Turbo air Speeds Up the Pace of Innovation

REFRIGERATOR MANUFACTURER
Turbo air

Part No. KUCTB2504

September 2020 edition

Refrigeration System
Installation & Operation Manual

Please read this manual completely before attempting to install or operate this equipment !

Unit Cooler

Condensing Unit

CONTENTS

Safety Information

Be sure all power sources are turned off before checking the electric wiring or appliances to avoid electric shock.
Do not run fan if cover or case is removed. This is to avoid electric shock.
All units are pressurized with dry air or nitrogen gas. All units must be evacuated before charging the system with refrigerant. Keep finger away from moving parts.
Avoid touching refrigerant lines. Some parts are very hot and can cause burns.
Avoid contacting sharp edges or coil surface that are a potential injury hazard.
Avoid touching the units or electric box in wet hands to prevent electric shock.
Please call the specialized installation company or trained personnel when you installing, moving, operating of the unit.
Field wiring must confirm to the requirements of units' electric specification.

Inspection

A person at the job site to receive material holds responsibility. Each shipment should be carefully inspected against the bill of lading. The shipping receipt should not be signed before careful inspection. Check carefully for concealed damage. Any shortage or damages should be reported to the delivering carrier. Damaged material becomes the delivering carrier's responsibility, and should not be returned to Turbo air unless prior approval is given. Check the serial tag information with invoice. Report any discrepancies to Turbo air sales representatives.

Locating Unit Cooler.

Minimum space required for Unit Cooler.

Figure 1. One evaporator

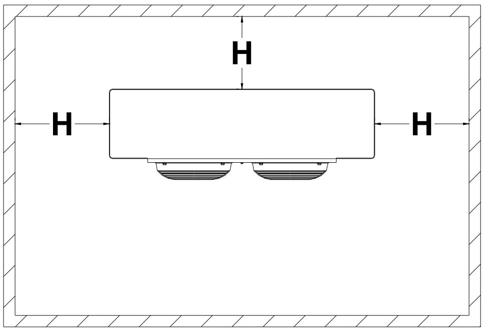
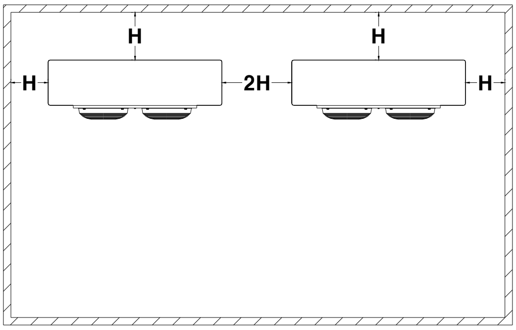


Figure 2. Two or more evaporators



※H=Space Required, Unit Cooler Height

Recommended location methods of Unit Cooler.

1. Avoid placing Unit Cooler close to doors. Install like Figure 3 or Figure 4.
2. Avoid having them face each other when installing multiple units. Install like Figure 5
3. Recommended placement when installing multiple units see Figure 6.

(H= Sapce Required, Unit Cooler Height)

