HC Commercial
10,000 GPD
USERS MANUAL

Table of Contents

I. Theory Of Operation

Upon start-up the feedwater pump runs through prefilters and will build up pressure which after 10 PSI will close a normally open pressure switch and allow the unit to continue running without pressing start switch. This will cause a contact on CR1 to close and hold CR1 closed**.**

If the auto-man switch is in auto position this will energize TD1, which in turn will energize CR2 (high pressure pump relay) and will start high pressure pump. At this time the pressure valve will be turned clockwise until the operating pressure is reached, at this time the RO membranes will be producing water.

A level switch in flush tank will close if the tank is not full and operate a diversion valve to fill the tank with product water when filled, the valve will close and product water will go to storage tank.

At any time the product water TDS raises above set level on salinity monitor, the product water will again be diverted to the flush tank, and if it is already filled it will go out the 1 1/4" hose marked :TO DRAIN" (the drain can be run just outside, for it will primarily be product water). The product water salinity controller should normally be set about 600 PPM. The probes on these instruments should be inspected and cleaned every few months, or if a problem developed with the diversion system.

During the operation of RO if high pressure goes above 900 PSI, the relief will open and pressure will have to be reduced back to near zero PSI and then brought back up to desired pressure. If high pressure relief fails, the high pressure switch will open and shut down the system. If low or high lights limits are exceeded the fault lights and alarm will come on and stay on until reset is pressed, or power removed.

After operation and unit is shut down, the time delay will operate normally closed contacts to turn on the CR3 flush relay. The flush pump will run approximately 40 gallons of permeate water through the HP pump and membrane and when low level switch opens the pump will shut down.

II. General Product Specifications

DESCRIPTION

Membrane Housings: Fiberglass/aluminum/316L Stainless Steel (Lifetime Warranty)
Membranes: Thin composite R.O. membranes

TEST CONDITIONS

Temperature: 78º F (25º C)
Operating Pressure: 800 PSI. 900 PSI MAX
Feed Water Quality: 32,000 PPM Total Dissolved Solids (32.0K mg/L)
Salt Rejection Performance: 99.2% Rejection NaCl (Typical)

AMPERAGE

AMPERAGE

HCCom 2000/2500	5 HP Motor	230 @ 21amps
HCCom 3000/4000	7-1/2 HP Motor	230 @ 36 amps

Note: (larger units will vary with capacity)

WATER PRODUCTION CAPABILITIES

SK	**GPD**	**GPH**
Model	**24 Hrs**	**1 Hr**
HCCom 2000	2000	80
HCCom 2500	2500	100
HCCom 3000	3000	120
HCCom 4000	4000	200
HCCom 10K	10000	7 GPM
HCCom 15K	15000	10 GPM

Note: Membrane outputs can very with salinity, temperature and age. Production output cannot be guaranteed for individual units.

III. Installation Instructions of HC Commercial Units

Select a Seawater Supply

A pressured seawater system used on many commercial vessels is an excellent source. If one is not available, you may have to install a new thru hull and 2" I.D seacock. The thru hull must be positioned as close to the bottom center of the boat as possible. Make sure there is nothing in the slip stream in front of the intake, or if in a sailboat the thru hull should be as low as possible so that the thru hull will not be above the waterline when heeled over. It is advisable to install an intake strainer at this time. It would be advantageous to keep the intake ahead of the prop wash. Air bubbles are a high pressure pump's greatest enemy!!! An air separator is furnished for supplying air-free water to the high-pressure pump, but large amounts of air can bypass this feature. If system is to be shorebased, a seawater or brackish well is recommended to raise the quality of the feedwater. This will increase prefilter life greatly

Select a Location For The Prefilter Bank

It should be between the prefilter pump and the high-pressure pump, in a location that is accessible. Clean prefilters are very important to the operation of the entire unit, as clogged filters can shutdown the system or produce a vacuum which can result in air entering the system.

Select an Area for the RO Housing and High-Pressure Pump

The RO desalinator should be kept in as cool place in the bilge as possible, and close to the high-pressure pump. An excellent choice is in front of the engine room bulkhead if possible, or if installed on a shore based operation, keep from sun and rain.

