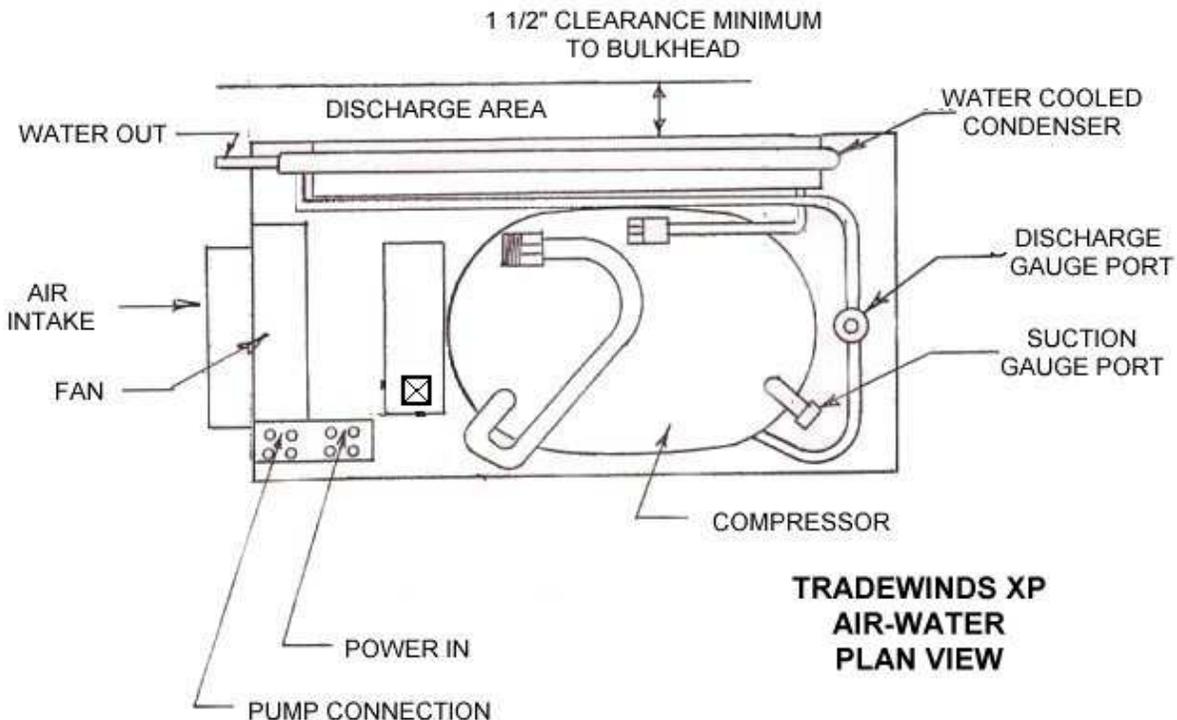


## TRADEWINDS AIR-WATER XP with AEO INSTALLATION INSTRUCTIONS

### CONDENSING UNIT LOCATION AND MOUNTING

The water-cooled option should be considered supplemental cooling. Installation should proceed with a proper air-cooling first. The water-cooling feature should be used to enhance efficiency on occasions when cold-water temperatures are encountered or interior cabin air temperatures are extreme

The design of the TRADEWINDS allows placement of the air-cooled unit in an enclosed space such as a cabin locker or sail locker. Allow 1.5 inches of clearance between the back of the unit and any obstruction. Air flows through the condensing unit and out the back. Intake air should be drawn in from the cabin area to insure the coolest, driest air supply. (Intake ducting from the exterior of the boat may cause damp salt air to be drawn in which might reduce unit life. This will also increase below deck moisture.) Standard 4" duct hose may be used. A vent must be installed in the area to allow warm air to escape.



An un-ducted unit in a poorly ventilated small space will heat the air, thereby lowering the capacity of the unit and possibly causing damage by overheating the compressor.

Service access and installation requires that the front, top, and left end should be accessible. The duct hose will require 4 inches of clearance past the end of the unit.

Mount the TRADEWINDS A/W level. (The compressor is at the bottom). The unit may be platform mounted. Holes have been drilled through the bottom of the housing for fastening to a platform.

## **INSTALLATION REQUIREMENTS**

- The air inlet should never be blocked.
- Provide for driest, coolest air for intake (top air port on housing.)
- Total combined air duct length should not exceed six feet.
- For intake through a finished panel, order a flange grill.

## **WORK HABITS**

Installer's care should be stressed. No matter how good SEA FROST equipment is, it's performance and life are in the hands of the installer. To insure your work:

1. Read this manual.
2. Reread any aspect you don't understand.
3. Follow Swagelok instructions carefully.
4. Install the RFD last and the same day the system is charged.
5. Spend enough time leak-checking to be sure there are no leaks.
6. Thanks from all of us who have to guarantee your work.

Two contaminants will give you problems in a refrigeration system. They are WATER and DIRT. Moisture in the air is always present and cannot be eliminated; water in this case refers to puddles and drops. Dirt is any solid. The installer's habits will be most important in ensuring a trouble-free start-up. The receiver filter drier (RFD) will take care of all dirt and moisture that might get into the system during a careful installation. Moisture in the system is boiled off when the system is evacuated, or it is captured in the desiccant. There is a screen in the expansion valve to prevent dirt from plugging it.

Excess moisture that the RFD can't handle will plug the expansion valve with ice. This ice stops the cycle. The only cure is to discharge the refrigerant, replace the RFD, re-evacuate the system, and recharge it. This remedy takes time and is somewhat costly. Keep the system clean and dry!

## **PUMP INSTALLATION**

This is a most important operation. Please understand this before beginning the installation. The TRADEWINDS A/W uses a centrifugal pump. It is not self-priming. Air pockets caused by loops or descending lines from one component to the other may cause pump problems. This pump must never be run dry. It is water cooled and lubricated. The wet end may be destroyed if it is started dry.

A separate through hull fitting 1/2" or larger should be used. It should be as low in the boat as possible and away from head and cockpit drains. A forward facing scoop will prevent problems if the unit is operating underway.

A large seawater strainer should be mounted above the seacock.

The pump should be mounted horizontally. It should be higher than the strainer. The discharge should be on the top. The hose should feed up hill to the unit.

Refer to the drawing at the end of this manual.

## **EXPANSION VALVE**

Connect the expansion valve to either of the 3/8" tubes from the plate. (In a two plate system connect to one of the tubes on one of the plates and connect a jumper between the plates as in the drawing included. Please contact us for advice when connecting to a two-plate system.)

The valve should be located to allow access to the screw cap on top of the valve. It is preferable that the cap be up.

Trim the tube ends on the plate as necessary. However, allow at least 3/4" to insert into the fitting. Refer to the Swagelok installation instructions.

The expansion valve can be mounted inside the box or outside. If it is mounted outside it will need to be insulated with cork tape and foam to prevent unwanted sweating and dripping.

## **TUBE HANDLING**

Installation is quite simple. All the copper tube comes to you with the ends capped. Any routing of the tubing must be done with the tube either taped or capped. Cap both tube ends after each cut. Work with only one line at a time, and uncap only one end at a time.

## **TUBE CUTTING**

Use only a tube cutter; using a hacksaw or any other method will introduce chips to the system and distort the tube. This will make connections difficult and leak-prone. A miniature cutter is essential for this work. CUT SLOWLY to avoid a ridge on the inside of the tube. We do not recommend reaming or dressing the cut, as it is very easy to get chips of copper in the system that will cause trouble.

## **TUBE BENDING**

Make all but the long sweep bends with a spring or lever bender; one kink and the line must be re-run. Don't add any more fittings than are necessary. Route all the lines in such a way that they are most direct but out of the way. Always leave several inches of straight undistorted tubing leading to all Swagelok fittings to allow proper connection. Again, keep everything sealed until you are ready to make that connection.

## **THE RECEIVER FILTER DRIER (RFD)**

The RFD (receiver, filter, drier) should be the last component to be unpacked and fitted.

