



Village Marine LT-5000

Part Number: 95-0022

LT Watermakers

LT 3000-7000 GPD

Installation, Operation & Maintenance

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



ENGINEERING YOUR SUCCESS.

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: _____

LT Watermakers

3000 to 7000 GPD
(11 to 27 m³/day)



Practical and Reliable Fresh Water Supply

The LT desalinator offers a simple watermaker package with a compact frame and small footprint.

Racor VMT LT systems have a base frame only 40" wide x 33" deep, allowing a high capacity and high quality watermaker installation in a tight space.



Village Marine LT-5000

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www.parker.com/racor

Key Feature - Installation Flexibility:



LT units can be supplied with an optional media filter system. Also membrane rack can be mounted horizontally or as a module for remote bulkhead mounting.



ENGINEERING YOUR SUCCESS.

LT Watermakers

3000 - 7000 GPD
(11 to 27 m³/day)

Standard Features:

- Stainless steel high pressure pump is resistant to the corrosive seawater environment
- Fiberglass cartridge filter housing holds 100 square foot 5 micron element
- Marine bronze low pressure pump provides up to 50 psi of boost pressure to the filtration system
- Glycerine filled pressure gauges
- Flowmeters to monitor freshwater and reject rates
- Freshwater flush system included standard
- 316 stainless steel pressure regulator is adjustable to allow operation in brackish or fresh water
- Electrical control panel Nema 4X with motor starter and pump controls
- Automatic diversion valve diverts water to overboard if quality drops below acceptable standards
- Digital water quality monitor displays purity of product water produced

Model	Part Number*	Power Volts/ phase/Hz/Amps	Dimensions** inch/cm	Capacity GPH-m ³ /Day	Weight lbs/kg
LT-3000	90-6057 90-6059 90-6058	220/1/60/53 440/3/60/17 380/3/50/17	width 40/102 depth 39/99 height 62/157	125/11	1060/480
LT-4000	90-6060 90-6062 90-6061	220/1/60/53 440/3/60/17 380/3/50/17	width 40/102 depth 39/99 height 62/157	167/15	1080/490
LT-5000	90-6063 90-6031	440/3/60/22 380/3/50/24	width 40/102 depth 39/99 height 62/157	208/20	1140/520
LT-7000	90-6065 90-6064	440/3/60/22 380/3/50/24	width 40/102 depth 43/109 height 62/157	292/27	1290/585

* Add part number 90-0264 to include optional media filter.

**Includes membrane rack mounted vertically. Does not include boost pump or optional media filter that increase width to 56/142.

Spares and Consumables

Part No.	Description	Part No.	Description
33-5100	Filter Cartridge - 5 micron	40-0241	Salinity Probe
30-0405	O-Ring Seal - Filter Housing	33-0440	RO Membrane (up to LT 5000)
33-0315	Carbon Flush Filter Element	33-0036	RO Membrane (LT-7000)
70-1448	Drive Belt - Check for Exact Size	85-0045	Membrane Cleaner #1, 25 lbs. pail
85-0050	Pump Oil - Quart Bottle	85-0048	Membrane Cleaner #2, 25 lbs. pail
90-2323	Membrane O-Ring Kit (up to LT-5000)	85-0049	Membrane Preservative, 25 lbs. pail
32-1016	Membrane O-Ring Kit (LT-7000)		



WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

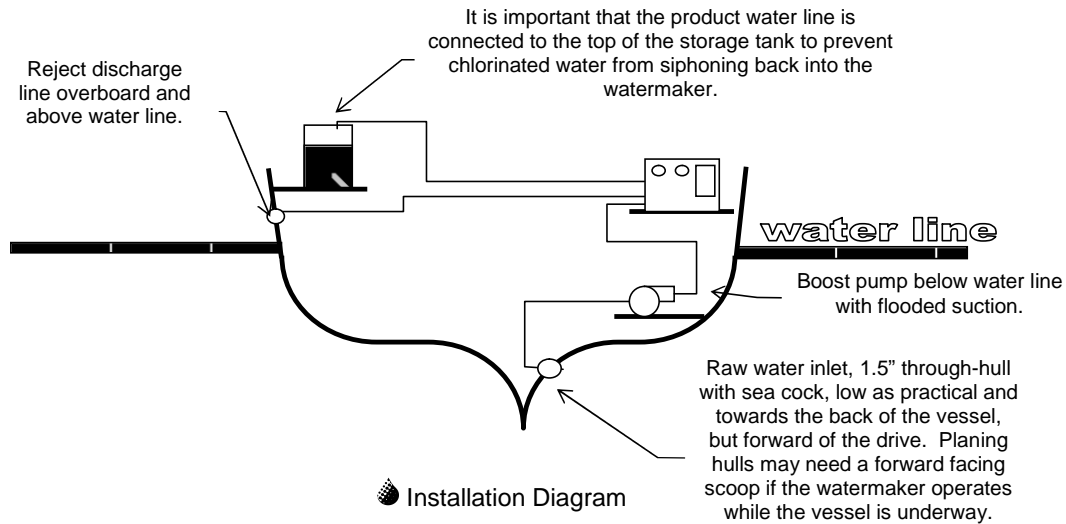
- This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.
- The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.
- To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

The Racor Village Marine LT series Seawater Desalinator is a single-pass purification system that uses reverse osmosis (RO) to produce potable water from seawater. Product water with salt concentrations of < 500 ppm are achieved by removing approximately 99% of the dissolved salt in seawater.

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.

The connection sizes are all 1" flanges, except the seawater feed connecting directly to the LP boost pump inlet with a 1.25" FNPT thread fitting. Consult the LT installation drawing towards the end of this manual. The LP boost pump should be below water line for flooded suction, and can be relocated away from the main unit if necessary.



CAUTION

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

NOTE

Avoid connecting the seawater source to a water line that services any other piece of equipment. Air could be drawn through the RO unit causing damage to the RO unit's pumps. Cross contamination is also possible. The best practice is a dedicated through hull for the watermaker, with a separate seacock and strainer.

Connect 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. Connect power to the main terminal block in the electrical enclosure.

Three phase power supplies will spin the motors and pumps either rotation direction, depending on the phase sequence of the three hot power legs. The HP pump should rotate counterclockwise from the pulley end and low pressure pumps are marked with a direction of rotation. It is important **not** to rotate the low pressure pump backwards. Even "bumping" the motor for a few seconds can loosen the impellor and cause damage. The high pressure pump will not be damaged from running backwards. Therefore, always use the high pressure pump only to check rotation and adjust the input power legs accordingly prior to checking the low pressure pump. If the low pressure pump is inadvertently "bumped" backwards, open the pump and check the impellor is secured on the motor shaft and spins freely prior to starting it again.

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. Never connect the RO unit to a supply that services another electrical device, the RO unit should have its own breaker or disconnect.

WARNING

Disconnect electrical power to RO unit prior to servicing the watermaker.

STARTUP AND OPERATING PROCEDURE

- 1) Check the HP pump oil level by observing sight gauge located on the pump. On initial start-up, the media filter may need to be loaded, and the membranes installed. Open the raw saltwater supply to the unit at the through-hull. The flushing valve V10 is in the saltwater position and the cleaning valve V5 should be in the normal position.
- 2) Verify the bypass valve V4 (black handle) is open, counterclockwise.
- 3) Start the LP pump, verify the filter pressure gauge PG1 shows > 10 psi indicating the system is primed with water.
- 4) Start the HP pump. Water should now be visible flowing through the reject flowmeter and discharging through the overboard reject line.
- 5) Slowly close the bypass valve, and confirm that the membrane pressure gauge PG2 registers 800 psi. The high pressure setting can be adjusted by turning the top adjusting bolt on the top of the high pressure regulator V3 behind the instrument panel.
- 6) Check the salinity reading, on the water monitor. Normal saltwater startup conditions produce salty water for the first 2 or 3 minutes. Gradually the monitor should show lower values, drinking water quality is commonly accepted as below 500 ppm. When the quality is below 500, the product solenoid valve will automatically open, and start fresh water supply through the product flowmeter and to the storage tank.
- 7) Now would be a good opportunity to make an operation log entry of the pressures, flow and salinity.
- 8) For shutdown, reverse the steps. First open the black bypass valve V4. Then shut down the HP and LP pumps. 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. Bacteria and biologic 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 extended periods, see the section on pickling or preserving the watermaker.

MONITOR INSTRUCTIONS

Salinity display, as ppm NaCl. Display reads 1 when result is above 2000 ppm.

Press the MEAS button to view the measured salinity. Calibrate by putting probe in a known buffer solution, and turning the CAL potentiometer with a screwdriver.

Press the SET button to view minimum acceptable water quality. Adjust by turning the tiny potentiometer marked SET with a screwdriver. Recommended setting 500, meaning water above 500 ppm is rejected overboard.



Over-ride Switch. Set to the Auto position for normal operation. Set to OFF to keep Product Solenoid Valve closed, for instance when flushing out cleaning chemicals or for 10 minutes when first installing new membranes. Set to ON to keep Product Solenoid Valve open, for instance when it is desired to override the quality reading from the probe or for troubleshooting.

LED lamp lights yellow when water is "good" quality (below setpoint). Lamp is green when water quality is "bad" (above setpoint)

FRESH WATER FLUSH PROCEDURE

Make sure the black handled bypass valve V4 is open (counter clockwise), and then turn the three way flushing valve V10 so the handle to the flushing position. The carbon filter scrubs chlorine that might be in your tank water, so the membranes are not exposed to any chlorine. Now fresh water is running through the system, you can start the high pressure pump and run for two minutes. After two minutes, stop the pump and turn the flushing valve back so the handle is pointing away from the flushing filter. If the fresh water supply line is not sufficient to run the pumps, then extend the flushing time. The goal is displace all water in the cartridge filter housing and the membrane vessels with fresh water – about 30 gallons.

MEDIA FILTER SYSTEM (OPTIONAL)

LT units supplied with a media filter require initial media filling as per the fill instruction page at the very back of this manual.

The media filter is fitted with a top mount multiport valve, V11, with SERVICE, BACKWASH and RINSE settings. The valve connections are with the filter inlet to the back of the bronze valve, the filtered water outlet to the right, and the backwash drain to the left. Frequency of backwash will depend on seawater turbidity and installation characteristics. As a starting point, backwash the media filter when the differential pressure at PG4 is 12 psi or every 24 operation hours. The RO must be off to backwash the media filter and the media bypass valve must be in the normal position

(not bypass). Start only the LP boost pump, and run for 5 minutes in the backwash position and then 3 minutes in the rinse position.

When the watermaker is not being used, the media filter should be backwashed whenever the RO is flushed. Regular backwash will minimize organic growth inside the tank.

MAINTENANCE INSTRUCTIONS

Adapt the following suggested routine maintenance schedule as required to your installation and operating conditions:

	Each Start	Weekly	Monthly	Quarterly	Semi-Annually	Annually	As Required	Labor Hours (approximate)
Clean and inspect micron filter							•	0.5
Replace filter element when filter pressure is 10 psi lower than clean element							•	0.5
Check pump oil level	•							0.1
Backwash media filter							•	0.2
Change pump oil after first 50 hours and then based on usage *						•		1.0
Lubricate HP pump motor at grease nipple with one stroke bearing grease						•		1.0

*Oil change should be monthly with the constant 24/7 usage. For installations under heavy use (8 hours per day average), change every 3 months. For installations where the watermaker is for back-up, emergency or special missions, oil change should be once every year. Oil change at approximately every 500 hours.

MEMBRANE CLEANING AND PRESERVATION

During normal operations, mineral scale and biological matter will slowly foul the RO membranes. These deposits build up over time and will eventually cause a loss of product water output, salt rejection capability, or both. The RO elements should be cleaned when product water output drops by 15% from the initial baseline established during the first hours of operation with new membranes. Chemical cleaning is usually not effective if fouling has dropped production below 80% of the original condition. Chemical cleaning can recover lost flow rate, but is less effective recovering lost salt rejection.

Preservation or pickling is done to protect the membranes during long term storage. A properly pickled system will stay fresh for 6 months in temperate climates or 4 months in the tropics, after which it needs to be flushed and the preservation process repeated.

The basic procedure for all cleaning and preservative treatments is the same - a specific chemical solution is loaded in the cartridge filter tank and circulated through the system for 20 minutes and then flushed out. Cleaner #1 is an alkaline detergent is used to remove biological matter and grime from the surface of the RO membranes. Cleaner #2 is an acid cleaner is used to remove mineral scale deposits. Use #1 first in most cases to better remove biological fouling. Use #2 first in special cases where hardness scaling or iron deposits are known to be the primary foulant. The preservative or pickling chemical is labeled as Chemical #3.

Cleaner	LT3000-7000
Cleaning Chemical #1, part 85-0045	5 to 15 lbs (8 to 25 cups)
Cleaning Chemical #2, part 85-0048	4 to 12 lbs (7 to 20 cups)
Preservative Chemical #3, part 85-0049	4 lbs (6 cups)

Chemical Requirements

Dissolve the appropriate amount powder in a pail of fresh water. Make sure that the chemical is completely dissolved (use warm water if necessary). There is a large variance in the required amount of chemical due to several factors. If RO product water is used to flush the unit prior to cleaning, the quantity required will be on the lower side. If the fresh water flush is done with dock or city water that is hard, then the required amount will rise. If the unit is significantly fouled, the quantity also rises. The key is to use only enough chemical to achieve the desired pH (pH 11 for #1 and pH 3 for #2). Extreme pH will damage the membranes, so do not exceed the recommendations. For the first cleaning of a system, use the lower quantities and measure the pH after circulating as described below. Keep adding chemical as needed until the cleaning solution maintains the desired pH level. Keep a record of the total chemical needed, so that on subsequent cleanings the correct amount can be used without the needed pH measurements and adjustments.

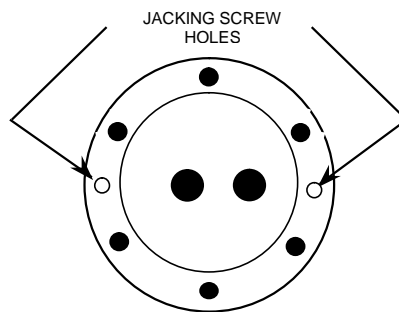
Use the following procedure for cleaning or preservation:

- 1) Flush the watermaker, so that the chemical works in fresh water not saltwater.
- 2) Remove the cartridge filter housing lid, and pour in the mixed chemical. Leave the filter cartridge in place and replace the lid.
- 3) Turn the cleaning valve V5 to the cleaning position.

- 4) Make sure the black bypass valve is open, counter clockwise. Turn the over-ride slide switch on the water monitor to OFF. Temporarily open the flush valve to allow fresh water to boost the cleaning loop pressure. It may be necessary to do this several times after the pump is running, watch the filter pressure gauge PG1. Run the HP pump for 20 minutes
- 5) If you are preserving, you are done. On the initial restart after preservation, run the unit for 10 minutes prior to switching the water monitor slide switch back to auto to clear all the preservative from the system.
- 6) If you have just finished circulating cleaner #1, conduct the fresh water flush sequence to purge out the chemical and repeat the circulation process with cleaner #2. The cleaning valve V5 must be in normal position for flushing and then back to cleaning position to circulate the next cleaner
- 7) After both cleaners have circulated and been flushed out, reset the watermaker for normal operation. Reset the slide switch on the water monitor to AUTO. Run the watermaker with seawater and record the performance in your log to determine the effectiveness of the cleaning.

PRESSURE VESSEL AND MEMBRANES - DISASSEMBLY

- 1) Disconnect all plumbing connections from the pressure vessel to be disassembled.
- 2) Remove the bolts holding each end plug in place with an Allen wrench. Place a mark on each end plug removed and its corresponding collar. This will ensure proper orientation during assembly.



● Figure 6.0 - Pressure Vessel End Plug

- 3) Locate the jacking screws on opposite sides of the end cap (see Figure 6.0). Screw in the correct size bolt until the end cap is pulled off. There are also prying slots on either side of the end plug to assist in removal.

