

Adler/Barbour Series ColdMachine™ & SuperColdMachine™ Cooling Units And Evaporators

INSTALLATION & OPERATIONS MANUAL

For CU-100 and CU-200 Cooling Units and
VD-150, VD-151, VD-152, VD-153, and VD-160 Evaporators

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Table of Contents

Introduction	1	Wiring The System	16
THIS MANUAL COVERS	1	VOLTAGE DROPS	16
TERMINOLOGY	1	Importance of Using a 15 Amp Breaker	17
UNPACKING THE EQUIPMENT	1	MAKING THE POWER CONNECTIONS	17
TOOLS & EQUIPMENT NEEDED FOR INSTALLATION	2	WIRE SIZE	17
Planning the Condensing Unit Installation	2	Wiring Diagrams	19
GENERAL	2	Operation of System	24
VENTILATION REQUIREMENTS	2	START UP	24
Duct Kits And Powerduct Kits	2	AC/DC OPERATION	24
LOCATION CONSIDERATIONS	3	MAINTENANCE	24
Engine Compartment	3	DEFROSTING	24
Closed Compartment	3	BATTERY CARE	24
Under Settee, Galley Counter, Berth or Locker	3	Wet-Type Batteries	24
Equalizing (Wet-Type Batteries Only)	24		
All Batteries	24		
Mounting The Condensing Unit	4	WINTER OPERATION	25
BULKHEAD MOUNTING BRACKET (OPTIONAL)	4	PROGRAMING THE DIGITAL CONTROL	25
PLANNING THE EVAPORATOR INSTALLATION	4	Programming Set Point	25
Evaporator Location - Vertical Applications	4	Programming Differential, High & Low Limits	25
Evaporator Location - Horizontal Applications	7	Calibration	25
Mounting The Evaporator	7	ELECTRONIC MODULE SYSTEM MANAGEMENT AND PROTECTION	26
Quick-Connect Refrigerant Couplings	8	OPERATIONAL ERRORS INDICATED BY FLASHING LED	26
HOW THE QUICK-CONNECT COUPLERS WORK	8	Troubleshooting	27
DESIGN ADVANTAGES	8	Procedure For Removing Compressor Unit	29
REFRIGERANT SERVICE PORT	9	Procedure For Removing Evaporator And Tube Set	29
Connecting the Refrigerant Couplings	9	Procedure For Removing Powerplate And Tube Set	30
BEFORE CONNECTING	9	Owners Limited Warranty	30
CONNECTING THE COUPLINGS	9	SECTION I - WHAT'S COVERED	30
Lower Connection First	9	SECTION II - WHAT'S NOT COVERED	30
Upper Connection Second	10	SECTION III - COVERAGE PERIOD	31
Installing The Analog (Knob Type) Thermostat	10	SECTION IV - GETTING SERVICE	31
INSTALLATION PROCEDURE	10	TABLE OF WARRANTY PERIODS	32
Installing The Digital Thermostat	11		
MOUNTING THE CONTROL HEAD	11		
MOUNTING THE TEMPERATURE-SENSING BULB	11		
CONNECTING THE CONTROL HEAD TO THE CONDENSING UNIT	12		
Mounting The Powerplate	13		
POWER PLATE TUBE SET	13		
CONNECTING THE PLATE COUPLINGS	13		
CONNECTING THE COUPLINGS TO CONDENSING UNIT	13		
ELECTRICAL CONSIDERATIONS	14		
Water-Cooled Option Package	14		
Water-Cooled Option Installation	14		
Battery Recommendations	16		
HIGH-OUTPUT ALTERNATOR, ELECTRICAL MANAGEMENT SYSTEMS, AND BATTERIES	16		

Introduction

Thank you for purchasing your new Adler/Barbour marine refrigeration system. This manual explains how to install the system on your boat—in just a few hours—with ordinary tools.

**NOTE:**

This system is charged with HFC134, a non-ozone-depleting refrigerant. Please refer to “Troubleshooting” on page 27 of this manual for more details.

THIS MANUAL COVERS

All air-cooled ColdMachine™ products and all air/water-cooled SuperColdMachine™ products with:

- Standard aluminum “bin” shaped evaporators
- Custom formed “flat”, “L”, “U” shaped evaporators
- PowerPlate stainless steel holdover evaporators
- Analog type thermostatic controls (standard)
- Digital type thermostatic controls (optional)

TERMINOLOGY

Below are terms and definitions that will be used throughout this manual:

Box, Cabinet, Icebox, Compartment

The insulated space that will be converted into a mechanical refrigerator, freezer, or combination refrigerator/freezer.

ColdMachine™

The term “ColdMachine” is used throughout this manual when referring to the condensing unit (whether air cooled only or air/water cooled).

Condensing Unit

The stainless-steel base plate mounted compressor, electronic control module, electrical housing and terminal block, refrigerant couplings, air-cooled condenser and shroud (the condensing unit comes pre-charged with R134a refrigerant). Condensing units may be:

- ColdMachine™ (air-cooled only)
- SuperColdMachine™ (air/water-cooled)

Electronic Module

The housing attached to the compressor provides complete digital system management.

Evaporator

Also referred to as “the freezer”, this is the formed aluminum “bin” (or custom-formed “L”, “U”, or “flat”) with connecting tube set and couplings (also pre-charged with R134a refrigerant). Mounts inside the space to be refrigerated.

Junction Box

The stainless-steel housing with terminal block, LED, thermostat harness socket, fuses and relay.

LED

Light Emitting Diode. Mounted in the junction box, used for diagnostics.

Power Plate

The flat, stainless-steel, holdover plate-type evaporator (pre-charged with R134a refrigerant). Mounts inside the space to be refrigerated.

Thermostatic Control (Thermostat)

May be analog (knob) type or digital (LED display) type.

Tube Set

The copper refrigerant tubing and couplings, also pre-charged with R134a refrigerant. Tube sets may come attached (evaporators) or separate (PowerPlates).

UNPACKING THE EQUIPMENT

When unpacking the unit, carefully check for shipping damage and identify all listed items to ensure that all components have been received and that no in-transit damage has occurred. File claims for loss or damage directly with the carrier. If the system was purchased through a dealer, please contact the dealer directly.

Your ADLER/BARBOUR refrigeration system includes one or more of the following components:

- Condensing unit
- Evaporator assembly (either aluminum with integral tube set or PowerPlate with separate tube set)
- Ice cube trays, vertical or horizontal to suit: 2 for small evaporators, 3 for large evaporators (trays are not included with PowerPlate systems or flat plates)
- Separator to retain ice cube trays (vertical style only)
- Thermostatic control (either digital with wire harness or analog [knob type] with wire harness)
- Installation / small parts package
- Paper template for evaporator mounting hole locations (only supplied with rectangularly shaped box-type evaporators)
- Soft-sealing removable mastic putty ("Mortite") for tubing exit hole through box (never use the durable marine type)

TOOLS & EQUIPMENT NEEDED FOR INSTALLATION

- Electric drill with assorted small bits including 9/64 inch/3.6 mm
- Stubby Phillips screwdriver
- Hole saw 1-1/2 inches/3.8 cm diameter
- Wrench, open end type, 5/8 inch*
- Wrench, open end type, 13/16 inch*
- Wrench, open end type for powerplate, 3/4 inch*
- Electrical wire, 2-conductor, marine-type tinned flexible copper stranded (see Wire Size Table in this manual)

*Alternatively, two (2) adjustable wrenches, 10 inch/25.4 cm size

Planning the Condensing Unit Installation

Please keep the following points in mind when planning the installation.

GENERAL

- The connecting refrigerant tube set length between the condensing unit and the freezer is 15 feet/4.57 m (12.5 feet/3.72 m for PowerPlate). Plan the location of the two units accordingly.
- The route of the refrigerant tube set through the boat from the condensing unit to the icebox must be determined before starting any work. The tube set must be kept clear of any bilge water and protected from chafe and damage.
- Ventilation openings or ventilation duct options will be required if the compressor unit is located in a small, confined compartment. Re-circulating the same air is unacceptable.
- Locating the condensing unit in the engine room is okay if the continuous environment is not over 100°F/37.7°C, but performance will be much improved if a Duct Kit or Power Duct Kit is installed to provide inlet air at under 90°F/32.2°C. A cooler location = less running time = lower amperage draw.
- Accessibility is an important consideration.
- All components must be protected from bilge water, spray or possible physical damage.

VENTILATION REQUIREMENTS

The ColdMachine is a device that moves heat from one place to another. It does not "create cold." The heat removed from your icebox by way of the evaporator is transferred to the air around the condensing unit. If you locate the condensing unit in a small, hot or confined enclosure, it will suffocate. Its built-in fan will have to re-circulate hotter air. It will run continuously, draw excess amps and not cool efficiently. It will never shut off and its performance will be unacceptable.

Let the unit breathe! Position the condensing unit so that its fan can intake air from one space and discharge it to another. Do not re-circulate the same air unless the compartment in which you mount the unit is 100 cubic feet/2.83 cubic meters or larger in volume, unobstructed, and mostly below the waterline.

DUCT KITS AND POWERDUCT KITS

To achieve cool airflow through your ColdMachine, we offer four different packages to improve ventilation:

For the ColdMachine

Part #C8079 Ventilation Duct Kit with adapter shroud, 3 feet/91.4 cm of 4-inch/10.16 cm flex duct, 1 adapter flange and trim grille. Attaches to the condensing unit with four screws.

Can be used in two ways:

1. To bring air to the unit from a cooler location—bilge, yacht accommodation, cool ventilated locker, etc., or

- The condensing unit's fan can be physically reversed and the duct kit can be used to extract air from the unit and discharge it into another space. This is preferred if the location has cool air available, but has no way to get rid of the warmer air after it has passed through the condensing unit.

Part #C8075 Power Duct Booster Duct Kit—as above, with 5 feet/152.4 cm of 4-inch/10.16 cm flex duct, 3 adapter flanges and additional booster fan. Used exactly like above, plus the longer length and push-pull fans allow you to go to a greater distance through the boat to pick up cool air or get rid of heated air.

For the SuperColdMachine:

Part #C8070 Ventilation Duct Kit with 3 feet/91.4 cm of 4-inch/10.16 cm flex duct, 1 adapter flange and trim grille. Attaches to the SuperColdMachine condensing unit with 4 existing fan mount screws. Can be used in 2 ways:

- To bring air to the unit from a cooler location—bilge, yacht accommodation, cool ventilated locker, etc., or
- The condensing unit's fan can be physically reversed and the duct kit can be used to extract air from the unit and discharge it into another space. This is preferred if the location has cool air available, but has no way to get rid of the warmer air after it has passed through the condensing unit.

Part #C8071 Power Duct Booster Duct Kit—as above, with 5 feet/152.4 cm of 4-inch/10.16 cm flex duct, 3 adapter flanges and additional booster fan. Used exactly like above, plus the longer length and push-pull fans allow you to go to a greater distance through the boat to pick up cool air or get rid of heated air.

LOCATION CONSIDERATIONS

IMPORTANT: Find the coolest possible location in the largest compartment available. However, many other locations are acceptable provided the appropriate ventilation duct kit is installed (see below).

ENGINE COMPARTMENT

Duct kit or Power duct kit mandatory.

Mount the condensing unit as far as possible from the engine, particularly the hot exhaust pipe sections. Route the connecting tubing from the evaporator away from the hot spots such as the engine, manifold or hot water pipes. If the tubing must be run close enough to local hot spots to become noticeably heated, protect it with insulated sponge tubing ("Armaflex" or similar, available from home-improvement outlets).

IMPORTANT: The condensing unit must be mounted horizontally, base down. NO EXCEPTIONS. It will tolerate up to 30° off-level but must not be mounted off-level initially.

CLOSED COMPARTMENT

(Such as Sail Bin, Large Lazarette, or any Closed Compartment)

Generally adequate without ducting if there is 100 cubic feet/2.83 cubic meters of volume and half of the outside surfaces are below the waterline for heat dissipation. In such a case, heat will transfer outside the compartment via conduction. Be sure that airflow into and out of the condenser is not obstructed by sail bags, lines, etc. Position the unit so that it can still move air freely despite an occasional sail bag or two dropped nearby.

If above conditions cannot be met or if compartment air temperature exceeds 100°F/37.7°C, you MUST install a duct kit.

UNDER SETTEE, GALLEY COUNTER, BERTH OR LOCKER

(or any space under 100 cubic feet/2.83 cubic meters)

Position the unit so that it can positively draw air from one space and discharge it into another. Simply cutting holes or grilles into the space will not accomplish this.