Unpack and fit the RFD last and at the time of evacuation and charging to prevent saturating the desiccant with moisture. Refer to the "Valve Schematic" drawing. Mount the RFD external to the TRADEWINDS cabinet, connecting to the 1/4" liquid line. It must be mounted vertically with the fittings at the top. It is fitted with a sight glass for checking the charge. This glass is best viewed looking straight into the top. Install the RFD in a location that allows proper viewing of the sight glass. The RFD must be installed in the proper flow direction. Connect the tube from the compressor to the "in" side of the RFD. The "out" connects to the tube that connects to the valve.

## **RUNNING TUBING LINES**

The plate and the compressor are connected by two lines. One is 3/8" and the other is 1/4".

Run the 1/4" liquid line between the condensing unit area and the expansion valve. This 1/4" line makes up at the expansion valve. The externally mounted receiver filter drier (RFD) will be fitted to this line. (See; "RFD"). The 3/8" line connects to the other plate tube end with a 3/8" fitting. The other end of this 3/8" line connects at the compressor.

Run the 1/4" liquid line in contact with 3/8" suction line for at least one foot from the cabinet. Wrap these two tubes tightly together with electrical tape. Insulate this section. This will improve operation and prevent moisture from condensing on the coldest

section of these tubes. It is not necessary to insulate the remaining length of 3/8" return line to the compressor.

Be sure to keep the copper tubing clean and free of moisture by capping the tubing after each cut with the plastic caps provided. Support the tubing every 18 inches as necessary, using tie-wraps fastened with self-taping screws.

## **WARNING:**

**The TRADEWINDS unit is shipped with some nitrogen pressure. Before removing the caps on the connection ports, remove the plastic caps on the service valve covers and depress the valve cores to vent any existing pressure.**

## Compressor Connections

Working one line at a time, remove the Swagelok caps from compressor and condenser fittings. Attach the union fitting bodies. This is a pre-swaged connection. Make up of these pre-swaged connections is 1/4 turn from wrench snug.

Connect the 1/4" line to the condenser fitting and 3/8" line to the compressor. Tighten these fittings 1-1/4 turns from *wrench snug*.

## **NOTES ON SWAGELOK FITTINGS**

Swagelok fittings come to you completely assembled, finger-tight. (Pieces a, b, and c in Drawing #1 are already together). They are ready for immediate use.

Disassembly before use can result in dirt and foreign material getting into the fitting and causing leaks and you risk damaging the threads if nuts are removed. If disassembly is necessary, reassemble per drawing.

This is a double ferrule system. The most serious installation problem encountered with SEA FROST is the improper assembly of these fittings. Be sure that you assemble all fittings as in Drawing #1.

To ease assembly slacken the fitting nut slightly before assembly. Then retighten with fingers before tightening with a wrench. (This is to avoid cross threading.)

Step 1. Always leave two inches of straight, undistorted tubing leading to all Swagelok fittings to allow proper connection.

Step 2. Prior to inserting 1/2" tubing into the Swagelok tube fitting, make a pencil mark 1" from end of tube. Prior to inserting 3/8" tubing, make a pencil mark 3/4" from the end of the tube. With 1/4" tubing make a mark 5/8" from the end.

Step 3. Insert clean, smooth tubing with the pencil mark into the Swagelok tube fitting. You can be sure the tube is resting firmly on the shoulder of the fitting when the pencil mark is flush with the nut. This mark will also indicate that the tube has not moved before tightening. (As the fitting is tightened the space from the pencil mark to the shoulder will increase.)

Step 4. Tighten the Swagelok nut to a wrench snug\* position. Scribe the nut with a pencil at the 6:00 o'clock position (see drawing #1, step # 2).

\* Wrench snug is the first point in the assembly tightening when the tube cannot be pulled from the fitting, (i.e. when the ferrules tighten enough to contact the tubing).

Step 5. Now, while holding the fitting body with a back-up wrench, tighten the nut one-and-one-quarter turns ( 1-1/4). To do so, watch the scribe mark, make one complete revolution, and continue to the 9:00 o'clock position. (See drawing #1, step #3).

**DRAWING 1**



**STEP 1**

Simply insert the tubing into the SWAGELOK tube fitting. **Make sure that the tubing rest firmly on the shoulder of the fitting and that the nut is wrench snug.**

**STEP 2**

Before tightening the SWAGELOK nut, scribe the nut at the six o'clock position.



**STEP 3**

Now, while holding the fitting body steady with a backup wrench, tighten the nut 1 1/4 turns. Watch the scribe mark, make one complete revolution and continue to the 9 o'clock position. By scribing the nut at the 6 o'clock position as it appears to you, there will be no doubt as to the starting position. When tightened 1 1/4 turns to the 9 o'clock position, you can easily see that the fitting has been properly installed.



SWAGELOK FITTINGS ARE TO BE TIGHTENED TO A TORQUE SPEC, NOT INFINITE TIGHTNESS. BE SURE YOUR STARTING POINT IS WRENCH SNUG. A DISTORTED TUBE MIGHT GIVE A FALSE STARTING POINT.

\* When making all connections, USE TWO WRENCHES. Don't allow the fittings to turn or twist when tightening.

## **RECONNECTING PRE-SWAGED FITTINGS**

Connections can be disconnected and retightened many times.

When reconnecting, insert the tubing with pre-swaged ferrules into the fitting until the front ferrule seats in the fitting. Tighten the nut by hand. After tightening to wrench snug, rotate the nut about one-quarter turn with a wrench.

## **SWAGELOK PERFORMANCE**

Swagelok fittings have built-in spring interaction between the ferrules. This compensates for temperature changes and allows the fittings to be reconnected many times. As the fitting is tightened, a burnishing occurs between the body of the fitting and the ferrules and between the ferrules and the tube. This action provides the tightest connection available.

## **SNOWFLAKE PANEL THERMOSTAT INSTALLATION & WIRING**

### **Holdover Plate Systems**

For the best looking job, the thermostat should be recessed into a panel.

**Plan ahead.** Locate the thermostat close enough for the bulb on the sensing tube (pig tail type coil) to reach a mounting ear on the plate. (Install the sensing bulb on the second plate in a two-plate system. This is the plate without the valve.) It is necessary that the bulb end of the sensing tube be in excellent thermal contact with the plate. Attach the thermostat bulb to the plate using the stainless steel clip. Use one of the existing plate mounting screws as an attachment point. Neatly coil any extra sensing tube in the box and secure with ties.

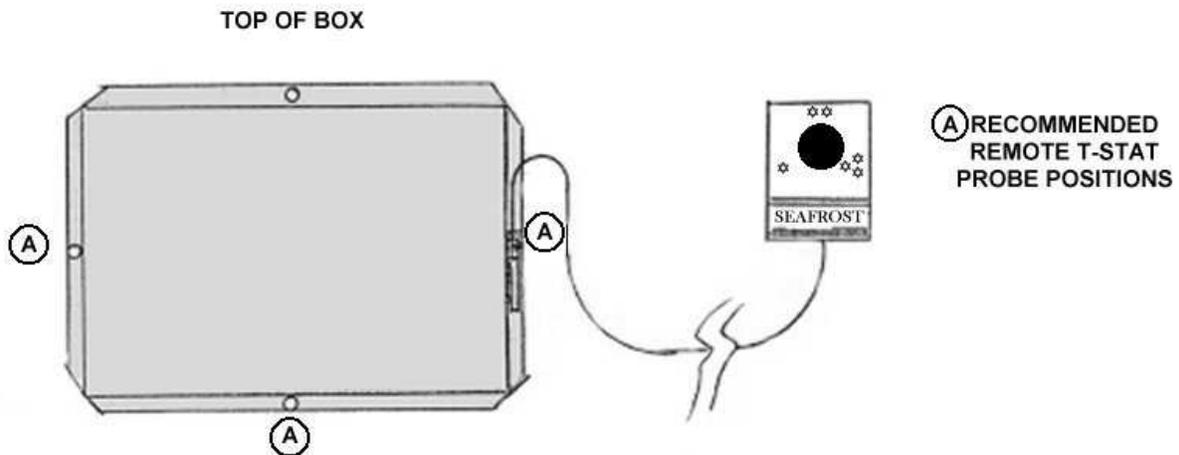
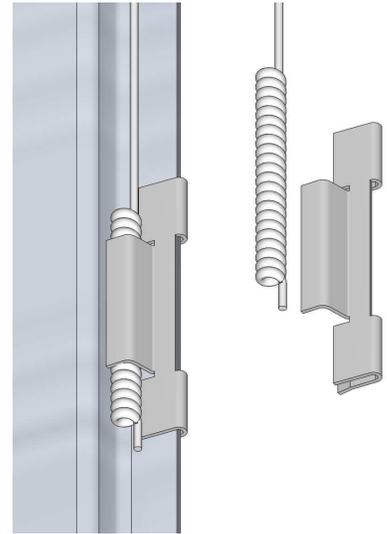
On block systems attach the bulb to the center of the bottom of the block using a 1/4"-20 x 1/2" pan head into the pre-tapped hole.

