 BAR). The bypass valve should only be adjusted at startup and shutdown.

NOTE

The high-pressure setting is set by the factory to operate at 800 psi (56 BAR). If the setting needs to be changed, the pressure regulator set screw can be adjusted at the top of the system manifold.

Customers do not have to adjust the regulator set screw valve to operate the unit.

For smaller increment changes, use the bypass valve to make pressure changes. The system can be operated between 600-800 psi depending on the expected product flow.

10) After 2 minutes of operation, confirm the salinity by taste test or by hand meter at the sample valve. Once it is acceptable, turn the diversion valve to direct water to your storage tank. A digital salinity monitor and automatic diversion valve is available as an option (see pg.3).
11) Now, would be a good opportunity to record the pressures, flow, and salinity on the Operation Log. (pg.2)
12) For shutdown, reverse the steps. First, open the black bypass valve. Then shut down the HP and LP pumps. Turn the diversion valve back to reject position. If you are unsure if the watermaker will be restarted in a day or so, now is time to flush the watermaker to keep the membranes fresh while idle, please see the next section.

CAUTION

Bacteria and biological growth increases, the longer stagnant water is in contact with the membranes, so the flushing is advised whenever the unit will be idle. Once flushed, the flush should be repeated once every one or two weeks if the idle period continues. For short term storage, see the Fresh Water Flush / Short Term Storage

section. For extended periods, see the membrane preservation in the Maintenance section of the manual.

2.3 FRESHWATER FLUSH / SHORT TERM STORAGE

Ideally, the system performs optimally when the RO unit is used regularly. The likelihood of bacterial and biological growth in the membranes increases when stagnant seawater (in extended periods) is in contact with the membranes. A freshwater flush procedure is necessary to prevent clogging and growth of organic contaminants in the RO system and its membranes. This method pushes out older stagnant seawater (saltwater) out of the membranes and replaces it with freshwater (non-saltwater), leaving less chance of fouling the membranes. The freshwater flush procedure should be used when the unit will be placed idle or in "stand by" condition for more than several days. Although they do not attack the membranes or other system components directly, high concentrations of biological matter can block enough of the product water channels to cause a reduction of as much as 40% of the total system capacity.

CAUTION

Perform a freshwater flush to the RO unit with non-chlorinated fresh water only. Exposing the membranes to chlorinated water will cause irreversible damage and void the RO unit warranty. The freshwater flush system uses a carbon filter inline before the system to consume the chlorine that may be present from the dock water.

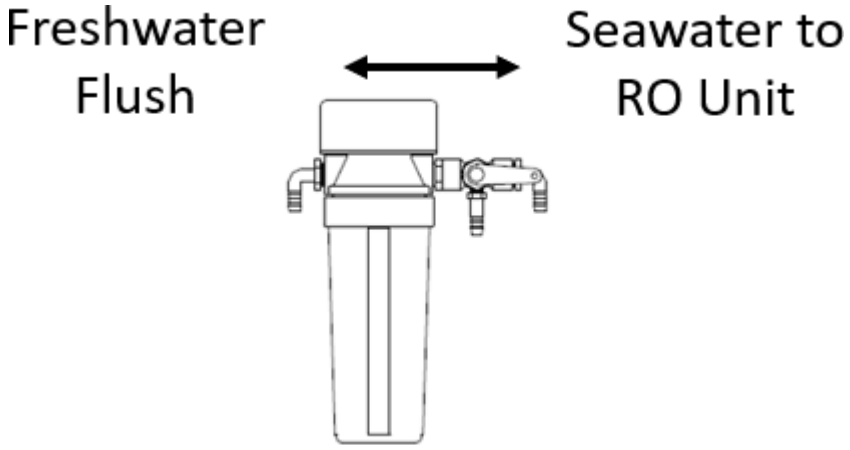


Figure 2.4: Three-way Flush Valve Handle Direction.

2.3.1 TO FLUSH THE RO UNIT

1) Ensure all power switches and power sources are turned OFF.
2) Ensure the cleaning valve should be in the “reject” position, directed to discharge overboard.
3) Ensure seawater supply is turned off to system.
4) Ensure the High-Pressure Bypass Valve is fully open
5) Turn the gray Fresh Water Flush Valve to Fresh Water Flush. See figure 2.1: Fresh Flush Valve.

6) Pressurized water from the vessel should begin to flow through the system. If the water is chlorinated it will be removed by the flush filter.
7) Allow water to flow for 3-5 minutes – this allows time to push out all the seawater.
8) Turn the gray Fresh Water Flush Valve back to Seawater to RO Unit position.
9) Leave RO unit in standing condition, for up to three weeks. Then re-flush or preserve.
10) To restart the RO Unit, refer to instructions in section 2.2 Operation

2.4 SALINITY MONITOR (OPTIONAL):

The salinity monitor will continuously monitor the quality of the product water and divert it overboard when it is below the user-determined preset level.

Figure 2.5: Salinity MONITOR

The Salinity Monitor will have three ports A, B, & C. Port A will be the connection to the reject line, Port B will be the connection to the product line, and Port C will be the incoming product connection from the system manifold. For a more detailed plumbing Diagram with the salinity monitor check pg. 8 & 9.

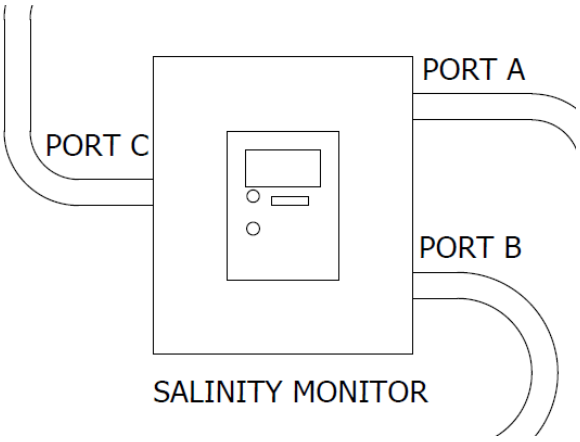
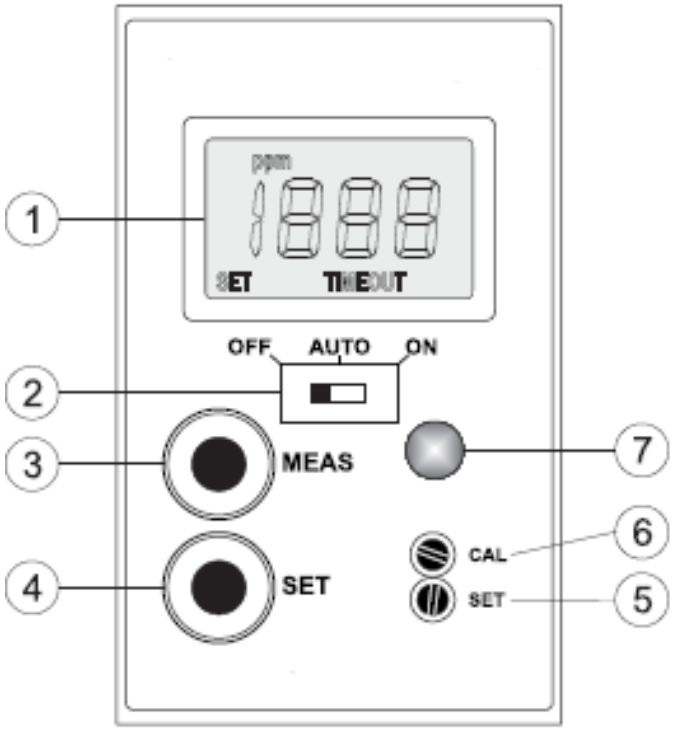


Figure 2.6: Salinity Monitor Connections



1- Diversion Mode
2- Switch for selecting dosing mode:
   . **OFF** = diversion disabled
   . **AUTO** = automatic diversion active
   . **ON** = manual diversion
3- **MEAS**: monitor mode
4- **SET**: key to display and set the setpoint value
5- **SET**: trimmer to adjust the setpoint value
6- **CAL**: trimmer
7- 3-color LED indicator:
   . Green = monitoring
   . Orange/Yellow = diverting to tank
   . Red, blinking = indicated an alarm condition

Figure 2.7: Salinity Monitor LED

3. MAINTENANCE

The service life of most system equipment is directly related to the raw water inlet conditions. Improper maintenance will also significantly reduce the life expectancy of the major unit components (such as the membranes, filters and pumps), as well as the reliability of the unit as a whole. Under normal conditions, and with proper maintenance, a reverse osmosis membrane (which is the major consumable item) should have an effective service life of 3 to 5 years.
The RO unit must be serviced when product water production output drops by 20%.

	Daily	Weekly	Monthly	Quarterly	Semi-Annually	Annually	As Required	Labor Hours (approximate)
Freshwater Flush System		•					•	0.5
Clean/inspect micron pre-filter			•				•	0.5
Replace filter(s)*				•				0.5
Change Fresh Flush Filter					•			0.5
Check pump oil level	•							0.1
Change pump oil**						•		0.5
Replace Membranes							•	1.0
Clean membranes							•	2.0

Table 3.0: Maintenance Task Chart.

* Parker pre-filter cartridges can be rinsed with freshwater and be reused up to 3 times.
** Change pump oil after first 50 hours of RO use. After the first oil change at 50 hours, change the pump oil every 500 hours thereafter or once annually which ever interval comes first.

3.1 Load 5-Micron Prefilter.

PARTS NEEDED

Description	Part No.	Quantity
5-micron	33-0117	1

1) Ensure all power switches and power sources are turned OFF.
2) Ensure seawater is turned off to system.
3) Remove filter housing by turning counterclockwise.
4) Inspect filter O-ring.
5) Replace filter and reinstall filter housing.

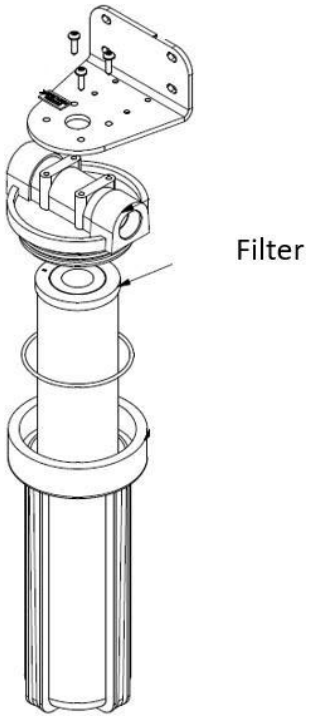


Figure 3.0: 5-micron prefilter

3.2 Load Fresh Flush Filter.

PARTS NEEDED

Description	Part No.	Quantity
Flush Carbon Filter	33-0311	1

1) Verify all power switches and power sources are turned OFF.
2) Verify seawater and freshwater is turned off to system
3) Remove filter housing by turning counterclockwise.
4) Inspect filter O-ring.
5) Replace filter and reinstall filter housing.