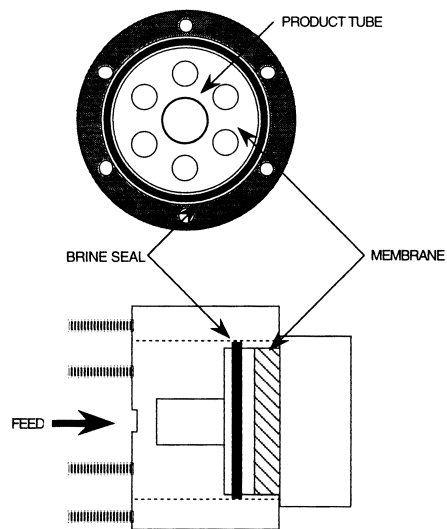


Figure 6.1 - Brine Seal Orientation

- 4) After end caps are off, note which end of the membrane has the brine seal. 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 the feed flow direction marked by a sticker on the outside of the pressure vessel, or trace the flow direction from the high pressure pump to confirm the high pressure flow direction. See Figure 6.1.

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 the membrane is difficult to remove, use a length of 2" plastic pipe to apply pressure on the protected end of membrane.

- 5) Whenever possible, remove the membrane from the discharge end of the pressure vessel (opposite the brine seal). This is accomplished by pushing on the membrane from the feed end of the pressure vessel until it is visible at the

discharge end. Then grasp the protruding membrane and pull it out of pressure vessel. Place the membrane in a clean area.

- 6) Remove the product water o-rings and end plug o-ring from each end plug for inspection. The product water o-rings are internal o-rings located inside the center hole in the end cap.

PRESSURE VESSEL AND MEMBRANES - REASSEMBLY

- 1) Clean all parts thoroughly. Inspect the o-rings on all fittings. Replace any parts that are damaged.

NOTE

Do not apply Teflon tape or other sealant to straight thread fittings such as those used on HP hose assemblies and their adapters.

- 2) Install the product water and end plug o-rings onto the end plugs. Lubricate the o-rings and entrances to the pressure vessel with glycerin or silicone lubricant. Locate the discharge end of pressure vessel. Install the end plug into the discharge end making sure to align the end plug holes and the mounting studs on the pressure vessel while paying particular attention to the reference mark (see Section 6.3.1, Step 2). Apply pressure to the end plug until screws can be threaded into the collars. If the end plug will not slide into the pressure vessel sufficiently, see Figure 6.2 for an installation aid. Install and hand tighten the screws.

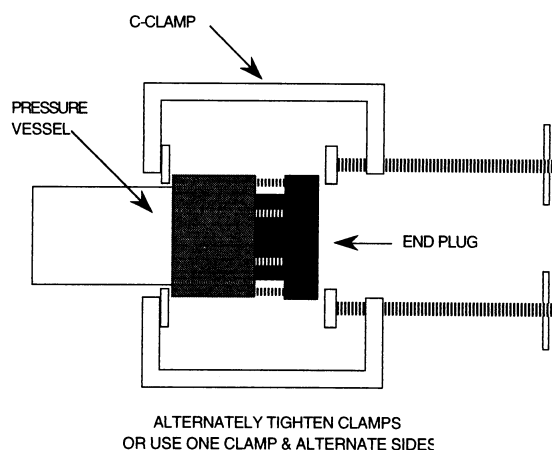


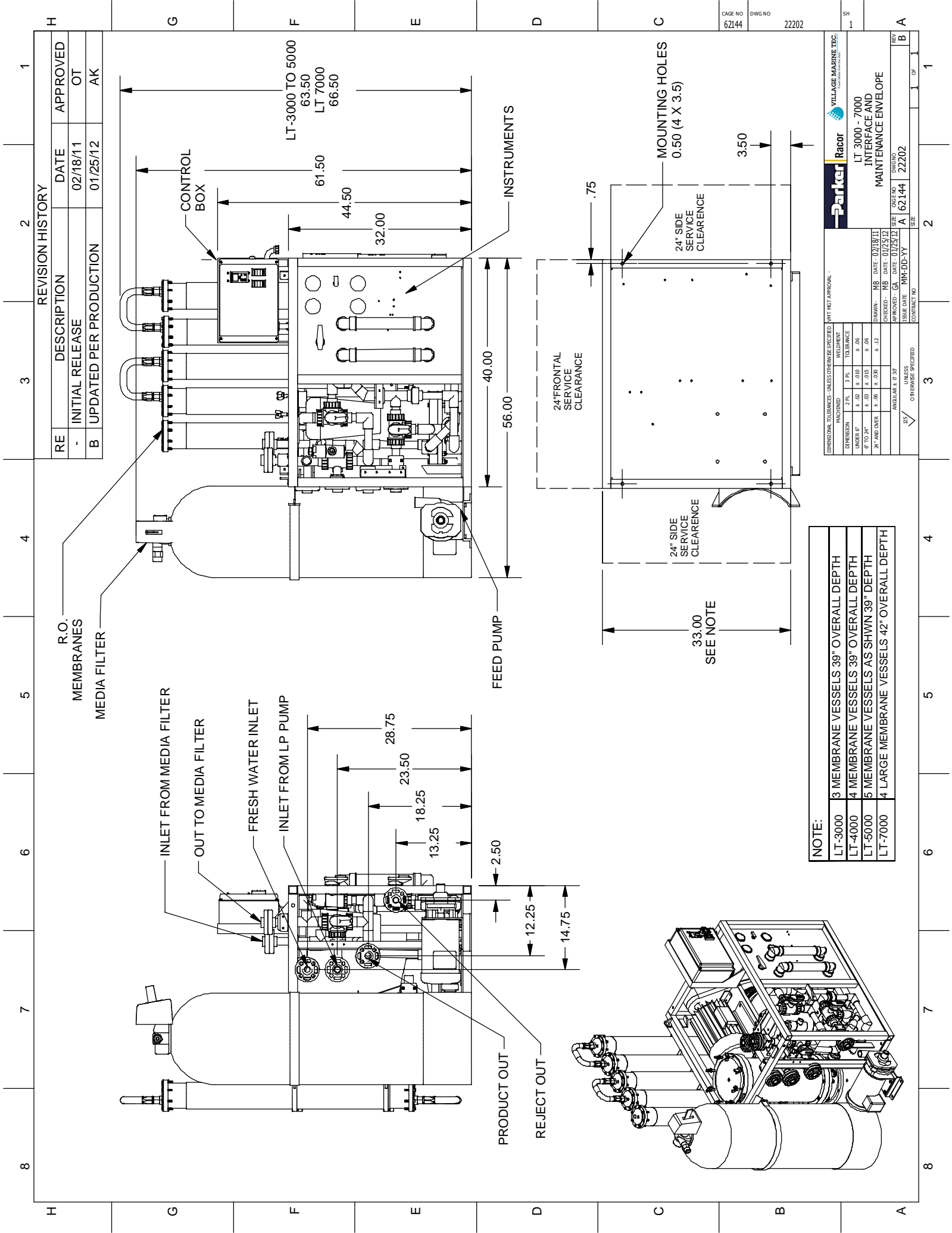
Figure 6.2 - End Plug Installation Aid

- 3) Lubricate the brine seal and product water tubes of RO membrane with glycerin or silicone lubricant. Do not use a petroleum based lubricant. Orient the membrane such that the end without the brine seal enters the feed end of the pressure vessel first. Slide the membrane into the pressure vessel until resistance is felt. Continue to apply moderate pressure until the product water tube seats in the end plug.
- 4) Install the remaining end plug making sure to align the end plug holes with the mounting studs on the pressure vessel while paying particular attention to the reference mark (see Section 6.3.1, Step 2). Apply moderate pressure to the end plug until the screws can be threaded into the collar. If the end plug will not slide into the pressure vessel sufficiently, see Figure 6.2 for installation aid. Install and hand tighten the nuts.
- 5) Make sure that antiseize compound is applied to each screw before the final tightening and torque the screws to 15 ft-lbs.
- 6) Reconnect all plumbing connections to pressure vessels.

OPERATION LOG

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

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REVISION HISTORY			
RE	DESCRIPTION	DATE	APPROVED
-	INITIAL RELEASE	02/18/11	OT
B	UPDATED PER PRODUCTION	01/25/12	AK

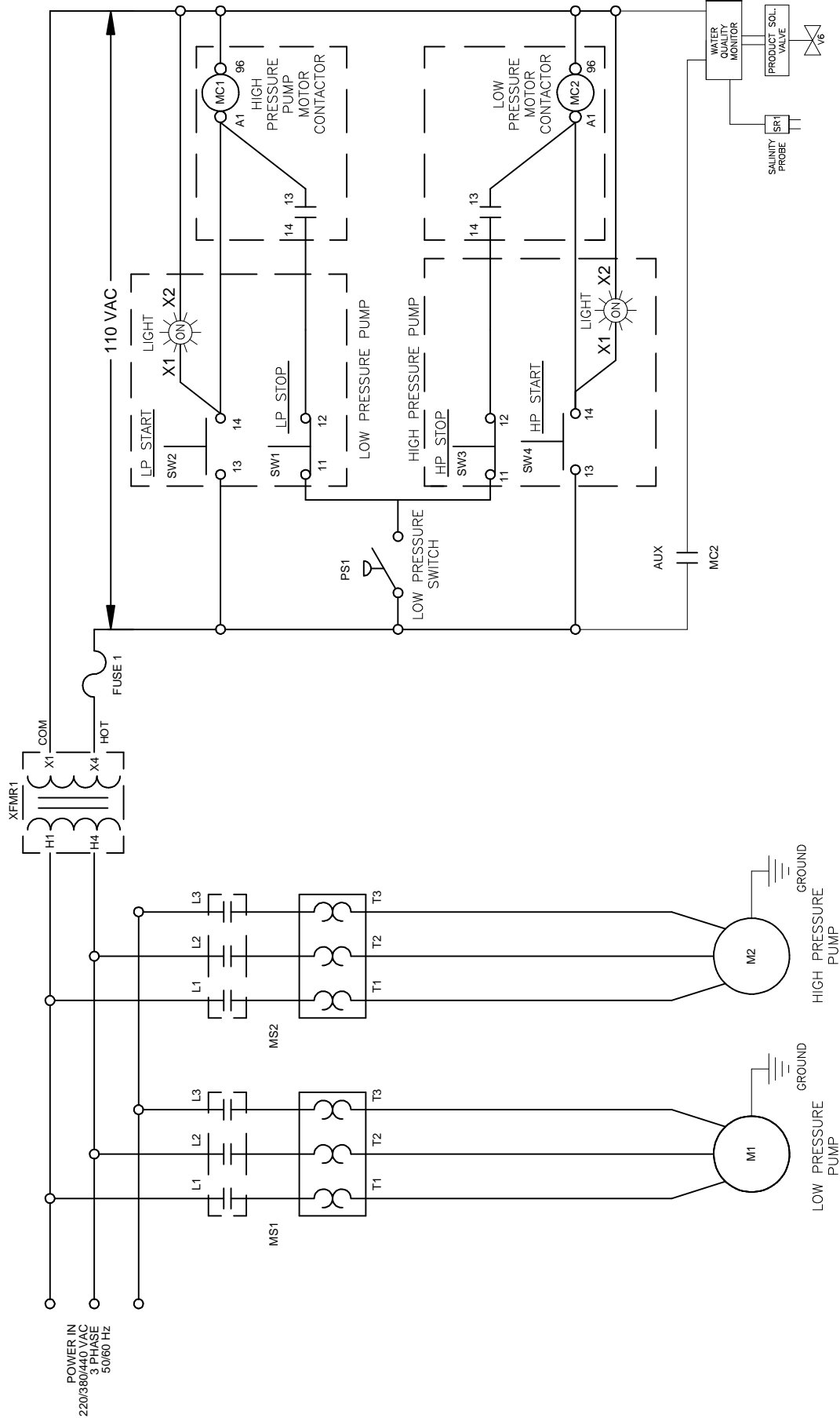
NOTE:			
LT-3000	3 MEMBRANE VESSELS 39" OVERALL DEPTH		
LT-4000	4 MEMBRANE VESSELS 39" OVERALL DEPTH		
LT-5000	5 MEMBRANE VESSELS AS SHWN 39" DEPTH		
LT-7000	4 LARGE MEMBRANE VESSELS 42" OVERALL DEPTH		

CAGE NO. 62144		DWG NO. 22202		SH 1
VILLAGE MARINE TEC. Racor		LT 3000 - 7000 INTERFACE AND MAINTENANCE ENVELOPE		REV B
DRAWN: MB DATE: 02/18/11		CHECKED: MB DATE: 01/25/12		DWGNO 62144
APPROVED: GB DATE: 01/25/12		ISSUE DATE: MM-DD-YY		SIZE A
UNLESS OTHERWISE SPECIFIED		CONTRACT NO.		CF
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H G F E D C B A

REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
-	INITIAL RELEASE	4/15/2011	



CAGE NO
62144

REVISION STATUS OF SHEET	
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DWG NO
22250