The best results are achieved by cutting a rectangular opening in the bulkhead equal to the size of the condenser (8 inches x 8 inches/20.3 cm x 20.3 cm). Mount the unit with its condenser against the opening for air intake. Provide another opening of at least equal size at the other end (or either side) of the unit so that warm air can exhaust. Small slots or air holes generally are not satisfactory. One big opening is much better. However, if visible finished joinery must be cut into, plan to use teak louvered grilles (available in many stock sizes from your Dometic dealer). Increase the size of the outlet opening by at least 1/3 (i.e.: to about 100 square inches/645.2 square cm or more) to compensate for the teak louver obstruction.

Mounting The Condensing Unit



CAUTION:
Unit must be mounted horizontally, base down.

Handle the condensing unit carefully. Do not pick it up by the tubing. The cooling fins on the condenser (the radiator-like object) are very thin for maximum efficiency and bend easily. If bent, they should be straightened using the flat blade of a screwdriver or "combed" using a "fin comb" obtainable at a refrigeration supply house.

Use four (owner-supplied) fasteners to mount the unit base down on a suitable, sturdy HORIZONTAL platform. Use 1/4 inch/6.4 mm diameter wood screws, self-tapping screws or machine screws and nuts, depending on the type of mounting platform. There are mounting holes in each of the four corners of the condensing unit base for this purpose.

BULKHEAD MOUNTING BRACKET (OPTIONAL)

If this optional part was ordered, it must be bolted through the bulkhead selected, not screwed to it. Use 1/4 inch/6.4 mm or 5/16 inch/8 mm diameter bolts with large flat washer or backup plate on other side. The system is supplied with 4 oversized flat washers. These must be used on the wood or fiberglass bulkhead side to distribute the bolt loading to the bracket properly.



NOTE:
The bracket may seem too light and flexible before it is mounted. Once bolted securely to the bulkhead using the supplied bolts to secure the condensing unit base, it becomes stabilized and very rigid.

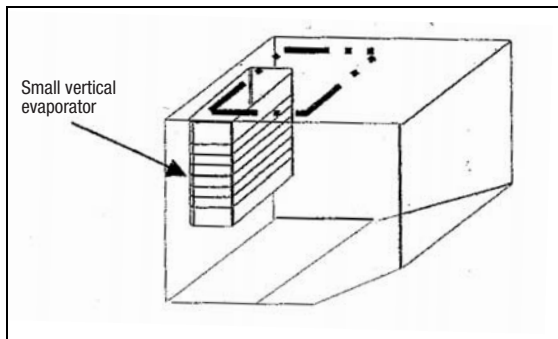
PLANNING THE EVAPORATOR INSTALLATION

EVAPORATOR LOCATION - VERTICAL APPLICATIONS

Locate the evaporator vertically, as high as possible on any side-wall in the icebox. Template, standoffs (1 inch/25.4 mm) and mounting screws (1-3/4 inch/44.5 mm) are supplied.

Allow sufficient space for access to the freezer interior, insertion and removal of the VertiCube™ ice trays and periodic cleaning.

Figure 1: Small Vertical Evaporator

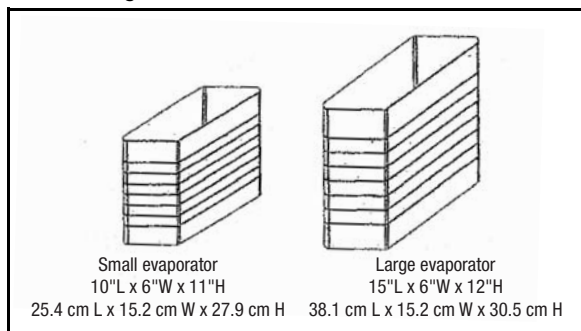


Basic Refrigerator

Up To 9 Cubic Feet/0.25 Cubic Meters

Small vertical evaporator mounted in typical top opening box smaller than 9 cubic feet/0.25 cubic meters.

Figure 2: Basic Refrigerators



Optional Box Modifications & Combinations

Freezer/Refrigerators—up to 9 cubic feet/0.25 cubic meters total

In many applications, the Adler/Barbour system has substantial surplus capacity beyond that needed for a refrigerator only. Therefore, it is often practical to partition the box into two sections if a larger freezer capacity than provided by the evaporator unit itself is desired. The amount of volume allotted to each section will depend on your individual need and is subject to the system's capacity.

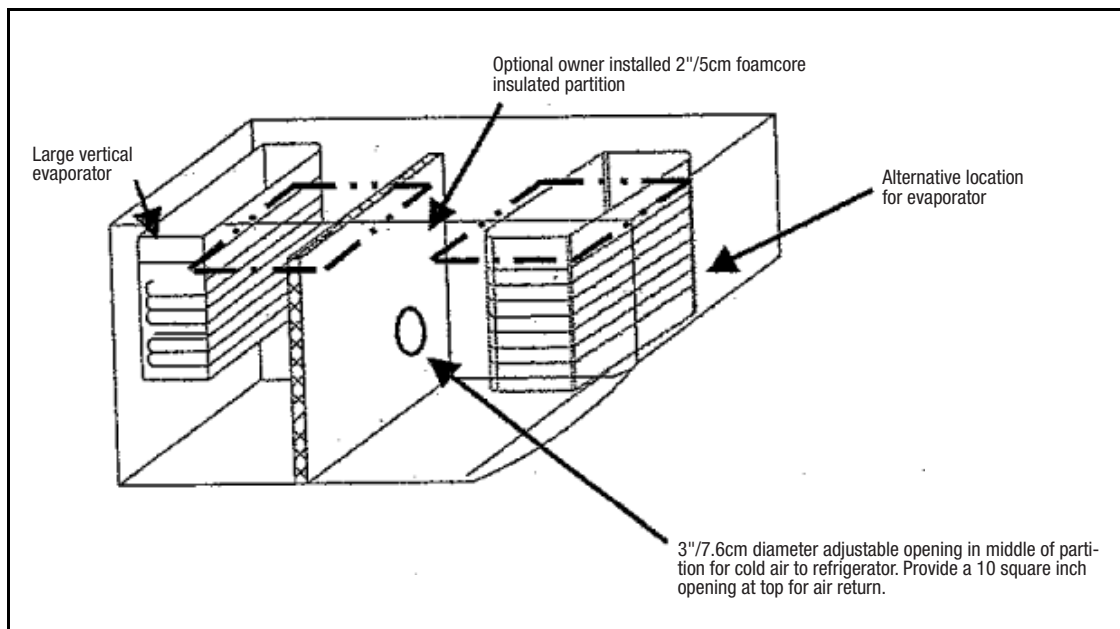
A large-size evaporator system (VD-152 or VD-153) is best. The small-size evaporator systems (VD-150 or VD-151) will generally work only if the total box volume is under 6 cubic feet/0.17 cubic meter.

Some experimentation may be necessary before the location of the partition is finalized. A minimum of 4 inches/10.2 cm of rigid polyurethane foam insulation is mandatory on all box surfaces for this application. Please do not attempt it with less. In boxes up to 8 or 9 cubic feet/0.23 or 0.25 cubic meter, it is generally possible to obtain 2-3 cubic feet/0.06-0.08 of below-freezing space by creating a suitable partition.

For the partition, use a sheet of 2 inches/5.1 cm rigid polyurethane foam core with fiberglass or Formica faces, tightly fitted and sealed airtight to the box sides and bottom. The necessary materials should be available locally (home-improvement outlets) and are relatively easy to work with.

For cool air feed to the refrigerator side, drill a 3 inch/7.6 cm diameter hole halfway up the partition and leave about a 1 inch/2.5 cm gap at the top. This will allow for natural convection airflow from the freezer to the refrigerator section.

Figure 3: Combination Box



You may need to install a manual damper over the hole to better control individual compartment temperatures. This can be a simple disc with a single pivot screw. As an alternative, you can use the Adler/ Barbour self-powered, thermostatically controlled Automatic Shutter (Part #D7230). Use one automatic shutter for each 4 cubic feet/0.11 cubic meters of refrigerator space. For the shutter, cut a slot 1-1/8 inch high x 4 inches/28.6 mm x 101.6 mm wide instead of a 3 inch/76.2 mm hole.

For side door refrigerators, a Spillover Fan Kit #C7210 is preferred—please see the following section.

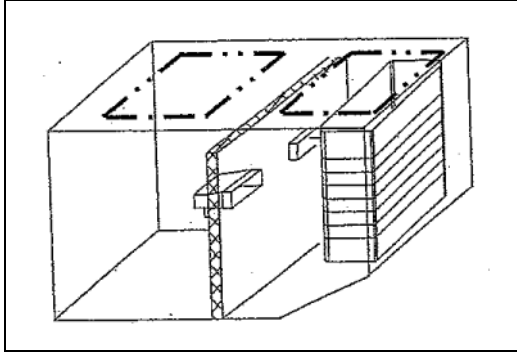
Large Refrigeration or Combination Box

9 -15 cubic feet/0.25 - 0.42 cubic meters total

Options:

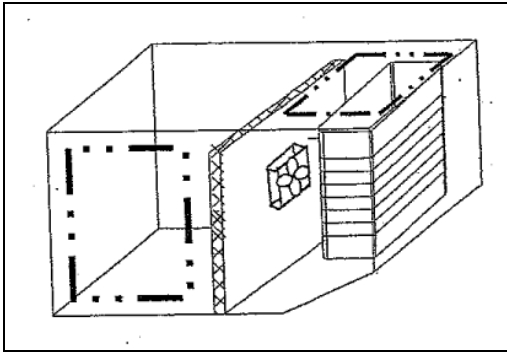
- **“All Refrigerator” without optional partition** - Provides ample capacity for 3 ice trays (which are standard) and frozen food, or 9 ice trays only and no frozen food.
- **“Divided Refrigerator-Freezer” with customer-installed partition** - Provides additional freezer capacity (up to approximately 3 cubic feet/0.08 cubic meters). Minimum 4 inches/10.2 cm of insulation is mandatory on all surfaces, including lids and countertops.

Figure 4: Combination Box - Top Opening



Top-opening refrigerator/freezer using one or two #D7230 automatic shutters (one shutter for each 4 cubic feet/0.11 cubic meters of refrigerator volume).

Figure 5: Combination Box - Side and Top Opening



Side-door refrigerator and top-opening freezer using #C7210 spillover fan with thermostat control.

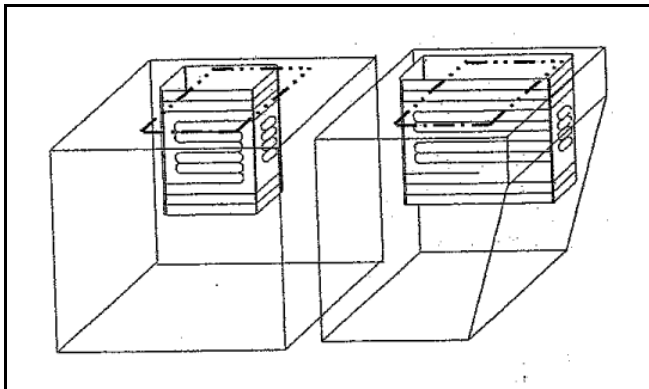
Separate Refrigerator & Freezer Using 2 Independent Systems

Use this arrangement for a single, large, fully partitioned box or for two separate boxes in different locations.

Freezer: The large evaporator is used for freezer applications up to 6 cubic feet/0.17 cubic meters with box insulation of 4 inches/10.2 cm or better; 8 cubic feet/ 0.23 cubic meters with insulation of 6 inches/15.2 cm or better.

Refrigerator: The standard small vertical or small horizontal evaporator is used for refrigerators up to 9 cubic feet/0.25 cubic meters. The large evaporator is used for refrigerators up to 9-15 cubic feet/0.25-0.42 cubic meters. Use box insulation of 3 inches/7.6 cm or better.

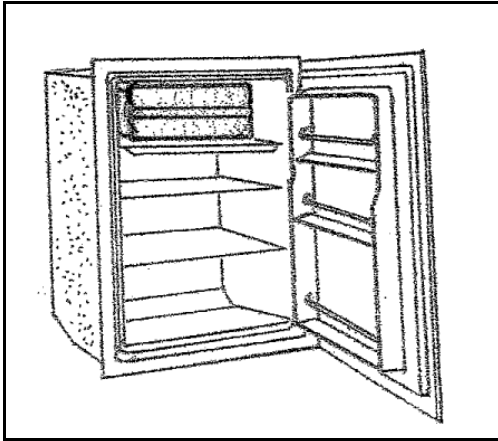
Figure 6: Separate Refrigerator & Freezer With Independent Systems



EVAPORATOR LOCATION - HORIZONTAL APPLICATIONS

Mount the evaporator unit horizontally from the roof of the icebox. Standoffs (1 inch/2.5 cm) and mounting screws (1-3/4 inch/4.4cm) are supplied. Allow clearance for the freezer door to swing open.