Figure 3

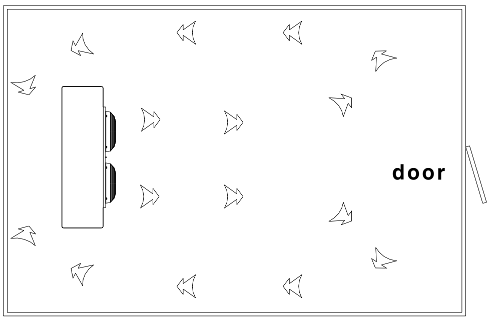


Figure 5

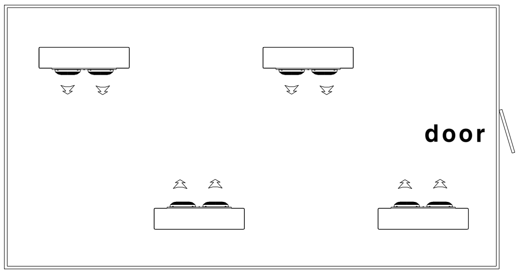


Figure 4

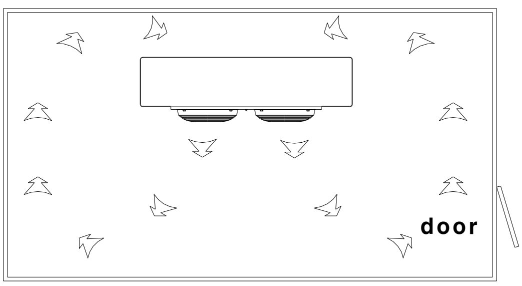
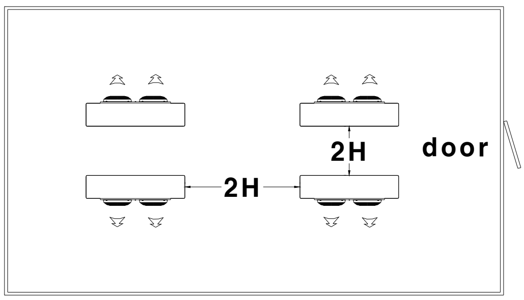


Figure 6

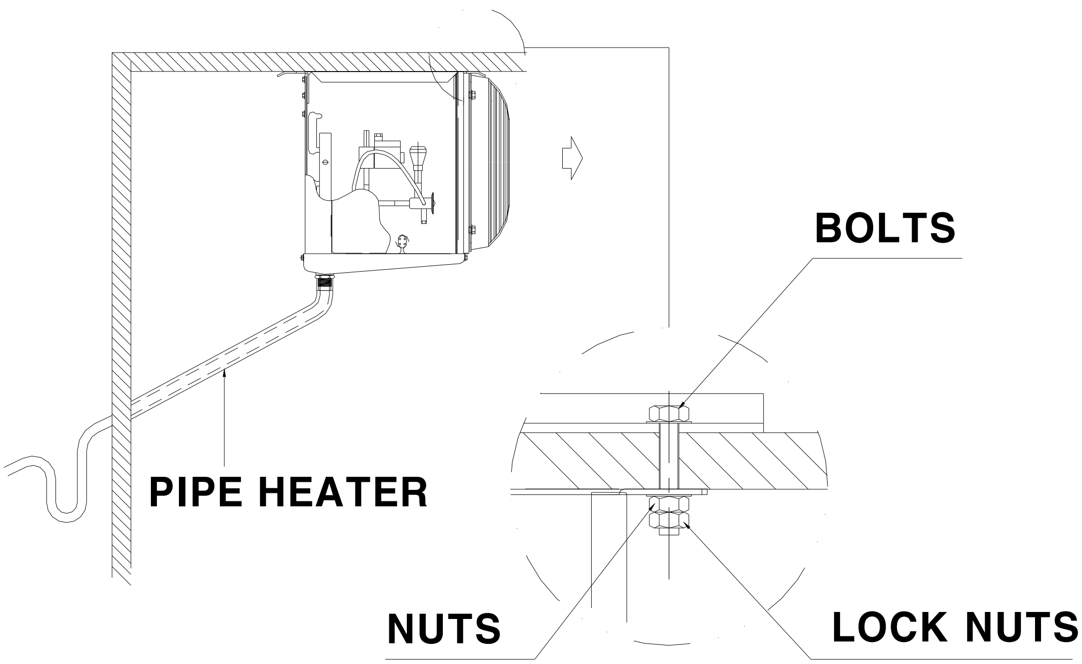


Locate evaporators so that air pattern covers all of the room. Do not restrict the inlet or outlet air stream. When installed, there should be 12"clearance from bottom of the unit. Always avoid placement of unit coolers directly above doors and door openings.

Most evaporators can be mounted with rod hangers, lag screws or bolts. (use 3/8" and 5/8" stainless steel bolts) Refer to Figure 7. Mount the unit level so that condensate drains properly. When using rod hangers, allow adequate space between the top of the unit and the ceiling. (NSF Standard 7). The area above the unit cooler must be sealed or exposed in such away to allow hand cleaning without the use of tools. When lagging or bolting unit flush to the ceilings, seal the joint between the top and the ceiling with an NSF listed sealant. Ends of open hanger channels must be sealed to prevent accumulation of foreign material.

Refer to Figures 1 through 4. Air flow distance must be considered when coolers or freezers will not accommodate all required evaporators on one wall. Refer to Figure 7. Traps on low temperature units must be outside of refrigerated enclosures. Traps subject to freezing temperatures must be wrapped with heat tape and insulated.

Figure 7. Unit Cooler Installation Diagram.



Unit Cooler Piping.

When brazing refrigerant lines, an inert gas should be passed through the line at low pressure to prevent scaling and oxidation inside the tubing. Dry nitrogen is preferred.