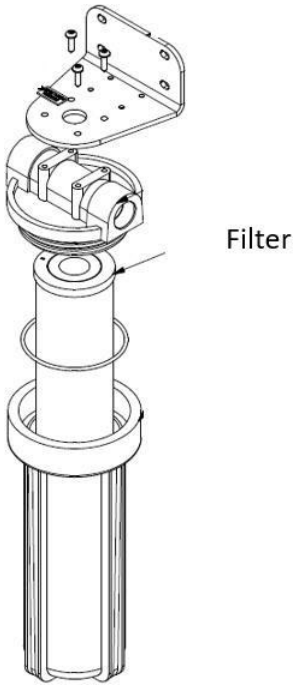


Figure 3.1: Fresh Flush Filter

3.3 OIL CHANGE PROCEDURE

An oil change is recommended after the first 50 hours of RO use. Subsequent oil changes are to be performed every 500-hour intervals OR changed annually. Change oil any time moisture is detected or if oil is cloudy. For additional pump information, refer to MANUFACTURER'S LITERATURE in this manual.

PARTS NEEDED

Description	Part No.	Quantity
Pump Oil	85-0050	1

CAUTION

Do not run pump without oil in the crankcase. Permanent damage to pump will occur.

1) Verify all power switches and power sources are turned OFF.
2) Before changing the oil, obtain a container (i.e. tray or catch basin) to collect the oil drainage.
3) Remove the oil drain plug (Refer to Figure 3.0) and direct the oil to a catch basin. Allow the oil to drain empty.
4) Reconnect the oil plug or oil drain stopper. Then unscrew the oil fill cap and refill oil to fill line (located on oil sight glass). Check for leaks and re-secure oil cap.

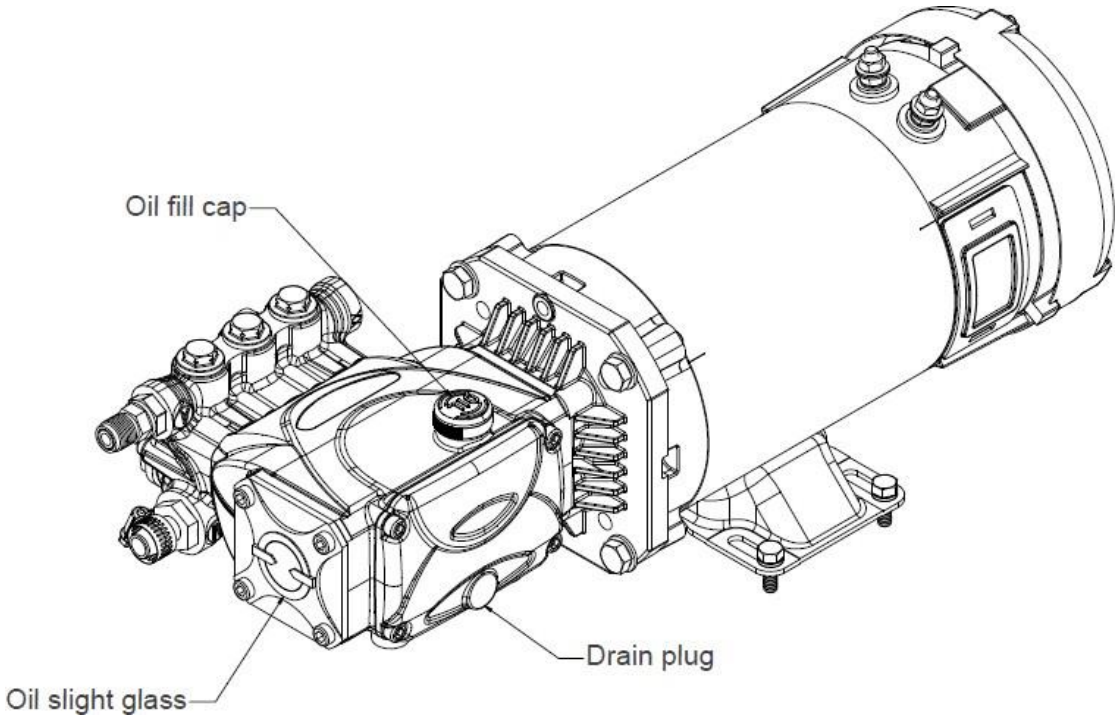


Figure 3.2: High Pressure Pump Service Locations

3.4 MEMBRANES LOADING

PARTS NEEDED LTM-145-300

Series	Description	Part No.	Quantity
145	Membrane	33-2519	1
300	Membrane	33-2519	2

PARTS NEEDED LTM-350-1800

Description	Part No.	Quantity
Membrane	33-0238	Varies

1) Verify all power switches and power sources are turned OFF.
2) Verify seawater is turned off to system
3) Disconnect plumbing from pressure vessel for disassembly.
4) Remove the pressure vessel(s) to a workbench to continue.
5) Remove the six fasteners and cap ring holding each end plug with an Allen wrench.
6) Place a mark on each end plug to be removed, place a corresponding mark on each end collar. This will ensure proper orientation during assembly. See bulletin at the back of the manual for part numbers of the individual components.

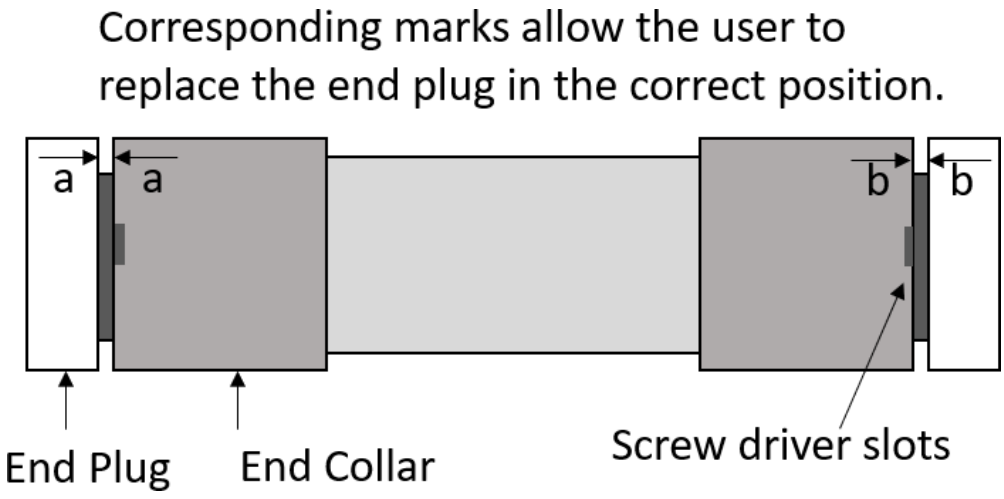


Figure 3.3: Mark Pressure Vessel End Plugs

Remove both screws until the end plug breaks loose from the pressure vessel. A prying motion on both sides of the end plug with the screwdrivers will quickly remove it. Use this procedure for both end caps. Push or pull the membrane element out of the pressure vessel tube.

CAUTION

Never force a membrane out of a pressure vessel by applying pressure on the product water tube (center tube), as this will damage the membrane. If membrane is difficult to remove, use a 1-1/2" diameter plastic pipe (PVC) to apply pressure on the protected end of the membrane.

8) Once all end plugs are removed, the membranes can be pushed out of the vessels.
9) Use the O-ring's provided with the membranes. Inspect and replace damaged O-rings on the endcaps as required.
10) Once the O-ring's have been replaced, reinstall the one end plug into the vessel.

CAUTION

At each end of the Reverse Osmosis Membrane Element is a Product Water Tube. The outside diameter surface of this product water tube is a sealing surface, which isolates the Product Water from the seawater. The surface of the Product Water Tube must be scratch free. Never use pliers or other grabbing tools on the Product Water Tube.

NOTE

A RO Membrane Element comes with a “U” cup Brine Seal at one end of the Element. This Brine Seal must be positioned at the INLET end of the Pressure Vessel. The seal faces the flow.

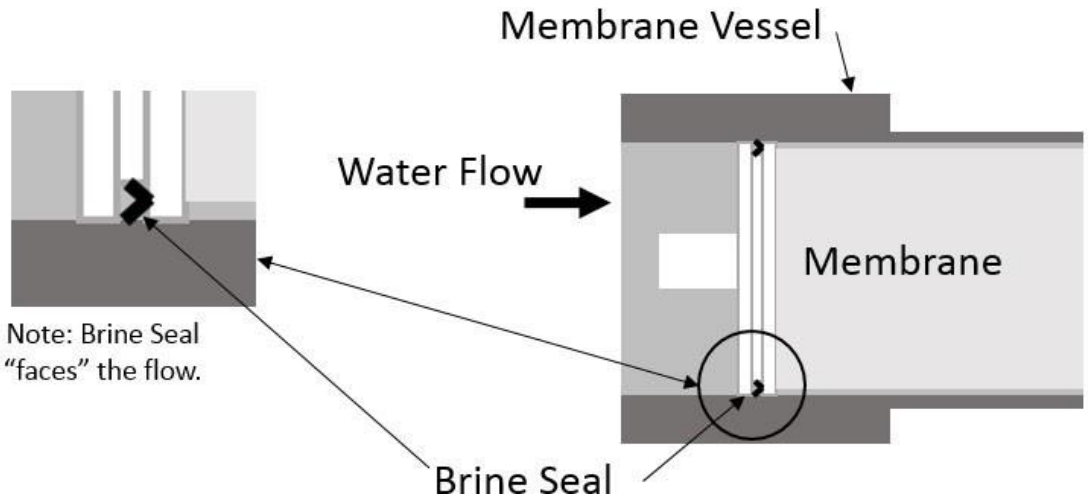


Figure 3.4 – Brine Seal Orientation

WARNING

DO NOT use compounds or lubricants other than the lubricant provided with the membrane. Most lubricants are petroleum-based and unsafe for use in potable water production. Failure to follow this warning may result in membrane or component failure.

11) Slide the Membrane Element into the Pressure Vessel, so the brine seal is last, and the product tube seats in the opposite end.

CAUTION

RO Membranes must be installed in the direction of flow. Installing RO Membrane against direction of flow can permanently damage the brine seal on the membrane, preventing reverse osmosis from occurring. Always insert the RO Membrane from the inlet end of the RO vessel, with the brine seal inserted last. Failure to follow this caution may result in low flow and high salinity.

12) Insert the End Plug into the Pressure Vessel continue pushing inward on the End Plug until it allows engagement of the Allen screws.

CAUTION

- RO vessel end caps must be installed in the correct position and orientation for proper connections to align.
- Use care when installing RO vessel end caps to prevent damaging 0-ring seals.
- Failure to follow these cautions may result in damage to equipment.

