SEA FROST®

148 OLD CONCORD TURNPIKE BARRINGTON, NH 03825 USA TEL (603) 868-5720 www.seafrost.com

SEA FROST BAIT FREEZER

BF 3.5 404a
Pre- charged System
Air & Water

110 OR 220 volt

DESCRIPTION

The Sea Frost Bait Freezer system consists of several parts: The cold plates or wrapped box liner (hidden cooling coils), a refrigerant control valve, copper connecting lines, a receiver filter drier with sight glass, a compressor / condensing unit and a thermostat.

OPERATION

With the thermostat in the “on” position, the compressor, fan, and pump will operate. Within a few minutes of starting the Bait Freezer, the tubing in close proximity to the valve and the valve itself will be noticeably cold. (see drawings in back of manual for valve location) **(If after 10 minutes of operation the cooling in this area is not observed, do not continue to operate the system.)**

After several hours, the box temperature will cool to well below freezing.
The first plate or the top section of a wrapped box will cool first. Because it freezes first, all the moisture suspended in the air within the box condenses and freezes at this plate. Frost is not a good indication of proper operation; check the temperature with a thermometer. When the box and contents cool to the desired setting, the compressor and fan will cycle off and on periodically to maintain the set temperature.

CONDENSING UNIT LOCATION AND MOUNTING

Air Cooling

The condensing unit should be mounted with the compressor at the bottom parallel to the boat's water line at rest. The BF 3.5 is both water and air cooled. Air is drawn through the unit and discharges at the fan screen on the upper left side. The unit depends on a water pump to cool it. The condensing unit should be installed in the most open area that is protected from water. It should not be placed in an enclosed space such as a sealed locker or engine room. If an engine or machine space is used, operation on air only should be limited to times when the engine is cool and ventilation of the compressor can be enhanced by opening doors or hatches.

Mount the unit level with the compressor at the bottom. The unit may be bulkhead or platform mounted. All BF units are fitted with Wellnut rubber inserts with ¼"-20 female threads for mounting plates to be attached.

Water Cooled

Cooling water from an air conditioning system manifold or separate pump may be connected to the water fittings on the left side.

Water from an air conditioning pump manifold can be plumbed into the BF condensing unit and triggered by the supply labeled "pump" or a dedicated pump can be installed. A flow of two to three GPM is sufficient. (Pump draw not to exceed 2.5 amps at 110-volts.)

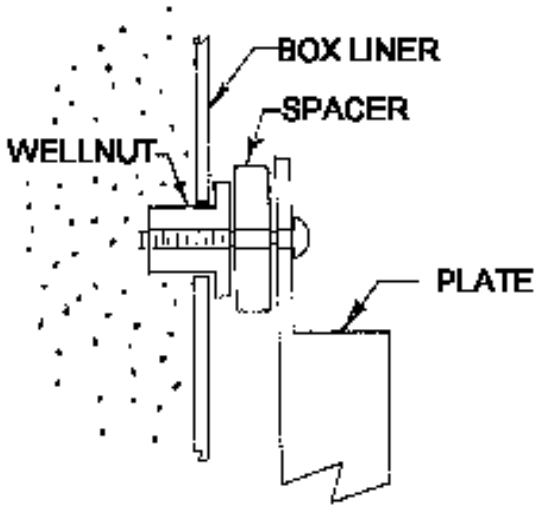
Water-cooling is required on BF3.5 units.

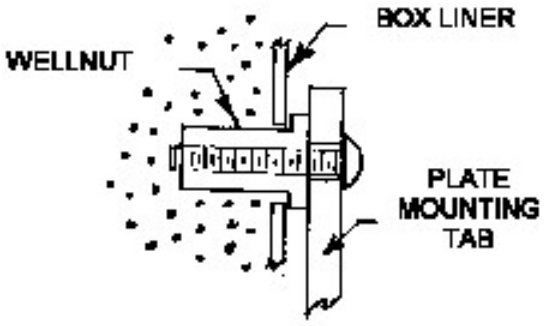
Installation Requirements

Never block the inlet or outlet. Service access and installation requires that the front and left end (inlet/outlet side) be exposed. Provide the driest, coolest air for intake. Air exhaust ducting will help. Avoid any ducting that could channel water into the compressor during wash down or seawater dousing.