Figure 7: Horizontal Evaporator

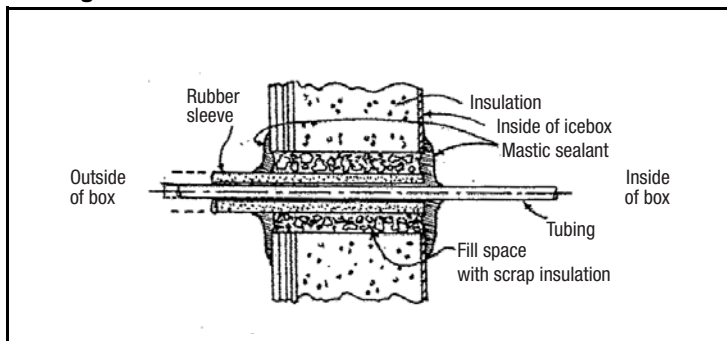


Mounting The Evaporator

Plan the installation to allow for minimum modification of existing shelving.

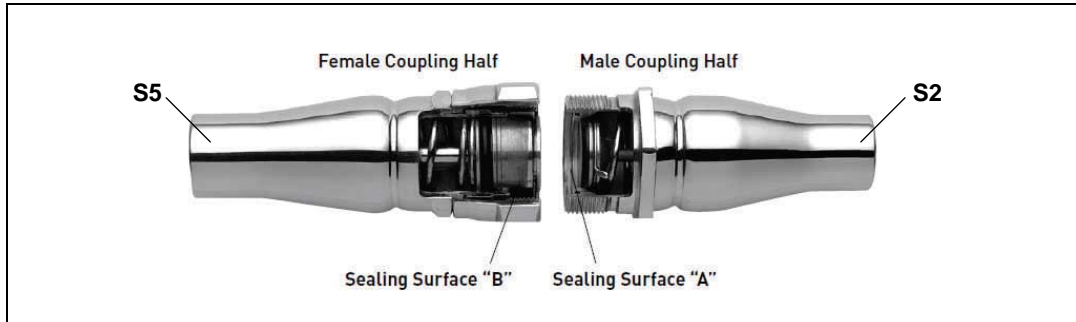
1. Mark the location of the four mounting holes on your mounting surface. You can either hold the plate in place and mark the holes with a pen or pencil, or (if applicable) cut out and tape the supplied paper template and mark the holes where indicated (paper templates are only supplied with rectangularly shaped box-type evaporators).
2. Position the refrigerant tube exit hole in the icebox for minimum bending and strain on the evaporator and tube set. Mark its location (1-1/2 inch/3.81 cm diameter).
3. Drill the mounting holes using a 9/64 inch/0.36 cm drill and the tube set exit hole using a 1-1/2 inch/3.81 cm hole saw.
4. Unroll the entire tube set. An assistant is very helpful here. It is often easier to unroll the entire tube set and stretch it outside the boat. Feed the tube set and couplings through the holes in the icebox and bulkheads while an assistant supports the freezer unit and keeps the tubing feeding smoothly without damaging it. Be careful not to kink, flatten or strain joints. Make sure the plastic caps are in place over the refrigerant couplings. Keep dirt out of the couplings.
5. Feed the tube set through the boat to the compressor unit. Do not attempt to connect the mating couplings or remove the plastic caps yet.
6. Fasten the freezer unit to the icebox liner with 1-3/4 inch/4.45 cm stainless-steel screws and 1 inch/2.5 cm plastic standoffs supplied.
7. Position the rubber insulation sleeve on the tube set so that its end is flush with the inside of the liner of the icebox with the balance extending outside.
8. Form excess tubing, if any, into an 18 inch/45.7 cm (approximately) diameter coil in the horizontal plane above the compressor unit or at any other convenient location.
9. As shown below, seal the icebox hole using the supplied mastic sealant (a gray putty). If you need more sealant, this product is readily available at hardware stores under the brand name "Mortite".

Figure 8: Sealing Hole In Icebox



Quick-Connect Refrigerant Couplings

Figure 9: Self-Sealing Quick-Connect Couplings



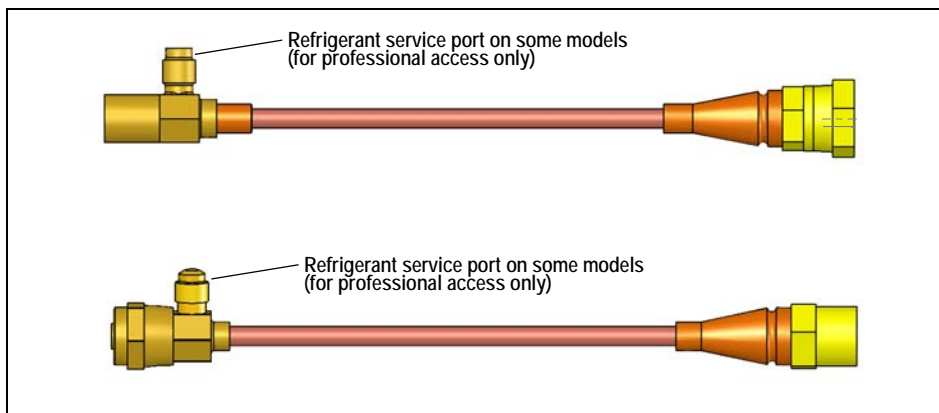
The self-sealing Quick-Connect refrigerant coupling uses synthetic seals and metal threads, so the couplings can be removed and reconnected as often as needed with no loss of refrigerant. (Professional installation is not required when all couplings in the system are Quick-Connect.)



NOTE:

Self-sealing Quick-Connect Adapter Kits (P/N 755570000) are available for replacement cooling units or evaporators that join older “one-shot” units to their new self-sealing counterparts. (Professional installation is required to capture and recharge the refrigerant.)

Figure 10: Quick-Connect Adapter Kit (P/N 755570000)



HOW THE QUICK-CONNECT COUPLERS WORK

When disconnected, spring-loaded valve assemblies in the male and female coupling halves are sealed to prevent refrigerant loss and the inclusion of air or foreign materials. A spring in the male coupling half presses the bonded poppet against sealing surface “A” of the coupling body. Likewise, a spring in the female coupling half presses the sleeve against sealing surface “B” of the stem valve head.

When partially connected, the sealing surface of the male coupling body contacts the bonded seal of the female coupling's sleeve assembly as the two coupling halves are threaded together. At the same time, the stem valve head in the female coupling assembly contacts the male coupling's bonded poppet, forcing air out of the coupling. During this stage, both coupling halves are still completely sealed, preventing leakage of refrigerant.

When fully connected, continued tightening of the union nut (female coupling) draws the couplings together, and opens the fluid passage by forcing the male coupling's poppet assembly and the female coupling's sleeve assembly open. When fully coupled, a metal ring located in the front of the male coupling forms a leak-free metal-to-metal seal between the two coupling halves. Refrigeration professionals can use the service port (on some models) to add or remove refrigerant if necessary.

DESIGN ADVANTAGES

Mix & Match: Each half of your system is precisely charged with refrigerant at the factory. After coupling together, the completed system will have the correct total charge.

Result: Any Adler/Barbour VD-150 Series aluminum evaporator, or VD-160 PowerPlate can be connected to any CU-100 ColdMachine™ or CU-200 SuperColdMachine™ condensing unit.

**NOTE:**

Our 80 Series products each have their own “families” of charge-balanced evaporators. They are not interchangeable with each other or with the Cold-Machine™ evaporator family. Nor can an 80 Series condensing unit be used to replace a ColdMachine™ CU-100 or CU-200 condensing unit by coupling it to a ColdMachine™ Series VD-150 or VD-160 evaporator.

REFRIGERANT SERVICE PORT

The refrigerant service port is a feature on some models. This service port is only for use by refrigeration professionals with proper equipment for adding or evacuating refrigerant. See Figure 10 on page 8.

Connecting the Refrigerant Couplings

BEFORE CONNECTING

- The tubing must not be allowed to vibrate or chafe. Secure tubing and wiring to protect from chafe and vibration.
- Coil the excess tubing and the thermostat wiring harness in an 18” to 24” diameter coil and secure preferably in a horizontal orientation.
- Support the refrigerant tube set and the wire harness using clamps and/or plastic wire ties (4 supplied).
- Keep the tube set and harness out of bilge water and protected from chafe and vibration.
- Seal the exit hole in the icebox wall using the supplied mastic. (Refer to “Mounting The Evaporator” on page 7.)

CONNECTING THE COUPLINGS

Couplings must be immaculately clean. **Do not allow any dirt, sawdust, foam insulation dust, etc., to get into coupling ends as this will seriously damage the system.** Leaving plastic caps and plugs in place, carefully wipe off the fittings to remove dirt, dust and moisture.

LOWER CONNECTION FIRST

Refer to Figure 9 on page 8. Connect the **lower** refrigerant male to female coupling first:

1. Drill holes in bulkhead or panel to accommodate the coupling half if necessary. Remove dust cap before positioning on bulkhead.
2. Remove dust caps and plugs if used, making sure that component synthetic seals are intact.

**IMPORTANT:**

Save all coupling protective caps. Put them in a marked container and keep aboard. If a future service procedure requires that any coupling pair be disconnected, these caps must be re-installed immediately to keep out dirt.

3. Wipe off coupling seals and threaded surfaces with a clean cloth to prevent the inclusion of dirt or any foreign material in the system.
4. Generously LUBRICATE the synthetic seal and threads of fittings in both the S2 male and S5 female couplings with refrigeration oil.
5. Thread coupling halves together by hand to ensure proper mating of threads. **Do not try to turn the male coupling.** Just hold it with your 7/8” wrench. **Turn only the free-turning part of the female coupling.**
6. Using the 7/8” wrench on the male coupling body hex (**holding the male coupling hex stationary**) and the 15/16” wrench on the female coupling nut, tighten (clockwise) the female coupling nut until the coupling halves “bottom out” or a definite resistance is felt. This will require about 6 full turns. Work rapidly to minimize any possible escape of refrigerant past the temporary rubber O-ring seal (it is inside the male coupling). Occasionally there may be a slight “hiss” and/or a drop or two of refrigerant oil when making these connections. **Don’t stop if this happens—just continue until the couplings feel very tight.**

**IMPORTANT:**

Do not rotate the S2 male or S5 female coupling bodies during connection. Only rotate the coupling nut on the S5 female coupler.

- Using a marker or ink pen, mark a line lengthwise from the coupling hex to the bulkhead. then tighten an additional 1/8 to 1/4 turn. The misalignment of the line will show the degree of tightening. This final turn is necessary to ensure that the knife-edge metal seal bites into the brass seat of the coupling halves, forming the leakproof joint. If a torque wrench is used, tighten to 10-12 foot pounds/13.6-16.3 newton meters. *Note that the final turn starts **after** the couplings are already very tight.*

UPPER CONNECTION SECOND

Connect the **upper** refrigerant male to female couplings following the same procedure described above, except you do not have to use 2 wrenches since the male coupling is held securely by its support bracket.

Installing The Analog (Knob Type) Thermostat

Mount the thermostatic control unit high in the icebox, away from moisture and spillage. It should also be visible and accessible. It is acceptable to mount the thermostatic control unit outside of the icebox space if you prefer. At least 12 inches/30.5 cm of capillary sensing tube must be inside the box.

The capillary sensing tube is 36 inches/91.4 cm long and must reach from the thermostatic control unit to the clamping plate on the side of the freezer unit. It must be routed along the icebox wall—clear of food, shelving, etc.

The thermostat can be mounted by using either the adhesive backing on the thermostat mounting flanges or the stainless steel mounting screws (supplied).