SH
1

VILLAGE MARINE TECH.	
Racor	
ELECTRICAL SCHEMATIC	
3PHASE SUPPLY	
LT - 3000 TO LT - 7000	
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ISSUE DATE	DATE
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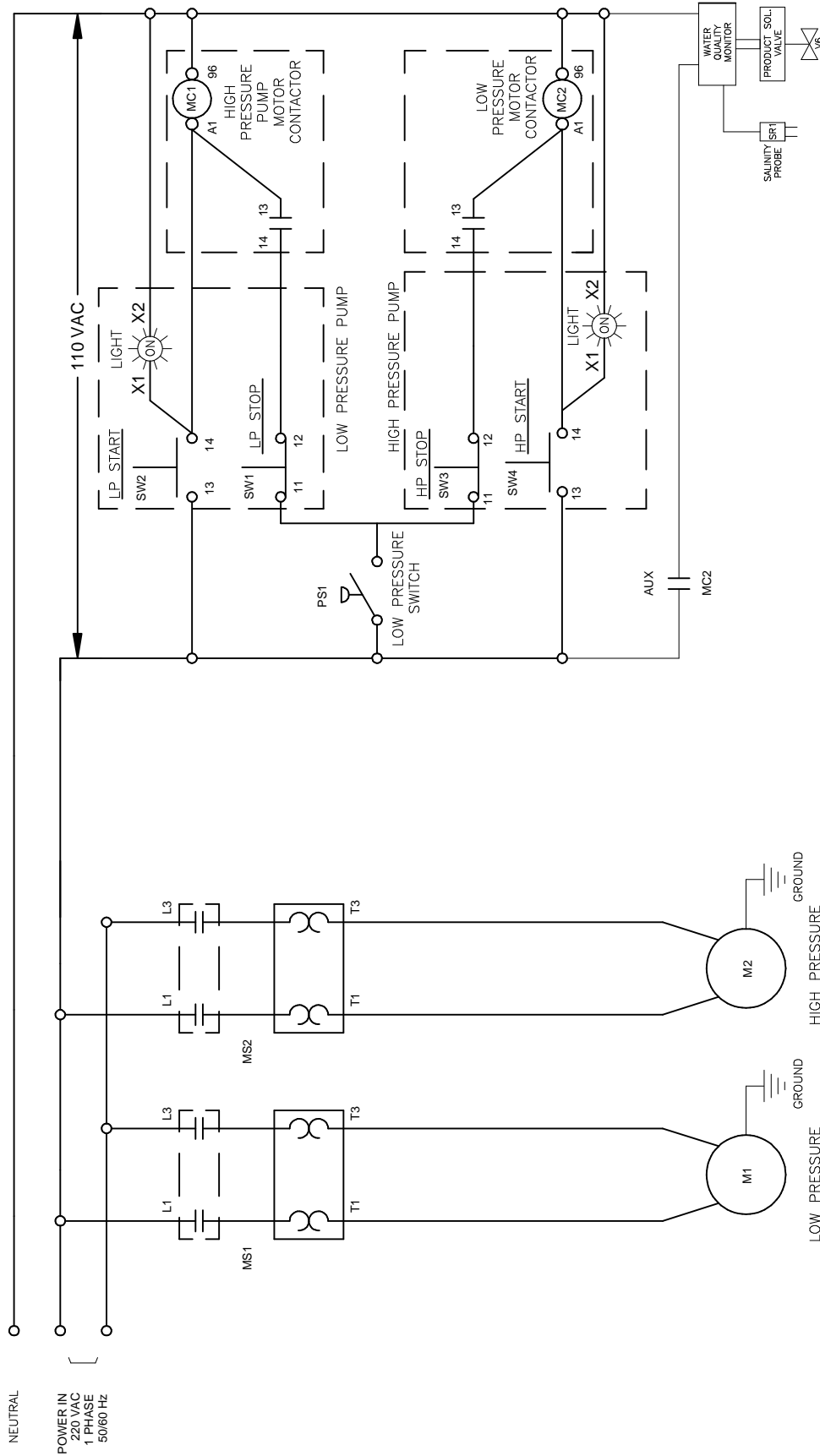
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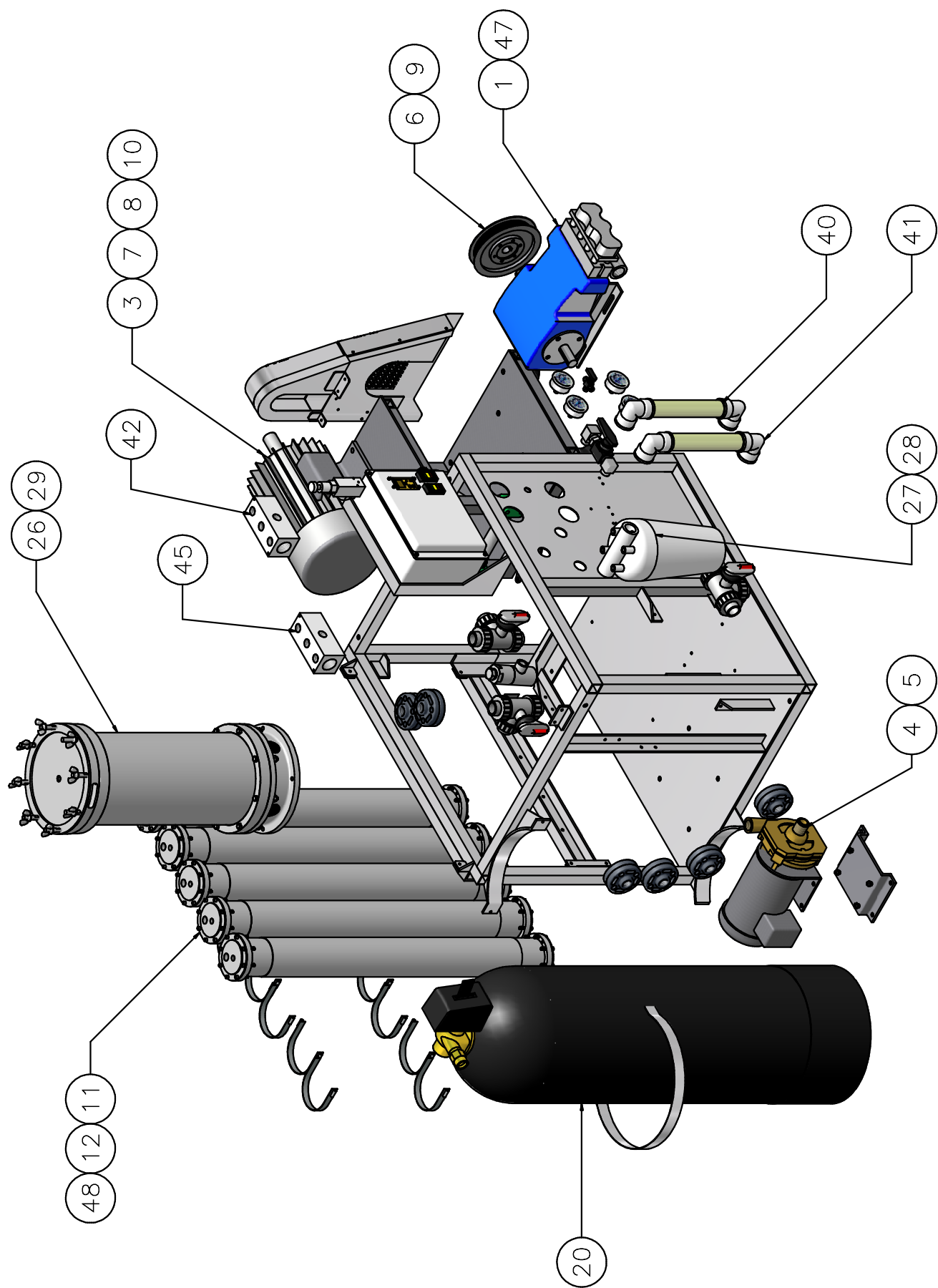
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-	INITIAL RELEASE	4/15/2011	

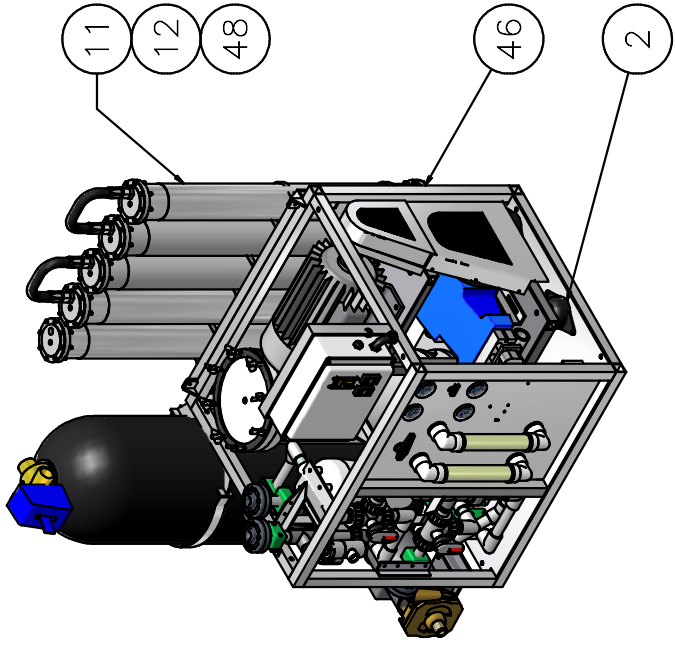
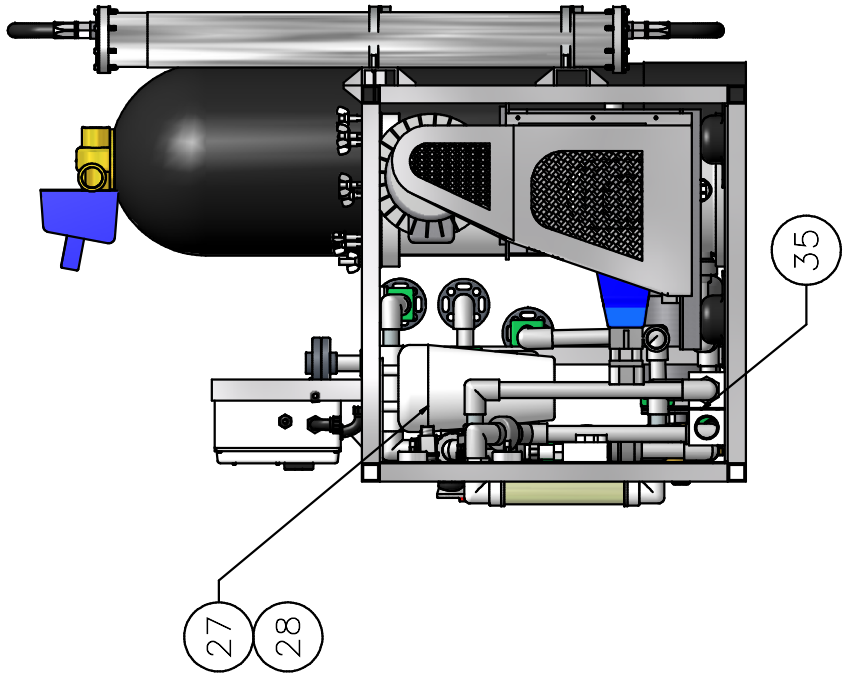
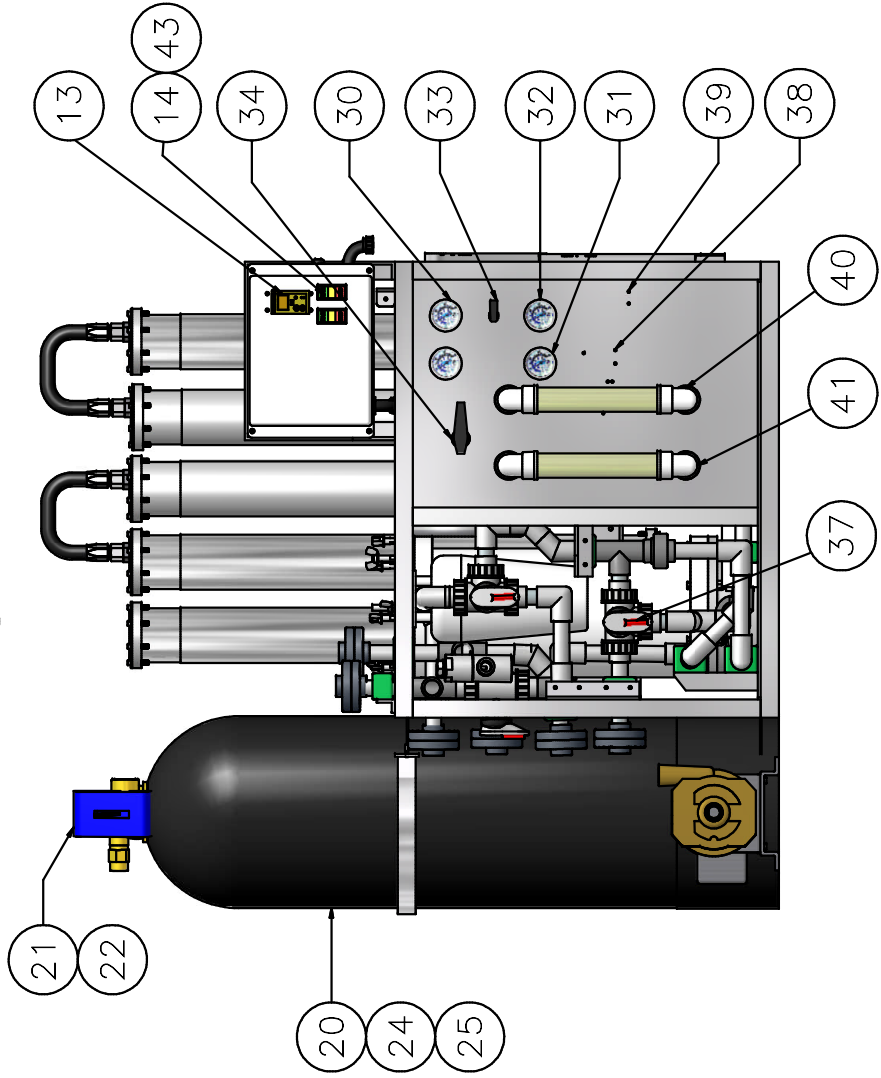
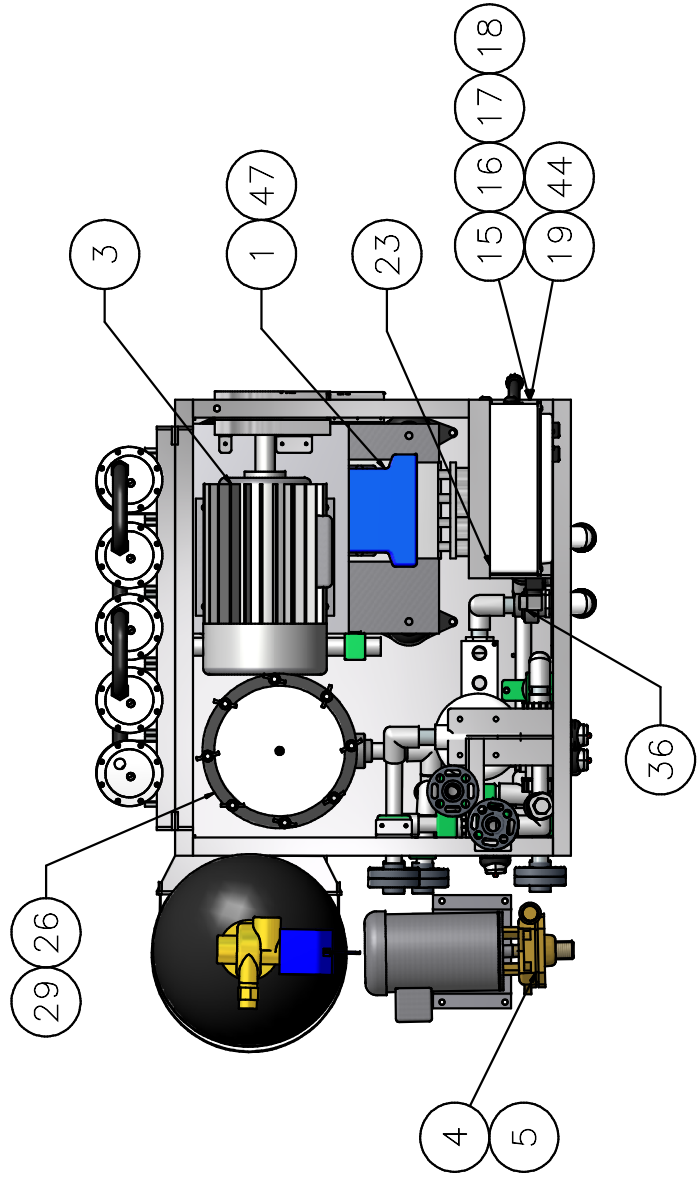


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DWG NO	22250
REVISION STATUS OF SHEET	
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VILLAGE MARINE TECH.			
Racor			
ELECTRICAL SCHEMATIC			
1 PHASE SUPPLY			
LT-3000 TO LT-7000			
DESIGNED BY	MB	DATE	04/12/11
CHECKED BY	OF	DATE	04/15/11
ISSUED BY	MM-DD-YY	DATE	
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OTHERWISE SPECIFIED		OTHERWISE SPECIFIED	

