Installation, Operation, and Maintenance Information

Low Velocity Unit Coolers

Bulletin No. IOM 110.3

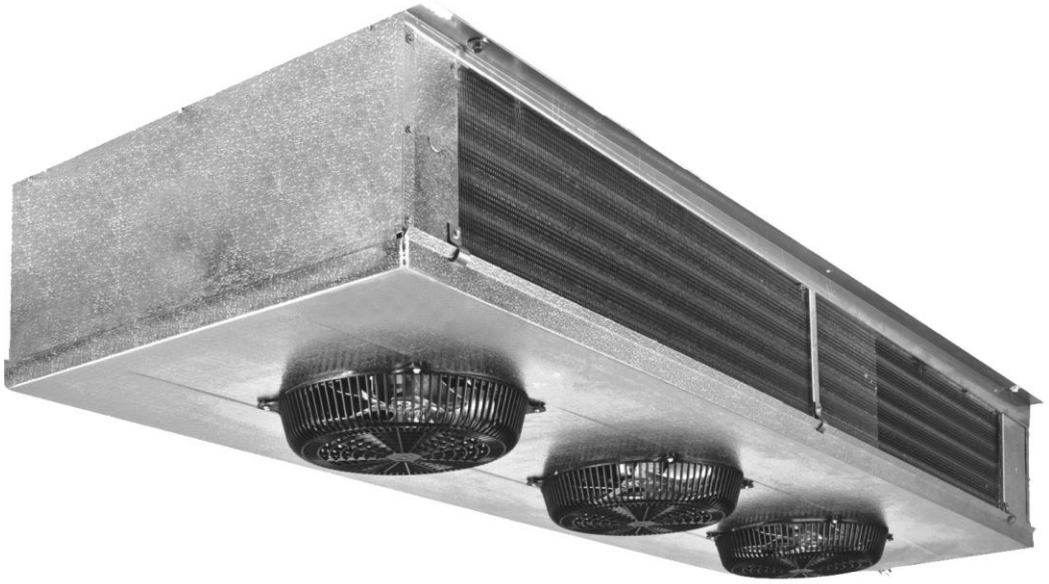


Table of Contents

INSPECTION

When the equipment is received, the number of crates and cartons should be checked against the bill of lading. Any damage or shortages should be noted immediately and a report given to the freight carrier and the manufacturer. It is the customer's responsibility to file all freight claims with the carrier. Verify that the voltage listed on the unit nameplate matches the power supply available.

INSTALLATION

General

Installation and maintenance must be performed by qualified personnel who are familiar with the local codes and regulations and who are experienced with this type of equipment. When mounting the units, lift and handle them by the cabinet or hanger flanges only. Lifting by the tubing or fan guards may result in damage to the unit. The unit should be mounted level to ensure proper drainage. **Caution: Avoid contact with sharp edges and coil surface as they are potential injury hazards.**

Location

Determine the best location for the unit cooler in the room to be refrigerated. Placement of the unit should be centered in the room and away from doors to keep warm, outside air from being drawn into the unit. This dual discharge unit draws air up through the fan blades and discharges it through the coil surface. Figure 1 shows the proper clearances that should be maintained for proper air flow and service access to the unit. Allow at least 36 inches space below the drain pan for air flow and service access. Before unit is raised into position all packaging should be removed while taking care not to damage the drain fitting or refrigerant connections. The unit should be supported on 5/16" minimum rod hangers, or 5/16" minimum lag bolts, at all mounting slots. To meet NSF requirements, the unit must be positioned flush with the ceiling and all gaps properly caulked. If hung below the ceiling, adequate space for cleaning must be provided per NSF requirements.