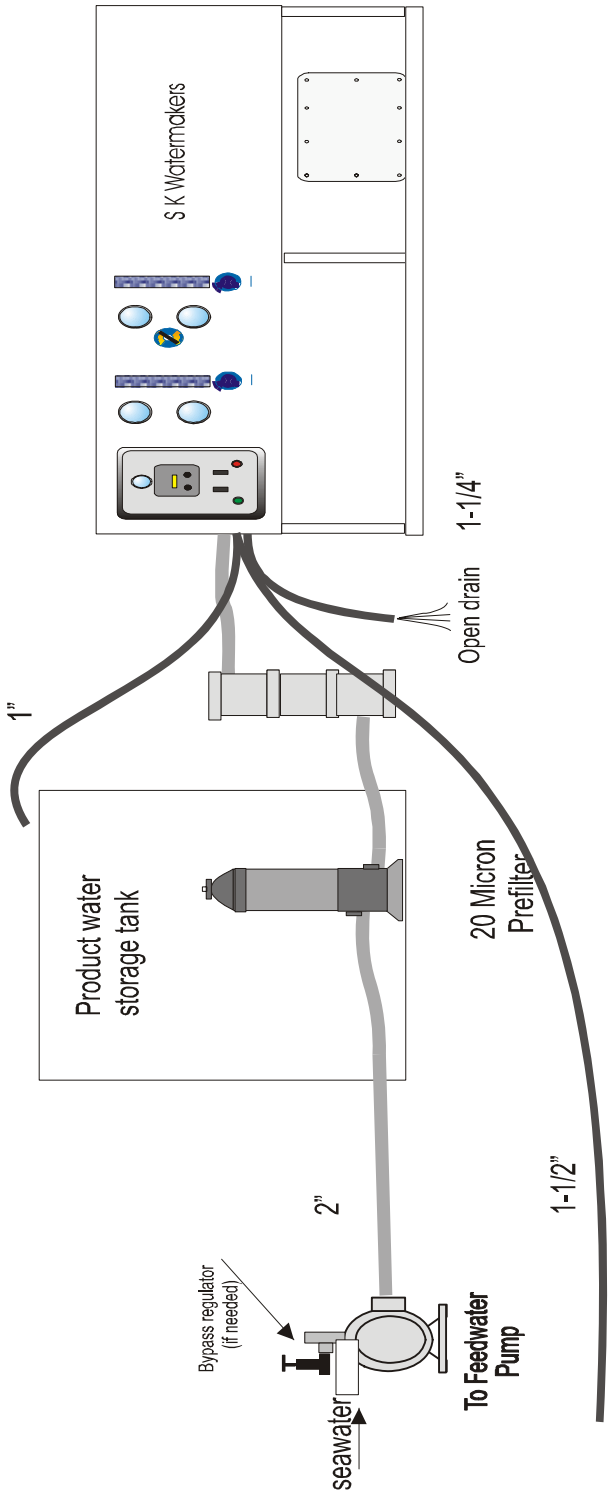
Overboard/Brine Dump Connection

Select a 1 1/2" thru hull for the brine dump. It should be located above the waterline. Location is not critical. If on shore, brine dump should be placed as far as possible from the intake