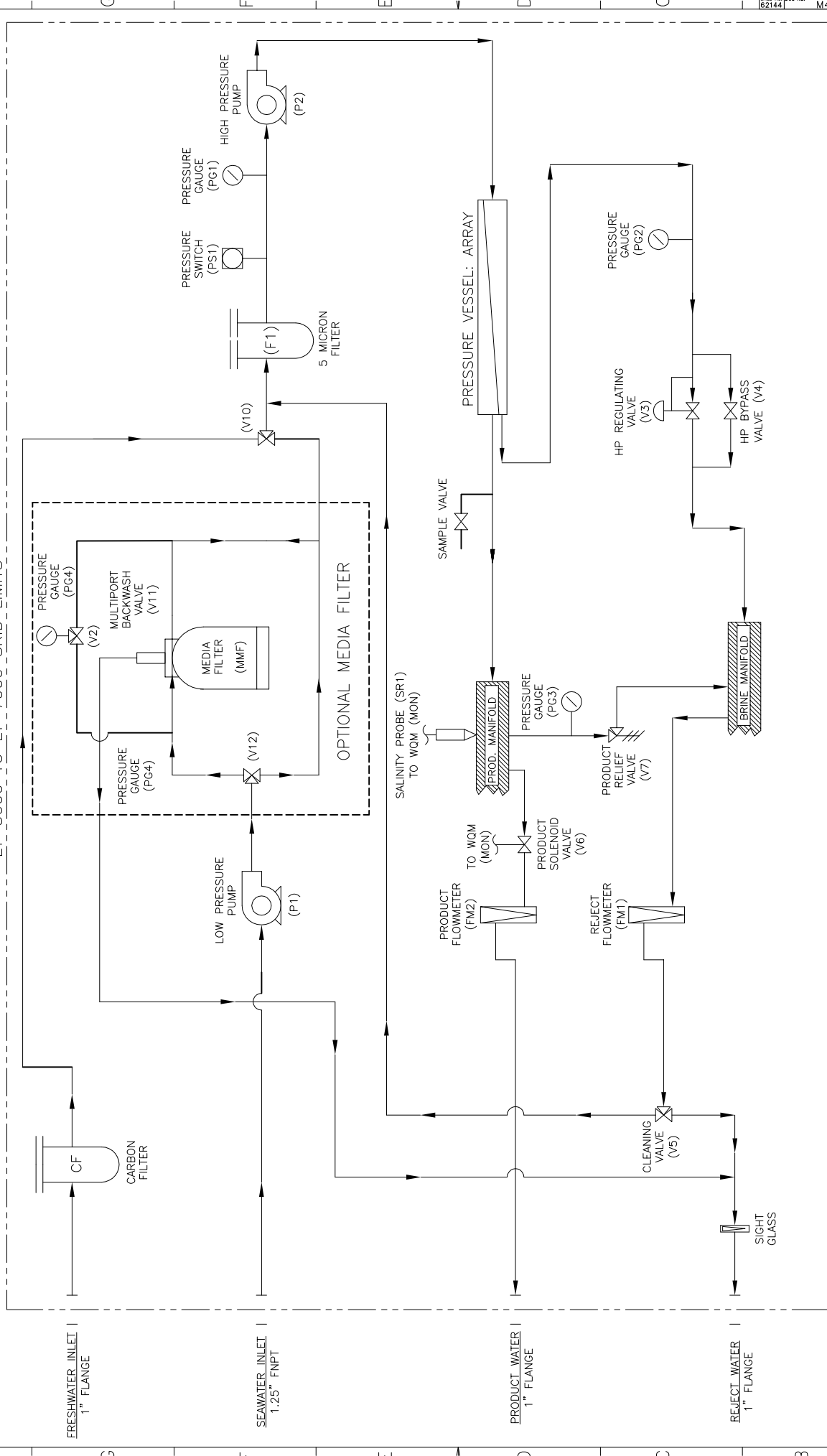
1 2 3 4 5 6 7 8





PARTS LIST - LT-3000 to LT-7000

Callout	PID Tag	LT-3000 440/3/60	LT-5000 440/3/60	LT-5000 380/3/50	LT-7000 440/3/60	LT-7000 380/3/50	QTY	DESCRIPTION
1	P2	70-1257	70-1257	70-1257	70-1257	70-1257	1	PUMP, HIGH PRESSURE
2		70-1290	70-1290	70-1290	70-1290	70-1290	4	MOUNT, MTR/PMP, PMT
3	M2	20-0062	20-2333	20-2333-50	20-2333	20-2333-50	1	MOTOR, HP PUMP
4	P1	70-1251	70-1251	70-1251	70-1251	70-1251	1	PUMP, LOW PRESSURE BOOST, NO MOTOR
5	M1	20-0234	20-0234	20-1259	20-0234	20-1259	1	MOTOR, 2HP, LP BOOST PUMP
6		70-0808	70-0808	70-0808	70-0808	70-0808	1	PULLEY, PUMP
7		70-2830	70-0040	70-0014	70-0040	70-0014	1	PULLEY, MOTOR
8		70-1121	70-1055	70-1054	70-1055	70-1054	1	BELT, DRIVE
9		70-1038	70-1038	70-1038	70-1038	70-1038	1	BUSHING, PUMP,
10		70-0138	70-0035	70-0244	70-0035	70-0244	1	BUSHING, MOTOR
11		32-0444	32-0444	32-0444	32-6040	32-6040	3,4,5	PRESSURE VESSEL ASSEMBLY
12		33-0440	33-0440	33-0440	33-0036	33-0036	3,4,5	MEMBRANE ELEMENT
13	WQM	40-0226	40-0226	40-0226	40-0226	40-0226	1	MONITOR, WATER QUALITY
14	SW1-4	20-1591	20-1591	20-1591	20-1591	20-1591	2	PUSHBUTTON, DUAL, START/STOP
15		20-1441	20-1441	20-1062	20-1441	20-1062	1	TRANSFORMER, .150KVA,
16		20-0264	20-0264	20-0264	20-0264	20-0264	1	CONTACTOR, LP PUMP
17		20-1015	20-1015	20-1015	20-1015	20-1015	1	RELAY, OVERLOAD, 3-5 AMPS L/P PUMP
18		20-0581	20-0581	20-0581	20-0581	20-0581	1	CONTACTOR, HP PUMP
19		20-1016	20-0004	20-0004	20-0004	20-0004	1	RELAY, OVERLOAD, HP PUMP
20	MMF	33-0002	33-0002	33-0002	33-0002	33-0002	1	TANK, MEDIA FILTER
21	V11	60-0166	60-0166	60-0166	60-0166	60-0166	1	VALVE, MEDIA, 1.5" FNPT
22		60-0028	60-0028	60-0028	60-0028	60-0028	1	VALVE, VACUUM BREAKER
23	PS1	20-0480	20-0480	20-0480	20-0480	20-0480	1	SWITCH, LOW PRESS
24		85-5010	85-5010	85-5010	85-5010	85-5010	4	SAND MEDIA, per pail
25		85-5006	85-5006	85-5006	85-5006	85-5006	1	GRAVEL MEDIA, per pail
26	F1	30-4353	30-4353	30-4353	30-4353	30-4353	1	FILTER, HOUSING, 100 SQ FT, FRP
27	CF	33-0315	33-0315	33-0315	33-0315	33-0315	1	FILTER ELEMENT, CARBON, 5" X 10", BW
28	CF	33-0011	33-0011	33-0011	33-0011	33-0011	1	FILTER, HOUSING, 5" X 10", 1.5" FNPT
29	F1	33-5100	33-5100	33-5100	33-5100	33-5100	1	FILTER ELEMENT, 5 MIC, 100 SQ FT
30	PG1,PG4	40-0016	40-0016	40-0016	40-0016	40-0016	2	GAUGE, PRESSURE, 0-100PSI, BACK CONN.
31	PG3	40-0303	40-0303	40-0303	40-0303	40-0303	1	GAUGE, PRESSURE, 0-60PSI, BACK CONN.
32	PG2	40-0302	40-0302	40-0302	40-0302	40-0302	1	GAUGE, PRESSURE, 0-1000PSI, BACK. CONN.
33	V2	60-0013	60-0013	60-0013	60-0013	60-0013	1	VALVE, 3-WAY, 1/4" TUBE, 316SS
34	V4	60-0068	60-0068	60-0068	60-0068	60-0068	1	VALVE, BALL, BYPASS, 1/2" FNPT, 316SS
35	SR1	40-0241	40-0241	40-0241	40-0241	40-0241	1	SALINITY PROBE
36	V3	60-0040	60-0040	60-0040	60-0040	60-0040	1	VALVE, HP REGULATOR, 40 GPM
37	V5,10,12	60-0084	60-0084	60-0084	60-0084	60-0084	3	VALVE, 3-WAY, 1" PVC, SIDE LOAD
38	V6	20-1141	20-1141	20-1141	20-1141	20-1141	1	VALVE, SOLENOID, 120 V, 3/4" PORTS
39	V7	60-7742	60-7742	60-7742	60-7742	60-7742	1	VALVE, RELIEF, 3/4" FNPT, NYL, VMT
40	FM2	40-0211	40-0211	40-0211	40-0015	40-0015	1	FLOWMETER, PRODUCT, 1.5"MNPT
41	FM1	40-0210	40-0210	40-0210	40-0210	40-0210	1	FLOWMETER, REJECT, 1.5"MNPT
42		50-0026	50-0026	50-0026	50-0026	50-0026	1	MANIFOLD, PRODUCT, PW3K-10K
43		20-1592	20-1592	20-1592	20-1592	20-1592	2	CONTACT BLOCK, START / STOP BUTTONS
44		20-0684	20-0684	20-0684	20-0684	20-0684	1	FUSE, TRANSFORMER
45		50-0026	50-0026	50-0026	50-0026	50-0026	1	MANIFOLD, REJECT
46		60-0375	60-0375	60-0375	60-0375	60-0375	3,4,5	VALVE, SAMPLE PRODUCT
47	P2	85-0050	85-0050	85-0050	85-0050	85-0050	3	PUMP OIL
48		90-2323	90-2323	90-2323	32-1016	32-1016	3,4,5	MEMBRANE O-RING KITS



1	-	REVISION
-	-	STATUS
		OF SHEETS

 Village Marine Technology
2000 West 136th Street - Gardena - California 90249

OWNER	M.B.	DATE	11-19-10
DESIGNED		DATE	
CHECKED		DATE	
APPROVED		DATE	
ISSUE DATE			
CONTRACT NO.			
SCALE			
SIZE	CAGE NO	DWG NO	REV
	E 62144	M4485	A
			1 OF 1

25PFR PLUNGER PUMP SERVICE MANUAL



25 FRAME SPLIT MANIFOLD:

2530, 2531, 2537

INSTALLATION AND START-UP INFORMATION

Optimum performance of the pump is dependent upon the entire liquid system and will be obtained only with the proper selection, installation of plumbing, and operation of the pump and accessories.

SPECIFICATIONS: Maximum specifications refer to individual attributes. It is **not** implied that **all maximums** can be performed **simultaneously**. If more than one maximum is considered, check with your CAT PUMPS supplier to confirm the proper performance and pump selection. Refer to individual pump Data Sheets for complete specifications, parts list and exploded view.

LUBRICATION: Fill crankcase with CAT PUMPS custom-blend, ISO-68 hydraulic oil per pump specifications [84 oz., 2.5 L]. **DO NOT RUN PUMP WITHOUT OIL IN CRANKCASE.** Change initial fill after 50 hours running period. Thereafter, change oil every **3 months or 500 hour intervals**. **Oiler adjustment** is vertical to start feed, horizontal to stop feed, dial to adjust flow rate. Additional lubrication may be required with increased hours of operation and temperature.

PUMP ROTATION: Pump was designed for forward rotation to allow optimum lubrication of the crosshead area. Reverse rotation is acceptable if the crankcase oil level is increased slightly above center dot to assure adequate lubrication.

PULLEY SELECTION: Select size of motor pulley required to deliver the desired flow from Horsepower Requirement and Pulley Selection Chart (refer to Tech Bulletin 003 or individual Data Sheet).

MOTOR SELECTION: The motor or engine driving the pump must be of adequate horsepower to maintain full RPM when the pump is under load. Select the electric motor from the Horsepower Requirement Chart according to required pump discharge flow, maximum **pressure at the pump** and drive losses of approximately 3-5%. Consult the manufacturer of gas or diesel engine for selection of the proper engine size.

MOUNTING: Mount the pump on a rigid, horizontal surface in a manner to permit drainage of crankcase oil. An uneven mounting surface will cause extensive damage to the pump base. To minimize piping stress, **use appropriate flexible hose to inlet and discharge ports**. Use the correct belt; make sure pulleys are aligned. Excessive belt tension may be harmful to the bearings. Hand rotate pump before starting to be certain shaft and bearings are free moving.

LOCATION: If the pump is used in extremely dirty or humid conditions, it is recommended pump be enclosed. Do not store or operate in excessively high temperature areas or without proper ventilation.

INLET CONDITIONS: Refer to complete **Inlet Condition Check-List** in this manual before starting system. **DO NOT STARVE THE PUMP OR RUN DRY.** Temperatures above 130°F are permissible. Add 1/2 PSI inlet pressure per each degree F over 130°F. Elastomer or RPM changes may be required. See Tech Bulletin 002 or call CAT PUMPS for recommendations.

C.A.T.: Installation of a C.A.T. (Captive Acceleration Tube) is recommended in applications with stressful inlet conditions such as high temperatures, booster pump feed, long inlet lines or quick closing valves.

DISCHARGE CONDITIONS: OPEN ALL VALVES BEFORE STARTING SYSTEM to avoid deadhead overpressure condition and severe damage to the pump or system.

Install a **Pulsation Dampening** device on the discharge head or in the discharge line as close to the head as possible. Be certain the pulsation dampener (Prrrr-o-lator) is properly precharged for the system pressure (see individual Data Sheet.)

A **reliable Pressure Gauge** should be installed near the discharge outlet of the high pressure manifold. This is extremely important for adjusting pressure regulating devices and also for proper sizing of the nozzle or restricting orifice. The pump is rated for a maximum pressure; this is the **pressure** which would be **read at the discharge manifold of the pump**, NOT AT THE GUN OR NOZZLE.

Use PTFE thread tape or pipe thread sealant (sparingly) to connect accessories or plumbing. Exercise caution not to wrap tape beyond the last thread to avoid tape from becoming lodged in the pump or accessories. This condition will cause a malfunction of the pump or system.

PRESSURE REGULATION: All systems require both a primary pressure regulating device (i.e., regulator, unloader) and a secondary pressure safety relief device (i.e., pop-off valve, safety valve). The primary pressure device must be installed on the discharge side of the pump. The function of the primary pressure regulating device is to protect the pump from over pressurization, which can be caused by a plugged or closed off discharge line. Over pressurization can severely damage the pump, other system components and can cause bodily harm. The secondary safety relief device must be installed in-line between the primary device and pump or on the opposite side of the manifold. This will ensure pressure relief of the system if the primary regulating device fails. Failure to install such a safety device will void the warranty on the pump.

If a large portion of the pumped liquid is by-passed (not used) when the high pressure system is running, this by-pass liquid should be routed to an adequately sized, baffled supply tank or to drain. If routed to the pump inlet, the **by-pass liquid can quickly develop excessive heat and result in damage to the pump**. A temperature control device to shut the system down within the pump limits or multiple THERMO VALVES must be installed in the by-pass line to protect the pump.

NOZZLES: A worn nozzle will result in loss of pressure. Do not adjust pressure regulating device to compensate. Replace nozzle and reset regulating device to system pressure.

PUMPED LIQUIDS: Some liquids may require a **flush between operations or before storing**. For pumping liquids other than water, contact your CAT PUMPS supplier.

STORING: For extended storing or between use in cold climates, drain all pumped liquids from pump and **flush with antifreeze solution to prevent freezing and damage** to the pump. **DO NOT RUN PUMP WITH FROZEN LIQUID** (refer to Tech Bulletin 083).

WARNING

All systems require both a primary pressure regulating device (i.e., regulator, unloader) and a secondary pressure safety relief device (i.e., pop-off valve, safety valve). Failure to install such relief devices could result in personal injury or damage to the pump or to system components. CAT PUMPS does not assume any liability or responsibility for the operation of a customer's high pressure system.

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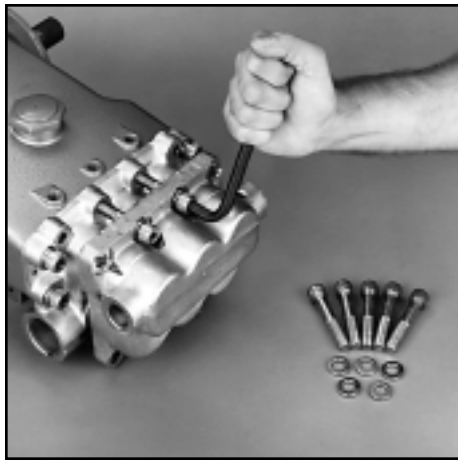
e-mail: cpi@catpumps.be www.catpumps.be

CAT PUMPS DEUTSCHLAND GmbH

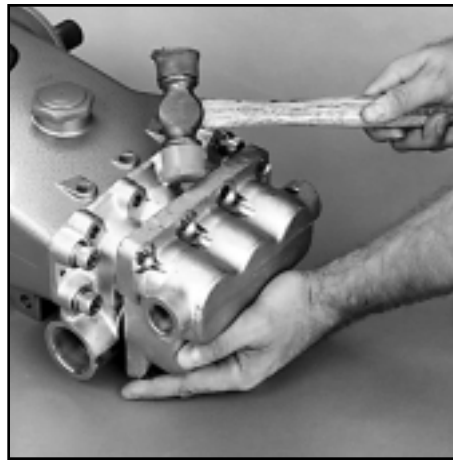
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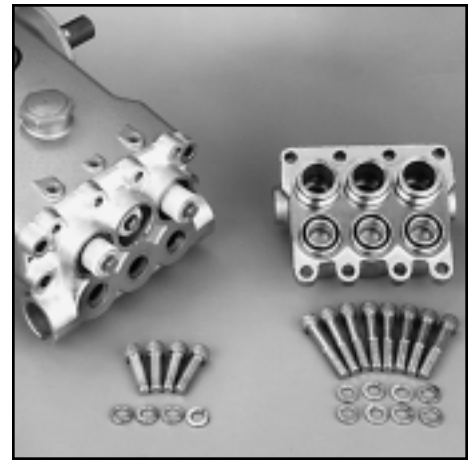
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Removal of Discharge Socket Head Screws



Separation of Discharge Manifold from Inlet Manifold



Discharge Manifold with both Inlet Valve Adapters and Discharge Valve Spacers.

CAUTION: Before commencing with service, shut off drive (electric motor, gas or diesel engine) and turn off water supply to pump. Relieve all discharge line pressure by triggering gun or opening valve in discharge line.

After servicing is completed, turn on water supply to pump, start drive, reset pressure regulating device and secondary valve, read system pressure on the gauge at the pump head. Check for any leaks, vibration or pressure fluctuations and resume operation.

SERVICING THE VALVES

Disassembly

1. To service the Valves, the Discharge Manifold must be removed. Using a M10 allen wrench remove the eight Socket Head Screws.
2. Support the underside of the Discharge Manifold and lightly tap the top back of the manifold with a soft mallet. Two screwdrivers may be needed to further separate the Discharge Manifold from the Inlet Manifold.
3. Remove the Discharge Manifold and place it **crankcase side up**.