	Dimension (Ft.)		
	A	B	C
Min.	5	10	2
Max.	15	30	10

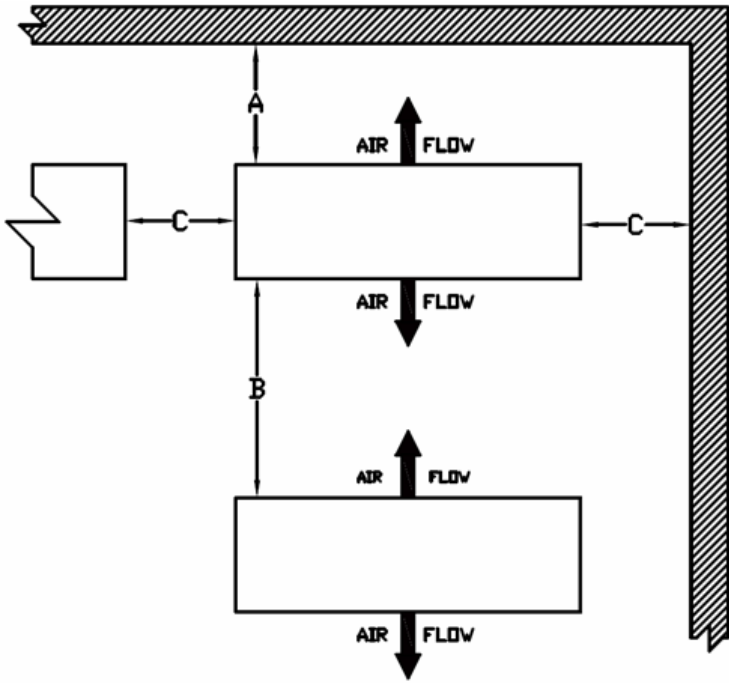


Figure 1: Unit Location (Top View)

Drain Line

The drain line should be pitched at a minimum of 1/2” per foot to allow proper drainage and should exit the refrigerated space as soon as possible. The drain line should be insulated and sealed to protect from freezing where it passes through the wall and a trap provided outside the refrigerated area. In rooms with temperatures below 34° F, the drain line should be heated and insulated.

Refrigerant Piping

Refrigerant piping should be installed in accordance with all applicable codes and using good refrigeration practices. For liquid and suction line sizing, refer to the ASHRAE Refrigeration Handbook. A trap must be installed prior to any risers in the suction line. Horizontal suction lines should be sloped at a minimum of 1/8” per foot to provide proper oil return to the compressor. Suction lines should be properly insulated to prevent sweating and higher return gas temperatures.

Expansion Valve

Expansion valves are to be sized and installed in accordance with the valve manufacturer’s recommendations. Valves should include an external equalizer line, which must be connected. Proper location of the sensing bulb is extremely important to the performance of the coil. Good thermal contact to the suction line is essential. On solder type valves, a wet cloth wrapped around the valve during installation will help protect it from overheating and damage during the installation process.

Evacuation

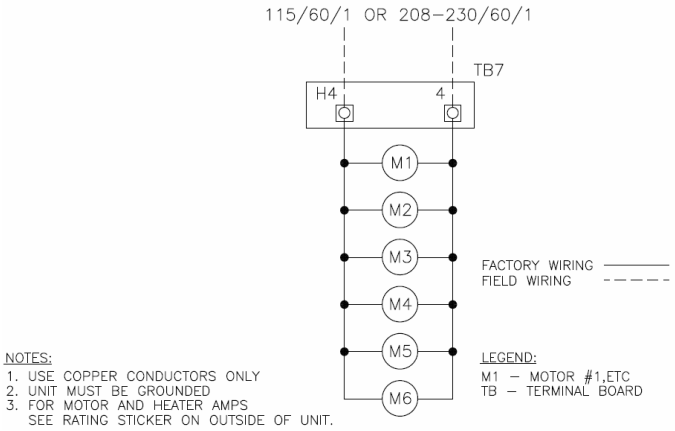
Proper evacuation is essential prior to charging the system. This avoids many problems that may arise due to lack of detail in this step. After charging, the system should be checked through all cycles to ensure proper operation. See Start-up Procedure section in this bulletin.