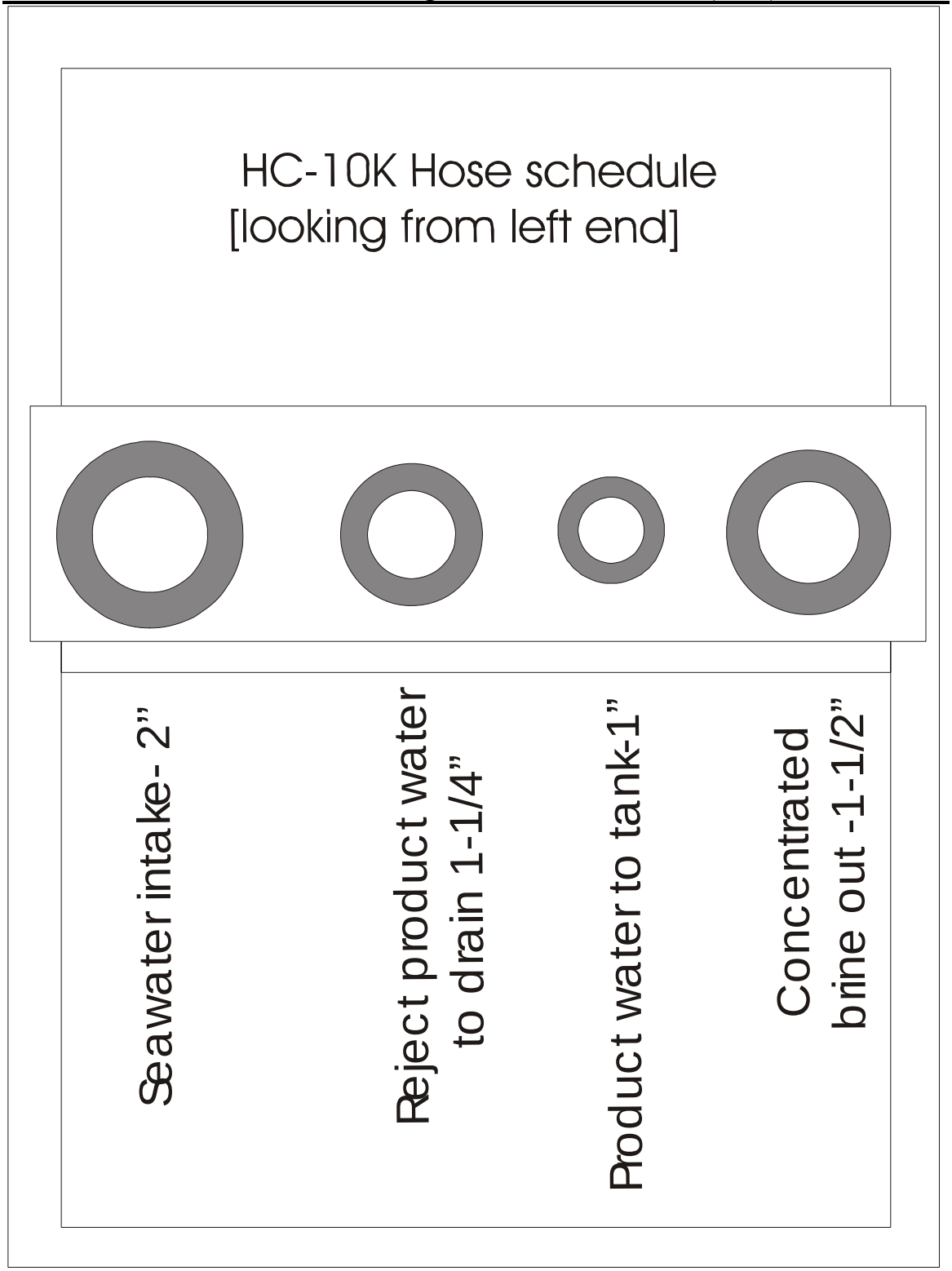
Seacock Connection

Connect the seacock to the feedwater pump with a 2" minimum suction hose. (either flexible plastic hose or rubber w/wire, on shorebased units, PVC piping may be used except for flexible conn. to watermaker) Connect the output from the prefilters to the RO with a 2" minimum hose. (reinforced beverage hose is a good choice)

IV. HC Commercial Installation Diagram and Hose Schedule



IV. HC Commercial Installation Diagram and Hose Schedule (cont.)



III. Installation of HC Units (cont.)

Fresh Water Connection

The **"Product Water To Tank**" port should now be connected with a 1"clear braid hose and run to the top of the tank. This should not have a shut off in this line. Stoppage of product water will damage the unit. The hose should be run high enough so that tank water cannot siphon back to the RO unit, although there is an internal check valve.

A.C. Source Connection

. #10 gauge marine grade wire with ground is adequate for 5 to 71/2 HP units on 3 phase. Use #18 gauge for 220 volts 3 phase for 5 HP, 7 1/2 and 10 HP single phase. Larger units willbe specified individually

Note: HC-10K for Crocked Island project will be #8 480 volts network ("Y) with 208-220 to center tap.

V. Operating Instructions

Check Connections

• Check all hose connections for tightness and seaworthiness

• Make sure all hose clamps are securely tightened. (Failure to do so will allow air into the system. The suction side of the high-pressure pump or feedwater pump is a key area of concern.)

• Be sure to **open** the thru hull seacock valve to feed the system with seawater, failure to do so will damage HP pump..