NOTE: The Discharge Valve Assembly is secured in the upper chambers by the Discharge Valve Spacer, while the Inlet Valve Assembly is secured in the lower chambers by the Inlet Valve Adapter.

4. The Discharge Valve Spacers will remain in either the Inlet Manifold or the Discharge Manifold. To remove the Spacer from the manifold, insert two screwdrivers on opposite sides under the machined lip on the outside of the Spacer and pry out.

5. Use a reverse pliers to remove the Inlet Valve Adapters from the Discharge Manifold or insert two screwdrivers into the secondary groove on opposite sides of the adapter and pry from valve chamber.
6. Both the Inlet and Discharge use the same Valve Assembly. With a flat head screwdriver, carefully pry the Seat, O-Ring, Valve, Spring and Retainer from the manifold chamber.

CAUTION: Exercise caution to avoid scoring the manifold chamber wall.

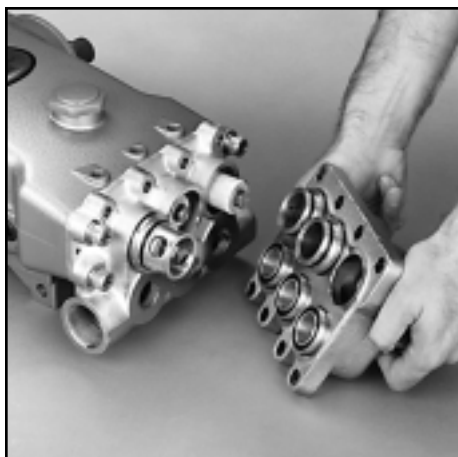
NOTE: This Valve Assembly does not snap together.

Reassembly

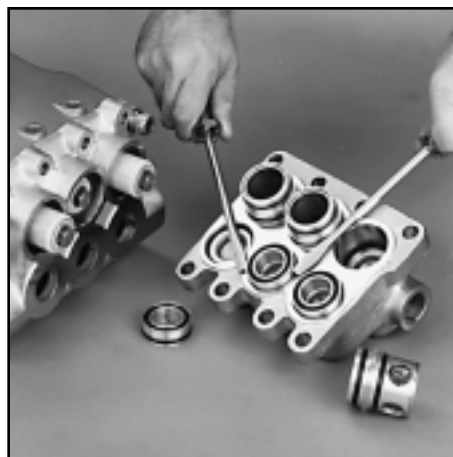
NOTE: For certain applications apply liquid gasket to the O-Ring crevices and seal surfaces. See Tech Bulletin 053 for model identification.

NOTE: EPDM elastomers require a silicone-base lubricant.

1. Inspect the Spring Retainer for any scale buildup or wear and replace as needed. Place the Spring Retainer into the valve chamber.



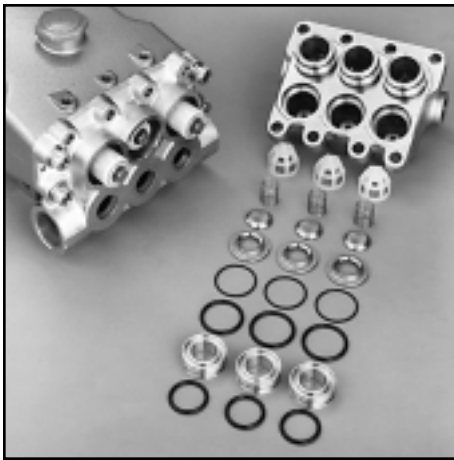
Removal of Discharge Valve Spacers



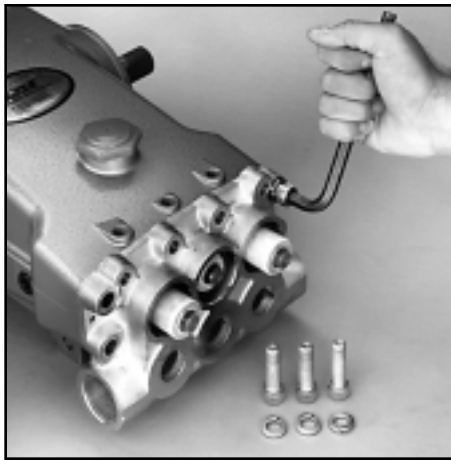
Removal of Inlet Valve Adapters



Discharge Valve Assembly



Inlet Valve Assembly



Removal of I.M. Socket Head Screws



Rotate Crankshaft to position plungers

2. Examine the Spring for fatigue or breaks and replace as needed. Place the Spring into the Retainer.
3. Examine the Valve for pitting or grooves and replace as needed. Set the Valve onto the Spring with the **concave side down**.
4. Place the Seat into the valve chamber with the **concave side down**. Then apply liquid gasket to the O-Ring and press squarely into the lip on the Spring Retainer.

NOTE: Effective with 6-95 mfg date, the O-Ring was moved to the back side of the Seat with the O-Ring installed first, onto the lip in the manifold chamber, then the Seat with the machined O-Ring groove down.

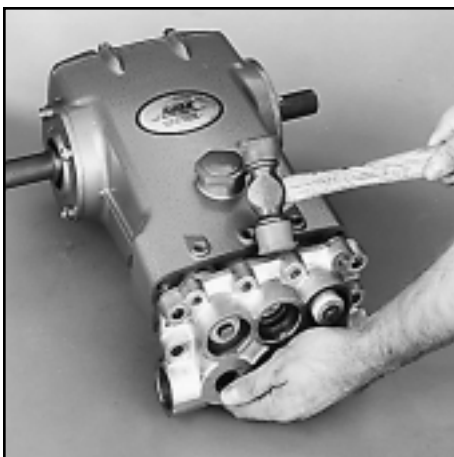
NOTE: Effective with 11-95 mfg date, the Seat was modified to a new thicker style, still with the O-Ring installed first, onto the lip in the manifold chamber, then the Seat with the machined O-Ring groove down.

5. Examine the Seat for any grooves, pitting or wear and replace. Place the new Seat onto the the O-Ring with the concave side down.
6. Look for wear or damage to both the inner and outer O-Rings on the Inlet Adapter and replace.
7. Fit the O-Rings into both the outer groove and face groove of the Inlet Adapter and apply liquid gasket into the O-Ring crevice.

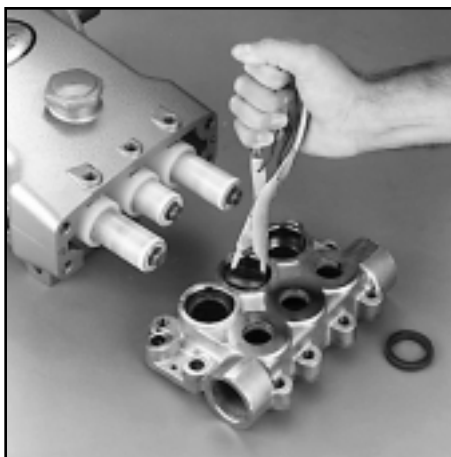
8. Press the Inlet Adapter into the lower manifold chamber.
9. Remove and examine both O-Rings on the Discharge Valve Spacer for wear or cuts and replace as needed.
10. Fit the new O-Rings into the groove on the outside of the Discharge Valve Spacer. Apply liquid gasket into the O-Ring crevice and carefully press the Spacer completely into the Discharge Manifold chamber with the **smaller diameter side down**.
11. Replace Discharge Manifold over the Plunger Rods with Discharge Valve Spacers to the top and Inlet Adapters to the bottom. Tap with a soft mallet until completely seated in chambers.
12. Reinstall the eight Socket Head Screws and torque in sequence to specifications in torque chart.

NOTE: It is highly recommended that antiseize lubricant (PN6119) be applied to the threads on all stainless steel components to prevent galling.

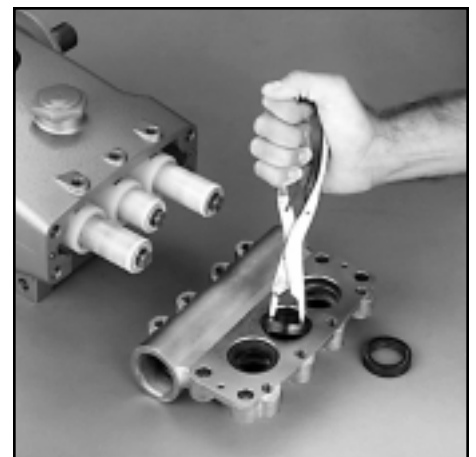
IMPORTANT: Follow the torque sequence to assure the proper alignment.



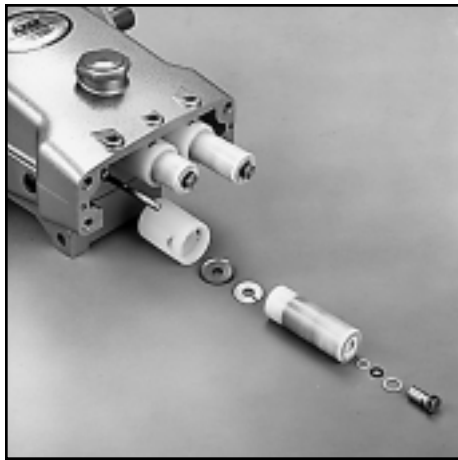
Removal of Inlet Manifold



Removal of Hi-Pressure Seals



Removal of Lo-Pressure Seals



Plunger Arrangement

SERVICING THE SEALS

Disassembly

1. Remove the Discharge Manifold as described in **SERVICING THE VALVES** section.
2. To service the seals the Inlet Manifold must be removed, use a M10 allen wrench to remove the 4 Socket Head Screws.
3. Support the Inlet Manifold and lightly tap the top back side with a soft mallet. Remove the Inlet Manifold and place it **crankcase side down**.
4. Use a reverse pliers to remove the Hi-Pressure Seals.
5. The Lo-Pressure Seals may stay on the Plungers or in the Inlet Manifold.
6. Invert the Inlet Manifold with the **crankcase side up**.
7. Remove the Lo-Pressure Seal using a reverse pliers or slide it off the Plunger by hand.

Reassembly

NOTE: If your pump has been built with special seals and O-Rings, service with same type of special parts. Refer to pump Data Sheet for correct parts or kits.

NOTE: For certain applications apply liquid gasket to the O-Ring crevices and seal surfaces. See Tech Bulletin 053 for model identification.

NOTE: EPDM elastomers require a silicone-base lubricant.

1. Examine the Lo-Pressure Seal for wear or spring fatigue and replace. Apply liquid gasket to the outside of the new Lo-Pressure Seal and carefully press it into the Inlet Manifold chamber with the **spring down**.

NOTE: When using alternate materials, the fit of the special materials may be snug and require gently driving the LPS into position with a cylinder of the same diameter to assure a square seating and no damage to the LPS.

2. Invert the Inlet Manifold and place the **crankcase side down**. Examine the Hi-Pressure Seal for deformity or wear and replace. Apply liquid gasket to the outside of the new Hi-Pressure Seal and carefully press it into the Inlet Manifold chamber with the **metal side down**.

SERVICING THE PLUNGERS

Disassembly

NOTE: The Ceramic Plungers and the Plunger Retainers should be examined on the same schedule as servicing the seals.

1. To service the Ceramic Plungers, first remove the Seal Retainers.
2. Loosen the Plunger Retainer about three or four turns using a M14 hex tool.
3. Grasp the Ceramic Plunger and push toward the Crankcase until it separates from the Plunger Retainer.
4. Unthread the Plunger Retainer with Gasket, O-Ring, Back-up-Ring and Ceramic Plunger. Remove the Keyhole Washer and Barrier Slinger from the Plunger Rod.

Reassembly

1. Examine the Barrier Slinger for any wear or damage and place on the Plunger Rod with the **concave side facing out**.
2. Examine the Keyhole Washer and place on the Plunger Rod with the **slot down**.
3. Examine the O-Ring and Back-up-Ring on the Plunger Retainer and replace if worn or damaged. First install the Gasket, then the O-Ring and Back-up-Ring. Lubricate the Plunger Retainer O-Ring to avoid cutting during installation.
4. If the Plunger Retainer unthreads from the stud during removal, thread the stud into the retainer.
5. Examine the Ceramic Plunger for scoring, cracks or scale and replace if needed. The Ceramic Plunger can be cleaned with a scotchbrite pad. Slide the Ceramic Plunger onto the retainer and stud assembly with the **shallower counterbore away from the retainer**.

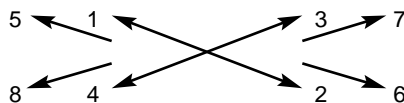
NOTE: Plunger can only be installed one direction. Do not force into Plunger Rod.

NOTE: Do not lubricate wicks at initial start-up. Operate for 10 to 15 minutes to allow grease from LPS to penetrate the plunger surface, then lubricate as needed.

6. Apply Loctite® 242® to the threads of the Plunger Retainer Stud and thread onto the Plunger Rod. Then torque to specifications in chart.

7. Install new wicks in front half of seal retainer. Press rear half of seal retainer into front half until ends are flush. Holes should be to the top and bottom to line up with front retainer holes. Slide Seal Retainers over plungers and press into crankcase chamber until flush with oil seal.
8. Rotate the Crankshaft to line up the outside Plungers. Then lightly lubricate the Plungers with oil.
9. Carefully slide the Inlet Manifold over the Ceramic Plungers and press until flush with the Crankcase.
10. Reinstall the four Inlet Socket Head Screws and torque to specifications in chart.
11. The Hi-Pressure Seals may shift while installing the Inlet Manifold. Use one of the Discharge Valve Spacers to press the Seals back into position.
12. Carefully press the Discharge Manifold into the Inlet Manifold. Use a soft mallet to tap into place and reinstall the eight Socket Head Screws. Torque in sequence to specifications in torque chart.

TORQUE SEQUENCE



SERVICING THE CRANKCASE SECTION

1. While Inlet Manifold, Plungers and Seal Retainers are removed, examine Crankcase Oil Seals for leaking and wear.
2. Check for any signs of leaking at Rear Cover or Dipstick.
3. Check oil level and for evidence of water in oil. Change oil on a regular schedule. See Preventative Maintenance Check-List.
4. Rotate Crankshaft by hand to feel for smooth bearing movement.
5. Examine Crankshaft Oil Seals externally for drying, cracking or leaking.
6. Consult CAT PUMPS or your local distributor if Crankcase service is required. See also Tech Bulletin 035.

See Section II of the Plunger Pump Service DVD for additional information.

PREVENTATIVE MAINTENANCE CHECK-LIST

Check	Daily	Weekly	50 hrs.	500 hrs.*	1500 hrs.**	3000 hrs.**
Clean Filters	x					
Oil Level/Quality	x					
Oil Leaks	x					
Water Leaks	x					
Belts, Pulley		x				
Plumbing		x				
Initial Oil Change			x			
Oil Change				x		
Seal Change					x	
Valve Change						x
Accessories					x	

* If other than CAT PUMPS custom-blend, multi-viscosity, ISO-68 hydraulic oil is used, change cycle should be every 300 hours.

** Each system's maintenance cycle will be exclusive. If system performance decreases, check immediately. If no wear at 1500 hours, check again at 2000 hours and each 500 hours until wear is observed. Valves typically require changing every other seal change.

Duty cycle, temperature, quality of pumped liquid and inlet feed conditions all effect the life of pump wear parts and service cycle.

** Remember to service the regulator/unloader at each seal servicing and check all system accessories and connections before resuming operation.

Refer to service DVD for additional assistance.