NOTE

Note which end of the pressure vessel the brine seal was installed at. The brine seal is a black u-cup seal on the membrane outer diameter near one end. This is the feed end of the pressure vessel. When reinstalling the RO membrane, the brine seal must be located at the feed end of the pressure vessel.

NOTE

Do not apply Teflon tape or sealant to straight thread fittings such as those used on High-Pressure hose ends.

13) Install the vessels and reconnect plumbing. The system is now ready for operation.

3.5 MEMBRANE CLEANING AND PRESERVATION

PARTS NEEDED

Part #	Description	Cartridge	Qty
85-0102	Cleaning Chemical #1 Cleaning Chemical #2	Cartridge (Blue Stripe) Cartridge (Red Stripe)	1 each
85-0103	Preservative Chemical #3	Cartridge (Green Stripe)	1

The membrane elements require occasional service; it is recommended to clean the membranes only when fouled. Basic procedure for all cleaning and preservative treatments is similar; a specific chemical solution is circulated through the system for a pre-determined length of time.

NOTE

All cleaning and preservation procedures should be performed with

NONCHLORINATED freshwater to optimize performance of cleaning process.

NOTE

Allow your unit's product water to run with product to DUMP for the first 10 minutes after cleaning or upon startup after preservation.

3.5.1 CLEANING CHEMICALS

CAUTION

Cleaning chemical #1 is an alkaline detergent, used to remove oil, grease, biological matter, and grime from the surface of the RO membranes. See warning label on side of package and observe all safety precautions on label.

CAUTION

Cleaning chemical #2 is an acid, a mineral scale remover. See warning label on side of package and observe all safety precautions on label.

WARNING

THE USE OF CHEMICALS OR CLEANING METHODS OTHER THAN THOSE OUTLINED IN THIS MANUAL WILL VOID THE RO UNIT WARRANTY. NON-IONIC SURFACTANTS USED FOR MEMBRANE CLEANING OR ANY OTHER CHEMICALS NOT APPROVED IN WRITING BY PARKER, WILL VOID THE RO UNIT WARRANTY.

3.5.2 WHEN TO CLEAN

Chemically clean the RO when product water output drops below 80% of original production. The frequency of this occurring varies greatly upon feed water. Membrane fouling will occur with normal use.

NOTE

Product water output depends on feedwater temperature, pressure and salinity. Product water output reductions from these factors are normal and may not indicate need for membrane cleaning.

3.5.3 CLEANING PROCEDURE - CLEANING CHEMICALS #1, #2

1) Fresh water flush system for 3-7 minutes.
2) Remove 5-micron prefilter and replace with cleaning cartridge filter (Chemical

#1 – Blue Stripe), then fill housing with unchlorinated water. Screw housing back into place.

3) Fully open the High-Pressure Bypass Valve for Cleaning Mode.
4) Move cleaning valve handle to “cleaning” at bottom of manifold.
5) Turn product sample valve to center of product and reject.
6) Close fresh water flush valve, putting valve handle in center.
7) Start RO unit running booster pump only run for 30 minutes.
8) Turn system off.
9) Remove cleaning cartridge and replace with 5-micron pre-filter.
10) Move cleaning valve handle to “reject” at bottom of manifold.
11) Turn fresh water flush valve to freshwater position and flush for 5 minutes to flush out all cleaning chemicals.
12) Repeat Step 1 – 11 using cleaning chemical #2 (Red Stripe).
13) The RO unit is now ready for operation. Record production flow rate before and after cleaning to determine effectiveness.

3.5.4 PRESERVATION PROCEDURE:

1) Fresh water flush system for 3-7 minutes.
2) Remove 5 micron prefilter and replace with preservative cartridge filter (Chemical #3 – Green Stripe), then fill housing with unchlorinated water. Screw housing back into place.
3) Fully open the High-Pressure Bypass Valve for preservative Mode.
4) Move cleaning valve handle to “cleaning” at bottom of manifold.
5) Turn product sample valve to center of product and reject.
6) Close fresh water flush valve, putting valve handle in center.
7) Start RO unit running booster pump only run for 15 minutes.
8) Turn system off.
9) Leave all valves in position they are in now.
10) Unit is now preserved. The 5-micron prefilter will have to be installed prior to returning to operation.

NOTE

For resuming normal RO operation (“un-preserving” or “unpickling”), install a 5-micron prefilter into pre-filter housing and fill it with UNCHLORINATED WATER, Begin system Start-Up Procedures.

NOTE

If RO unit storage time is to exceed four months, then it is NECESSARY to Flush (Push Out) the existing chemical out of the unit and re -preserve at EVERY FOUR MONTH INTERVAL.

3.5.5 WINTERIZATION PROCEDURE:

There is a good probability of damaging your watermaker by exposing it to temperatures below 32F (0 Celsius) conditions. Therefore, protecting your watermaker against freeze damage is recommended.

If long term storage is planned perform preservation on the watermaker before winterization. See section 3.5 for details.

CAUTION

Do not use ethylene glycol (found in automotive antifreeze products).

1) Close inlet seacock and flush unit with fresh water. Refere to fresh water flush procedure in section 2.
2) Remove the micron filter from the prefilter housing and empty the prefilter housing.
3) Pour the Parker Racor Winterizing solution PN:40-0005 into filter housing, top off with non-chlorinated fresh water if needed, then reattach the prefilter housing.
4) Switch the watermaker unit ON, refer to the operation of the unit in Section 2.
5) Verify the vacuum pressure gauge reads more than zero (0 psi), if not more than 0 psi recheck operational valves (see section 2).
6) Allow watermaker unit to run for at least 15 minutes to circulate the winterizing solution into the membranes, houses, fittings, and pumps.
7) Switch OFF the unit, high pressure pump and low pressure booster pump, respectively.

Once the procedure is complete, the unit can be left for up to 6 months. The freeze protection solution is now circulated throughout the feed and reject sides, including the membrane and the pumps. To protect the product side, open all blue/grey hoses and drain out the water from the membrane outlets, product manifold, product flow meter, product relief valve (if equipped), and solenoid valve (if equipped).

3.5.6 OPERATION AFTER WINTERIZATION PROCEDURE:

To return your machine to operating condition after freeze protecting it, adhere to the following steps:

1) Verify the system is ready for operation, refer to section 2 for initial setup before operation.
2) Open the 5-micron filter housing. Fill housing with non-chlorinated freshwater.
3) Open the seacock to the watermaker.
4) Turn Watermaker breaker in main electrical Panel.
5) Start LP booster pump. Allow the unit to Prime a few seconds before starting High

pressure Pump.

6) Start the high pressure Pump.
7) Flush the unit with raw seawater for 20 minutes.
8) After raw water flushing the unit for 20 minutes, shut down the high pressure pump and low pressure pump respectively.
9) Your watermaker is now ready for normal operation.

3.5.7 Freezing Points of Propylene Glycol:

Freezing Points of Propylene Glycol – Water Mixtures

Percent Propylene Glycol (wt. %)	Freezing Point (°F)	Freezing Point (°C)
0	32	0
10	26	-3
20	20	-7
30	10	-12
36	0	-18
40	-5	-20
43	-10	-23
48	-20	-29
52	-30	-34
55	-40	-40
58	-50	-46
60	-60	-51

3.5.8 ALTERNATE WINTERIZATION PROCEDURE:

Instead of applying the winterizing solution Parker Racor solution PN:40-0005 to the water maker system, an alternative method to freeze protect the watermaker is available:

1) Perform a chemical #3 preservation to the unit. To preserve your unit refer to instruction sin your owners manual or preservation technical application publication.
2) Remove membrane vessels from the boat, placing caps over the fittings. This is a more practical alternative for the MODULAR system (like the LTM series)
3) Store the membranes in an environment protected from freezing
4) Refresh the preservative every 6 months as recommended
5) Drain the entire watermaker of all water.

NOTE

Membranes must be kept wet with preservative solution.

3.5.9 WINTERIZATION CONSUMABLES:

CONSUMABLES: The consumables required for any six month operation of the watermaker. Use ONLY Racor Village Marine approved filters and chemicals.

Description	QTY	Part No.
Chemical Cleaning Cartridge Kit #1, #2	1ea/box	85-0102
Preservative Cartridge Kit, Chemical #3	2/box	85-0103
Filter, 5 micron, 10 sq-ft.	1ea	33-0117
Filter, Carbon, 10 sq-ft.	1ea	33-0311
High Pressure Pump Oil	1 qt	85-0050
Economy Mini Water Tester, TDS	1 ea	99-1990
Winterization Solution, 16 Oz Bottle	1 ea	40-0005

3.6 OPERATION LOG

We encourage operators to keep a simple operation log for the watermaker. Even occasional entries will help in troubleshooting. It is especially important to record performance after the first 3 hours after installation, so the baseline is known.

Date	Filter Pressure	Membrane Pressure	Product Flow	Water Quality TDS (ppm)	Water Temp	Comments

4. TROUBLESHOOTING

Below is a list of frequently encountered operational problems and some guidelines and troubleshooting checks. This section can only be a guide to solving potential problems with the RO unit and does not contain all possible malfunctions. The best troubleshooting tool is your knowledge of the RO gained through experience. Situations not covered in this section may be resolved by contacting Parker Hannifin via phone calls and e-mail.

1) Confirm that a free sea water feed is supplied.
2) The thru-hull is clear of trash or kelp.
3) Seacock is open.
4) Sea strainer is clean.
5) Booster pump is running.
6) 5-micron filter is clean.
7) Check for proper valve configuration. Confirm by checking water is flowing overboard through the brine discharge. The flow of the brine discharge should be around 60-80% of the feed water coming in the unit.
8) Check for loose connections or broken wires when checking electrical parts. Check for good voltage at the high-pressure pump motor; and if it is low, then follow the wire back to the breaker with a voltmeter until a loose connection is found.
9) Low product production may be caused by low temperature seawater.
10) Poor salt rejection may be caused by warm and/or very high salinity saltwater. Do not interpret environmental factors as equipment problem.