Start the System

• Turn high-pressure control valve counter-clockwise to fully open position.

• Turn sample valve to **SAMPLE** position to divert the product water to the drain.

• When starting the unit upon installation or after changing prefilters, turn prefilter auto manual switch to: **MANUAL.**

• Allow prefilter pump to run until the water runs clear of air

• Check for leaks. Make sure water is flowing.

• If autostart ramp up or inverter is furnished, wait at least 1 minute after ramp up. then slowly turn high-pressure control valve clockwise until pressure reaches 800 PSI. (in seawater), or until product water output reaches designed output.

•Auto start or inverter drives may leave pressure set without adjusting on every start up.

• Check for leaks and make sure product water is flowing (see general specifications for flow-rates.

•If product water is not flowing after 1 minute stop here, shut down the system and **Trouble-Shoot.**

Normal Start-Up

• Press start button (you may have to hold the start button until feedwater pressure increases enough to hold low pressure switch closed)

• After start-up the high pressure pump will energize automatically after a preset time.

DO NOT TUR

Check Water Quality

• Let system fun for 30 minutes.

• Sample water and use the hand-held salinity meter provided to test water quality.

• If reading is under 800 you may divert product to the tank.

• When auto salinity diversion is used, check on start up with hand held meter every month or two.

The system is filled with a preservative solution from the factory. Salinity (TDS) will improve after a short period of operation. When in operation it is advisable to start up with no pressure for a minute or two. When stopping the RO unit, the pressure should be turned down first.

WARNING!

It is advisable not to use an RO unit in a highly polluted or silted harbor. If it is necessary, carefully monitor the prefilters. The pump should be shut down when low-pressure gauge reads 12 PSI or lower.

VI. Water Quality Testing

The water quality produced by the RO unit upon starting will be low due to the normal osmotic pressure (salt tends to diffuse into fresh sea level). Under normal everyday use drinkable water would become available in a very short time (usually under a minute). If the units sits without use for an abnormal period, the time required to produce acceptable water will increase.

Low Quality - Symptoms Causes

- Too much time between use (every day use would be best)
- Temperature (hot climates and engine rooms tend to increase bacterial activity)
- Seawater quality
- High seawater salinity
- Pressure (too low or too high)

Symptoms Reduction

- Everyday use
- Fresh or permeate water flush
- Preserving (Pickling the membrane)

Depending on the model you purchased, your unit will be provided with a electronic tester (hand held or built in). The built in models will read directly in T.D.S. (total dissolved solids) which will be salt content in parts per million. The hand held meter will also read directly in TDS.

The world health organization recommends approximately 800 PPM as a limit, but if your unit has increased to 700 or higher or production has fallen 15% or more after original output, we recommend you clean or replace your membrane. Also for an accurate reading, let the RO unit run for 10-15 minutes before sampling.

VII. Maintenance and Cleaning

Long Duration Shut Down Procedure

*If you purchased **a fresh water flush** with system see section on fresh water flush*

- With system running connect a 3/4" hose to product water sample port.
- Place the other end of hose in a 30 gal container, filled with product water and 2 lbs of preservative.
- Turn high-pressure control valve counter-clockwise to fully open position.
- Place 2" intake hose in container of product water and preservative.
- Connect 1 1/2" hose to brine reject port on RO unit place the other end of hose into same container with preservative solution.
- Run unit for 30 minutes at lowest pressure (control valve all the way counterclockwise), shut system off.
- Discard preservative and replace hoses to original position.
- This will be sufficient for about 6 months storage.
- After future start run unit for 30 minutes before using product water to clear out preservative.

WARNING!!!
Do not use water from on board tanks to flush RO. Chlorine may have been used in the tanks.Chlorine will permanently damage the RO membranes. Always use product water

Prefilters

Observe prefilter gauge pressure. This will give you a good indication of your prefilters's condition. If pressure falls below 10 PSI it is time to change your prefilters and clean intake strainer (plankton filter - if one is in line). If feedwater pressure falls below 10 PSI the RO will shut down.

Control Housing

Check fittings for leaks, clean housing with plain soap and water. Check high-pressure pump for leaks at fittings. At any sign of a leak or saltwater spill the RO should be washed down with fresh water.