EVAPORATOR PLATE INSTALLATION

Mount the plates on opposite walls as high as possible to take advantage of thermal convection. Install the plates with the Wellnut, spacers and screws provided.

For standard evaporator plates The plate(s) mounts with a Wellnut expandable neoprene blind hole fastener. A template or the plate itself should be used to locate the mounting holes. Drill a 3/16" pilot hole. Increase this hole to 3/8". Install the screw into the plate through the spacer then tighten the screw in the Wellnut. Install the plate pushing the rubber mounts in to the pre-drilled holes. Tighten the screws.	

For fully welded solution filled plates SEA FROST holdover plates mount with a "Wellnut" expandable neoprene blind hole fastener. A template or the part itself should be used to locate the mounting hole tabs. Drill 1/4" pilot holes then increase them to 1/2". Install the screw into the mounting tab then screw the mount onto the screw. Install the plate pushing the rubber mounts into the pre-drilled holes. Tighten the screws.	

QUICK CONNECT FITTING INSTRUCTIONS

Aeroquip -6 quick connect fittings are used in this pre-charged system. These fittings reseal upon disconnecting and do not leak during assembly. The final seal is metal to metal.

If installing this compressor in an existing system. Use LSA line adapters to interface with the new compressor. Attach the LSA fittings to the existing lines from the cold plates or wrapped coils, evacuate using a vacuum pump, leak check, and then add a vapor charge of R-404a before connecting to the pre-charged condensing unit.

In a pre-charged system installation make all the other connections before doing the compressor connections. The last two connections at compressor should be the suction fitting (large line) then the discharge fitting (smaller line).

To assemble the fittings, remove the heat shrink and plastic cap. Be sure the threads and the end of the fittings are clean.

Finger tighten the fittings to avoid cross threading. Tighten to wrench snug. This is where the fitting won't turn with good force and then pull up 1/16 turn. Only turn the larger swivel nut.

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

COLD PLATE AND WRAPPED BOX PIPING

Several drawings are included in this manual to explain various designs plumbing.

Pre-Charged Kits

Installing a Jumper

If installing a multi plate system, use the 3/8" jumper to connect the remaining tube on the first plate to either tube on the second plate.

Installing the Return Line

Connect a 3/8" return line to the remaining tube. This return line connects to the compressor.

Support the tubing every 18 inches as necessary with mountable tie wraps and self taping screws.

THERMOSTAT

Thermostat Location

The BF 3.5 Ranco ETC thermostats are low voltage and are connected and powered by the built-in transformer in the compressor cabinet. Mount the thermostat in a dry location. The thermostat is not weather proof. The sensing bulb wires may be extended if needed to reach the insulated box.

The probe temperature is displayed when 110-volt power is applied to the compressor. The location of the thermostat sensing probe can be in a corner of the box. A small plastic tube glued in a corner with holes in it and an open bottom can be made to protect it

Thermostat Wiring

A 15' wiring harness is fitted to the thermostat. Use red, blue, and white 16-gauge wire to extend this harness if a longer length is needed. Attach the wires to the terminal strip using ring terminals, matching corresponding wire color. **The connections are for Sea Frost low voltage controls only. Do not apply power or add to this wiring.**