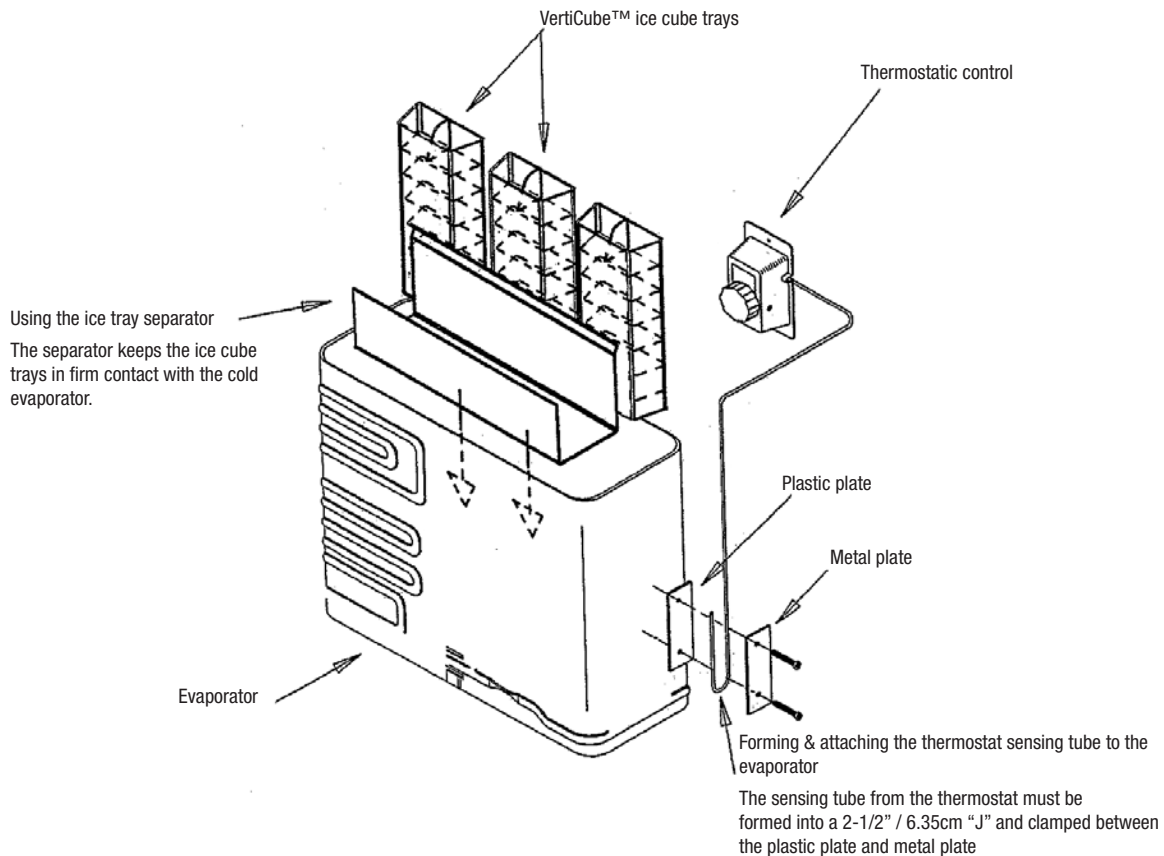
If using the adhesive backing, the mounting area must be clean and dry. Peel off the protective backing from the adhesive foam on both mounting flanges of the thermostatic control unit, position carefully and press firmly to adhere.

We recommend that you also use the mounting screws by drilling two 9/64 inch/0.36 cm holes through the thermostat flange holes.

INSTALLATION PROCEDURE

- Carefully unroll just enough capillary tubing to reach the metal and plastic clamp plates on the side of the freezer unit. Via this tube, the thermostatic control unit senses the temperature of the freezer unit. Bend the last 2 inches/5.1 cm into a “J” shape. Slide the “J” shaped end between the metal and plastic plates and fasten the screws firmly. Be sure that 4 inches/10.2 cm of tubing are clamped under the metal plate or the thermostatic control unit will not function properly.
- Secure the coil and tube against chafing. (Leave the excess capillary tubing coiled). The tube must not touch the freezer unit at any point except the clamp plates or an erratic control cycle will result.
- Uncoil the 21 foot/6.4 meter electrical harness from the thermostat and run it alongside the refrigerant tube set to the condensing unit phone jack. Plug this harness into its mating receptacle on the face of the junction box.

Figure 11: Installation Layout (with Analog Control)



Installing The Digital Thermostat

(If supplied)

Installing this control is fast and simple. When planning the control location, keep in mind that the sensing bulb wire is 10 feet/ 3.1 meters long.

This optional control has several advanced features, including:

- Touch-pad status indicator for cut-out, cut-in temperatures
- LED relay status indicator
- Temperature set point display
- Programmable set point and differential
- Large (0.56 inch/1.42 cm) red LED display

MOUNTING THE CONTROL HEAD

1. Make the cutout for the control 3.1 inch x 1.35 inch (7.9 cm x 3.4 cm).
2. Snap the control head through the mount faceplate.
3. Mount the faceplate using the four black screws provided.

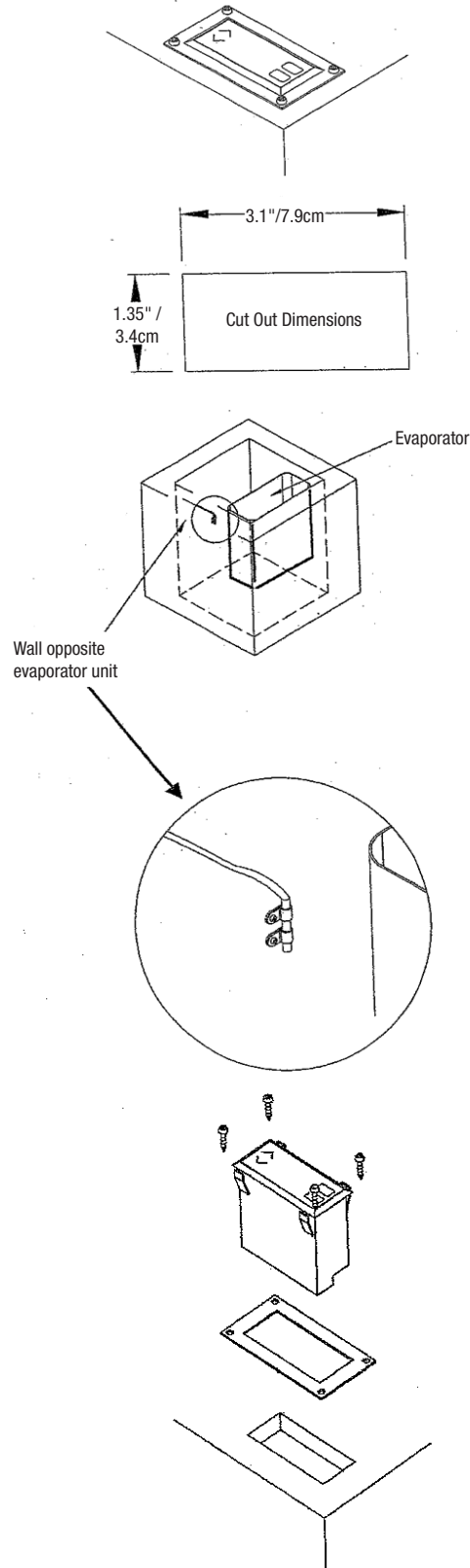
MOUNTING THE TEMPERATURE-SENSING BULB

1. Run the sensing bulb and wire into the refrigerated box to be controlled. Mount the sensing bulb on a box side wall midway between top and bottom, using the two nylon clamps and screws provided. (NOTE: This is an air-sensing bulb, and is **not** clamped to the evaporator.)
2. Keep the bulb as far away as possible from the evaporator (approximately 2 feet/61 cm away) and out of the direct airflow if a spillover fan kit is installed.
3. Secure the excess wire to protect it from chafe and damage.

CONNECTING THE CONTROL HEAD TO THE CONDENSING UNIT

1. The digital control has a pre-wired power and signal cable, terminating in a male 4-pin phone plug. This plug mates with the phone jack (socket) located on the face of the electrical box on the condensing unit and marked "T" STAT CONNECTION.

Figure 12: Installing the Digital Thermostat



Mounting The Powerplate

1. Plan the installation to position the PowerPlate in the preferred orientation: on a vertical wall of the refrigerator (or freezer) cabinet with the label on top. In this position, the PowerPlate will perform at maximum efficiency. If this is not possible, it may be installed in any spatial orientation; but a small reduction of efficiency may result.
2. Position the PowerPlate high in the compartment—within 2 inches/5.1 cm of the top for best results.
3. Be sure to leave room for mating and tightening the couplings that connect the PowerPlate to the tube set.
4. Mark and drill four (4) mounting holes using a 9/64 inch/0.36 cm drill and a tube exit hole using a 1-1/2 inch/3.1 cm hole saw.
5. Be sure to use the supplied four (4) plastic spacers to ensure that the PowerPlate is spaced away from the cabinet wall to permit air circulation behind it for best efficiency. Do not mount the PowerPlate flush against the wall as a major loss of performance will result.

POWER PLATE TUBE SET

1. Drill a 1-1/2 inch/3.1 cm diameter hole through the cabinet wall for the tube set. Unroll the tube set. Feed the end with the couplings into the box. Do not remove the protective caps yet.
2. Position the insulating sleeve OUTSIDE (not inside) the refrigerated space. The end of the sleeve should butt against the outside wall of the box (you will be sealing this joint later with mastic putty included in your kit).
3. Route the service port coupling ends of the tube set through the boat to the condensing unit. Do not remove the protective caps yet.
4. Before you connect the refrigerant couplings to the power plate, refer back to the section entitled “Quick-Connect Refrigerant Couplings” on page 8 for additional information. Have the required 5/8 inch and 3/4 inch wrenches at hand now. **Do not allow any dirt, sawdust, foam insulation dust, etc., to get into coupling ends as this will seriously damage the system.**
5. These couplings are different from the couplings that join the tube set to the condensing unit. The small couplings are screwed, o-ringed, and LocTite-sealed to the bases that are in-turn soldered to the copper tubes. Therefore, it is most important that you do not unscrew the small couplings from their bases. Put your wrenches on the coupling bodies only!

Torque Required For Small Coupling: 12–15 foot pounds/16.3-20.3 newton meters (less than the large couplings)

CONNECTING THE PLATE COUPLINGS

(From tube set to PowerPlate)

1. Remove the protective caps of one mating pair of the couplings inside the box (start with either pair). Screw the couplings halves together until they bottom metal-to-metal with very firm pressure (about 4 turns) using two wrenches: 5/8” and 3/4”.



IMPORTANT:

Save all coupling protective caps. Put them in a marked container and keep aboard. If a future service procedure requires that any coupling pair be disconnected, these caps must be re-installed immediately to keep out dirt.

2. Mark the coupling halves. Using your two wrenches (do not use pliers, vise-grips, etc.) tighten couplings an additional one flat (1/6 turn). This should require considerable wrench torque. If it did not, you did not “bottom” the couplings first.
3. Repeat the above for the other pair of coupling halves.

CONNECTING THE COUPLINGS TO CONDENSING UNIT

To connect the couplings to condensing unit, please refer to section entitled “Connecting The Couplings” on page 9.

Insulating sleeve: After connecting the couplings to condensing unit, seal the black rubber insulating sleeve to the outside of the refrigerated box making it airtight, using Mortite or other (removable-type) caulking sealant. All 3 feet/91.4 cm of sleeve must be outside the box. The sleeve may butt against the outer wall or the inner liner.

Excess tubing: Form a coil about 18 inches/45.7 cm in diameter, (taking care not to deform the tubes) in the horizontal orientation if possible, and secure tightly to the bulkheads, etc. using plastic wire straps. Protect tubing from chafe and vibration with soft sleeving as necessary.

ELECTRICAL CONSIDERATIONS

WATER-COOLED OPTION PACKAGE

How It Works And Why

To get absolutely top performance from your SuperColdMachine, you can add this package during your original installation or at any time in the future.

If inlet air temperature to the SuperColdMachine exceeds 90°F/32.2°C, switching to water-cool mode will produce shorter “on” times and lower average amp draw. As air temperature increases, the water-cooled advantage increases. In tropical conditions, the total daily power consumption can be reduced by 25-40%.

When you select “water pump on” using the switch panel provided with this option, the built-in fan (and the Powerduct fan, if fitted) continues to run. This ensures a flow of air over the compressor to keep it relatively cool and is normal.

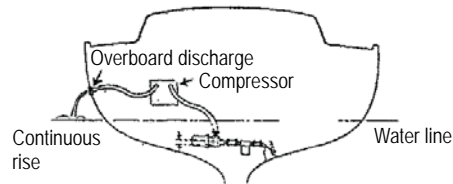
It is strongly recommended that you switch the pump off while using dockside power. With the battery charger working, it is more important to extend the life of the water pump than it is to save battery power.

Example: You left the boat on Sunday night, plugged in, freezer full of food, and left the water pump on. On Wednesday, a plastic bag gets sucked into the pump intake. The pump runs dry, its impeller shaft locks up, the pump motor stalls. The result is a damaged pump bearing requiring replacement (available from Dometic). The “pump / fan” fuse may or may not blow. If it does, the frozen food may be lost because the unit may shut down to protect itself. It is important to shut off the pump when you leave.