VII. Maintenance and Cleaning (cont.)

Membrane

If production falls and TDS goes above 700 PPM the membrane may need to be cleaned. If production does not come up after cleaning, repeat procedure. If the cleaning procedure is not successful, the membrane will need to be replaced.

Membrane Cleaning Procedure

Follow the Long duration Shut Down Procedure detailed previously but instead of using 2lb. preservative, dissolve (2lb.) Alkaline Membrane Cleaner into 30 gallons of water. Cleaner must be at 95 to 110 degrees for proper cleaning. Run for 30 minutes at lowest pressure. (high pressure regulator valve turned all the way counterclockwise). replace hoses to original positions to normal operating pressure and discard product water for 30 minutes. Check water for quality and production.

VIII. Trouble-Shooting Guide

CONDITION	CAUSES	REMEDY
low pressure reading on prefilter gauge	Clogged water inlet	Check for stoppage
	Stopped up or kinked hose from inlet	Remove debris or replace hose
	Dirty prefilter or strainer .	Clean strainer or change filters
High pressure gauge will not come up to 800 PSI	No intake water	Check prefilter and vacuum gauge, check intake replace filters if necessary
	Seawater bypass	Replace or clean or adjust safety bypass
	Air in system	Check suction fittings
	Defective high pressure pump	Rebuild or replace pump
HP pump runs rough .	Air in inlet plumbing	Tighten connections check for proper location of inlet thru hull
	Restrictions in inlet plumbing	Check for kinks or dirty prefilters
	Defective valve or diaphram in HP pump	Repair or replace pump
Low product water	Fouled or worn RO membrane	Clean or replace RO membrane

VIII. Trouble-Shooting Guide (cont.)

CONDITION	CAUSES	REMEDY
Higher product water flow than normal	Failed RO membrane	Replace membrane
	Using RO unit in fresh or brackish water with pressure set too high	Lower pressure
HP pump does not run	Defective electric motor	Repair or replace electric motor
	Defective breaker, switch or fuse	Replace breaker, switch or fuse
	Defective inverter if used	Replace or repair invertor
Product water quality above 800 PPM	Fouled membrane	Clean or replace membrane
	Product tubes o-rings damaged	Replace o-rings

IX. Installation and Operation of Manual Fresh water Flush *(Optional)* .

Installation

- Locate convenient location and install flush
- Run hose or line to pressurized water from ship's freshwater system supply
- Run 3/4" hose from freshwater flush to 3/4" barb on tee supplied w/flush
- Install 2" 3-way 90* ball valve on inlet

Operation

- RO HP pump should be OFF while flushing, unless flushing directly with product water.
- High pressure valve on control should be in the open position (all the way counterclockwise) turn 3-way valve on intake to "FLUSH"
- Turn handle on the freshwater flush so the handle is inline with the valve and let it flush for 10 to 20 minutes
- Close valve on fresh water flush filter , return 3-way valve to "RUN" position - flushing is complete
- Flushing is very good insurance against membrane failure and will increase the life of your entire system
- Flushing may be done at any time after RO shutdown with a simple turn of the valve on the carbon filter
- A good practice would be to flush your RO after every use, if it is not to be used every day

Your system is good for approximately 1 month after flush depending on the temperature. The activated carbon filter must be changed at a maximum of 3 months regardless of use. Use a high quality filter as any chlorine will damage the RO membrane.

X. Tips for Operation of Marine Desalinators

THE DO'S

• Lower pressure before stopping and starting, unless a "RAMP" or soft start is furnished

• Lower pressure in brackish water. (Stay within the GPH rating of the unit)

• Flush RO unit with fresh water whenever possible. **(NO CHLORINE**) A freshwater flush is available at a low cost.

• Preserve RO membrane with pickling solution for long time storage. (up to 6 months)

• Monitor prefilters carefully for blockage.

• Change oil in high pressure pump regularly. (First 50 hours and 500 hours therafter.)

THE DON'TS

• Operate in very silty conditions. (this may scale membranes and require acid cleaning)

• Operate in any situation with oil in the seawater.