*The sensing tube is hollow; avoid kinking and breaking it.*

## Evaporator Plate Systems

Stainless Steel Evaporator plates:

Slide the bulb clip onto the edge of the plate and over the sensing bulb as shown in the drawing to the right. The sensing bulb must be in excellent thermal contact with the plate. We recommend that the probe be mounted on the plate in the one of the lower mounting positions as shown in the drawing below. This is best because these positions remain colder



## SNOWFLAKE PANEL THERMOSTAT OPERATION

The SEA FROST Tradewinds thermostat is variable. Turning the knob fully counterclockwise turns the unit "OFF". The full clockwise setting is the coldest (three snowflakes). The thermostat may be adjusted to obtain any temperature desired in the cabinet.

The thermostat may be calibrated should the warmest setting be too cold. To calibrate the thermostat remove the mounting screws and tip the panel forward. Remove the electrical tape to expose a torx adjustment screw, which is about an inch into the case. To lower box temperature, rotate this screw counter clockwise. One full revolution will

change the box temperature approximately 6 degrees F. To raise the temperature in the box rotate the screw clockwise.

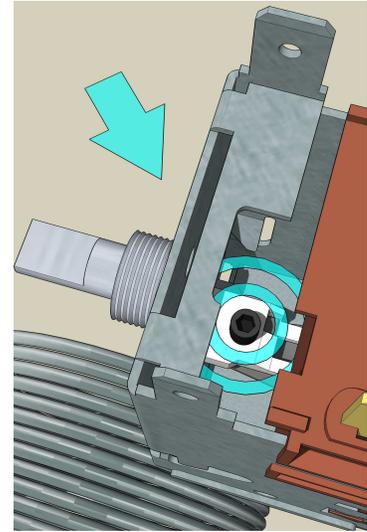
Make small adjustments. Record all adjustments.

If the lowest setting on the thermostat panel is too cold:

- Turn the adjustment screw clockwise. One 360-degree turn will raise the box temperature approximately 6 degrees f.

If the highest setting on the thermostat panel is too warm:

- Turn the adjustment screw counterclockwise.



## THERMOSTAT WIRING

Connect the thermostat wires at the compressor module to terminals T & C using female 1/4" crimp connectors. This is for AEO operation. There is no polarity requirement.

Remote (snowflake panel) thermostat wires ~ red.

Electronic thermostat thermometer (version 1) wires ~ green and white

Electronic thermostat thermometer (version 2 & 3) cat 5 data cable with RJ 45

connector. Install a 3-amp ATC fuse in the fuse holder on the Module PCB board. **The PBC board fuse is required only if using Electronic Thermostat with the RJ-45 jack.**

## ELECTRONIC THERMOSTAT THERMOMETER (Option)

Follow the detailed instructions provided with the ETT.

## WIRE SIZE

12-volt installations use AWG #10 wire for distances up to 10 feet from battery supply (20' roundtrip), and #8 AWG wire for distances up to 25 feet from battery supply (50' roundtrip). **Fuse 30 Amps.**

24 Volts: The module will self calibrate to the applied voltage and provide proper fan voltage. **Fuse 15 Amps.** The remote water pump must be a 24volt pump.

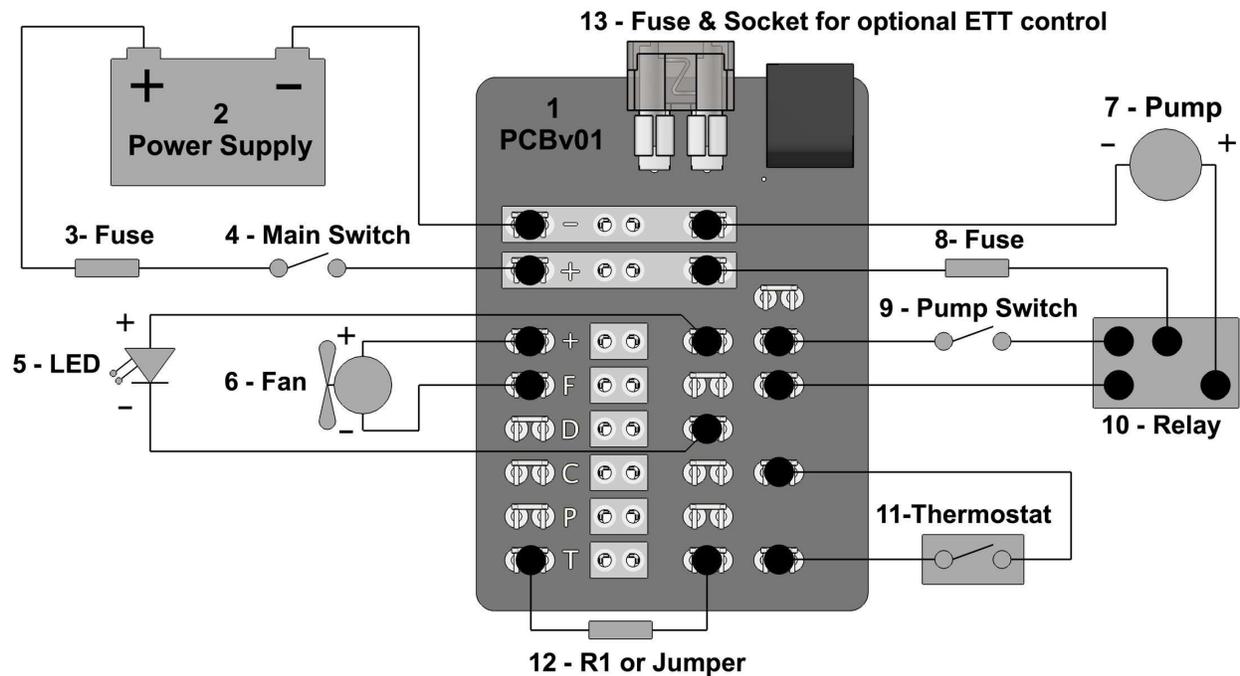
If the polarity is reversed, the electronic module will not work. In any application, use the next largest wire if in doubt to prevent a voltage drop. A fuse is preferred over a breaker as it has less potential voltage end to protect this wire. Connect the wires to the compressor module with ¼ female quick connects at (-) and (+). For best

performance, the electronic module must always be connected directly to the battery or battery selector switch. Connecting the module through the boat's breaker panel may cause a voltage drop; small wires and multiple connectors create resistance.

**FOR PROTECTION OF THE INSTALLATION, AN EXTERNAL FUSE MUST BE INSTALLED CLOSE TO THE BATTERY IN THE POWER SUPPLY (+) CABLE.**

The fuse is not provided. Connect a red wire from 12 or 24 volts positive to the (+) terminal of the terminal strip. Connect a black wire from 12 or 24 volts negative to the (-) terminal of the **line in** terminal strip.