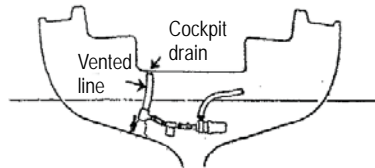
WATER-COOLED OPTION INSTALLATION

1. The pump must be at least 1 foot/30.5 cm below waterline at all times (regardless of which tack you are on).
2. The pump orientation must be as shown in Figure 13 on page 15—no other positions will work.
3. The strainer should be mounted with the bowl pointing downward, otherwise, it will trap air and possibly airlock the water pump.
4. Inlet thru-hull must not be “shared” with any power-driven pump and absolutely not the engine’s intake! You may “tee-off” a toilet inlet, cockpit drain, galley seawater foot-pump line, etc., provided that the seacock is at least 2 inches/5.1 cm below the waterline.
5. Inlet thru-hull must have a “scoop” facing forward on the outside of the hull to prevent “back siphoning.” At high sailing speeds, the flow direction may reverse, introducing air into the pump and damaging it. Failure to provide this scoop is the major cause of pump failures.
6. Heeling can obviously be a problem since the pump may be well below the waterline at rest or on one tack, but not on the other. Traps and airlocks may also be created when the boat is heeling. In most cases, the positive “ram effect” created by the outside hull inlet scoop will overcome these problems. This is another reason why the scoop is so important.
7. Overboard thru-hull (supplied) must be above the waterline—so you can verify pump operation.
8. Total hose length must not exceed the 15 feet/4.6 meters furnished.
9. Total lift (example: highest point of piping above pump) must not exceed 5 feet/1.5 meters.
10. No “traps” allowed! This means no “dips” in hoses. They must run level or steadily uphill from inlet to strainer to pump to highest point. To simplify, if you picked the boat up in slings, the entire water circuit (except for strainer contents) must drain through the inlet thru-hull.

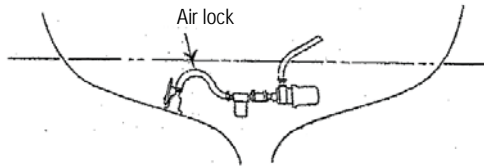
Figure 13: Pump Positioning - Preferred, Acceptable, and Unacceptable



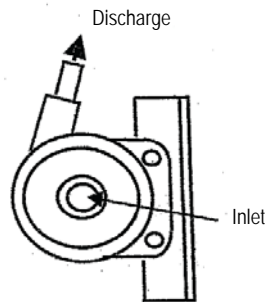
PREFERRED ARRANGEMENT



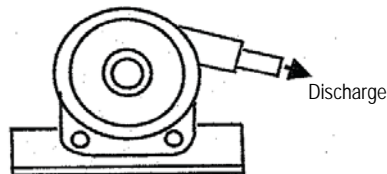
ACCEPTABLE ARRANGEMENT



UNACCEPTABLE ARRANGEMENT



Good - Base vertical discharge points UP



Good - Base horizontal discharge is approximately horizontal

Battery Recommendations

A minimum of THREE marine-grade batteries are strongly recommended: One exclusively for engine starting and the other two as a single bank for all other DC electrical devices such as lights, electronics and your system. The second battery or group of batteries (wired in Series or parallel depending on voltage) is commonly called the “house bank.” A standard marine battery selector switch should be installed to isolate each battery or battery bank.

The house bank should be at least 300 amp/hour capacity. More is desirable. The larger the battery bank, the longer you can operate the various loads between engine charging and the faster you can recharge. This is because the alternator actual output in amps is greater into a larger battery bank. Experts suggest the bank’s nominal amp/hour rating should be four times (4x) the alternator’s rated (hot) output.

The following ampere/hour capabilities are recommended for the house bank, which serves the ColdMachine™:

- **For the “casual cruiser”** of 25-35 feet/7.6-10.7 meters, seldom away from dock for longer than overnight use a minimum of 200 amp/hours.
- **For the “serious cruiser”** of 30-50 feet/9.1-15.2 meters, often cruising for a week or more, use a minimum of 300 amp/hours
- **For the charter yacht or tropics-based “serious cruiser”** operating in hot climates and requiring greater quantities of ice cubes and frozen foods, use a minimum of 400 amp/hours.

HIGH-OUTPUT ALTERNATOR, ELECTRICAL MANAGEMENT SYSTEMS, AND BATTERIES

The continuing proliferation of electrical and electronic devices aboard boats has produced great interest in reducing engine-running time required for battery charging. Specialty high-output alternators are readily available. Several manufacturers offer complete electrical generation and management systems. It is now entirely practical for medium sized cruising boats to support DC refrigeration, inverter-driven galley appliances, navigational systems including computerized charting and radars, all with very acceptable daily engine hours for battery charging.

As to batteries, a good deal of misinformation still exists regarding “marine,” “deep-cycle” and “deep-discharge” batteries. These terms generally describe a battery constructed to provide small-to-moderate currents for long periods of time, as opposed to short bursts of high current to start engines. While “deep-cycle” batteries start engines quite satisfactorily, engine-starting batteries are very poor for small current, long-term tasks. Automotive, sealed, or so-called “maintenance-free” wet-type batteries are okay for the engine-start battery, but are not suitable for the house or service battery bank that runs all the other equipment on your boat regardless of how they are labeled. A few manufacturers of genuine, marine, heavy-duty, deep-cycle wet-type batteries are creating a public awareness of the inadequacies of disguised, re-labeled automotive batteries for marine use, particularly as house batteries in sailing yachts.

GEL and AGM Batteries (as distinguished from so-called “maintenance free” auto batteries): Several high quality products are available in all popular sizes. They perform comparably to the very best wet-type deep-cycle traditional batteries, but require little or no maintenance. However they require very carefully regulated charging systems, and cannot be simply interchanged with wet batteries.

What all this means is that a boat owner with a full complement of equipment aboard such as electronics, refrigeration, auto-pilot, stereo, etc. and who feels the engine must be run too long for battery charging, can get very substantial improvements by using the technology and equipment now available.

We strongly urge all boat owners to take advantage of the excellent technical manuals, articles and products now available in the marine industry. There is no longer any reason to put up with long hours of engine running and marginal electrical systems.

Wiring The System

All Adler/Barbour products incorporate a powerful and energy efficient compressor featuring a 3-phase AC motor, which is driven and digitally managed by the electronic module (the finned device on the side of the compressor).

The electronic module is not repairable, should not be opened and must be replaced if damaged. This control unit, like most electrical devices, requires fairly “clean” DC current for stable operation and long service life. Batteries provide clean, ripple-free DC current. Many battery chargers, alternators and AC/DC converters may not. This means that the ColdMachine should not be connected directly to any of these devices, unless a battery is between them in the circuit.

VOLTAGE DROPS

When in the starting mode, the ColdMachine may momentarily draw nearly 10 amps, even though the continuous running current is between 3 and 5 amps. If the electronic control module does not “see” at least 11.0V DC during the start period, it will abort. Therefore, to avoid erratic problems, the supply wiring must be correctly sized. Refer to Figure 14: Wire Size Table, page 18.

Make your wiring connection in one of these three ways:

- Directly to the battery via a 15A breaker (recommended). (See “Importance of Using a 15 Amp Breaker” on page 17.)
- To a heavy output terminal on the battery selector switch, via a 15A breaker (recommended).
- To the ship’s distribution breaker panel. This method is acceptable if the selected breaker is directly re-wired to the main battery selector switch with its own heavy wire. If not directly re-wired, the voltage drops within the panel will be excessive and cause erratic operation.

Use the shortest possible route for wiring between the unit and battery to avoid voltage drops.

Install a 15 amp circuit breaker in the positive leg for line protection. The circuit breaker is also necessary for long “off” periods because even with the thermostat off, there is still a milli-amp range of current flow in the system.

Make sure that all wiring conforms to applicable safety regulations. Note that a replaceable 15 amp fuse located on the condensing unit provides backup protection in case the breaker should fail in the shorted condition.

Use marine-quality connectors and circuit breaker to prevent voltage drops in the supply circuit to the ColdMachine. Also, do not install voltage-dropping devices such as indicator lights, volt and amp meters, etc., in the 12 volt DC wiring circuit.

Correct polarity is critical. If you connect in reverse, the system will not operate. Should this occur, correct your wiring. The system will automatically restart.

IMPORTANCE OF USING A 15 AMP BREAKER

The main fuse on the ColdMachine or SuperColdMachine junction box is 15 amp. Dometic calls for a 15 amp breaker in the (+) DC supply for several reasons:

1. The breaker will generally trip before the fuse will blow, thus saving a crawl through the bilge.
2. The installer may use an incorrect higher-rated breaker, so the 15A fuse will still provide proper circuit protection.
3. In very hot ambient temperatures, the largest systems may briefly draw more than 10 amps for a few seconds, resulting in nuisance trips if a 10A breaker is fitted.

MAKING THE POWER CONNECTIONS

Use color-coded wire so you know which is positive (+) and which is negative (-). Connect the positive wire to the (+) screw on the terminal strip. Connect the negative (-) terminal screw to the negative lead to the battery, or the main negative terminal or bus bar.

WIRE SIZE

Wire size is critical. If you use undersized wire, your system will run erratically, often fail to start, produce unsatisfactory cooling and fail early in its service life. Use a wire gauge size based on the total distance from the compressor unit to the battery selector switch.

Figure 14: Wire Size Table

Maximum Distance To Compressor Unit From Battery AND Back to Battery From Compressor Unit (round-trip length)	Gauge AWG
4 feet and under 1.2 meters and under	#14
5 to 10 feet 1.5 to 3.1 meters	#12
11 to 17 feet 3.4 to 5.2 meters	#10
18 to 27 feet 5.5 to 8.2 meters	#8*
28 to 35 feet 8.5 to 10.7 meters	#6*
36 to 50 feet 11 to 15.2 meters	#4*

*The terminal block on the junction box will accept #10 AWG wire maximum. If you need to run heavier wiring, you should terminate it at a suitably sized heavy terminal strip and run #10 AWG from there to your condensing unit.

Wiring Diagrams

Figure 15: Wiring Diagram for 2 Systems With 1 Digital Control, All PCB-Based Models With Modular (Phone Type) Connector

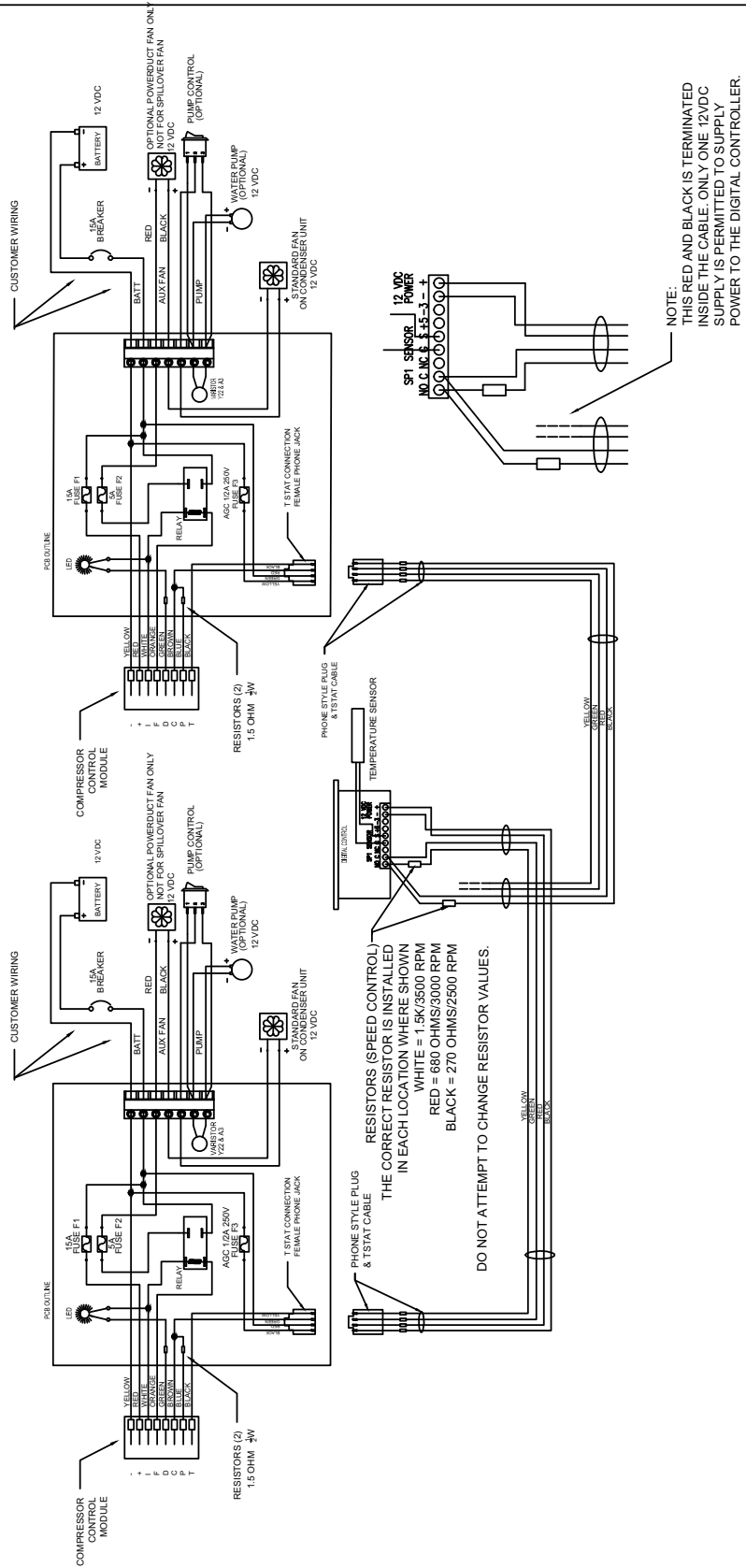


Figure 16: Adding Digital Thermometer to Any System With Modular (Phone Type) Thermostat Connector