PLUMBING PRIOR TO NOV,2020

PARTS DIAGRAM - SEE ALSO SPARES LIST AT FRONT OF MANUAL

Prefilter Assembly
Replacement Element
Models 500, 800 p/n 33-0117
Models 1000 and up, p/n 33-0052
Filter Pressure Gauge, p/n 40-0300

Flushing Filter Assembly
Replacement Element p/n 33-0311
Flush Valve p/n 60-0014

LP Pump
Models up to 800 at 110 V, p/n 70-7504
Pump repair kit p/n 70-7506
Models up to 800 at 220 V, p/n 70-7505
Pump repair kit p/n 70-7506
Models 1000 and up, p/n 70-1550
Pump repair kit p/n 90-0617

Pump Oil, p/n 85-0050

Membrane Element
Model 500, one 33-0238
Model 800, two 33-0238
Model 1000, two 33-0238
Model 1300, three 33-0238
Model 1800, four 33-0238

HP Pump
Model 500, p/n 70-1253
Model 800, p/n 70-1255
Models 1000 & 1300 at 50 hz, p/n 70-1254
Models 1000 & 1300 at 60 hz, p/n 70-1256
Model 1800 Pump, p/n 70-1254

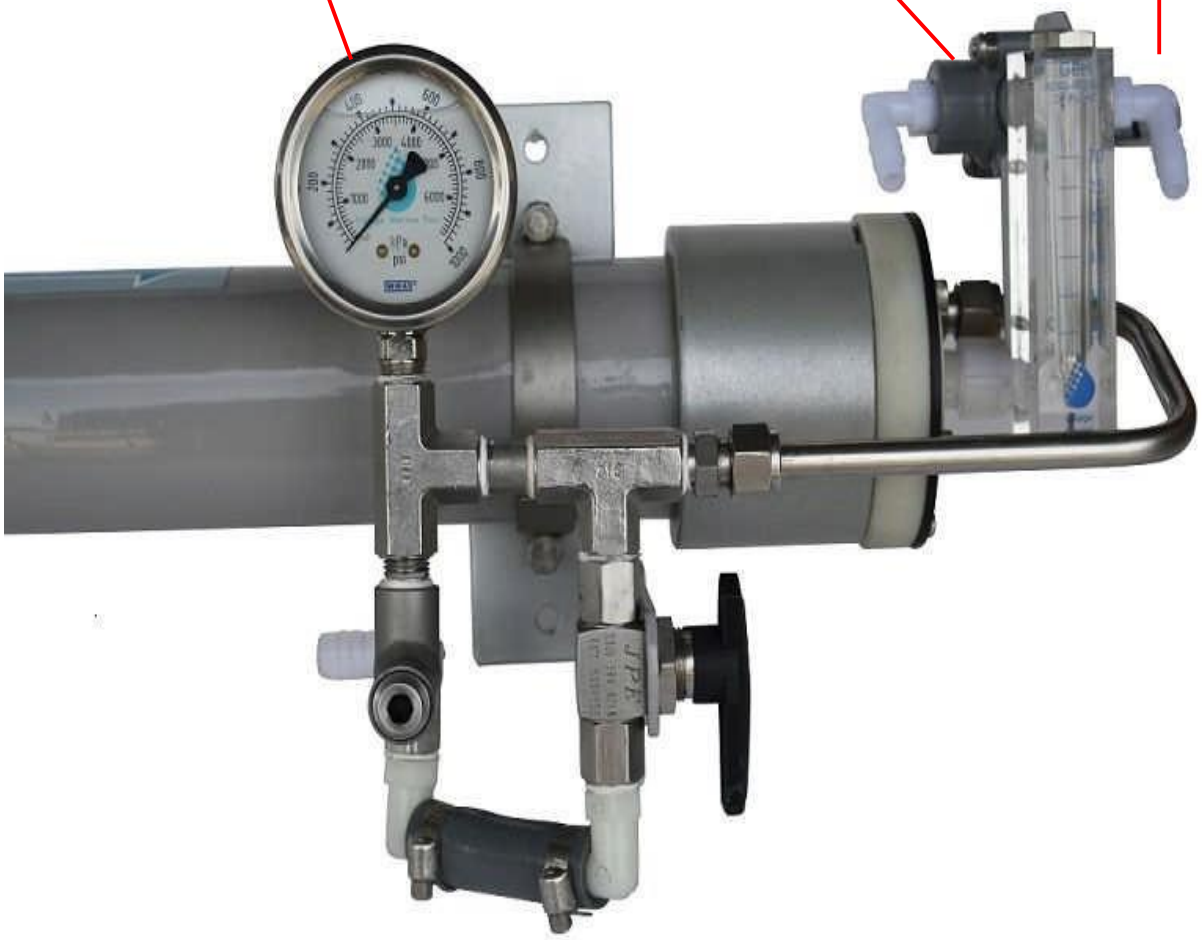
Pumps 70-1253/5/6, HP Pump outlet valve kit, p/n 70-6135
Pumps 70-1253/5/6, HP Pump inlet valve kit, p/n 70-6136
Pumps 70-1253/5/6, HP Pump seal service kit, p/n 70-6134
Pump 70-1254 only, HP Pump outlet valve kit, p/n 70-6138
Pump 70-1254 only, HP Pump inlet valve kit, p/n 70-6139
Pump 70-1254 only, HP Pump seal service kit, p/n 70-6137

PARTS DIAGRAM - INSTRUMENTS

Product Flowmeter
Model 500, p/n 40-1006
Models 800, 1000, 1300, p/n 40-1018
Model 1800, p/n 40-0240

Sample Valve
Models 500, 800, p/n 60-0140
Models 1000 and up, p/n 60-0014

Membrane Pressure Gauge p/n 40-0599



HP Regulating Valve, p/n 60-0088

Bypass Valve, p/n 60-0064
Counter-clockwise for priming, starting, flushing or cleaning.
Clockwise for making water.

5. DRAWINGS AND LITERATURE

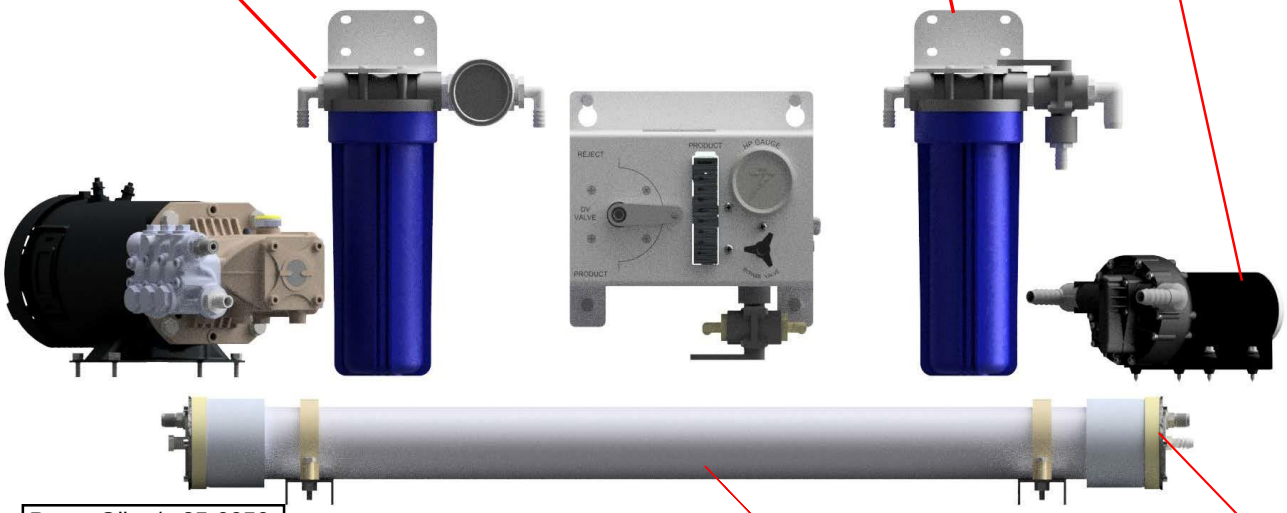
AS OF SEPTEMBER 2021

PARTS DIAGRAM – SEE ALSO SPARES LIST AT FRONT OF MANUAL

Prefilter Assembly
Replacement Element
Models 500, 800 p/n 33-0117
Models 1000 and up, p/n 33-0052
Filter Pressure Gauge, p/n 40-0300

Flushing Filter Assembly
Replacement Element p/n 33-0238
Flush Valve p/n 60-0014

LP Pump
Model 145 and 300 V01620001
Model 350 12V 12123800001
Model 350 24V 12123800002A



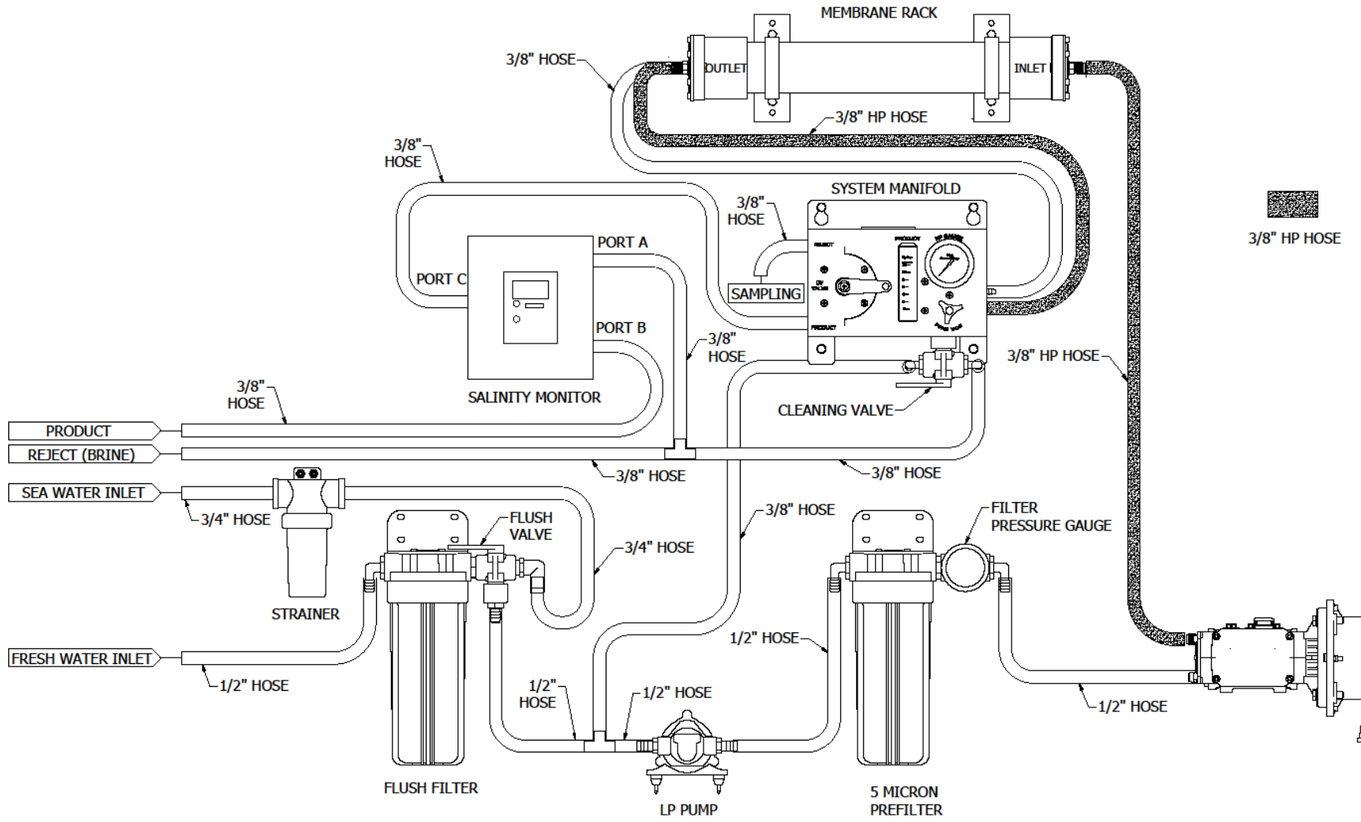
Pump Oil, p/n 85-0050

HP Pump

MOTORS:
Model 145 12V, P/N 15093110CF
Model 145GPD 12V, P/N 15093110CF
Model 300GPD 12V, P/N 15153210LE
Model 300GPD 24V, P/N 15163210LE
Model 350GPD 12V P/N 1531421000
Model 350GPD 24V P/N 15322809LE
Model 500,800,1000,1300 GPD at 110-220V 15AD062412
Model 500,800,1000,**1300 GPD at 230-460V** 82012005
Pumps P/N 81012021/81012022/81012023/81012024/
81012025/81012026 (REFER TO CUSTOMER DRAWING)
-HP Pump seal service kit p/n 70-6134
-HP Pump outlet valve kit p/n 70-6135
-HP Pump inlet valve kit p/n 70-6136 Pump p/n 70-1254 only
-HP Pump seal service kit p/n 70-6137
-HP Pump outlet valve kit p/n 70-6138