Use only a suitable silver solder alloy on suction and liquid lines. All piping must be adequately supported to prevent vibration and breaking.

Tube clamps should have a gasket surface to prevent abrasion.

The system as supplied by Turbo air was thoroughly cleaned and dehydrated at the factory.

Foreign matter may enter the system by way of the evaporator to condensing unit piping.

Therefore, care must be used during installation of the piping to prevent entrance of foreign matter.

Use only refrigeration grade copper tubing properly sealed against contamination.

Figure 8. Suction piping installation on an evaporator.

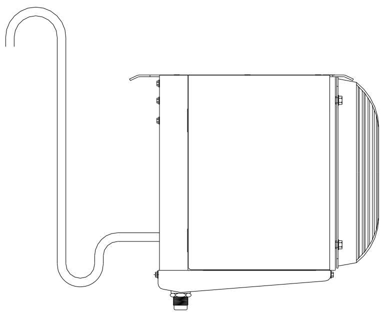


Figure 9. suction piping installation on multiple evaporators.

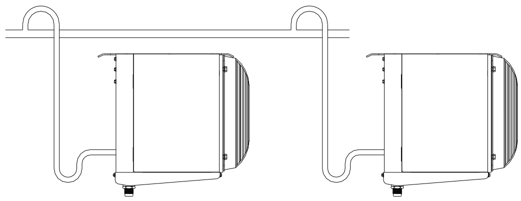
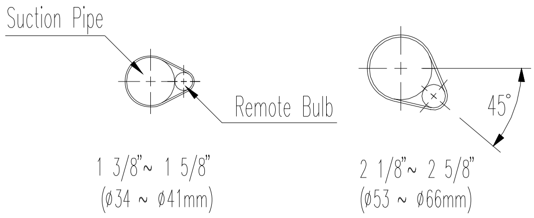


Figure 10. Installation of expansion valve bulb.



Refer to Figure 8 through 9. Suction line risers must be carefully selected, have an oil trap at the bottom and at 15 foot intervals up the riser. They should be the same size as the vertical riser connected to its outlet. Riser should not be larger in diameter than horizontal runs.

Refer to Figure 10.

Expansion valves are supplied with clamp for securing bulb to the suction line. The bulb must be secured at the evaporator outlet, on the side of a horizontal run of suction line, before any trap.

Do not over tighten bulb clamps or deform the bulb in anyway. Install all refrigeration system components in accordance with applicable local and national codes and in conformance with good practice required for the proper operation of the system.

All piping must be protected where it passes through walls or ceilings. Precautions should be taken to see that the piping does not touch any structural the transmission of vibration into the building.

The piping chase must be thoroughly sealed to protect the tube and prevent ambient air from entering the refrigerated space. Seal around the drain line where it passes through the wall. Air leaks can cause equipment problems. Damage the structure and product, increase load, increase operating cast, and can cause a safely hazard. Eliminate all air leaks.

Expansion valve selection.

Expansion valve selection for each model (Table 1)

Table 1 refer to SPORLAN, other expansion valve be referred to their catalogue.

Table 1. Expansion Valve Specs by Model.

MODEL	CAPACITY (BTUH)	Evap. Temp (°F/°C)	EXPANSION VALVE	
			SPORLAN (R-404A)	SPORLAN (R-448A/449A)
ADR043AE	4285	25 / -4	SBFSE-AA-C	SBFDE-AAA-C
ADR060AE	6058		SBFSE-AA-C	SBFDE-AA-C
ADR089AE	8989		SBFSE-A-C	SBFDE-AA-C
ADR112AE	11280		SBFSE-A-C	SBFDE-A-C
ADR125AE	12609		SBFSE-A-C	SBFDE-A-C
ADR137AE	13744		SBFSE-A-C	SBFDE-A-C
ADR171AE	17213		SBFSE-B-C	SBFDE-A-C
ADR191AE	19213		SBFSE-B-C	SBFDE-A-C
ADR258AE	25883		SBFSE-B-C	SBFDE-B-C
ADR325AE	32584		SBFSE-C-C	SBFDE-B-C
ADR352AE	35287		SBFSE-C-C	SBFDE-B-C
ADR392AE	39317		SBFSE-C-C	SBFDE-B-C
LED025BE	2584	-20 /-29	SBFSE-AAA-Z	SBFDE-AAA-Z
LED036BE	3764		SBFSE-AA-Z	SBFDE-AAA-Z
LED052BE	5351		SBFSE-AA-Z	SBFDE-AA-Z
LED072BE	7369		SBFSE-A-Z	SBFDE-AA-Z
LED081BE	8313		SBFSE-A-Z	SBFDE-AA-Z
LED090BE	9161		SBFSE-A-Z	SBFDE-A-Z
LED114BE	11587		SBFSE-A-Z	SBFDE-A-Z
LED124BE	12608		SBFSE-A-Z	SBFDE-A-Z
LED157BE	15901		SBFSE-B-Z	SBFDE-A-Z
LED176BE	17842		SBFSE-B-Z	SBFDE-A-Z
LED225BE	22711		SBFSE-C-Z	SBFDE-B-Z
LED244BE	24664		SBFSE-C-Z	SBFDE-B-Z
LED273BE	27609		SBFSE-C-Z	SBFDE-C-Z