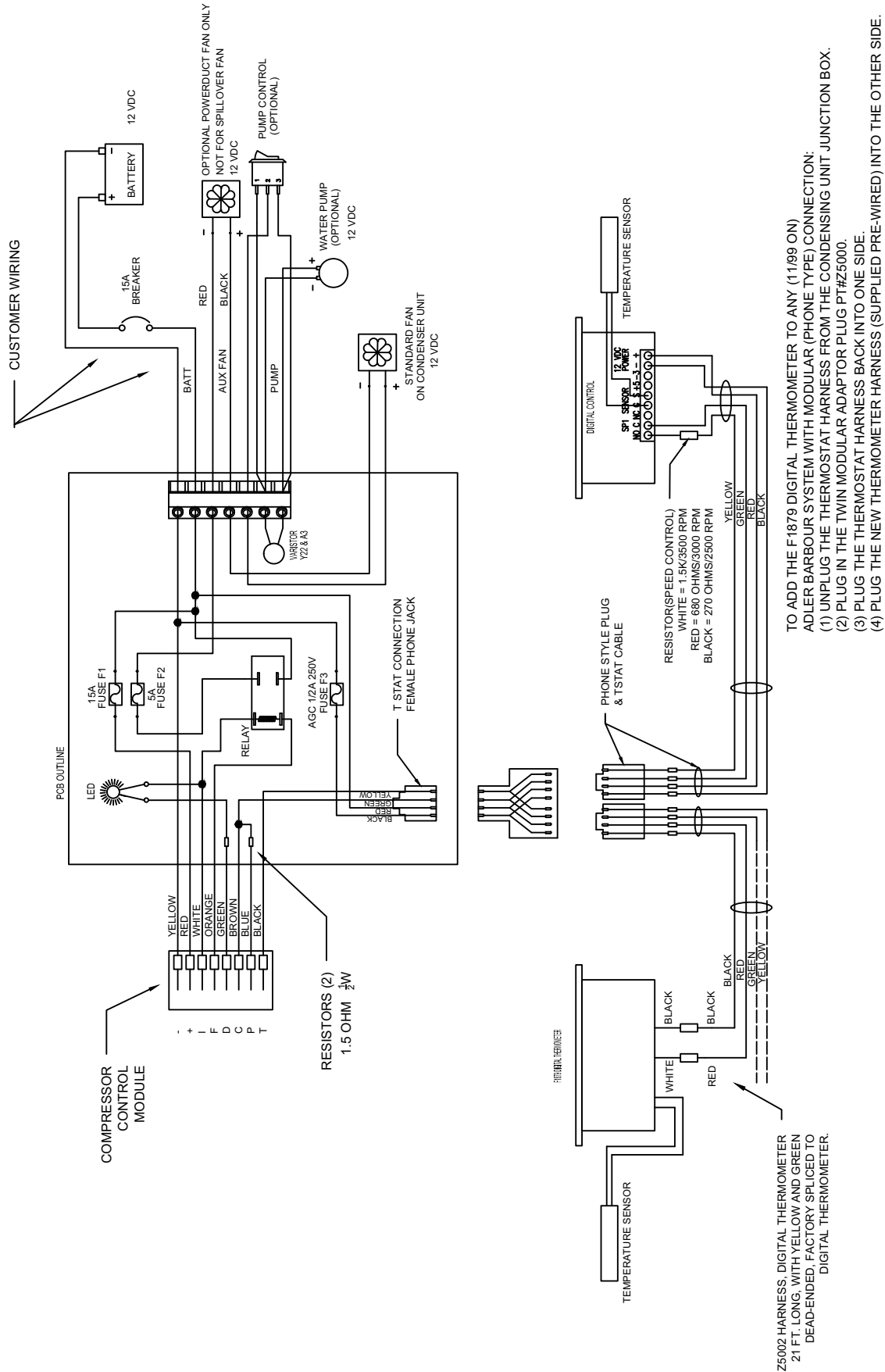


Figure 17: Digital Control Wiring Diagram for SuperColdMachine, All PCB-Based Models with Modular (Phone Type) Thermostat Connection - 12 VDC

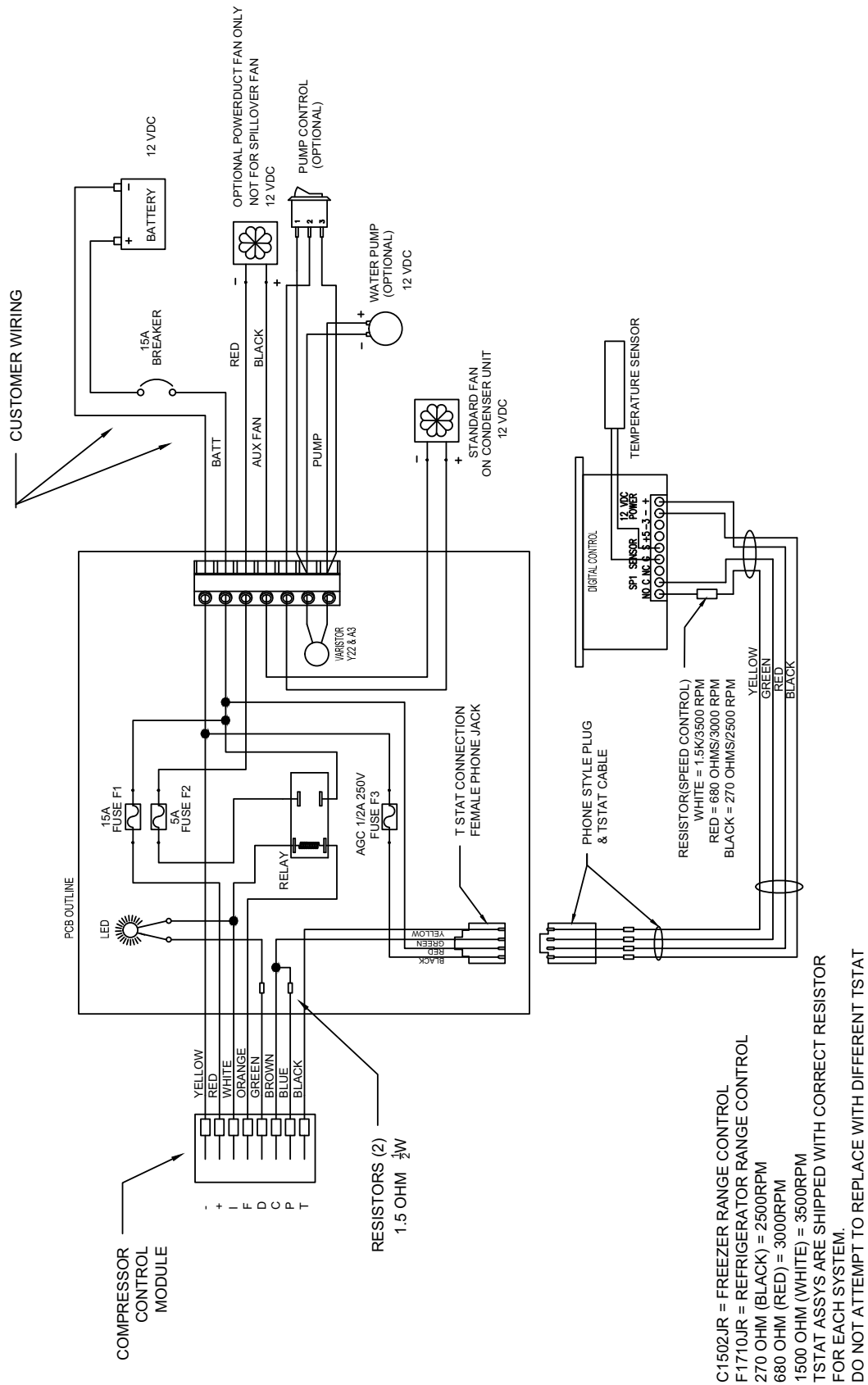


Figure 18: Analog (Knob Type) Thermostat Control Wiring for ColdMachine & SuperColdMachine, All PCB-Based Products With Modular (Phone Type) Connector - 12 VDC