TORQUE CHART

Pump Item	Thread	Tool Size [Part No.]	Torque in. lbs. ft. lbs. Nm		
Plunger Retainer	M7	M14 Hex [25053]	108	9.0	12.2
Inlet Manifold Screws	M12	M10 Allen [33047]	355	30.0	40
Discharge Manifold Screws	M12	M10 Allen [33047]	355	30.0	40
Rear Cover/ Bearing Cover Screws	M8	M13 Hex [25324]	115	9.58	13
Connecting Rod Screws	M8	M13 Hex [25324]	216	18.0	24
Bubble Oil Gauge	M28	Oil Gauge Tool [44050]	45	3.8	5

TECHNICAL BULLETIN REFERENCE CHART

No.	Subject	Models
002	Inlet Pressure VS Liquid Temperature	All Models
003	Power Unit Drive Packages	3PFR - 68PFR, 10FR - 60FR
024	Lubrication of Lo-Pressure Seals	All Models
035	Servicing Crankcase Section	7PFR - 60PFR
036	Cylinder and Plunger Reference Chart	All Models
043	LPS and HPS Servicing	All Plunger Models
053	Liquid Gasket	All Plunger NAB-S.S. Models
064	By-Pass Hose Sizing	All Unloaders/Regulators
074	Torque Chart	Piston and Plunger Pumps
076	Valve Seat and O-Ring	2530 and 2537
077	Oil Drain Kit	All Models (except 2SF/4SF)
081	Seal Case and Wick	2530 and 2537
083	Winterizing a Pump	All Models
085	M8 Keyway	25FR, 25PFR, 28PFR
095	Galling Preventative	Stainless Steel Pumps

INLET CONDITION CHECK-LIST

Review Before Start-Up

Inadequate inlet conditions can cause serious malfunctions in the best designed pump. Surprisingly, the simplest of things can cause the most severe problems or go unnoticed to the unfamiliar or untrained eye. REVIEW THIS CHECK-LIST BEFORE OPERATION OF ANY SYSTEM. Remember, no two systems are alike, so there can be no **ONE** best way to set-up a system. All factors must be carefully considered.

INLET SUPPLY should exceed the maximum flow being delivered by the pump to assure proper performance.

- ☐ Open inlet shut-off valve and turn on water supply to avoid starving pump. **DO NOT RUN PUMP DRY.**
- ☐ Temperatures above 130°F are permissible. Add 1/2 PSI inlet pressure per each degree F over 130°F. Elastomer or RPM changes may be required. See Tech Bulletin 002 or call CAT PUMPS for recommendations.
- ☐ Avoid closed loop systems especially with high temperature, ultra-high pressure or large volumes. Conditions vary with regulating/unloader valve.
- ☐ Low vapor pressure liquids, such as solvents, require a booster pump and C.A.T. to maintain adequate inlet supply (where compatible).
- ☐ Higher viscosity liquids require a positive head and a C.A.T. to assure adequate inlet supply.
- ☐ Higher temperature liquids tend to vaporize and require positive heads and C.A.T. to assure adequate inlet supply.
- ☐ When using an inlet supply reservoir, size it to provide adequate liquid to accommodate the maximum output of the pump, generally a minimum of 6-10 times the GPM (however, a combination of system factors can change this requirement); provide adequate baffling in the tank to eliminate air bubbles and turbulence; install diffusers on all return lines to the tank.

INLET LINE SIZE should be adequate to avoid starving the pump.

- ☐ Line size must be a minimum of one size larger than the pump inlet fitting. Avoid tees, 90 degree elbows or valves in the inlet line of the pump to reduce the risk of flow restriction and cavitation.
- ☐ The line **MUST** be a FLEXIBLE hose, NOT a rigid pipe, and reinforced on SUCTION systems to avoid collapsing.
- ☐ The simpler the inlet plumbing the less the potential for problems. Keep the length to a minimum, the number of elbows and joints to a minimum (ideally no elbows) and the inlet accessories to a minimum.
- ☐ Use pipe sealant to assure air-tight, positive sealing pipe joints.

INLET PRESSURE should fall within the specifications of the pump.

- ☐ Acceleration loss of liquids may be increased by high RPM, high temperatures, low vapor pressures or high viscosity and may require pressurized inlet and C.A.T. to maintain adequate inlet supply. **DO NOT USE C.A.T. WITH SUCTION INLET.**
- ☐ Optimum pump performance is obtained with +20 PSI (1.4 BAR) inlet pressure and a C.A.T. for certain applications. With adequate inlet plumbing, most pumps will perform with flooded suction. Maximum inlet pressure is 70 PSI (4.9 BAR).
- ☐ After prolonged storage, pump should be rotated by hand and purged of air to facilitate priming. Disconnect the discharge port and allow liquid to pass through pump and measure flow.

INLET ACCESSORIES are offered to protect against over pressurization, contamination or temperature and control flow.

- ☐ A shut-off valve is recommended to facilitate maintenance.
- ☐ Installation of a C.A.T. is essential in applications with stressful conditions such as high temperatures, booster pump feed or long inlet lines. **Do not use C.A.T. with negative inlet pressure.**
- ☐ A stand pipe can be used in some applications to help maintain a positive head at the pump inlet line.
- ☐ Inspect and clean inlet filters on a regular schedule to avoid flow restriction.
- ☐ A pressure transducer is necessary to accurately read inlet pressure. **Short term, intermittent cavitation will not register on a standard gauge.**
- ☐ All accessories should be sized to avoid restricting the inlet flow.
- ☐ All accessories should be compatible with the solution being pumped to prevent premature failure or malfunction.
- ☐ Optional inlet protection can be achieved by installing a pressure cut off switch between the inlet filter and the pump to shut off pump when there is no positive inlet pressure.

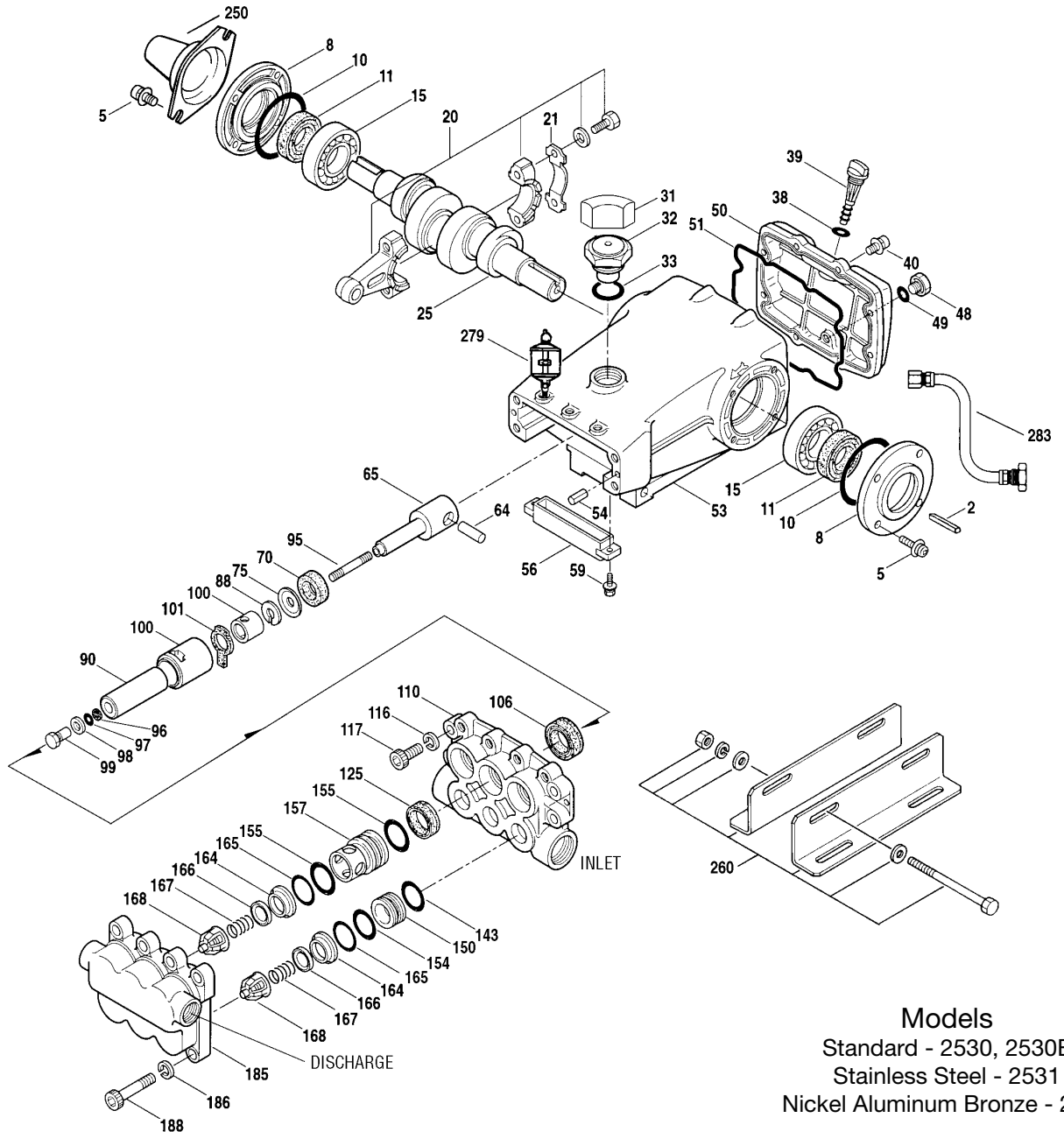
BY-PASS TO INLET Care should be exercised when deciding the method of by-pass from control valves.

- ☐ It is recommended the by-pass be directed to a baffled reservoir tank, with at least one baffle between the by-pass line and the inlet line to the pump.
- ☐ Although not recommended, by-pass liquid may be returned to the inlet line of the pump if the system is properly designed to protect your pump. When a pulsation dampener is used, a PRESSURE REDUCING VALVE must be installed on the inlet line (**BETWEEN** THE BY-PASS CONNECTION AND THE INLET TO THE PUMP) to avoid excessive pressure to the inlet of the pump. It is also recommended that a THERMO VALVE be used in the by-pass line to monitor the temperature build-up in the by-pass loop to avoid premature seal failure.
- ☐ A reinforced, flexible, low pressure hose rated up to 300 PSI should be used for routing by-pass back to the pump inlet.
- ☐ Caution should be exercised not to undersize the by-pass hose diameter and length. Refer to Technical Bulletin 064 for additional information on the size and length of the by-pass line.
- ☐ Check the pressure in the by-pass line to avoid over pressurizing the inlet.
- ☐ The by-pass line should be connected to the pump inlet line at a gentle angle of 45° or less and no closer than 10 times the pump inlet port diameter e.g. 1-1/2" port size = 15" distance from pump inlet port.

PARTS LIST

ITEM	2530	PART NUMBER				DESCRIPTION	QTY	
	2530E	MATL	2531	MATL	2537	MATL		
2	990036	STL	990036	STL	990036	STL	Key (M8x7x40) [2/00]	1
5	92508	STZP	125753	S	125753	S	Screw, HHC, Sems (M8x25)	8
	126544	STCP R	—	—	—	—	Screw, HHC, Sems (M8x25)	8
8	27773	AL	27773	AL	27773	AL	Cover, Bearing	2
	49533	ALE	—	—	—	—	Cover, Bearing (2530E Only)	2
10	27772	NBR	27772	NBR	27772	NBR	O-Ring, Oil Seal Case - 70D	2
11	27771	NBR	27771	NBR	27771	NBR	Seal, Oil, Crankshaft - 70D	2
15	26512	STL	26512	STL	26512	STL	Bearing, Ball	2
20	48613	TNM	48613	TNM	48613	TNM	Rod, Connecting	3
21	126562	STCP R	126562	STCP R	126562	STCP R	Washer, Locking	3
25	48704	FCM	48704	FCM	48704	FCM	Crankshaft - Dual End [2/00] (See Tech Bulletin 085)	1
31	828710	—	828710	—	828710	—	Protector, Oil Cap w/Gasket	1
32	43211	ABS	43211	ABS	43211	ABS	Cap, Oil Filler	1
33	14177	NBR	14177	NBR	14177	NBR	O-Ring, Oil Filler Cap - 70D	1
38	11338	NBR	11338	NBR	11338	NBR	O-Ring, Dipstick - 70D	1
39	27769	ABS	27769	ABS	27769	ABS	Dipstick	1
40	92508	STZP	125753	S	125753	S	Screw, HHC, Sems (M8x25)	8
	126544	STCP R	—	—	—	—	Screw, HHC, Sems (M8x25)	8
48	25625	STCP	25625	STCP	25625	STCP	Plug, Drain (1/4"x19BSP)	1
50	27768	AL	27768	AL	27768	AL	Cover, Rear	1
	49531	ALE	—	—	—	—	Cover, Rear (2530E Only)	1
51	27767	NBR	27767	NBR	27767	NBR	O-Ring, Rear Cover - 70D	1
53	27762	AL	27762	AL	27762	AL	Crankcase w/Guide Pins	1
	49528	ALE	—	—	—	—	Crankcase w/Guide Pins (2530E Only)	1
54	27488	S	27488	S	27488	S	Pin, Guide	2
56	27790	POP	27790	POP	27790	POP	Pan, Oil	1
59	92519	STZP	92538	S	92538	S	Screw, HHC, Sems (M6x16)	2
	125824	STCP R	—	—	—	—	Screw, HHC, Sems (M6x16)	2
64	27784	CM	27784	CM	27784	CM	Pin, Crosshead	3
65	† 48592	SSHS	† 48592	SSHS	† 48592	SSHS	Rod, Plunger	3
70	27785	NBR	27785	NBR	27785	NBR	Seal, Crankcase Oil - 70D	3
75	110669	S	110669	S	110669	S	Slinger, Barrier	3
88	110670	S	110670	S	110670	S	Washer, Keyhole	3
90	45749	CC	45749	CC	45749	CC	Plunger (M32x93)	3
95	† 89835	SS	† 89835	SS	† 89835	SS	Stud, Retainer (M7x87)	3
96	20184	PTFE	20184	PTFE	20184	PTFE	Back-up-Ring, Plunger Retainer	3
97	14190	NBR	14190	NBR	14190	NBR	O-Ring, Plunger Retainer - 70D	3
	14161	FPM	14161	FPM	14161	FPM	O-Ring, Plunger Retainer - 70D	3
	◆ 48239	EPDM	◆ 48239	EPDM	◆ 48239	EPDM	O-Ring, Plunger Retainer	3
98	44069	SS	44069	SS	44069	SS	Gasket, Plunger Retainer	3
99	44068	SS	44068	SS	44068	SS	Retainer, Plunger [7/02]	3
100	110672	NY	110672	NY	110672	NY	Retainer, LPS, Front	3
	111116	NY	111116	NY	111116	NY	Retainer, LPS, Rear	3
101	110796	—	110796	—	110796	—	Wick, Long Tab (M32)	3
106	† 44098	NBR	† 44098	NBR	† 44098	NBR	Seal, LPS w/SS-Spg	3
	44827	FPM	44827	FPM	44827	FPM	Seal, LPS w/SS-Spg	3
	◆ 48244	EPDM	◆ 48244	EPDM	◆ 48244	EPDM	Seal, LPS w/SS-Spg	3
110	49265	CFBB	48583	SS	45830	NAB	Manifold, Inlet	1
116	126570	STCP R	19085	S	19085	S	Lockwasher, Split	4
117	126518	STCP R	88398	S	88398	S	Screw, HSH (M12x40)	4
125	† 45832	SNG	† 45832	SNG	† 45832	SNG	Seal, HPS w/SS	3
	48220	HT*	48220	HT*	48220	HT*	Seal, HPS w/SS, 2-PC w/S-Support	3
143	14203	NBR	14203	NBR	14203	NBR	O-Ring, Adapter, LPS, Rear-70D	3
	11731	FPM	11731	FPM	11731	FPM	O-Ring, Adapter, LPS, Rear	3
	◆ 48241	EPDM	◆ 48241	EPDM	◆ 48241	EPDM	O-Ring, Adapter, LPS, Rear	3
150	45752	BB	45835	SS	45835	SS	Adapter, LPS	3
154	18690	NBR	18690	NBR	18690	NBR	O-Ring, Adapter, LPS, Front -70D	3
	11744	FPM	11744	FPM	11744	FPM	O-Ring, Adapter, LPS, Front	3
	◆ 48242	EPDM	◆ 48242	EPDM	◆ 48242	EPDM	O-Ring, Adapter, LPS, Front	3
155	14520	NBR	14520	NBR	14520	NBR	O-Ring, Adapter, Valve -70D	6
	11745	FPM	11745	FPM	11745	FPM	O-Ring, Adapter, Valve	6
	◆ 48240	EPDM	◆ 48240	EPDM	◆ 48240	EPDM	O-Ring, Adapter, Valve	6
157	45751	BB	45834	SS	45834	SS	Adapter, Valve	3
164	† 46857	SS	† 46857	SS	† 46857	SS	Seat [11/95] (See Tech Bulletin 076)	6
165	14014	NBR	14014	NBR	14014	NBR	O-Ring, Seat	6
	48238	FPM	48238	FPM	48238	FPM	O-Ring, Seat	6
	◆ 48243	EPDM	◆ 48243	EPDM	◆ 48243	EPDM	O-Ring, Seat	6
166	† 45839	SS	† 45839	SS	† 45839	SS	Valve	6
167	† 45840	SS	† 45840	SS	† 45840	SS	Spring	6
168	110682	PVDF	110682	PVDF	110682	PVDF	Retainer, Spring	6
185	49267	CFBB	48585	SS	45836	NAB	Manifold, Discharge	1
186	126570	STCP R	19085	S	19085	S	Lockwasher, Split	8
188	89573	STCP	89628	S	89628	S	Screw, HSH (M12x65)	8
	126517	STCP R	—	—	—	—	Screw, HSH (M12x65)	8
250	26516	STCP	26516	STCP	26516	STCP	Protector, Shaft	1
260	30614	STZP R	30614	STZP R	30614	STZP R	Rail, Angle Assy	1
269	30206	F	30206	F	30206	F	Pulley (10") [See Drive Packages, Tech Bulletin 003]	1
270	30059	STL	30059	STL	30059	STL	Hub, "H", M30 (Keyway M8) [See Drive Packages, Tech Bulletin 003] [2/00]	1
279	30278	STZP	30278	STZP	30278	STZP	Oilers (1 oz.)	3
281	30967	—	30967	—	30967	—	Glass, Oiler	3
282	10069	NBR	10069	NBR	10069	NBR	Gasket, Oiler	3