MODEL	CAPACITY (BTUH)	Evap. Temp (°F/°C)	EXPANSION VALVE	
			SPORLAN (R-404A)	SPORLAN (R-448A/449A)
TCA084AE	8431	25 / -4	SBFSE-A-C	SBFDE-AA-C
TCA113AE	11352		SBFSE-A-C	SBFDE-A-C
TCA187AE	18827		SBFSE-B-C	SBFDE-A-C
TCA207AE	20761		SBFSE-B-C	SBFDE-A-C
TCA249AE	24986		SBFSE-B-C	SBFDE-B-C
TCA285AE	28475		SBFSE-B-C	SBFDE-B-C
TCA338AE	33843		SBFSE-C-C	SBFDE-B-C
TCA381AE	38137		SBFSE-C-C	SBFDE-B-C
TCA477AE	47796		SSE4-C	SBFDE-C-C
TCE066BE	6731	-20 /-29	SBFSE-A-Z	SBFDE-AA-Z
TCE093BE	9398		SBFSE-A-Z	SBFDE-A-Z
TCE156BE	15793		SBFSE-B-Z	SBFDE-A-Z
TCE175BE	17697		SBFSE-B-Z	SBFDE-A-Z
TCE214BE	21415		SBFSE-C-Z	SBFDE-B-Z
TCE241BE	24247		SBFSE-C-Z	SBFDE-B-Z
TCE288BE	28959		SBFSE-C-Z	SBFDE-C-Z
TCE325BE	32738		SBFSE-C-Z	SBFDE-C-Z
TCE410BE	41243		SSE4-Z	SBFDE-C-Z

MODEL	CAPACITY (BTUH)	Evap. Temp (°F/°C)	EXPANSION VALVE	
			SPORLAN (R-404A)	SPORLAN (R-448A/449A)
TTA085AE	8535	25 / -4	SBFSE-A-C	SBFDE-AA-C
TTA130AE	13053		SBFSE-A-C	SBFDE-A-C
TTA176AE	17595		SBFSE-B-C	SBFDE-A-C
TTA221AE	22151		SBFSE-B-C	SBFDE-B-C
TTA248AE	24887		SBFSE-C-C	SBFDE-B-C
TTE064BE	6570	-20 /-29	SBFSE-A-Z	SBFDE-AA-Z
TTE102BE	10369		SBFSE-A-Z	SBFDE-A-Z
TTE140BE	14240		SBFSE-B-Z	SBFDE-A-Z
TTE179BE	18152		SBFSE-B-Z	SBFDE-A-Z
TTE203BE	20508		SBFSE-C-Z	SBFDE-B-Z

Table 2. Recommended line size for suction diameter. (R-404A)