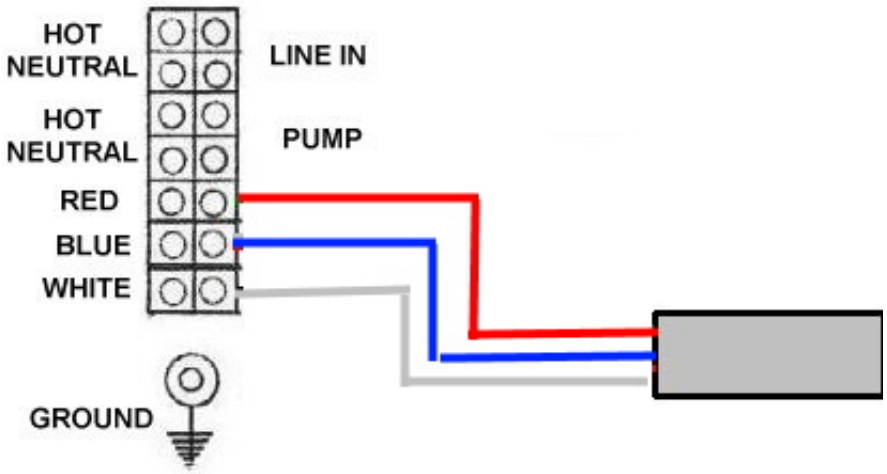
White=common, blue to white=24 volts AC, red=relay.

<u>Installations using line switching thermostats</u>, jump red and blue. Leave white open. Connect the line thermostat to the line in terminals.

Refer to separate manual for operation of IR33 Electronic thermostat.

110-VOLT or 220 VOLT CIRCUIT

A separate 20-amp breaker is required. This circuit powers the thermostat through a built-in transformer. *For operation, it is necessary to have power at all times.*



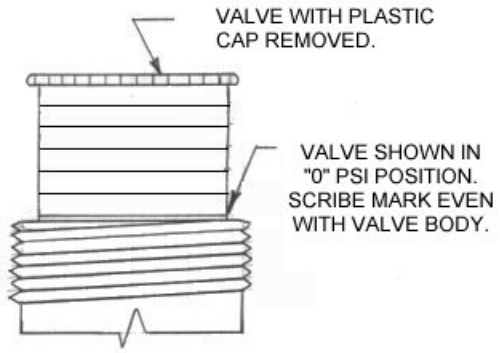
EXPANSION VALVE (CPV)

The expansion valve/ liquid line/drier connects to one of the plate fittings and at the discharge fitting on the compressor section.

After assembly, externally mounted, valves will need to be insulated to prevent frost and sweating.

BF 3.5 R-404a units are set at 15 psi. Factory set valves have heat shrink over the plastic cap. This indicates the valve has been set at the factory. Do not remove, unless troubleshooting. Disregard the below section on valve setting unless trouble shooting.

15 PSI = 5-1/2 scribes lines showing, from zero turn clockwise one full turn.



Constant Pressure Valve

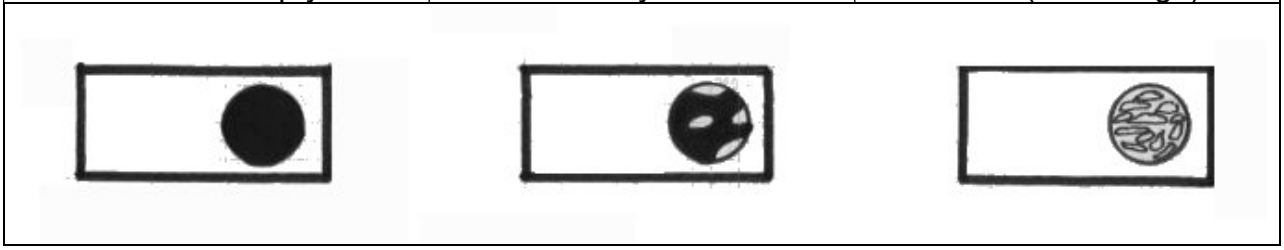
CPV Valve Operation

The constant pressure valve sets the refrigerant boiling point. The pressure setting will indicate the minimum temperature that the freezer system can obtain. It has been preset at the factory. Observing the low side pressure with gauges, note that the pressure is constant at 15 psi. depending on the valve setting. This will produce -15 to -20 F. on the plates or coils. The plate temperature will always be at least 5 to 10 degrees colder than the box. Refer to a pressure temperature chart for R-404a. to be sure the box can reach the thermostat cutout temperature. Test operate the system to check that the thermostat is set in the proper range.

The low side operating pressure of the system will not indicate the amount of refrigerant in the system.

