



# User's Manual

## SXII MODELS



### SEA XCHANGE

**SXII-600**

**SXII-600-2**

**SXII-1200**

**SXII-1800**

**SXII-2200**

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# **PART 1: INTRODUCTION**

## ACRONYMS AND DEFINITIONS

ACRONYM/SYMBOLS	DEFINITION
FWF	FRESH WATER FLUSH
RO	REVERSE OSMOSIS
PSI	POUNDS PER SQUARE INCH
GPM	GALLONS PER MINUTE
GPD	GALLONS PER DAY
TDS	TOTAL DISSOLVED SOLIDS
PPM	PARTS PER MILLION
TCF	TEMPERATURE CORRECTION FACTOR
LP SWITCH	LOW PRESSURE SWITCH
HP SWITCH	HIGH PRESSURE SWITCH
Φ	PHASE

## **CONGRATULATIONS**

Your Dometic SeaXchange SXII-Series Reverse Osmosis System is a durable piece of equipment that, with proper care, will last for many years. This User's Manual outlines installation, operation, maintenance, and troubleshooting details vital to the sustained performance of your system.

## **SAFETY**

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

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

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



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



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



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

# PRINCIPLES OF REVERSE OSMOSIS

## REVERSE OSMOSIS

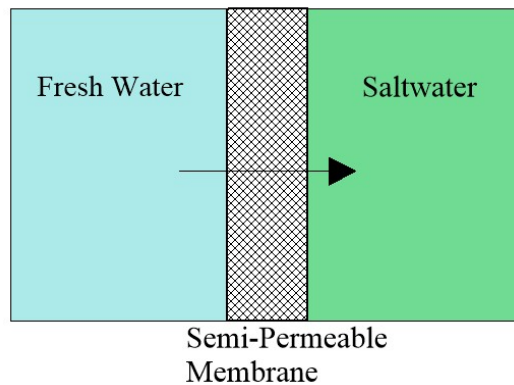
### **How Fresh Water Is Produced**

Reverse Osmosis or “RO” is a process where freshwater water is produced by pumping saltwater through a semi-permeable membrane.

### **Osmosis**

Osmosis is a naturally occurring process where a weak solution will cross a semi-permeable membrane to mix with a highly concentrated solution. For example a freshwater solution will naturally want to mix with a saltwater solution.

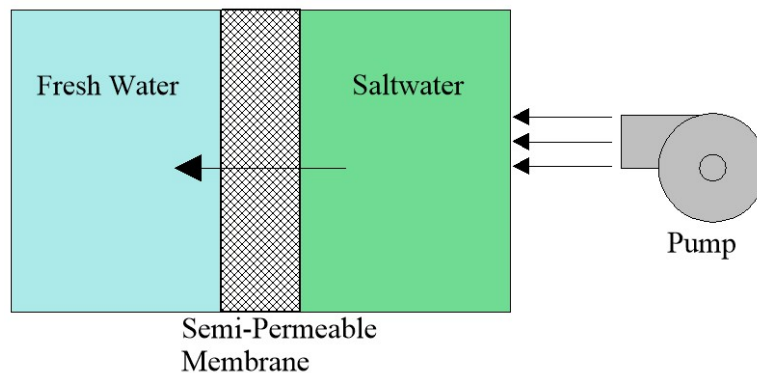
Process of Osmosis



### **Reverse Osmosis**

To reverse this process work is put into the system using a pump. The pump causes pressure to build up on the saltwater side of the membrane. This pressure forces water across the semi-permeable membrane. The membrane is designed to allow the water molecules to pass while preventing the salt and other solids from doing so. Fresh water is collected on the other side of the membrane as a result.

Process of Reverse Osmosis



## UNIT SPECIFICATIONS

SXII MODEL	600	600-2	1200	1800	2200
Configuration	1 Vessel	2 Vessel	2 Vessel	3 Vessel	4 Vessel
Feed Water Source	Sea Water	Sea Water	Sea Water	Sea Water	Sea Water
Rated production gpd (gpm)	600(0.41)	600(0.41)	1200(0.83)	1800(1.25)	2200(1.52)
<b>Rejection and Flow Rates</b>					
Nominal Salt Rejection %	99.4%	99.4%	99.4%	99.4%	99.4%
Minimum Feed Flow gpm (lpm)	4.2 (15.9)	4.2 (15.9)	4.2 (15.9)	4.2 (15.9)	4.2 (15.9)
Minimum Concentrate Flow gpm (lpm)	3.79 (14.3)	3.79 (14.3)	3.3 (12.5)	2.95 (11.2)	2.68 (10.1)
<b>Connections</b>					
Feed inch	¾" Hose	¾" Hose	¾" Hose	¾" Hose	¾" Hose
Product inch	3/8" QC 9.5mm	3/8" QC 9.5mm	3/8" QC 9.5mm	3/8" QC 9.5mm	3/8" QC 9.5mm
Concentrate inch	1/2" QC 2.7mm	1/2" QC 12.7mm	1/2" QC 12.7mm	1/2" QC 12.7mm	1/2" QC 12.7mm
<b>Membranes</b>					
Membrane Per Vessel	1	1	1	1	1
Membrane Quantity	1	2	2	3	4
Membrane Size	2540	2521	2540	2540	2540
<b>Pumps</b>					
High Pressure Pump Type	Piston	Piston	Piston	Piston	Piston
HP motor amps	10.6	10.6	10.6	10.6	10.6
High Pressure Motor HP (kw)	2.5	2.5	2.5	2.5	2.5
Booster motor amps	4.3	4.3	4.3	4.3	4.3
Booster Pump RPM @ 60 (50Hz)	1750 (1450)	1750 (1450)	1750 (1450)	1750 (1450)	1750 (1450)
<b>Electrical</b>					
Voltage	230V 50/60Hz 1Φ	230V 50/60Hz 1Φ	230V 50/60Hz 1Φ	230V 50/60Hz 1Φ	230V 50/60Hz 1Φ
Amp Draw	14.9	14.9	14.9	14.9	14.9
<b>System Dimensions</b>					
L x W x H inch (cm)	25.75"x16.99"x 14.09" (65.4x43.2x35.8)	25.75"x16.99"x 14.09"(65.4x43. 2x35.8)	44.85"x16.99"x 14.09"(113.9x43.2 x35.8)	44.85"x16.99"x 14.09"(113.9x43 .2x35.8)	44.85"x16.99"x 14.09"(113.9x43 .2x35.8)
Weight lb. (kg)	120 (54.4)	115 (52.2)	125 (56.7)	130 (59)	130 (59)



## OPERATION SPECIFICATIONS

### BEFORE STARTING

The reverse osmosis process causes the concentration of impurities. The impurities may precipitate (fall out of solution) when their concentration reaches saturation levels when operated beyond rated production. This precipitation can scale or foul the membranes. In order to prevent this, your SXII unit should never be operated over the **rated production** listed in the **UNIT SPECIFICATION** chart (page 8) and also should not be run above **850psi pump pressure**. Water temperature and inlet water ppm are variables that affect product flow rate and pump pressure



***CAUTION: THE RATED PRODUCTION WILL HAVE TO BE CORRECTED FOR TEMPERATURE OF SEA WATER WHEN DETERMINING RATED FLOW FOR YOUR UNIT. SEE 'TEMPERATURE CORRECTION FACTORS FOR WATER PRODUCTION' CHART (PAGE 12-13) FOR AN EXAMPLE ON CORRECTING THE RATED FLOW RATE.***

### PRE-FILTRATION

SXII-Series systems are supplied with a 25-micron (part number 252404292) and 5-micron (part number 252404291) HIGH CAPACITY sediment filters. These filters are made from Typar™ filter media and contain 30% more media than most 2.5" x 10" pleated sediment cartridges. To prevent damage to the system, we recommend using the sediment filters supplied with this system. Change the pre-filters once the pressure gauge labeled **FILTER OUT** is 15psi or lower.

### BOOSTER PUMP

SXII-series systems are supplied with a stainless steel centrifugal pump. The pump must be located below the water line to maintain a positive suction head for priming purposes. Refer to page 104 for the Booster Pump Manual.



***THE BOOSTER PUMP MUST NEVER BE RUN DRY. OPERATING THE PUMP WITHOUT SUFFICIENT FEED WATER WILL DAMAGE THE PUMP.***

## OPERATION SPECIFICATIONS

### HIGH PRESSURE PUMP

The pump used on the SXII-Series systems is a piston type constructed of stainless steel. Follow these guidelines to ensure proper operation of the pump:

- Refer to the CAT High Pressure Pump in manufacturer's index for recommended maintenance (page 90).
- The pump must **NEVER** be run dry. Operating the pump without sufficient feed water will damage the pump.
- **ALWAYS** use the required filters when operating the unit. The high pressure pump is susceptible to damage from sediment and debris.
- If any damage occurs to your system's pump, a re-build kit is available. Contact your local dealer or distributor and inform them of your system's model and pump size.
- Follow the instructions in the FWF section on page 42.

### MEMBRANES

SXII-Series reverse osmosis systems come pre-loaded with DOW FILMTEC™ sea water membranes unless otherwise specified. For the best longevity of membranes, use the manufacturer's recommended prefilters, operate it within its limits, and ensure the system is performing its regular FWF. Membrane element guidelines can be found in the Dow FILMTEC™ Membranes Manual on page 120.

### DIVERSION VALVE

The diversion valve controls the product water after the membranes. If the controller determines that the salinity of the water is acceptable, (based on the salinity set point) it will energize the diversion valve solenoid, causing the water to flow to the vessels tank. If the electrical portion of the solenoid fails or the controller fails to energize the solenoid, a manual bypass on the diversion valve may be utilized if the product water is found to be acceptable. Refer to picture on page 55 and the Diversion Valve Manual on page 124.

### SYSTEM CONTROLLER

The controller is a logic based pc board that can analyze and control the electrical components within the system. Its primary functions are to monitor safety switches (high and low pressure), perform the program sequence of operations to optimize the start, normal operation, and shutdown sequence. Refer to the System Controller Manual on page 78.

## **OPERATION SPECIFICATIONS**

### **PRODUCT WATER**

Dometic SeaXchange SXII-Series Reverse Osmosis Systems are designed to produce product water at the capacities indicated. For example, the SXII 600 produces 600 gallons per day or 0.41 gallons per minute (600gpd ÷ 24hrs/day ÷ 60mins/hr=0.41gpm) of product water at the listed operating test conditions.

#### **Rejection**

The amount of total dissolved solids (TDS) rejected by the membrane is expressed as a percentage. For example, a 99.4% rejection rate means that 99.4% of total dissolved solids do not pass through the membrane. To calculate the % rejection, use the following formula:

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

Example:

$$99.4\% = [(35,000-210)/35,000] \times 100$$

#### **Recovery**

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

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

Example:

$$36\% = (1.52/4.22) \times 100$$

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

## OPERATION SPECIFICATIONS

### TEMPERATURE CORRECTION FACTORS FOR MEMBRANE

To find your SXII-series unit's rated flow at a given temperature, refer to the chart to find the Temperature Correction Factor (TCF). Divide the rated product flow at 77°F by the TCF. The result is the corrected product flow at current water inlet temperature. The water temperature can be found on the main screen. See the example on the next page.

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

## **OPERATION SPECIFICATIONS**

### **TEMPERATURE CORRECTION FACTORS FOR MEMBRANE (FORMULA)**

If a system is rated to produce 1.25 gpm of product water @ 77° F. The same system will produce more water at a higher temperature. It will also produce less water at a lower temperature. Use the temperature correction table to obtain the correct flow.

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

#### **Example:**

1.25 gpm @ 59° F (1.25÷1.42=.88 gpm)

1.25 gpm @ 77° F (1.25÷1=1.25 gpm)

1.25 gpm @ 84° F (1.25÷0.89=1.4 gpm)

**NOTE:** Fahrenheit/Celsius conversion:  $F = (°C \times 9/5) + 32$

## **PART 2: INSTALLATION AND COMMISSIONING**

## INSTALLATION KIT

### ITEMS INCLUDED WITH EACH SYSTEM

#### **MAIN INSTALLATION ITEMS**

- 252404258 – stainless steel booster pump and motor assembly
- 252404295 - 2.5" x 10" carbon block filter
- 252404172 - 2.5"x 10" double pre-filter assembly
- 252404326 – 2.5" filter housing wrench
- 252404202 – 20' of ¾" white double walled hose. **(Not to be used on the suction side of feed pump. Always use wire reinforced hose from the seacock to the suction side of the feed pump.)**
- 252404004 – 50' of ¼" Spot Zero white nylon tubing **(for FWF)**
- 252404003 – 50' of ½" Spot Zero white nylon tubing **(for overboard)**
- 252404002 - 50' of 3/8" Spot Zero white nylon tubing **(for product)**
- 252404099 – (2) 3/8" x ½" connectors
- 252404114 – (2) 3/8" tee
- 252404109 – (3) 3/8"QC x 3/8"QC 90° elbow
- 252404118 – (18) 3/8" red locking clip
- 254404094 – (3) ½" elbow tube
- 252404093 –(1) ½" connector male
- 252404115 – (2) ½" tee
- 252404115 – (10) ½" red locking clip
- (10) – Blue clamp aid safety covers
- (8) – Stainless steel 5/16" x 1" lag bolts
- (8) – Stainless steel 5/16" flat washers

#### **CONSUMABLE ITEMS**

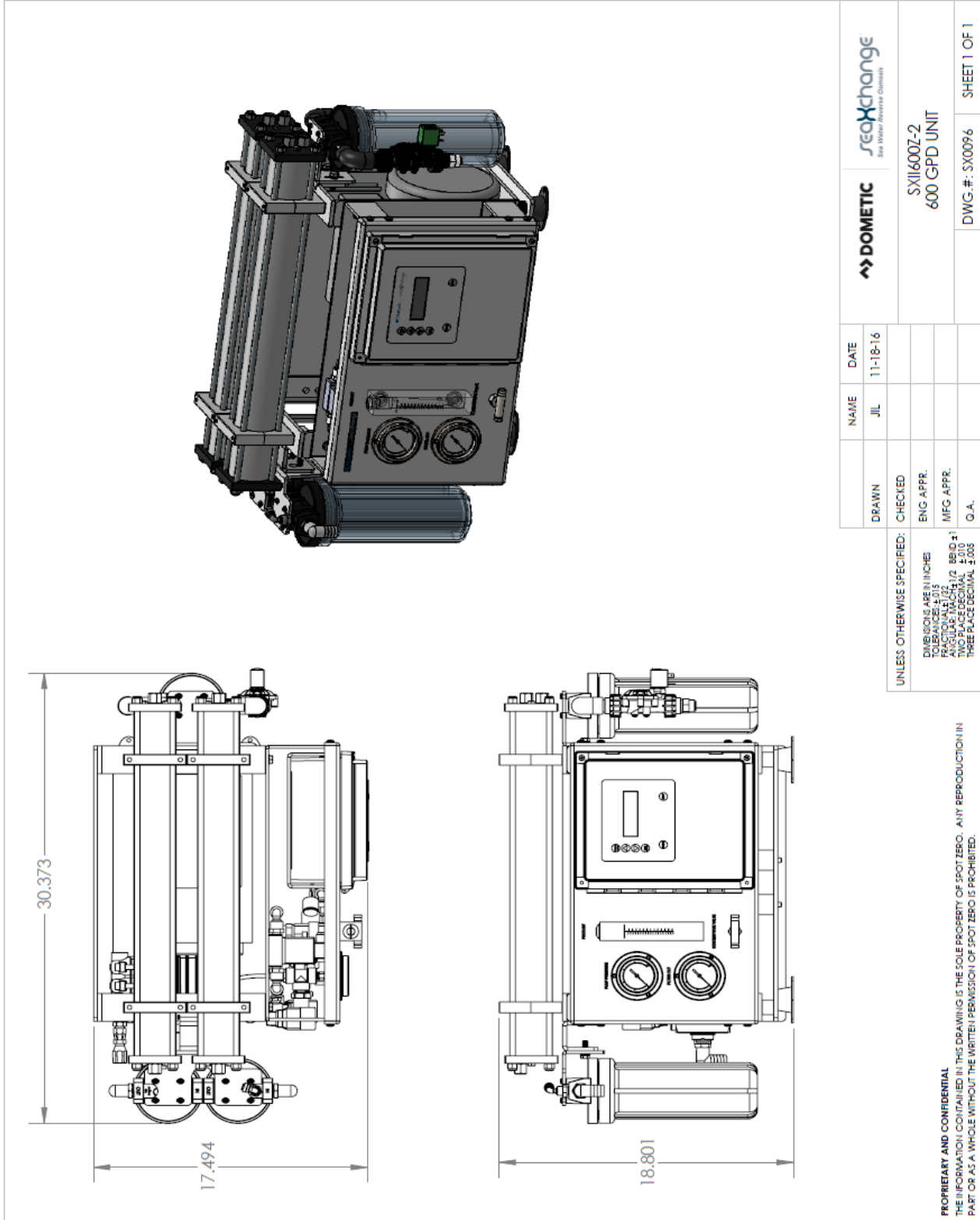
- 252404192 – 2.5" x 10" 25 micron pre-filter
- 252404191 – 2.5" x 10"5 micron pre-filter
- 252404015 – 21oz. bottle CAT pump oil
- 252404179 – SW30 2540 membrane
- 252404178 – SW30 2521 membrane

#### **OPTIONAL ITEMS**

- 252404298 – high capacity prefilter (4.5" X 20")
- 252404317 – high capacity prefilter assembly
- 252404225 – remote control and 50' cable
- 252404121 – spare fitting kit
- 252404040 – hand held TDS meter
- Membrane and vessel array upgrade

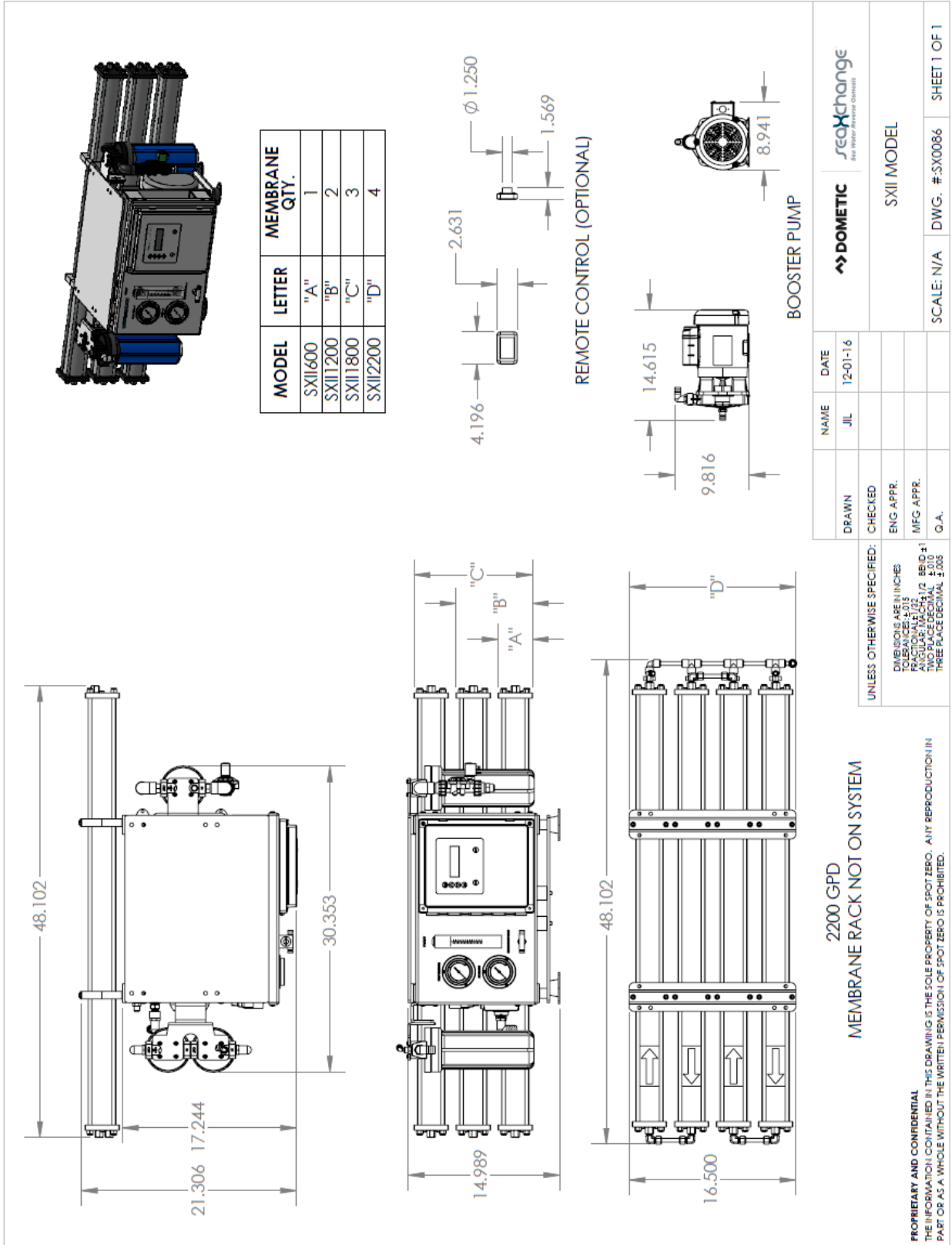
**NOTE:** Items listed are 1 unit supplied unless noted within parentheses.

# DIMENSIONS

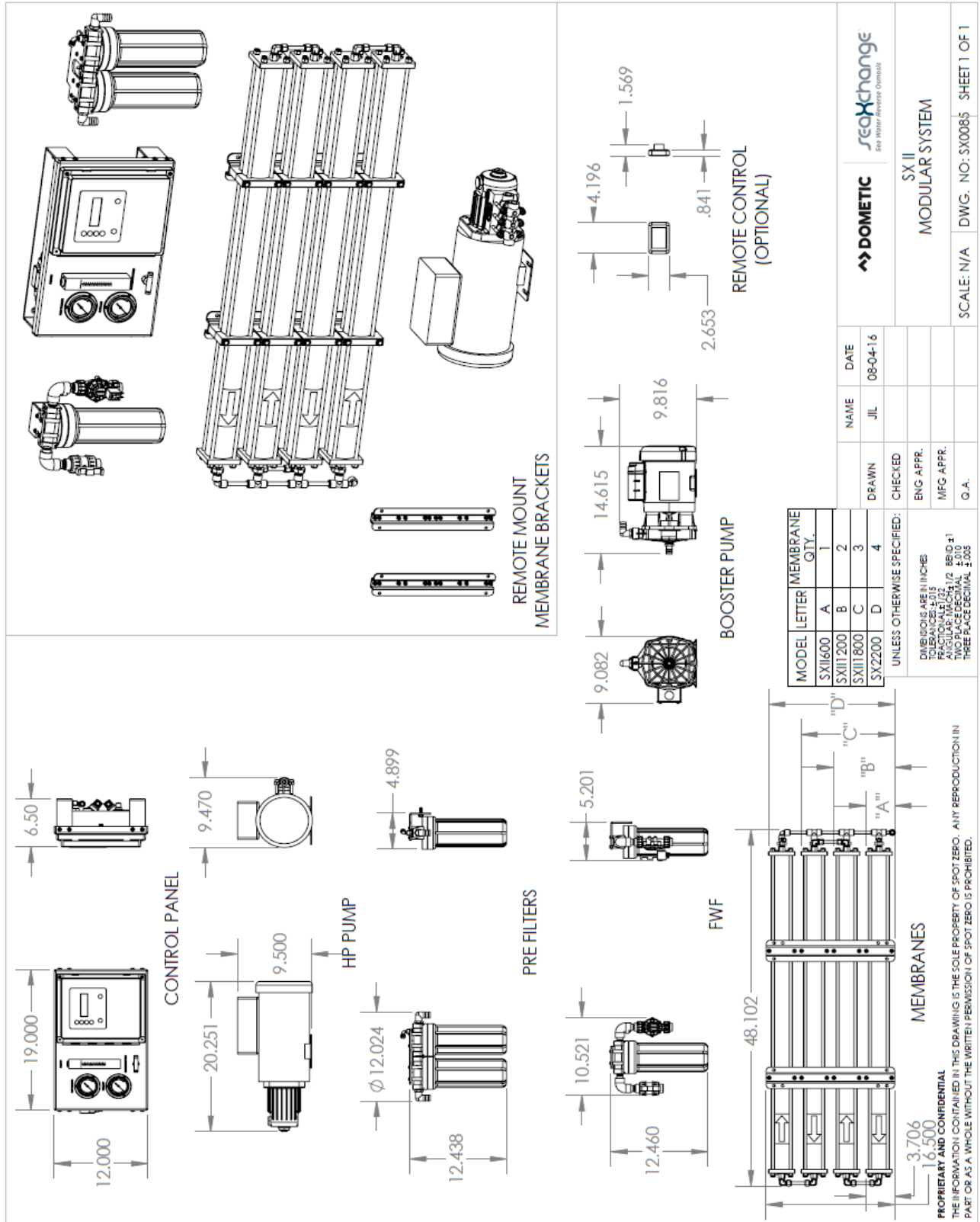




# DIMENSIONS

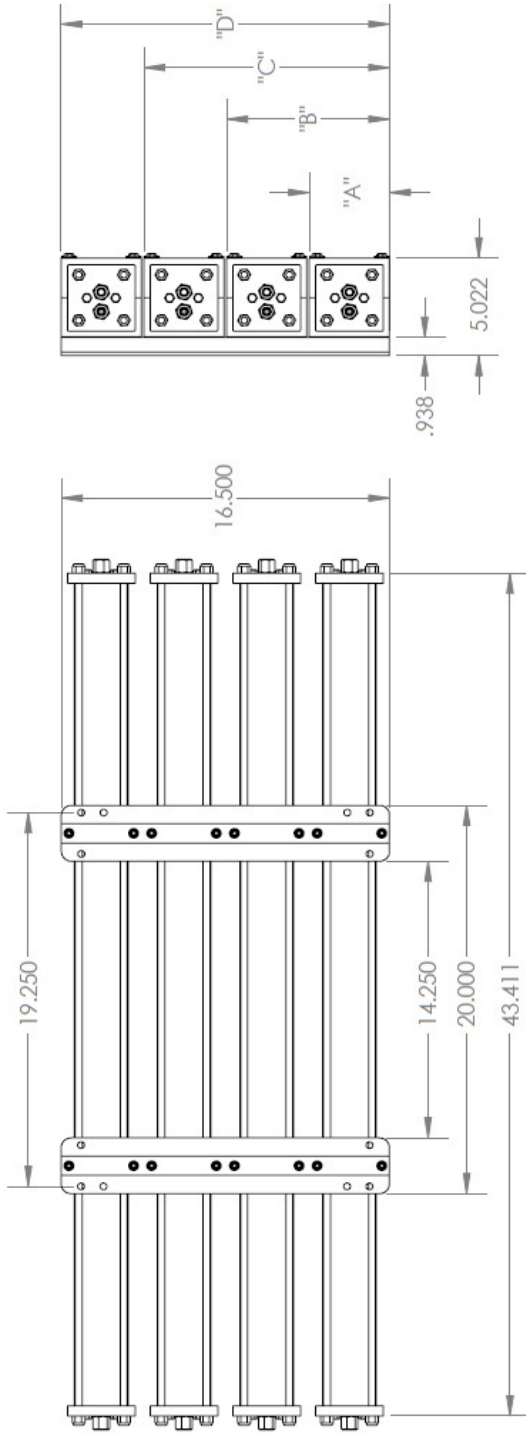


# DIMENSIONS



# DIMENSIONS

NOTES:  
1. BRACKET HEIGHT IS CONSTANT FOR ALL MODELS.



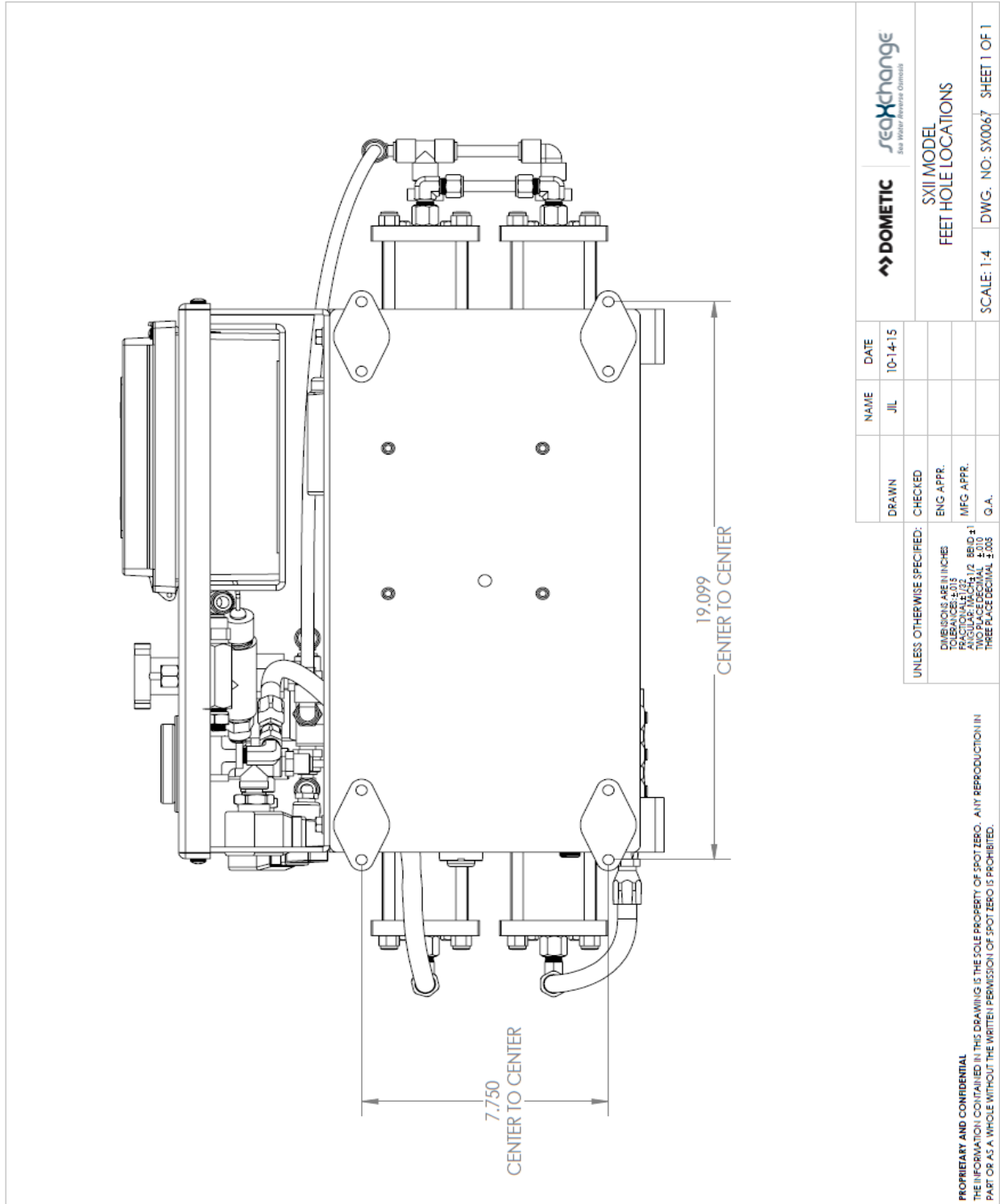
LETTER	MODEL	HEIGHT
"A"	SX600	4.031
"B"	SX1200	8.191
"C"	SX1800	12.351
"D"	SX2200	16.511

	<b>DOMETIC</b>	<small>Sea Water Reverse Osmosis</small>	NAME JIL	DATE 02-25-14	
Sea Xchange Membrane Assy					
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DECIMALS TO 0.015 FRACTIONS TO 1/32 ANGLES TO NEAREST 1/2 TWO PLACE DECIMAL THREE PLACE DECIMAL ±.008					
DRAWN			CHECKED		
ENG. APPR.			MFG. APPR.		
G.A.			Q.A.		
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SPOT ZERO. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SPOT ZERO IS PROHIBITED.					
SCALE: 1:8				DWG. #: SX0004	
				SHEET 1 OF 1	

# MOUNTING

The freestanding system should be bolted down and securely fastened.

## FEET/HOLE LOCATIONS



## ELECTRICAL REQUIREMENTS

### ELECTRICAL

The SXII-Series systems are available in 1 $\phi$  (phase).