Do not operate the Tradewinds directly from a DC charger without a battery.



**NOTE:** When using the modular thermostat connection (#13) there are no connections on thermostat terminals (#11).

<ul style="list-style-type: none"> <li>1. Electronic unit</li> <li>2. Battery</li> <li>3. Fuse (see electrical connections)</li> <li>4. Main switch (optional)</li> <li>5. LED for operational errors</li> <li>6. Fan</li> <li>7. Pump</li> <li>8. Fuse</li> </ul>	<ul style="list-style-type: none"> <li>9. Pump Switch</li> <li>10. Relay</li> <li>11. Thermostat</li> <li>12. R1- Resistor for pre-setting speed (optional) or Jumper for AEO module</li> <li>13. RJ45 jack for optional Electronic Thermostat.</li> </ul>
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## REFRIGERANT HANDLING AND SAFETY

**Do not** proceed with any aspect of a procedure you do not fully understand and know what results to expect. Understand that pressure exists in refrigeration systems. Be careful.

### **GENERAL SAFETY THIS IS IMPORTANT. READ THIS!**

R-134a is safe if handled properly. Avoid breathing vapors and prolonged skin exposure. Avoid using in areas of open flames. The vapor is heavier than air and may reduce oxygen available for breathing. Use with sufficient ventilation to keep exposure below recommended limits. **Do not mix with air for leak testing or use with air for any purpose above atmospheric pressure.** Liquid R-134a will freeze the skin. It's especially dangerous to the irreparable tissues of the eyes.

**Do not pressurize an empty system with R-134a without first evacuating the system with a vacuum pump.**

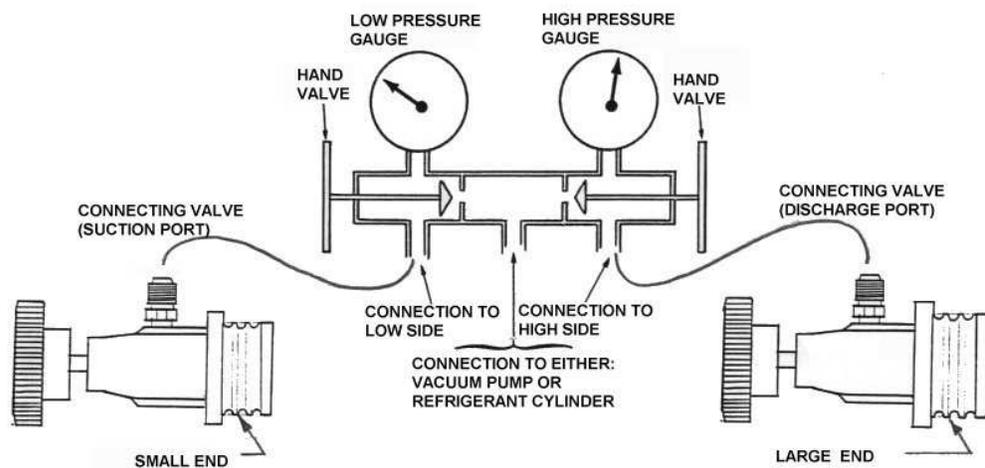
**NEVER** operate a system with the high side (discharge) open to the refrigerant supply. Pressurization of the refrigerant container could cause it to burst.

**NEVER** connect or disconnect gauges to a system while the compressor is operating.

## GAUGES

Gauges must be used in the evacuation and charging. They will provide information on the operation of the system when troubleshooting.

A gauge sets consist of two gauges installed in a manifold with two hand wheel valves and hoses to connect the gauges to the system. The left gauge (blue) is a compound device; it indicates pressure and vacuum. The right gauge (red) indicates pressure only. The hand wheels open a center port (yellow) to the left or right side respectively. Operation of the hand wheels is only necessary when moving refrigerant or evacuating. With the hand wheels closed, the gauges read the pressures of the connection points. At the end of the red and blue service hoses are R-134a connecting valves.



## VENTING THE GAUGE SET

If the gauge set is not fitted with sealing valves or has not been purged with refrigerant, vent the hoses at the manifold body by opening the hand wheels to an open center hose for a few seconds allowing some of the system refrigerant to purge the hoses of air.

## EVACUATION WITH A VACUUM PUMP

Evacuation removes air, readying the system for charging. Connect the gauge center hose to a high vacuum pump. Start the pump and slowly open the suction gauge hand wheel. As the vacuum drops below 20 inches, open both hand wheels fully.

## EVACUATION LEAK TEST

Evacuate the system to the best vacuum (lowest pressure). Close the hand wheels to the pump. Observe the vacuum gauge and be sure the pressure remains constant for 5 minutes. If the pressure rises rapidly, check all the connections again. Re-evacuate to the lowest pressure and test by holding a vacuum with the gauges closed. Be sure the system will hold this vacuum. Proceed by opening the hand wheels and continuing the evacuation process for 30 minutes or more.

**The "Evacuation Leak Check" is a preliminary check and is not to be considered a system leak check. A micron gauge can be used to measure vacuum. Proper dehydration and evacuation should be in the range of 200 to 500 microns.**

## COMMISSIONING

Attach clean, purged R-134a gauges to the suction service port on compressor. This is the blue-capped tube stub on the compressor. (It is not necessary to connect to the

high-pressure port when starting a new system. This is provided to aid in fault diagnosis.)

## **NEW SYSTEM CHARGING ~ INTRODUCING INITIAL CHARGE**

### **READ ALL SECTIONS ON CHARGING BEFORE STARTING ANY PROCEDURE**

After the evacuation leak test and pump down shut off the hand wheels, disconnect the center hose from the pump and connect it to the refrigerant supply. Vent the hose from the can tap (refrigerant supply) to the gauge body. With the refrigerant can (12 oz) in the inverted (liquid) position, open the discharge hand wheel and feed in about 1/2 of a can of refrigerant (6 to 8 ounces). Close the hand wheel and begin an inspection of all the connections in the system. Begin leak checking.

### **VENTING THE CHARGE HOSE**

To avoid pulling air or other contaminants into the system, it is necessary to vent the air from the hose that is used to carry R-134a to the system. To vent the hose, open the can tap valve with the can upright (vapor) then loosen the center hose fitting at the manifold. After several seconds of venting, tighten the hose end fitting.

### **TAPPING A CAN OF REFRIGERANT**

Be sure the can of R-134a is clean and dry. Any contaminants on the top of the can or in the hose will enter the system. Turn the can tap valve counterclockwise to retract the piercing point, then thread the valve body onto the can. Be certain that the gasket is present and is smooth and elastic. With the can upright, screw the valve until the point pierces the can and the rubber gasket has sealed. The can is now tapped. The refrigerant flow is now regulated with the can tap valve.

### **LIQUID OR VAPOR**

Refrigerant is either a vapor or liquid. To supply vapor to a system, keep the refrigerant can in the upright position. To supply liquid to the system, invert the can, valve down. Be sure the can is handled carefully to ensure the correct refrigerant condition is supplied.

### **LEAK CHECKING**

**Leak checking is an important step** and should be done with diligence. A leak will cripple this system. Please take the time needed to be sure all connections are tight. Check every connection even the ones that were pre-made in manufacture. **The "Evacuation Leak Check" is a preliminary check and is not to be considered a system leak check.**

## **LEAK CHECKING A CHARGED SYSTEM**

Refrigerant in a saturated condition, part liquid and part vapor will exert a pressure that is a function of its temperature. The higher the temperature the higher the pressure will be. Avoid leak checking in cold weather.

A refrigerant leak will show with moderate pressure. A leak is not a function of pressure. Pressure is only required to aid in detection.

In cold weather, it is possible to raise the pressure in the system by warming the plate with a light bulb left in close proximity to the plate for several hours.

There are two ways to leak-check a pressurized system:

1. Soap bubbles: A solution of dish soap and water works well.
2. R-134a electronic leak detector: The probe senses the presence of refrigerant molecules.