See bulletin for
Pressure Vessel
Parts, back of manual

Membrane Element
Model 145, one 33-2519
Model 300, two 33-2519
Model 350,800,1000, two 33-2519
Model 500, one 33-0238
Model 1300, three 33-0238
Model 1800, four 33-0238



PLUMBING DIAGRAM - LTM 145-350 GPD

WITH OPTIONAL SALNITY MONITOR

DIMENSIONAL TOLERANCES - UNLESS OTHERWISE SPECIFIED			
MACHINED			WELDMENT
FRACTION	±1/32"		± 1/16"
X	-	± 4mm	± 1/8"
.X	± .1"	± 2mm	± 1/16"
.XX	± .01"	± .25mm	± 1/32"
.XXX	± .005"	± .025mm	± 1/32"
ANGULAR ± 1°			
125 UNLESS OTHERWISE SPECIFIED			

CUSTOMER -

PROJECT -

DRAWN - OM DATE - 9/13/2021

CHECKED - SY DATE - 9/13/2021

APPROVED - BB DATE - 9/13/2021

DRY WT: 51 lbs 23 kg

WET WT:

CONTRACT NO

Parker Hannifin Corporation
Filtration Group / Water Purification
2630 E. El Presidio Street
Carson, CA 90810

Contact
Office: 310-608-5600
Fax: 310-608-5692
www.parker.com

LTM 145-350 GPD

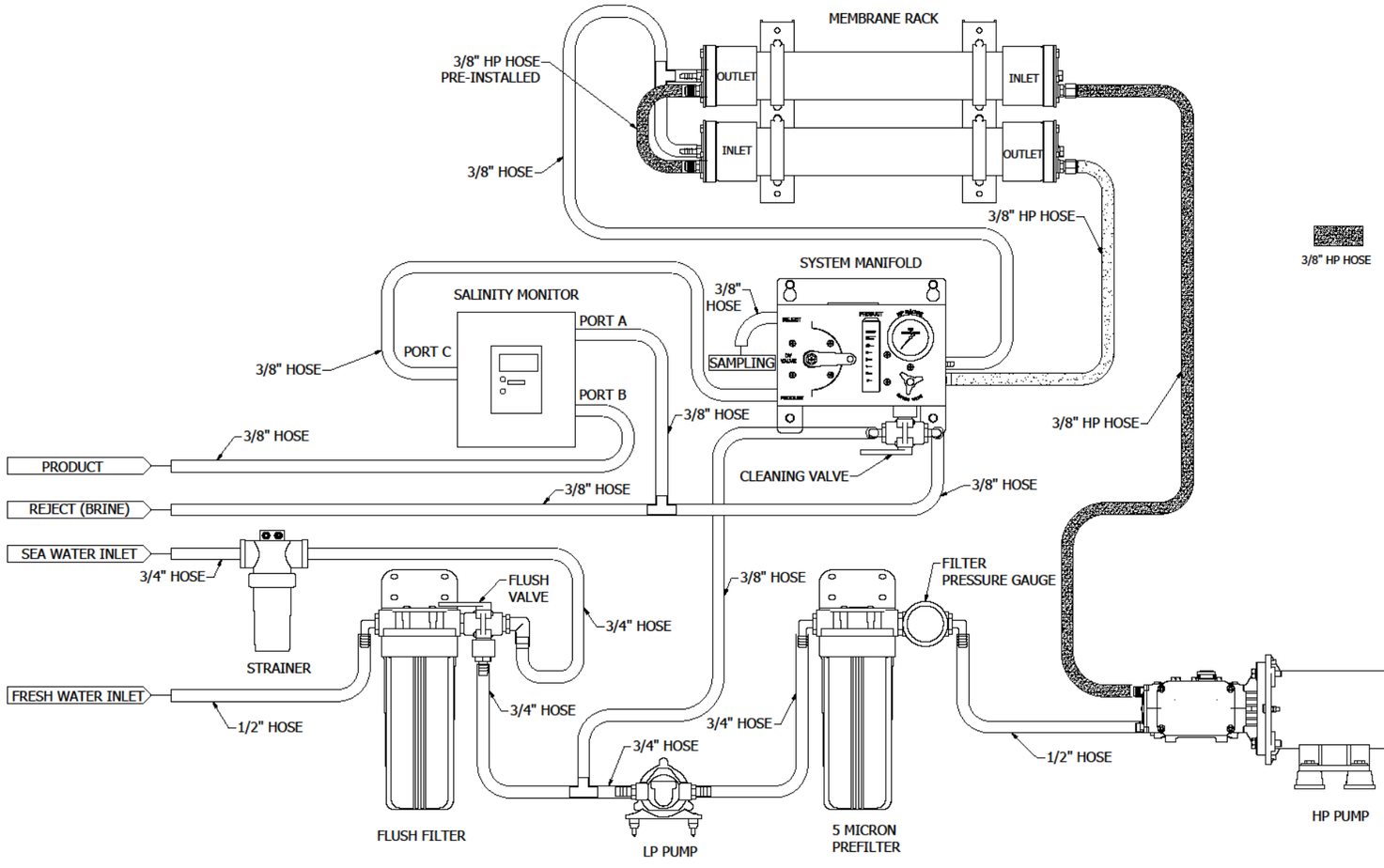
SIZE D | DWG NO LTM-PD | REV -

SCALE NTS | 1 OF 3

DWG NO LTM-PD

SH 1

REV A



3/8" HP HOSE

PLUMBING DIAGRAM - LTM 500-1800 GPD

WITH OPTIONAL SALNITY MONITOR

DIMENSIONAL TOLERANCES - UNLESS OTHERWISE SPECIFIED			
MACHINED			WELDMENT
FRACTION	±1/32"		± 1/16"
X	-	± 4mm	± 1/8"
.X	± .1"	± 2mm	± 1/16"
.XX	± .01"	± .25mm	± 1/32"
.XXX	± .005"	± .025mm	± 1/32"
ANGULAR ± 1°			
125 UNLESS OTHERWISE SPECIFIED			

CUSTOMER -

PROJECT -

DRAWN - OM DATE - 9/13/2021

CHECKED - SY DATE - 9/13/2021

APPROVED - BB DATE - 9/13/2021

DRY WT: 60 lbs | 27 kg

WET WT:

CONTRACT NO

Parker Hannifin Corporation
Filtration Group / Water Purification
2630 E. El Presidio Street
Carson, CA 90810

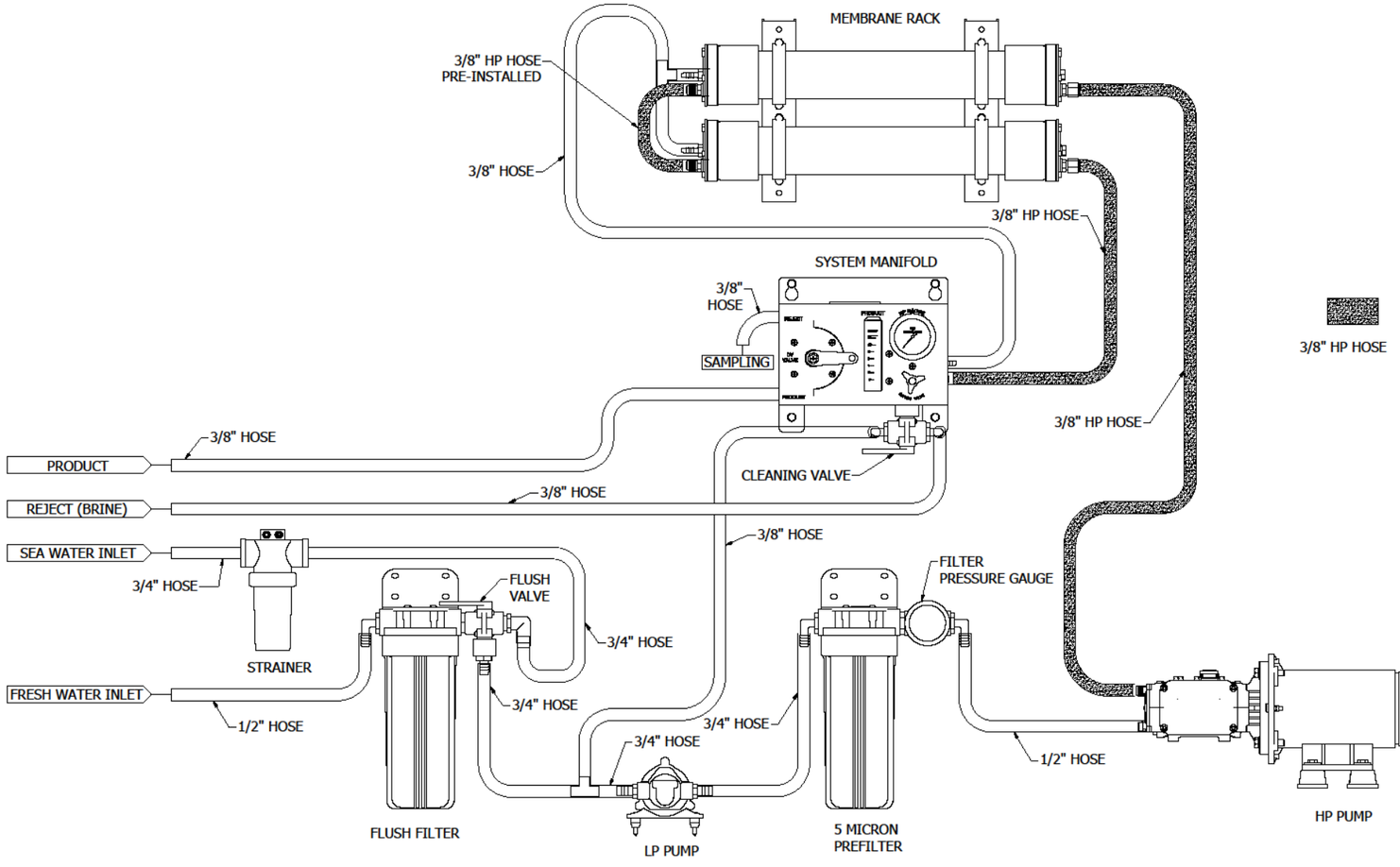
Contact
Office: 310-808-5600
Fax: 310-808-5692
www.parker.com