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

READING THE SIGHT GLASS

SIGHT GLASS DETAIL		
Clear or empty	Stationary bubbles	Foam (low charge)
		

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.

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. Turn off the main breaker to the control panel to prevent operation until the system can be properly leak tested and recharged.

Fast moving white foam with the compressor operating indicates an insufficient charge level. Watch closely for a transition from foam to total liquid, (indicated by a clear sight glass). This transition point can be missed if proper attention is not given. Also, IT IS POSSIBLE for the sight glass to show large bubbles even when the charge is sufficient, so it is important to differentiate between "foam" and "bubbles". The foam condition has velocity and direction. Bubbles are large, temporary, and nearly stationary. Do not try to chase away these larger bubbles with more refrigerant: overcharging will then occur. Air in the system may give a false sight glass reading, making bubbles.

In a warm system, when the cabinet is above freezing (32.F) upon start-up, the sight glass may take several minutes to clear. A cold cabinet may show a clear glass within seconds of start-up.

RE-CHARGING OR ADDING REFRIGERANT

Refrigerant R-404a is a mix of refrigerants. It must be liquid charged.

SINGLE ZONE SYSTEMS (1 Box)

Adding refrigerant will not change the suction (low) side pressure when the system is built with a CPV valve. The low side pressure with the compressor running will be fixed depending on the CPV valve setting. Systems with TXV systems will have great swing in low side pressures as the system starts.

Do not charge more than 12 oz of R-404a in an empty system. Typical head pressure will be about 25 degrees above air temp or15 degrees above water temp. If you are adding refrigerant and exceed the calculated head pressure you are overcharging and may risk breaking the compressor valves. Do not adjust the charge to prevent frost back. The return line may be well below freezing if the thermostat doesn't turn off or the expansion valve is set wrong or stuck. Contact the factory if you have questions.

Maximum charge 8-10 oz. R-404a

Do not add refrigerant charge to a new pre-charged system.

DUAL ZONE SYSTEMS (2 boxes)

For applications where one compressor is cooling two different boxes a Dual Solenoid Panel (electro valves) is required. A thermostat for each zone is used to control the solenoids and the compressor. The expansion valves are TXV's (temperature controlled). **A receiver RFD must be added** in the liquid line between the compressor and the Dual Solenoid Panel, The thermostats can be set to run one zone or the other or both zones at once. Refrigerant charging should clear the sight glass with just the larger of the two zones operating. High side pressure should not change when switching from one zone to the other or when both are on. Low side pressure unlike the CPV valved system will fluctuate at a much higher pressure before settling to operating pressure. Pressures are affected by the type of refrigerant and the temperature of the air, water or cabinet.

Maximum charge 18 oz. R-404a

Thermostat Operation – Ranco

The thermostat is pre-set and locked at the factory. When locked the keypad is disabled and changes to the settings cannot be made. To change the settings the lockout switch must be placed in the unlock position.

To access the lockout switch:

1. Switch off the power.
2. Remove the four screws and cover.
3. Slide the lockout switch to the right to the unlock position.
4. Replace the cover.
5. Re-power the system.
6. To program refer to table below.