We recommend both procedures.

### **To Check with Bubbles**

Soap each connection and observe all sides of the connection with a bright light and a mirror. A leak will blow bubbles. Without careful examination and plenty of pressure this test is not reliable.

### **To Check with an Electronic Detector**

Use a detector designed for R-134a. Slowly trace the area with the probe. Refrigerant is heavier than air, therefore, trace below the fitting. Most units can be calibrated to home in on a leak. We use and recommend electronic detection. TIF brand detectors can accurately detect leaks as low as 1/2 oz loss per year. This sensitivity exceeds SAE leak specifications. Be sure to test the operation of the detector before and after you leak check the system

### **IF A LEAK IS DETECTED**

Try tightening the fitting nut slightly. (See Swagelok fitting instructions) If the leak is not stopped, it is possible that the fitting was assembled incorrectly. Discharge the system, and then disconnect the fitting for inspection. After reassembly, proceed to the leak check procedure.

## SPECIAL NOTES

- Propellants and solvents in sprays and foams may upset electronic detectors.

To confirm a leak detected with a detector use bubbles and be sure it is a leak and not some erroneous vapor that is upsetting the machine.

Electronic detectors do not function below 40.F.

A good leak detector is able to pick up leaks as low as 1/2 oz per year.

## REFRIGERANT CHARGE

**This system operates with refrigerant R-134a. The proper charge amount is 6-12 oz.**



**WARNING!** Do not use refrigerant with any additives, including but not limited to: oil, dye, and leak stop.

This may be liquid-fed into the low side after evacuation, before the compressor is operated. The evaporator pressure is regulated by an automatic expansion valve. This valve is adjusted to maintain a constant evaporator pressure. The proper charge must be added before the valve can be accurately set.

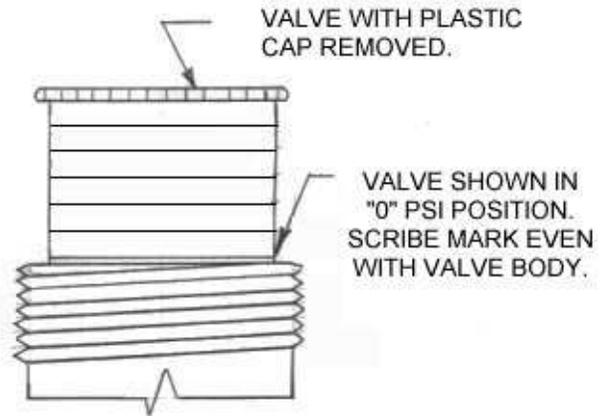
## READING THE SIGHT GLASS

A clear sight glass, when the compressor is operating, signifies a sufficiently charged system. To determine the meaning of "clear", notice the appearance of the RFD sight glass when the system is at rest with the compressor off. This is a "clear" glass.

**SPECIAL WARNING: A clear sight glass can also indicate a completely EMPTY system. Anytime the compressor is started, white foam should appear in the sight glass indicating that the refrigerant is present. This foam may disappear quite quickly but, IF NO FOAM IS EVIDENT and the system is not cooling, the system is empty. DO NOT OPERATE THE SYSTEM in this empty condition. Operation in this mode will ruin the compressor.**

## ADJUSTING THE VALVE

Before operating the compressor, unscrew the plastic cover on the valve body. Note the adjusting knob. Counter-clockwise rotation decreases the pressure. Clockwise rotation increases the pressure. One turn should equal a 2 psi pressure change. Check that the valve is set in the "0" position. The "0" position is when the top thread on the valve adjustment knob is even with the valve body.



Temporarily cover the compressor using cardboard and tape to create a forced air path through the condenser while the gauges are attached. Start the compressor. The valve must be adjusted to a 0 to 2 psi reading on the low side gauge port. (Be sure your gauge is set at 0 before hook-up). Allow several minutes between each adjustment. (Moisture may form on the adjusting knob side of the valve and freeze causing the valve to malfunction. To prevent this replace the cap after each adjustment. Be sure the valve is dry before final cap replacement.) Operate for 30 minutes to confirm proper valve setting and operation.

The valve may need to be cleared of dirt or chips if adjustment is not possible. With the compressor running, turn the valve adjustment knob clockwise about 3 turns momentarily then back to the proper setting. (Do not leave the valve in open position (allowing high backpressure) as this may cause the compressor to overload).

After satisfactory adjustment, turn off the thermostat. Remove the gauges. Recap the service ports. Replace the service panel. When the valve has dried, insulate the valve body by cutting the insulating sleeve to fit the valve then wrap it with cork tape. This is to prevent condensation. Also insulate the one-foot section of 3/8" tubing that exits the cabinet. (The valve need not be insulated if the valve is in the icebox).

**Trouble shooting note:** The operating pressure of the system **will not** indicate the amount of refrigerant in the system. The valve will not give proper operation or pressure if it is undercharged. Check the valve scribe line. It should correlate to gauge pressure.

The system requires enough refrigerant to supply liquid to the valve. If the valve has a steady hissing sound then the charge is ok. If the valve is sputtering then it is low. If the valve is making a noticeable roar it is empty. If the low side pressure is properly set the high side pressure will be 80 to 135 psi depending on the air temperature (50 to 95 degrees F.) through the unit. Almost immediately upon start up the valve body will begin to frost.

## OPERATION DESCRIPTION

When the control switch (mounted on the left end of the cabinet) is down, the unit is operating as an **air-cooled** system. With the switch in the up, position the unit will operate as an **air & water-cooled** unit. The pump will switch on and off with the compressor and fan.

The TRADEWINDS A/W in air only mode will operate in up to 120 degrees of ambient air temperature. The unit will freeze a holdover plate from warm but may take all day. If rapid cooling of the system is needed operate the Engine Drive to bring the system to its cooling temperature then let the TRADEWINDS A/W take over. The unit will automatically operate if the thermostat is on and 12 volts or 24 volts D.C. is available. The system may be operated using the shore power charger to maintain the batteries. The TRADEWINDS A/W and the Engine Drive are separate units and may be operated simultaneously. Both units operate from separate controls.

## PUMP OPERATION

The water pump has a switch on the left end of the compressor cabinet. The on switch position for the pump is up. With the pump switch on the pump will operate automatically when the compressor starts.

You may want to switch off the pump when leaving the boat unattended. This is especially important when jellyfish, seaweed and other trash is present in the water and could block the intake sea strainer. Be sure the pump is switched off when operating the system when the boat is out of the water.

## DEFROSTING

Excessive frost/ice build up on the plate will reduce the cooling effect by insulating the plate. Allowing the plate to warm above freezing is one method of defrosting. Boiling water or a scraper will also work.

## OPERATION INSPECTION

Within a few minutes of starting the TRADEWINDS A/W tubing in close proximity to the valve and the valve itself will be noticeably cold. **(If after 20 minutes of operation cooling in this area is not observed do not continue to operate the system.)**

## OPERATIONAL INFORMATION

<b>VOLTAGE:</b>	12 D.C. or 24 D.C.
<b>AMP DRAW:</b>	3.3 TO 14 @ 12 VOLTS 2 to 7 @ 24 VOLTS
<b>WIRE SIZE TO BATTERY SUPPLY: FOR 12 VOLT OPERATION</b>	AWG # 10 up to 10' (20' round trip) AWG # 8 up to 25' (50' round trip)
<b>LOW VOLTAGE CUT-OFF</b>	10.4 VOLTS / 12 VOLTS 22.8 VOLTS / 24 VOLTS
<b>FUSE MAX INSTALLED AT BATTERY</b>	12-VOLT–30 AMP STANDARD AUTOMOTIVE 24-VOLT–15 AMP STANDARD AUTOMOTIVE

## TROUBLESHOOTING

A light emitting diode (LED) is connected between terminals **+** and **D**. In case the electronic unit records an operational error, the diode will flash a number of times. The number of flashes depends on what kind of operational error was recorded. Each flash lasts 1/4 second. After the actual number of flashes there will be a delay with no flashes, the sequence for each error recording is repeated every 4 seconds. Flashes will only occur in the fault mode with the system on.