- 230 volts at 14.9 amps (including booster pump)
- 50/60 Hertz available in the 230 volt unit

***NOTE: IT'S RECOMMENDED THAT A QUALIFIED ELECTRICIAN WIRE YOUR SYSTEM IN ACCORDANCE WITH ALL APPLICABLE CODES, RULES, AND REGULATIONS.***



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

## **PLUMBING AND PIPING CONNECTIONS**

### **PLUMBING**

The membranes and high pressure pumps used on SXII-Series Reverse Osmosis Systems require a continuous flow of water with a maximum temperature not to exceed 113°F. ***Please see Complete Install Guide and the connection drawings on the following pages.***

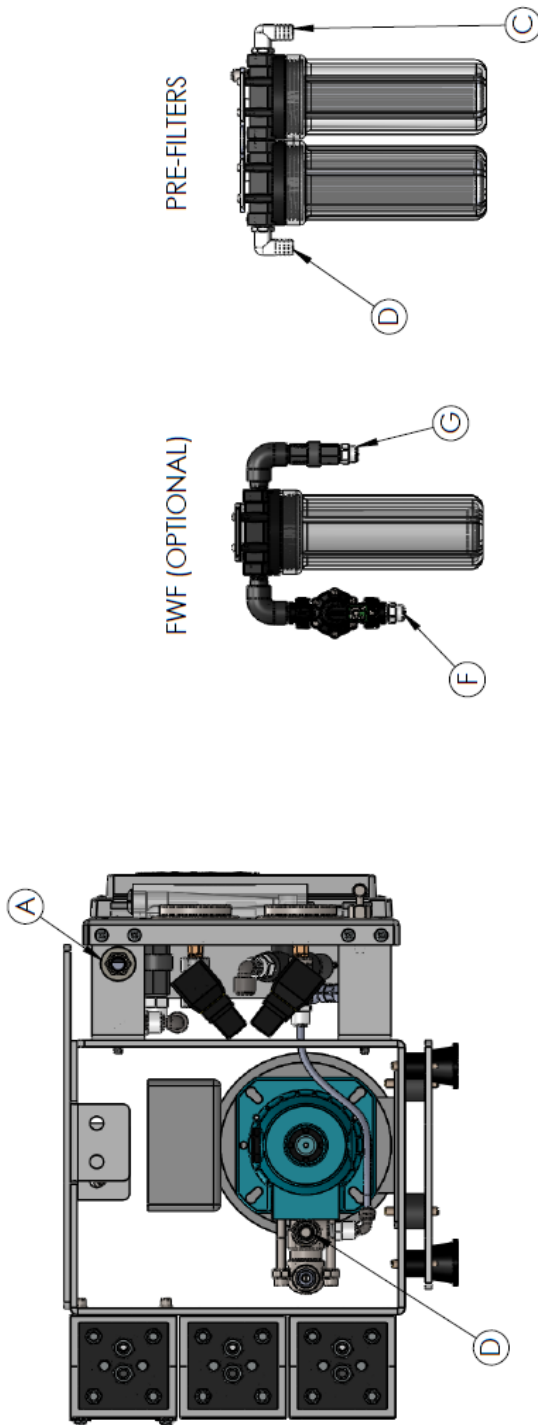


***CAUTION: ANY RESTRICTIONS OR BLOCKAGE IN THE CONCENTRATE LINE CAN CAUSE BACKPRESSURE, WHICH WILL INCREASE THE SYSTEM'S OPERATING PRESSURE. THIS CAN RESULT IN DAMAGE TO THE SYSTEM'S MEMBRANES AND COMPONENTS.***



# PLUMBING AND PIPING CONNECTIONS

## INLETS AND OUTLETS



LOCATION	DESCRIPTION	SIZE
A	OVERBOARD OUTLET	1/2" TUBE
B	PRODUCT WATER OUTLET	3/8" TUBE
C	SEA WATER INLET	3/4" HOSE
D	TO HP PUMP	3/4" HOSE
F	SHIPS FRESH WATER TANK INLET	3/8" TUBE
G	TO BOOSTER PUMP	1/4" TUBE

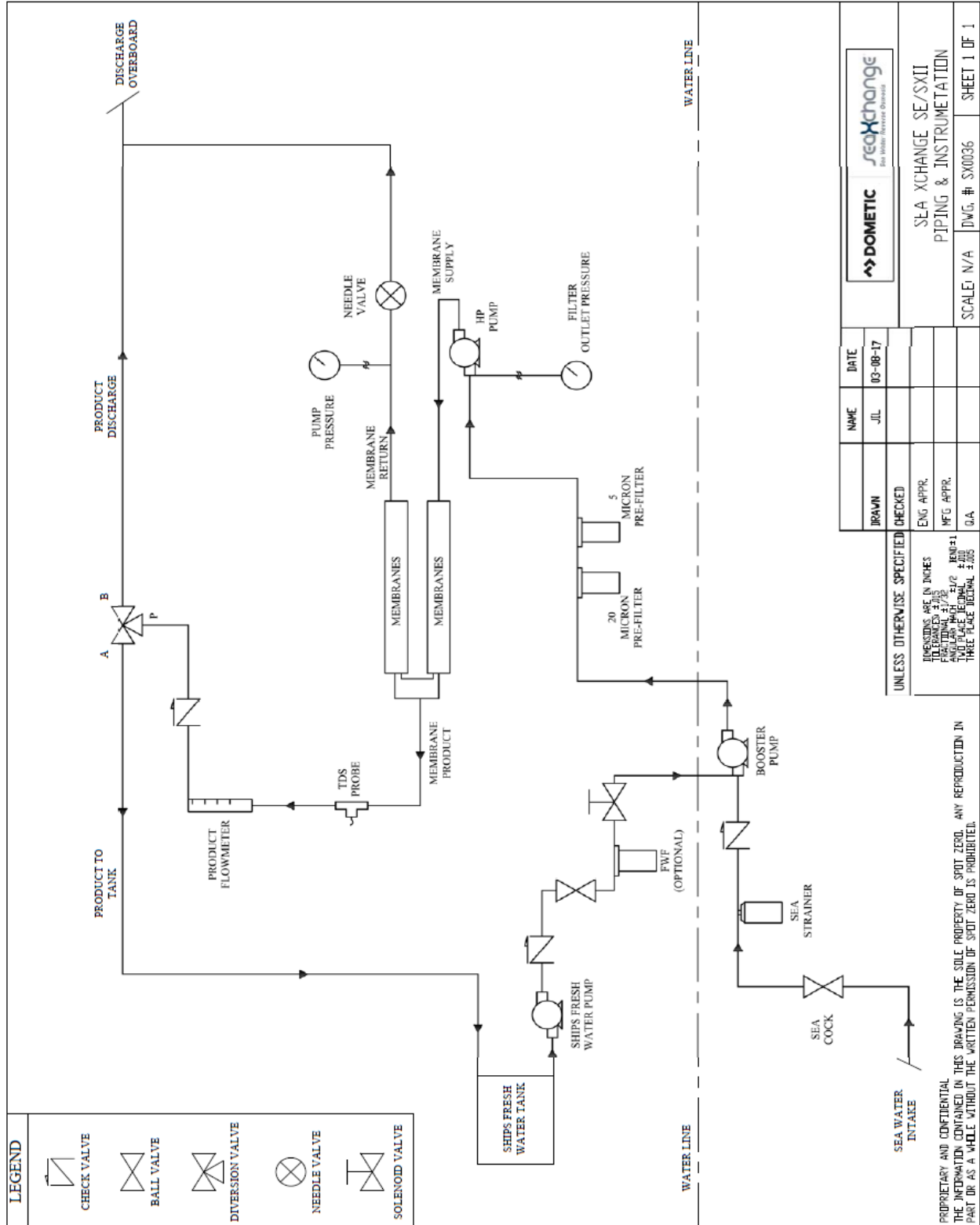
DRAWN		NAME	DATE
CHECKED		JIL	12-01-16
ENG. APPR.			
MFG. APPR.			
G.A.			
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONAL ±.015 DECIMAL ±.005 TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005			
<b>DOMETIC</b>		<b>seaXchange</b> <small>Sea Water Reverse Osmosis</small>	
		SXII	
		INLET & OUTLET LOCATIONS	
SCALE: N/A	DWG. #: SX0098	SHEET 1 OF 1	

PROPRIETARY AND CONFIDENTIAL  
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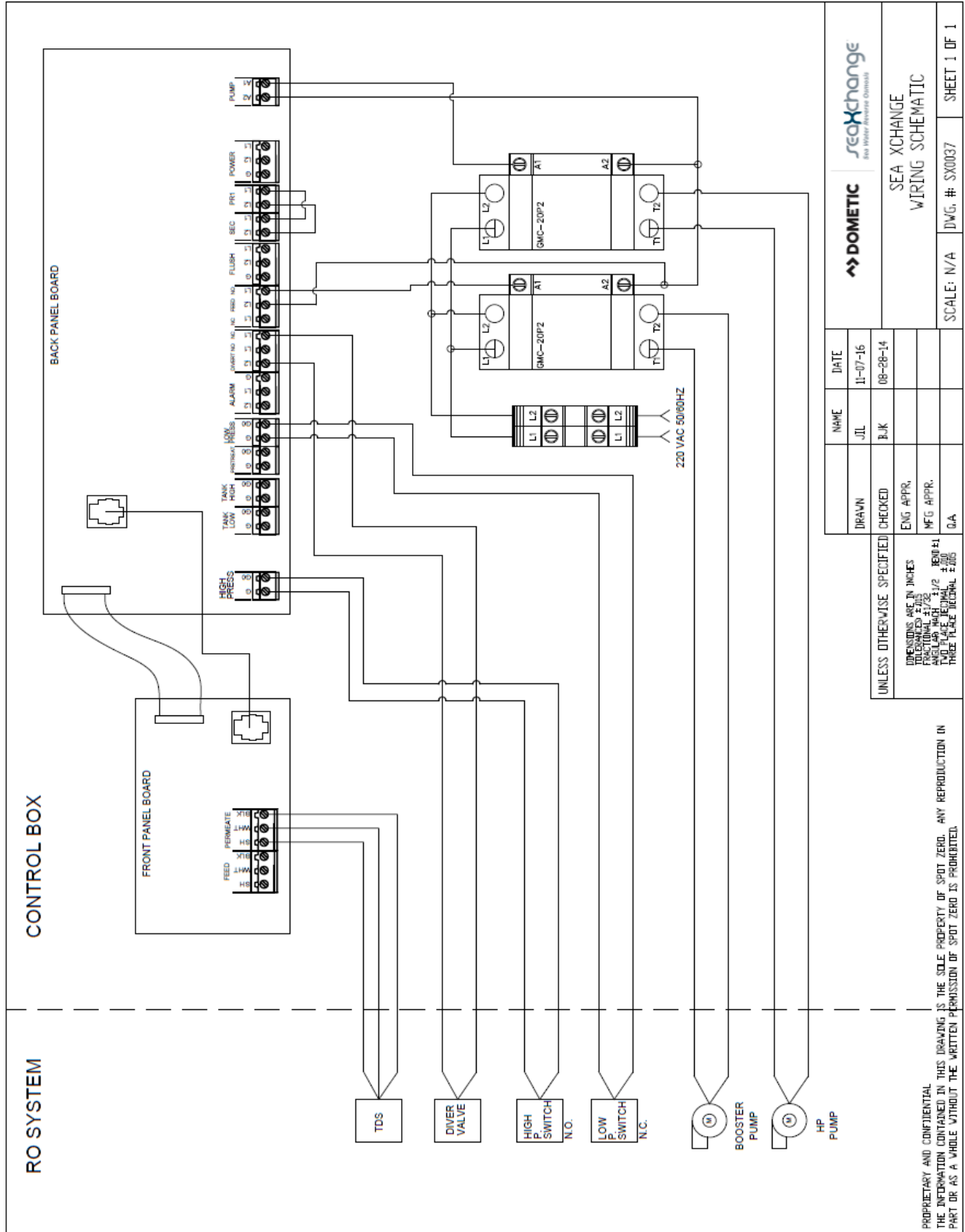
# SYSTEM LAYOUT AND SCHEMATICS

## SXII SERIES PIPING DIAGRAM



# SYSTEM LAYOUT AND SCHEMATICS

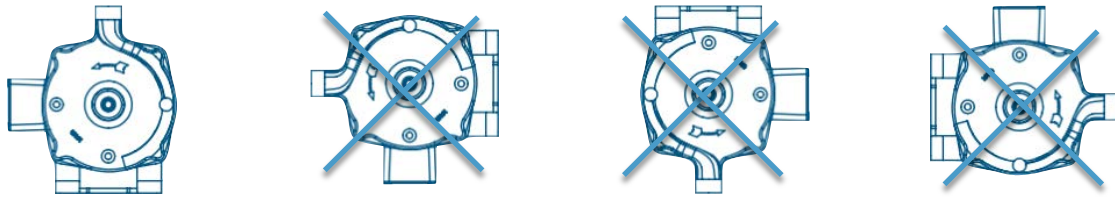
## SXII SERIES ELECTRICAL DIAGRAM



# COMPLETE INSTALL GUIDE

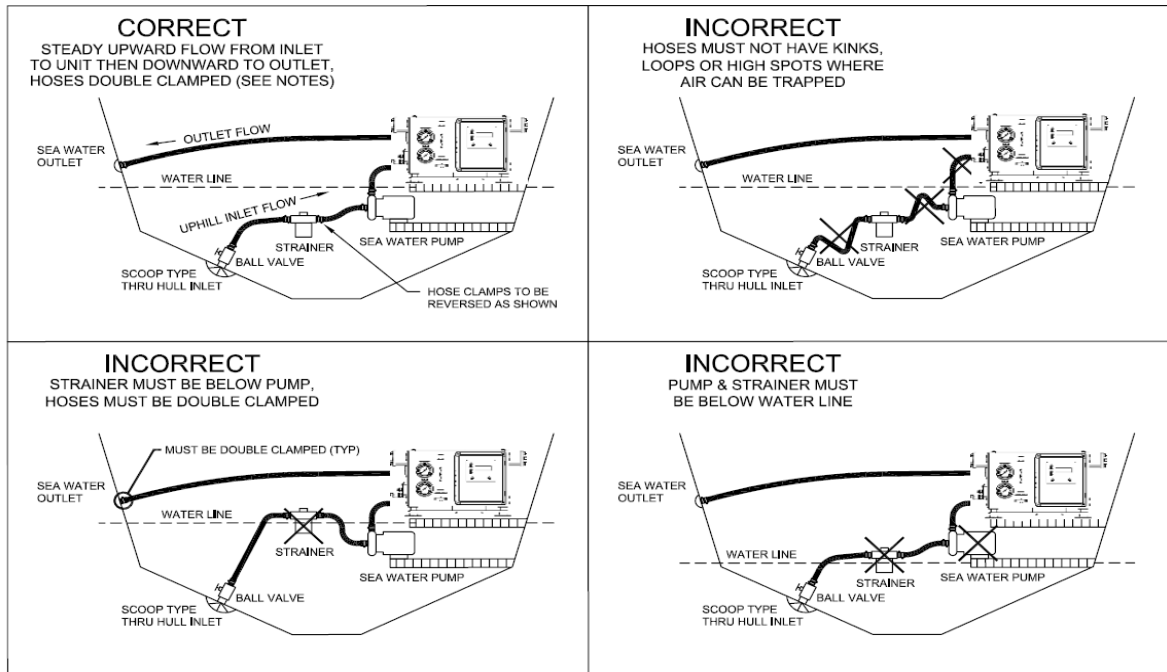
## SEA WATER PLUMBING CONNECTIONS

1. Locate a dedicated sea cock to be used for booster pump supply. Sea cock should be a minimum of 3/4" with a speed scoop to prevent a Venturi effect while vessel is underway.
2. Install a sea strainer with at least a 50 mesh rating after sea cock.
3. Install supplied booster pump below water line.



**NOTE - BOOSTER PUMP OUTLET MUST REMAIN THE HIGHEST POINT OF PUMP AND CANNOT BE ROTATED 90 OR 180 DEGREES.**

4. Run reinforced suction hose from sea cock to sea strainer to booster pump in an upward flow manner to prevent air traps.



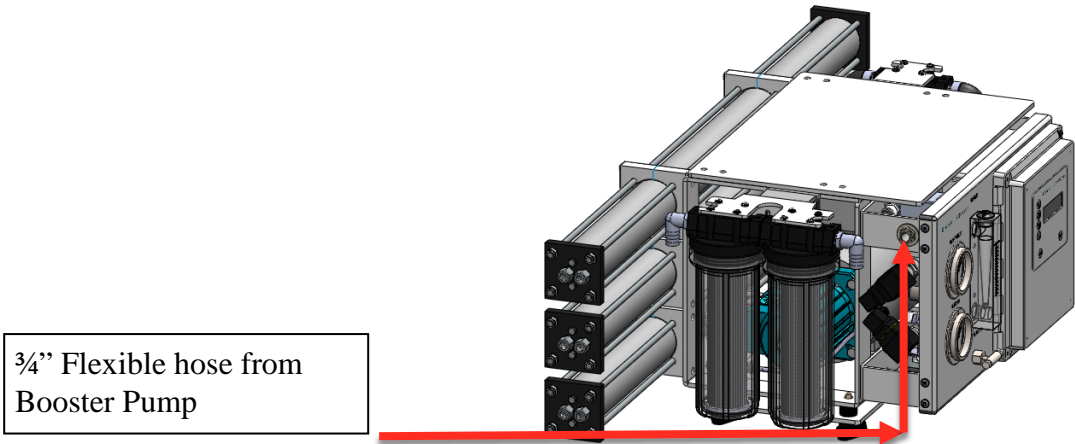
**NOTES:**

- 1) THRU HULL INLET, BALL VALVE, HOSE AND STRAINER SHOULD BE SIZED NO SMALLER THAN PUMP INLET.
- 2) INSTALL THRU HULL FITTING AS FAR BELOW THE WATER LINE AS POSSIBLE.
- 3) PUMP NEEDS DEDICATED THRU HULL NOT SHARED WITH OTHER PUMPS.
- 4) AVOID OR MINIMIZE 90° ELBOW FITTINGS AS MUCH AS POSSIBLE, ROTATE PUMP HEAD TOWARDS DIRECTION OF WATER FLOW.

## COMPLETE INSTALL GUIDE

### SEA WATER PLUMBING CONNECTIONS

5. Use supplied white 3/4" flexible hose from discharge of booster pump to **Pre-Filter Inlet** connection on **Sea Xchange Sediment** filter assembly located on left side of system. Filter assembly may be remote mounted if desired. Be sure that there are no kinks in hose run and avoid 90's where possible to prevent restricted flow.



6. Double clamp all sea water hose connections to prevent potential leaks.
7. Locate connection labeled **OVERBOARD** on lower left side of system. Run supplied white 1/2" tube to a dedicated overboard connection.

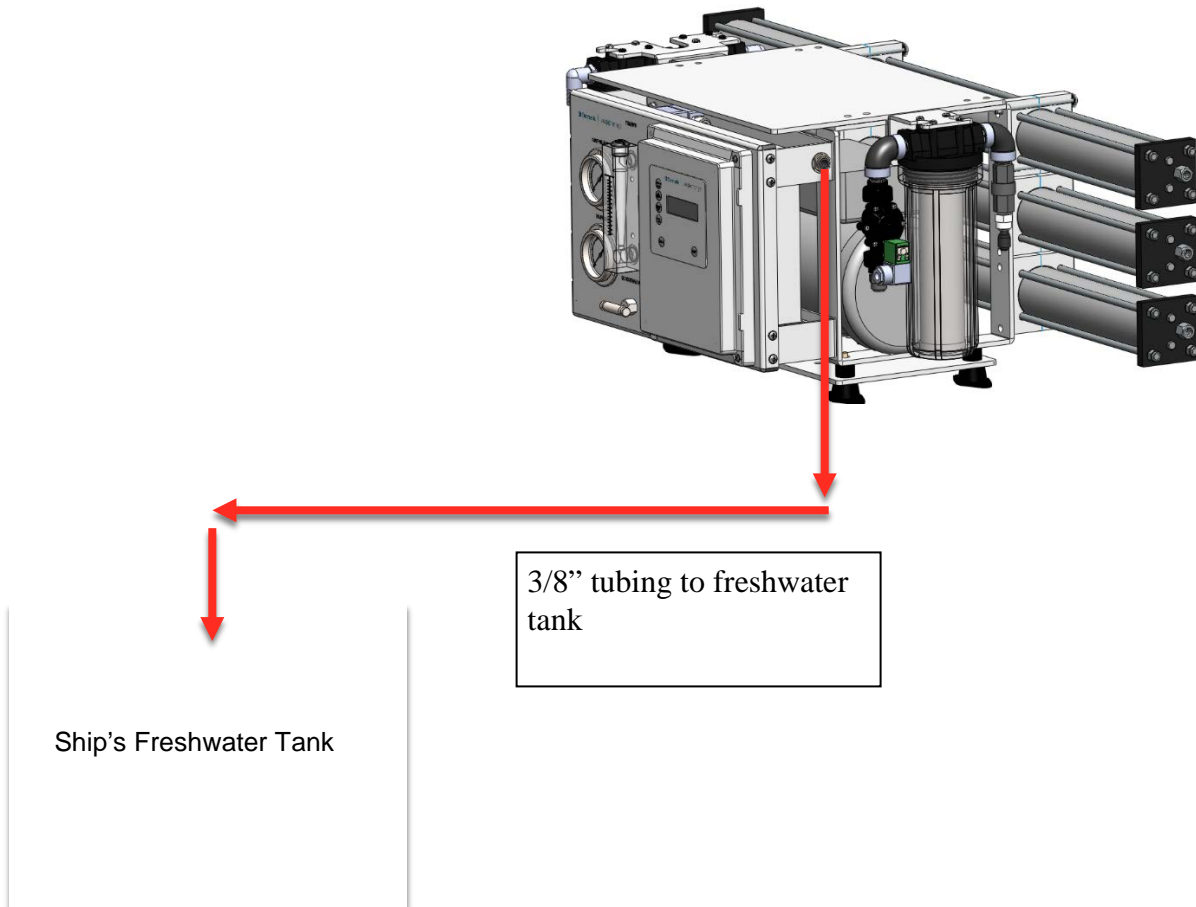


**WARNING - SEA WATER OVERBOARD MUST NEVER BE CLOSED OR OBSTRUCTED WHILE SYSTEM IS OPERATIONAL. CLOSING OR OBSTRUCTING THE OVERBOARD FLOW ON SYSTEM MAY CAUSE PERMANENT DAMAGE TO SYSTEM.**

## COMPLETE INSTALL GUIDE

### PRODUCT TO TANK CONNECTION

1. Locate the fitting labeled **PRODUCT TO TANK** on left side of system. Connect supplied white 3/8" tubing from system to the highest point of the vessels fresh water tank.



**WARNING - SHIPS FRESH WATER TANK MUST BE VENTED PROPERLY TO AVOID BACK PRESSURE ON SYSTEM. FAILURE TO DO SO MAY CAUSE PERMANENT DAMAGE TO SYSTEM AND/OR TO NOT FUNCTION PROPERLY.**



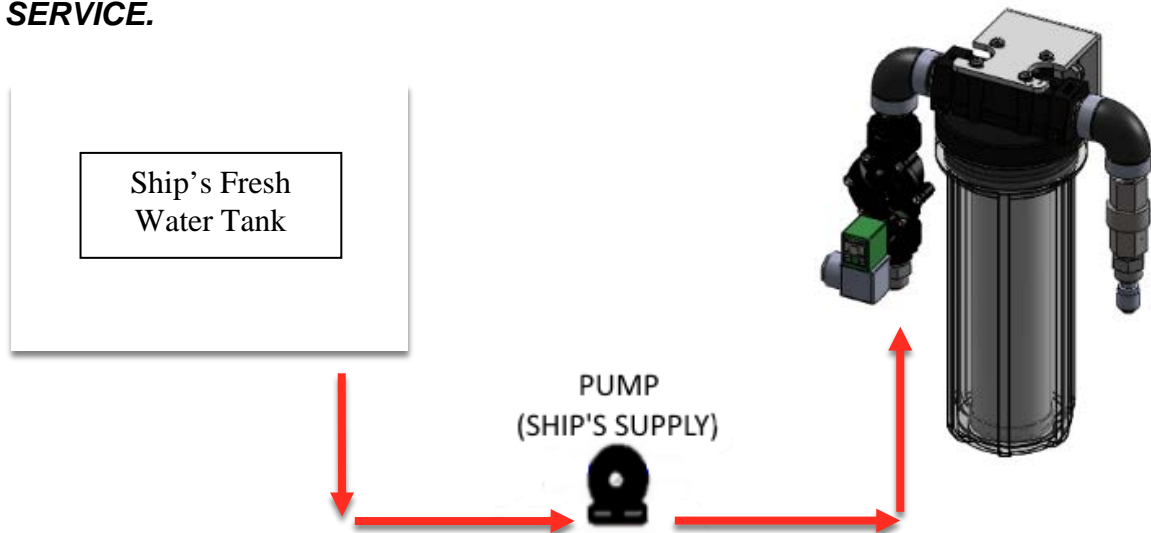
**WARNING - PRODUCT TO TANK MUST NEVER BE CLOSED OR OBSTRUCTED WHILE SYSTEM IS OPERATIONAL. CLOSING OR OBSTRUCTING THE PRODUCT FLOW ON SYSTEM MAY CAUSE PERMANENT DAMAGE TO SYSTEM AND/OR TO NOT FUNCTION PROPERLY.**

## COMPLETE INSTALL GUIDE

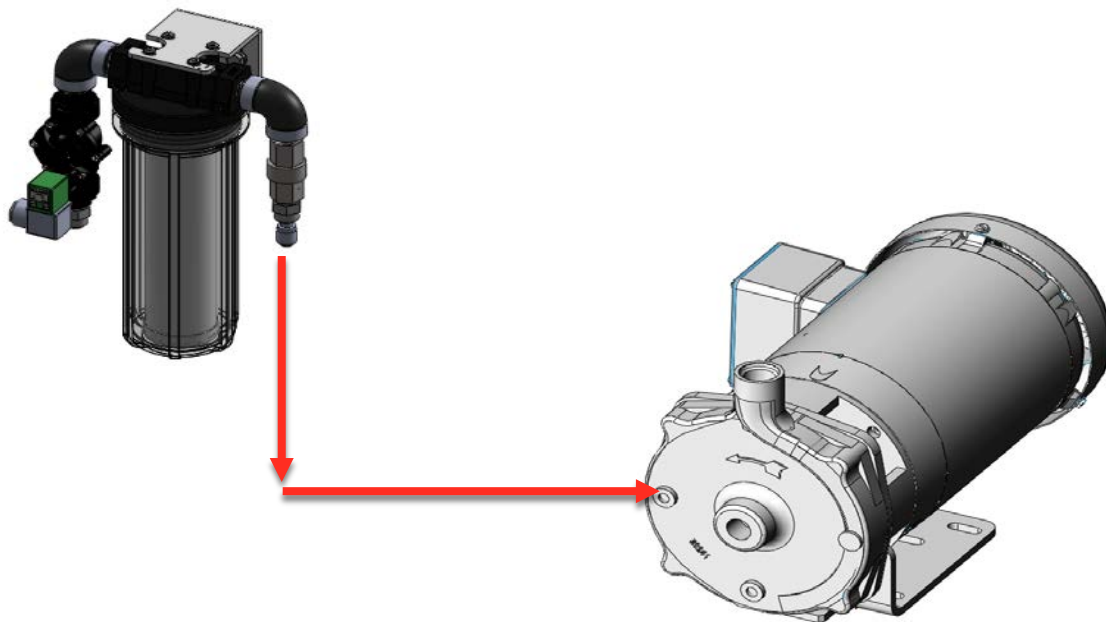
### FRESH WATER FLUSH CONNECTION

1. Locate filter assembly labeled **FRESH WATER FLUSH** and connect the inlet of fresh water flush solenoid to the ship's pressurized fresh water system.

**NOTE - A SHUT OFF VALVE IS RECOMMENDED TO BE INSTALLED ON SUPPLY LINE TO FRESH FLUSH ASSEMBLY FOR SERVICE.**



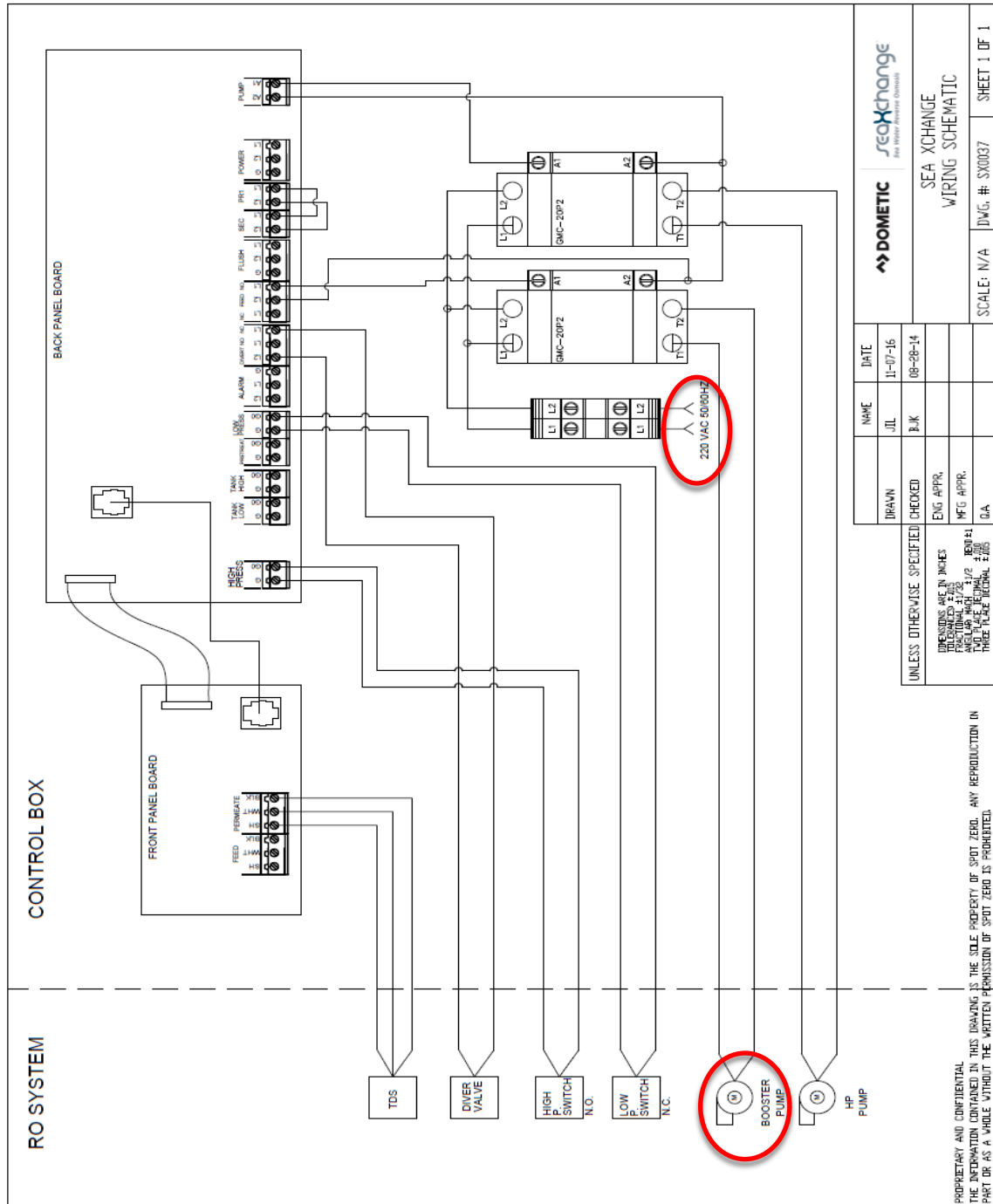
2. Run supplied white ¼" tubing from outlet filter assembly labeled **FRESH WATER FLUSH** and connect to ¼" tubing fitting on face of booster pump.



# COMPLETE INSTALL GUIDE

## ELECTRICAL CONNECTIONS

1. Connect main power supply to main power terminal blocks, connect power to booster pump from contactor as shown below. Ground main power supply and booster pump to grounding bus bar located inside control box.



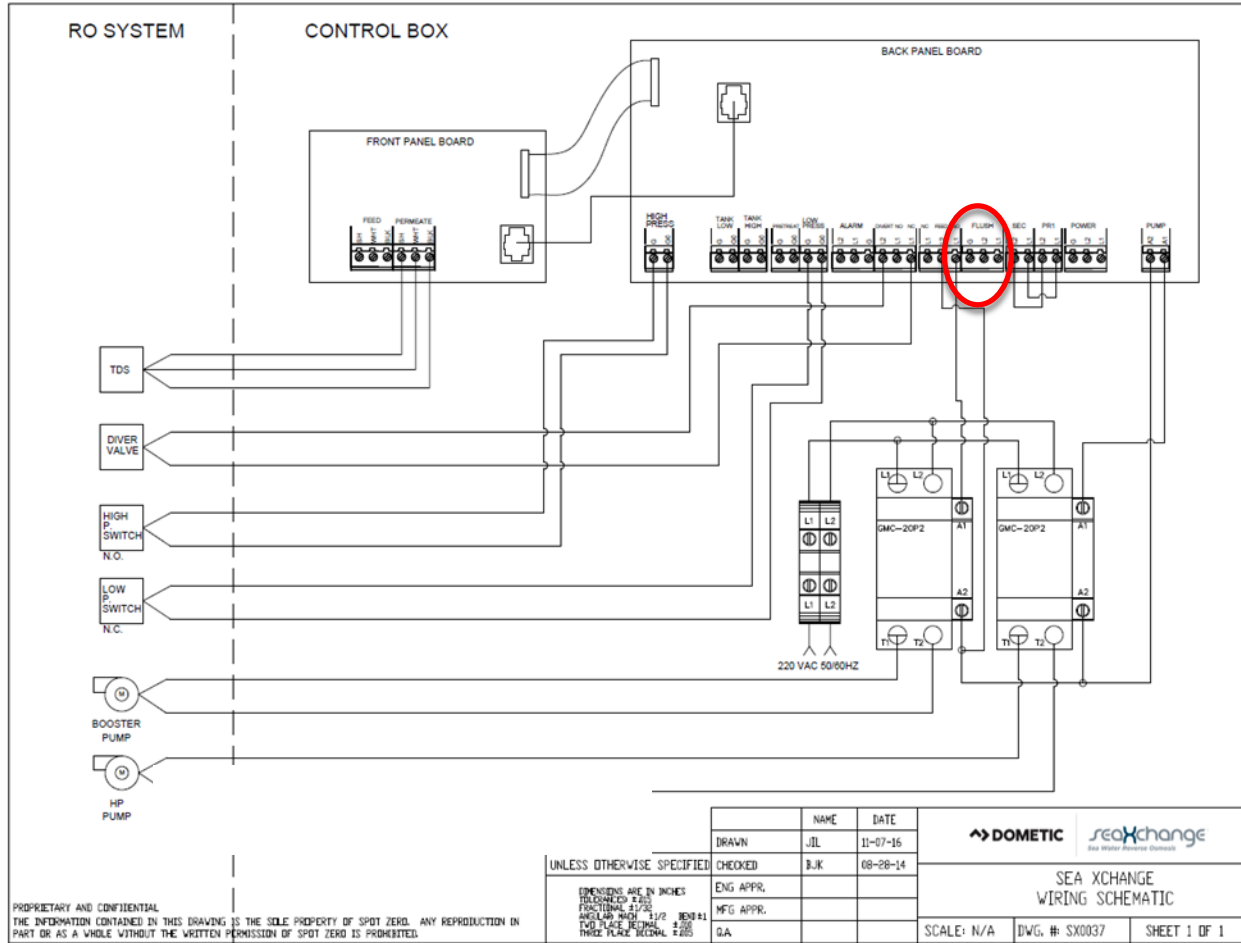
<b>DOMETIC</b>		<b>seaXchange</b> <small>For Water Treatment Controls</small>	
NAME	DATE	DRAWN	CHECKED
J.L.	11-07-16	B.J.K.	08-28-14
UNLESS OTHERWISE SPECIFIED		ENG APPR.	MFG APPR.
DIMENSIONS ARE IN INCHES		REVISION	DATE
FRACTIONAL 1/32		1	08-28-14
DECIMALS ARE TO BE TRUNCATED AT 1/32		2	08-28-14
DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED		3	08-28-14
SCALE: N/A		DWG. # SX0037	
		SHEET 1 OF 1	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. DECIMALS ARE TO BE TRUNCATED AT 1/32. DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

# COMPLETE INSTALL GUIDE

## ELECTRICAL CONNECTIONS

2. Connect fresh water flush power leads as shown below.





## NEW SYSTEM START-UP

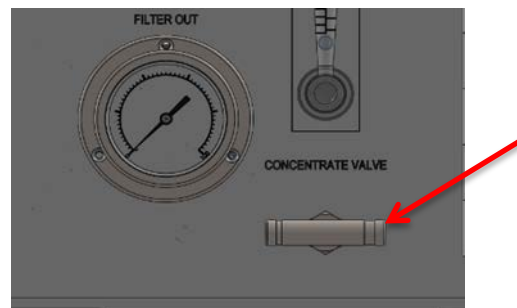
### INSPECTION

Carefully inspect your system before initial start-up. Check that all plumbing and electrical connections are not loose or have not come undone during shipment. A User's Manual, Test Results, and Filter Housing Wrench will accompany your SXII-Series Reverse Osmosis System.

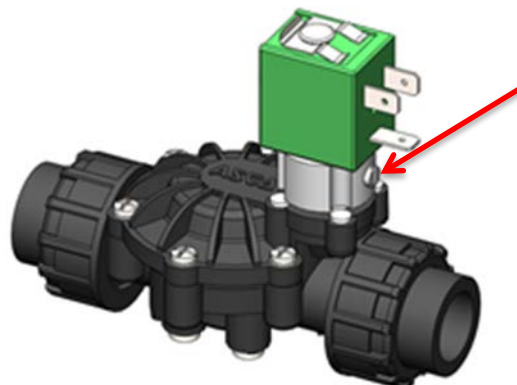
***NOTE: LEAVE THE POWER TO THE SYSTEM OFF FOR THE SYSTEM PURGE PROCEDURE.***

### SYSTEM PURGE

1. Redirect product water to the drain for this procedure.
2. Fully open the concentrate valve (Counter Clockwise).



3. With a flat head screw driver, turn set screw  $\frac{1}{4}$  turn clockwise on the Fresh Water Flush solenoid valve (see drawing below). Allow the system to purge 30 minutes to flush the preservative solution from the system.



## **NEW SYSTEM START-UP**

### **SYSTEM PURGE**

4. Turn the RO system on and adjust the concentrate valve by turning it clockwise to the specified system's production as noted on page 8, or until system reaches 850 psi: whichever occurs first.



5. Inspect the system for leaks.
6. After 30 minutes, shut down the system.
7. Re-direct the product water back to the tank or point-of-use.
8. Record the readings daily for a week; after one week record the readings regularly.