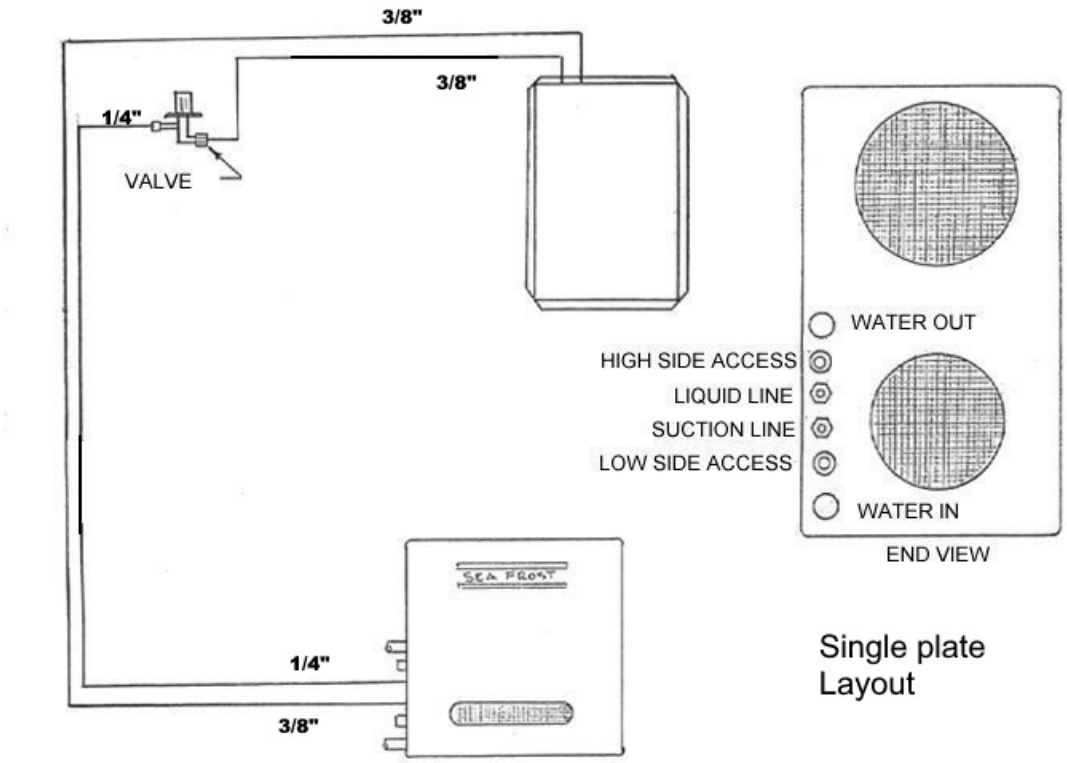
Step	Display	Description
1	F or C	Fahrenheit or Celsius Scale Press the **set** key once to access the Fahrenheit / Celsius scale. The display will show the current status, either F for degrees Fahrenheit or C for degrees Celsius. *The thermostat has been pre-set at the factory for Fahrenheit.* Press the up or down arrow key to choose between the F and C.
2	S1 (blinking)	Setpoint Temperature Press the **set** key again to access the setpoint. The display will show the current set point. *The setpoint has been pre-set to 0 degrees F.* Press either the up or down arrow key to change the setpoint to the desired temperature.
3	DIF 1 (blinking)	Differential Temperature Press the **set** key again to access the differential. The display will show the current differential. *The differential temperature has been pre-set at 5 degrees F.* Press either the up or down arrow key to increase or decrease the differential setting.
4	C1 / H1	Cooling or Heating Mode Press the **set** key again to access the heating or cooling mode. The display will show the current mode. C1 for cooling or H1 for heating. The Thermostat has been pre-set for C1. ***Do not change this setting.*** The BF does not work in heat mode. Press the set key once more and programming is complete.

Note: Pressing the set key accepts the setting and brings you to the next step. You must push the **set** key through all steps to return to the temperature display to allow the compressor to operate.