LTM 500-1800 GPD

SIZE D | DWG NO LTM-PD | REV -

SCALE NTS | 2 OF 3

DWG NO LTM-PD REV A



3/8" HP HOSE

PLUMBING DIAGRAM WITHOUT SALINITY MODULE

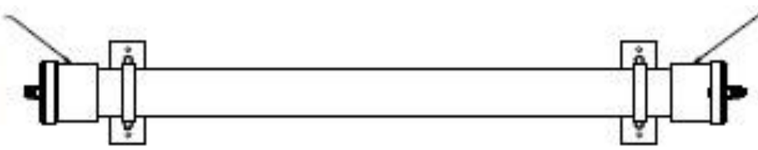
STANDARD OPTION

DIMENSIONAL TOLERANCES - UNLESS OTHERWISE SPECIFIED				CUSTOMER -	Parker Hannifin Corporation Filtration Group / Water Purification 2630 E. El Presidio Street Carson, CA 90810
MACHINED			WELDMENT	PROJECT -	Contact Office: 310-608-5600 Fax: 310-608-5692 www.parker.com
FRACTION	±1/32"		± 1/16"		
X	-	± 4mm	± 1/8"		LTM 500-1800 GPD
.X	± .1"	± 2mm	± 1/16"	DRAWN - OM DATE - 9/13/2021	
.XX	± .01"	± .25mm	± 1/32"	CHECKED - SY DATE - 9/13/2021	
.XXX	± .005"	± .025mm	± 1/32"	APPROVED - BB DATE - 9/13/2021	
ANGULAR ± 1°				DRY WT: 60 lbs / 27 kg	SIZE D · DWG NO LTM-PD · REV -
125 UNLESS OTHERWISE SPECIFIED				WET WT:	
				CONTRACT NO	SCALE NTS · 3 OF 3

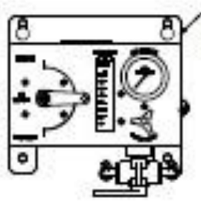
PARTS DIAGRAM

(SEE SPARES LIST AT THE FRONT OF THE MANUAL)

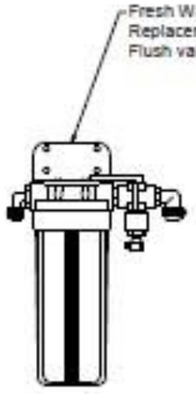
Membrane Element
Model 145, one 33-2519
Model 350, two 33-2519
Model 350, two 33-0238
Model 500, one 33-0238
Model 800, two 33-0238
Model 1000, two 33-0238
Model 1300, three 33-0238
Model 1800, four 33-0238



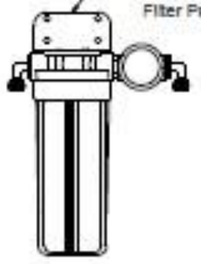
See Bulletin for
Pressure Vessel
Parts, back of manual



LTM System Manifold Assembly P/N V502060005
HP Gauge Replacement P/N 10181421CC
Flowmeter Replacement P/N 85012009

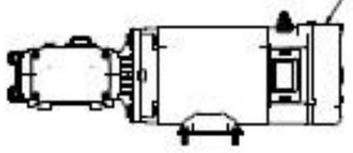


Fresh Water Flush Filter Assembly P/N 90-0215
Replacement Element P/N 33-0238
Flush valve P/N 60-0014



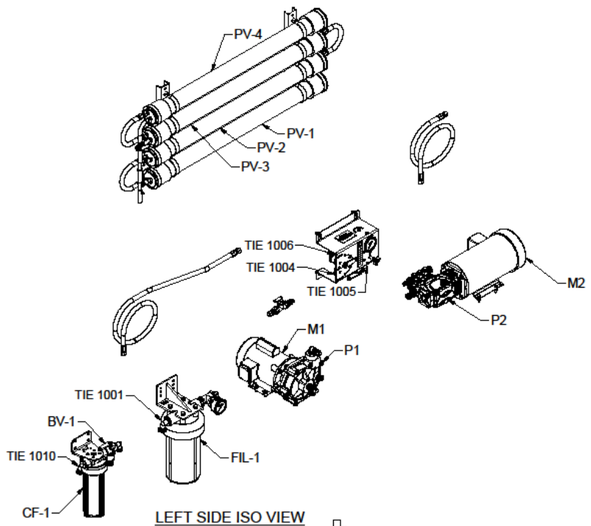
Pre-filter Assembly
Replacement Element
Models 500, 800 P/N 33-0117
Models 1000 and up, P/N 33-0052
Filter Pressure Gauge, P/N 40-0300

LP Pump
Model 145 AND 350 V016020001
Model 350 12V 1212380001
Model 350 24V 1212380002A
Model 500, 800, 1000 110-230V P/N 70-1500
Model 1300,1800 110-230VB016080026
Model 500, 800, 1000, 1300,1800 230-460V B016080027

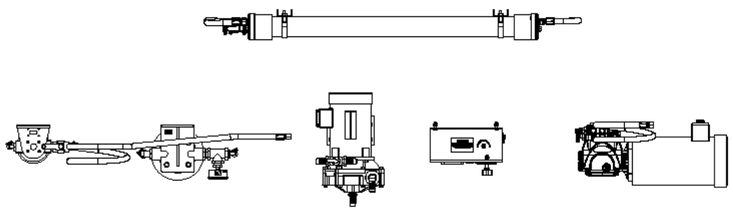


HP Pump
Model 145 12V P/N 15093110CF
Model 145 24V P/N 15103210CF
Model 350 12V P/N 15153210LE
Model 350 24V P/N 15163210LE
Model 350 12V P/N 1531421000
Model 350 24V P/N 15322809LE
Model 500,800,1000 & 1300 at 110-220V, P/N 15AD062412
Model 500,800,1000 & 1300 at 230-460V, P/N 82012005
Pumps P/N 81012021, 81012022, 81012023,
81012024,81012025, 81012026
-HP Pump seal service kit P/N 70-6134
-HP Pump outlet valve kit P/N 70-6135
-HP Pump inlet valve kit P/N 70-6136
Pump P/N 70-1254 only
-HP Pump seal service kit P/N 70-6137
-HP Pump outlet valve kit P/N 70-6138
-HP Pump inlet valve kit P/N 70-6139
Pump Oil, P/N 85-0050

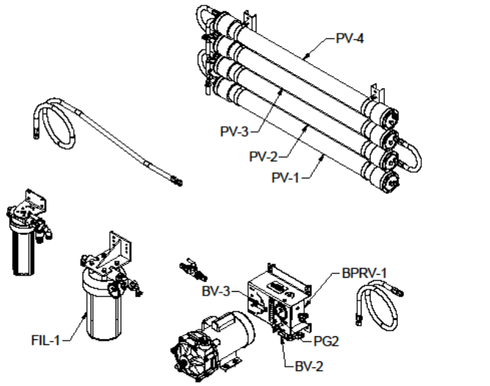
REVISION HISTORY					
REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
A	6/14/2021	CREATED NEW FORMAT LEVEL-3 DRAWING AND UPDATED PRESSURE GAUGE FROM 40-0300 TO 10181522CC	OM	SY	BB



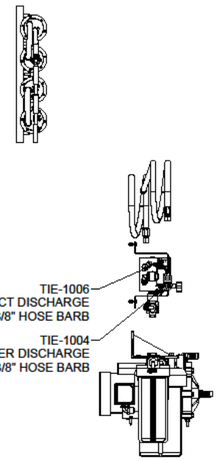
LEFT SIDE ISO VIEW



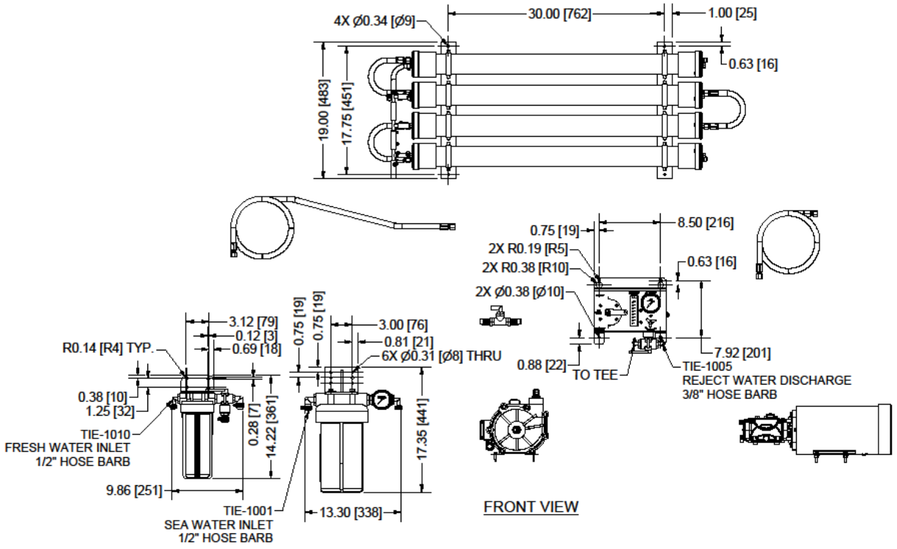
TOP VIEW



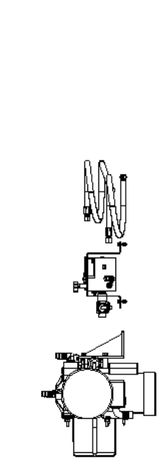
RIGHT SIDE ISO VIEW



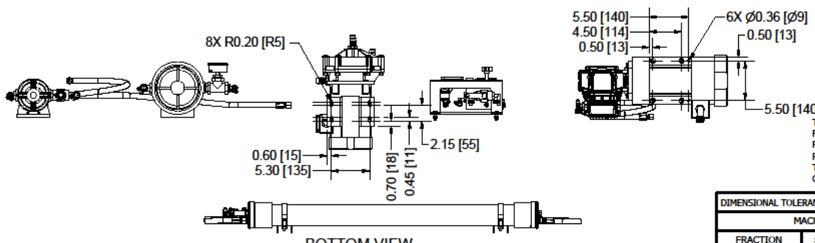
LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW