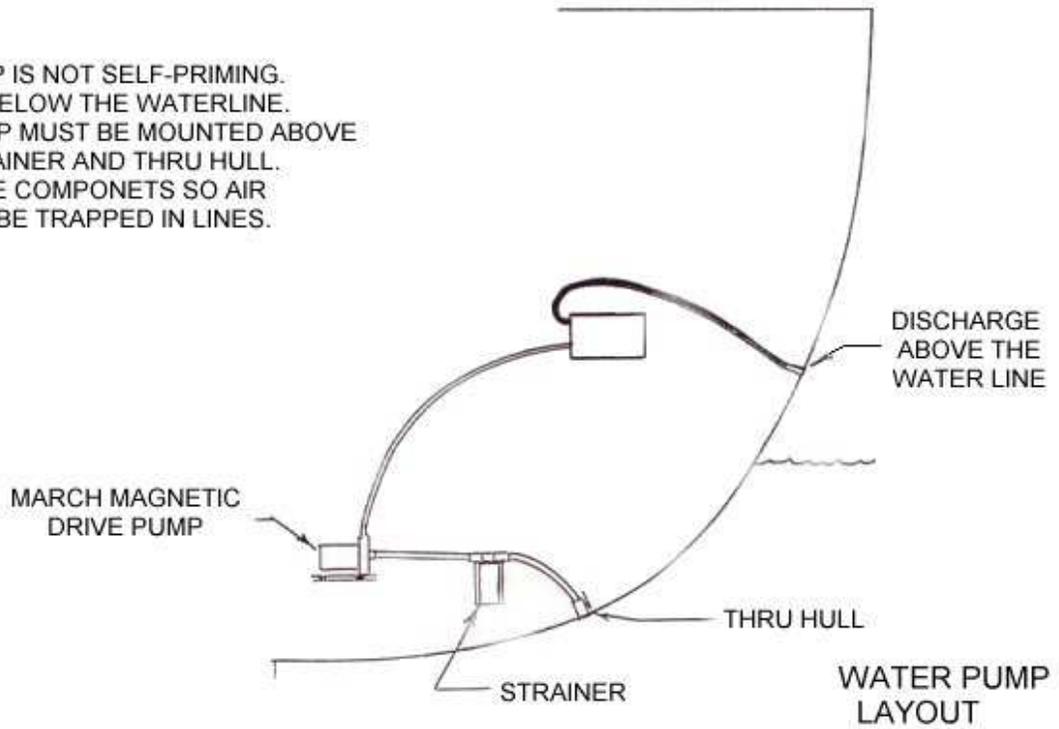
See additional trouble shooting information available at [www.seafrost.com](http://www.seafrost.com)

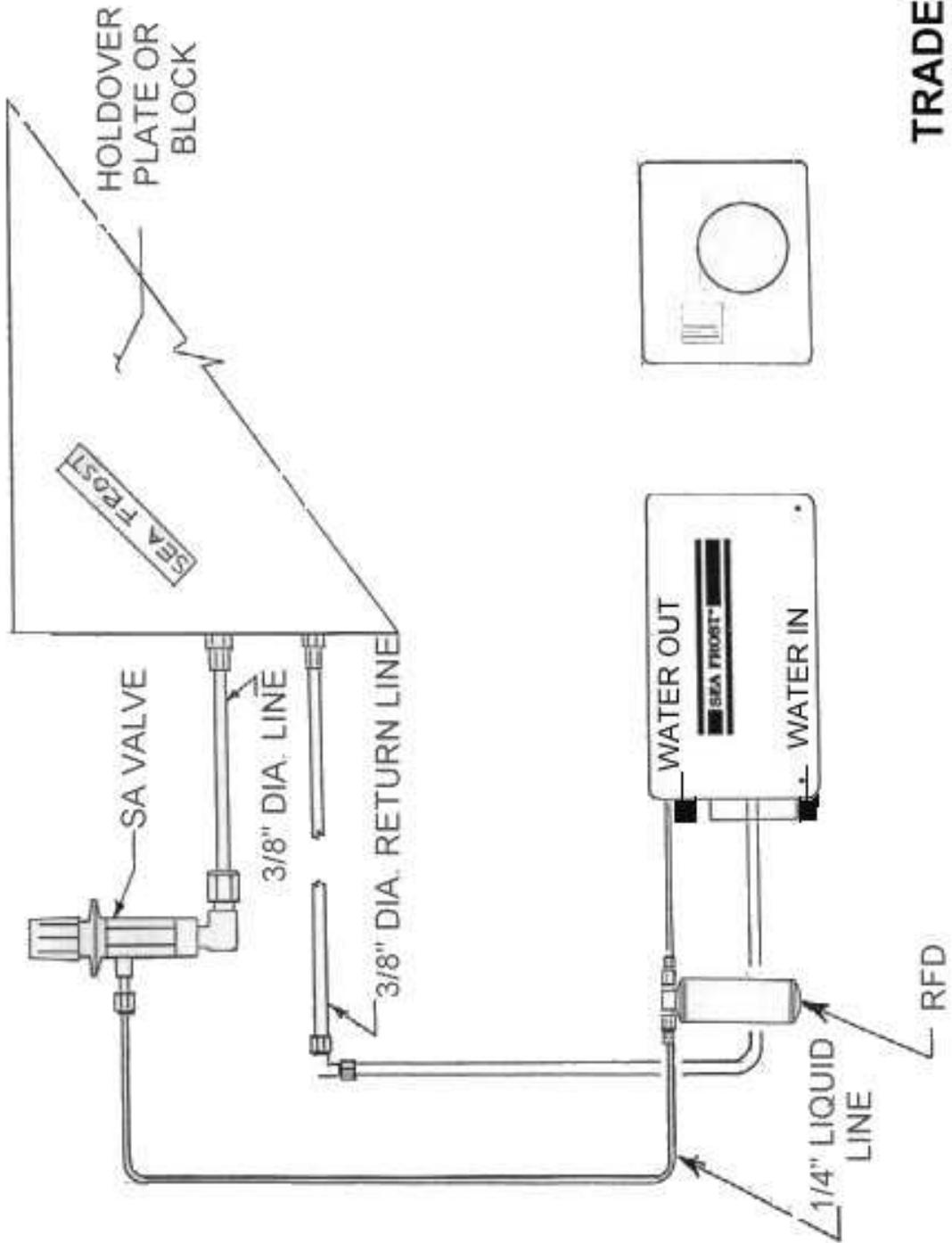
## OPERATIONAL ERRORS SHOWN BY LED

Number of flashes	Error type
5	<b>Thermal cut-out of electronic unit</b> (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot.)
4	<b>Minimum motor speed error</b> (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed 1,850 rpm.)
3	<b>Motor start error</b> <b>A.</b> (The system might be overcharged.) Has charge been added? <b>B.</b> Faulty module. <b>C.</b> This fault may also occur when the compressor is trying to start a warm system or on initial start up on a new system. Several attempts and then start up can be normal. <b><i>Do not let out refrigerant until first contacting Seafrost!</i></b>
2	<b>Fan over-current cut-out</b> (The fan is defective.)
1	<b>Battery protection cut-out</b> (The voltage is outside the cut-out setting. Low voltage.)