Wiring

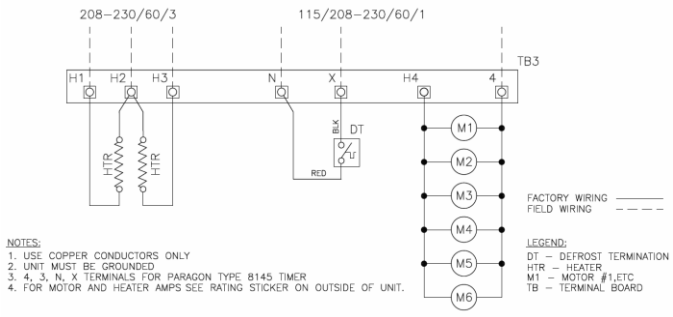
Wiring should be done in accordance with all national and local codes. Electric defrost units are supplied with a temperature sensing defrost termination switch which will terminate the defrost at a preset temperature. A fan delay switch is also provided to allow the coil to cool down prior to the fans restarting after the defrost cycle. The time clock should be adjusted to have a maximum 30 minute override to prevent overheating and steaming of the coils. Typically one to two defrosts per day are recommended however the number of defrosts are ultimately dictated by the usage of the box and the actual amount of frost buildup on the coils.

Typical Wiring Diagrams

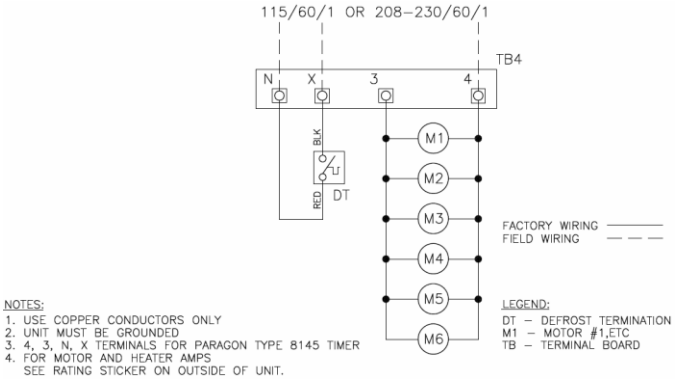
Air Defrost



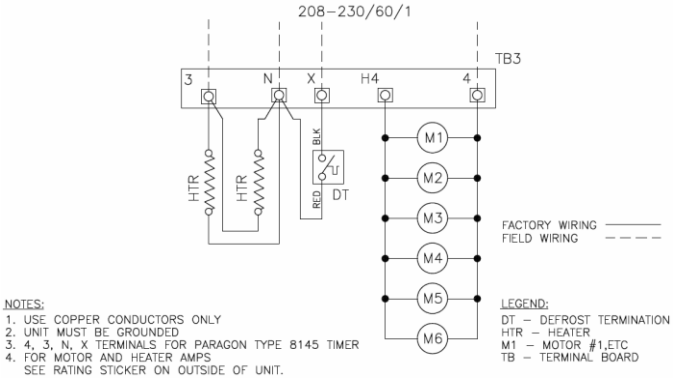
Electric Defrost – 230/3



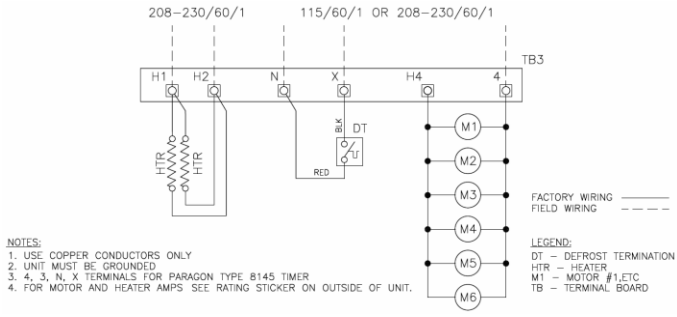
Hot Gas Defrost



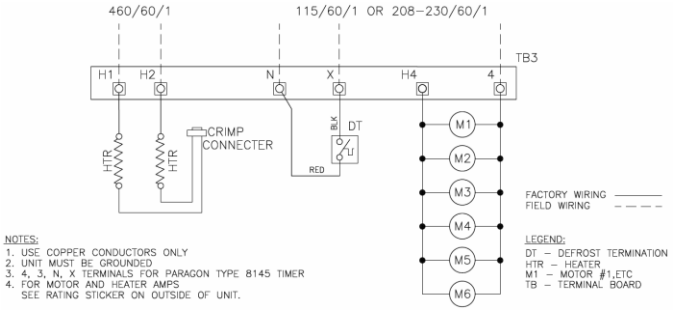
Electric Defrost – 230/1



Electric Defrost – 230/1 (Optional)