BOTTOM VIEW

TIE POINT CONNECTION		
TIE	DESCRIPTION	CONNECTION
1001	SEA WATER INLET	3/4" FNPT NYLON PVC HOSE BARB
1004	PRODUCT WATER DISCHARGE	3/8" FNPT NYLON PVC HOSE BARB
1005	REJECT DISCHARGE	3/8" FNPT NYLON PVC HOSE BARB
1006	SAMPLE REJECT DISCHARGE	3/8" FNPT NYLON PVC HOSE BARB
1010	FRESH WATER INLET	1/2" FNPT NYLON PVC HOSE BARB

2. LTM-1800 SHOWN FOR REFERENCE ONLY.
1. ENG MUST APPROVE ANY DEVIATIONS
NOTES: UNLESS OTHERWISE SPECIFIED

DIMENSIONAL TOLERANCES - UNLESS OTHERWISE SPECIFIED			
MACHINED			WELDMENT
FRACTION	±1/32"		± 1/16"
X	-	± 4mm	± 1/8"
.X	± .1"	± 2mm	± 1/16"
.XX	± .01"	± .25mm	± 1/32"
.XXX	± .005"	± .025mm	± 1/32"
ANGULAR ± 1'			
125 UNLESS OTHERWISE SPECIFIED			

CUSTOMER -

PROJECT -

DRAWN - OM DATE - 6/13/2021

CHECKED - SY DATE - 7/6/2020

APPROVED - BB DATE - 7/6/2020

DRY WT: SEE TABLE | SEE TABLE

WET WT: SEE TABLE

CONTRACT NO

Village Marine

Parker Hannifin Corporation
Filtration Group / Water Purification
2630 E. El Presidio Street
Carson, CA 90810

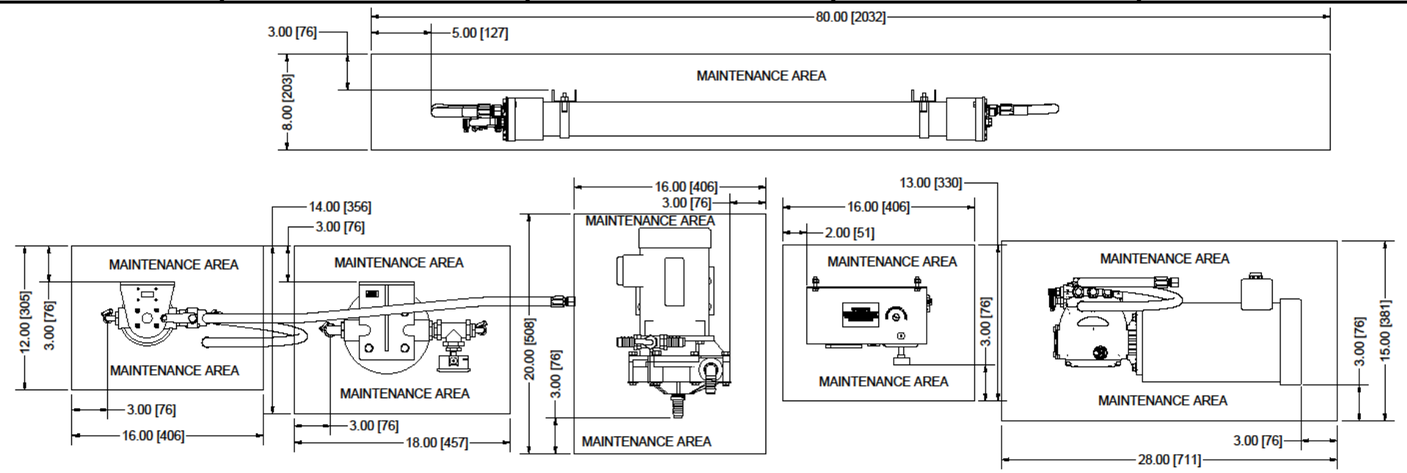
Contact
Office: 310-608-5600
Fax: 310-608-5692
www.parker.com

CUSTOMER DWG
LTM-145-1800-TM SERIES

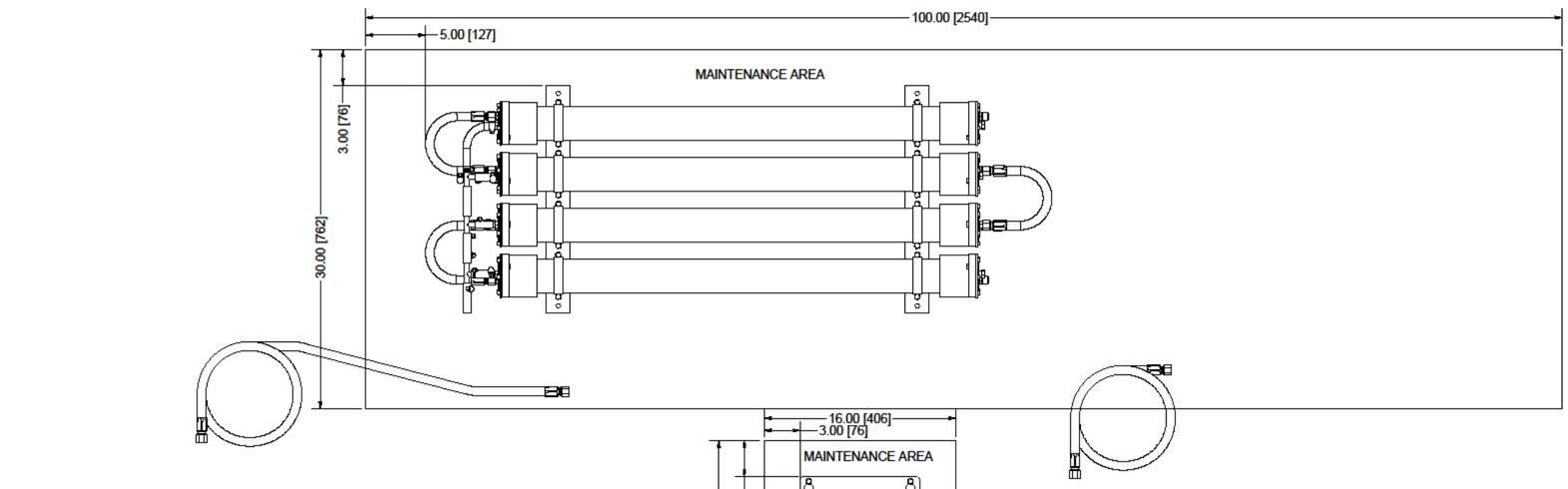
SIZE	DWG NO	REV
D	LTM-145-1800-TM	A

SCALE NTS | 1 OF 4

90-6078



TOP VIEW



FRONT VIEW

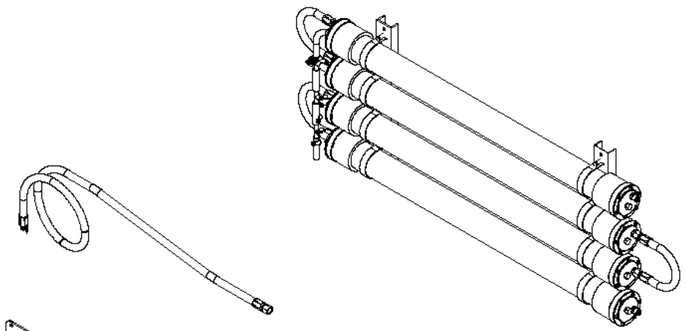
SIZE	DWG NO	REV
D	LTM-145-1800-TM	A
SCALE NTS	2 OF 4	

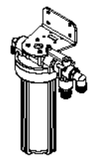
DWG NO 90-6078 SH 2

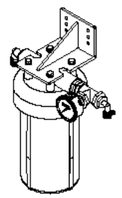
TABLE										
PART NUMBER	VOLTAGE	CAPACITY (M3/DAY)	PERMEATE GPH	HP MOTOR	HP PUMP	BOOSTER PUMP	MEMBERANE VESSEL	MEMBERANE ELEMENT	DRY WT lbs	WET WT lbs
90-8200PH	12V	0.54	6.04	15093110CF	81012021	V016020001	QTY 1 32-2519	33-2519	52 (24)	64 (30)
90-8266PH	24V	0.54	6.04	15103210CF	81012021	V016020001	QTY 1 32-2519	33-2519	59 (27)	71 (33)
90-8596PH	12V	1.32	14.58	15153210LE	81012021	V016020001	QTY 2 32-2519	33-2519	62 (28)	74 (34)
90-8154PH	24V	1.32	14.58	15163210LE	81012021	V016020001	QTY 2 32-2519	33-2519	62 (28)	74 (34)
90-6009	12V	1.3	15	1531421000	81012022	1212380001	QTY 1 32-2537	33-0238	78 (36)	96 (44)
90-6010	24V	1.3	15	15322809LE	81012022	1212380002A	QTY 1 32-2537	33-0238	78 (36)	96 (44)
90-6019	110-110/1/60	1.9	21	15AD062412	81012023	70-1500	QTY 1 32-2537	33-0238	148 (67)	166 (75)
90-6047	220-220/1/60	1.9	21	15AD062412	81012023	70-1500	QTY 1 32-2537	33-0238	148 (67)	166 (75)
90-6048	230-230/1/50	1.9	21	15AD062412	81012024	70-1500	QTY 1 32-2537	33-0238	148 (67)	166 (75)
90-6049	110-110/1/60	3	33	15AD062412	81012024	70-1500	QTY 2 32-2537	33-0238	167 (76)	190 (87)
90-6050	220-220/1/60	3	33	15AD062412	81012024	70-1500	QTY 2 32-2537	33-0238	167 (76)	190 (87)
90-6051	220-220/1/50	3	33	15AD062412	81012024	70-1500	QTY 2 32-2537	33-0238	167 (76)	190 (87)
90-6079	230-460/3/50-60HZ	3	33	82012005	81012024	B016080027	QTY 2 32-2537	33-0238	162 (74)	187 (85)
90-6052	220-220/1/60	3.8	42	15AC062412	81012025	70-1500	QTY 2 32-2537	33-0238	169 (76)	194 (88)
90-6053	230-230/1/50	3.8	42	15AC062412	81012026	B016080026	QTY 2 32-2537	33-0238	211 (95)	236 (107)
90-6080	230-460/3/50-60HZ	3.8	42	82012005	81012026	B016080027	QTY 2 32-2537	33-0238	162 (74)	187 (85)
90-6054	220-220/1/60	4.9	54	15AC062412	81012025	B016080026	QTY 3 32-2537	33-0238	230 (104)	251 (114)
90-6055	230-230/1/50	4.9	54	15AC062412	81012026	B016080026	QTY 3 32-2537	33-0238	230 (104)	251 (114)
90-6082	230-460/3/50-60HZ	4.9	54	82012005	81012026	B016080027	QTY 3 32-2537	33-0238	182 (82)	203 (92)
90-6056	220-220/1/60	6.8	75	15AC062412	81012026	B016080026	QTY 4 32-2538	33-0238	249 (113)	278 (126)
90-6076	230-230/1/50	6.8	75	82012005	81012026	B016080027	QTY 4 32-2538	33-0238	201 (91)	230 (105)
90-6077	380-410/3/50	6.8	75	82012005	81012026	B016080027	QTY 4 32-2538	33-0238	201 (91)	230 (105)
90-6078	460-480/3/60	6.8	75	82012005	81012026	B016080026	QTY 4 32-2538	33-0238	249 (113)	278 (126)