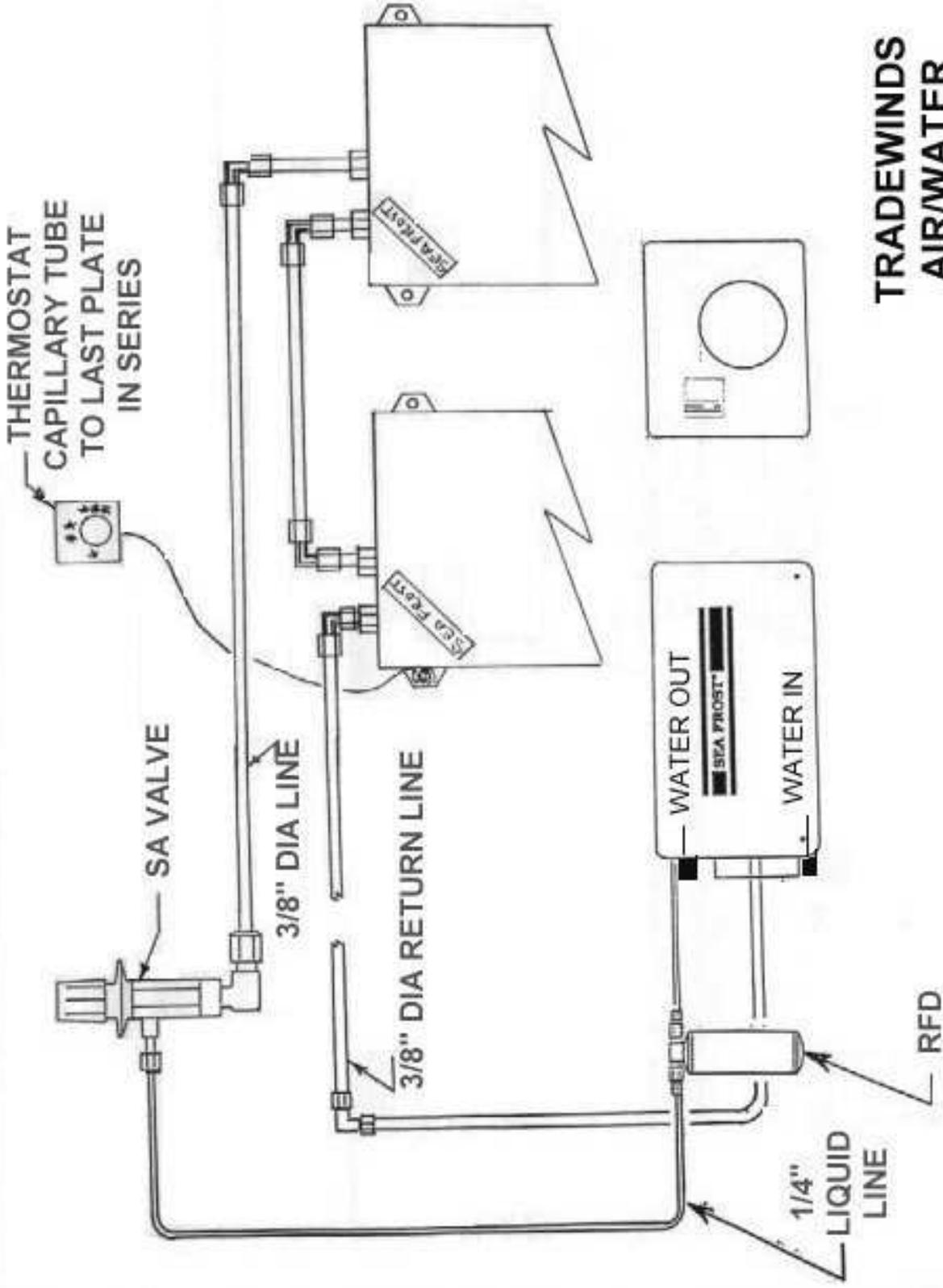
NOTE

1. THE PUMP IS NOT SELF-PRIMING.  
MOUNT BELOW THE WATERLINE.
2. THE PUMP MUST BE MOUNTED ABOVE  
THE STRAINER AND THRU HULL.
3. ARRANGE COMPONENTS SO AIR  
CANNOT BE TRAPPED IN LINES.





**TRADEWINDS  
AIR/WATER**



**TRADEWINDS  
 AIR/WATER  
 TWO PLATE FREEZER**

## THERMOSTAT CALIBRATION INSTRUCTIONS

Note: Be sure that the unit is operating properly before making any thermostat adjustments. The sensing bulb must be in excellent thermal contact with the plate or block.

The range of this control may be changed. To access the adjustment screw, remove the four mounting screws on the thermostat panel. Tip the panel forward and make the adjustment with a torx or small phillips head screwdriver.

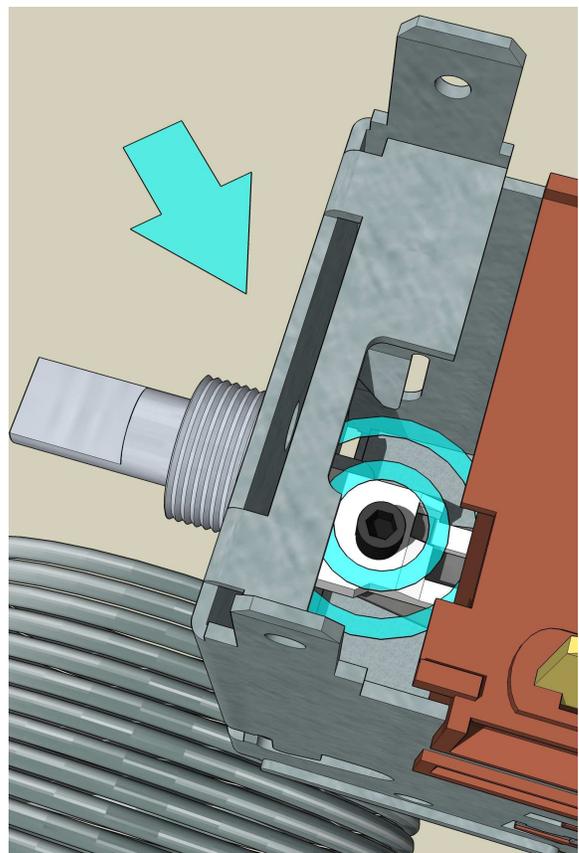
Make small adjustments. Record all adjustments.