***NOTE: USE THE COMMISSIONING REPORT FORM ON THE NEXT PAGE***

## SEA XCHANGE COMMISSIONING REPORT FORM

### System Information:

Model number - \_\_\_\_\_  
Date of Commission - \_\_\_\_\_  
Installed by - \_\_\_\_\_

Serial number - \_\_\_\_\_  
Commissioned by- \_\_\_\_\_  
Vessel hull number- \_\_\_\_\_

First step to commissioning a new system is to look over the install to be sure everything is installed correct. This checklist must be gone through prior to powering up the system.

- \_\_\_ Have all plumbing connections have been made, and secured?
- \_\_\_ Have all plumbing lines been run to the correct locations?
- \_\_\_ Is the boost pump installed below the water line?
- \_\_\_ Has wire reinforce hose been used on the suction side of the boost pump?
- \_\_\_ Is raw water intake open?
- \_\_\_ Is the overboard open and free of obstructions?
- \_\_\_ Is the system \_\_\_\_\_ voltage, \_\_\_\_\_ hertz, and \_\_\_\_\_ phase correct?
- \_\_\_ Is the circuit breaker sized properly with sufficient wire gauge?
- \_\_\_ Is the power cable connected to the power inlet terminals of the system?

Now power up the system,

- \_\_\_ Are all displays on and functional?

At this time follow the start-up procedure in the manual and operate the system for an hour at its rated capacity, then record the following data.

### System operating readings

Pre-filter inlet \_\_\_\_\_ psi  
psi

Pre-filter outlet \_\_\_\_\_

Concentrate pressure \_\_\_\_\_ psi

Concentrate flow \_\_\_\_\_ gpm

Product flow \_\_\_\_\_ gpm

Product TDS \_\_\_\_\_ ppm

Feed water TDS \_\_\_\_\_ ppm

Feed water temperature \_\_\_\_\_ F or C

Hours on system \_\_\_\_\_ hrs

Amp draw \_\_\_\_\_ Voltage \_\_\_\_\_

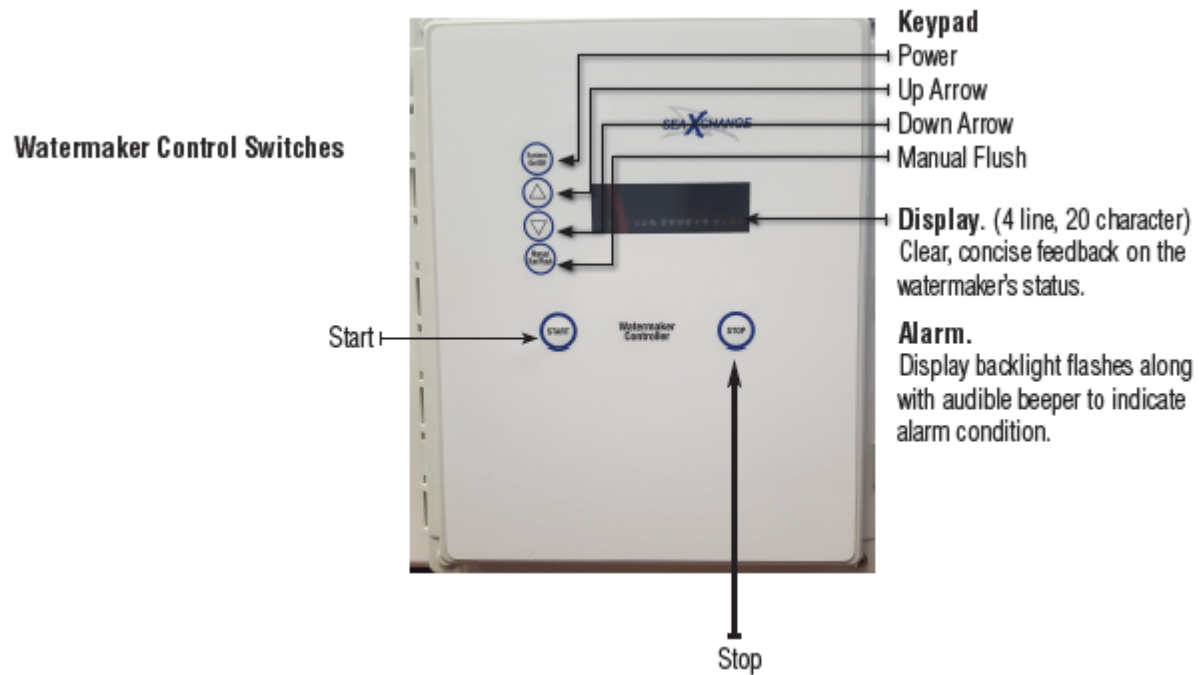
Location system was tested \_\_\_\_\_

Problems or other notes:

# **PART 3: OPERATION AND MAINTENANCE**

## CONTROLLER OVERVIEW

The Watermaker System Controller Documentation can be found in the manufacture's index on page 78. The following is a quick overview of the front panel. Refer to this manual before starting to familiarize yourself with Watermaker Control Switches.



## NORMAL OPERATION

### START-UP

1. Make sure the valve feed to the booster pump is fully open.
2. Fully open the concentrate valve by turning counter clockwise (Figure 1).

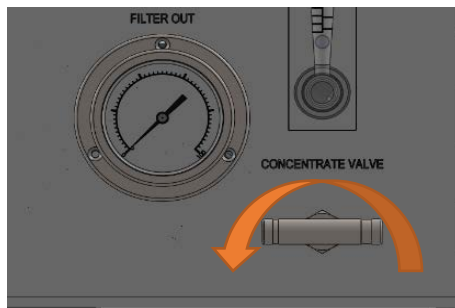


Figure 1

3. Turn the system ON (Figure 2).



Figure 2

4. Press the START button (Figure 3).



Figure 3

5. Wait 30 seconds for high pressure pump to turn ON.

# NORMAL OPERATION

## START-UP

6. Pressurize the system to the rated flow turning the concentrate valve clockwise or 850 psi, whichever comes first (Figure 4).

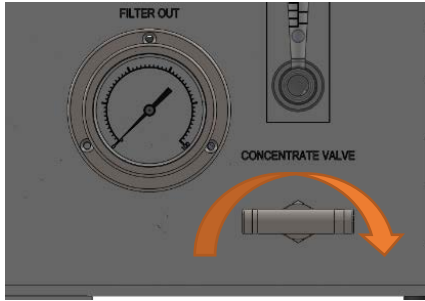


Figure 4

**Note:**

1. Product water production varies depending on the temperature of the feed water. Refer to temperature correction chart on page 12-13.
2. Regulate concentrate valve to reach the rated flow (Figure 5) or 850PSI on the Pump Pressure gauge, whichever comes first.
3. See Table 1 for rated flows by model.

Table 1

MODEL	GPD	RATED FLOW (GPM)
SXII600 & SXII600-2	600	0.41
SXII 1200	1200	0.83
SXII 1800	1800	1.25
SXII 2200	2200	1.52

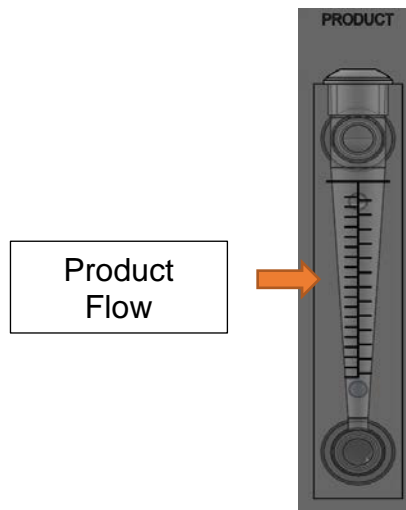


Figure 5

## NORMAL OPERATION

### SHUTDOWN

1. Do NOT leave vessel unattended while the machine is operating!
2. Once the vessel's tank is full press the STOP button (Figure 6).



Figure 5

3. Fully open the concentrate valve in order to allow the FWF to clean the membrane and for the next start up (Figure 7).

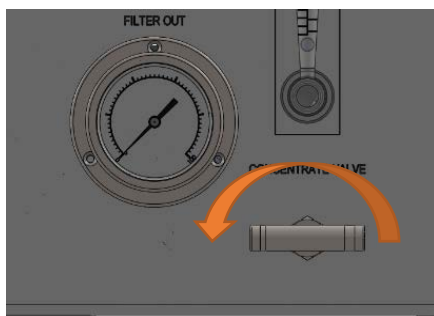


Figure 6

**NOTE: NORMAL OPERATION IS RECOMMENDED WHEN STARTING AND STOPPING THE UNIT. THE REMOTE CONTROL CAN BE USED TO REMOTELY OPERATE THE UNIT IF THE TEMPERATURE AND THE CONCENTRATION (PPM) OF THE SUPPLY WATER DOES NOT CHANGE.**

### FRESHWATER FLUSH

1. The unit will FWF 10 seconds at the beginning of operation.
2. The FWF will automatically start after the high pressure pump turns off after each use.
3. FWF lasts for 10 minutes after the unit shuts down.
4. Leave the system power ON and vessel's fresh water system pressurized for the FWF to flush periodically (occurs automatically and set to happen every 7 days).



## NORMAL OPERATION

### OPERATIONAL DO's AND DON'Ts

#### DO

1. Change the FWF filter every 4 months.
2. Change sediment filters when **FILTER OUT** gauge reads less than 15psi.
3. Monitor the system and keep a daily log.
4. Adjust the system concentrate valve to recommended values.
5. Always run system with the recommended cartridge filters.

#### DON'T

1. Operate above (temperature corrected) rated production
2. Operate above 850psi on pump pressure.
3. Permit chlorine to be present in the feed water.
4. Shut down the system for extended periods without preservation.
5. Close the concentrate valve completely.
6. Operate the system with insufficient feed flow.
7. Operate the high pressure pump or booster pump dry.

## **FRESH WATER FLUSH**

### **AUTOMATIC FRESH WATER FLUSH**

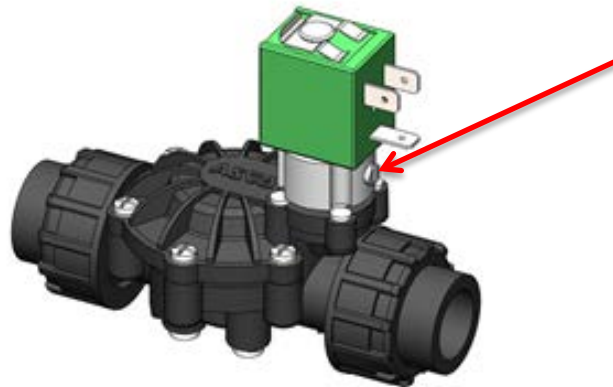
An automatic fresh water flush occurs when:

- The unit starts (10 second duration).
- The unit is shut down and the high pressure pump shuts off (duration is 10 minutes).
- Every 7 days when the unit power is left ON.

### **MANUALLY FLUSHING THE SYSTEM** (Manual Bypass on solenoid)

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

1. Unit not in operation.
2. Unit electrical supply does not have to be secured.
3. With a flat head screw driver, turn set screw  $\frac{1}{4}$  turn clockwise on the FWF solenoid valve (see drawing below).



## STORAGE OR WINTERIZATION OF UNIT

### **Option 1: Storage with Fresh Water Flush**

When a system will not be used for a significant period of time (i.e. 3 months – 1 year), the best practice for storage of the system is to allow the automatic fresh water flush to operate by leaving the power to the system on and ensuring that the vessels fresh water system is ON and pressurized. Normal replacement of fresh water flush filter is still required every 4 months.

### **Option 2: Storage without Fresh Water Flush:**

If the vessel will not be able to allow for fresh water flushing over the duration of the storage period, the membrane vessels must have static water replaced with membrane storage chemical solution. Membrane storage chemical part # is 252404263.

### **Option 3: Winterization**

**Option 3a: Winterization with membrane rack removal** - The best practice for winterization is to remove membrane rack and store with membrane storage chemical in heated storage climate. The remainder of the system should be stored with propylene glycol from sea cock to overboard to prevent freeze damage (propylene glycol can be purchased at most hardware or automotive retailers).

**Option 3b: Winterization without membrane rack removal** - If the system is going to be exposed to freezing or near freezing temperature while being stored and the membrane rack can not be removed and stored in a heated climate, the following should be done. A 50% solution of storage chemical and 50% propylene glycol should be ran through the entire system from sea cock to overboard and then valve off both sea cock and overboard. Membrane storage chemical part # is 252404263.

**NOTE: PROPYLENE GLYCOL CAN BE PURCHASED AT MOST HARDWARE OR AUTOMOTIVE RETAILERS**



***WARNING: DO NOT USE ETHYLENE GLYCOL, ONLY NON-TOXIC PROPYLENE GLYCOL SHOULD BE USED.***

### **Re-commissioning of System after Storage or Winterization**

After storage or winterization, the system must be completely voided of all storage chemical and or propylene glycol. To do this, follow the new system startup guide on page 33.

## MEMBRANE REMOVAL AND REPLACEMENT

### REMOVAL AND REPLACEMENT

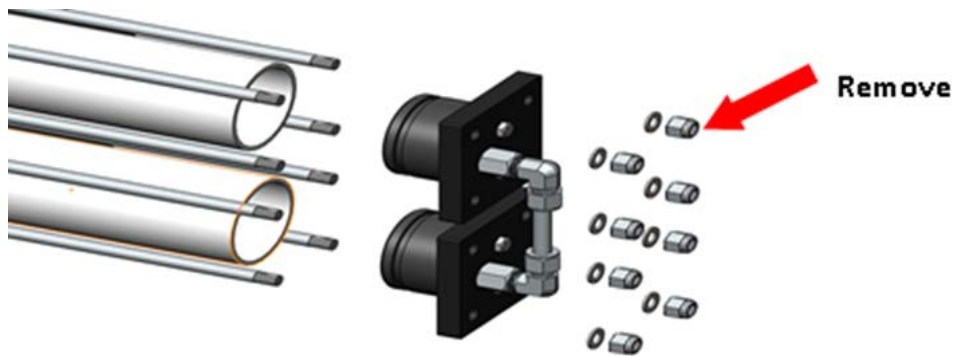
Removing and replacing membranes in the pressure vessels is an easy process if you have the proper information and tools at hand. Please refer to the following instructions when removing and replacing membrane elements.



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

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

1. Remove the end plugs from the side of the pressure vessels. This is done by removing the four 3/8" nuts and washers; the end plugs should then freely slide out of the pressure vessel.

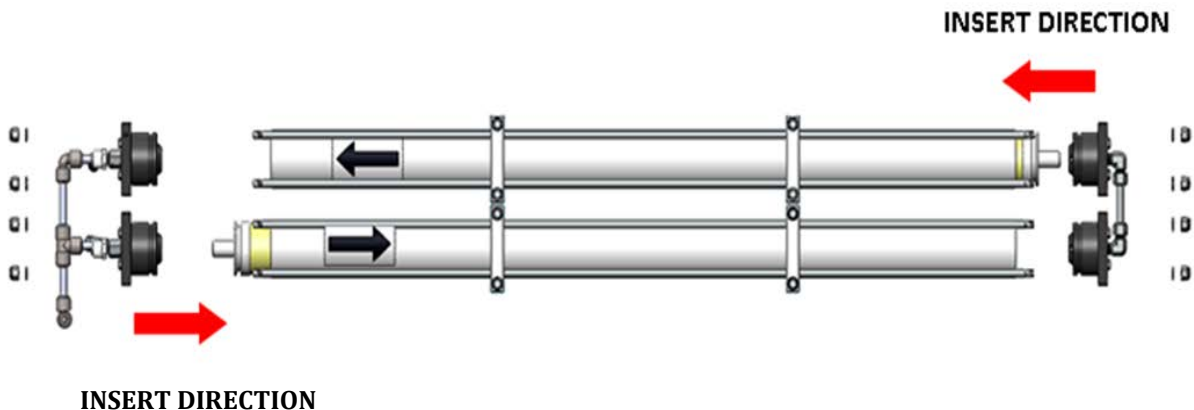


2. Remove the replacement membrane element(s) from the shipping box; the membrane(s) should be contained within a plastic oxygen barrier bag.
3. Cut the bag open as close as possible to the seal at one end of the bag, so the bag may be re-used if necessary.
4. Make sure that all parts are clean and free from dirt. Examine the brine seal, and product tube for nicks or cuts. Replace the O-rings or brine seal if damaged.

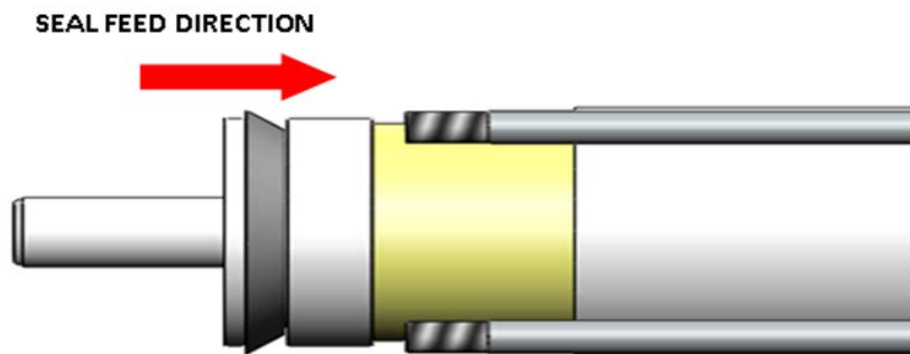
## MEMBRANE REMOVAL AND REPLACEMENT

### REMOVAL AND REPLACEMENT

5. Flow directions should be observed for installation of each element into their respective pressure vessels.



6. Remove one membrane element at a time from the pressure vessels, from the side of each housing. Long nose pliers may be necessary to pull the old membrane element out of the membrane element housing.
7. Lubricate the brine seal with a non-petroleum based lubricant, such as Dow Corning® 111 part # 252404879.
8. Install membranes with brine seal at the supply side of the vessel.



**WARNING: THE BRINE SEAL MUST BE IN THE SAME POSITION FOR EACH MEMBRANE ELEMENT HOUSING, SO MARK EACH HOUSING PRIOR TO REMOVING THE MEMBRANE ELEMENTS. THE BRINE SEAL IS A RUBBER SEAL THAT PROTRUDES ON ONE SIDE OF THE MEMBRANE AND IS ALWAYS ON THE FEED SIDE OF THE MEMBRANE ELEMENT.**

## MEMBRANE REMOVAL AND REPLACEMENT

### REMOVAL AND REPLACEMENT

9. With a smooth and constant motion, push the membrane element into the housing so the brine seal enters the housing without coming out of the brine seal groove.
10. Re-install the end plugs by gently twisting the end cap while pushing it onto the housing. Ensure that you do not pinch or fatigue any O-rings while re-installing the end plug. Push the end plug on until the plug is flush with the pressure vessel.
11. Insert the four rods through the plate and fasten using a 3/8 wrench and a flat screw driver.
12. Reconnect any fittings that may have been disconnected when the membrane pressure vessels were disassembled.
13. To Start-Up the system, please refer to the Normal Start-Up section of this manual.  
(See page 38)



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

## HIGH PRESSURE PUMP OIL CHANGE

### OIL CHANGE STEPS

1. Run unit for 30 minutes prior to draining oil
2. Drain the oil out of the pump by opening the oil drain valve. Dispose of oil properly.



3. Close the drain valve on the high pressure pump drain.
4. Locate and remove oil fill cap.



## **HIGH PRESSURE PUMP OIL CHANGE**

### **OIL CHANGE STEPS**

5. Fill oil above the center of sight glass not exceeding the very top of the site glass.  
(refer to picture below)



6. Screw fill cap back onto top of high pressure pump

***NOTE: OIL LEVEL CAN ONLY BE CHECKED WITH THE UNIT NOT RUNNING***



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## **PART 4: TROUBLESHOOTING**

## REVERSE OSMOSIS TROUBLESHOOTING

SYMPTOMS	POSSIBLE CAUSES	CORRECTIVE ACTION
<b>LOW INLET PRESSURE</b>	Low supply pressure	Increase Inlet Pressure
	Cartridge filters plugged	Change Filters
	Leaks	Fix any visible leaks
<b>LOW PRODUCT FLOW</b>	Cold feed water	See temperature correction sheet
	Low operating pressure	Adjust throttle and concentrate valve
	Defective membrane brine seal/ Membrane installed backwards	Replace brine seal and / or Reposition membranes
	Fouled or Scaled membrane	Clean membranes
	Damaged product tube O-rings	Inspect and/or replace
<b>HIGH PRODUCT FLOW</b>	Damaged or oxidized membrane	Replace membrane
	Exceeding maximum feed water temperature	See temperature correction sheet
	Low operating pressure	Adjust concentrate valve
<b>POOR PRODUCT QUALITY</b>	Damage product tube O-rings	Inspect and/or replace
	Damaged or oxidized membrane	Replace membrane
<b>MEMBRANE FOULING</b>	Scaling (CaSO <sub>4</sub> , CaSO <sub>3</sub> , BaSO <sub>4</sub> , SiO <sub>2</sub> )	Reduce recovery. Clean with Acid Cleaners
	Biological Fouling	Clean Membranes
	Organic Fouling	Clean with high pH cleaner.
	Chlorine Oxidation	Check Chlorine feed equipment and de-chlorination system.

***NOTE: CONTACT YOUR LOCAL DOMETIC SERVICE DEALER IF FURTHER TROUBLESHOOTING IS NEEDED***

## **ABNORMAL PRODUCT FLOW**

As time progresses, the efficiency of the membrane will be reduced. In general, the salt rejection does not change significantly until two or three years after installation when operated on properly pretreated feed water. The product flow rate will begin to decline slightly after one year of operation, but can be extended with fresh water flushing of the system. A high pH and/or precipitation of hardness can cause premature loss in rejection.

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

***NOTE: TO DETERMINE THE TEMPERATURE CORRECTION FACTOR, LOCATE THE TEMPERATURE CORRECTION TABLE IN THIS USER'S MANUAL ON PAGE 12 AND FOLLOW THE DIRECTIONS.***

## **PRESSURE SWITCH ADJUSTMENT**

The low and high pressure switch come factory calibrated. The setting for each switch is the following:

- LP - 5psi
- HP - 950psi

If field calibration is necessary then follow the steps below to adjust the switch.

***NOTE: THE SWITCH ADJUSTMENT STEPS ARE THE SAME FOR BOTH LP AND HP SWITCHES***

1. Locate the switches on the left side of the unit just behind the main panel.



## **PRESSURE SWITCH ADJUSTMENT**

2. Remove the sealed cap from pressure switch



3. Adjust set point with 5/64<sup>th</sup> Allen wrench, clockwise to increase setting and counterclockwise to lower the setting.



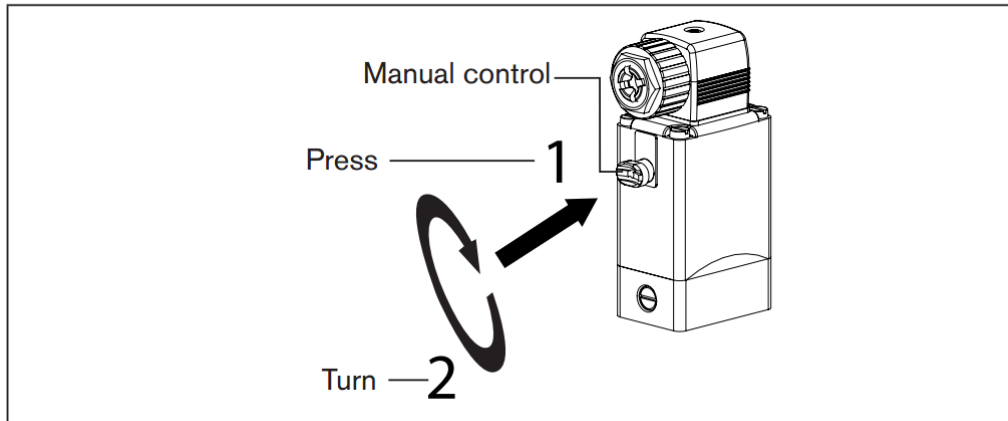
## DIVERSION VALVE

### BY-PASS

If the electrical portion of the solenoid fails or the controller fails to energize the solenoid, a manual bypass on the diversion valve may be utilized if the product water is found to be acceptable. Refer to picture below and the Diversion Valve Manual on page 124.

### **NOTE!**

- ▶ When the manual control is locked, the valve cannot be actuated electrically.



## **PART 5: PARTS**



## SXII SERIES PARTS LIST

DRAWING	ITEM	PART NUMBER	DESCRIPTION
SXII GENERAL EXPLOSION <u>PAGE 63</u>	1	252404155	2.5HP MOTOR
	2	252404870	1/4-20 x 1 SS BUTTON SOCKET CAP BOLT
	3	252404871	1/4 NYLON WASHER
	4	252404872	SXII TOP COVER
	5	252404155	4.2 GPM SS PUMP
	6	252404873	PRE-FILTER OFFSET BRACKET
	7	252404874	SXII RIGHT MEMBRANE SUPPORT
	8	252404875	SXII LEFT MEMBRANE SUPPORT
	9	252404806	5/16 FLAT WASHER SS
	10	252404807	5/16 LOCK WASHER
	11	252404800	5/16 X 1 SS HEX FLAT BOLT
	12	252404310	GAUGE, 0-1500 PSI, 2.5"DIA, SS, SG, 1/4MNPT
	13	252404328	GAUGE, 0-60 PSI, 2.5"DIA, SS, SG, 1/4MNPT
	14	252404152	0-2 GPM FLOW METER 1/2-1/4 W./O VALVE
	15	252404833	NEEDLE VALVE 3/8, SS
	16	252404051	WATERMAKER CONTROLLER
	17	252404803	MOUNT VIBRATION 5/16-18, FEMALE THREAD
	18	252404802	VIBRATION ISOLATOR, 50LB, 5/16-18
	19	252404801	MOUNT, VIBRATION 5/16-18
	20	252404876	5/16 NYLOCK SS
	21	SEE DWG SX105	VESSEL ARRAY ASSEMBLY
SEA EXCHANGE VESSEL EXPLODED VIEW <u>PAGE 64</u>	1	252404179	SW MEMBRANE 40" LONG
	2	252404312	SW PRESSURE VESSEL 40" LONG
	3	252404178	SW MEMBRANE 20" LONG
	4	252404281	SW VESSEL 20" LONG

## SXII SERIES PARTS LIST

DRAWING	ITEM	PART NUMBER	DESCRIPTION
CONCENTRATE SIDE PARTS <u>PAGE 65</u>	1	252404814	END PLUG ONE PORT
	2	252404815	BEARING PLATE ONE PORT
	3	252404816	1/4-20 X BOLT SET OF 4
	4	252404817	HEX PORT
	5	252404818	1/4MNPT X 3/8 COMP. ELBOW SS
	6	252404868	3/8 SS S HP TUBING FOR CONC. SIDE 3" LONG
	7	252404819	3/8-16 LOCK NUT SET OF 8
	8	252404820	END PLUG O-RING
	9	252404821	1/4 SS WASHER
PRODUCT SIDE PARTS <u>PAGE 66</u>	1	252404822	END PLUG TWO PORT
	2	252404823	TWO PORT BEARING PLATE
	3	252404816	1/4-20 X BOLT SET OF 4(B1)
	4	252404817	HEX PORT
	5	252404274	1/4MNPT X 3/8 FLARE ELBOW SS
	6	252404125	1/4MNPT X 3/8QC ACETAL
	7	252404819	3/8-16 LOCK NUT SET OF 8
	8	252404821	3/8 WASHERS SET OF 8
	9	252404824	3/8QC X 3/8QC ELBOW ACETAL
	10	252404825	3/8QC TEE ACETAL
SW VESSEL O-RINGS <u>PAGE 67</u>	1	252404826	PORT SEAL O-RING
	2	252404827	END PLUG SEAL O-RING
	3	252404828	HUB SEAL O-RING

## SXII SERIES PARTS LIST

DRAWING	ITEM	PART NUMBER	DESCRIPTION
SXII/XTC MOTOR AND PUMP PARTS <u>PAGE 68</u>	1	252404808	3/8 SS COUNTERSINK PLUG
	2	252404864	1/4MNPT X 1/4QC ACETAL
	3	252404836	1/4QC PLUG IN ELBOW
	4	252404865	1/2MNPT ELBOW SWIVEL TO 3/8QC
	5	252404812	3/4FNPT X 3/4 BARB ELBOW
	6	252404866	3/4 X 3/8 HEX NIPPLE
	7	252404867	3/8-16 X 1 1/4 SS HEX BOLT
	8	252404273	3/8MNPT X 3/8 FLARE STRAIGHT
	9	252404155	2.5HP MOTOR
	10	252404161	4.2GPM PUMP
SXII/SE CONTROL PANEL PARTS <u>PAGE 69</u>	1	252404125	1/4MNPT X 3/8QC ACETAL
	2	252404829	PLUG IN ELBOW 3/8QC ACETAL
	3	252404002	3/8 TUBING
	4	252404828	3/8QC X 3/8QC ELBOW ACETAL
	5	252404831	1/4 HP SS TEE
	6	252404076	HIGH PRESSURE SWITCH 950PSI
	7	252404075	LOW PRESSURE SWITCH 5PSI
	8	252404832	3/8MNPT X 3/8QC ACETAL
	9	252404833	3/8 SS NEEDLE VALVE
	10	252404834	3/8 X 1/4 REDUCER HEX BUSHINGSS
	11	252404274	1/4MNPT X 3/8 FLARE HP SS ELBOW
	12	252404835	1/4" MNPT X 1/4" COMPRESSION ELBOW
	13	252404836	PLUG IN ELBOW 1/4 ACETAL
	14	252404837	1/4 SCHEDULE 80 SS REINFORCED TEE
SXII/SE CONTROL PANEL PARTS <u>PAGE 70</u>	1	252404829	PLUG IN ELBOW 3/8QC ACETAL
	2	252404832	3/8MNPT X 3/8QC ACETAL
	3	252404838	½ SCHEDULE 80 SS REINFORCED TEE
	4	252404839	TDS PROBE SENSOR-SP5
	5	252404821	¼ X ¼ COMP SS HP ELBOW
	6	252404869	3/8 HP SEAMLESS TUBING BENT fore P.GAUGE SXII-SE

## SXII SERIES PARTS LIST

DRAWING	ITEM	PART NUMBER	DESCRIPTION
SXII/SE CONTROL PANEL PARTS <i>PAGE 71</i>	1	252404002	3/8 TUBING
	2	252404829	PLUG IN ELBOW 3/8QC ACETAL
	3	252404840	1/2QC TO 3/8QC REDUCER STRAIGHT
	4	252404841	1/2QC TEE ACETAL
	5	252404003	1/2 TUBING
	6	252404842	1/2QC TO 3/8QC REDUCING ELBOW
	7	252404843	PLUG IN ELBOW 1/2QC ACETAL
	8	252404844	1/2QC ELBOW ACETAL
	9	252404845	3/8QC CHECK VALVE ACETAL
	10	252404846	1/2QC TO 1/2QC BULKHEAD
SXII/SE CONTROL PANEL PARTS <i>PAGE 72</i>	1	252404847	3/8QC TO 3/8QC BULKHEAD
	2	252404002	3/8 TUBING
	3	252404125	1/4MNPT X 3/8QC ACETAL
	4	252404083	3/2 BURKERT DIVERSION VALVE-230V
	5	252404257	3/2 BURKERT DIVERSION VALVE-115V
	6	252404829	PLUG IN ELBOW 3/8QC ACETAL
	7	252404848	DIN CONNECTOR PLUG

## SXII SERIES PARTS LIST

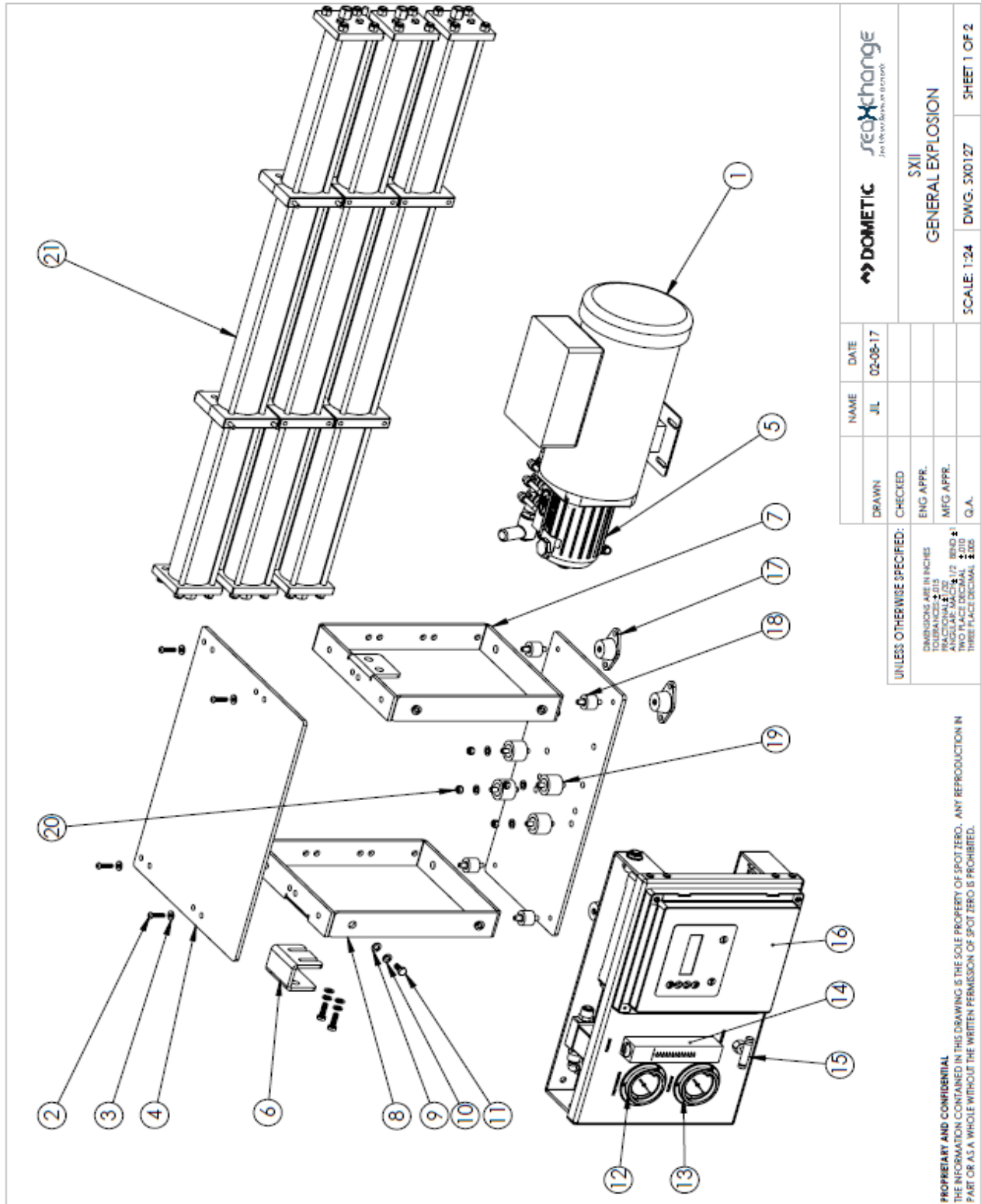
DRAWING	ITEM	PART NUMBER	DESCRIPTION
SX/XTC/SE PRE-FILTER SUB ASSEMBLY <u>PAGE 73</u>	1	252404854	10-24 X 1/2 PAN SS SCREW
	2	252404806	5/16 SS WASHER
	3	252404807	5/16 SS LOCK WASHER
	4	252404800	5/16 X 1 SS HEX BOLT
	5	252404861	1/2 MNPT X 3/4 BARB ELBOW NYLON
	6	252404862	1/2 NIPPLE 1.5" THREADED
	7	252404324	2.5 X 10 CLEAR HOUSING
	8	252404863	DOUBLE PRE-FILTER BRACKET
	9	252404836	1/4 PLUG IN ELBOW ACETAL
	10	252404864	1/4 MNPT TO 1/4QC CONNECTOR ACETAL
	11	252404292	25 MICRON FILTER
	12	252404291	5 MICRON FILTER
	13	252404856	2.5 x 10 CLEAR HOUSING O-RING
	14	252404326	WRENCH FOR 2.5 CELAR HOUSING