SYSTEM	SUCTION TEMPERATURE															
CAPACITY	+30。F				+20。F				+10。F				-10。F			
BTUH	30'	75'	100'	150'	30'	75'	100'	150'	30'	75'	100'	150'	30'	75'	100'	150'
3000	3/8	3/8	1/2	1/2	3/8	1/2	1/2	1/2	1/2	1/2	1/2	5/8	1/2	5/8	5/8	5/8
4000	3/8	3/8	1/2	1/2	1/2	1/2	1/2	5/8	1/2	1/2	5/8	5/8	1/2	5/8	5/8	7/8
6000	1/2	1/2	5/8	5/8	1/2	5/8	5/8	7/8	1/2	5/8	5/8	7/8	5/8	5/8	7/8	7/8
9000	1/2	5/8	7/8	7/8	5/8	7/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8
12000	1/2	5/8	7/8	7/8	5/8	7/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8
15000	5/8	5/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8
18000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8
24000	5/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8
30000	7/8	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8
36000	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8
42000	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8
48000	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8
54000	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8
60000	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8
66000	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8
SYSTEM	SUCTION TEMPERATURE															
CAPACITY	-20。F				-30。F				-40。F				LIQUID LINE SIZE			
BTUH	30'	75'	100'	150'	30'	75'	100'	150'	30'	75'	100'	150'	30'	75'	100'	150'
3000	1/2	5/8	5/8	5/8	1/2	5/8	5/8	7/8	5/8	5/8	7/8	7/8	3/8	3/8	3/8	3/8
4000	1/2	5/8	5/8	5/8	5/8	5/8	7/8	7/8	5/8	5/8	7/8	7/8	3/8	3/8	3/8	3/8
6000	5/8	7/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1 1/8	3/8	3/8	3/8	3/8
9000	5/8	7/8	7/8	1 1/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	3/8	3/8	3/8	3/8
12000	7/8	7/8	1 1/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	7/8	1 3/8	1 3/8	3/8	3/8	3/8	3/8
15000	7/8	1 1/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	3/8	3/8	3/8	1/2
18000	7/8	1 1/8	1 1/8	1 3/8	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	3/8	3/8	1/2	1/2
24000	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 1/8	1 5/8	1 5/8	3/8	1/2	1/2	1/2
30000	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 1/8	1 3/8	1 5/8	1 5/8	1/2	1/2	1/2	5/8
36000	1 1/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1/2	1/2	1/2	5/8
42000	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1/2	1/2	5/8	5/8
48000	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1/2	1/2	5/8	5/8
54000	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1/2	1/2	5/8	5/8
60000	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1/2	1/2	5/8	5/8
66000	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	1/2	1/2	5/8	5/8

1. All line size are basic for O.D type L copper tube. The above table is maximum suction size and riser size should not exceed horizontal size.

2. Suction line size should be selected at pressure drop equivalent to 2。F, and reduce estimate of system capacity accordingly.

3. For easy oil return, use U trap in suction line.

4. Consider double suction risers, if capacity control can reduce capacity 35% below.

DEFROST

Once ice forms in an evaporator coil it keeps building more ice and eventually will lead to equipment failure if not manually defrosted.

Some symptoms of ice forming in the coil are:

1. loss of air circulation and air throw
2. loss of room temperature.
3. no off-cycle time.
4. flood back.
5. water spitting out of the fans or coil on air defrost systems.

Long term ice formation will crush the refrigerant tubes in the coil causing leaks and major equipment problems. If ice formation is suspected, carefully check the interior rows of the coil with a good light. Ice formation usually starts at the bottom of the coil in the middle rows and can be difficult to detect.

For most applications, two to four defrost cycles per day should be adequate. The defrost requirements will vary on each installation so the defrost settings should be determined by observing the system operation.

Air defrost

The normal "off cycle" of the compressor may be adequate to keep the evaporator coil clear of frost. In other applications, a defrost timer may be necessary to help assure a clear coil in a medium temperature environment, "Air defrost" is initiated by the timer, but the evaporator fans continue to operate to facilitate the melting of frost on the fan surface. Other types of defrost schemes require that the fans on the evaporator shut off during the defrost period.

Electric defrost

The recommended electric defrost circuitry is typically using a defrost heater.

During defrost cycle, compressor and fan are stopped automatically by the timer at predetermined times.

In generally, electric defrost uses defrost timer for preventing over heating.

There are two kinds defrost timers. Turbo air uses bimetal method.

During the defrost cycle, if the room temperature rises above the desired setting, defrost heater will turn off automatically and if the room temperature drops lower than desired temperature,

Defrost heater will turn off.

If the defrost time finished, defrost timer will turn on and the compressor and fans will run continuously.

At this time, fan power is supplied later than compressor power by fan delay thermostat. If it does not, a partial defrost results and the residual water and slush will re-freeze into ice during the next cycle. Ice removal will require a manual defrost.

Defrost Thermostat

Bimetal Disc Type

Turbo air uses Klixon type thermostat made by Texas Instruments Company.

This thermostat terminates defrost at 50°F(10℃) and prevents the fans from running when the coil temperature is above 40°F(4.4℃). And defrost termination/fan delay thermostat terminates defrost at 55°F(12.8℃) after defrost is finished.

This will allow fan delay time for eliminating the residual water and slush in the evaporator coil.

Fan delay time can be eliminated by jumping the fan switch contacts. This will allow the fans to start immediately after defrost termination. This will disable the fan delay.