Electric Defrost – 460/1(Optional)



START-UP PROCEDURE

System Check

Before starting the refrigeration system, check the following items:

1. Make sure the system is wired as shown in the diagrams in the Installation section of this bulletin or the diagram in the unit.
2. Make sure all electrical connections are tight.
3. Make sure all piping is done as described in the Installation Section of this bulletin and in accordance with good piping practice.
4. Make sure all fan set screws are tight.
5. Make sure that the service valves on the compressor and receiver are open.
6. Make sure the unit is mounted securely and level. Pour water into the drain pan to make sure that the drain pan and drain line drain completely.
7. Make sure that the drain line is adequately heated on freezer applications.
8. Properly evacuate the system.
9. Follow proper procedures for handling and start-up of systems using polyester based lubricants.
10. Record the refrigerant type, system charge and oil type in the blanks provided on the unit nameplate.

Initial Start-up

Check the following items after initial unit start-up:

1. Check the system for proper refrigerant charge and oil level.
2. Make sure that the expansion valve superheat is set correctly. See the "Superheat Adjustment" section below.
3. Make sure the drain line heater is functioning properly.
4. During initial start-up it is not unusual to have very heavy frost loads. It may be necessary to manually initiate defrost cycles as needed until the moisture level in the room is reduced.
5. Observe the first defrost cycle on electric and hot gas defrost units to make sure that all system components are functioning properly. Check the amp draw of the defrost heaters on electric defrost units to make sure that they are working. Also make sure that the defrost cycle is terminated by the termination thermostat and not by the "fail-safe" on the timer.

Superheat Adjustment

The superheat must be adjusted properly for efficient unit cooler operation and to protect the compressor from floodback. Superheat settings should be checked after the system has balanced out at the desired room temperature. On systems sized for a 10° to 12° F TD, the valve should be adjusted to maintain 4° to 6° F superheat. Higher evaporator TD will allow a higher superheat setting. On multiple evaporator systems, the piping should be arranged such that the flow from any valve cannot affect the bulb of another.

1. Allow the system to operate until the refrigerated space temperature has been reduced to the design temperature.
2. Connect an accurate low pressure gauge to the access fitting installed in the suction line at the unit cooler outlet. **Caution : The evaporator pressure reading must be taken at a point no more than five feet from the unit cooler. For this reason, it is not normally suitable to use the compressor suction service valve for this purpose.**
3. Tape the sensor from an electronic thermometer to the suction line as close to the expansion valve bulb as possible. Insulate the sensor.
4. Take evaporator pressure and temperature readings with the system operating. Determine the superheat using a Pressure-Temperature Saturation Table for the refrigerant being used. The following example will illustrate the procedure.

Given:

Refrigerant: R-404A
Measured pressure = 55 PSIG
Measured temperature= 35° F

Solution:

From a Saturation Table, the saturation temperature for R-404A at 43 PSIG is 20° F. Compare the saturated suction temperature from the table to the actual suction temperature on the thermometer. The difference is the superheat.

35° F - 20° F = 15° F superheat

A superheat of 15°F is too high so the valve must be opened up. See the expansion valve manufacturer's recommendations for the adjustment procedure. Always wait for 20 to 30 minutes after adjustment for the system to stabilize. Take new readings and readjust the valve as required.

MAINTENANCE

General

General maintenance involves an occasional cleaning of dirt accumulation on the fan blades, fan guards, and coils. The motors are life lubricated and do not require any regular maintenance. **Disconnect all power sources before performing service or maintenance.**

Cleaning

The unit should be shut down and cleaned at least once every six months per NSF regulations. Make sure electrical power to the unit is turned off before cleaning.