## SXII SERIES PARTS LIST

DRAWING	ITEM	PART NUMBER	DESCRIPTION
SXII/XTC/SE FRESH WATER FLUSH SUB ASSY <u>PAGE 74</u>	1	252404324	2.5 X 10 CLEAR HOUSING
	2	252404849	3/8 TO 1/4QC STEM REDUCER
	3	252404850	1/2 MNPT X 3/8QC CONNECTOR ACETAL
	4	252404851	1/2 THREADED NIPPLE
	5	252404852	1/2 FNPT REINFORCED ELBOW
	6	252404853	SINGLE PRE-FILTER BRACKET
	7	252404354	10-24 X 1/2 PAN SS SCREW
	8	SEE DWG	2-WAY SOLENOID
	9	252404855	DIN CONNECTOR
	10	252404856	2.5 CLEAR HOUSING O-RING
	11	252404014	CARBON BLOCK FILTER
	12	252404800	5/16 X 1 SS HEX BOLT
	13	252404807	5/16 SS LOCK WASHER
	14	252404806	5/16 SS WASHER
	15	252404217	1/2 SPRING CHECK VALVE
	16	252404326	WRENCH FOR 2.5 CELAR HOUSING
	17	202404858	WATER RESTRICTOR 1.0

# SXII DRAWINGS

## SXII MODEL



# SXII DRAWINGS

## SEA EXCHANGE VESSEL

PRODUCT SIDE EXPLODED VIEW  
PG. 3

CONCENTRATE SIDE EXPLODED VIEW  
PG. 2

ITEM #	PRODUCT #	DESCRIPTION
1	252404179	SW MEMBRANE 40" LONG
2	252404312	SW PRESSURE VESSEL 40" LONG
1	252404178	SW MEMBRANE 20" LONG
2	252404281	SW VESSEL 20" LONG

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES: ±.015  
 FRACTIONS: 1/32, 1/16, 3/32, 1/8, 1/4  
 DECIMALS: .1, .2, .3, .4, .5  
 TWO PLACE DECIMAL: ±.05  
 THREE PLACE DECIMAL: ±.005

**DOMETIC** **seaXchange**  
 AND HYDRO MEMBRANE DIVISIONS

SEA EXCHANGE  
 VESSEL EXPLODED VIEW

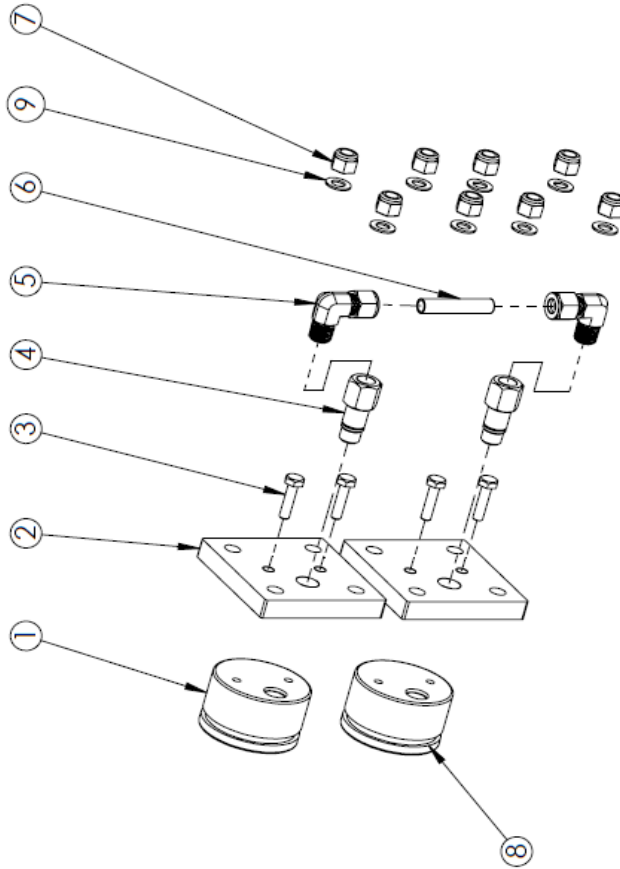
SCALE: 1:16 DWG. #: SX0105 SHEET 1 OF 3

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# SXII DRAWINGS

## CONCENTRATE SIDE



ITEM #	PRODUCT #	DESCRIPTION
1	252404814	END PLUG ONE PORT
2	252404815	BEARING PLATE ONE PORT
3	252404816	1/4-20 X BOLT SET OF 4
4	252404817	HEX PORT
5	252404818	1/4MINPT X 3/8 COMP. ELBOW SS
6	252404868	3/8 SS S HP TUBING FOR CONC., SIDE 3" LONG
7	252404819	3/8-16 LOCK NUT SET OF 8
8	252404820	END PLUG O-RING
9	252404821	1/4 SS WASHER

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UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES: ±.015  
 FRACTIONS: 1/16, 1/8, 3/16, 1/2, 5/8, 3/4  
 TWO PLACE DECIMAL ±.010  
 THREE PLACE DECIMAL ±.005

DRAWN	NAME	DATE
CHECKED	JLU	01-26-17
ENG APPR.		
MFG APPR.		
Q.A.		

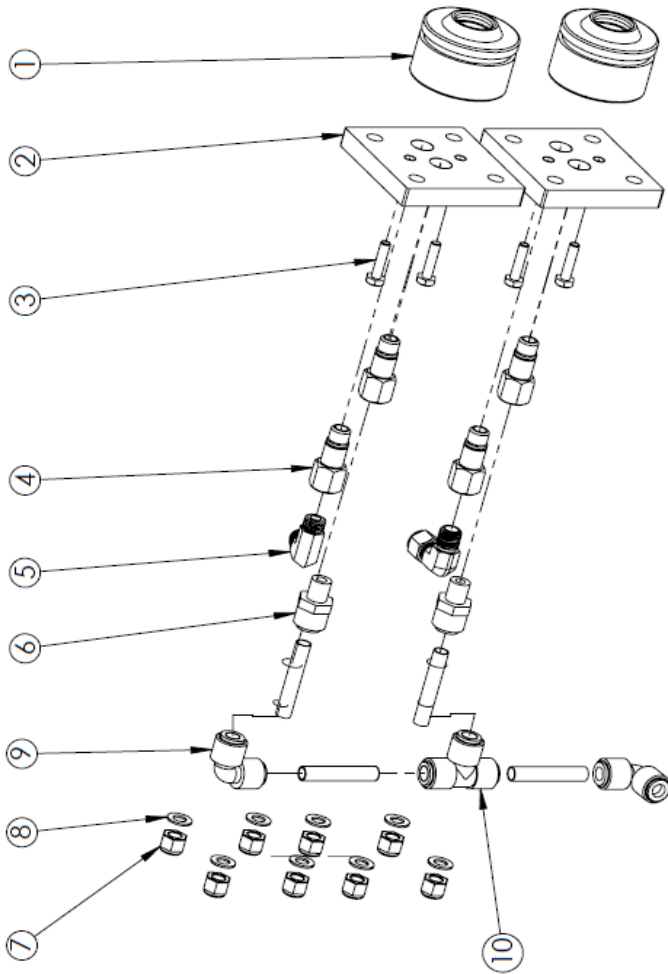


CONCENTRATE SIDE  
PARTS

SCALE: 1:16    DWG. #SX0105    SHEET 2 OF 4

# SXII DRAWINGS

## PRODUCT SIDE



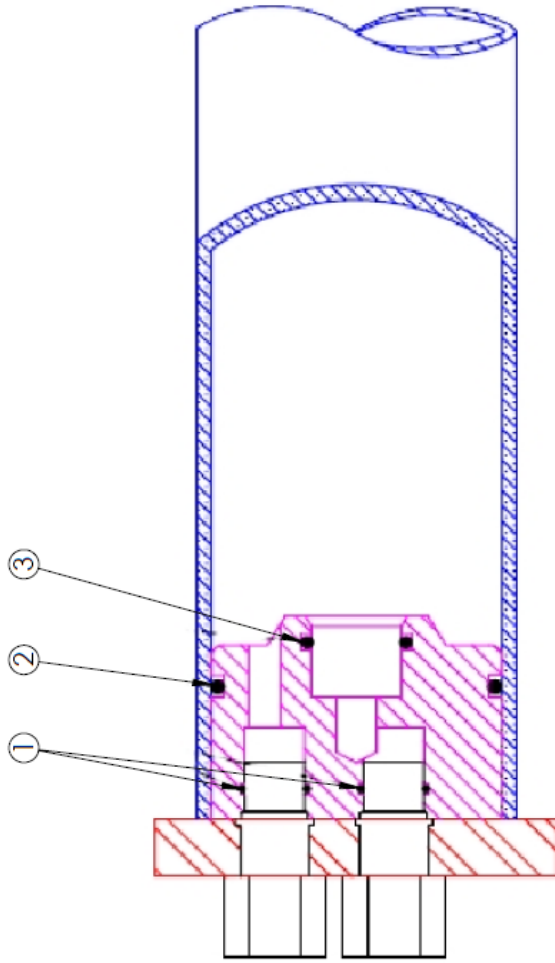
ITEM #	PRODUCT #	DESCRIPTION
1	252404822	END PLUG TWO PORT
2	252404823	TWO PORT BEARING PLATE
3	252404816	1/4-20 X BOLT SET OF 4B
4	252404817	HEX PORT
5	252404274	1/4MNPT X 3/8 FLARE ELBOW SS
6	252404125	1/4MNPT X 3/8QC ACETAL
7	252404819	3/8-16 LOCK NUT SET OF 8
8	252404821	3/8 WASHERS SET OF 8
9	252404824	3/8QC X 3/8QC ELBOW ACETAL
10	252404825	3/8QC TEE ACETAL

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<b>DOMETIC</b>		<b>seaXchange</b> <small>The Water Recovery Company</small>	
DRAWN	JIL	NAME	JIL
CHECKED		DATE	01-26-17
ENG APPR.		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONAL ±.02 DECIMAL ±.015 TWO PLACE DECIMAL ±.005 THREE PLACE DECIMAL ±.003	
MFG APPR.		PRODUCT SIDE PARTS	
Q.A.		SCALE: N/A	DWG.#: SX0105
			SHEET 3 OF 4

# SXII DRAWINGS

## SW VESSEL O-RINGS



ITEM #	PART #	DESCRIPTION
1	252404826	PORT SEAL O-RING
2	252404827	END PLUG SEAL O-RING
3	252404828	HUB SEAL O-RING

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES: ±0.015  
 FINISH: 125  
 THREADS: 1/16" 12  
 RIGID: ±1  
 TWO PLACE DECIMAL ±0.10  
 THREE PLACE DECIMAL ±0.05

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DRAWN	NAME	DATE
CHECKED	JIL	01-26-17
ENG. APPR.		
MFG. APPR.		
G.A.		



SW VESSEL O-RINGS

SCALE: 1:16 DWG. #SX0105 SHEET 4 OF 4

# SXII DRAWINGS

## SXII MOTOR AND PUMP

ITEM #	PART #	DESCRIPTION
1	252404808	3/8 SS COUNTERSINK PLUG
2	252404864	1/4MNPT X 1/4QC ACETAL
3	252404836	1/4QC PLUG IN ELBOW
4	252404865	1/2MNPT ELBOW SWIVEL TO 3/8QC
5	252404812	3/4FNPT X 3/4 BARB ELBOW
6	252404866	3/4 X 3/8 HEX NIPPLE
7	252404867	3/8-16 X 1 1/4 SS HEX BOLT
8	252404273	3/8MNPT X 3/8 FLARE STRAIGHT
9	252404155	2.5HP MOTOR
10	252404161	4.2GPM PUMP

UNLESS OTHERWISE SPECIFIED:	DIMENSIONS ARE IN INCHES
	TOLERANCES: ±.015
	ANGLES: ±.5°
	THREADS: PER ANSI B1.1
	FINISH: UNLESS OTHERWISE SPECIFIED
	TWO PLACE DECIMAL ±.010
	THREE PLACE DECIMAL ±.005

DOMETIC	seaXchange	SXII/XTC
	ALL OTHER PARTS DIRECT	
		PUMP AND MOTOR PARTS
SCALE: 1:8	DWG. #: SX0126	SHEET 1 OF 1

NAME	JIL	DATE	01-31-17
DRAWN	CHECKED	ENG. APPR.	
		MFG APPR.	
		G.A.	

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# SXII DRAWINGS

## CONTROL PANEL

ITEM #	PART #	DESCRIPTION
1	252404125	1/4MNPT X 3/8QC ACETAL
2	252404829	PLUG IN ELBOW 3/8QC ACETAL
3	252404002	3/8 TUBING
4	252404828	3/8QC X 3/8QC ELBOW ACETAL
5	252404831	1/4 HP SS TEE
6	252404076	HIGH PRESSURE SWITCH 950PSI
7	252404075	LOW PRESSURE SWITCH 5PSI
8	252404832	3/8MNPT X 3/8QC ACETAL
9	252404833	3/8 SS NEEDLE VALVE
10	252404834	3/8 X 1/4 REDUCER HEX BUSHINGSS
11	252404274	1/4MNPT X 3/8 FLARE HP SS ELBOW
12	252404835	1/4" MNPT X 1/4" COMPRESSION ELBOW
13	252404836	PLUG IN ELBOW 1/4 ACETAL
14	252404837	1/4 SCHEDULE 80 SS REINFORCED TEE

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**UNLESS OTHERWISE SPECIFIED:**  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES:  
 FRACTIONS: ±.015  
 DECIMALS: ±.005  
 ANGLES: ±.001  
 TWO PLACE DECIMAL: ±.010  
 THREE PLACE DECIMAL: ±.005

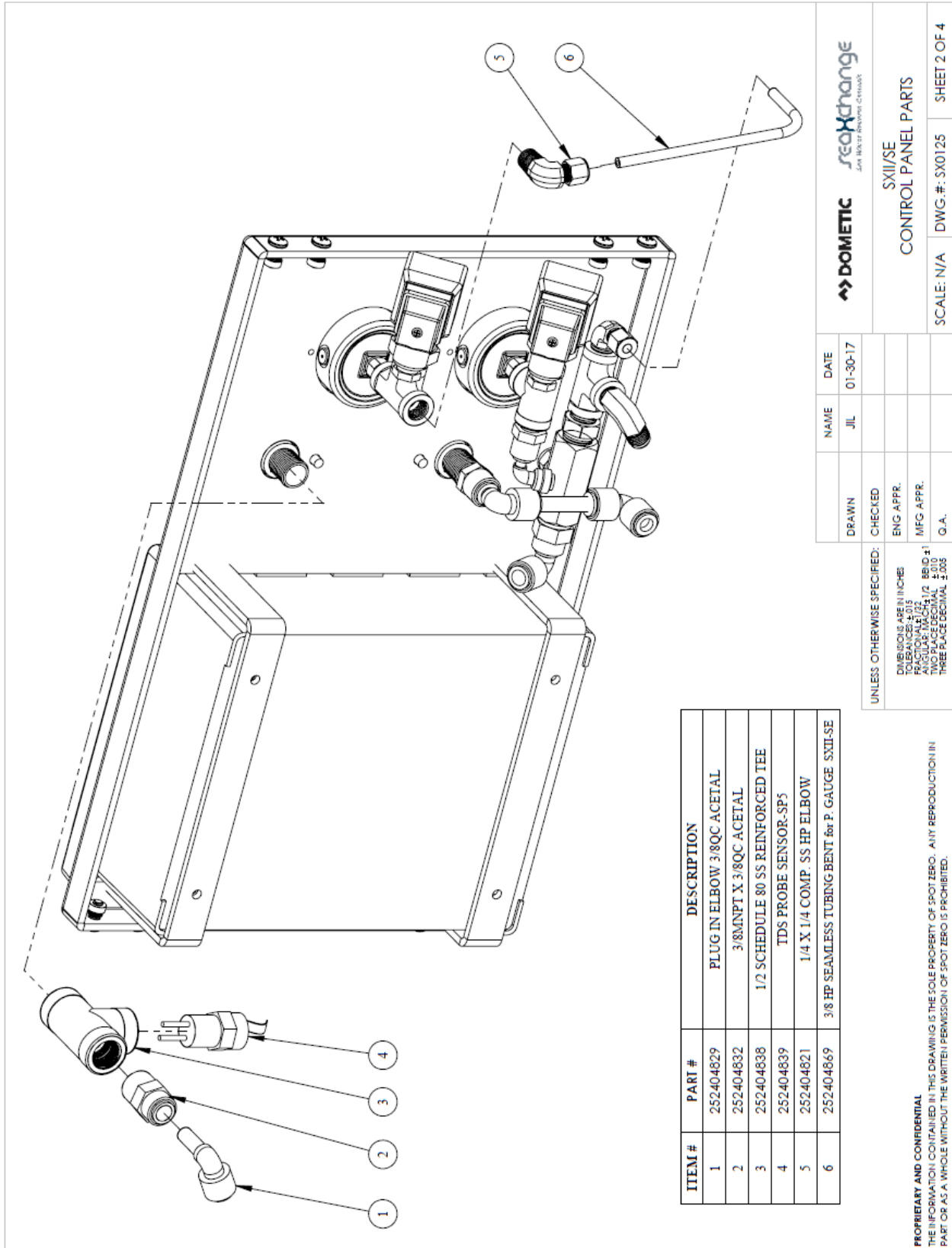
**DOMETIC** **seaXchange**  
 For Water Delivery Systems

NAME: JIL DATE: 01-27-17  
 DRAWN: CHECKED: ENG. APPR.: MFG. APPR.: Q.A.  
 SCALE: N/A DWG. #: SX0125 SHEET 1 OF 4

SXII/SE  
 CONTROL PANEL PARTS

# SXII DRAWINGS

## CONTROL PANEL



ITEM #	PART #	DESCRIPTION
1	252404829	PLUG IN ELBOW 3/8QC ACETAL
2	252404832	3/8MNPT X 3/8QC ACETAL
3	252404838	1/2 SCHEDULE 80 SS REINFORCED TEE
4	252404839	TDS PROBE SENSOR-SP5
5	252404821	1/4 X 1/4 COMP. SS HP ELBOW
6	252404869	3/8 HP SEAMLESS TUBING BENT for P GAUGE SXII-SE

DRAWN	JIL	DATE	01-30-17
CHECKED			
ENG APPR.			
MFG APPR.			
G.A.			

**DOMETIC** **seaXchange**  
LOW MOUNT SYSTEMS COMPANY

SXII/SE  
 CONTROL PANEL PARTS

SCALE: N/A DWG.#: SX0125 SHEET 2 OF 4

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES: ±.015  
 FINISH: MILL  
 THREADS: PER ANSI B1.13  
 TWO PLACE DECIMAL ±.010  
 THREE PLACE DECIMAL ±.005

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# SXII DRAWINGS

## CONTROL PANEL

ITEM #	PART#	DESCRIPTION
1	252404002	3/8 TUBING
2	252404829	PLUG IN ELBOW 3/8QC ACETAL
3	252404840	1/2QC TO 3/8QC REDUCER STRAIGHT
4	252404841	1/2QC TEE ACETAL
5	252404003	1/2 TUBING
6	252404842	1/2QC TO 3/8QC REDUCING ELBOW
7	252404843	PLUG IN ELBOW 1/2QC ACETAL
8	252404844	1/2QC ELBOW ACETAL
9	252404845	3/8QC CHECK VALVE ACETAL
10	252404846	1/2QC TO 1/2QC BULKHEAD

NAME	DATE

**DOMETIC** **seaXchange**  
*The Water Recovery Company*

SXII/SE  
 CONTROL PANEL PARTS

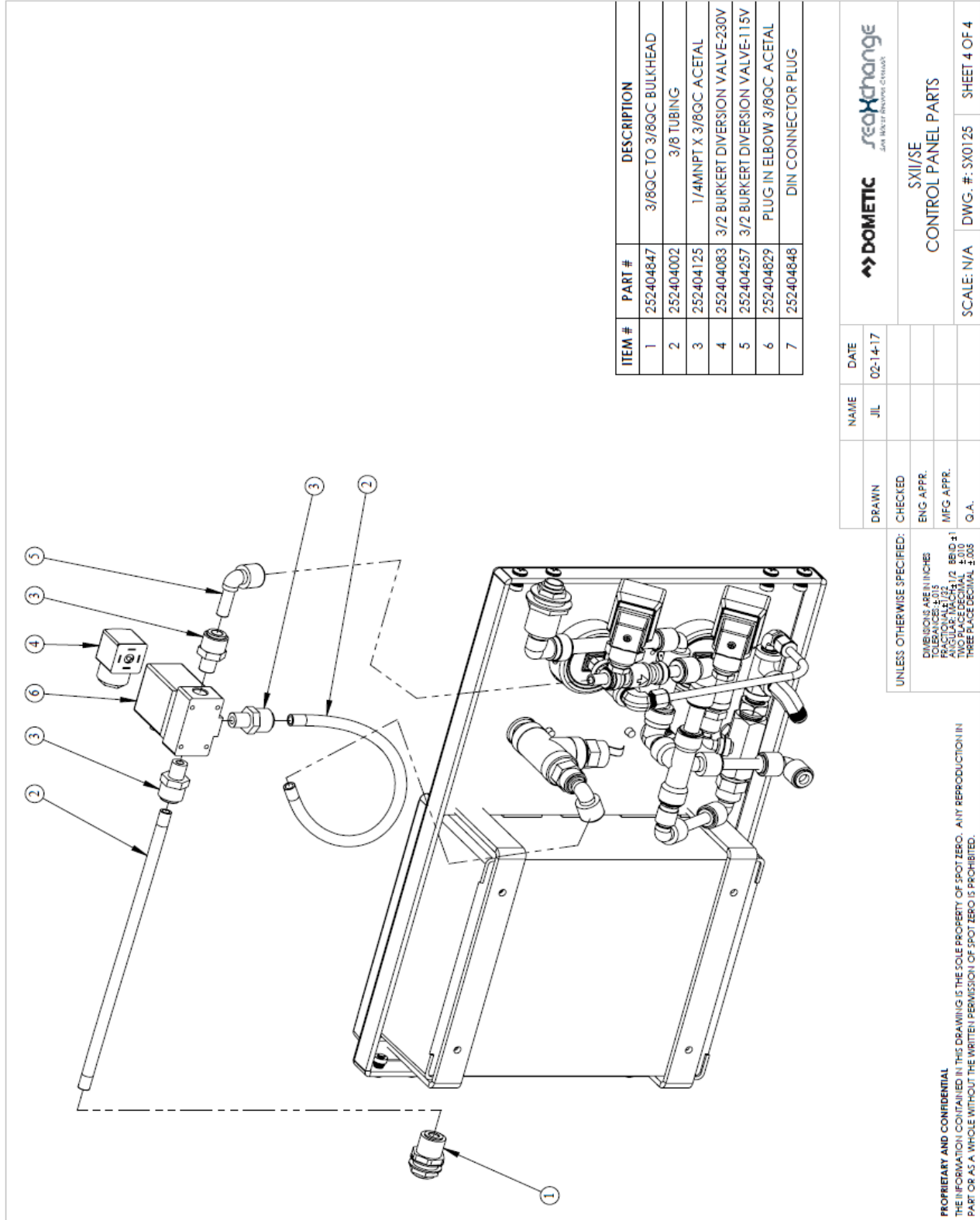
SCALE: N/A DWG. #: SX0125 SHEET 3 OF 4

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES ARE:  
 FRACTIONAL ±.02  
 DECIMAL ±.015  
 TWO PLACE DECIMAL ±.005  
 THREE PLACE DECIMAL ±.003

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# SXII DRAWINGS

## CONTROL PANEL



ITEM #	PART #	DESCRIPTION
1	252404847	3/8GQC TO 3/8GQC BULKHEAD
2	252404002	3/8 TUBING
3	252404125	1/4MINPT X 3/8GQC ACETAL
4	252404083	3/2 BURKERT DIVERSION VALVE-230V
5	252404257	3/2 BURKERT DIVERSION VALVE-115V
6	252404829	PLUG IN ELBOW 3/8GQC ACETAL
7	252404848	DIN CONNECTOR PLUG

NAME	JIL	DATE	02-14-17
DRAWN		CHECKED	
		ENG APPR.	
		MFG APPR.	
		Q.A.	



SXII/SE  
CONTROL PANEL PARTS

SCALE: N/A DWG. #: SX0125 SHEET 4 OF 4

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:  
FRACTIONS ±.015  
DECIMALS ±.010  
ANGULAR DIMENSIONS ±.010  
TWO PLACE DECIMAL ±.010  
THREE PLACE DECIMAL ±.005

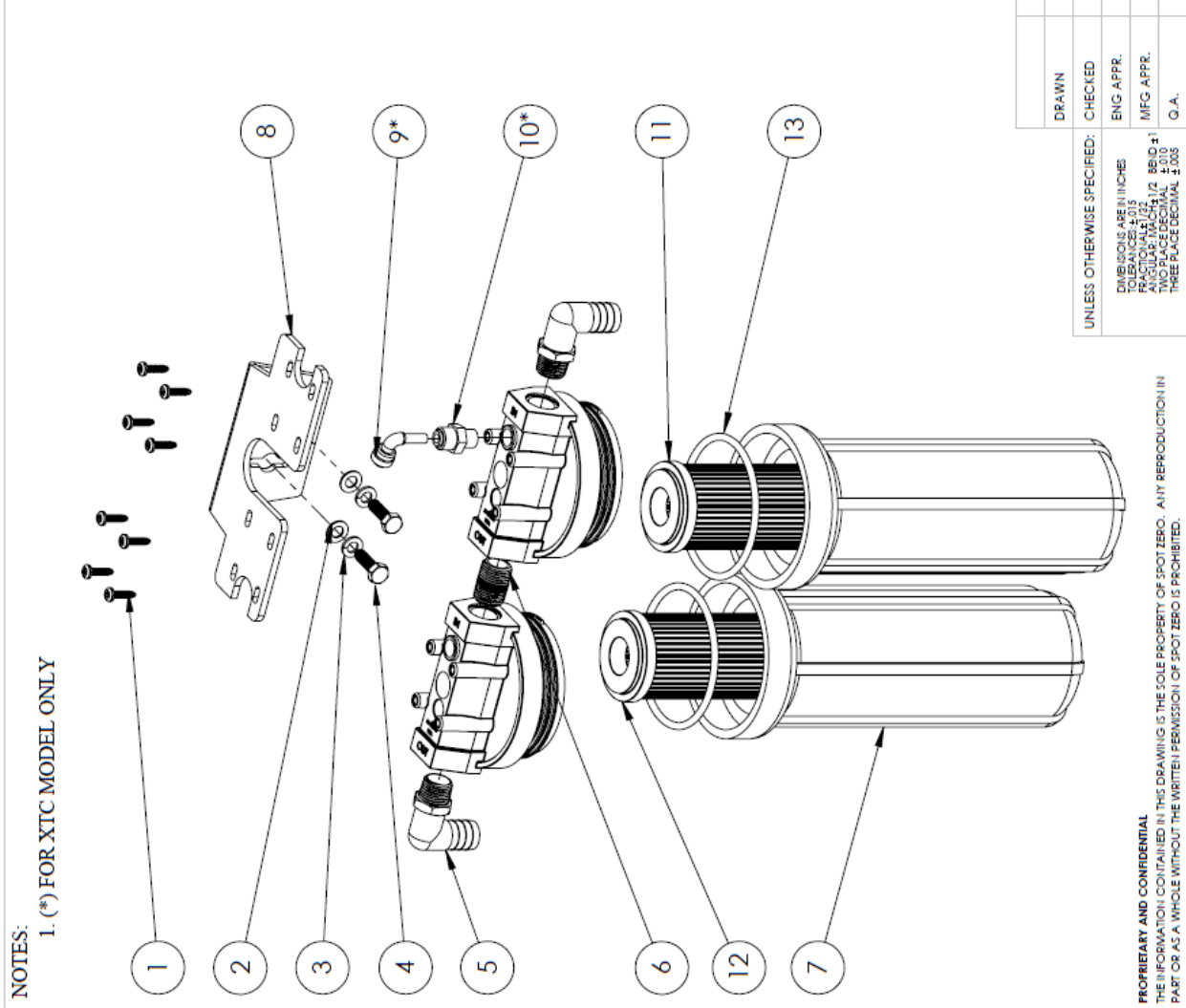
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# SXII DRAWINGS

## PRE-FILTER ASSEMBLY

ITEM #	PART #	DESCRIPTION
1	252404854	10-24 X 1/2 PAN SS SCREW
2	252404806	5/16 SS WASHER
3	252404807	5/16 SS LOCK WASHER
4	252404800	5/16 X 1 SS HEX BOLT
5	252404861	1/2 MNPT X 3/4 BARB ELBOW NYLON
6	252404862	1/2 NIPPLE 1.5" THREADED
7	252404324	2.5 X 10 CLEAR HOUSING
8	252404863	DOUBLE PRE-FILTER BRACKET
9	252404836	1/4 PLUG IN ELBOW ACETAL
10	252404864	1/4 MNPT TO 1/4QC CONNECTOR ACETAL
11	252404292	25 MICRON FILTER
12	252404291	5 MICRON FILTER
13	252404856	2.5 x 10 CLEAR HOUSING O-RING
14	252404326	WRENCH FOR 2.5 CELAR HOUSING



NAME	JIL	DATE	10-1-14
DRAWN		CHECKED	
ENG APPR.		MFG APPR.	
Q.A.			



SX/XTC/SE  
 PRE-FILTER SUB-ASSEMBLY

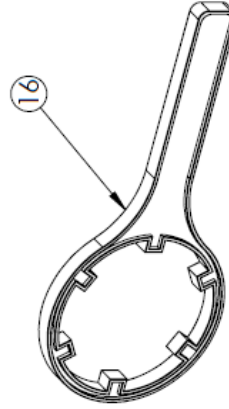
SCALE: N/A DWG. #: SX0041 SHEET 1 OF 1

# SXII DRAWINGS

## FRESH WATER FLUSH SUB ASSEMBLY

ITEM #	PART #	DESCRIPTION
1	252404324	2.5 X 10 CLEAR HOUSING
2	252404849	3/8 TO 1/4QC STEM REDUCER
3	252404850	1/2 MNPT X 3/8QC CONNECTOR ACETAL
4	252404851	1/2 THREADED NIPPLE
5	252404852	1/2 FNPT REINFORCED ELBOW
6	252404853	SINGLE PRE-FILTER BRACKET
7	252404854	10-24 X 1/2 PAN SS SCREW
8	SEE CHART	2-WAY SOLENOID
9	252404855	DIN CONNECTOR
10	252404856	2.5 CLEAR HOUSING O-RING
11	252404014	CARBON BLOCK FILTER
12	252404800	5/16 X 1 SS HEX BOLT
13	252404807	5/16 SS LOCK WASHER
14	252404806	5/16 SS WASHER
15	252404217	1/2 SPRING CHECK VALVE
16	252404326	WRENCH FOR 2.5 CLEAR HOUSING
17	252404858	WATER RESTRICTOR 1.0

2-WAY SOLENOID		
SYSTEM VOLTAGE	SYSTEM MODEL	PART #
115V	SE	252404256
230V	SE/SXII	252404074
24V	XTC/XZ	252404860



DRAWN		NAME	DATE
CHECKED		JIL	10-01-14
ENG APPR.			
MFG APPR.			
G.A.			

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES:  
 ANGULAR: MACHINIST  
 TWO PLACE DECIMAL ±.010  
 THREE PLACE DECIMAL ±.005

**DOMETIC** **seaXchange**  
 A Dometic Group Product

SXII/XTC/SE  
 FRESH WATER FLUSH SUB ASSY

SCALE: 1:8 DWG. #: SX0042 SHEET 1 OF 1

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SPOT ZERO. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SPOT ZERO IS PROHIBITED.