When the coil temperature reaches approximately 40°F(1.7℃), fan delay is sends a signal to the control circuit, and it will run fan motor. If you wish to control fan delay time and defrost termination time, adjust the position of thermostat. If this method is used, it will result in higher temperature.

Adjustable Type (F25 Series)

The F25 Control terminates defrost and delays evaporator fan operation following a defrost cycle. The coil temperature rises during the defrost cycle to the control cut-out setting. At this setting the defrost cycle terminates and refrigeration starts. The fan remains off during the initial start-up of the refrigeration cycle. When the coil temperature drops to the control cut-in setting, the fan is turned on. The delayed fan operation prevents warm moist air from being circulated into the controlled space and danger of increased vapor pressure and product damage is eliminated.

Defrost Timer Setting

For Paragon's 8145-20B type ;

Timer should be set correctly. Determine the number of defrosts per day and the best time of day for it to occur. Insert pins accordingly. Set the fail-safe time to terminate the defrost a few minutes beyond the estimated temperature termination time. Air defrost termination time is usually 30 to 50 minutes. The colder the room, the longer the fail-safe time required. Electric defrost systems normally have a 25 to 40 minute fail-safe time.

For GRASSLIN's DTSX-B-240 type ;

The DTSX Defrost Timer is identical in function, terminal identification, and wiring to the Paragon 8140 and Precision 6140series Defrost Timers.

The DTSX may also be used to replace Paragon 8040 and Precision 6040 series time terminated defrost timers .

With the addition of a remote pressure switch, the DTSX can replace the Paragon 8240 series and Precision 6240 series pressure terminated defrost timers.

Defrosts will be initiated at the times set on the timer, which will accept from 1 to over 24 defrost initiation settings per day at 15minute intervals (8:00AM, 8:15AM, 8:30AM, etc.)

Defrost duration is settable in 15 minute intervals from a minimum of 15 minutes up to several hours (15 minutes , 30 minutes , 45 minutes , 1hour, 1 hour-15 minutes , etc.)

The defrost duration determines the termination time.

In standard configuration, the contacts between terminals 1 and 3 are normally open and close during a defrost to energize defrost heaters ; the contacts between terminals 2 and 4 are normally closed (when timer is energized) and open during a defrost to de-energize refrigeration and fans.

Setting Defrost Initiation Time :

Move a white tab (tripper) on the outer dial outward at each desired initiation time. For example, to set defrost initiation times at 6:00AM, 11:30AM, 4:30PM and 11:00PM, move the tab adjacent to the "M" in AM on the dial (6:00AM), the tab that lies between 11:30AM and 11:45 AM, the tab between 4: 30PM and 4: 45PM, and the tab adjacent to the 11:00-11:15PM marks.

Setting Maximum Defrost Duration :

Different defrost durations may be set for each defrost initiation setting. Each white tab (tripper) provides a 15minute interval. The tabs that set the initiation time provide a minimum of 15minutes of defrost. For longer defrost duration, move additional tabs (following in time) from the initiation tab. For example, if a 45minute defrost is to start at 7:00AM, move the tab outward that lies between 7:00 and 7:15 on the AM side of the dial, and the tabs adjacent to 7:15-7:30 and 7:30-7:45. (3 tabs moved outward). The defrost will initiate at 7:00AM and time terminate at 7:45AM (if temperature termination does not occur first.)

Head Pressure Control

This system is used to increase the efficiency of the system by controlling the condensing pressure when the outside temperature is low.

A. Fan ON/OFF Control System (Standard)

This system controls the condensing pressure by turning the condenser fan on/off using a pressure switch.

One fan model turns off at 157psi condensing pressure and turns on at 228psi. In the two fan model, one fan is turned off at 157 psi condensing pressure, turned on at 228 psi, and the other fan turned off at 138 psi and turned on at 203 psi.

B. Head Pressure Control Valve System (when supplied)

This valve used on high pressure refrigerant systems controls the head pressure at approximately 180 PSIG.

C. Fan Speed Controller System (when supplied)

Fan speed controller XGE-type stabilizes condensing pressure by changing condenser's fan speed. The controller reduces fan noise and saves energy in low ambient conditions. Fan speed controller keeps the condensing pressure at a steady level by regulating the speed of the AC/EC fan motors. When pressure is declining the controller decreases the output voltage changing the speed of AC/EC fan motor.

XGE saves energy and reduces noise by lowering the fan speed or cutting it off.