Clean the fins with an approved coil cleaning agent. The drain pan and the end panels should be opened and cleaned. The end panels may be removed and totally immersed in water, if so desired. The fan blades can be cleaned when the fan guards have been removed. Care must be taken not to bend the blades, which could result in an out-of-balance condition. All internal surfaces should also be cleaned.

Check-Up

All components should be checked at least every six months for proper operation as follows:

1. Tighten all electrical connections.
2. Tighten fan set screws.
3. Check the system refrigerant charge and oil level.
4. Make sure the defrost controls are functioning properly.
5. Check the drain pan and drain line for proper drainage.
6. Check the drain line heaters for proper operation.

Fan and Motor Replacement

1. Disconnect the drain line from the drain pan, remove all screws in the drain pan, unfasten the latches, and lower the drain pan.
2. Disconnect the motor by unplugging the motor wires from the wiring harness.
3. Remove the fan blade.
4. Remove the four nuts from the shaft end of the motor.
5. Make sure motor leads are free, grasp motor, slide it out of the mount, and remove from unit.

Reverse the above steps to reinstall the fan and/or motor(s).

Defrost Heater Replacement

1. Disconnect the drain line from the drain pan, remove all screws in the drain pan, unfasten the latches, and lower the drain pan.
2. Unplug the heater wires from the terminal block.
3. Remove heater from hooks which hold the heaters in place.
4. Slide the heater out of the unit.

Reverse the above steps to reinstall the replacement heater.

TROUBLESHOOTING CHART

Symptoms	Possible Causes	Corrective Action
Fan(s) will not operate.	1. Main switch open. 2. Blown fuse(s). 3. Defective motor(s). 4. Defective defrost timer or thermostat. 5. Unit is in defrost cycle. 6. Evaporator temperature approaching 30°F	1. Close Switch. 2. Replace fuse(s). 3. Replace motor(s). 4. Replace defective component.. 5. Wait for completion of cycle. 6. Adjust fan delay.
Room temperature too high.	1. Room thermostat set too high. 2. Superheat too high. 3. System low on refrigerant. 4. Coil iced-up.	1. Adjust thermostat. 2. Adjust thermal expansion valve. 3. Add refrigerant. 4. Manually defrost coil. Check defrost controls for malfunction.
Defrost heaters will not operate.	1. Main switch open. 2. Blown fuse(s). 3. Defective heater(s). 4. Defective timer.	1. Close Switch. 2. Replace fuse(s). Check for short circuits or overload conditions. 3. Replace heater(s) 4. Replace timer.
Coil not clearing frost during defrost cycle.	1. Defective heater(s). 2. Not enough defrost cycles per day. 3. Defective defrost timer or thermostat. 4. Defrost termination thermostat not sensing area of coil that is not clearing. 5. Defrost cycle too short.	1. Replace heater(s) 2. Adjust timer for more defrost cycles. 3. Replace defective component.. 4. Relocate thermostat. 5. Lengthen fail-safe time setting. Do not exceed 40 minutes.
Ice accumulating in drain pan.	1. Defective heater(s). 2. Unit not pitched properly. 3. Drain plugged. 4. Defective drain line heater.	1. Replace heater(s) 2. Check and adjust if necessary. 3. Clean drain. 4. Replace heater.
Unit stays in prolonged defrost cycle.	1. Defective defrost timer or thermostat. 2. Defrost termination thermostat not sensing coil temperature. 3. Fail-safe on defrost timer set too long.	1. Replace defective component.. 2. Make sure thermostat is positioned to sense coil return bend temperature. 3. Shorten fail-safe setting on timer.