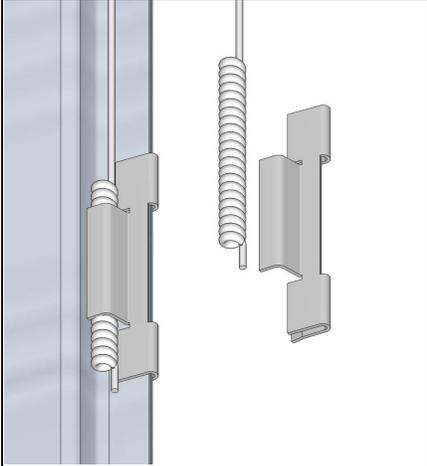
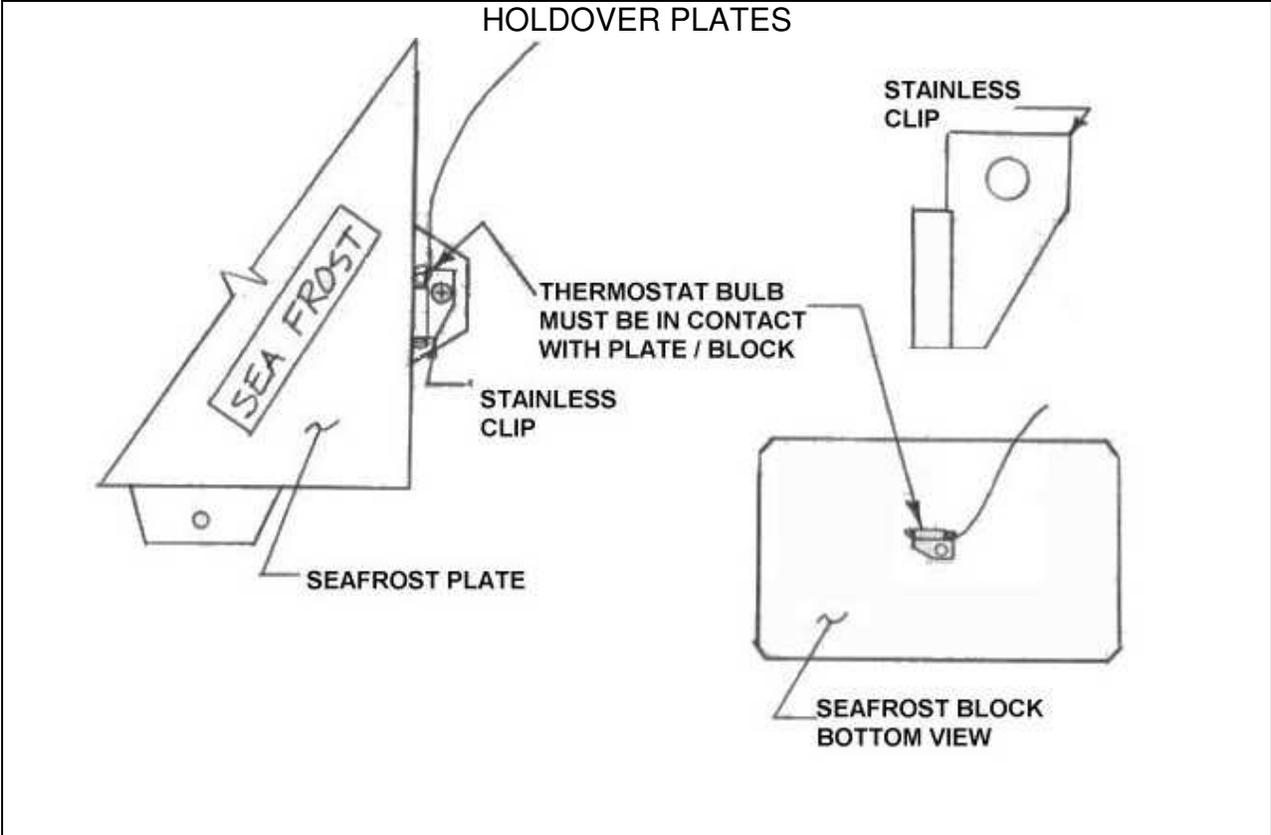
If the lowest setting on the thermostat panel is too cold:

- Turn the adjustment screw clockwise. One 360-degree turn will raise the box temperature approximately 6 degrees f.

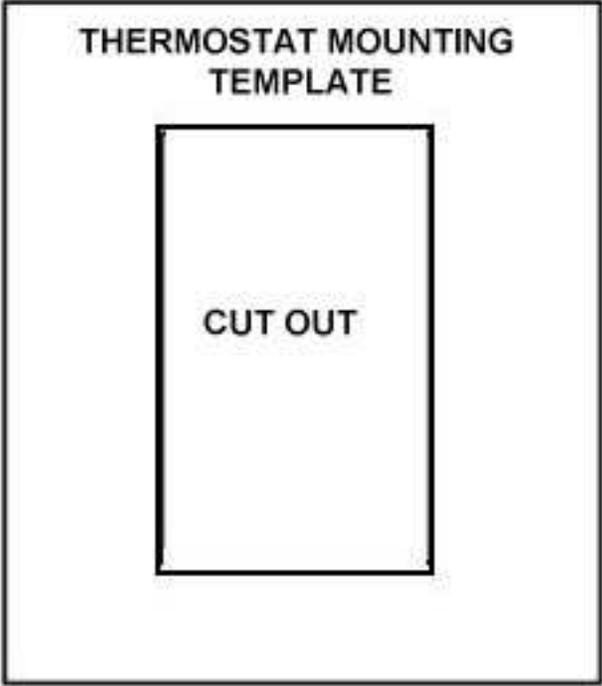
If the highest setting on the thermostat panel is too warm:

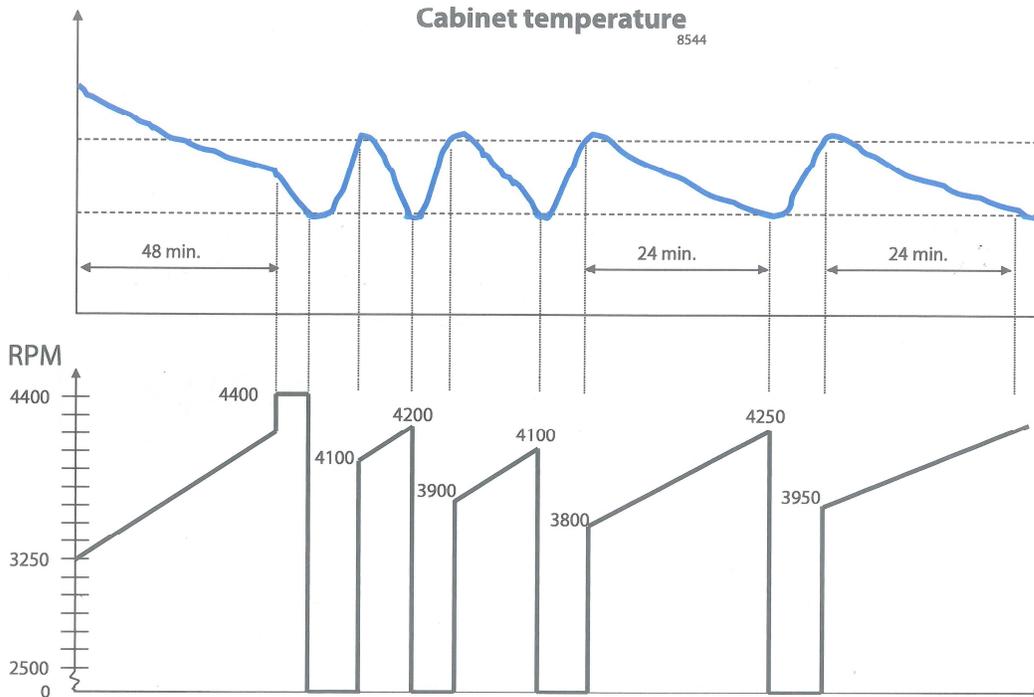
- Turn the adjustment screw counterclockwise.





STAINLESS STEEL EVAPORATOR PLATES





## Adaptive Energy Optimization (AEO) with High Speed Electronit Unit

### Introduction

Herewith a description of a function in the high speed electronic unit. The unit contains a feature called **Adaptive Energy Optimization (AEO)**. It is very suitable for systems with huge load variations and applications where energy is an important issue.

### Function

#### *Initial start up conditions*

Every start up of the compressor takes place at low speed (soft start). The start up speed is equal to: the speed at thermostat cut out minus 300 rpm. After start up the speed of the compressor will be ramped up and adapted to the load. The ramp up speed is 9.4 rpm/min.

#### *Adaptation of the capacity.*

The software algorithm adapts the capacity of the compressor to the actual load of the system.

The unit regulates the capacity so that the compressor runtime is approximately 24 minutes. If the compressor does not reach cut out temperature within 48 minutes the speed is set to 4400 rpm.

#### *Example how to determine the speed*

Start up speed: 3250 rpm  
 Runtime: 15 minutes  
 Speed at cut out:  $3250 + (9.4 \times 15)$   
 ~3390 rpm

Start up speed:  $3390 - 300 = 3090$  rpm  
 Runtime: 20 minutes  
 Speed at cut out:  $3090 + (9.4 \times 20)$   
 ~3280 rpm

Start up speed:  $3280 - 300 = 2980$  rpm  
 Runtime: 30 minutes  
 Speed at cut out:  $2980 + (9.4 \times 30)$   
 ~3260 rpm

### Curves

The graphs on page 2 show the relation between cabinet temperature and speed. After a power cut out the start speed will always be set to 3250 rpm.

After a thermostat cut out the start up speed is calculated as speed at stop minus 300.

The speed will be adapted automatically so that the thermostat runtime will be approximately 24 minutes.

### Benefits

- Independent of load variations
- Energy savings
- Reduced number of compressor starts
- Prevents short cycling of the compressor
- Battery protection
- Soft start in tropical conditions