The easily accessible adjusting screw is situated on the top surface of XGE. The direction to turn the screw for decrease or increase in the setting pressure is indicated by arrow markings next to the adjusting screw (1turn = 21.7psi).

Locating and Mounting Condensing Unit

Locating Condensing Unit.

Condensing Unit must be located and installed where there is an unrestricted area. Avoid areas where there are corrosive vapors or flammable materials.

Avoid locating units too close to walls. Fan intake and discharge air space should be at least 1m and 2m from wall. Other sides should be at least 0.5m from wall. No impediments should be located in front of condensing units intake and discharge.

If above is not followed correctly noise and inadequate air flow may result.

Condensing units should be located away from general public and the street.

Make sure units are kept horizontal.

Mounting Condensing Unit.

Mounting base should be concrete or steel sufficient to support between 2 to 5 times the weight of condensing unit.

Condensing units must be mounted using pads to avoid vibration or shifting.

The anchor bolts should be used to fix the unit and tightened with spring washer and nuts.

Spring Mounted Compressor.

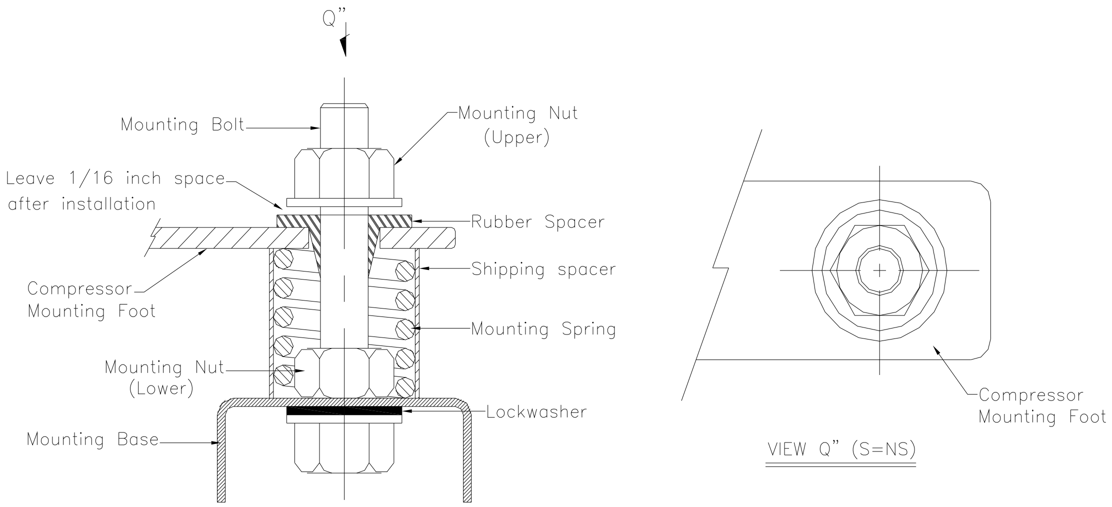
Semi-hermetic compressor unit use the mounting assembly shown in Figure 11, the shipping spacer is to be in place during shipment to insure maximum support for the compressor body during transit.

Before the unit is put in operation, the shipping spacer should be removed and discarded.

Before operating the unit, it is necessary to follow these steps.

1. Remove the upper nuts and washers.
2. Remove and discard the shipping spacers.
3. Install the rubber spacer. (rubber spacer tied to compressor.)
4. Replace the upper mounting nuts and wahers.
5. Allow 1/16" between the upper nut and the rubber spacer as **Figure 11**.

Figure 11. Spring Mount.



System Operation.

Evaporator Superheat.

Evaporator superheat is generated from the compressor suction line reducing system efficiency.

Normally 6°F to 12°F is acceptable on most refrigeration systems. Preferably, 6°F to 8°F on low temperature systems and 8°F to 10°F on medium temperature systems are desired. For systems operating at higher temperatures, the superheat can be adjusted to 12°F to 15°F as required.

The method of measuring evaporator superheat is found by P-T method.

Obtain evaporator superheat by measuring the suction line temperature at the expansion valve bulb. Obtain pressure at a Schrader fitting in the evaporator suction connection area, near the expansion valve bulb, and convert to temperature with a P-T chart.

Subtract the converted temperature from the measured temperature and the difference is superheat at the evaporator. Obtain the desired superheat by adjusting the expansion valve.

Evaporator superheat greater than 14°F can substantially reduce system capacity, while superheat less than 4°F has the potential for flood back.

Compressor Superheat.