REPLACEMENT PARTS

Model Number	Voltage	Description	Part Number
*WF - 050, 100, 130, 160, 190, 220, 270, 340	115/230	FAN BLADE, 10 IN. DIA., 31° PITCH, CCW, HUBLESS	204395018
*WF - 075	115/230	FAN BLADE, 10 IN. DIA., 20° PITCH, CCW, HUBLESS	204395016
*WF - 050, 100, 130, 160, 190, 220, 270, 340	460	FAN BLADE, 10 IN. DIA., 28° PITCH, CCW	08221007
*WF - 075	460	FAN BLADE, 10 IN. DIA., 13° PITCH, CCW	08221005
All Models	115/230/460	FAN GUARD, 12 IN. BLACK PLASTIC	119647000
All Models	115	MOTOR, EC, 16W, 1550 RPM, 115V	107933006
All Models	230	MOTOR, EC, 16W, 1550 RPM, 230V	107933003
All Models	115/230/460	MOTOR MOUNT	10243000
All Models (Optional)	115	MOTOR, PSC, 16W, 1550 RPM, 115V (5 MFD CAPACITOR NOT INCLUDED)	107933001
All Models (Optional)	460	MOTOR, PSC, 16W, 1550 RPM, 460V	08216135
All Models (Optional)	115	MOTOR, SHADED POLE, 16W, 1550 RPM, 115V	103104007
All Models (Optional)	230	MOTOR, SHADED POLE, 16W, 1550 RPM, 230V	103104008
All Models (Optional)	460	MOTOR MOUNT, 460V PSC	0825489400
All Models (Optional)	115	CAPACITOR, 5 MFD, USE WITH 115V PSC MOTOR	202163004

*WF - 050	115/230/460	DRAIN PAN/VENTURI PANEL, 1 FAN	0852507601
*WF - 075, 100	115/230/460	DRAIN PAN/VENTURI PANEL, 2 FAN	0852507701
*WF - 130, 160	115/230/460	DRAIN PAN/VENTURI PANEL, 3 FAN	0852507801
*WF - 190, 220	115/230/460	DRAIN PAN/VENTURI PANEL, 4 FAN	0852507901
*WF - 270	115/230/460	DRAIN PAN/VENTURI PANEL, 5 FAN	0852508001
*WF - 340	115/230/460	DRAIN PAN/VENTURI PANEL, 6 FAN	0852508101
*WF - 050 (Optional)	115/230/460	DRAIN PAN/VENTURI PANEL, 1 FAN, WHITE PAINTED	0852507607
*WF - 075, 100 (Optional)	115/230/460	DRAIN PAN/VENTURI PANEL, 2 FAN, WHITE PAINTED	0852507707
*WF - 130, 160 (Optional)	115/230/460	DRAIN PAN/VENTURI PANEL, 3 FAN, WHITE PAINTED	0852507807
*WF - 190, 220 (Optional)	115/230/460	DRAIN PAN/VENTURI PANEL, 4 FAN, WHITE PAINTED	0852507907
*WF - 270 (Optional)	115/230/460	DRAIN PAN/VENTURI PANEL, 5 FAN, WHITE PAINTED	0852508007
*WF - 340 (Optional)	115/230/460	DRAIN PAN/VENTURI PANEL, 6 FAN, WHITE PAINTED	0852508107

*WF - 050	115/230/460	DEFROST HEATER 545W, 42 IN. LONG (2 PER UNIT)	0821500901
*WF - 075, 100	115/230/460	DEFROST HEATER 545W, 61 IN. LONG (2 PER UNIT)	0821500902
*WF - 130, 160, 190, 220	115/230/460	DEFROST HEATER 1305W, 79 IN. LONG (2 PER UNIT)	0821500903
*WF - 270	115/230/460	DEFROST HEATER 2180W, 90 IN. LONG (2 PER UNIT)	0821500904
*WF - 340	115/230/460	DEFROST HEATER 2725W, 114 IN. LONG (2 PER UNIT)	0821500905

All Electric and Hot Gas Defrost Models	115/230/460	DEFROST CONTROL, TERMINATION	103079010
All Electric and Hot Gas Defrost Models	115/230/460	DEFROST CONTROL, ADJUSTABLE	204464037
All Electric and Hot Gas Defrost Models	115/230/460	DEFROST CONTROL, HEATER SAFETY	103079003

Service Record

Date	Maintenance Performed	Components Required