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## **PART 6: MANUFACTURERS INDEX**

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## **WATERMAKER SYSTEM CONTROLLER**



# Watermaker System Controller Documentation

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Controller Detail, TB-4: Figure 4 _____	7
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Controller Fault Conditions _____	11



**Table 1. Specifications****Inputs**

Tank level switches	(2) Normally-Closed. <i>Can be used with a single level switch.</i>
Start/Stop	Momentary contact, normally open (RJ45 connector, 8 conductor)
Pretreat lockout switch	Normally-Open.
High Pressure switch	Normally-Open.
Controller Power	110/240 VAC, 60/50Hz
Permeate Conductivity	0-3000 PPM, 0-6000 $\mu$ s (standard sensor, CP-1, K=.75)
Feed Conductivity	not applicable on Seawater

**Output Relay Ratings** (relays are fused with a 6A fuse)

Feed Valve (Boost Pump Coil)	1A @ 250VAC (with NO and NC contacts for motorized valves)
Flush Valve	1A @ 250VAC.
Divert Valve	1A @ 250VAC (with NO and NC contacts)
Alarm	1A @ 250VAC
HP Pump Motor Coil	1A @ 250VAC

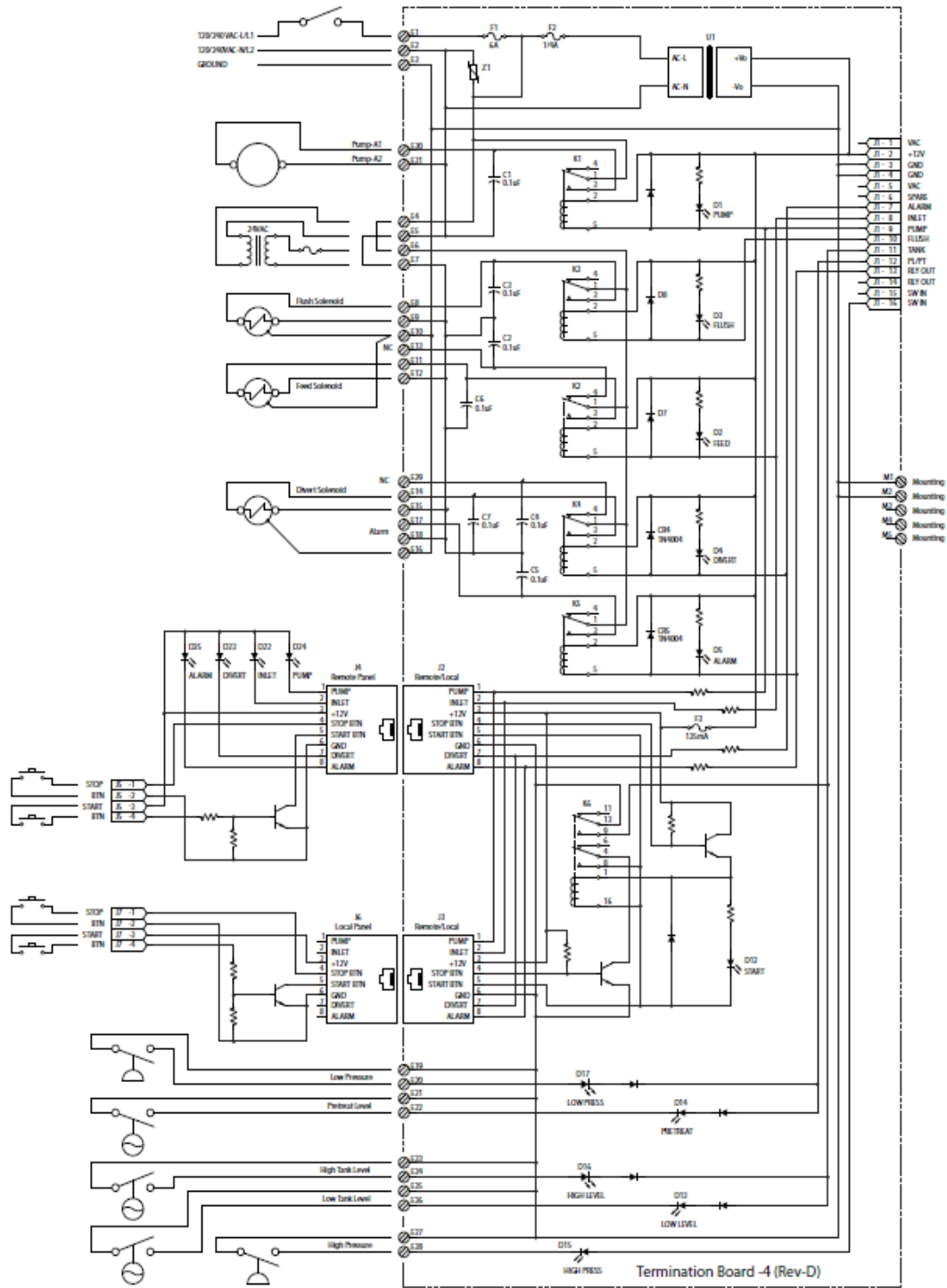
**Circuit Protection**

Main Power Fuse	F1	6 Amp	5x20mm	Littelfuse O234.006 or Buss GMC-6R
Power Supply Fuse	F2	1/4 Amp	5x20mm	Littelfuse O218.250

**Other**

Dimensions	10.5" tall, 9.5" wide, 5.0" deep. Nema 4X non-metallic (10x8x4) 12.5" tall, 11.25" wide, 7.0" deep. Nema 4X non-metallic (12x10x6) 14.5" tall, 13.5" wide, 7.0" deep. Nema 4X non-metallic (14x12x7)
Weight	4.2 lb. (10.5x9.5) (Enclosure, CPU-4 and TB-4 only.) 6.0 lb. (12.5 x 11.25) (Enclosure, CPU-4 and TB-4 only.) 10.6 lb. (12.5 x 11.25) (Enclosure, CPU-4 and TB-4 only.)
Environment	0-50°C, 10-90%RH (non-condensing)

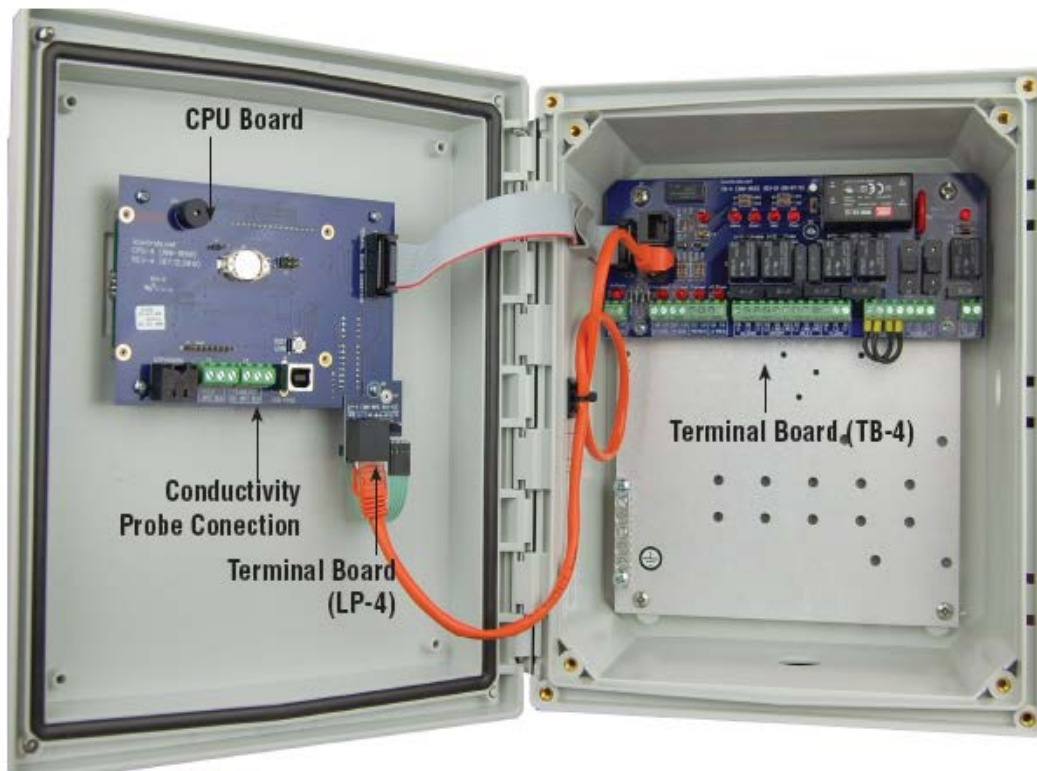
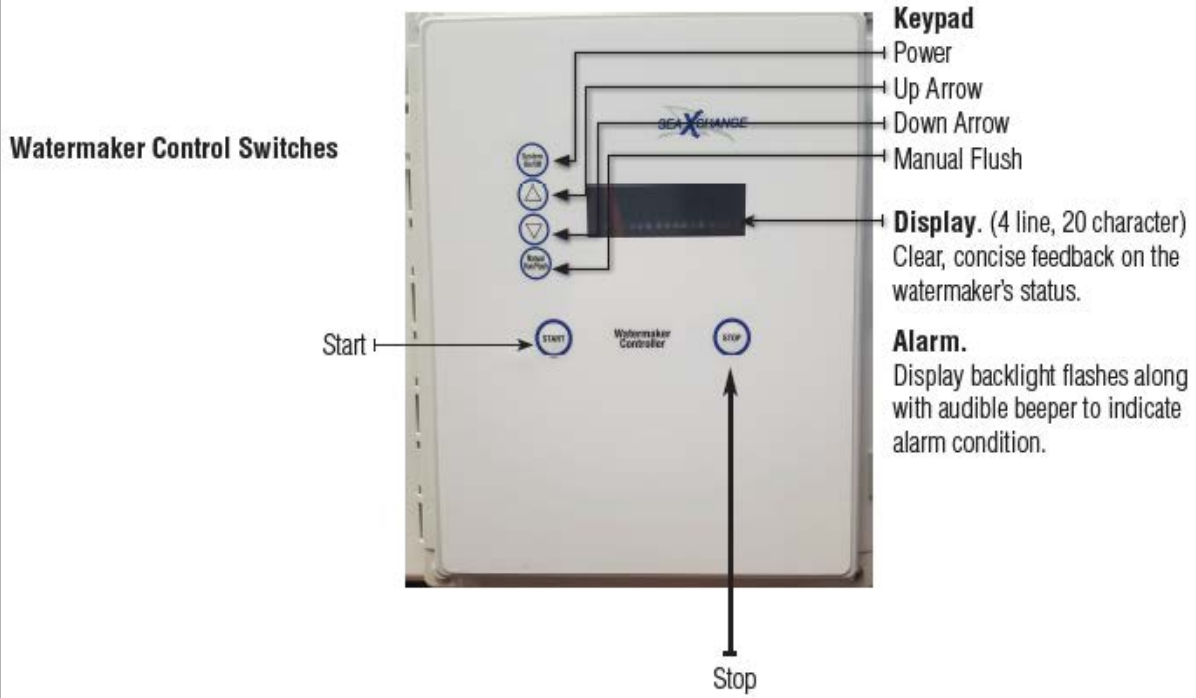
Figure 1. Terminal Board Schematic



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Figure 2. Controller Overview

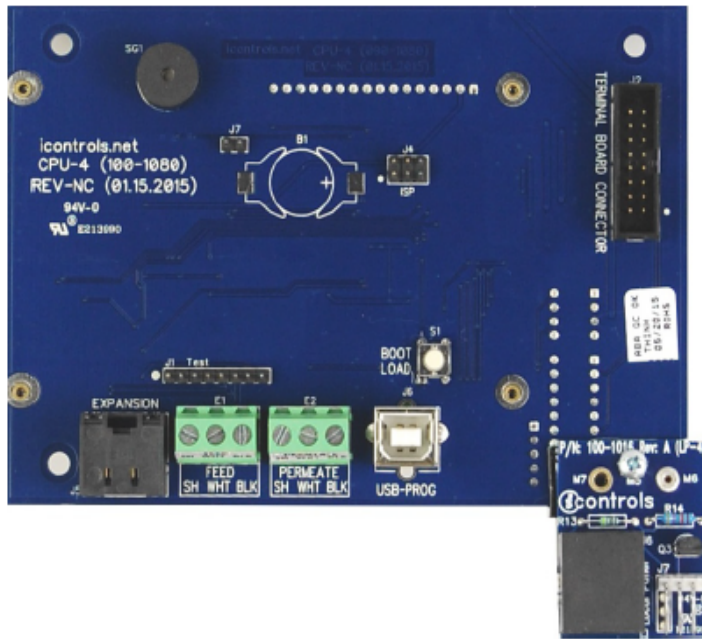


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**Figure 3. Controller Detail: CPU-4/LP-4**

**Typical Configuration**



**Detailed View**

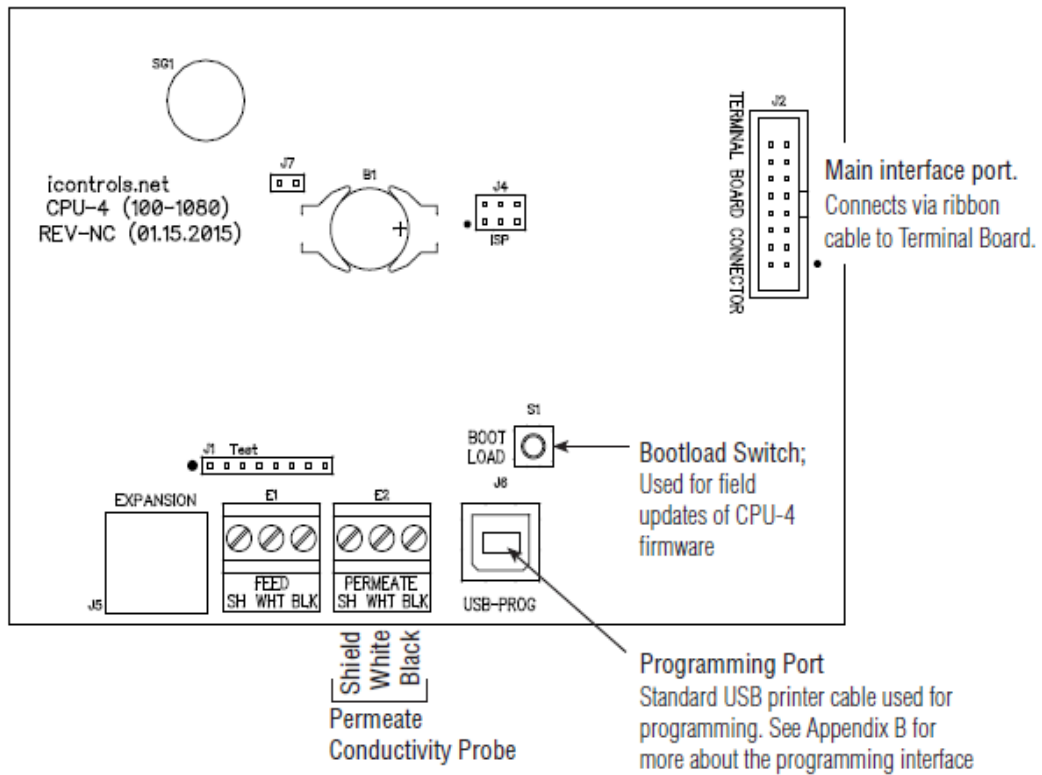
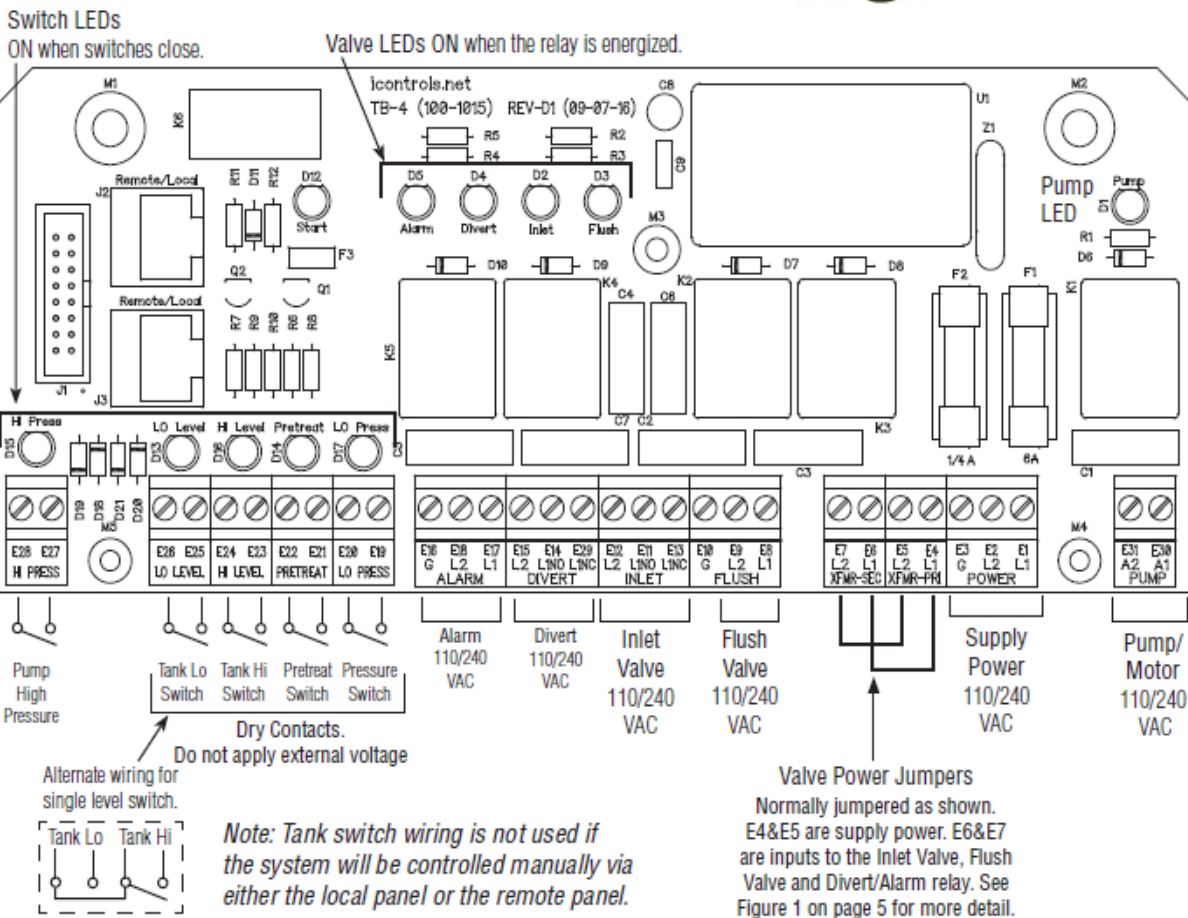
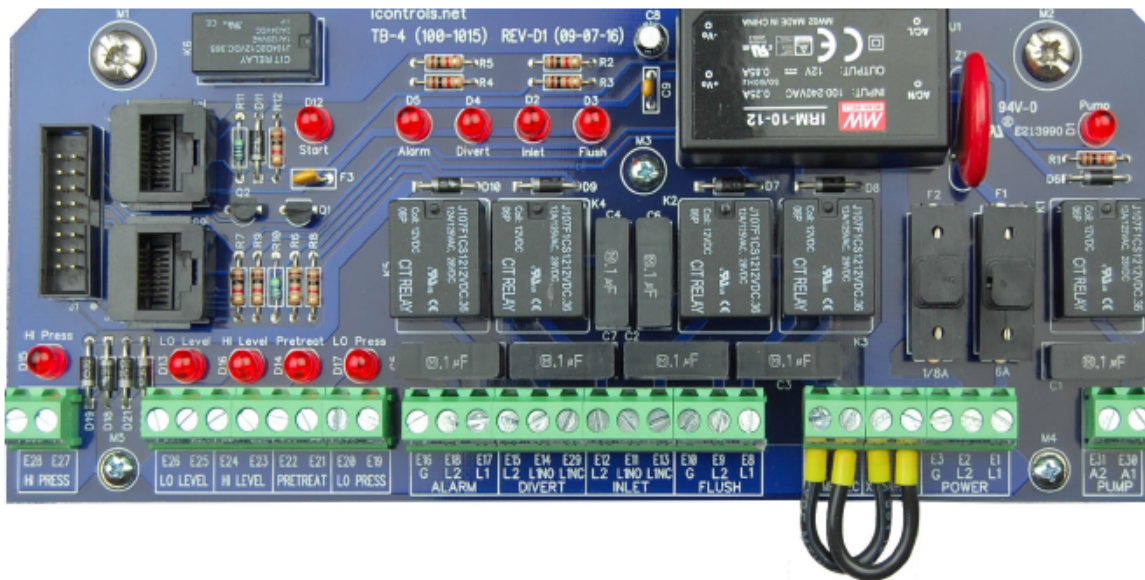


Figure 4. Controller Detail: Terminal Board, TB-4 (See Fig. 1 for schematic)



**Figure 5. Conductivity Probe Installation**



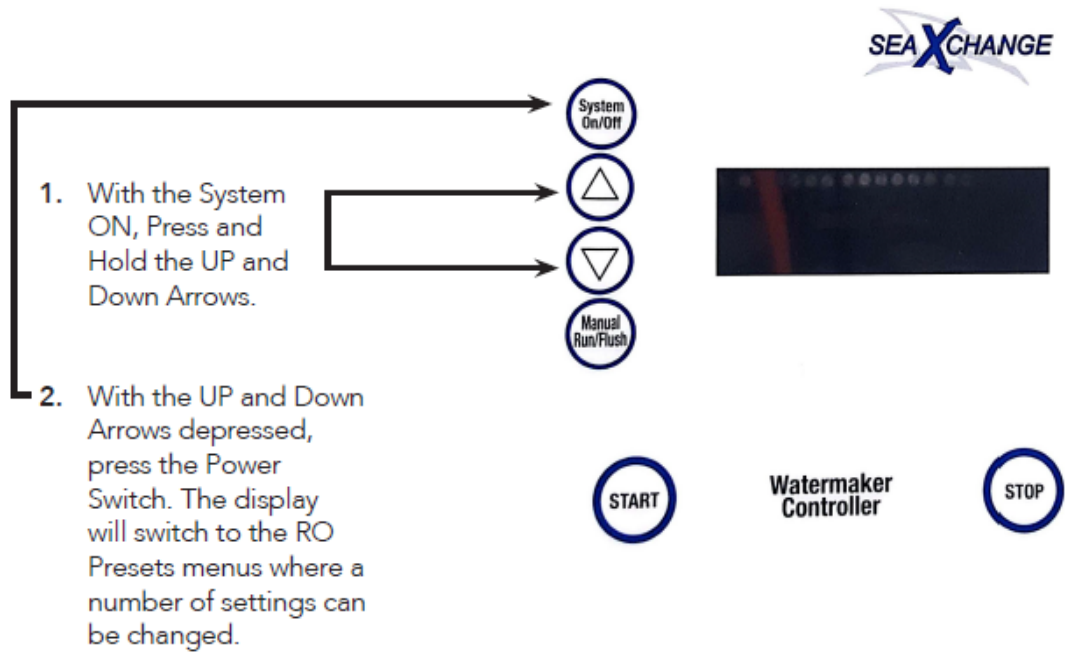
### Conductivity Probe Calibration

Because the conductivity measurement is affected by the physical environment in which it operates, it is best to calibrate while installed in the system and operating under normal conditions. This requires an external conductivity measurement device that is known to be accurate to serve as a reference.

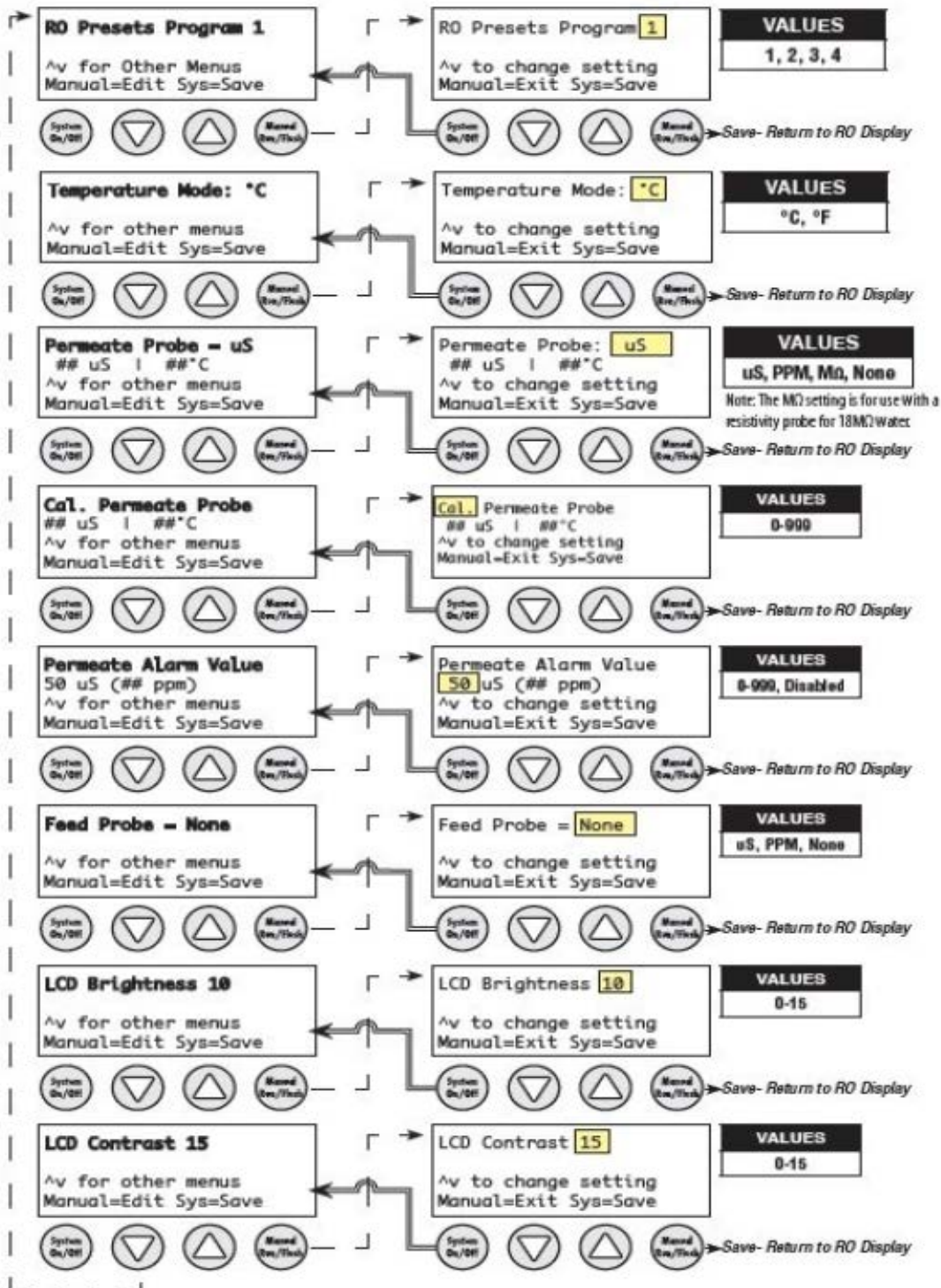
1. Operate the RO long enough for the membranes, operating temperature and permeate conductivity reading to stabilize.
2. Take a sample of the permeate and measure it with the reference meter.
3. See Figure 7 for instructions on how to access the Permeate Calibration Menu.
4. Enter the Permeate Calibration menu and use the UP or Down arrow until the value on the controller matches the value obtained on the reference meter.
5. Exit and Save the calibration.
6. The same procedure applies to the Feed Probe calibration.

NOTE: The probe calibration must be performed using solutions with conductivity of less than 900 ppm or  $\mu\text{s}$ . The conductivity calibration circuit will behave erratically if you attempt to calibrate using a higher value. When using a standard calibration solution, the NaCl PPM value can be used in place of the  $\mu\text{s}$  value if desired.

Figure 6. Controller Programming. Accessing the hidden menus.



**Figure 7. Controller Programming: Menu Navigation**



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## Controller Fault Condition Displays

Below are examples and explanations of the displays which accompany the fault conditions possible in the ROC-3. Fault conditions always indicated a problem of some sort which requires corrective action. the displays provide sufficient information to recognize the source of the fault and the required corrective action.

**High Pressure Fault:** *(Occurs when High Pressure Switch Closes)*

Line 1 "Service Fault"  
Line 2 "High System Pressure"  
Line 3  
Line 4 "To Reset Push OFF/ON"

**Low Pressure Fault:** *(System is responding to low pressure condition per system settings)*

Line 1 "Service Fault"  
Line 2 "Low Feed Pressure"  
Line 3  
Line 4 "Restart in MM:SS"

**Pre Treat Fault:** *(Pretreat Switch is closed indicating problem with pretreat system).*

Line 1 "Service Fault"  
Line 2 "Pretreat"  
Line 3  
Line 4 "Check Pretreat Sys."

**Permeate Conductivity Fault:** *(Permeate conductivity is higher than the alarm setpoint.)*

Line 1 "Service Fault"  
Line 2 "Permeate TDS xxx ppm" or "Permeate Cond xxx uS"  
Line 3 "Alarm SP xxx ppm" or "Alarm SP xxx uS"  
Line 4 "To Reset Push OFF/ON"

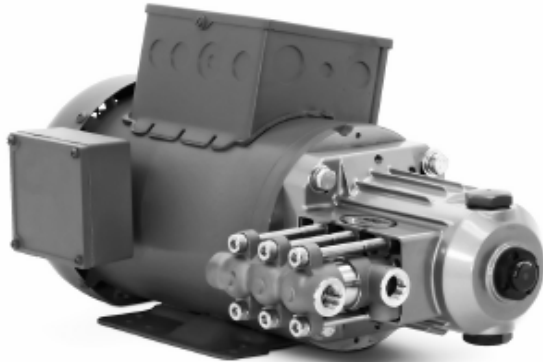
**Feed Conductivity Fault:** *(Feed conductivity is higher than the alarm setpoint.)*

Line 1 "Service Fault"  
Line 2 "Feed TDS xxx ppm" or "Feed Cond xxx uS"  
Line 3 "Alarm SP xxx ppm" or "Alarm SP xxx uS"  
Line 4 "To Reset Push OFF/ON"

**Conductivity Probe Error messages:**

Line 2 "Over-range" - Measurement is out of range for the circuit, probe may also be shorted  
Line 2 "Probe shorted" - Short circuit detected on temperature sensor in probe  
Line 2 "Probe not detected" - Open circuit detected on temperature sensor in probe  
Line 2 "Probe Startup 1" - Internal reference voltage too high to make valid measurement  
Line 2 "Probe Startup 2" - Internal reference voltage too low to make valid measurement  
Line 2 "Probe Startup 3" - Internal excitation voltage too high to make valid measurement  
Line 2 "Probe Startup 4", - Internal excitation voltage too low to make valid measurement

## **CAT HIGH PRESSURE PUMP**



Motorized pump unit 2SF42SEEL251 Shown

## Stainless Steel Direct-Drive Plunger Pump

**Models 2SF05SEEL, 2SF10SEEL  
2SF15SEEL, 2SF22SEEL  
2SF25SEEL, 2SF29SEEL  
2SF35SEEL, 2SF42SEEL**

### FEATURES

- Unique spring loaded inlet valves and the flow through ceramic plungers provides a smooth, steady flow.
- Optional EPDM and FPM elastomers for compatibility with many liquids.
- Hollow shaft direct drive to provide the smallest possible footprint for challenging spaces.

### COMMON SPECIFICATIONS

Discharge Pressure Range	.....100-1200 psi	7-85 bar
Inlet Pressure Range	.....Flooded to 60 psi	Flooded to 4 bar
Shaft Diameter	.....5/8"	15.9 mm
RPM	.....1725 rpm	1725 rpm
Bore	.....0.709"	18 mm
Bore (2SF42SEEL Only)	.....0.787"	20 mm
Maximum Liquid Temperature	.....160°F	70°C
Above 130°F call CAT PUMPS for inlet conditions and elastomer recommendations.		
Crankcase Capacity	.....11.15 oz.	0.33 l
Inlet Port (1)	.....3/8" NPT(F)	3/8" NPT(F)
Discharge Ports (2)	.....3/8" NPT(F)	3/8" NPT(F)
By-Pass Return Port (1)	.....1/4" NPT(F)	1/4" NPT(F)
Weight (Pump Only)	.....8.9 lbs.	4 kg
Dimensions (Pump Only)	.....6.8 x 8.7 x 5.2"	173 x 221 x 133 mm

#### **⚠ CAUTIONS AND WARNINGS**

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

Read all CAUTIONS and WARNINGS before commencing service or operation of any high pressure system. The CAUTIONS and WARNINGS are included in each service manual and with each Accessory Data sheet. CAUTIONS and WARNINGS can also be viewed online at [www.catpumps.com/cautions-warnings](http://www.catpumps.com/cautions-warnings) or can be requested directly from CAT PUMPS.

#### **WARRANTY**

View the Limited Warranty on-line at [www.catpumps.com/warranty](http://www.catpumps.com/warranty).

### SPECIFICATIONS

U.S. Measure

Metric Measure

#### **MODEL 2SF05SEEL**

Flow (60 Hz-1725 rpm)	.....0.5 gpm	1.9 lpm
Flow (50 Hz-1450 rpm)	.....0.42 gpm	1.6 lpm
Stroke	.....0.071"	1.8 mm

#### **MODEL 2SF10SEEL**

Flow (60 Hz-1725 rpm)	.....1.0 gpm	3.8 lpm
Flow (50 Hz-1450 rpm)	.....0.84 gpm	3.1 lpm
Stroke	.....0.122"	3.1 mm

#### **MODEL 2SF15SEEL**

Flow (60 Hz-1725 rpm)	.....1.5 gpm	5.7 lpm
Flow (50 Hz-1450 rpm)	.....1.26 gpm	4.8 lpm
Stroke	.....0.177"	4.5 mm

#### **MODEL 2SF22SEEL**

Flow (60 Hz-1725 rpm)	.....2.2 gpm	8.3 lpm
Flow (50 Hz-1450 rpm)	.....1.84 gpm	7.0 lpm
Stroke	.....0.248"	6.3 mm

#### **MODEL 2SF25SEEL**

Flow (60 Hz-1725 rpm)	.....2.5 gpm	9.5 lpm
Flow (50 Hz-1450 rpm)	.....2.1 gpm	7.9 lpm
Stroke	.....0.287"	7.3 mm

#### **MODEL 2SF29SEEL**

Flow (60 Hz-1725 rpm)	.....2.85 gpm	10.8 lpm
Flow (50 Hz-1450 rpm)	.....2.4 gpm	9.1 lpm
Stroke	.....0.335"	8.5 mm

#### **MODEL 2SF35SEEL**

Flow (60 Hz-1725 rpm)	.....3.5 gpm	13.2 lpm
Flow (50 Hz-1450 rpm)	.....2.9 gpm	11.0 lpm
Stroke	.....0.402"	10.2 mm

#### **MODEL 2SF42SEEL**

Flow (60 Hz-1725 rpm)	.....4.2 gpm	15.9 lpm
Flow (50 Hz-1450 rpm)	.....3.5 gpm	13.2 lpm
Discharge Pressure Range	.....100-1000 psi	7-70 bar
Stroke	.....0.402"	10.2 mm

Refer to pump **Service Manual** for repair procedure and additional technical information.

## PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	MODEL USED	QTY	ITEM	P/N	MATL	DESCRIPTION	MODEL USED	QTY
5	547445	S	Screw, HHC Sems (M6x14) [3/03]	All	3	152	† 26089	NBR	O-Ring, Adapter Spacer, Inner-80D	05-35SEEL	3
8	547153	AL	Cover, Bearing [3/03]	All	1		11377	FPM	O-Ring, Adapter Spacer, Inner-80D	05-35SEEL	3
10	14041	NBR	O-Ring, Bearing Cover-70D [3/03]	All	1		46647	EPDM	O-Ring, Adapter Spacer, Inner-80D	05-35SEEL	3
11	55337	NBR	Seal, Oil, Crankshaft -70D [3/03]	All	1		549539	NBR	O-Ring, Adapter Spacer, Inner-70D	42SEEL	3
15	14488	STL	Bearing, Ball - Inner	All	1		129977	FPM	O-Ring, Adapter Spacer, Inner-70D	42SEEL	3
20	547046	TNM	Rod, Connecting	All	3		129978	EPDM	O-Ring, Adapter Spacer, Inner-70D	42SEEL	3
25	<b>831987</b>	CM	Crankshaft, 1.8mm	05SEEL	1	157	<b>544700</b>	SS	Adapter, Valve	05-35SEEL	3
	<b>46109</b>	CM	Crankshaft, 3.1mm	10SEEL	1		<b>831289</b>	SS	Adapter, Valve	42SEEL	3
	<b>44931</b>	CM	Crankshaft, 4.5mm	15SEEL	1	159	† 26089	NBR	O-Ring, Adapter Spacer, Outer-80D	All	3
	<b>45160</b>	CM	Crankshaft, 6.3mm	22SEEL	1		11377	FPM	O-Ring, Adapter Spacer, Outer-80D	All	3
	<b>544693</b>	CM	Crankshaft, 7.3mm	25SEEL	1		46647	EPDM	O-Ring, Adapter Spacer, Outer-80D	All	3
	<b>45914</b>	CM	Crankshaft, 8.5mm	29SEEL	1	164	544293	SS	Seat	All	3
	<b>544694</b>	CM	Crankshaft, 10.2mm	35SEEL, 42SEEL	1	166	543669	SS	Valve	All	3
26	12385	STL	Ring, Retaining, Bearing	All	1	167	543700	SS	Spring	All	3
27	15710	STL	Bearing, Ball - Outer	All	1	168	44565	PVDF	Retainer, Spring	All	3
31	549726	—	Cap, Vented w/O-Ring (Rain Cap)	All	1	185	547705	S	Manifold, Discharge	All	1
32	547961	RTP	Cap, Oil Filler w/O-Ring	All	1	188	544701	S	Screw, HSH (M8x80)	All	6
33	14179	NBR	O-Ring, Oil Filler Cap - 70D	All	1	255	30517	STZP R	Assy, Bolt Mount	All	1
37	92241	—	Gauge, Oil w/Gasket - 80D	All	1	283	990394	—	Kit, Oil Drain	All	1
38	44428	NBR	Gasket, Flat, Oil Gauge - 80D	All	1	285	80228	STL	Screw (M8-1.25x80) (Motor Removal) (Not Shown)	All	2
48	44842	NY	Plug, Drain	All	1	300	34973	NBR	Kit, Seal (Incls: 106, 125, 152, 159)	05-35SEEL	1
49	14179	NBR	O-Ring, Drain Plug - 70D	All	1		33453	FPM	Kit, Seal (Incls: 106, 125, 152, 159)	05-35SEEL	1
53	547285	AL	Crankcase (See Tech Bulletin 92)	All	1		30536	EPDM*	Kit, Seal (Incls: 106, 125, 152, 159)	05-35SEEL	1
64	16948	CM	Pin, Crosshead	All	3		76973	NBR	Kit, Seal (Incls: 106, 125, 152, 159)	42SEEL	1
65	544695	SSZZ	Rod, Plunger	All	3		76955	FPM	Kit, Seal (Incls: 106, 125, 152, 159)	42SEEL	1
69	126259	STCP R	Washer, Oil Seal	All	3		76996	EPDM	Kit, Seal (Incls: 106, 125, 152, 159)	42SEEL	1
70	25461	NBR	Seal, Oil Crankcase	All	3	310	34972	NBR	Kit, Valve (Incls: 152, 159, 164, 166, 167, 168)	05-35SEEL	1
90	<b>544697</b>	CC	Plunger, Ceramic (M18x18)	05-35SEEL	3		33454	FPM	Kit, Valve (Incls: 152, 159, 164, 166, 167, 168)	05-35SEEL	1
	<b>831290</b>	CC	Plunger, Ceramic (M20x18)	42SEEL	3		30546	EPDM	Kit, Valve (Incls: 152, 159, 164, 166, 167, 168)	05-35SEEL	1
100	44869	PVDF	Retainer, Seal	All	3		76972	NBR	Kit, Valve (Incls: 152, 159, 164, 166, 167, 168)	42SEEL	1
106	<b>547683</b>	NBR	Seal, LPS w/SS-Spg	All	3		76445	FPM	Kit, Valve (Incls: 152, 159, 164, 166, 167, 168)	42SEEL	1
	<b>545192</b>	FPM	Seal, LPS w/SS-Spg	All	3		76446	EPDM	Kit, Valve (Incls: 152, 159, 164, 166, 167, 168)	42SEEL	1
	<b>546507</b>	EPDM	Seal, LPS w/SS-Spg	All	3	311	39668	NBR	Kit, Inlet Valve w/SS-IV (Incls: 134-138, 152, 159)	05-35SEEL	1
110	<b>547704</b>	SS	Manifold, Inlet	05-35SEEL	1		34974	NBR	Kit, Inlet Valve w/NY-IV (Incls: 134-138, 152, 159)	05-35SEEL	1
	<b>831288</b>	SS	Manifold, Inlet	42SEEL	1		33460	FPM	Kit, Inlet Valve w/NY-IV (Incls: 134-138, 152, 159)	05-35SEEL	1
125	<b>44652</b>	SNG	Seal, HPS w/SS	05-35SEEL	3		30556	EPDM	Kit, Inlet Valve w/NY-IV (Incls: 134-138, 152, 159)	05-35SEEL	1
	<b>46652</b>	HT*	Seal, Hi-Temp, 2-Pc w/S-Support	05-35SEEL	3		76668	NBR	Kit, Inlet Valve w/SS-IV (Incls: 134-138, 152, 159)	42SEEL	1
	<b>44649</b>	SNG	Seal, HPS w/SS	42SEEL	3		76465	FPM	Kit, Inlet Valve w/SS-IV (Incls: 134-138, 152, 159)	42SEEL	1
	<b>44936</b>	FPM	Seal, HPS w/SS	42SEEL	3		76466	EPDM	Kit, Inlet Valve w/SS-IV (Incls: 134-138, 152, 159)	42SEEL	1
	<b>46667</b>	HT*	Seal, Hi-Temp, 2-Pc w/S-Support	42SEEL	3	352	44050	STZP	Tool, Oil Gauge Removal	All	1
134	<b>543691</b>	SS	Valve, Inlet (See Tech Bulletin 91)	05-35SEEL	3	—	6107	—	Oil, Bottle (21 oz) ISO-68 Hydraulic	All	1
	33873	NY	Valve, Inlet (See Tech Bulletin 91)	05-35SEEL	3	<i>(Fill to specified crankcase capacity prior to start-up)</i>					
	<b>831400</b>	SS	Valve, Inlet	42SEEL	3						
135	543689	SS	Spacer	All	3						
136	543690	SS	Spring, Inlet Valve	All	3						
137	88575	S	Washer, Conical (M6)	All	3						
138	543692	SS	Nut (M6)	All	3						

**Bold print part numbers are unique to a particular pump model.** *Italics are optional items.*

[ ] Date of latest production change. † Production parts are different than repair parts. R Components comply with RoHS Directive.