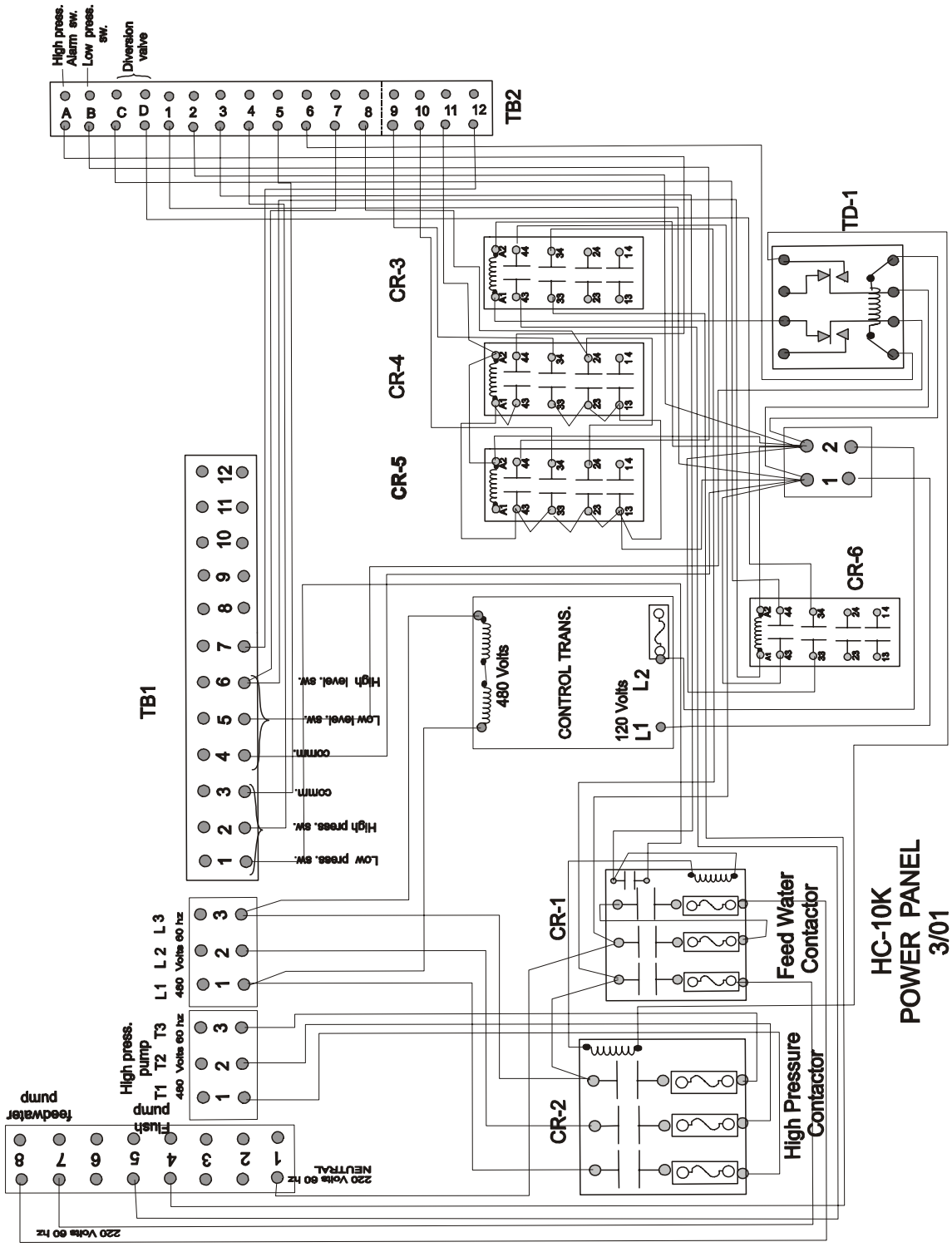
• Let the RO membrane(s) dry out, they will be irreversibly damaged.

