

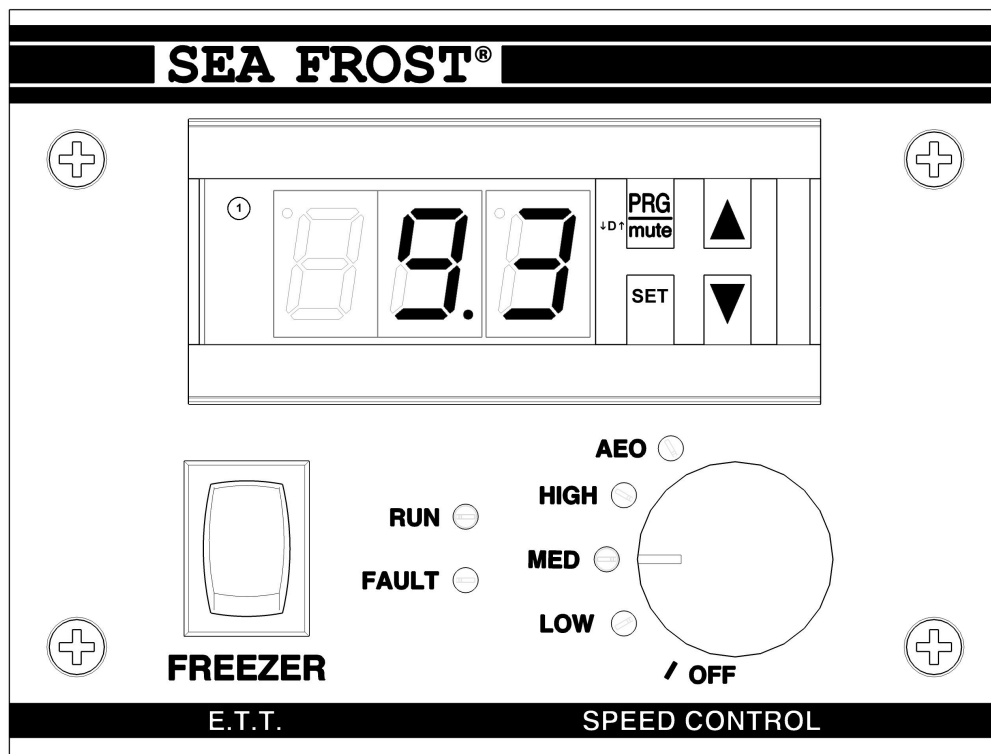
# SEA FROST®

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## ELECTRONIC THERMOSTAT AND THERMOMETER With SPEED CONTROL



- The Sea Frost ETT (Electronic Thermostat/Thermometer) will accurately control temperature for the best efficiency
- The ETT always shows cabinet temperature, and will display in Centigrade or Fahrenheit.
- Non-volatile memory, control will not lose settings.

The ETT is pre-wired with plug in connectors for the two 10' probes and 20' data cable included. Custom lengths are available.

Faceplate size: 4-5/8" x 3-1/2" (120 mm x 90 mm). Requires 3" (76.20 mm) clearance behind mounting panel. Weight 1 lb (.4 kilo).

## **CLEANING**

Do not use acetone or any solvent on the control panel, clean with a damp cloth and mild detergent.

## **INSTALLATION AND OPERATION**

### **Operation**

The Sea Frost Electronic Thermostat and Thermometer with speed control (ETTsc) is an electronic device using two probes installed in the refrigerated space. One probe is sensing the cabinet temperature, which is displayed. The other probe, with the red band, controls the compressor operation by measuring the temperature of a cold plate.

To operate the control, push the top of the rocker switch to turn on the temperature readout. The display will light and the cabinet temperature will be displayed. To start the compressor turn the speed control knob to desired position. There will be a slight delay and the red led run light will turn on.

### **Changing Speeds**

Speed can be changed at any time. If the compressor is running when the speed is changed, the red run light will go off and then will go back on when the compressor has adjusted to the new speed.

### **Run Light**

The run light indicates the compressor is operating. In addition, two orange indicator lights will light up on the control head. Number "1" to the left of the temperature display and "D" to the right.

When the compressor cools to the pre-set cut out temperature the run indicator light, the "1" and the "D" will all go off with the compressor.

To display temperature only, turn the compressor speed control to the off position.

To turn off both the temperature readout and compressor the rocker switch may be used. All temperature settings will be saved.

### **Error Light**

The yellow error light indicates a compressor fault. See error codes on page 8.

## **THE TEMPERATURE SETTING**

Before adjusting the thermostat make sure the refrigeration system is working properly.