EXPLODED VIEW



Models
 Standard - 2530, 2530E
 Stainless Steel - 2531
 Nickel Aluminum Bronze - 2537

	2530		2530E	MATL		2531	MATL		2537	MATL			
283	34334	—	34334	—	34334	—	34334	—	34334	—	Kit, Oil Drain (See Tech Bulletin 077)	1	
290	6124	—	6124	—	6124	—	6124	—	6124	—	Gasket, Liquid (3 oz.)	1	
299	814838	BB	816735	SS	816538	NAB					Head, Complete	1	
300	30952	NBR	30952	NBR	30952	NBR	30952	NBR	30952	NBR	Kit, Seal (Incls: 97,106,125,143,154,155)	1	
	33607	FPM*	33607	FPM*	33607	FPM*	33607	FPM*	33607	FPM*	Kit, Seal (Incls: 97,106,125,143,154,155)	1	
	◆ 33608	EPDM*	◆ 33608	EPDM*	◆ 33608	EPDM*	◆ 33608	EPDM*	◆ 33608	EPDM*	Kit, Seal (Incls: 97,106,125,143,154,155)	1	
310	33952	NBR	33952	NBR	33952	NBR	33952	NBR	33952	NBR	Kit, Valve (Incls: 143,154,155,164,165,166,167,168) [Prior to 11/95 6 Req.] [1/96]	2	
	31267	FPM	31267	FPM	31267	FPM	31267	FPM	31267	FPM	Kit, Valve (Incls: 143,154,155,164,165,166,167,168) [Prior to 11/95 6 Req.] [1/96]	2	
	◆ 31268	EPDM	◆ 31268	EPDM	◆ 31268	EPDM	◆ 31268	EPDM	◆ 31268	EPDM	Kit, Valve (Incls: 143,154,155,164,165,166,167,168) [Prior to 11/95 6 Req.] [1/96]	2	
390	714500	SS	714500	SS	714500	SS	714500	SS	714500	SS	C.A.T. (Inlet pressure stabilizer for RO and boosted inlet applications)	1	
391	714505	SS	714505	SS	714505	SS	714505	SS	714505	SS	Adapter (2 per C.A.T.) (See Data Sheet for complete selection)	2	
392	701828	SS	701828	SS	701828	SS	701828	SS	701828	SS	Elbow Assy Used With Adapter Assy 714505	1	
—	6575	—	6575	—	6575	—	6575	—	6575	—	Plunger Pump Servicing DVD	1	
—	—	—	6119	—	—	—	—	—	—	—	Lubricant, Antiseize (1 oz.) (See Tech Bulletin 095)	1	
—	701931	—	—	—	—	—	—	—	—	—	Sealant, Silicone (2.7oz) (2530E Only)	1	
—	6100	—	6100	—	6100	—	6100	—	6100	—	Oil, Case (12 Bottles) ISO 68 Hydraulic	1	

Bold print part numbers are unique to a particular pump model. Italics are optional items. [] Date of latest production change.

◆ Silicone oil/grease required. †Production parts different from service parts. R Components comply with RoHS Directive.

*Review individual parts in each kit for material code identification.

View Tech Bulletins 002, 003, 024, 036, 043, 053, 074, 076, 077, 081, 083, 085 and 095 for additional information. MATERIAL CODES (Not Part of Part Number):

ABS=ABS Plastic AL=Aluminum ALE=Aluminum Epoxy BB=Brass CC=Ceramic CFBB=Chrome Forged Brass CM=Chrome-moly
 EPDM=Ethylene Propylene Diene Monomer F=Cast Iron FCM=Forged Chrome-moly FPM=Fluorocarbon HT=High Temp (EPDM Alternative) NAB=Nickel Aluminum Bronze
 NBR=Medium Nitrile (Buna-N) NY=Nylon POP=Polypropylene PTFE=Pure Polytetrafluoroethylene PVDF=Polyvinylidene Fluoride S=304SS SS=316SS
 SNG=Special Blend (Buna) STG=Special Blend PTFE White STL=Steel SSSH=316SS/High Strength
 STCP=Steel/Chrome Plated STZP=Steel/Zinc Plated TNM=Special High Strength

INSTRUCTIONS

The care required of this pump, while nominal, is very important. We recommend a careful review of the installation and maintenance covered in this instructional pamphlet to ensure extended trouble-free service.

LOCATION

The motors used on Ampco pump units have been selected as the best for the anticipated environment. For greatest service life, mount the pump and motor where the environment is relatively clean, dry, and non-corrosive. Standard totally enclosed motors may be installed where dirt, moisture and mild corrosion are present or in outdoor locations. Specialty motors may be required for moist, corrosive, or explosive environments. Motor drain plugs (if not equipped with automatic drains) must be removed periodically to drain accumulated condensation. Pump units should be located where daily visual inspection is possible and no surrounding structure interferes with ventilating air over or through the motor.

INSTALLATION

Installation of Ampco pumps should be made as close to the supply of liquid as possible, with short and direct suction piping. Avoid high points in the piping where air pockets can form. The suction and discharge piping should be simple with the connections properly aligned to prevent any strain from being placed on the pump casing. Provisions should be made for pipe expansion and contraction in services handling hot or cold liquids. Base-mounted pedestal pumps must be realigned AFTER installation and piping is completed.

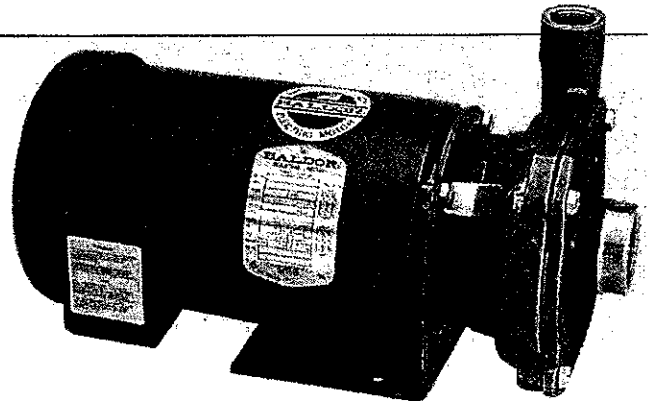
ROTATION

Check direction of rotation BEFORE starting the pump. Correct rotation is counter clockwise as viewed from the pump inlet. Incorrect rotation may cause catastrophic failure. Close coupled pumps will be equipped with single phase motors properly sequenced or with three phase motors labeled to indicate required power sequence ABC or CBA for correct rotation. Use a phase sequence indicator to identify power source sequence. For base mounted pumps disconnect the coupling and check motor rotation while disconnected from the pump.

MAINTENANCE

Daily observation of Ampco pumps while in operation is the ounce of prevention needed to extend the service life. Mechanical seals are selected for maximum life with due consideration to the economy of the installation. The seal is the only expendable item. Other pump parts are designed for indefinite life expectancy, except as they may be corroded and/or eroded by aggressive products or by misapplication such as undersizing, oversizing, cavitation, etc. Bearings on

KC2/KP2 PUMPS



some pedestal pumps and some motors are prelubricated and require no additional lubrication. Schedule for regreasing other types of bearings will vary, depending on size speed, duty, and environment. For guidance, a steady running, indoor installation in a relatively clean atmosphere at 40C (104F) ambient should not require grease for two years. Care should also be taken not to over grease motors. Pumps handling corrosive or otherwise aggressive solutions should be flushed with clean water after each use because stagnant conditions are usually most corrosive. In seawater, Ampco Alloy pumps provide cathode protection for stainless steel parts. To prevent crevice corrosion and pitting, drain and then flush out the pump with fresh water when inactive for periods greater than one week.

Ampco KC2 and KP2 pumps fitted with standard mechanical seals have all-metal seal parts of 316 stainless steel, carbon rotating face, ceramic stationary seat, and Buna-N elastomers. Other seal types are supplied when specified. Optional materials such as Viton, EPDM, or Teflon elastomers, Tungsten Carbide, Silicon Carbide, or Ni-Resist faces can be supplied when requested. The mechanical seal should be replaced at the first sign of leakage where the shaft enters the pump. Leakage may cause motor bearing damage. Also, since the primary seal surfaces are lapped to precise flatness, the seal should be replaced whenever the pump is dismantled to the point of separating the seal faces. Always keep a replacement seal kit on hand. It includes a complete seal along with the gasket and o-ring required to rebuild the pump.

There may be other pump assemblies, parts and seal arrangements not shown or otherwise described in this pamphlet, that require the same philosophy of seal positioning. It is suggested that highlights of these instructions be applied while paying close attention to parts arrangement during dismantling.

DISMANTLE AND REPLACE PARTS AS FOLLOWS:

Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, to retain correct direction of rotation when reconnecting. Incorrect rotation may cause catastrophic failure.

It is recommended that the complete unit be removed and serviced on a workbench. For the close-coupled KC2 disconnect the power marking the wires for reconnection. For the base mounted KP2, disengage the coupling and remove the pump and pedestal.

1. Remove the suction cover by unbolting the four capscrews (9/16 wrench). Note the condition of the gasket, which will adhere either to the suction cover or the casing.
2. Unscrew the impeller from the shaft, turning in a counter-clockwise direction. Loctite used during assembly may require heating impellers of all type KC2 and KP2 to assist in removal. Apply approximately 350F heat to the center of the impeller. A screwdriver slot on the motor shaft opposite the pump is provided for steadying the shaft. Use of a strap wrench on the impeller hub is recommended to prevent marring. Otherwise, file or polish out wrench marks before reusing impeller.

The fluid end of the pump is now sufficiently dismantled for completing most repairs and replacements, including the mechanical seal.

3. If it is necessary to repair or replace the motor of a close coupled assembly or the bearing adapter of a pedestal assembly, unbolt the capscrews fastening the pump to motor or pedestal, thus disengaging the casing and bracket.

The mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces.

4. Remove the rotating parts of the mechanical seal from the impellers shaft like extension (see drawing). The seals flexible bellows may stick tightly to the impeller stem. Bathe in oil to soften the adhesive, or cut away with knife. Remove the o-ring from the shaft I.D.
5. The stationary seat and its cup gasket or o-ring may be removed while the casing is in an assembled position with a wire hook (coat hanger wire). Insert the hook between the I.D. of the seat and the shaft and pull forward, or remove the casing and press out the seat.
6. Thoroughly clean impeller stem, seat cavity and motor shaft with solvent and dry with a clean cloth.

An anti-seize lubricant was originally applied to the I.D. of the impeller that fits over the shaft and is retained by an o-ring. Either preserve this lubricant or add fresh lubricant to the I.D., not the shaft, and replace the o-ring. One drop of oil applied on the shaft will prevent the o-ring from binding on the shaft while assembling the impeller.

7. Lightly oil bore and finger press stationary seat with gasket or o-ring into its cavity. Seat (usually ceramic) is fragile. Do not abuse.
8. Clean the polished face of the stationary seat with a lint-free cloth or tissue, and lightly coat this surface with an SAE-10 or equivalent oil. Care should be taken that the cleansing material and the oil are free of foreign particles. Do not use grease or allow grease onto the sealing surfaces.
9. Place the rotating portion of the mechanical seal on the shaft like extension of the impeller that may be lightly oiled (SAE 10W-30) to facilitate sliding of the bellows by softening an adhesive film on the seal (Use soap, glycerin, etc. if oil is not permitted i.e. EPDM). Do not use grease, as this would prevent the adhesive film from resetting. Final adherence to the impeller stem is essential for shaft, impeller, and seal to rotate as a unit. First place the spring retainer and spring over the impeller shaft. Then press the carbon rotating sub-assembly down the impeller shaft until it engages the spring. Do not continue to slide the assembly down the shaft once the rotating assembly has engaged the spring. Inspect the carbon sealing face and remove any foreign particles with a lint-free cloth or tissue. Do not allow grease on the sealing surfaces.
10. Place the impeller with mechanical seal in place on the drive shaft. A slight extra push is required to start the o-ring onto the shaft. Proceed to screw the impeller clockwise onto the treaded shaft, utilizing the slot on the opposite end of the shaft to steady the shaft. Hand tighten or use a strap wrench, or other non-marring device such as a jar opener.
11. The pump assembly is completed by reinstalling the suction cover plate and its gasket. Be sure casing and gasket surfaces are relatively clean and free of foreign particles.
12. Your pump is now ready to be reinstalled into its accompanying pipe system and the motor reconnected.

One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating or checking rotation.

NOTE: Starting motor in direction of unthreading impeller will result in jamming and damaging bearing and possibly other motor and pump parts. Motor connections should have been marked to avoid this possibility. Also, an economical phase sequence indicator will identify your A-B-C connections. If a reassembled pump unit is not going to be put back in service immediately, or if there is a real possibility for incorrect start up rotation, a suitable thread-locking compound may be used (i.e. Loctite #271).

Filter Housings

FRP Shell with Nylon Caps
100X-FRP



Racor Village Marine offers fiberglass filter housings specifically designed for seawater use. Simple but secure closure systems allow quick cartridge change. Aluminum collars are bonded to fiberglass shells offer superior corrosion resistance. The base and lid are nylon.

The housings fit VMT pleated cartridge elements of 100 square feet area. Available in 0.5, 1, 5, 20, and 100 micron ratings.

Contact Information:

Parker Hannifin Corporation
Racor Division - Village Marine
2000 W. 135th St.
Gardena, CA 90249

phone 310 516 9911
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racor@parker.com
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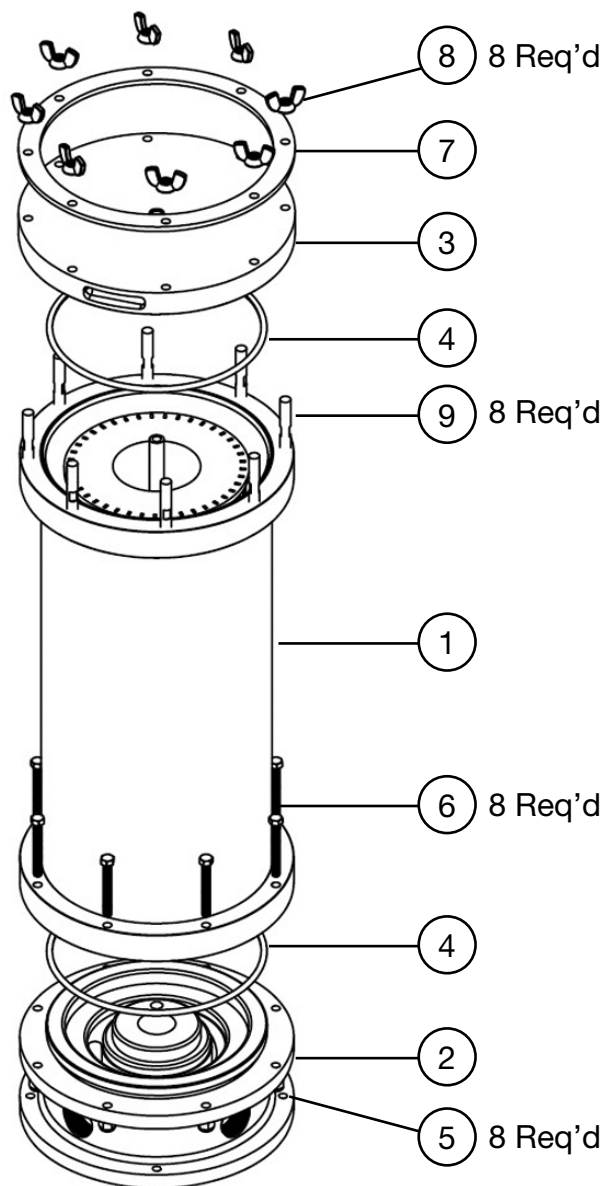
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Filter Housings

FRP Shell with Nylon Caps
100X-FRP

DWG	Description	Part Number
	Filter Assembly	30-4353
1	Vessel Shell	M4353-4
2	Base	M1157-1
3	Lid	M4353-2
4	O-Ring	30-0405
5	Nuts - bottom	86-0022
6	Bolt - bottom	86-0260
7	Retaining Ring	M4353-1
8	Wingnut	86-0268
9	Studs	86-0262

Specifications	
Pressure Rating*	100 psi
Inlet	1.5" FPT
Outlet	1.5" FPT
Height	33"/84 cm
Diameter	13"/33 cm



*Filter Housing Vessel is designed in accordance with ASME section x pressure vessel code.