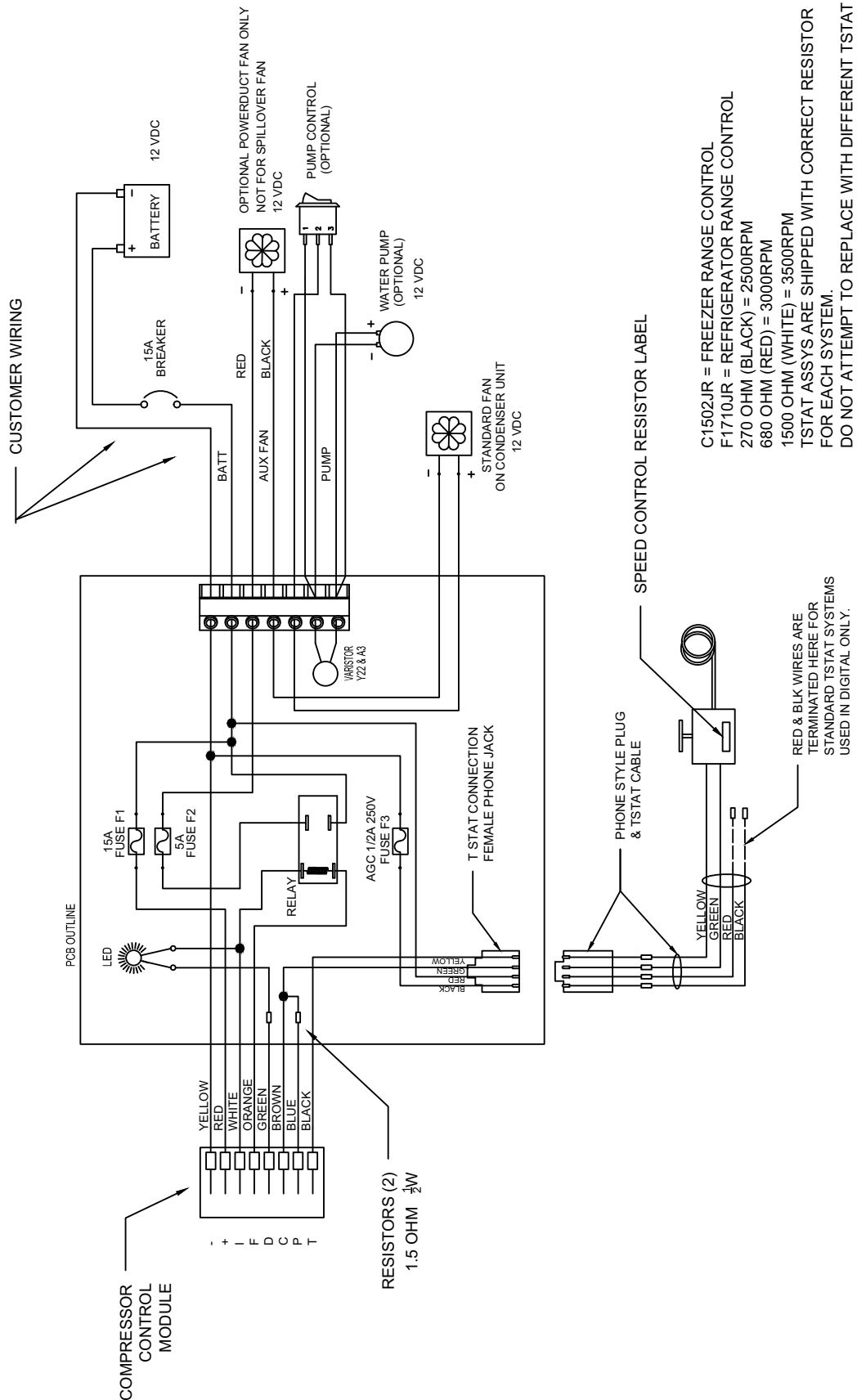
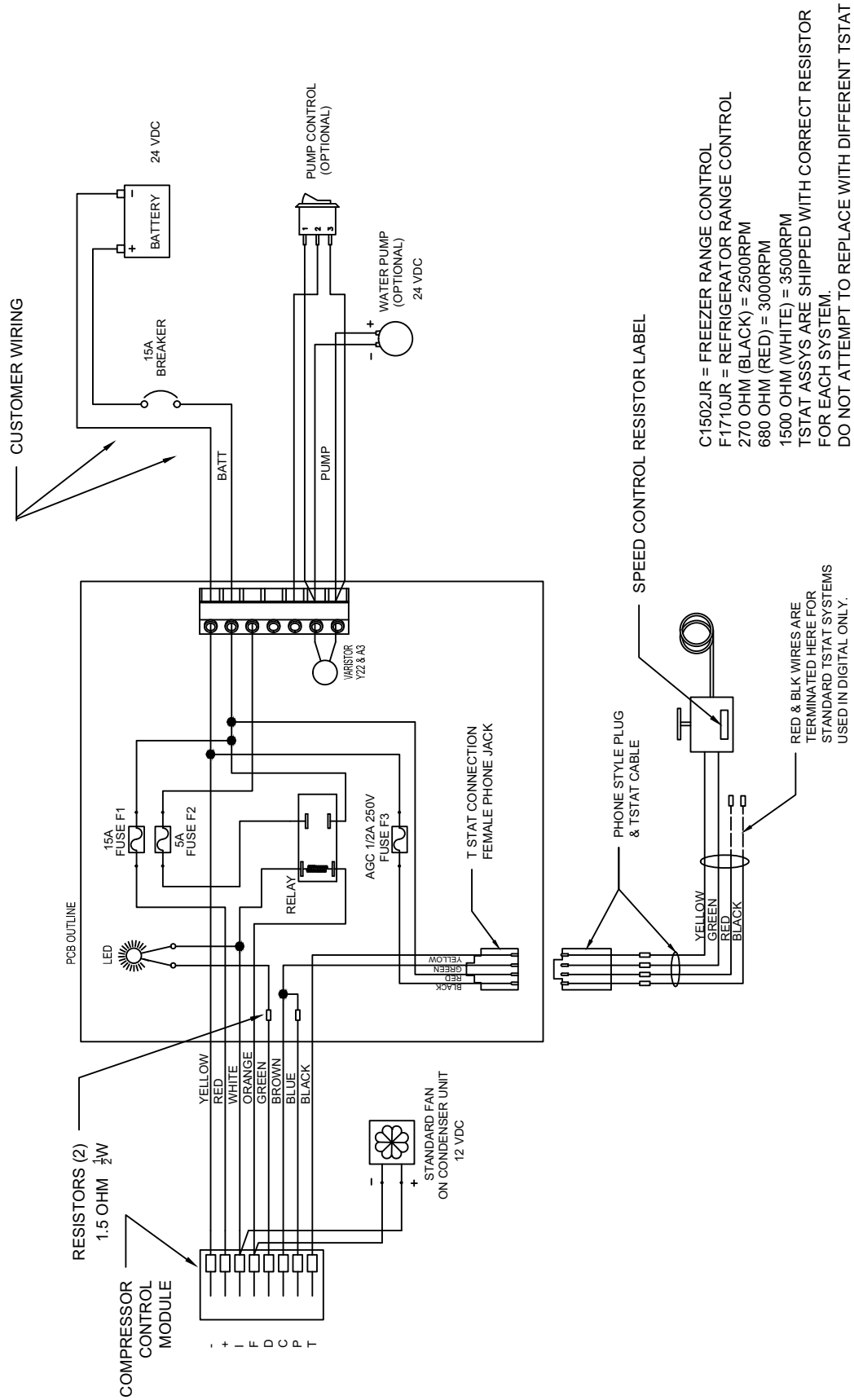


Figure 19: Analog (Knob Type) Thermostat Control Wiring for ColdMachine & SuperColdMachine, All PCB-Based Products With Modular (Phone Type) Connector - 24 VDC



Operation of System

START UP

- **Analog (Knob-Type) Control** - Turn the thermostatic control clockwise to about #2 or #3. (#1 on the thermostatic control is the warmest setting, #7 is the coldest.)
- **Digital Control** - This control is pre-programmed at the factory to a temperature range of 35-45°F/1.7-7.2°C (0-20°F/-17.8 to -6.7°C for freezer). If you want to change these settings, see “Programming The Digital Control” on page 25.

The ColdMachine system will now start. Within a few minutes, the evaporator will begin to frost (note that a PowerPlate will take much longer before frost is visible on the surface). The system will operate continuously until the box cabinet and contents have been brought to the selected temperature. The system will then cycle off, and thereafter cycle on and off—maintaining proper temperature (similar to a home refrigerator).

AC/DC OPERATION

The ColdMachine will also operate automatically at dockside with the addition of a battery charger. We recommend a quality MARINE battery charger (not an automotive charger) of sufficient size to handle your ColdMachine along with the other onboard DC loads (such as lights, stereo and electronics).

For the ColdMachine, figure approximately 5 amps when running. The average draw, as the ColdMachine cycles on and off, is 1.8 to 2.4 amps for most 4 to 8 cubic foot/0.11 to 0.23 cubic meter iceboxes with average (3 inch/7.6 cm or more) rigid polyurethane foam insulation.

MAINTENANCE

Regular or seasonal maintenance is normally not needed, nor is maintenance required for winter storage or decommissioning. However, you should wash the evaporator occasionally and again before winter storage (use a mild dish detergent such as Joy or Ivory). In addition, the air condenser (the radiator-like object in the condensing unit) can get clogged with dirt and should be carefully vacuumed seasonally with a soft brush attachment. Be careful not to bend the cooling fins.

If a water-cooled option kit is installed, the water circuit must be drained or filled with antifreeze solution.

DEFROSTING

Defrost your refrigerator when frost gets over 1/4 inch/0.6 cm thick. This should not occur in less than a month or so. Excessively fast or thick frost formation is an indication of moist, outside air entering through a poorly-sealed lid, doors or liner joints. These conditions must be eliminated for proper performance.

The best way to defrost is to turn the power off. Open the icebox lid or door and allow sufficient time for the freezer unit to defrost naturally. **Never use an icpick, knife or other metal object—you could pierce the refrigerant coils.**

BATTERY CARE

Batteries are one of the most neglected and abused items on boats. Unlike automobiles, boat engines run slowly and infrequently. The batteries tend to be buried in the bilge, are damp, dirty and chronically undercharged. Boat wiring is subject to corrosion at various connections, which creates voltage drops as we add more electrical devices each season. As these electrical loads grow, it becomes even more important that you keep your battery and charging system at top efficiency.

In addition, batteries can be deceptive. They may look good and read normal voltage, but may have deteriorated internally and be unable to deliver adequate power for more than short periods of time.

WET-TYPE BATTERIES

Check your batteries at least every month with a hydrometer (inexpensive and available from automotive supply stores). The readings of each cell should be approximately the same. If one reading is lower than the other, it indicates a defective battery. Use distilled water only.

EQUALIZING (WET-TYPE BATTERIES ONLY)

During periodic equalizing, the battery voltage can exceed 15 or even 16 volts. To prevent possible damage to your unit, shut the Adler/Barbour system off before starting the equalizing process.

ALL BATTERIES

Check your batteries seasonally with a “battery load tester” (obtain from a boatyard or mechanic). This tests the battery’s condition and capacity under a heavy actual load. If your batteries do not pass these tests, replace them. You are just wasting valuable fuel, engine hours and time in trying to charge them. Observing the following points can add to the dependability and operational life of your battery:

- Keep the tops of the batteries clean and dry. A damp battery can lose 20% of its charge in a day.
- Keep the battery post clamps tight, clean and free from corrosion.

WINTER OPERATION

If ambient temperatures drop below 35°F in the operational area of the condensing unit, it may be necessary to block off half of the air condenser face area (on the side opposite the condenser fan motor) with a piece of cardboard to maintain system efficiency. The cardboard can simply be taped in place for the winter season and removed in the spring when seasonal temperatures return to above 35°F.

PROGRAMMING THE DIGITAL CONTROL

(if supplied with your system)

The digital thermostat is pre-programmed at the factory. If settings have to be changed, the following information will allow you to easily program the controller.

PROGRAMMING SET POINT

Set Point (SP) is the desired temperature of the refrigerator. It is pre-programmed at the factory to a temperature range of 35-45°F/1.7-7.2°C (0-20°F/-17.8 to -6.7°C for freezer).

To program Set Point (SP1):

1. Start the programming sequence by pressing the SET button once. Unit displays "SP1" (set point 1).
2. Press the SET button again to display SP1 value.
3. To program an increase or decrease in SP1, press the appropriate ADJUST arrow.
4. To complete the programming sequence, press the SET button until the screen goes blank. After five seconds, the unit will automatically display sensor temperature.

PROGRAMMING DIFFERENTIAL, HIGH & LOW LIMITS

- **Differential (dF)** is the difference between the cut-in and cut-out temperature of the thermostat. **The differential must be a negative value.** If it is set as a positive value, the relay in the thermostat will close on temperature fall and open on temperature rise. In other words, it will respond as a heating thermostat instead of a cooling thermostat. Do not set a positive differential. Do not set a differential of 0 (zero).
- **High & Low Set Point Limits (Hi & Lo)** allow you to limit the range at which temperature set points can be programmed. This is factory set and should not need to be adjusted, unless changing from refrigerator to freezer or vice versa.

Only adjust these settings if necessary. To start the process, you must press the hidden button located behind the "F" symbol at the upper right corner of the control to program these settings. After programming, you must press the "F" button until the screen goes blank.

1. Press "F" once. "DF1" will appear on the screen. Press "F" again. A negative value will appear. Use the appropriate "ADJUST" arrow to change this setting. This event must be set to a negative value but should not be lower than -5 to avoid short-cycling.
2. Press the "F" button again. The screen will read "HI". Press "F" again and you will read a value. This is the high set point limit. It prevents the control from being tampered with and raised any higher than this point. Now you can press the "ADJUST" arrows to get to your desired set point.
3. Press the "F" button again. The screen will display "LO". Press the "F" and you will read the LO set point limit. Use the "ADJUST" arrows to change it.
4. Pressing the "F" button again will display "CAL". Press "F" again and you should see 00. This should never be changed. If "CAL" reads any value either than 00, use the "ADJUST" arrows until it reads 00.
5. Press the "F" button again. You will see a blank screen. The reprogramming has been accepted and the control will now revert to the box temperature display mode.



NOTE:

If the programming sequence is interrupted for more than 15 seconds or not set to the blank screen, the thermostat will revert to temperature display without acknowledging any new inputs.

CALIBRATION

Calibration (CAL) is set at the factory to a certified standard. Do not alter or change.

ELECTRONIC MODULE SYSTEM MANAGEMENT AND PROTECTION

The ColdMachine is designed for nominal 12 volt DC operation. The normal operating range is 10.0 volts -15.0 volts. The electronic module will automatically shut off the system if voltage at the module input terminal falls below 10.0 volts. As the battery recharges, the electronic module will automatically turn the system on when the voltage reaches 11.1 volts. This circuitry protects the battery from the damaging effects of a complete discharge and also protects the ColdMachine from chronic low-voltage operation.

Management functions include:

- High and low voltage protection (10.0 V DC to 17.0 V DC). (See NOTE*)
- Reverse polarity protections (compressor will not operate).
- High temperature cutout if electronic unit is overheated.
- Overload protection if compressor is dangerously overloaded (by overcharging or extreme high temperature).
- Automatic start abort if the compressor motor cannot rotate.
- Battery protection: Low voltage cut out prevents total battery discharge or drain.
- Fan relay circuit protection (0.5 amp max; over current will cause system to shut down).
- LED diagnostics.

*NOTE: If voltage reaches 17.0 V DC, the module “thinks” it is a 24 V DC system suffering from low voltage, and LED will display one flash. The module will probably survive. The fan(s) and pump (optional) may not.

OPERATIONAL ERRORS INDICATED BY FLASHING LED

Operational errors are indicated by a flashing LED on the condensing unit. If the electronic module “senses” a malfunction, it will automatically switch into its protective mode and will make repeated start attempts at about 1 minute intervals.