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

View Tech Bulletins 002, 036, 043, 055, 064, 070, 073, 074, 091, 092 and 095 for additional information.

NOTE: Discard Key that may come standard with most motors and engines and use only the key included in Bolt kit.

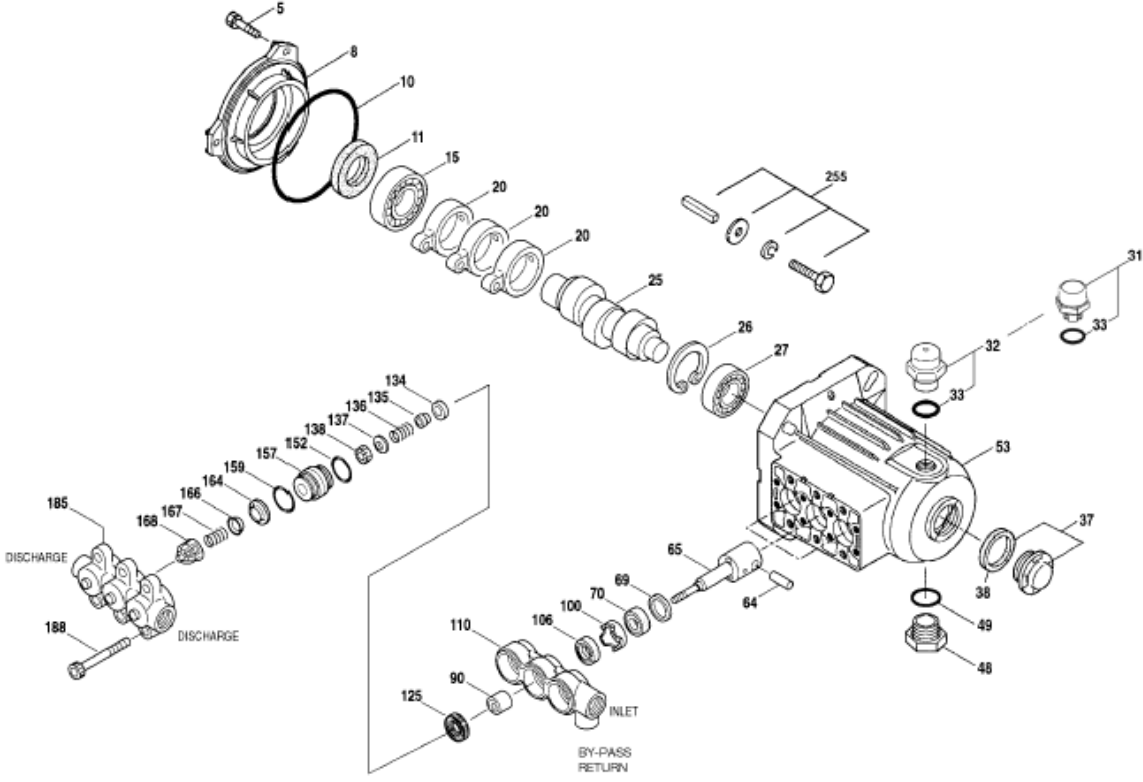
MATERIAL CODES (Not Part of Part Number): AL=Aluminum CC=Ceramic CM=Chrome-Moly

EPDM=Ethylene Propylene Diene Monomer FPM=Fluorocarbon HT=Hi-Temp (EPDM Alternative) NBR=Medium Nitrile (Buna-N) NY=Nylon

PVDF=Polyvinylidene Fluoride RTP=Reinforced Composite S=3045S SNG=Special Blend (Buna) SS=316SS SSZZ=316SS Zamak STL=Steel

STCP=Steel/Chrome Plated STZP=Steel/Zinc Plated TNM=Special High Strength

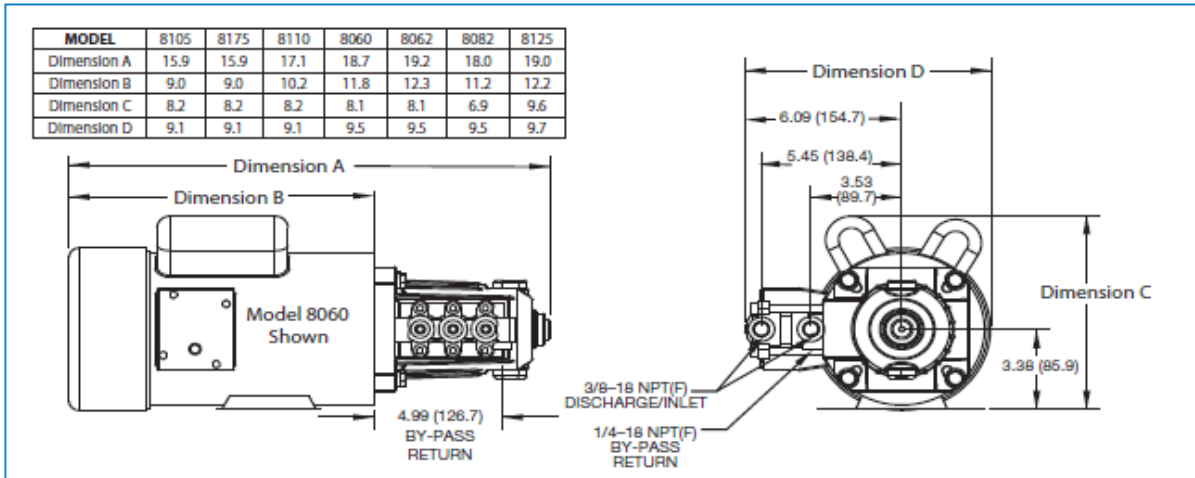
**EXPLODED VIEW**



**Models**

- 2SF05SEEL, 2SF10SEEL
- 2SF15SEEL, 2SF22SEEL
- 2SF25SEEL, 2SF29SEEL
- 2SF35SEEL, 2SF42SEEL

**April 2014**



Models 2SF05SEEL, 2SF10SEEL, 2SF15SEEL, 2SF25SEEL, 2SF29SEEL, 2SF35SEEL, 2SF42SEEL

MOTOR SPECIFICATIONS							
MODEL	8105	8175	8110	8060	8062	8082	8125
HorsePower	0.5	0.75	1.0	1.5	2.0	2.0/1.5	2.5
Phase	Single	Single	Single	Single	Single	Three	Single
RPM	1750	1745	1750	1725	1725	1725/1425	1750/1450
Frame Size	56C TEFC	56C TEFC	56C TEFC	56C TEFC	56C TEFC	56HC TEFC	56HC TEFC
Shaft Diameter (inches)	5/8	5/8	5/8	5/8	5/8	5/8	5/8
Maximum Volts	115/208-230	115/208-230	115/208-230	115/230	115/230	230/460 190/380	115/230 110/220
FULL LOAD AMPS	7.4/3.6-3.7	10.6/5.2-5.3	14/6.8-7.0	14.0/7.0	17.0/8.5	5.9-5.6/2.8 5.2/2.6	21/11.5 23.6/11.8
Hertz	60	60	60	60	60	60/50	60/50
Service Factor	1.15	1.15	1.15	1.2	1.15	1.15	1.2/1.0
Max. Ambient Temp. (F)	104	104	104	104	104	104	104
Capacitor Start	Yes	Yes	Yes	Yes	Yes	No	Yes
Thermal Overload-Manual Reset	No	Yes	No	Yes	Yes	No	No
Weight (lbs.)	25	28	34	42	45.7	40	52.9

**NOTE:** Motor start-up AMPS may vary, then settle within FULL LOAD AMPS rating after initial run time.

ELECTRIC HORSEPOWER REQUIREMENTS						
FLOW		PRESSURE psi (bar)			PUMP rpm	
U.S. gpm	Metric lpm	700 (50)	1000 (70)	1200 (85)		
0.5	1.9	0.24	0.35	0.41	1725	
1.0	3.8	0.48	0.68	0.82	1725	
1.5	5.7	0.72	1.03	1.23	1725	
2.5	9.5	1.19	1.71	2.05	1725	
2.85	10.8	1.36	2.0	2.3	1725	
3.5	13.2	1.67	2.39	2.87	1725	
4.2	15.9	2.01	2.88	N/A	1725	


**DETERMINING REQUIRED H.P.**

$$\frac{\text{gpm} \times \text{psi}}{1460} = \text{Electric Brake H.P. Required}$$

★ ★ Before mounting pump on motor, apply P.N. 6106 Antiseize Lubricant to pump shaft.

Refer to Tech Bulletin 055 for instructions on removing pump from electric motor.

For warranty consideration contact Cat Pumps for the local Authorized Service Center. If you are uncertain as to the cause of failure (Pump or Motor), secure **Returned Goods Authorization number** and return complete assembly **PREPAID** to CAT PUMPS for evaluation.



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PN 993132 Rev J 4/14 14083

# SF PLUNGER PUMP SERVICE MANUAL



## 2SF, 2SFX, CEE, SEEL MODELS:

2SF10, 2SF20, 2SF22,  
2SF25, 2SF29, 2SF30, 2SF35  
2SF05, 10, 15, 25, 29, 35SEEL

## 4SF MODELS:

4SF32ELS, 4SF40ELS, 4SF45ELS, 4SF50ELS,  
4SF30GS1, 4SF35GS1, 4SF40GS1, 4SF45GS1,  
4SF45GS118, 4SF50GS1

## 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 Sheet for complete specifications, parts list and exploded view.

**LUBRICATION:** Fill crankcase with special CAT PUMP oil per pump specifications [2SF, 2SFX: prior 3/03-11.83 oz., after 3/03-10.15 oz., 4SF: 23.66 oz.]. 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.

**MOTOR SELECTION:** Identify the pump shaft size. (2SF) "ES" and "ELS" models have 5/8" electric shaft; "GES" models have 3/4" electric shaft; "GS" and "GZ" models have 3/4" gas shaft. (4SF) "ELS" models have 1-1/8" electric shaft; "GS" models have a 1" gas shaft. 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 and maximum pressure at the pump! Consult the manufacturer of gas or diesel engine for selection of the proper engine.

**MOUNTING:** All 2SF and 4SF are direct drive and do not need to be mounted to another surface. Only the solid shaft 2SF22SLS with attachment brackets needs to be mounted to a rigid, horizontal surface. An uneven mounting surface will cause extensive damage to the pump base. Use the correct belt; make sure pulleys are aligned. Excessive belt tension may be harmful to the bearings. To minimize piping stress, use appropriate flexible hose to inlet and discharge ports. Before mounting pump to motor or gas engine, apply PN 6106 anti-seize lubricant to pump shaft. Refer to Tech Bulletin 055 for instructions on removing pump from gas engine or electric motor.

**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.

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

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.

All 2SF and 4SF Pumps come complete with a Pressure Regulating Unloader. NOTE: Except "CEE" and "SEEL" Models.

**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 between the primary device and pump. 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.

When the high pressure system is left running with the trigger gun off, the by-pass liquid can be routed to drain or to the pump inlet. If routed to the pump inlet, the by-pass liquid can quickly develop excessive heat and result in damage to the pump. A THERMO VALVE installed in the by-pass line is recommended to protect the pump. An AUTO SHUT-OFF ASSEMBLY may also be used.

**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 063).

### 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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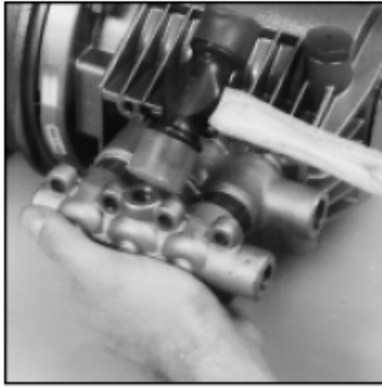
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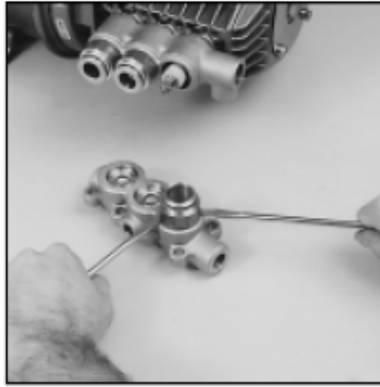
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PN 30036 Rev K 4364



Removal of Discharge Manifold



Removal of Adapter from Discharge Manifold



Removal of Adapter from Inlet Manifold

## SERVICING THE VALVES

### Disassembly of the Discharge Valve Assembly

1. Disconnect all plumbing and remove unloader for ease in servicing.

**NOTE: CEE and SEEL models do not come with standard unloader.**

2. Inspect oil for proper level, presence of water or discoloration and replace as needed.
3. Using a standard M6 allen wrench remove the six (6) (2SF) or eight (8) (4SF) Socket Head Screws from the manifold. Remove the outer screws first, then the center screws.
4. Using a soft mallet tap the back side of the Discharge Manifold from alternate sides to maintain alignment and avoid damage to the plungers.
5. Grasp the Discharge Manifold from the from underside and gradually lift manifold while you pull away from the Crankcase.
6. The Adapter Spacers may stay with either the Discharge or Inlet Manifold. By inserting two opposing

screwdrivers between Spacer and manifold you can easily pry them out of the Discharge Manifold. If they stay in the Inlet Manifold, gently work them up and down as you pull away from the Inlet Manifold.

7. The valve assemblies are in the Discharge Manifold ports and will fall out when manifold is turned over. A complete valve assembly includes: Retainer, Spring, Valve and Seat.

**NOTE: On "X" models the Adapter and Seat are one-piece.**

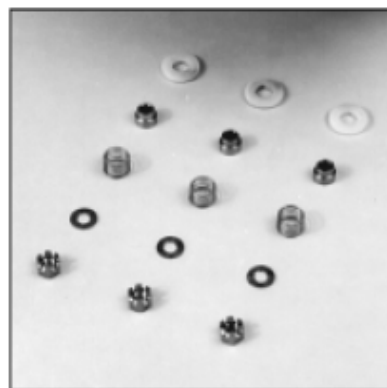
**NOTE: The "GZ" models use the standard "SF" Valve Kit.**



Discharge Valve Assembly (4SF)

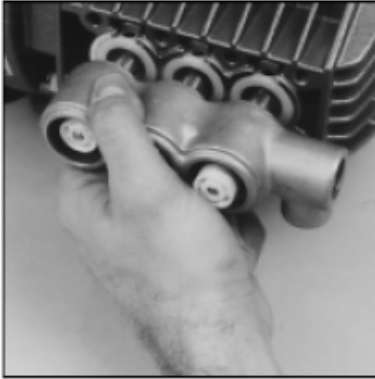


Adapter and Discharge Valve Assembly (2SF)

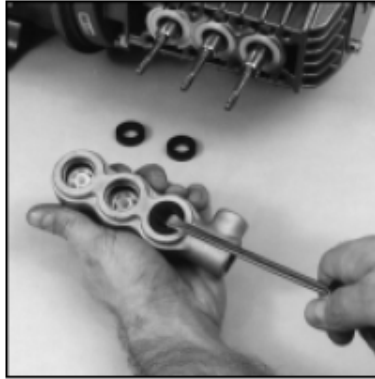


Inlet Valve Assembly

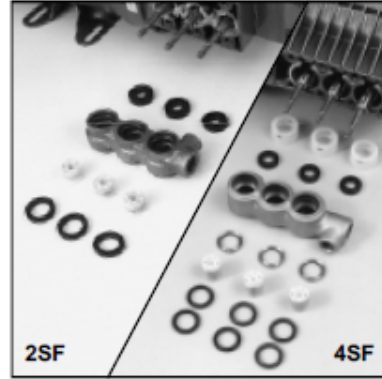




Removal of Inlet Manifold



Removal of Lo-Pressure Seal



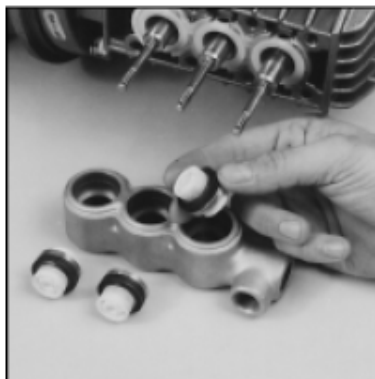
Plunger, Seals and V-Packing Arrangement

### Reassembly of the Discharge Valve Assembly

1. Examine Adapter Spacer O-Rings and replace if worn. Lubricate and install O-Rings and Back-up-Rings on **both front and rear of the Adapter Spacer**.
  2. Examine the Valve Retainers for scale buildup or wear and install into each Discharge Manifold port with tab down into the manifold chamber.
  3. Replace worn or damaged Springs and place into Retainers.
  4. Examine Valve and Seats for pitting, grooves or wear and replace as needed.
  5. Place Valves over Springs with **concave side down**.
  6. Place Valve Seats on Valves with **concave side down**.
- NOTE: On "X" Models, the Adapter and Seat are one-piece.**
7. Lubricate O.D. of Adapter Spacer and insert **smaller I.D. into Discharge Manifold ports**. Snap into position. Exercise caution not to cut or pinch o-rings.
  8. Carefully guide Discharge Manifold with Spacers over Plunger Rod ends and press into Inlet Manifold.
  9. Replace Socket Head Screws and torque per chart. Use torque sequence chart.
  10. If oil was not changed, be certain oil is to mark on Oil Gauge before resuming operation.



Installation of Lo-Pressure Seals



V-Packing Positioning



Installation of V-Packings

## SERVICING THE SEALS

### Disassembly of the Seal Assembly

1. Remove the Inlet Valve Assembly from the exposed plunger rod ends, including Cotterpin, Nut, Washer, Spring, Spacer and Inlet Valve.
2. Grasp the Inlet Manifold from the front and underside and pull to remove from Plunger Rods.
3. Carefully examine back side of Lo-Pressure Seal before removing from the Inlet Manifold as it will be damaged during removal. If worn, insert screwdriver into I. D. of seal and pry out from the backside of the I.M. Exercise caution to avoid damage to the Inlet Manifold.

4. Press ceramic Plunger with thumb or soft tool from **back side of Inlet Manifold**.

On the Model 2SF the Hi-Pressure Seal may stay with the plungers or remain in the Inlet Manifold. If on the plungers, slide off by hand. If in the manifold, use a reverse pliers to remove.

On the Model 4SF the V-Packing and Female Adapters may stay with the plungers or remain in Inlet Manifold. If on the plungers, slide off by hand. If in the manifold, use a reverse pliers to remove.

5. Remove Seal Retainers from Crankcase by grasping tab with pliers and pulling out.
6. Examine Crankcase Oil Seal to determine if Crankcase servicing is needed.
7. Examine Ceramic Plunger, Lo-Pressure Seals, V-Packings for scoring, cracks and wear and replace.  
**NOTE: The "S" versions of the 4SF pumps have a replaceable Sleeve.**
8. Examine the Sleeve for grooves for scale buildup and replace as needed. Grasp the Sleeve by hand and pull from the Plunger Rod.
9. Examine the O-Ring and Back-up-Ring under the Sleeve for cuts or wear and replace.
10. Examine the Barrier Slinger for wear and replace as needed. Install the Barrier Slinger with the concave side facing away from the Crankcase.

### Reassembly of Seal Assembly

1. With Inlet and Discharge Manifold removed, examine Seal Retainers and replace if worn or damaged. Install on Plunger Rod and press into Crankcase **with tab out**.
2. Place Inlet Manifold on work surface with **Crankcase side up**.
3. Lubricate new Lo-Pressure Seals and press into position with **garter spring down**. Be certain the seal is seated squarely on the shoulder in the inlet manifold chamber.
4. Place Inlet Manifold on work surface with **Crankcase side down** (larger I.D. ports up).
5. On the Model 4SF place new Female Adapter into Inlet Manifold chamber with **v-groove facing up**.
6. Carefully examine the Plungers for scoring or cracks and replace if worn.
7. On the Model 2SF lubricate Ceramic Plungers and new Hi-Pressure Seals. Press the plunger into the seal and position seal in middle of plunger.

**NOTE: Place the deeper recessed end of the plunger into the seal from the metal back side.**

**NOTE: The "Hi-Temp" 2SF models use a special Hi-Pressure Seal and Hi-Temp Seal Kit.**

On the Model 4SF lubricate Ceramic Plungers and new V-Packings. Press Plunger into the V-Packings and position in the middle of plunger.

**NOTE: The deeper recessed end of the plunger should face the same direction as the v-groove on the V-Packing.**

8. On the Model 4SF lubricate the Plunger Rod O-Ring to avoid cutting during installation. Install the Back-up-Ring first then the O-Ring into the groove on the Plunger Rod.
9. Install the Sleeve with the tapered end facing out. Gently press towards the Plunger Rod shoulder until flush with the Barrier Slinger.
10. Carefully install Inlet Manifold over Plunger Rod ends and slowly press into Crankcase.
11. Install the Plungers onto the plunger rods. Press into position using the **larger I.D. end of Valve Spacer**.

## SERVICING THE CRANKCASE SECTION

- Examine Inlet Valve and replace if worn. **Inlet valves cannot be reversed if worn.** The S.S. Inlet Valves may be lapped if not badly worn. Install the S.S. Inlet valves with **square edges towards the plungers** (round edges towards the discharge). Install the Nylon Inlet Valve with **ridged side towards the discharge**.

**NOTE: The "Hi-Temp" 2SF models use a Nylon Inlet Valve (order individual parts, not standard Inlet Valve Kit).**

- Examine Spacers for wear and replace as needed. Install Spacer on each Plunger Rod with **smaller O.D. towards inlet valve**.
- Examine Springs for damage or fatigue and replace as needed. Place on Plunger Rods.
- Install Washers next with **concave side towards Inlet Manifold**.
- Install Nuts and torque per chart.
- On 2SF and 4SF models **always install new Cotterpins** and turn ends to secure in position.

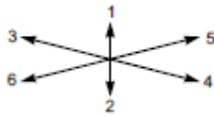
**NOTE: "X" and S.S. Models do not use Cotterpins.**

- Refer to steps 7-10 under Servicing Valves-Reassembly to replace the Discharge Manifold.

- While Inlet Manifold, Plungers and Seal Retainers are removed, examine Crankcase Seals for wear.
- Check oil level and for evidence of water in oil.
- Rotate Crankshaft by hand to feel for smooth bearing movement.
- Examine Crankshaft Oil Seal externally for drying, cracking or leaking.
- Consult CAT PUMPS or your local distributor if Crankcase service is required.

**See section VIII of the Plunger Pump Service Video for additional information.**

### 2SF Torque Sequence



### 4SF Torque Sequence



Torque diagonally in order shown. The outer four (4) screws then center screws all hand tight. Then repeat series to specifications in torque chart.

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 special multi-viscosity ISO68 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 video for additional assistance.

TORQUE CHART						
Pump Item	Thread	Tool Size [Part No.]	Torque in. lbs. ft. lbs. Nm			
<b>Outer Bearing Case Screw</b>	M6	M10 Hex/Phil. [25082]	50	4.0	6	
<b>Inner Bearing Case Screw</b>	M6	M10 Hex/Phil. [25082]	50	4.0	6	
<b>Manifold Screw</b>	M8	M6 Allen [30941]	115	9.4	13	
<b>Plunger Rod Nut</b>	M6	M10 Hex [25082]	55	4.4	6	
<b>Bubble Oil Gauge</b>	M28	Oil Gauge Tool [44050]	45	3.6	5	
<b>Mounting 2SF</b>						
Adapter Plate to Gas Engine	5/16-24	1/2" Hex	90	7.2	10	
Pump to Adapter Plate	3/8-16	9/16" Hex	110	9.0	12	
Pump to Electric Motor	3/8-16	9/16" Hex	110	9.0	12	
<b>Mounting 4SF</b>						
Adapter Plate to Gas Engine	3/8-16	9/16" Hex	110	9.0	12	
Pump to Adapter Plate	1/2-13	3/4" Hex	150	12.5	17	
Pump to Electric Motor	1/2-13	3/4" Hex	150	12.5	17	

TECHNICAL BULLETIN REFERENCE CHART		
No.	Subject	Models
002	Inlet Pressure VS Liquid Temperature	All Models
024	Lubrication of Lo-Pressure Seals	All Models
043	LPS and HPS Servicing	All Plunger Models
055	Removing Pumps from Gas Engine or Electric Motor	2SF, 2SFX, 2DX, 4SF, 5DX, 6DX
057	Set Screw and Hardened Key	4SF
064	By-Pass Hose Sizing	All Unloaders/Regulators
065	Higher Performance Ratings	2SF and 4SF
070	Maximum Performance	2SF and 4SF
073	Hi-Temp HPS	3PFR, 5PFR, 2SF
074	Torque Chart	Piston and Plunger Pumps
075	Sleeved Plunger Rod	4SF'S*
083	Winterizing a Pump	All Models
091	2SF Inlet Valve	2SF Models
092	Crankcase Changes	All 2SF-2SFX

## 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 be adequate to accommodate the maximum flow being delivered by the pump.

- Open inlet shut-off valve and turn on water supply to avoid cavitating 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 without a Thermo Valve high temperature protection.
- Avoid low vapor pressure and high viscosity liquids.
- Higher temperature liquids tend to vaporize and require positive heads.
- 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 thick walled fittings, 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.

- Optimum pump performance is obtained with +20 PSI (1.4 BAR) inlet pressure. With adequate inlet plumbing, most pumps will perform with flooded suction. Maximum inlet pressure is 75 PSI (5.25 BAR).
- After prolonged storage, pump should be purged of air to facilitate priming. Disconnect any discharge port and allow liquid to pass through pump.

**INLET ACCESSORIES** are designed to protect against over pressurization, control inlet flow, contamination or temperature and provide ease of servicing.

- A shut-off valve is recommended to facilitate maintenance.
- A stand pipe can be used in some applications to help maintain a positive head in the inlet line.
- Inspect and clean inlet filters on a regular schedule.
- A pressure gauge is recommended to monitor the inlet pressure and should be mounted **AS CLOSE TO THE PUMP INLET** as possible. **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.

**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.
- The 2SF and 4SF come standard with a Regulating Unloader to handle by-pass liquid directed to the inlet line of the pump. If other than standard valve is used, exercise caution to use proper flexible hose and adequate diameter. A **PRESSURE REDUCING VALVE** may be needed 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 may also be necessary to use a **THERMO VALVE** in the by-pass line to monitor the temperature build-up in the by-pass loop to avoid premature seal failure.
- A low-pressure, **FLEXIBLE CLOTH BRAID** (not metal braid) hose should be used from the by-pass connection to the inlet of the pump.
- If standard unloader valve is not used, check the pressure in the by-pass line to avoid over pressurizing the inlet.

### HOSE FRICTION LOSS

Water* Flow Gal/Min	PRESSURE DROP IN PSI PER 100 FT OF HOSE WITH TYPICAL WATER FLOW RATES Hose Inside Diameters, inches						
	1/4	5/16	3/8	1/2	5/8	3/4	1"
0.5	16	5	2				
1	54	20	7	2			
2	180	60	25	6	2		
3	380	120	50	13	4	2	
4		220	90	24	7	3	
5		320	130	34	10	4	
6			220	52	16	7	1
8			300	80	25	10	2
10			450	120	38	14	3
15			900	250	80	30	7
20			1600	400	121	50	12
25				650	200	76	19
30					250	96	24
40					410	162	42
50					600	235	62
60						370	93

\*At a fixed flow rate with a given size hose, the pressure drop across a given hose length will be directly proportional. A 50 ft. hose will exhibit one-half the pressure drop of a 100 ft. hose. Above values shown are valid at all pressure levels.

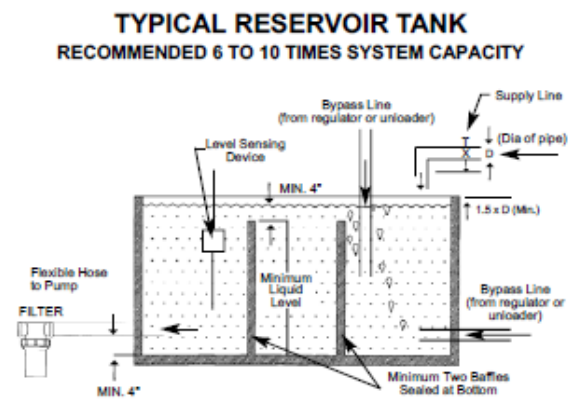
### WATER LINE PRESSURE LOSS PRESSURE DROP IN PSI PER 100 FEET

Water GPM	Steel Pipe—Nominal Dia.			Brass Pipe—Nominal Dia.			Copper Tubing O.D. Type L								
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/4	1 1/2	1 3/4	2					
1	8.5	1.9		6.0	1.6		120	13	2.9	1.0					
2	30	7.0	2.1	20	5.8	1.8	400	45	10	3.4	1.3				
3	60	14	4.5	1.1	40	11	3.6	94	20	6.7	2.6				
5	150	36	12	2.8	100	28	9.0	2.2	230	50	17	6.1	3.0		
8	330	86	28	6.7	1.9	220	82	21	5.2	1.8	500	120	40	18	6.5
10	520	130	43	10	3.0	320	90	30	7.8	2.4	180	56	22	10	
15	270	90	21	6.2	1.8	190	62	16	5.0	1.5	120	44	20		
25	670	240	86	16	4.2	2.0	470	150	40	12	3.8	1.7	330	110	50
40		88	17	8.0			39	11	5.0				550	200	88
60			37	17					23	11					
80			52	29					40	19					
100			210	107	48				81	28					

### RESISTANCE OF VALVES AND FITTINGS

Nominal Pipe Size Inches	Inside Diameter Inches	Equivalent Length of Standard Pipe in Feet							
		Gate Valve	Globe Valve	Angle Valve	45° Elbow	90° Elbow	180° Close Ret.	Tee Thru Run	Tee Thru Branch
1/2	0.622	0.41	18.5	9.3	0.78	1.67	3.71	0.93	3.33
3/4	0.824	0.54	24.5	12.3	1.03	2.21	4.90	1.23	4.41
1	1.049	0.69	31.2	15.6	1.31	2.81	6.25	1.56	5.62
1 1/4	1.380	0.90	41.0	20.5	1.73	3.70	8.22	2.06	7.40
1 1/2	1.610	1.05	48.0	24.0	2.15	4.31	9.59	2.40	8.63
2	2.067	1.35	61.5	30.8	2.59	5.55	12.30	3.08	11.60
2 1/2	2.469	1.62	73.5	36.8	3.09	6.61	14.70	3.68	13.20
3	3.068	2.01	91.5	45.8	3.84	8.23	18.20	4.57	16.40
4	4.026	2.64	120.0	60.0	5.03	10.80	23.90	6.00	21.60

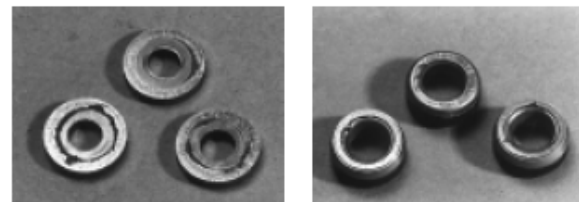
Arriving at a total line pressure loss, consideration should then be given to pressure loss created by valves, fittings and elevation of lines.  
If a sufficient number of valves and fittings are incorporated in the system to materially affect the total line loss, add to the total line length, the equivalent length of line of each valve or fitting.



## Handy Formulas to Help You

- Q. How can I find the RPM needed to get specific GPM (Gallons Per Minute) I want?
- A.  $\text{Desired RPM} = \text{Desired GPM} \times \frac{\text{Rated RPM}}{\text{Rated GPM}}$
- Q. I have to run my pump at a certain RPM. How do I figure the GPM I'll get?
- A.  $\text{Desired GPM} = \text{Desired RPM} \times \frac{\text{Rated GPM}}{\text{Rated RPM}}$
- Q. Is there a simple way to find the approximate horsepower I'll need to run the pump?
- A.  $\text{Electric Brake Horsepower Required} = \frac{\text{GPM} \times \text{PSI}}{1460} \quad (\text{Standard } 85\% \text{ Mech. Efficiency})$
- Q. What size motor pulley should I use?
- A.  $\text{Pump Pulley (Outer Diameter)} \times \frac{\text{Pump RPM}}{\text{Motor/Engine RPM}} \quad (\text{Consult Engine Mfr.})$
- Q. How do I calculate the torque for my hydraulic drive system?
- A.  $\text{Torque (ft. lbs.)} = 3.6 \left( \frac{\text{GPM} \times \text{PSI}}{\text{RPM}} \right)$

## Avoid Cavitation Damage



One or several of the conditions shown in the chart below may contribute to cavitation in a system resulting in premature wear, system downtime and unnecessary operating costs.