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

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Print Reorder Number 7940 Rev-

2-17-2011



ENGINEERING YOUR SUCCESS.

Pleated Filters and Filter Cartridge Kits



Contact Information:

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Racor Division/Village Marine Tec.
2000 W. 135th St.
Gardena, CA 90249

phone 310 516 9911
fax 310 538 3048
racor@parker.com
www.villagemarine.com

www.parker.com/racor



The Village Marine Tec. line of pleated filters are designed specifically for the RO watermaker industry and are superior to wound or polyspun cartridges to give you a longer filter life as well as increasing flow rates and keeping cartridge size down.

Available in a wide arrange of sizes and micron ranges to ensure that every type of watermaker filter need is taken care of. Stock sizes fit most standard filter housings, if the size you need is not shown please contact us with the dimensions required.

Single use Cleaning and Preservative Cartridge Kits are designed specifically for small RO Systems. The Cartridges allow for easy and effective membrane maintenance.

The Cleaning and Preservative Cartridge Kits eliminate the trouble and mess of measuring powdered chemicals and ensuring correct chemical concentrations. The Chemical cartridges fit directly into 2.5" x 10" housings and contain the correct amount of chemical for a single use.

ENGINEERING YOUR SUCCESS.

Pleated Filters and Filter Cartridge Kits

Features:

Pleated Filters

- Polypropylene pleated construction
- Longer service life over wound or polyspun cartridges
- Easily cleaned and reused
- Chemically compatible with a wide range of alkalies, most acids and saline solutions
- 0.5, 1, 5, and 20 micron ranges available
- Pliable plastisol ends ensures filter seal to eliminate bypass
- High packing density reduces filter size while keeping flow rates up
- Filter bands on large diameter elements keep filter shape during system pulsations

Pleated Sediment Elements

Part Number	Microns	Filter Area ft ² /m ²	Diameter inch/cm	Length inch/cm
33-0118	20	10/0.93	2.75/7	9.75/25
33-0117	5	10/0.93	2.75/7	9.75/25
33-0053	20	18/1.67	4.5/11.4	9.75/25
33-0052	5	18/1.67	4.5/11.4	9.75/25
33-0020	20	30/2.79	8.63/22	7.75/20
33-0005	5	30/2.79	8.63/22	7.75/20
33-0058	20	35/3.25	4.5/11.4	20/51
33-0057	5	35/3.25	4.5/11.4	20/51
35-0020	20	35/3.25	6.12/15.5	11.9/30
35-0001	5	35/3.25	6.12/15.5	11.9/30
33-0172	100	100/9.29	8.63/22	24.3/62
33-2100	20	100/9.29	8.63/22	24.3/62
33-5100	5	100/9.29	8.63/22	24.3/62
33-1100	1	100/9.29	8.63/22	24.3/62
33-1105	0.5	100/9.29	8.63/22	24.3/62

Filter Cartridge Kits

- Cartridge with Blue stripe contains cleaner #1, a biological cleaner to remove algae, fungi and bacteria
- Cartridge with Red stripe contains cleaner #2, an acidic cleaner to remove scale from the membrane
- Cartridge with Green stripe contains the preservative. This chemical is used for pickling the membranes
- Cartridges are capable of being used in any housing that takes a standard 2.5" (64mm) x 10" (254mm) filter cartridges

Carbon Flushing Filters

Part Number	Diameter inch/cm	Length inch/cm
33-0311	2.75/7	9.75/25
33-0315	4.5/11.4	9.75/25
33-0083	4.5/11.4	20/50.8

Cartridge Filter Kits

Description	Part Number	Contents
Cleaning Kit	85-0102	One Blue stripe cleaner #1 plus One Red stripe cleaner #2
Preservation Kit	85-0103	Two Green stripe preservative

To maintain peak performance always use genuine Parker-Racor/Village Marine Tec. replacement parts.



Pressure Vessel Assemblies

For Seawater Elements



Contact Information:

Parker Hannifin Corporation
Racor Division/Village Marine Tec.
2000 W. 135th St.
Gardena, CA 90249

phone 310 516 9911
fax 310 538 3048
racor@parker.com
www.villagemarine.com

www.parker.com/racor

Key Features:

Racor Village Marine RO membrane pressure vessels feature non-metallic wetted surfaces for excellent corrosion resistance. Simple end plug design allows quick removal for element servicing. If the size you require is not shown please contact us for custom builds.

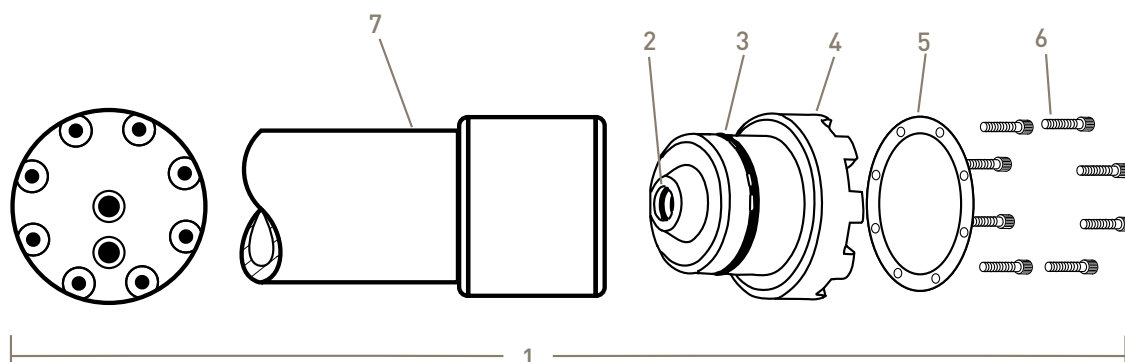
- Operating Pressure: 1000 psi/68 bar
- Shell: Filament Wound fiberglass
- Collars: 6061 T-6 Powdercoated aluminum
- End Plugs: Thermoplastic
- End Ring: 6061 T-6 Anodized aluminum on 2.5" and 4" size SS316 on 6" size
- Fasteners: SS316



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Pressure Vessel Assemblies

For Seawater Elements



Part Numbers:

Item	Description		Quantity per Assembly	2.5" x 19"	2.5" x 38"	4" x 40"	6" x 40"
1	Vessel Assembly**			32-2519	32-2537*	32-0444	32-6040
2	Product O-ring		4	32-2116	32-2116	32-2116	32-2229
3	End Plug O-ring		2	32-2228	32-2228	32-4342	32-0640
4	End Plug		2	32-2513*	32-2513*	32-4012	32-6012
5	End Ring		2	32-4013	32-4013	32-4014	32-0096
6	Capscrews		***	86-0106	86-0106	86-0123	86-0136
7	Shell	White	1	32-0025	32-0026	Please Call	Please Call
		Gray	1	32-0098	32-0099	32-4001	32-0001
	Weight (lbs/kg)			5/2	7/3	22/10	45/20

Notes:

*End Plug 32-2517 is also available for 2.5" vessels, which offers straight, coarse thread feed/reject port used on some VMT PW watermakers. Use of coarse thread end plug changes the vessel assembly p/n to 32-2538

**Membrane not included.
For applicable membrane elements see bulletin No. 7897 (Aqua Pro RO Membranes)

*** Capscrews:
Order 6 per end plug on 2.5" size
Order 8 per end plug on 4" size
Order 10 per end plug on 6" size

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

Aqua Pro® Sea Water RO Membranes



Contact Information:

Parker Hannifin Corporation
Racor Division/Village Marine Tec.
2000 W. 135th St.
Gardena, CA 90249

phone 310 516 9911
fax 310 538 3048
racor@parker.com
www.villagemarine.com

Aqua Pro® thin film composite reverse osmosis membranes deliver high salt rejection while maintaining high production rates to obtain the energy efficiency demanded by plant operators.

By selecting the highest grade of materials and thoroughly testing

performance, Racor Village Marine Tec. is able to offer the highest quality products.

Aqua Pro® membranes are designed for use in Parker Village Marine Tec. pressure vessel housings as well as other brand housings.

www.parker.com/racor

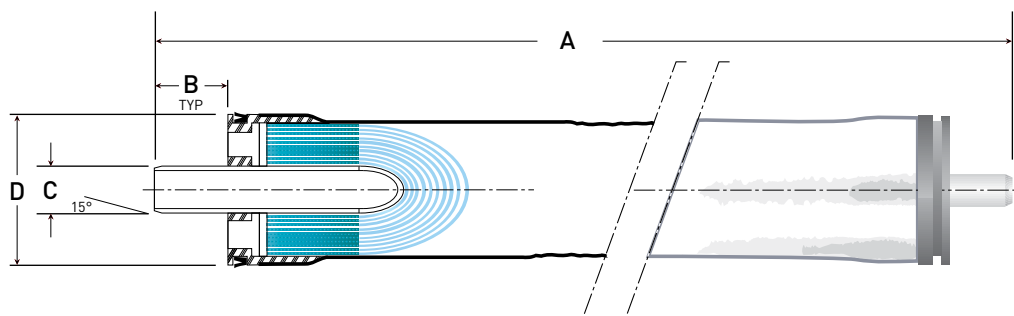


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Aqua Pro® Sea Water RO Membranes

Recommended Operating Limits:

- Maximum Operating Pressure: **1000 psi**
- Maximum Operating Temperature: **113°F (45°C)**
- Maximum Feed Turbidity: **1 NTU**
- Free Chlorine Tolerance: **0 PPM**
- Maximum Feed Silt Density Index: **SDI 5**
- pH Range:
Continuous Operation: 4-11
Short-term for Cleaning: (30 minute duration) 2.5-11



VMT Part No.	Nominal Size	Product Flow GPD m³/day	Typical Salt Rejection %	Dimensions inches/cm			
				A*	B	C	D
33-2519	2519	220 - 0.83	99.4	19/48	1.1/2.8	0.75/1.9	2.4/6.1
33-3000 **	2519	150 - 0.57	99.0	19/48	1.1/2.8	0.75/1.9	2.4/6.1
33-3001**	2519	105 - 0.40	99.0	19/48	1.1/2.8	0.75/1.9	2.4/6.1
33-0238	2538	550 - 2.08	99.4	38/96.5	1.1/2.8	0.75/1.9	2.4/6.1
33-3002**	2538	210 - 0.80	99.0	38/96.5	1.1/2.8	0.75/1.9	2.4/6.1
33-0440	4040	1200 - 4.54	99.4	40/101.6	1.0/2.5	0.75/1.9	3.96/10.1
33-0036	6040	2500 - 9.47	99.4	40/101.6	1.27/3.2	1.5/3.8	5.98/15.2

* All 19" and 38" elements come with a 2" removable extender so that the stocked size also fits 21" and 40" housings

** Elements are specially designed for low feed flow applications. Use only with certain Sea Quencher and Little Wonder watermakers.

Notes:

- Keep elements moist at all times
- Permeate obtained from first two hours of operation should be discarded
- To prevent biological growth during storage, shipping, or system shutdowns it is recommended that elements be immersed in a protective solution. The standard solution for long or short term storage should contain 1.0 percent (by weight) sodium metabisulfite (available as VMT p/n 85-0103, 85-0038, 85-0044 or 85-0049)
- Standardized test conditions are 32,000 ppm NaCl at 77° F (25° C), with 800 psi feed. Production rates for individual elements may vary +/- 20% and rejection may vary +/- 0.4%

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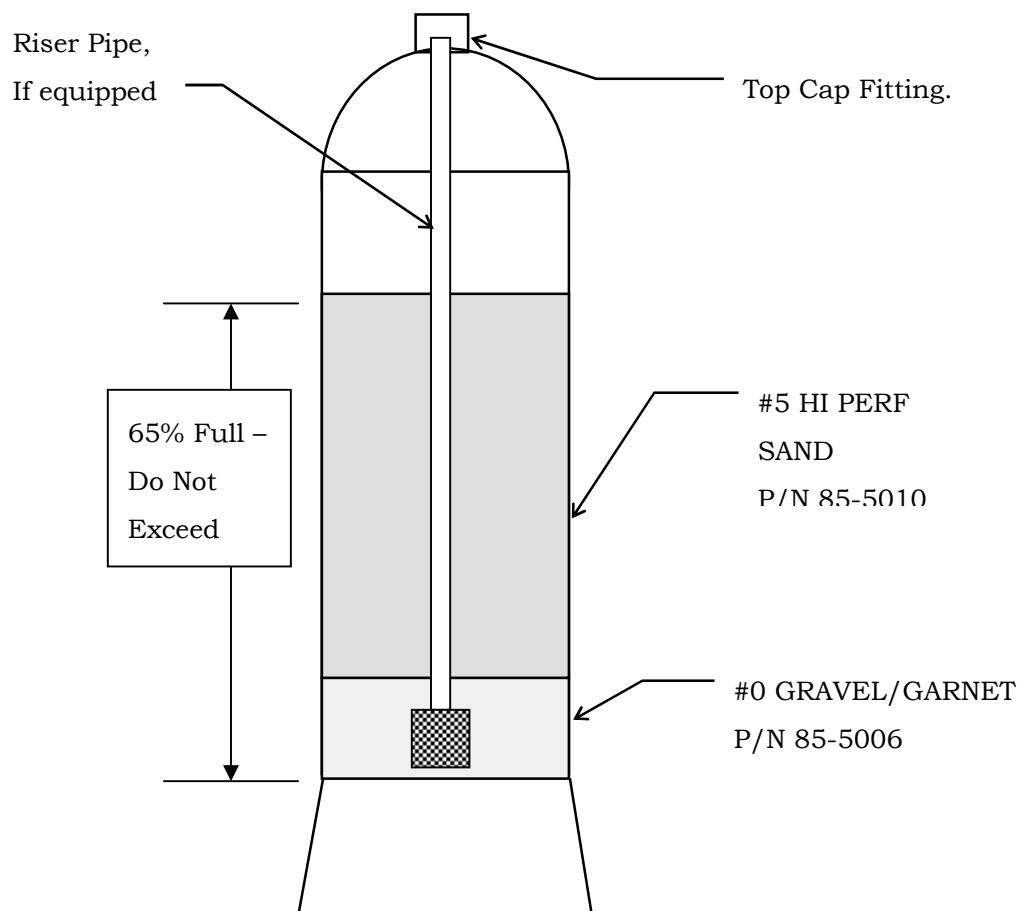
Village Marine Tec.

2000 West 135th. Street, Gardena, CA 90249 USA Tel 310-516-9911/800-421-4503 FAX 310-538-3048

World Wide Web: www.villagemarine.com, E-mail: sales@villagemarine.com

IMF MEDIA FILTER LOADING PROCEDURE

Village Marine's media mix comes in portions according to the capacity of filter being used. The high performance media fill uses a special sand for depth filtration that allows high loading rates for smaller physical size of the filter unit. The Village Marine high performance media filter uses two different media materials, supplied in pails labeled #0 and #5. All of the media that is supplied should be divided evenly between the number of filters installed in order of their respective labels. Some overage may be supplied – under no circumstances fill beyond 65% full. The media should be poured into the filter through the top cap fitting on the tank. If a riser pipe present, cover hole with tape to prevent media falling into pipe. Filling tank one third full of water before adding media will help reduce dust. Clean media after initial fill by alternate rinsing, backwashing and rinsing as per operation manual.



Media Filter