• Share a thru hull with any other devices aboard. (**EXCEPTION!!!** Saltwater wash down pump or toilet pickup)

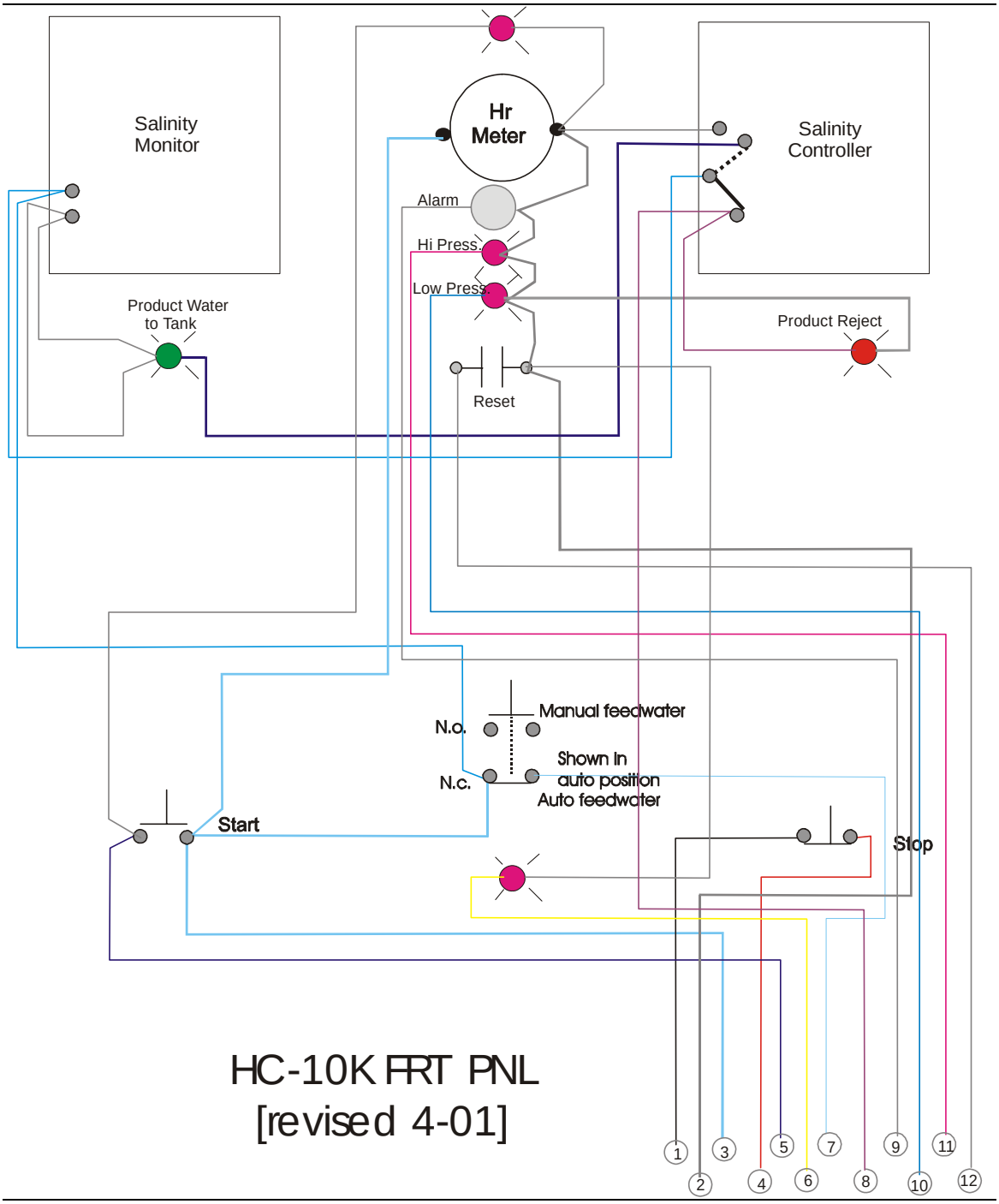
• Operate under low voltage conditions.

• Clean equipment with anything but soap and water or window cleaner. (no acetone)