- **1 FLASH** - Low Voltage Supply. If the supply voltage measured at the upper (-) and (+) terminals of the electronic module drops below 10.0 V DC, the system will shut down. It will not restart until 11.1 V DC is maintained throughout the momentary high-current start attempt.
- **2 FLASHES** - Relay Coil Circuit Overload. The relay coil and/or its wiring is shorted. The electronic module shuts off the output current that drives the coil. The fan(s) and water pump (optional) will not operate. (See NOTE*)
- **3 FLASHES** - Compressor Motor Starting Problem. The motor rotor (armature) is mechanically blocked or stuck or the differential pressure inside the compressor is too high and the motor cannot start.
- **4 FLASHES** - Under-speed Compressor Motor Problem. If the compressor cannot reach or maintain its minimum speed of 1800 RPM (due to poor condenser air flow, overcharge, air in the system, extremely hot ambient temperature), it will automatically shut down.
- **5 FLASHES** - Electronic Overload. The electronic module is overheated and/or the system has been heavily overloaded (by very high ambients, fan and/or pump failure, air in the refrigerant circuit, and/or refrigerant overcharge).

*NOTE: Do not operate the system longer than 10 minutes without the fan running.

If the system displays any unusual symptoms, runs continuously or does not cool properly, please refer to “Troubleshooting” on page 27.

Troubleshooting

Symptom	LED Blink Code	Test/Diagnosis	Corrective Action
Compressor and fan do not attempt to start.		No power to unit / Blown fuse. Reverse polarity.	Replace MAIN fuse (15 amp). Correct wiring refer to manual. Correct polarity.
	3	Pressure too high.	Wait, try again.
	3	Faulty electronic module. Faulty compressor.	Replace module. Call factory.
	2	Faulty / shorted delay.	Replace PCB inside stainless-steel electrical box.
Compressor and fan attempt to start as shown by momentary voltage dip, fan movement or compressor vibration.	1	Low voltage at unit: C/o=9.6V C/in=11.0V	Charge battery.
	1	Excessive voltage drop from battery to unit during start-up attempt.	Correct wiring (refer to manual).
	3, 4	Internal refrigerant pressures not yet equalized.	Shut off power, wait 15 minutes, restore power.
		Faulty electronic module.	Replace electronic module.
	3	Faulty compressor.	Call factory.
	5	Excessively hot electronic module.	Improve air flow to unit.
	4, 5	Overheated compressor.	Improve air flow to unit.
Compressor does not run, fan does not run.	2	Defective or shorted relay or wiring drawing over 0.5 amps activates protective circuit in electronic module.	Replace PCB inside stainless steel electrical box.
		Fan / Pump fuse blows.	Replace fuse (5 amp).
		Faulty fan.	Replace fan.
		Faulty wiring to fan.	Repair wiring fault.
		Fan okay, but module faulty test by putting 12V to fan directly.	Replace electronic module.
Intermittent compressor / fan operation.		Poor electrical supply, chronic voltage fluctuations.	Review manual, correct wiring faults, recharge or replace battery.
		Faulty control module.	Replace control module.
		Faulty compressor.	Call factory.
Power duct fan does not run.		Faulty fan (test with 12V DC power source).	Replace fan.
		Faulty wiring to power duct fan.	Repair wiring.

*NOTE: Federal law prohibits servicing of this refrigerant circuit by non-certified operators. Please call Dometic's technical service department for assistance.

Symptom	LED Blink Code	Test/Diagnosis	Corrective Action
Compressor and fan cycle but box not cold enough.		Digital thermostat control setting too warm or control is defective.	Re-program digital control, lowering set point (SP) and "HI" and "LO" settings (see manual) or replace control.
		Analog thermostat set too warm or defective.	Adjust control or replace.
		Evaporator too small for box.	Call factory.
		Thermostat tube touching evaporator.	See manual, correct.
Compressor and fan runs, evaporator frosts, but box not cold enough.		Inadequate air flow to condensing unit.	Remove blockage and/or improve circulation.
		Refrigerant undercharged--only part of the evaporator is frosting.*	Call factory.
		Refrigerant overcharged--evaporator is fully frosted plus frost continues along tube set beyond rubber insulating sleeve.	Call factory.
		Partial clog in refrigerant circuit only part of the evaporator is frosting.	Call factory.
	3	Box insulation is inadequate or box too large.	Re-insulate. Contact local dealer for assistance.
	3, 4, 5	Condensing unit in very hot area and/or condenser fins blocked.	Relocate unit, remove blockage provide better airflow, review Duct Kit section of this manual.
		Thermostat tube touching evaporator.	See manual, correct.
Compressor and fan run continuously, no cooling at all.		No refrigerant in system: Loose couplings, defective component(s) punctured evaporator, broken tubing. "Hiss" may be audible at evaporator when compressor is running.	Call factory first. Decision to repair locally or return entire system (evaporator & condensing unit) to factory will be made before proceeding.
		Complete clog inside refrigerant circuit: no audible "hiss" at evaporator while compressor.	Call factory for assistance in confirming this diagnosis and best way to proceed.
Compressor and fan run continuously, food in refrigerator freezes.		Thermostat control set too cold.	Turn knob (analog) to lower number, and if digital, re-program set point.
		Thermostat shorted, defective or malfunctioning.	Call factory.
		Box very small or unusually well insulated.	Install partition between evaporator and perishable food section.
		Thermostat sensing bulb not mounted correctly.	See manual, correct.

*NOTE: Federal law prohibits servicing of this refrigerant circuit by non-certified operators. Please call Dometic's technical service department for assistance.

Symptom	LED Blink Code	Test/Diagnosis	Corrective Action
Water pump runs, no water flow.		Air in pump, cannot self-purge.	Check piping for leaks, air entry, re-prime pump, re-pipe (see instructions).
		Impeller spindle damaged from dry running.	Obtain service parts from factory.
		Obstructions in inlet pipe, strainer, or outlet piping.	Load and eliminate.
Water pump motor does not run, does not pump.		Blown fan/pump fuse on condensing unit.	Replace with 5 amp fuse.
		Defective wiring.	Locate and repair.
		Defective pump.	Replace entire pump.
		Foreign material jammed pump impeller.	Disassemble and remove.

*NOTE: Federal law prohibits servicing of this refrigerant circuit by non-certified operators. Please call Dometic's technical service department for assistance.

Procedure For Removing Compressor Unit

1. Turn off DC power supply breaker for unit.
2. Disconnect the mating plugs of the thermostat control wire harness approximately 1 foot/30.5 cm from compressor unit.
3. Remove both DC power supply wires from the upper (-) and (+) screws of the terminal strip module.
4. Close inlet seacock (if water cool option is installed). Remove the 2 hoses from the condensing unit.
5. Disconnect the mating plugs of the digital or analog thermostat located on the condensing unit.
6. The refrigerant in this system must first be extracted by a qualified technician using approved recovery equipment before the couplings can be loosened or disconnected.
7. Disconnect both refrigerant couplings. Use two open-end wrenches: 13/16 inch hex or 10 inch adjustable to turn the female coupling; 5/8 inch hex or 10 inch adjustable to hold the male coupling. Turn only the female coupling. Do not turn the male coupling. If you twist the coupling from its soldered tubing connection, you will have a refrigerant leak. This is why you must use two wrenches.
8. Remove the compressor unit from the boat. Handle carefully. Do not pick it up by the tubing or electronic module. Be careful not to cut your fingers on the cooling fins and do not bend them. (The fins are soft and thin for maximum efficiency.)

Procedure For Removing Evaporator And Tube Set

1. Turn the thermostatic control to OFF.
2. Disconnect the 12V DC power supply to the compressor unit. Carefully remove the sensing tube of the thermostatic control from its clamp on the side of the freezer by loosening two screws and sliding out the "U" **J?** bend section of the tube.
3. Disconnect both pairs of refrigerant couplings at the compressor unit (see "Procedure For Removing Compressor Unit" above.)
4. Remove the soft mastic caulking material from the exit hole into the icebox where the tubing and wire harness pass through.
5. Using a "stubby" screwdriver, unscrew the four mounting screws (save these) and carefully withdraw the entire freezer and its 15 foot/4.6 m tube set from the icebox.
6. Be careful not to kink or flatten the tubing. Screw the plastic sealing caps into the coupling to keep them clean.
7. Carefully roll up the entire coil by rolling it around a cylindrical object of about 18 inches/46 cm in diameter.

Procedure For Removing Powerplate And Tube Set

1. Defrost the PowerPlate and thoroughly dry the small couplings.
2. Disconnect the 12V DC power supply to the condensing unit.
3. Disconnect the couplings at the PowerPlate, using correct wrenches and taking care not to turn the soldered-in bases.
4. Install the plastic caps to protect the coupling.
5. Remove the PowerPlate by extracting the mounting screws and plastic standoffs.
6. Remove the tube set, first removing the soft self-sealing mastic at the box exit.
7. Coil the tube set carefully around a cylindrical object of about 12 inches/30.5 cm in diameter.

Owners Limited Warranty

As hereinafter described, Dometic limits the duration of any implied warranty to the duration of the underlying express warranty and also disclaims any liability for consequential or incidental damages arising from any application, installation, use or malfunction of any warranted product.

SECTION I - WHAT'S COVERED

What does the Limited Warranty cover?

Products manufactured by Dometic Corporation (Dometic) are under limited warranty to be free from defects in workmanship or materials. This being under normal use and service, with the obligation of Dometic under this limited warranty, being limited to replacing or repairing any component(s) which shall disclose defects within the limits defined in **Section III**. Which upon examination by Dometic, shall appear to the satisfaction of Dometic to be defective or not up to specifications.

This Limited Warranty is made in lieu of all other express warranties, obligations, or liabilities on the part of Dometic. In addition, Dometic shall not be responsible for any incidental or consequential damages. In those instances in which a cash refund is made, such refund shall effect the cancellation of the contract of sale without reservation of rights on the part of the purchaser. **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, any 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.

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 in this section.

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, specific legal rights, and you may also have other rights which vary from state to state. You also have implied warranty rights, including an implied warranty of merchantability, which means that your product must be fit for the ordinary purposes for which such goods are used. **The duration of any implied warranty rights is limited to the duration of the express warranty as found in Section III.** Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

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 split systems and refrigeration systems, for example; packing glands, flare nuts, quick disconnects. The adjustment of the refrigerant charge on a split system should be charged to the original installer or OEM.
9. Freight Damage (see page 10 for instructions for handling 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. Liquid line filter dryers are not covered.
15. Blowers with water damage.
16. Logic boards with water damage.
17. Logic boards with blown MOV's (Power Surge)
18. Mis-programmed displays.
19. Display heads with water damage.
20. Dirty Condensers and/or Evaporators.
21. Failures due to improper winterization.
22. Unit damage as a result of improper return packaging.
23. Replacement of freon with substitute without authorization from factory.
24. Environmental and/or Recovery Fees.
25. Welding and Nitrogen Fees.
26. 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 is not warranted by Dometic, because Dometic has no control or authority over the selection, location, application, or installation of these components.

SECTION III - COVERAGE PERIOD

What is the period of coverage?

(See **Limited Warranty Periods** at the end of this book).

All Dometic components bear a data plate on which there are model and serial numbers. The serial number is date coded. To determine whether or not any Dometic component is in warranty, proceed as follows:

1. Determine the manufacture date of the component from the serial number on the data plate. If you are not familiar with the date code, write or call the Dometic Customer Service Department to obtain the manufacture date. 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 there might exist a considerable time lag between the date a 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 warranty as described in **Section I**. 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.

SECTION IV - GETTING SERVICE

How do you get 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.
3. Third option: The customer may send his equipment back to the factory to have the repair work done. Dometic will make every effort to return the equipment to the customer within a three week time period. If the claim represents a legitimate warranty problem, Dometic will pay the freight both ways. Dometic prefers option one first, option two second, and option three only if one and two are not available.

The customer may contact the Dometic Service Department at (954) 973-2477 Monday through Friday, 8:00am - 5:00pm Eastern Time.

After hours (evenings and weekends) technical support is offered through Dometic's 24/7 Hotline at (888) 440-4494.

TABLE OF WARRANTY PERIODS

ADLER/BARBOUR REFRIGERATION		
Important Notes:		
<ol style="list-style-type: none"> 1. Warranty periods begin from the date of possession of the boat 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. 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. 5. These warranty periods are effective March 1, 2010. 		
ADLER/BARBOUR - Compressors and Evaporators		
Product	Sale Type	Warranty Coverage
CU Series	Catalog Sales	Parts: 1 year from date of purchase of unit. Labor: 6 months from date of purchase of unit. Not to exceed three (3) years from the date of manufacture.
	OEM or Dealer Installed	1-Year Warranty, parts and labor. Not to exceed three (3) years from date of manufacture.