CONDITION	SOLUTION
Inadequate inlet line size	• Increase line size to the inlet port or one size larger
Water hammering liquid acceleration/deacceleration	• Install C.A.T. Tube • Move pump closer to liquid supply
Rigid Inlet Plumbing	• Use flexible wire reinforced hose to absorb pulsation and pressure spikes
Excessive Elbows in Inlet Plumbing	• Keep elbows to a minimum and less than 90°
Excessive Liquid Temperature	• Use Thermo Valve in bypass line • Do not exceed pump temperature specifications • Substitute closed loop with baffled holding tank • Adequately size tank for frequent or high volume bypass • <b>Pressure feed high temperature liquids</b> • Properly ventilate cabinets and rooms
Air Leaks in Plumbing	• Check all connections • Use PTFE thread tape or pipe thread sealant
Agitation in Supply Tank	• Size tank according to pump output — <b>Minimum 6-10 times system GPM</b> • Baffle tank to purge air from liquid and separate inlet from discharge
High Viscosity Liquids	• Verify viscosity against pump specifications before operation • Elevate liquid temperature enough to reduce viscosity • Lower RPM of pump • Pressure feed pump • Increase inlet line size
Clogged Filters	• Perform regular maintenance or use clean filters to monitor buildup • Use adequate mesh size for liquid and pump specifications

## DIAGNOSIS AND MAINTENANCE

One of the most important steps in a high pressure system is to establish a regular maintenance program. This will vary slightly with each system and is determined by various elements such as the duty cycle, the liquid being pumped, the actual specifications vs rated specifications of the pump, the ambient conditions, the inlet conditions and the accessories in the system. A careful review of the necessary inlet conditions and protection devices required before the system is installed will eliminate many potential problems.

CAT PUMPS are very easy pumps to service and require far less frequent service than most pumps. Typically, only common tools are required, making in-field service convenient, however, there are a few custom tools, special to certain models, that do simplify the process. This service manual is designed to assist you with the disassembly and reassembly of your pump. The following guide will assist in determining the cause and remedy to various operating conditions. You can also review our **FAQ** or **SERVICE** sections on our **WEB SITE** for more facts or contact CAT PUMPS directly.

PROBLEM	PROBABLE CAUSE	SOLUTION
<b>Low pressure</b>	<ul style="list-style-type: none"> <li>•Worn nozzle.</li> <li>•Belt slippage.</li> <li>•Air leak in inlet plumbing.</li> <li>•Pressure gauge inoperative or not registering accurately.</li> <li>•Relief valve stuck, partially plugged or improperly adjusted.</li> <li>•Inlet suction strainer (filter) clogged or improperly sized.</li> <li>•Abrasives in pumped liquid.</li> <li>•Leaky discharge hose.</li> <li>•Inadequate liquid supply.</li> <li>•Severe cavitation.</li> <li>•Worn seals.</li> <li>•Worn or dirty inlet/discharge valves.</li> </ul>	<ul style="list-style-type: none"> <li>•Replace with properly sized nozzle.</li> <li>•Tighten belt(s) or install new belt(s).</li> <li>•Tighten fittings and hoses. Use PTFE liquid or tape.</li> <li>•Check with new gauge. Replace worn or damaged gauge.</li> <li>•Clean/adjust relief valve. Replace worn seats/valves and o-rings.</li> <li>•Clean filter. Use adequate size filter. Check more frequently.</li> <li>•Install proper filter.</li> <li>•Replace discharge hose with proper rating for system.</li> <li>•Pressurize inlet and install C.A.T.</li> <li>•Check inlet conditions.</li> <li>•Install new seal kit. Increase frequency of service.</li> <li>•Clean inlet/discharge valves or install new valve kit.</li> </ul>
<b>Pulsation</b>	<ul style="list-style-type: none"> <li>•Faulty Pulsation Dampener.</li> <li>•Foreign material trapped in inlet/discharge valves.</li> </ul>	<ul style="list-style-type: none"> <li>•Check precharge. If low, recharge, or install a new dampener.</li> <li>•Clean inlet/discharge valves or install new valve kit.</li> </ul>
<b>Water leak</b>		
•Under the manifold	<ul style="list-style-type: none"> <li>•Worn V-Packings, Hi-Pressure or Lo-Pressure Seals.</li> <li>•Worn adapter spacer o-rings.</li> </ul>	<ul style="list-style-type: none"> <li>•Install new seal kit. Increase frequency of service.</li> <li>•Install new o-rings.</li> </ul>
•Into the crankcase	<ul style="list-style-type: none"> <li>•Humid air condensing into water inside the crankcase.</li> <li>•Excessive wear to seals and V-Packings.</li> </ul>	<ul style="list-style-type: none"> <li>•Install oil cap protector. Change oil every 3 months or 500 hours.</li> <li>•Install new seal kit. Increase frequency of service.</li> </ul>
<b>Knocking noise</b>		
•Inlet supply	<ul style="list-style-type: none"> <li>•Inadequate inlet liquid supply.</li> </ul>	<ul style="list-style-type: none"> <li>•Check liquid supply. Increase line size, pressurize or install C.A.T.</li> </ul>
•Bearing	<ul style="list-style-type: none"> <li>•Broken or worn bearing.</li> </ul>	<ul style="list-style-type: none"> <li>•Replace bearing.</li> </ul>
•Pulley	<ul style="list-style-type: none"> <li>•Loose pulley on crankshaft</li> </ul>	<ul style="list-style-type: none"> <li>•Check key and tighten set screw.</li> </ul>
<b>Oil leak</b>		
•Crankcase oil seals.	<ul style="list-style-type: none"> <li>•Worn crankcase oil seals.</li> </ul>	<ul style="list-style-type: none"> <li>•Replace crankcase oil seals.</li> </ul>
•Crankshaft oil seals and o-rings.	<ul style="list-style-type: none"> <li>•Worn crankshaft oil seals or o-rings on bearing cover.</li> </ul>	<ul style="list-style-type: none"> <li>•Remove bearing cover and replace o-rings and/or oil seals.</li> </ul>
•Drain plug	<ul style="list-style-type: none"> <li>•Loose drain plug or worn drain plug o-ring.</li> </ul>	<ul style="list-style-type: none"> <li>•Tighten drain plug or replace o-ring.</li> </ul>
•Bubble gauge	<ul style="list-style-type: none"> <li>•Loose bubble gauge or worn bubble gauge gasket.</li> </ul>	<ul style="list-style-type: none"> <li>•Tighten bubble gauge or replace gasket.</li> </ul>
•Rear cover	<ul style="list-style-type: none"> <li>•Loose rear cover or worn rear cover o-ring.</li> </ul>	<ul style="list-style-type: none"> <li>•Tighten rear cover or replace o-ring.</li> </ul>
•Filler cap	<ul style="list-style-type: none"> <li>•Loose filler cap or excessive oil in crankcase.</li> </ul>	<ul style="list-style-type: none"> <li>•Tighten filler cap. Fill crankcase to specified capacity.</li> </ul>
<b>Pump runs extremely rough</b>		
•Inlet conditions	<ul style="list-style-type: none"> <li>•Restricted inlet or air entering the inlet plumbing</li> </ul>	<ul style="list-style-type: none"> <li>•Correct inlet size plumbing. Check for air tight seal.</li> </ul>
•Pump valves	<ul style="list-style-type: none"> <li>•Stuck inlet/discharge valves.</li> </ul>	<ul style="list-style-type: none"> <li>•Clean out foreign material or install new valve kit.</li> </ul>
•Pump seals	<ul style="list-style-type: none"> <li>•Leaking V-Packings, Hi-Pressure or Lo-Pressure seals.</li> </ul>	<ul style="list-style-type: none"> <li>•Install new seal kit. Increase frequency of service.</li> </ul>
<b>Premature seal failure</b>		
	<ul style="list-style-type: none"> <li>•Scored plungers.</li> <li>•Over pressure to inlet manifold.</li> <li>•Abrasive material in the liquid being pumped.</li> <li>•Excessive pressure and/or temperature of pumped liquid.</li> <li>•Running pump dry.</li> <li>•Starving pump of adequate liquid.</li> </ul>	<ul style="list-style-type: none"> <li>•Replace plungers.</li> <li>•Reduce inlet pressure per specifications.</li> <li>•Install proper filtration at pump inlet and clean regularly.</li> <li>•Check pressure and inlet liquid temperature.</li> <li>•DO NOT RUN PUMP WITHOUT LIQUID.</li> <li>•Increase hose one size larger than inlet port size. Pressurize and install C.A.T.</li> </ul>
	<ul style="list-style-type: none"> <li>•Eroded manifold.</li> </ul>	<ul style="list-style-type: none"> <li>•Replace manifold. Check liquid compatibility.</li> </ul>

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## **PRICE® BOOSTER PUMP**





Price® Pump Co.

# INSTALLATION, OPERATING AND MAINTENANCE MANUAL

## TYPE HP CENTRIFUGAL PUMPS

**MODELS: HP75 CN/CS, BN/BS, KN/KS, NN  
HP75 SS/SC, AB  
HP100 SS/SC, AB**

PLEASE FILL IN FROM PUMP NAMEPLATE

Pump Model \_\_\_\_\_

BOM. No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Price® Pump Company  
21775 8th. Street East  
Sonoma, CA 95476  
Tel: 707-938-8441  
Fax 707-938-0764  
Email: sales@pricepump.com

RETAIN MANUAL FOR REFERENCE

IN158-HP rev. H

# Congratulations

You are now the owner of a Price® Pump Co. Centrifugal Pump. This pump was carefully inspected and subjected to final performance evaluation before being released for shipment. In order to achieve maximum performance and reliability, please follow the simple instructions in this manual.

## RECOMMENDED PRECAUTIONS

1. For satisfactory operation and safety, maximum system pressure must not exceed 350 psi\* (24.6kg/sq cm).
2. For satisfactory operation and safety, maximum fluid temperature must not exceed 300°F\* (121°C).
3. No modifications, additions or deletions should be made to the pump without prior approval of the factory.
4. Drain pump completely and flush with water before servicing a pump handling volatile or harmful liquids.

## READ CAREFULLY THE CAUTION BELOW

The performance of your Price® Pump Co. Centrifugal Pump is based on clean, room temperature, water with suction conditions as shown on the performance curves. If used to pump liquids other than water, pump performance may differ from rated performance based on the different specific gravity, temperature, viscosity, etc. of the liquid being pumped. A standard pump, however, may not be safe for pumping all types of liquids, such as toxic, volatile or chemical liquids, or liquids under extreme temperatures or pressures.

Please consult Price® Pump Co. technical specifications as well as local codes and general references to determine the appropriate pump for your particular application. Since it is impossible for us to anticipate every application of a Price® Centrifugal pump, if you plan to use the pump for a non-water application, contact Price® Pump Co. beforehand to determine whether such application may be appropriate and safe under the operating conditions. Failure to do so could result in property damage or personal harm.

\* Depends on seal materials and seal type

Visit our website for product information and technical support

[www.pricepump.com](http://www.pricepump.com)

# INSTALLATION / OPERATING INSTRUCTIONS

## CENTRIFUGAL PUMPS

### **Warning**

Before installing, repairing or performing maintenance on this pump, read these instructions completely.

Disconnect power to pump before servicing to avoid dangerous or fatal electrical shock.

Match supply voltage and frequency to motor nameplate values. Incorrect voltage can cause fire or serious motor damage and void warranty.

Ground motor before connection to electrical power supply! Failure to ground motor can cause severe or fatal electrical shock!

### **Do not ground to gas supply line!**

Before disassembling pump, be certain all liquid has been removed. If pump was used to pump hazardous or toxic fluid, it must be decontaminated prior to disassembly.

### **Close Coupled Motor Pumps**

It is suggested that these pumps be firmly bolted to a level surface. Adequate air movement around motor will help prevent overheating.

Do not over tighten inlet and outlet piping or volute may be damaged.

### **Power Frame Mounted Pumps**

Power Frame mounted pumps must be mounted on a rigid base that will not warp or flex. Each pump must be mounted such that the pump shaft centerline is in-line with the driver shaft centerline. Pads and/or shims will be required on the pump, the driver or both to insure proper alignment. The two shafts should not touch each other (end to end) and the distance between them depends on the coupling used to connect them.

Misalignment will cause vibration, bearing failure and void warranty. Pumps are rough aligned at the factory

but must be realigned after shipment and installation.

Pulley driven pump must have pulleys inline and proper belt tightness practices followed.

### **Direction of Rotation**

Note: Motor shaft rotation is viewed from the suction end of pump. A rotational arrow is shown on the front of the pump volute casing. Incorrect rotation can cause pump damage, failure or reduced performance, voiding warranty. It is best to check rotation by momentarily energizing or jogging the motor prior to filling pump with liquid.

**Warning!** Do not operate pump without liquid as damage may result to the pump internal wear surfaces.

### **Plumbing**

All piping needs to be supported independently of the pump. Piping connections should not exert any stress on the pump volute or fittings.

## INSTALLATION / OPERATING INSTRUCTIONS

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### **Suction Piping (Inlet)**

(Horizontal Pumps)

Suction line must provide adequate suction pressure and even (Laminar) liquid flow for proper pump operation. Air, entrapped in the suction line due to leaks or improper piping design, may cause the pump to lose prime. Non-priming pumps must have their suction 'flooded' at start up (see datasheets for minimum NPSHR). Also, the suction line must provide sufficient pressure (NPSH) and even flow to pump inlet to prevent pump cavitation. The suction pipe entering the pump should be straight and a minimum length of 5 times and preferably 10 times the pump inlet diameter. Elbows, fittings or valves installed close to the pump inlet can disrupt liquid flow and cause cavitation. Suction lines must be at least the same diameter as the pump inlet or larger if possible.

Price Pump Company recommends against using foot valves in the suction line to maintain liquid in the pump when it's not operating. If foot valves are used, due to suction lift conditions, they must be properly maintained to avoid

leaks resulting from wear or fouling. Suction piping must be designed to prevent vapor from being trapped in high spots in the piping. This condition may cause the pump to vapor lock.

### **Discharge Piping (Outlet)**

To control flow and discharge head, it is advisable to install a valve (globe, ball, or other adjustable and non-leak type) in the discharge line adjacent to the pump. The valve may be closed during system repairs to prevent backflow. By installing a check valve in the discharge line, backflow can also be prevented during maintenance or during periods of pump stoppage.

### **Operation**

All centrifugal pumps must be filled with liquid prior to start up. It is suggested that during initial start up the discharge valve be closed and then opened as the motor reaches full rpm's. If pump does not build up pressure as motor speed increases, shut down and make sure that liquid flow into pump is not restricted (see "Troubleshooting").

**Note:** A centrifugal pumps flow rate and head (pressure) will vary with the amount of resistance ( pipe friction and flow restrictions) in the discharge line. As the valve on the discharge line opens, the flow rate and motor amperes draw will increase and head (pressure) will decrease. As the valve on the discharge line is closed, the flow rate and amperes draw will decrease and the head (pressure) will increase.

If resistance in the discharge line is not sufficient, the pump will operate at a condition of maximum flow, sometimes called "end of curve" performance.

Maximum horse-power is required to operate at this point and motor overload may result. If excessive amperes draw and motor overload is occurring, reduce the system flow rate by installing a valve or orifice in the discharge line to control (restrict) the pumps flow rate. Alternatively, reduce pump head by trimming impeller to a smaller diameter.

Consult Price Pump or a local Price Pump distributor for assistance.

[appsupport@pricepump.com](mailto:appsupport@pricepump.com)

## TROUBLESHOOTING

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### 1. Pump fails to build head pressure:

Check for:

- a. Pump not primed.
- b. Incorrect pump rotation.
- c. Driver speed too low.
- d. Suction line restricted.
- e. Driver failure.
- f. Plugged or damaged impeller.
- g. Pump or impeller undersized.
- h. Pump cavitation.
- i. Improper impeller clearance.

### 2. Pump fails to provide enough flow rate.

Check for:

- a. System resistance too high.
- b. Pump undersized.
- c. Pump not primed.
- d. Driver speed too low.
- e. Poor suction conditions.
- f. Improper impeller clearance.

### 3. Excessive noise or vibration during operation.

Check for:

- a. Motor bearing failing.
- b. Pump cavitation.
- c. Improper impeller clearance.

### 4. Leaking mechanical seal.

Check for:

- a. Improper assembly.
- b. Worn or cracked seal faces.
- c. Abrasive material in fluid.
- d. Liquid flashing at seal faces (Fluid temperature too high).
- e. Seal pressure rating too low for the service.
- f. Chemical attack of seal components.
- g. Seal operated dry or with a liquid having poor lubricating properties.

### 5. Pump gradually loses pressure and head.

Check for:

- a. Increasing temperature causing cavitation or liquid vaporization.
- b. Driver failure.
- c. Suction lift too high.
- d. Air entering suction line.

### 6. Motor overheating.

Check for:

- a. Excessive flow and amp draw (Throttle discharge).
- b. Low voltage or frequency.
- c. Flow rate too low with resulting heat rise.
- d. Bearing failure.
- e. System temperature too high.

## REPAIR AND MAINTENANCE

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### TYPE HP MAINTENANCE AND REPAIR

Before attempting any repairs under warranty, contact Distributor to obtain factory authorization. Repairs carried out without authorization may void warranty. Many causes of pump system failure are due to improper system design. Refer to the trouble shooting -list in this manual before carrying out pump inspection.

### DISASSEMBLY

1. Disconnect power source to motor.
2. Disconnect electrical connections tagging wires carefully to preserve correct rotation. Loosen motor base.
3. Remove pump and motor assembly to repair area. Observe position of all parts prior to disassembly. (Note: Volute may be left in piping.)
4. Remove bolts and remove volute from pump.
5. Remove impeller. Unscrew CCW. (note: remove center cap from rear of motor, insert screwdriver to hold shaft while unscrewing impeller).
6. Remove seal head from motor shaft. Type 8 & 9: Loosen set screws and slide seal head off shaft.
7. Remove motor bolts and remove bracket from motor.
8. Remove seal seat from bracket using fingers.

### REASSEMBLY

1. Clean seat cavity of the bracket thoroughly. (For Bell Gasket Design, assure that there are no cuts or tearing in the end bell gasket.)
2. Thoroughly clean pump shaft. Assure that the shaft is not grooved and that there is no evidence of pitting or fretting. Polish the shaft

with extra fine emery cloth if needed. If the shaft is grooved, fretted or worn, replace the motor.

### 3. For Type 6, 8, 9 and 21 seals:

- a. Place the bracket on a firm surface with the seat cavity (pump end) up. (For Bell Gasket Design, place new end bell gasket on bracket).
- b. Install seal seat into seat cavity. (For Bell Gasket Design remove the rubber seat cup and discard). Evenly push seat into cavity with fingers. To help ensure the seat is not damaged place cardboard disk over the seat face then gently tap seat into place with a wooden dowel or plastic rod (1-1/8" outside diameter).

#### T6 seal only:

- a. Set seal on shaft with carbon facing ceramic seat. Do not push seal head past shoulder on shaft (note: when impeller is threaded onto motor shaft seal height will automatically be set.)

#### T21 only:

- a. Lubricate shaft and elastomer with vegetable oil.
- b. Install rotary seal head onto motor shaft and slide toward seat until carbon face touches seal seat.
- c. Install seal spring and seal retainer.

#### T 8 & 9 only:

- a. Install seal head onto pump shaft sliding gently past shoulder of shaft. Slide seal head toward seat until carbon face contacts ceramic seat.
- b. Tighten seal head setscrews to pump shaft. Remove clips in seal head and discard.

## REPAIR AND MAINTENANCE

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### 4. Install impeller.

Thread impeller onto shaft CW. (For stainless steel / bronze impellers, apply Loctite 242, For CPVC / Noryl impellers, apply Loctite 248 or equivalent to the motor shaft before threading the impeller onto the motor shaft) Place screwdriver in motor shaft slot in rear of motor to hold while tightening impeller firmly. (For O-ring Design, install the O-ring on to the bracket face).

#### **Note: For type 21:**

Ensure that the spring retainer does not slip between the shoulder of the shaft and the hub of the impeller.

5. Install volute and tighten bolts evenly (star pattern) to required torque.

#### **Volute Bolt Torque Specifications**

**SS / Bronze** - 10-12 ft/lbs.  
(13.5-16.3 Nm)

**CPVC** - 6 ft / lbs.  
(9.5 Nm)

**Noryl**- 10 ft / lbs.  
(13.5 Nm)

6. Rotate shaft by hand to make sure impeller does not rub against volute.

7. Return pump to installation, reconnect electric connections.

8. Start pump momentarily to observe shaft rotation. If rotation corresponds to the rotation arrow pump may be put into service. If rotation is incorrect, switch any two leads on 3-phase motors. Check the wiring diagram of motor for single phase rotation.

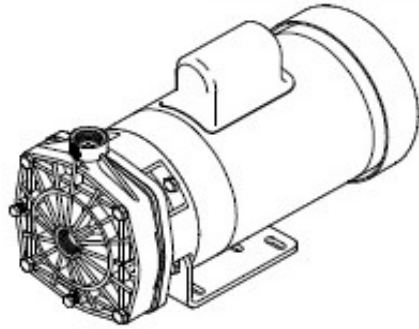
9. Prime pump thoroughly, making sure all air is purged.

10. Start pump allowing adequate time to purge any additional air from system. Observe any gauges, flow meters, etc. to verify that pump is performing properly.

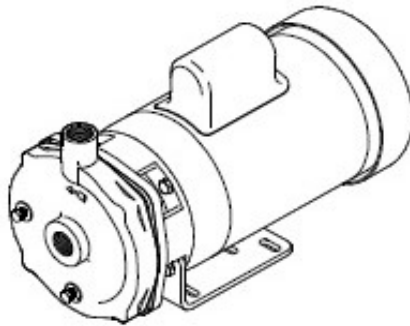
## REPAIR AND MAINTENANCE

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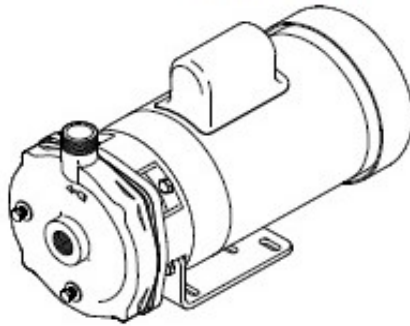
**HP75 CN/CS/NN**



**HP75 BN/BS/KN/KS/SS/SC/AB**



**HP100 SS/AB**





## REPAIR AND MAINTENANCE

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### INSTALLING A PEO (PUMP END ONLY) STUB SHAFT PUMP

- a. Place the bracket on a firm surface, loosen stub shaft setscrews and carefully remove shipping plug.
- b. Place motor in an upright position with motor shaft pointing upward. Make sure motor shaft and end bell flange are free of burrs and surfaces are clean.
- c. Align PEO stub shaft setscrews (if applicable) with motor shaft keyway and carefully slid the PEO onto the motor shaft until it sits firmly onto the motor end bell flange.
- d. Oriented the PEO's discharge port or base to preferred motor configuration while referencing the motors electrical box position.
- e. Install flange bolts and tighten. (Install pump base if applicable)
- f. Reposition pump back onto motor base.
- g. Refer to pump Reassembly Instructions and proceed to **setting the impeller clearance** (if applicable).

### INSTALLING A PEO (PUMP END ONLY) NON-STUB SHAFT PUMP

- a. Carefully un-pack all components received with your shipment and remove any shipping plugs.
- b. Place the bracket on a firm surface with the seat cavity (pump end) up. Follow seal Installation / reassembly instructions contained within this manual.
- c. Make sure motor shaft and motor end bell flange are free of burrs and surfaces are clean.
- d. Carefully place the Bracket assembly over the motor shaft and align bracket with motor end bell flange.
- e. Install impeller, gasket or o-ring, volute and volute mounting bolts.
- f. Oriented the PEO's discharge port or base to preferred motor configuration while referencing the motors electrical box position.
- g. Install motor flange bolts and tighten all bolts to proper torque . (Install pump base if applicable)

**PRICE PUMP CO.****HP75/HP100 (O-Ring Design) Parts List**

Key #	Description	QTY.	HP75/100 SS&SC:	HP75/100 AB:	HP75 NN:
A.	Volute HP75	1	0241(A <sup>1</sup> )	0229-0(A <sup>1</sup> )	8300NN(A <sup>1</sup> )
	Volute HP100	1	0241-2(A <sup>2</sup> )	0229-2(A <sup>2</sup> )	N/A
B.	1/8" Pipe Plug	2	0559(B <sup>1</sup> )	0558(B <sup>1</sup> )	8012BF(B <sup>1</sup> ) (1ea)
C.	Volute Bolts	4	0579(C <sup>1</sup> )	0592(C <sup>1</sup> )	0723(C <sup>2</sup> )
D.	Washers	12	N/A	N/A	1137
E.	Volute Nuts	4	N/A	N/A	1138
F.	Impeller	1	0918SS-(dia.)	0918BR-(dia.)	N/A
	Impeller CPVC	1	0918-(dia.)	N/A	0918-(dia.)
G	Bracket	1	0238(SS)(G <sup>1</sup> )	0242(BR)(G <sup>1</sup> )	8019NN-1(G <sup>2</sup> )
H <sup>1</sup>	T.21 Viton	1	0553 (std)	0553 (std)	0553
H <sup>2</sup>	T.8 Viton	1	2394-PU	2394-PU	N/A
H <sup>3</sup>	T.9 Teflon	1	1150	1150	N/A
H <sup>3</sup>	T.6 Buna	1	N/A	N/A	0118 (std)
J.	O-ring	1	3565	3565	0871
K.	Slinger	1	0515	0515	0515
L.	Base	1	0197	0197	0198
M.	Bolts, Motor				
	Upper	2	0579	0579	0588
	Lower	2	0724	0724	0673
N <sup>1</sup>	Motor	1	Specify P/N	Specify P/N	Specify P/N
N <sup>2</sup>	Power Frame	1	5479	5479	5479

**HP75 / HP100 Repair Parts Kits (O-ring Design)**

(Repair kits for SC pumps only)

P/N	Includes	P/N	Includes
0661SC-8	4.00" CPVC Imp., Viton O-ring, and Slinger	0661SC-3	5.25" CPVC Imp., Viton O-ring, and Slinger
0661SC-6	4.25" CPVC Imp., Viton O-ring, and Slinger	0661SC-2	5.50" CPVC Imp., Viton O-ring, and Slinger
0661SC-5	4.50" CPVC Imp., Viton O-ring, and Slinger	0661SC-1	5.75" CPVC Imp., Viton O-ring, and Slinger
0661SC-7	4.75" CPVC Imp., Viton O-ring, and Slinger	0661SC	6.00" CPVC Imp., Viton O-ring, and Slinger
0661SC-4	5.00" CPVC Imp., Viton O-ring, and Slinger		

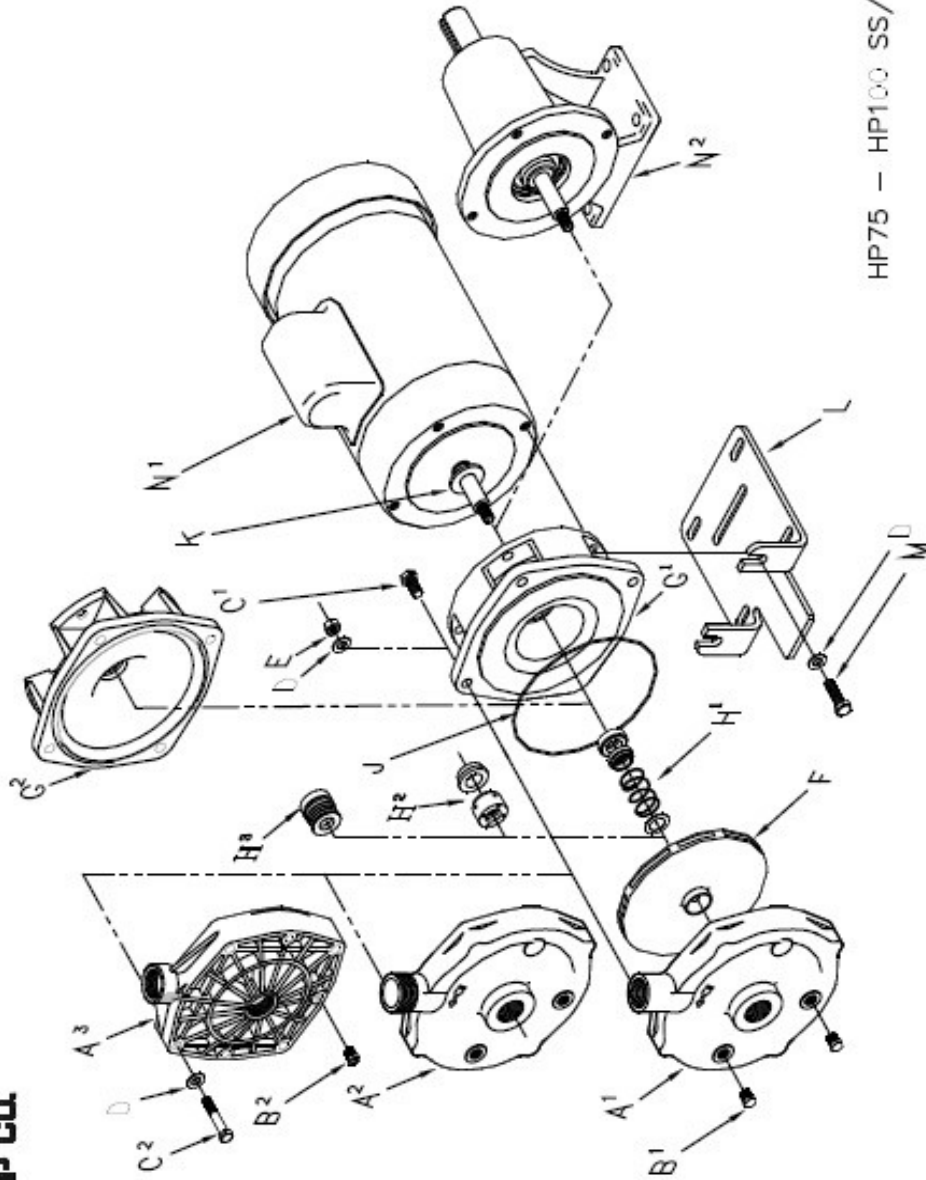
**Note: Seal/Seat must be ordered in addition to repair kit****Standard Pump Configurations**

Model:	Volute Material:	Bracket Material:	Impeller Material:
SS	316SS	316SS	316SS
SC	316SS	316SS	CPVC
AB	Bronze	Bronze	Bronze
NN	Noryl	Noryl	CPVC



PRICE PUMP CO.

HP75-100\_(O-Ring)\_P.dwg rev. B



HP75 — HP100 SS/SC/AB/NN

Price Pump Co.

21775 Eighth Street East • Sonoma, CA 95476-0329 • (707) 938-8441 • Fax (707) 938-0764

**PRICE PUMP CO.****HP75 (Gasket Design) Parts List**

Key #	Description	QTY.	HP75 BN/BS:	HP75 KN/KS:	HP75 CN / CS:
A.	Volute	1	0229(A <sup>1</sup> )	0229KP(A <sup>1</sup> )	8300CP(A <sup>2</sup> )
B.	1/8" Pipe Plug	2	0558(B <sup>1</sup> )	0559(B <sup>1</sup> )	8012PF(B <sup>2</sup> ) (1ea.)
C.	Volute Bolts	4	0592(C <sup>1</sup> )	0588(C <sup>1</sup> )	1136(C <sup>2</sup> )
D.	Washers	4	N/A	N/A	1137
E.	Volute Nuts	4	N/A	N/A	1138
F.	Impeller CPVC	1	0918-(Imp. Dia.)	0918-(Imp. Dia.)	0918-(Imp. Dia.)
	Impeller 316SS	1	0918SS-(Imp. Dia.)	0918SS-(Imp. Dia.)	0918SS-(Imp. Dia.)
G <sup>1</sup>	T.6 Buna (std)	1	0118	0118	0118
G <sup>2</sup>	T.21 Viton	1	0553	0553	0553
H.	Gasket, EPDM	1	0232	0232	0232
J.	Bracket	1	0228	0228	0228
K.	Slinger	1	0515	0515	0515
L.	Base	1	0198	0198	0198
M.	Bolts, Motor				
	Upper	2	0588	0588	0588
	Lower	2	0673	0673	0673
N <sup>1</sup>	Motor	1	Specify P/N	Specify P/N	Specify P/N
N <sup>2</sup>	Power Frame	1	5479	5479	5479

**HP75 Repair Parts Kits (Bell Gasket Design)**

(Repair kits for BN, KN, &amp; CN pumps only)

P/N	Includes	P/N	Includes
0661-8	4.00" CPVC Imp., EPR Gasket, and Slinger	0661-3	5.25" CPVC Imp., EPR Gasket, and Slinger
0661-6	4.25" CPVC Imp., EPR Gasket, and Slinger	0661-2	5.50" CPVC Imp., EPR Gasket, and Slinger
0661-5	4.50" CPVC Imp., EPR Gasket, and Slinger	0661-1	5.75" CPVC Imp., EPR Gasket, and Slinger
0661-7	4.75" CPVC Imp., EPR Gasket, and Slinger	0661	6.00" CPVC Imp., EPR Gasket, and Slinger
0661-4	5.00" CPVC Imp., EPR Gasket, and Slinger		

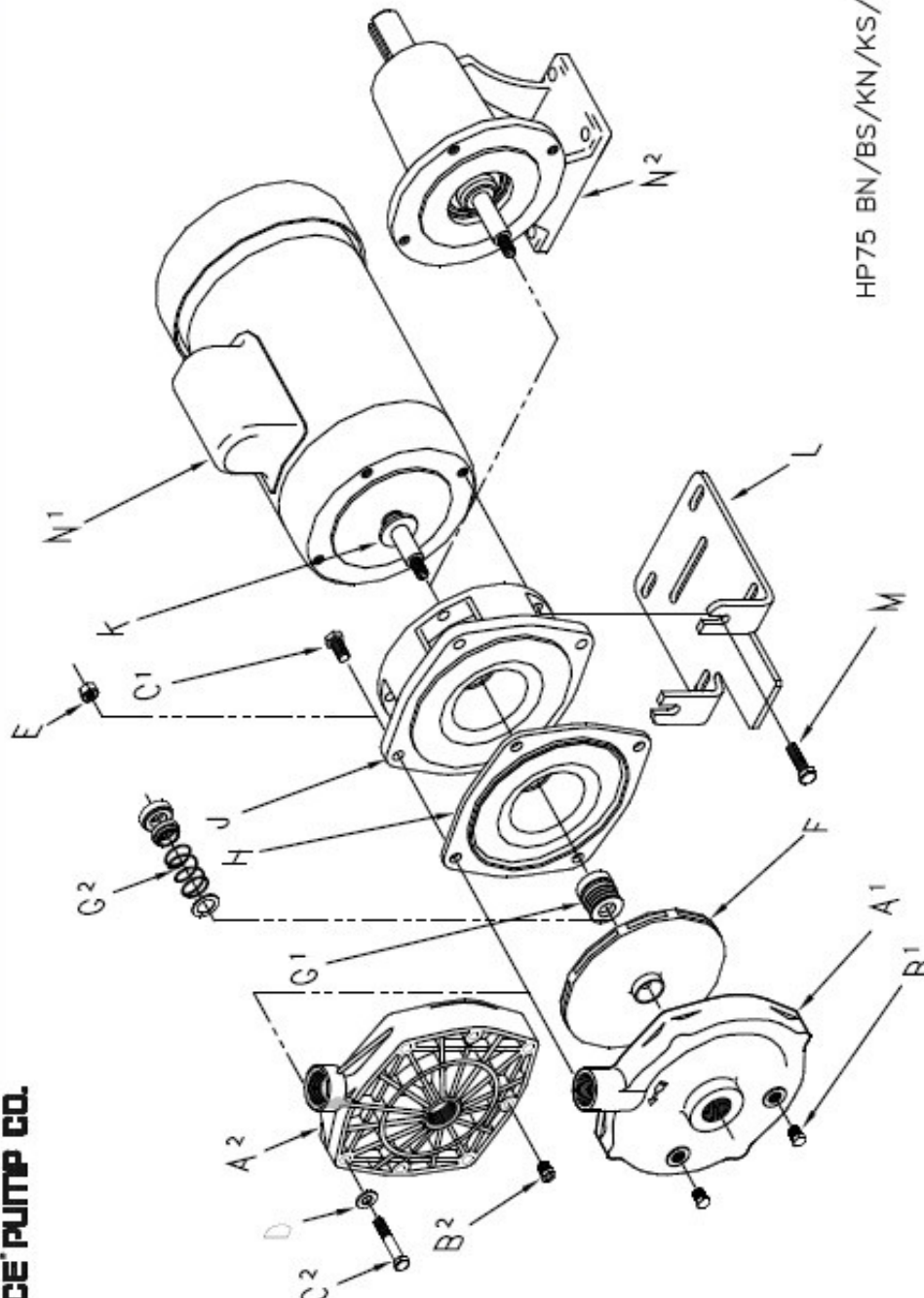
**Note:** Seal/Seat must be ordered in addition to repair kit .**Standard Pump Configurations**

Model:	Volute Material:	Bracket Material:	Impeller Material:
BN	Bronze	Cast Iron	CPVC
KN	Kanigen	Cast Iron	CPVC
CN	CPVC	Cast Iron	CPVC
BS	Bronze	Cast Iron	316SS
KS	Kanigen	Cast Iron	316SS
CS	CPVC	Cast Iron	316SS



PRICE PUMP CO.