The ETTsc can be adjusted and will maintain very stable temperatures. Care must be taken to adjust the settings to maintain obtainable temperatures. In initial testing do not set below -10 F. (-23 degrees C.) BDxpx models may be set lower - 20 F ( - 29 C.) Excessive compressor running will occur with no benefit if the setting is below the temperature the compressor system can easily obtain.

### **Changing the Temperature (ST2) ~ To Lower or Raise the Box Temperature**

The compressor turns off and on with the temperature of the cold plate not the box temperature. Probe 1 (b1) is the box temperature probe that functions as a thermometer. Probe 2 (b2) with the red band is the plate temperature probe that functions as a thermostat.

To change the cut out setting (cold stopping point) press the SET button until ST1 appears and then let go. Press the SET button again until ST2 appears then let go. The display will alternate between showing ST2 and then the current value of ST2. This is the cut out temperature of probe 2. For testing purposes only, we have set this to 20 degrees at the factory. Use the ↑ up and ↓ down arrows to change to desired plate temperature. We recommend changing in small increments at a time, letting the compressor run between changes, until desired box temperature is reached. Press SET to save and exit. The readout will return to operating display mode (box temperature).

- Press and hold the SET button until ST1 appears then let go. Press and hold again until ST2 appears.
- The display will alternate between showing ST2 and then the current value of ST2.
- Use the ↑ up and ↓ down arrows to change to desired plate temperature.
- Press SET to save and exit.

**Note:** While changing ST2 a red wrench will light up on the display. This means you are in programming mode.

The cut out temperature is associated with the second probe (red banded plate probe). This probe read out temperature is hidden and can only be seen following instructions on the next page.

## **Recommended Settings**

The air temperature in a refrigerator is always 10 to 15 degrees F. (6 to 9 C.) warmer than the cooling device. This difference in temperature must be remembered when setting the control cut out temperature (ST2 stopping point). A refrigerator might have to be set to run up to 20 degrees colder than the desired box temperature.

Make several small setting changes over a period of several days to determine the proper setting.

## **Plate Probe Temperature (b2)**

- Press the ↓ arrow once (b1) alternating with the value is displayed.
- Then press the ↑ arrow once (b2) alternating with the value is displayed.
- To exit, press the ↓ arrow once to go back to (b1).
- Press and hold the SET button for 3-5 seconds.

To view the temperature of probe 2 (red banded plate probe) Press the ↓ down arrow once. This displays probe 1 first (b1). It will alternate between (b1) and the value of (b1). This is box temperature and this temperature is shown when in operating mode. Press the ↑ arrow once to show (b2), the display will alternate between (b2) and the temperature of (b2), this is probe 2, the thermostat plate probe with the red band.

There are two ways to exit and go back to the operating display mode.

1. Wait about 1 minute until it times out on it's own and returns to operating mode.
2. Press the down arrow once to go back to (b1). Press and hold the SET button for 3-5 seconds until the display temperature appears and stops flashing.

**Note:** Six different parameters can be viewed by pressing the ↓ down arrow button.

b1: probe 1	di1: digital input 1 – not used	st1: set point 1 - not used
b2: probe 2	di2: digital input 2 – not used	st2: set point 2

This is for viewing these parameters only no changes can be made.

**Important:** If you press and hold the SET button while still viewing (b2) or any other parameter, that parameter will be displayed on exit. Make sure you go back to b1 before holding the SET button to save and exit.

### **The Differential Setting (p2)**

The differential is the number of degrees the temperature must rise before the compressor will come back on after cooling to the set point. The factory test setting is 6 degrees F. (4.5 C.) To change the differential setting press and hold PRG until P1 is displayed, then press the up ↑ arrow to display P2. Press SET. Use the up ↑ and down ↓ arrows to change to desired degrees of differential. Press SET again, this will bring you back to P2. Hold the PRG button for 3-5 seconds to save changes and exit. Normal operation and box temperature will now be displayed.

- Press and hold PRG until P1 is displayed. (Not used)
- Press the up ↑ arrow to display P2.
- Press set
- Use the ↑ and ↓ arrows to change P2 to desired degrees of differential.
- Press SET again, this will bring you back to P2.
- Hold the PRG button for 3-5 seconds to save changes and exit.

**Note:** While changing P2 a red wrench will light up on the display. This means you are in programming mode.

### **Readout Changes (c18) ~ Fahrenheit to Centigrade**

- Press and hold both PRG and SET for 5 seconds until 0 is displayed.
- Press ↑ arrow to navigate to #77. This is the password.
- Press SET.
- Press ↑ arrow to scroll to C-18.
- Press SET.
- Using the arrows keys to select either 0 for centigrade or 1 for Fahrenheit.
- Press SET to return to C-18.
- Hold the PRG button for 3-5 seconds to save changes and exit.