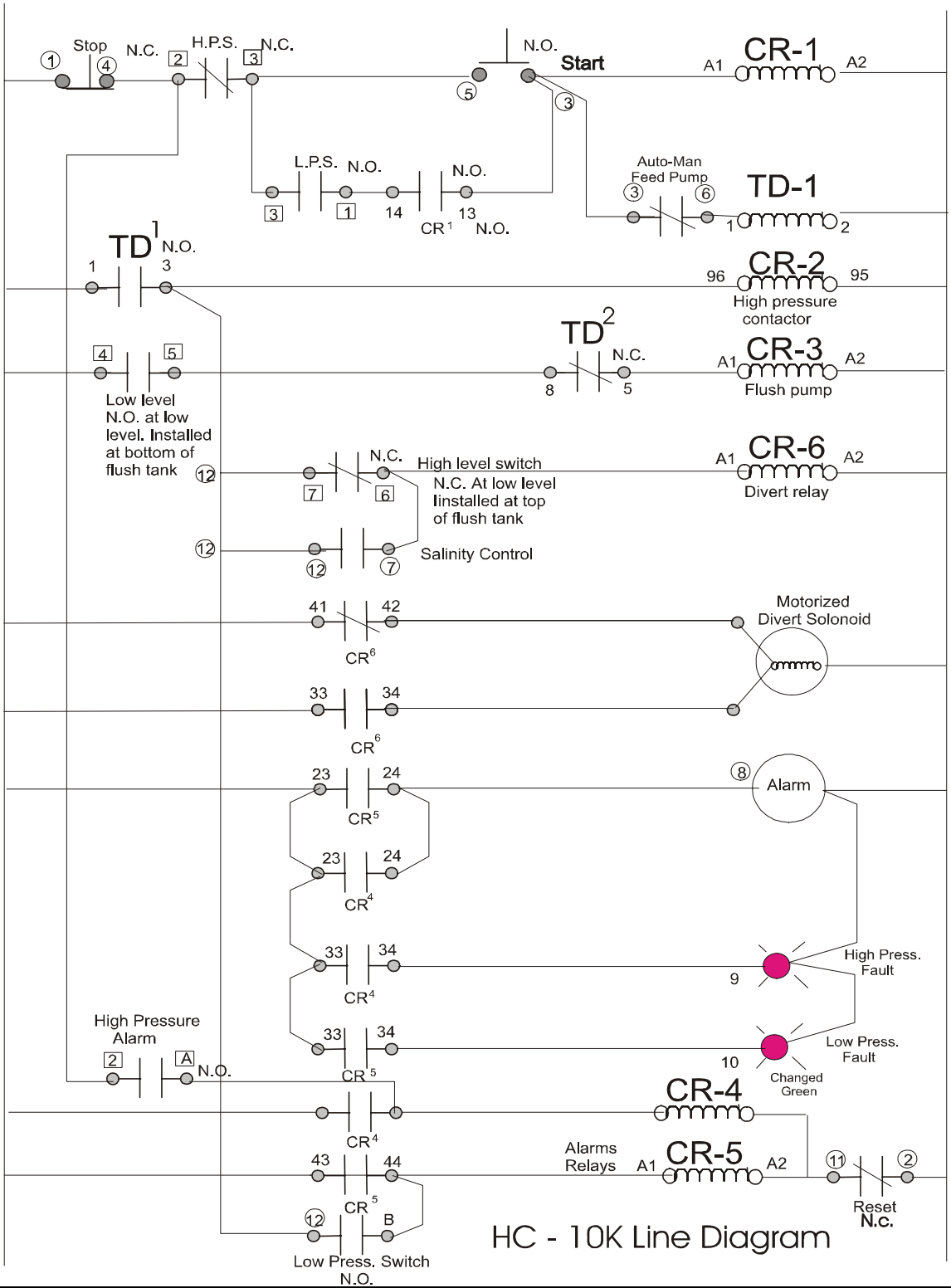
XI. Commercial HC Power Panel Diagram



XII. HC Commercial Front Panel Diagram



XIII. HC Commercial Line Diagram



LIMITED WARRANTY

SK Watermakers (from herein called SKW) warrants each new reverse osmosis unit/system to be free from defects in materials and workmanship under normal use, if installed and operated under SKW's design specifications, under the conditions listed below.

HARDWARE LIMITED WARRANTY: For a period of 1 year from initial use, SKW will repair and replace, at its option, any part of the HARDWARE which we find to be defective due to faulty materials or workmanship. Shipping charges shall be the responsibility of the purchaser.

This warranty shall only cover the original purchaser. Any damage caused by alteration, physical damage, installation, or operation contrary to our written specifications or instructions are not covered by this warranty.

IN ADDITION: it is the responsibility of the owner/user to change crankcase oil in pumps every 500 hours after the initial 50 hour oil change, also change prefilters as advised in the manual and furnish an AIR FREE supply of feedwater to the unit. Failure to comply or evidence of failure to comply with these requirements shall also void this warranty.