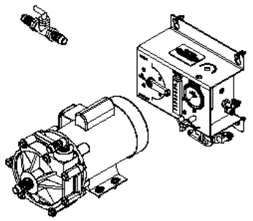
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
11	1	14012004	MANIFOLD,LTM&LWM
13	1	20200402102	BRACKET SINGLE FILTER
14	1	90-1474	BRACKET,FILTER,BIG WHITE,5X10
15	4	SEE TABLE	VESSEL ASSY,FRP,2538,WCOARSE
16	1	SEE TABLE	4.2 GPM SS, LEFT HAND SHAFT
17	1	SEE TABLE	BOOSTER PUMP HEAD N200
18	1	SEE TABLE	MOTOR,2.4HP,220-460,3-50-60@1425-725RPM
19	1	1519081110	MOTOR .50 HP 110-230-50-60-1PH
20	1	33-0011	FILTER HOUSING, 5" X 10", 1" FNPT, BIG WHITE
21	4	SEE TABLE	ELEMENT,SEA WATER,SW-2538
22	1	33-0311	FILTER,CARBON,5 MIC,2.5" X10"
27	1	33-0052	FILTER, 5 MIC, 18 SQFT, 5" x 10", BIG WHITE
29	1	10181421CC	GAUGE 0-1400 CBM.O-RING SEAL
30	1	85012009	FLOWMETER,75 GPH,ACRYLIC WITHOUT VALVE
31	1	0713020473	FILTER HOUSING .75 X 10
35	2	60-0014	VALVE, BALL, PVC, 3-WAY, 1/2"
36	1	60-0140	VALVE, BALL, PVC, 3-WAY, 14 FNPT
101	2	30-0258	HOSE, .38 X 1.0 LG,PVC WITH BRAID,GRAY
102	1	10181522CC	GAUGE -30-0-70 CBM.NPT

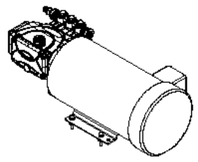
90-6078 (LTM-1800) SHOWN. SEE TABLE FOR OTHER VARIATIONS.





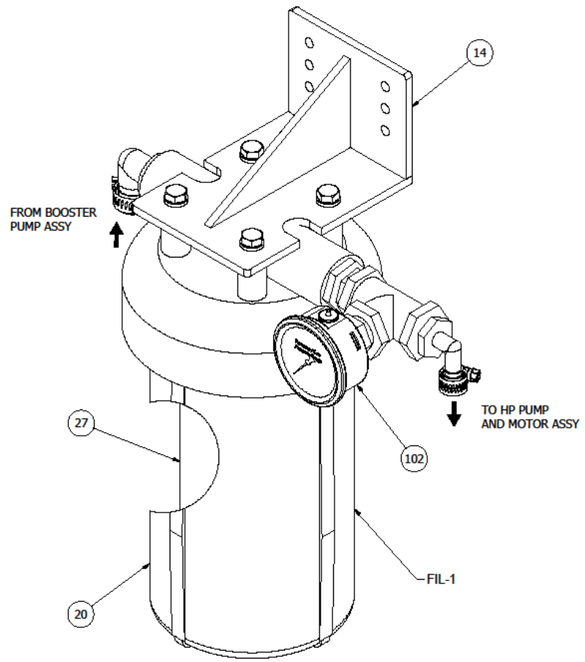




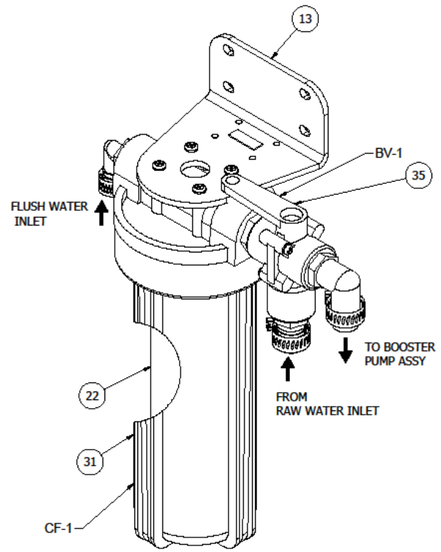


DWG NO 90-6078

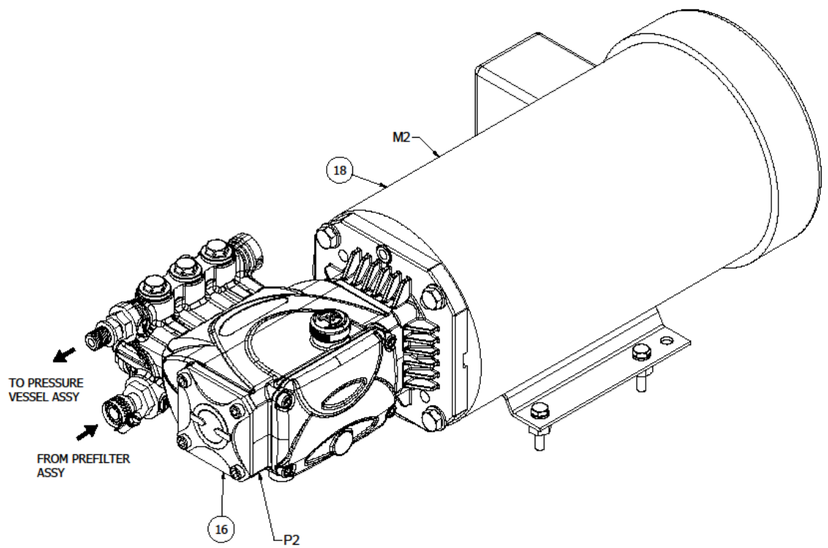
SIZE	DWG NO	REV
D	LTM-145-1800-TM	A
SCALE NTS		3 OF 4



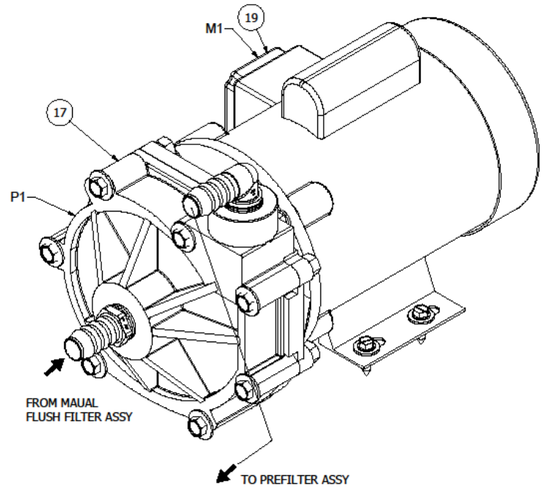
PREFILTER ASSY



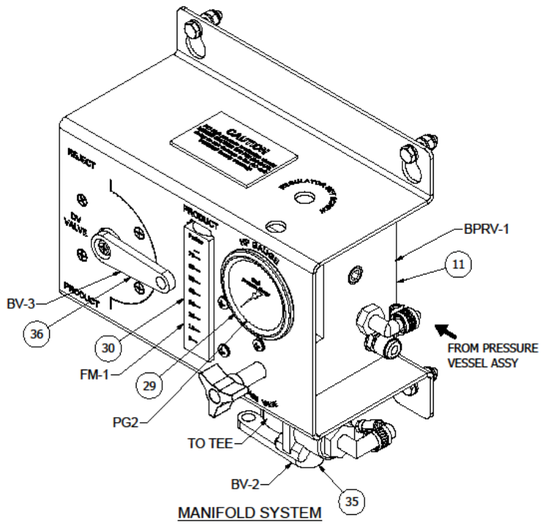
MANUAL FRESH FLUSH ASSY



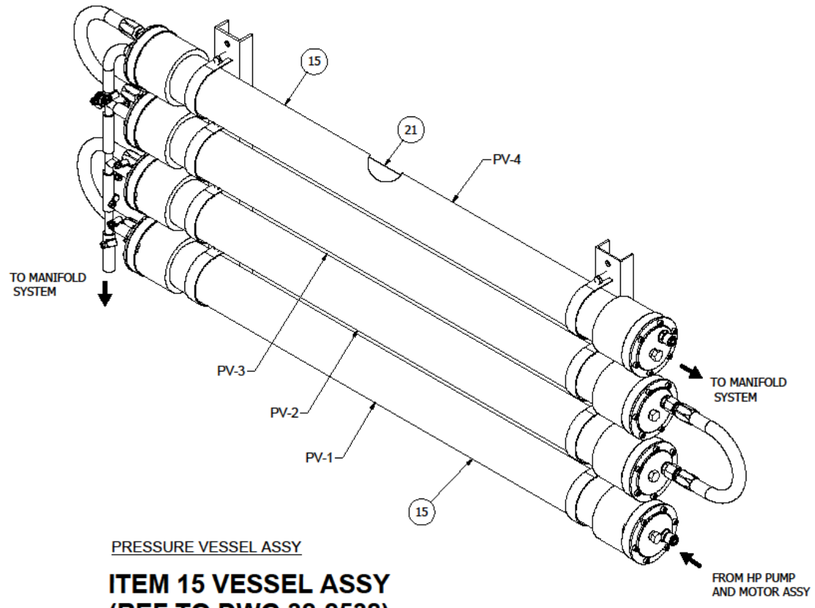
HP PUMP AND MOTOR ASSY



BOOSTER PUMP ASSY



MANIFOLD SYSTEM



PRESSURE VESSEL ASSY

ITEM 15 VESSEL ASSY
(REF TO DWG 32-2538)
USES ITEM 21 ONE ELEMENT (33-0238)

SIZE	DWG NO	REV
D	LTM-145-1800-TM	A
SCALE NTS		4 OF 4

DWG NO 90-6078