**Note:** While changing C-18 a red wrench will light up on the display. This means you are in programming mode.

**WARNING:** When changing temperature measurement units the cutoff setting (ST2) and the differential setting (P2) must be changed to represent the proper units.

## **INSTALLING THE ETTsc**

The ETTsc can be located anywhere as long as it is protected from water and spray. The leads to the probes may be extended to any length if the connections are soldered and sealed with heat shrink.

The ETT sc requires a 3 5/8" x 2-3/4" (91 mm x 70 mm) panel cut out. The minimum depth is 3" (76.20 mm).

### **Wire Routing and Connecting**

The cat-5 cable provides power and signal for the ETTsc. It connects at the compressor. The RJ-45 connector on this cable plugs into the RJ-45 port on the Module PCB board. Make certain the plug is clean, and that the plug has not been damaged when routing through the boat, before plugging it in.

If shortening this cable make sure the color code is observed. Any pre-made RJ-45 cable will work. Custom lengths are available.

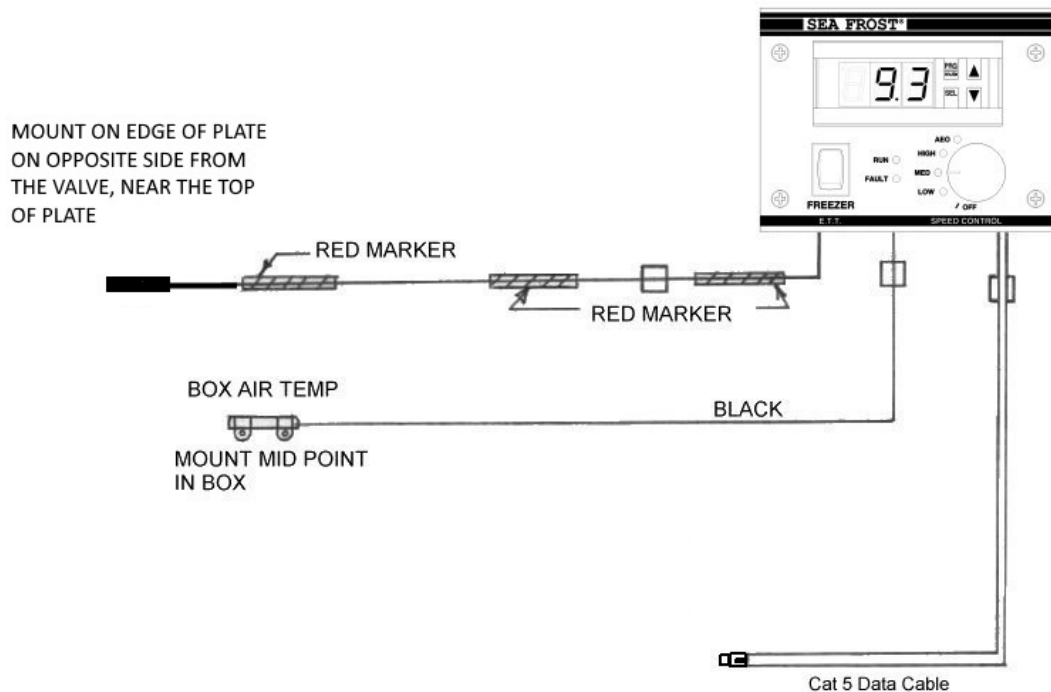
### **Fuse**

Install a 3-amp ATC fuse in the fuse holder on the Module PCB board on the compressor.

### **Wiring Connections**

The two probe wires must enter the refrigerated space. The probes plug into the head unit cables. NOTE: One probe has a red band and connects to the plug with the red band on the back of the ETTsc head. The probe with the red band must be routed to attach to the cold plate, if fitted with two cold plates the probe will attach to the second plate. The second plate is the one without an expansion valve.

If you need to disconnect the plugs, do not pull on the wires insert a small screwdriver blade between the halves of the plug.

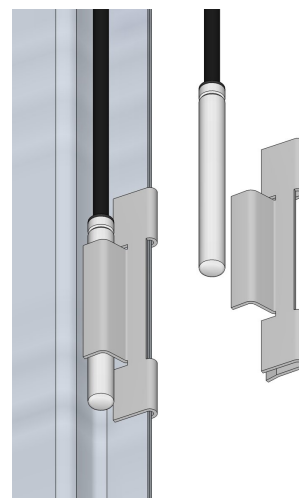


## PROBE ATTACHMENT

The probe with red bands must be in excellent thermal contact with the cold plate. Use the stainless steel clip provided, and attach it to the edge of the plate as shown in the drawing to the right.