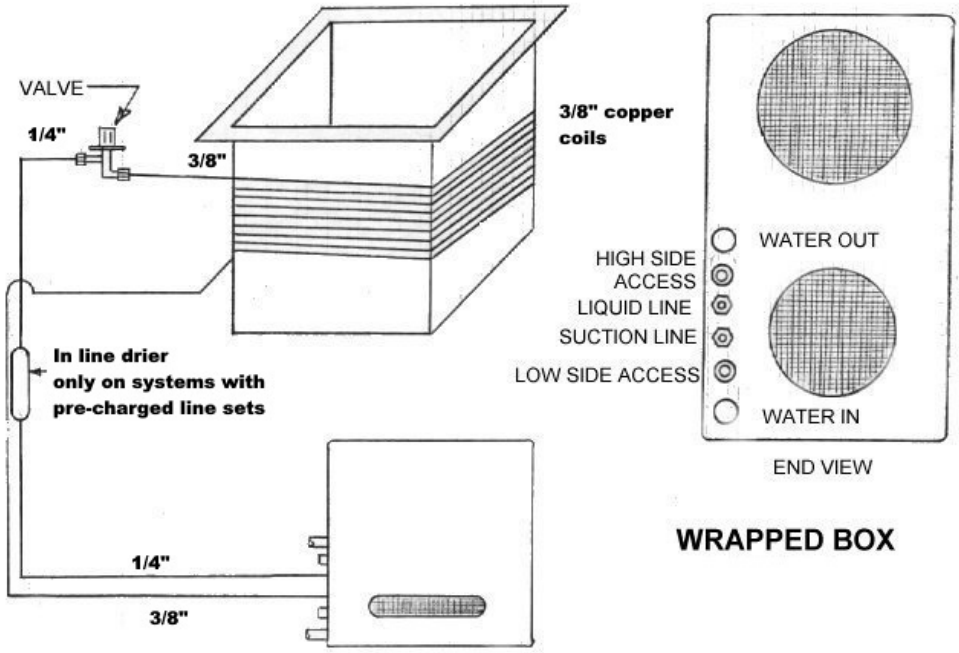
DEFROSTING

The unit will require defrosting from time to time as the frost layer builds up.

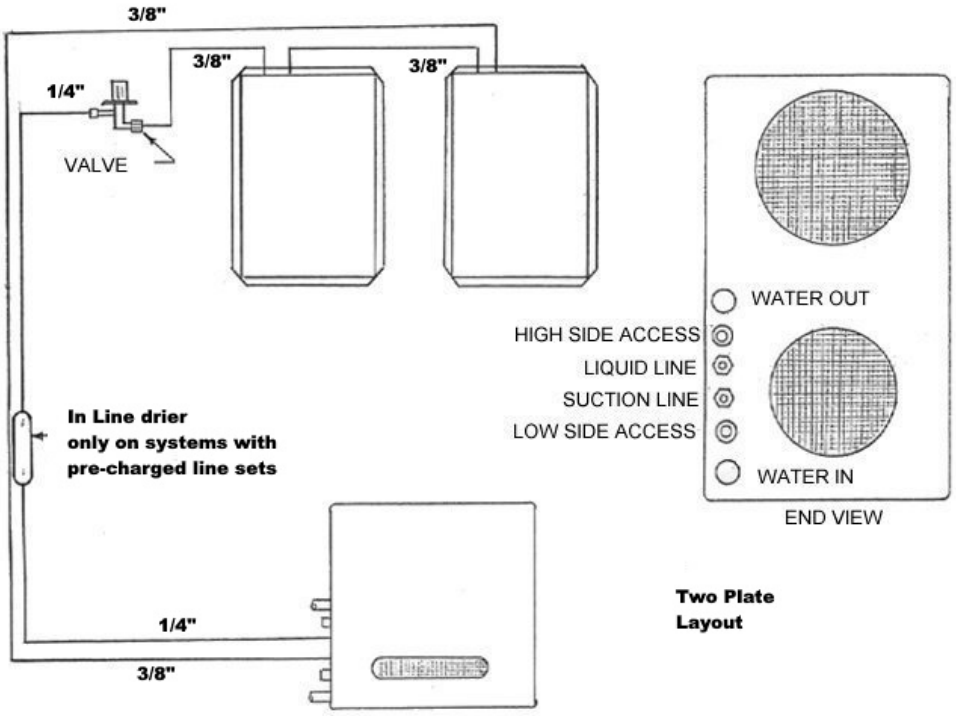
Bait Freezer Specifications		
	BF 3.5 110 VOLT	**BF 3.5 220 VOLT**
Amp Start (LR)	42	15
A.C. amp draw	5.6	2.6
Horsepower	3/8	3/8
BTU per hour	1044	1044
Height	16”	16”
Width	14.5"	14.5"
Depth	7.5"	7.5"
Cooling	Ducted Air and Water Cooled (remote water pump required)	Ducted Air and Water Cooled (remote water pump required)
Compressor unit weight	44	44



Single plate Layout



WRAPPED BOX



Two Plate Layout

Bait Freezer
Twin Valve Layout