HP775\_(Gasket)\_P.dwg rev. B



HP75 BN/BS/KN/KS/CN/CS

Price Pump Co.

21775 Eighth Street East \* Sonoma, CA 95476-0329 \* (707) 938-8441 \* Fax (707) 938-0764

## PRICE CENTRIFUGAL PUMP CAUTIONS & WARNINGS

- **CAUTION:** Price Pump centrifugal pumps must be operated above minimum flow rate to avoid damage.
- **CAUTION:** All Price Pump centrifugal pumps require the suction to be flooded.
- **CAUTION:** It is recommended that all piping connections to the pump be flexible.
- **WARNING:** Verify chemical compatibility of the pump materials of construction with the fluid being pumped.
- **WARNING:** Price centrifugal pumps are not designed for use in sanitary or food applications.
- **CAUTION:** Use only Price Pump original equipment factory replacement parts.
- **WARNING:** Price pump fluid temperature limits must be observed. Maximum operating temperature is 300°F.
- **CAUTION:** The pump should be thoroughly flushed and drained before disassembly.
- **CAUTION:** For larger pump motor units, weight may exceed 65 lbs. (30 kg).

### CAUTION: Maximum working pressure for seals:

o Type 6 Seal	<b>75 PSI</b> (5.2 bar)
o Type 6A Seal	<b>75 PSI</b> (5.2 bar)
o Type 8 Seal	<b>325 PSI</b> (22.4 bar)
o Type 9 Seal	<b>350 PSI</b> (24.1 bar)
o Type 21 Seal	<b>150 PSI</b> (10.3 bar)
o Type 2106 Seal	<b>150 PSI</b> (10.3 bar)

### CAUTION: Maximum solid size by pump

o HP75 / MS50	<b>0.030"</b> (0.76mm)
o SP150	<b>0.060"</b> (1.50mm)
o LT25	<b>0.120"</b> (3.05mm)
o F50/75/95	<b>0.150"</b> (3.81mm)
o OH75	<b>0.150"</b> (3.81mm)
o CD100/150	<b>0.150"</b> (3.81mm)
o CL150	<b>0.150"</b> (3.81mm)
o RC200/300	<b>0.380"</b> (9.60mm)
o XJ-JB100	<b>0.120"</b> (3.05mm)
o XJ-JB150	<b>0.250"</b> (6.40mm)
o XJ-JB200	<b>0.440"</b> (11.2mm)
o XL-XT100	<b>0.120"</b> (3.05mm)
o XL-XT150	<b>0.250"</b> (6.40mm)
o XL-XT200	<b>0.440"</b> (11.2mm)

### CAUTION: Minimum flow rate by pump

o HP75 / MS50	<b>0.5 GPM</b> (1.9 LPM)
o SP150	<b>10 GPM</b> (38 LPM)
o LT25	<b>0.5 GPM</b> (1.9 LPM)
o F50/75/95	<b>5.0 GPM</b> (19 LPM)
o OH75	<b>7.0 GPM</b> (26 LPM)
o CD100	<b>12 GPM</b> (45 LPM)
o CD150	<b>25 GPM</b> (94 LPM)
o CL150	<b>40 GPM</b> (150 LPM)
o RC200	<b>10 GPM</b> (38 LPM)
o RC300	<b>50 GPM</b> (189 LPM)
o XJ-JB150	<b>20 GPM</b> (75 LPM)
o XJ-JB150	<b>40 GPM</b> (150 LPM)
o XJ-JB200	<b>90 GPM</b> (340 LPM)
o XL-XT100	<b>10 GPM</b> (38 LPM)
o XL-XT150	<b>35 GPM</b> (132 LPM)
o XL-XT200	<b>50 GPM</b> (189 LPM)

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# **DOW FILMTEC™ MEMBRANES**





## DOW FILMTEC™ Membranes

DOW FILMTEC Seawater RO Elements for Marine Systems

### Features

Improved DOW FILMTEC™ seawater reverse osmosis elements offer the highest productivity while maintaining excellent salt rejection.

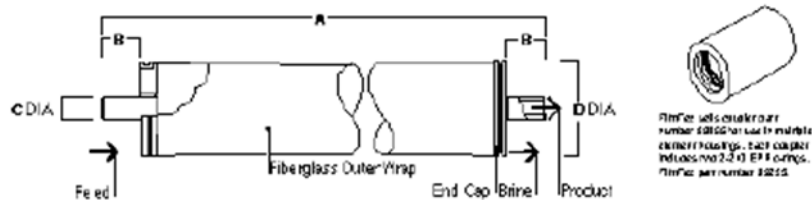
- DOW FILMTEC SW30 membrane elements have the highest flow rates available to meet the water demands of both sea-based and land-based desalinators.
- DOW FILMTEC SW30 elements may also be operated at lower pressure to reduce pump size, cost and operating expenses.
- Improved DOW FILMTEC seawater membrane combined with automated, precision element fabrication result in the most consistent product performance available.

### Product Specifications

Product	Part Number	Applied Pressure psig (bar)	Permeate Flow Rate gpd (m <sup>3</sup> /d)	Stabilized Salt Rejection (%)
SW30-2514	80733	800 (55)	150 (0.6)	99.4
SW30-2521	80734	800 (55)	300 (1.1)	99.4
SW30-2540	80737	800 (55)	700 (2.6)	99.4
SW30-4021	80740	800 (55)	800 (3.0)	99.4
SW30-4040	80741	800 (55)	1,950 (7.4)	99.4

1. Permeate flow and salt rejection based on the following test conditions: 32,000 ppm NaCl, pressure specified above, 77°F (25°C) and the following recovery rates; SW30-2514 – 2%, SW30-2521 & SW30-4021 – 5%, SW30-2540 & SW30-4040 – 8%.
2. Permeate flows for individual elements may vary +/-20%.
3. For the purpose of improvement, specifications may be updated periodically.

Figure 1



Product	Maximum Feed Flow Rate gpm (m <sup>3</sup> /h)	Dimensions – Inches (mm)			
		A	B	C	D
SW30-2514	6 (1.4)	14.0 (356)	1.19 (30.2)	0.75 (19)	2.4 (61)
SW30-2521	6 (1.4)	21.0 (533)	1.19 (30.2)	0.75 (19)	2.4 (61)
SW30-2540	6 (1.4)	40.0 (1,016)	1.19 (30.2)	0.75 (19)	2.4 (61)
SW30-4021	16 (3.6)	21.0 (533)	1.05 (26.7)	0.75 (19)	3.9 (99)
SW30-4040	16 (3.6)	40.0 (1,016)	1.05 (26.7)	0.75 (19)	3.9 (99)

1. Refer to DOW FILMTEC Design Guidelines for multiple-element systems.
2. SW30-2514, SW30-2521 and SW30-2540 elements fit nominal 2.5-inch I.D. pressure vessels.  
SW30-4021 and SW30-4040 elements fit nominal 4-inch I.D. pressure vessel.

1 inch = 25.4 mm

## Operating Limits

• Membrane Type	Polyamide Thin-Film Composite
• Maximum Operating Temperature	113°F (45°C)
• Maximum Operating Pressure	1,000 psi (69 bar)
• Maximum Pressure Drop	15 psig (1.0 bar)
• pH Range, Continuous Operation <sup>a</sup>	2 - 11
• pH Range, Short-Term Cleaning <sup>b</sup>	1 - 13
• Maximum Feed Silt Density Index	SDI 5
• Free Chlorine Tolerance <sup>c</sup>	<0.1 ppm
<sup>a</sup> Maximum temperature for continuous operation above pH 10 is 95°F (35°C).	
<sup>b</sup> Refer to Cleaning Guidelines in specification sheet 609-23010.	
<sup>c</sup> Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, DOW FILMTEC recommends removing residual free chlorine by pretreatment prior to membrane exposure. Please refer to technical bulletin 609-22010 for more information.	

## Important Information

Proper start-up of reverse osmosis water treatment systems is essential to prepare the membranes for operating service and to prevent membrane damage due to overfeeding or hydraulic shock. Following the proper start-up sequence also helps ensure that system operating parameters conform to design specifications so that system water quality and productivity goals can be achieved.

Before initiating system start-up procedures, membrane pretreatment, loading of the membrane elements, instrument calibration and other system checks should be completed.

Please refer to the application information literature entitled "Start-Up Sequence" (Form No. 609-02077) for more information.

## Operation Guidelines

Avoid any abrupt pressure or cross-flow variations on the spiral elements during start-up, shutdown, cleaning or other sequences to prevent possible membrane damage. During start-up, a gradual change from a standstill to operating state is recommended as follows:

- Feed pressure should be increased gradually over a 30-60 second time frame.
- Cross-flow velocity at set operating point should be achieved gradually over 15-20 seconds.
- Permeate obtained from first hour of operation should be discarded.

## General Information

- Keep elements moist at all times after initial wetting.
- If operating limits and guidelines given in this bulletin are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in a preservative solution.
- The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements.
- Maximum pressure drop across an entire pressure vessel (housing) is 50 psi (3.4 bar).
- Avoid static permeate-side backpressure at all times.

**DOW FILMTEC™ Membranes**  
For more information about DOW FILMTEC membranes, call the Dow Water & Process Solutions business:  
North America: 1-800-447-4369  
Latin America: (+55) 11-5188-9222  
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Pacific: +60 3 7958 3392  
Japan: +813 5460 2100  
China: +86 21 2301 1000  
[www.dowwaterandprocess.com](http://www.dowwaterandprocess.com)

**Notice:** The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

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## **BURKERT DIVERSION VALVE**

**Type 0121, 0330, 0331  
(0124, 0125, 0332, 0333)**

2/2- and 3/2-Way Solenoid Valve  
2/2- und 3/2-Wege-Magnetventil  
Electrovanne à 2/2 et 3/2 voies



Operating Instructions  
Bedienungsanleitung  
Manuel d'utilisation

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Manuals and data sheets on the Internet: [www.buerkert.com](http://www.buerkert.com)  
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Instructions de service et fiches techniques sur Internet : [www.buerkert.fr](http://www.buerkert.fr)

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Operating Instructions 1402/04\_EU-ML\_00803047 / Original DE

[www.buerkert.com](http://www.buerkert.com)

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1 THE OPERATING INSTRUCTIONS

**The operating instructions contain important information.**  
 ▶ Read the instructions carefully and follow the safety instructions.  
 ▶ Keep the instructions in a location where they are available to every user.  
 The liability and warranty for the device are void if the operating instructions are not followed.

1.1 Symbols

- ▶ Designates instructions for risk prevention.
- Designates a procedure which you must carry out.

- DANGER!**  
Immediate danger! Serious or fatal injuries.
- WARNING!**  
Possible danger! Serious or fatal injuries.
- CAUTION!**  
Danger! Moderate or minor injuries.

**NOTE!**

Warns of damage to property.



Important tips and recommendations.



Refers to information in these operating instructions or in other documentation.

1.2 Definitions of terms

In these instructions, the term "device" always refers to the Type 0121, 0330, 0331, (0124, 0125, 0332, 0333).

2 AUTHORIZED USE

**The device is designed to control, shut off and meter neutral and aggressive media up to a viscosity of 37 mm<sup>2</sup>/s.**  
 ▶ Use according to the authorized data, operating conditions and conditions of use specified in the contract documents and operating instructions.  
 ▶ Provided the cable plug is connected and installed correctly, e.g. Bürkert Type 2508, the device satisfies degree of protection IP65 in accordance with DIN EN 60529 / IEC 60529.

**Only operate the device**

- ▶ when in perfect condition and always ensure proper storage, transportation, installation and operation.
- ▶ Use the device only as intended.

2.1 Restrictions

If exporting the device, observe any existing restrictions.

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any contingencies and events which may arise during assembly, operation and maintenance.



**Risk of injury from high pressure in the system/device.**

- ▶ Before working on the system or device, switch off the pressure and vent/drain lines.

**Risk of injury due to electrical shock.**

- ▶ Before working on the system or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.

**Risk of burns/risk of fire if used for a prolonged switch-on time through hot device surface.**

- ▶ Keep device away from highly flammable substances and media and do not touch with bare hands.

**Risk of injury due to malfunction of valves with alternating voltage (AC).**

Sticking core causes coil to overheat, resulting in a malfunction.

- ▶ Monitor process to ensure function is in perfect working order.

**Risk of short-circuit/escape of media through leaking screw joints.**

- ▶ Ensure seals are seated correctly.
- ▶ Carefully screw valve and pipelines together.

**General hazardous situations.**

To prevent injuries:

- ▶ In a potentially explosive area, the device may be used only in accordance with the specification on the type label. For the use, observe the supplementary instructions manual enclosed with the device with safety instructions for the explosion-risk area.
- ▶ The enclosed UL instructions must be followed in the UL area.
- ▶ Do not carry out any external or internal modifications and do not subject the device to mechanical loads (e.g. by placing objects on it or standing on it).
- ▶ Secure the device against unintentional activation.
- ▶ Only trained technicians may perform installation and maintenance work.
- ▶ The valves must be installed in accordance with the regulations applicable in the country.
- ▶ After an interruption in the power supply, ensure that the process is restarted in a controlled manner.
- ▶ Observe the general rules of technology.

**4 SYSTEM DESCRIPTION****4.1 General description**

The pivoted armature valves are direct acting 2/2 or 3/2-way solenoid valves in a wide variety of circuit functions and models. Solenoid system and media chamber are separated from one another by a separating diaphragm system. The valves are fast acting and have a long service life.

Type 0121	2/2 or 3/2-way solenoid valve, socket valve body
Type 0330	2/2 or 3/2-way solenoid valve, socket valve body
Type 0331	2/2 or 3/2-way solenoid valve, flange valve body
Type 0332	Bistable 2/2 or 3/2-way solenoid valve with 2 coil windings, socket valve body
Type 0333	Bistable 2/2 or 3/2-way solenoid valve with 2 coil windings, flange valve body
Type 0124	2/2 or 3/2-way solenoid valve, socket valve body
Type 0125	2/2 or 3/2-way solenoid valve, flange valve body

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**5 TECHNICAL DATA**

! The following values are indicated on the type label:

- **Voltage** (tolerance  $\pm 10\%$ ) / **current type**
- **Coil power consumption** (active power in W - at operating temperature)
- **Pressure range**
- **Body material** (MS=brass, VA=stainless steel, PV=PVC, TE=PTFE, PP=polypropylene, PD=PVDF)
- **Sealing material** (F=FKM, A=EPDM, B=NBR, C=FFKM)

**5.1 Conformity**

The Types 0121, 0330, 0331, (0124, 0125, 0332, 0333) are compliant with the EC Directives according to the EC Declaration of Conformity.

**5.2 Standards**

The applied standards, which are used to demonstrate compliance with the EC Directives, are listed in the EC type test certificate and/or the EC Declaration of Conformity.

**5.3 Operating conditions**

Ambient temperature

Type 0121	max. +50°C
Other types	max. +55°C

Duty cycle

for body material

Brass or stainless steel	long-term operation, duty cycle 100%
Plastic	max. permissible duty cycle see data sheet

! **Important information for functional reliability.**

If switched off for a long period, 1-2 switching actions are recommended prior to restart.

Service life

High switching frequency and high pressures reduce the service life.

Degree of protection

IP65 in accordance with DIN EN 60529 / IEC 60529 with correctly connected and installed cable plug, e.g. Bürkert Type 2508

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**5.4 Mechanical data**

Dimensions	see data sheet
Coil material	epoxide
Connections	G 1/4 (NPT 1/4, G 1/8, G 3/8, Rc 1/4 on request)

**5.5 Fluidic data**

Media aggressive, neutral, gaseous and liquid media, which do not attack body and sealing materials. (see resistance table at [www.buerkert.de](http://www.buerkert.de)).

Medium temperature for sealing material

FKM	0 °C – +90 °C
EPDM	-30 °C – +90 °C
NBR	0 °C – +80 °C
FFKM	+5 °C – +90 °C

Circuit functions		
A (NC)		2/2-way valve, closed in rest position
B (NO)		2/2-way valve, open in rest position
C (NC)		3/2-way valve; closed in rest position, output A unloaded
D (NO)		3/2-way valve, in rest position, output B pressurized
E		3/2-way mixing valve; in rest position, pressure connection P2 connected to output A, P1 closed
F		3/2-way distribution valve, in rest position, pressure connection P connected to output B
T		3/2-way all purpose valve

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**5.6 Electrical data**

Connections DIN EN 175301-803 (DIN 43 650), shape A for cable plug Type 2508 or 2509

**5.7 Type label**

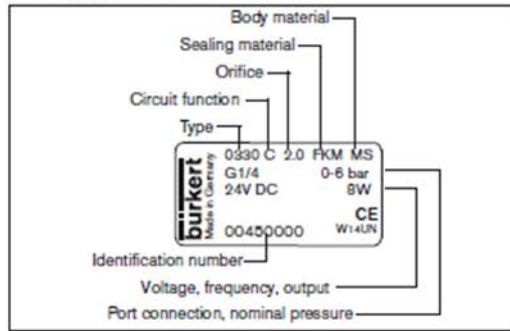


Fig. 1: Description of the type label (example)

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**6.1 Before installation**

**Installation position:**

The installation position is optional. Preferably: Actuator at the top.  
→ Prior to installation check pipelines for dirt and clean if necessary.

**Dirt filter:** To ensure that the solenoid valve functions reliably, a dirt filter (≤ 500 µm) must be installed in front of the valve input.



**6.2 Installation**

→ Observe flow direction:  
Functioning of the device is only ensured if the circuit function is maintained.

**Devices in socket model**

- Use PTFE tape as sealing material.
- Determine the maximum screw-in depth of the connecting threads as this does not comply with any standard.

**6.3 Manual control**

**NOTE!**

- ▶ When the manual control is locked, the valve cannot be actuated electrically.

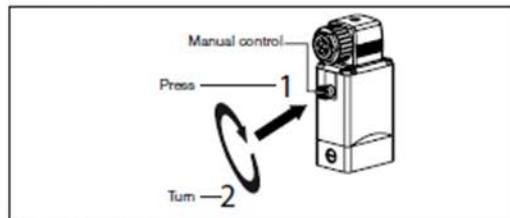


Fig. 2: Manual control

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**6 ASSEMBLY**

**! DANGER!**

**Risk of injury from high pressure in the system/device.**  
▶ Before working on the system or device, switch off the pressure and vent/drain lines.

**Risk of injury due to electrical shock.**  
▶ Before working on the system or device, switch off the power supply and secure to prevent reactivation.  
▶ Observe applicable accident prevention and safety regulations for electrical equipment.

**! WARNING!**

**Risk of injury from improper assembly.**  
▶ The assembly may be carried out only by trained technicians and with the appropriate tools.  
▶ Secure system against unintentional activation.  
▶ Following assembly, ensure a controlled restart.

**NOTE!**

**Caution risk of breakage.**  
▶ Do not use the coil as a lifting arm.

→ Hold the device with a suitable tool (open-end wrench) on the body; screw into the pipeline.

Attaching the device:

- Via bore holes M4x8 (made from brass or stainless steel) or self-tapping screws 3.9 DIN 7970 (made from plastic, max. screw-in depth 10 mm) on the bottom side of the body at drill pattern 3x24.

**Devices in flange model**

Attaching the device:

- Via supplied screws on basic devices or manifold.
- Tighten fastening screws on the coil to a maximum torque of 2 Nm.

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9

**7 ELECTRICAL CONNECTION**

**! DANGER!**

**Risk of injury due to electrical shock.**  
▶ Before working on the system or device, switch off the power supply and secure to prevent reactivation.  
▶ Observe applicable accident prevention and safety regulations for electrical equipment.

**If the protective conductor is not connected, there is a risk of electric shock.**

- ▶ Always connect protective conductor and check electrical continuity between coil and housing.

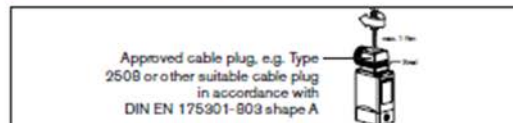


Fig. 3: Connecting the cable plug to the power supply

**! Note the voltage and current type as specified on the type label.**

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**7.1 Standard model**

- Connect L1/+ and N/- to terminals 1 and 2, independent of the polarity.
- Connect protective conductor.
- Attach seal and check for correct fit.
- Tighten cable plug (Type 2508 or 2509 in accordance with DIN EN 175301-803 (DIN 43 650), shape A, for order numbers see data sheet); while doing so, observe the maximum torque of 1 Nm.
- Check electrical continuity between coil and body (protective conductor function).

**7.2 Pulse model (CF 02)**

- !** In accordance with the terminals on the valves, the connection terminals in the cable plug are marked with the numbers 1 to 3.
- Connect as shown in "Fig. 4". Pulse on terminal 1 closes the valve; pulse on terminal 2 opens the valve.
- Attach seal and check for correct fit.
- Tighten cable plug (Type 2508 or 2509 in accordance with DIN EN 175301-803 (DIN 43 650), shape A, for order numbers see data sheet); while doing so, observe the maximum torque of 1 Nm.

→ Check electrical continuity between coil and body (protective conductor function).

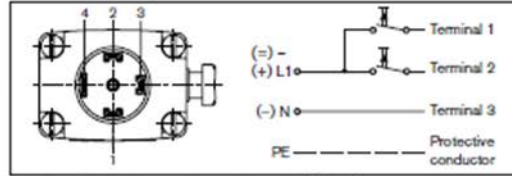


Fig. 4: Electrical connection - pulse model (CF 02)

**NOTE!**

- ▶ Prevent simultaneous pulsing on both coil windings.
- ▶ Parallel to the terminals, no other consumers (relay, etc.) may be connected.
- ▶ The respective coil connection that does not carry current must be galvanically isolated (open).
- ▶ In case two or more valves are connected in parallel, the use of two-pole or multi-pole switches must ensure that this requirement is met.

**8 DISASSEMBLY**

**! DANGER!**

- Risk of injury from high pressure in the system/device.**
  - ▶ Before working on the system or device, switch off the pressure and vent/drain lines.
- Risk of injury due to electrical shock.**
  - ▶ Before working on the system or device, switch off the power supply and secure to prevent reactivation.
  - ▶ Observe applicable accident prevention and safety regulations for electrical equipment.

**! WARNING!**

- Risk of injury from improper disassembly.**
  - ▶ Disassembly may be carried out only by trained technicians and with the appropriate tools.
- Risk of injury from hazardous media.**
  - ▶ Before loosening lines or valves, flush out hazardous media, depressurize and drain the lines.

**9 MAINTENANCE, TROUBLESHOOTING**

**9.1 Safety Instructions**

**! DANGER!**

- Risk of injury from high pressure in the system.**
  - ▶ Turn off the pressure and vent the lines before loosening lines or valves.
- Risk of injury due to electrical shock.**
  - ▶ Before working on the system or device, switch off the power supply and secure to prevent reactivation.
  - ▶ Observe applicable accident prevention and safety regulations for electrical equipment.

**! WARNING!**

- Risk of injury from improper maintenance work.**
  - ▶ Maintenance may be carried out only by trained technicians and with the appropriate tools.
  - ▶ Secure system against unintentional activation.
  - ▶ Following maintenance, ensure a controlled restart.

**9.2 Malfunctions**

- If malfunctions occur, check whether:
- the device has been installed according to the instructions,
  - the electrical and fluid connections are correct,
  - the device is not damaged,
  - all screws have been tightened,
  - the voltage and pressure have been switched on,
  - the pipelines are clean.

Malfunction	Possible cause
Valve does not switch	Short circuit or coil interrupted
	Medium pressure outside the permitted pressure range
	Manual control locked
Valve does not close	Inner compartment of the valve is dirty
	Manual control locked

**9.2.1 Repairs**

Repairs may only be carried out by the manufacturer. Operating data may change if spare parts are replaced by the user.

**10 TRANSPORTATION, STORAGE, DISPOSAL**

**NOTE!**

- Transport damage.**

Inadequately protected devices may be damaged during transportation.

  - ▶ Protect the device against moisture and dirt in shock-resistant packaging during transportation.
  - ▶ Prevent the temperature from exceeding or dropping below the permitted storage temperature.
- Incorrect storage may damage the device.**
  - ▶ Store the device in a dry and dust-free location.
  - ▶ Storage temperature -40 – +80°C.
- Damage to the environment caused by parts contaminated with media.**
  - ▶ Dispose of the device and packaging in an environmentally friendly manner.
  - ▶ Observe applicable disposal and environmental regulations.

## **PART 7: WARRANTY INFORMATION**

## OWNER'S LIMITED WARRANTY

Dometic Corporation (Dometic) warrants to the original purchaser/owner, and to subsequent owners during the applicable Limited Warranty Period, Dometic's Water Purification Products, Pumps, Related Accessories and Replacement Parts against failure from defects in material or workmanship arising in the periods specified in the Table of Limited Warranty Periods below. If a covered product or part fails during the applicable warranty period, Dometic will remedy same by repairing or replacing the defective warranted product or part as outlined below in the Table of Limited Warranty Periods. Defective parts shall be replaced free of charge and labor shall be paid for by Dometic only as set forth in the Table. Dometic reserves the right to refund the purchase price of the subject product or part as an alternative remedy to repair or replacement. The remedy allowed hereunder (repair, replacement or refund) shall be at Dometic's sole option.

### SECTION I

#### WHAT'S COVERED

##### **What does the Limited Warranty cover?**

Water Purification Products, Pumps, Related Accessories and Replacement Parts manufactured and/or marketed by Dometic for the durations set forth in the Table of Limited Warranty Periods.

##### **What is disclaimed, and are the warranties and remedies exclusive of all others?**

**Dometic does not disclaim the implied warranty of merchantability, but limits the duration of that implied warranty to the duration of the Limited Warranty offered herein.**

**This Limited Warranty, as well as the implied warranty of merchantability and the remedies offered by Dometic herein, are EXCLUSIVE and are made or provided in lieu of all other express or implied warranties, obligations, or liabilities. In no event shall Dometic be responsible or liable for any incidental or consequential damages alleged to have resulted from any defect in or failure of any warranted product or part. In those instances in which a cash refund is made, such refund shall effect the cancellation of the contract of sale and such refund shall constitute full and final satisfaction of all claims which the purchaser has or may have against Dometic due to any actual or alleged breach of warranty, either express or implied, including, without limitation, the implied warranty or merchantability or fitness for a particular purpose.** Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation may not apply to you. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

**The Dealer is not an agent for Dometic, except for the purpose of administering the above warranty to the extent herein provided. Dometic does not authorize the dealer or any other person to assume for Dometic any liability in connection with such warranty, or any liability or expense incurred in the replacement or repair of its products other than those expressly authorized herein. Dometic shall not be responsible for any liability or expense except as is specifically authorized and provided herein.**

Dometic reserves the right to improve its products, through changes in design or material without being obligated to incorporate such changes in products of prior manufacture. Dometic can make changes at any time in design, materials, or part of units of any one, model year, without obligation or liability to owners of units of the same year's model of prior manufacture.

This warranty gives you, the purchaser/owner, specific legal rights, and you may also have other rights which vary from state to state.

# OWNER'S LIMITED WARRANTY

## SECTION II

### WHAT'S NOT COVERED

#### What does this Limited Warranty not cover?

##### This Warranty Shall Not Apply to:

1. Failures resulting from improper installation or use contrary to instructions.
2. Failures resulting from abuse, misuse, accident, fire, or submergence.
3. Any part manufactured by Dometic, which shall have been altered so as to impair its original characteristics.
4. Any parts which fail as a result of misuse, improper application or improper installation.
5. Items not manufactured by Dometic, i.e., items, which are purchased from another manufacturer and supplied as received by Dometic without alteration or modification except as any part of a Dometic manufactured unit or component.
6. Components or parts used by or applied by the purchaser, as an integral part of products not manufactured by Dometic.
7. Labor resulting from difficult access to a Dometic product. The original installer or OEM is responsible for accessibility of unit.
8. Leaks due to improper installation of system, for example: hose clamps, fittings, flare nuts, quick disconnects.
9. Freight Damage.
10. Pumps that have been run dry, are water damaged or have blown freeze plugs.
11. Pumps with cracked heads.
12. Pump seals are not covered.
13. UV light bulbs are not covered.
14. Sea strainer elements are not covered.
15. Cartridge filter elements are not covered.
16. Sand & gravel in a multi-media filter are not covered.
17. Pump packing assemblies are not covered.
18. Pump valve assemblies are not covered.
19. Pump crankcase oil is not covered.
20. Gauge instrument calibration is not covered.
21. Fuses are not covered.
22. Valve seals and packings are not covered.
23. Exterior corrosion is not covered.
24. Membrane elements are not covered.
25. Logic boards with water damage.
26. Logic boards with blown MOV's (Power Surge)
27. Mis-programmed displays.
28. Displays or remotes with water damage.
29. Failures due to improper winterization.
30. Unit damage as a result of improper return packaging.
31. Travel costs are included in the hourly labor allowances and should not be billed as a separate item without preapproval from the factory.

Installation and application of Dometic components are not warranted by Dometic, because Dometic has no control or authority over the selection, location, application, or installation of these components.

## OWNER'S LIMITED WARRANTY

### SECTION III

#### COVERAGE PERIOD

##### **What is the period of coverage?**

SEE TABLE OF LIMITED WARRANTY PERIODS BELOW.

**How does one determine when the Limited Warranty Period begins?** All Dometic products bear a data plate on which there are model and serial numbers. The date of manufacture of the product can be determined by Dometic based on the serial number on the product. To determine whether or not any Dometic component is in warranty, proceed as follows:

1. Determine the model and serial number on the data plate located on the product. Write or call the Dometic Customer Service Department to obtain the manufacture date of the product. The hours of the Customer Service Department are 8:00 a.m. - 5:00 p.m. (USA, Eastern Standard Time Zone) Monday through Friday excluding holidays.
2. It is possible that a considerable time lag exists between the date a product or component is manufactured and the date it is put in service. In such instances, the date of manufacture could indicate that the item is out of warranty. However, based on the date the equipment is first put in service, the item may still be covered by the Dometic Limited Warranty. For proof of date put in service, Dometic will require a copy of the bill of sale of the Dometic equipment from the installer or new boat dealer to the original owner.

# OWNER'S LIMITED WARRANTY

## SECTION IV

### GETTING COVERED WARRANTY SERVICE

#### How does the purchaser/owner get warranty service?

**Please read the following Warranty Procedure:** If the failure of a Dometic component is determined to be covered under the Dometic warranty and the time in service is determined to be within the warranty time limit, the owner has the following three options:

1. Preferred option: Have a Dometic authorized Servicing Dealer, perform the work needed. The customer needs to call Dometic Customer Service Department for a recommendation as to the closest dealer. If the customer already knows an authorized servicing dealer, the dealer should be contacted directly.
2. Second option: If the customer contacts Dometic Service Department for a Servicing Dealer and Dometic has no one in that particular area, Dometic will authorize the use of a local service company and Dometic will work with the local company to assist in any way possible.

The customer may contact the Dometic Service Department at 1(800) 542-2477, Monday through Friday, 8:00am - 5:00pm.

### TABLE OF LIMITED WARRANTY PERIODS

#### Important Notes Regarding Product Start-up/ Commissioning:

1. Warranty periods begin from the date of possession of the boat/vessel by the first owner if OEM installed or date of installation if dealer installed, but not to exceed three (3) years from date of production of the product. However, if the product is started for any reason by the OEM or dealer, notwithstanding any provision to the contrary, the warranty period will be for a period of one (1) year commencing from the date that the product was started by the OEM or dealer. The warranty is transferable and will carry the remainder of the original owner's warranty based on the original date of purchase or date of installation.
2. Proof of purchase or installation may be required to verify warranty coverage.
3. Any unit or replacement part installed due to a warranty failure carries the remainder of the original warranty. Warranty coverage does not start over from the repair/replacement date.
4. Warranty coverage shall not exceed three (3) years from the date of production of the product.
5. These warranty periods are effective February 1, 2014.

### WATER PURIFICATION PRODUCTS:

#### PRODUCT SALE TYPE WARRANTY COVERAGE

**Spot Zero** OEM 1-year warranty, parts and labor, from date of delivery of vessel. Not to exceed 3 years from date of production of product, and subject to **Important Notes above**. Pump warranty, see Pump section.

Dealer Installed 1-year warranty, parts and labor, from date of installation. Not to exceed 3 years from date of production of product, and subject to **Important Notes above**. Pump warranty, see Pump section.

**Sea Xchange** OEM 1-year warranty, parts and labor, Not to exceed 3 years from date of production of product, and subject to **Important Notes above**. Pump warranty, see Pump section.

Dealer Installed 1-year warranty, parts and labor, from date of installation. Not to exceed 3 years from date of production of product, and subject to **Important Notes above**. Pump warranty, see Pump section.

(SE SERIES, SX SERIES FROM DATE OF DELIVERY OF VESSEL. XTC SERIES, CX SERIES)

### PUMPS, ACCESSORIES, REPLACEMENT PARTS:

#### PRODUCT SALE TYPE WARRANTY COVERAGE

Pumps OEM or Dealer Installed 1 year warranty, parts and labor. Wearable parts such as pump seals, brushes and plastic valves are not covered under warranty.

## **OWNER'S LIMITED WARRANTY**

### **SECTION IV (CONTINUED)**

Dealer Installed and 1 year warranty, parts only. Wearable parts such as pump seals, brushes and plastic valves are not covered under warranty.

Accessories OEM, Dealer Installed, 1 year warranty, parts only.

Replacement Parts Aftermarket sales. 90-Day warranty, parts only.