The probe without a red band should be installed at the mid point of the cabinet to get an accurate reading of the average temperature. Avoid installing this probe near a front opening door or too close to a cold plate. Mount the probe bulb with two nylon straps or self stick pads and tie wraps provided. *Do not drill and screw into a vacuum panel box!*

Secure the wires neatly using cable ties, self-stick pads, and proper yacht construction wiring practices.



## TROUBLESHOOTING

In case the electronic unit records an operational error, the fault 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.

### COMPRESSOR OPERATIONAL ERRORS SHOWN BY YELLOW LED

Number of flashes	Error type
5	Thermal cut-out of electronic unit (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	Minimum motor speed error (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed 1,850 rpm).
3	Motor start error (The system is overcharged).
2	Fan over-current cut-out (The fan is defective).
1	Battery protection cut-out (The voltage is outside the cut-out setting. Low voltage.)

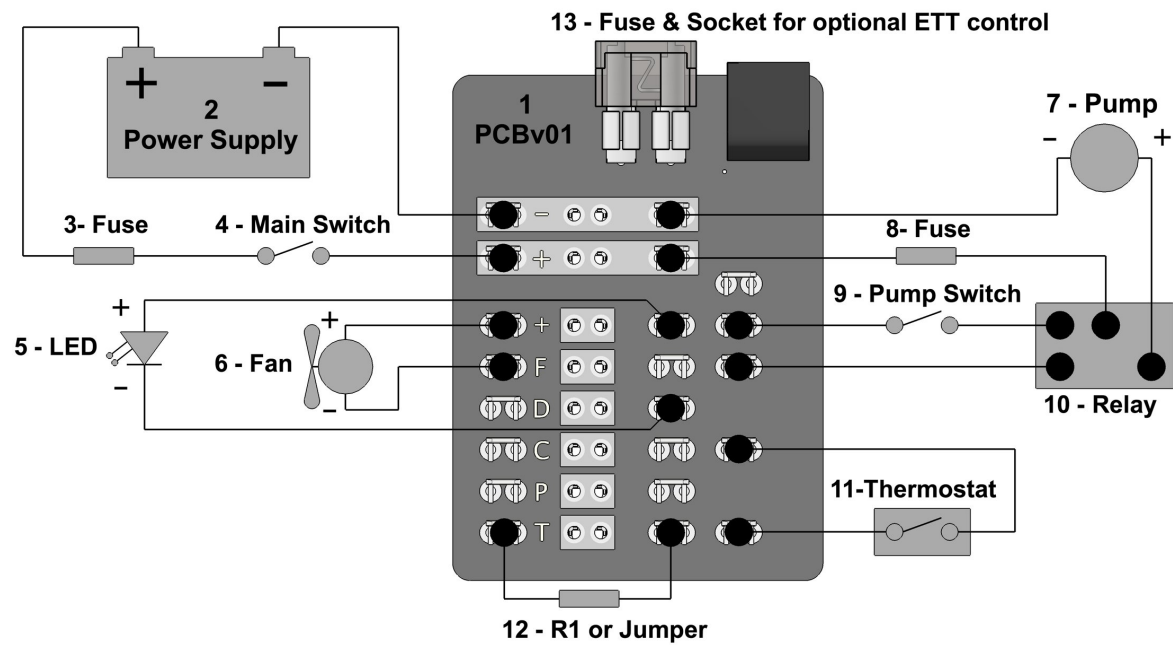
**See separate BD/Tradewinds Troubleshooting Data Pages on-line for troubleshooting compressor errors.**

### ETT Errors

Error on screen	Cause	Solution
E01	B1 probe fault Box air Temperature probe	Check probe connection Or bad probe, replace
E02	B2 probe fault Probe with red band – (plate probe)	Check probe connection Or bad probe, replace



### 13. Wiring for ETT



## SEA FROST ELECTRONIC THERMOSTAT AND THERMOMETER

DRILL (4) HOLES 3/32" FOR #6 SCREWS.



- (1) Control Panel Head
- (2) Sensor Probes (1-with red band, 1-without red band)
- (1) Cat 5 cable with RJ 45 Connector

### INSTALLATION KIT

- (4) #6 x 1/2" flat head screws for mounting panel
- (6) #6 x 1/2" pan head screws
- (5) 3/16" nylon clamps
- (8) Adhesive mounting tabs
- (8) 4" tie wraps
- (1) Stainless steel bulb clip
- (1) Fuse