Compressor superheat has an effect on system capacity and efficiency. Compressor superheat affects compressor life and recommends a minimum of 20°F superheat at the compressor. Too low a compressor superheat can permit liquid return to the compressor causing damage.

Too high a compressor superheat can cause high discharge temperature, resulting in lubricant breakdown, compressor overheating and can lead to compressor damage or failure.

Compressor superheat can be changed by adjusting the expansion valve, adding a suction-liquid line heat exchanger.

Obtain compressor superheat by measuring the suction line temperature about 6 to 12 inches from the compressor service valve.

Obtain pressure at the suction service valve and convert to temperature with a P-T chart. Subtract the converted temperature from the measured temperature and the difference is superheat at the compressor.

Refrigerant Charging.

When charging a system with refrigerant that is in a vacuum with vacuum pump, the above process is very important to remove moisture inside system. The moisture can cause system damage or failure.

Charge refrigerant into a system through a filter/drier in the charging line. This extra drier will insure that all refrigerant supplied to the system is clean and dry. Weigh the refrigerant drum before charging so an accurate record can be kept of the weight of refrigerant put in the system. Liquid refrigerant can be added directly into the receiver tank and charging 90% of system refrigerant capacity.

Start the system and finish charging until the sight glass indicates a full charge and the proper amount have been weighed in. If the refrigerant must be added to the system through the suction side of the compressor, charge in vapor form only. Liquid charging must be done in the high side only and with liquid metering devices. If R-404A is used, liquid must be charged and read up refrigerant explanatory.

Start-up.

Use the following operating procedure after the installation has been completed,.

1) Check all electrical and refrigerant connections. Check if the electrical status is in manual and if there are no holes in the refrigerant lines. Start-up
2) Check all fans on the evaporator and condensing unit to be sure they are operational and turning the proper direction.
3) Check high and low pressure switch, pressure regulating valves, and adjust if necessary.
4) Continue charging until system has sufficient refrigerant for proper operation. Do not overcharge. Bubbles in a sight glass may be caused by a restriction as well as a shortage of refrigerant. Check service valve and open if refrigerant is sufficiently charged and you still have bubbles in the sight glass.
5) Observe system and do not leave unit unattended until the system has reached normal operating conditions.

WARNING : SCROLL COMPRESSOR IS DIRECTIONAL DEPENDENT.
IF NOISY, SWITCH ANY TWO SUPPLY LINES.

Pressure Switch Setting.

Turbo air Condensing Unit uses "Dual Pressure Switch" as standard for pressure setting.

The high pressure setting is "425 PSIG" as the factory setting. If the system stops due to a high pressure trouble during system operation, you need to reset the "dual pressure switch". If a problem occurs on the high pressure side, it is necessary to check the system, so be sure to reset the system after visiting the site. Turbo air applied a manual reset method to protect the system.

Refer to the following “Table 3” for the low pressure setting value, and change the setting value if necessary.

Table 3. Dual Pressure Switch Low pressure setting values.

<table>
<tr><th rowspan="2">Box Setting
Temperature (℉)</th><th colspan="2">Low Pressure side setting</th><th rowspan="2">Cut Out (PSIG)</th><th rowspan="2">Setting</th></tr>
<tr><th>Cut In (PSIG)</th><th>DIFF. (PSIG)</th></tr>
<tr><td>40</td><td rowspan="5">36</td><td rowspan="5">29</td><td rowspan="5">7</td><td rowspan="5">Factory Setting</td></tr>
<tr><td>30</td></tr>
<tr><td>20</td></tr>
<tr><td>10</td></tr>
<tr><td>0</td></tr>
<tr><td>-10</td><td rowspan="2">15</td><td rowspan="2">13</td><td rowspan="2">2</td><td rowspan="3">Field Setting</td></tr>
<tr><td>-20</td></tr>
<tr><td>-30</td><td>8</td><td>8</td><td>0</td></tr>
</table>

Unit Cooler troubleshooting.

Symptoms	Possible causes	Solution
Cooling is insufficient. (Room temperature too high.)	Insufficient refrigerant	Add refrigerant
	Too much oil in unit cooler	Check the easy oil return in suction line.
	Superheat too high	Adjust expansion valve.
	Room thermostat set too high	Adjust thermostat
	Coil iced-up	Manually defrost coil. Check defrost time, period, controls.
	Defective distributor	Replace.
Uneven coil frosting.	Defective distributor	Replace
	Defective heater	Replace
	Defrost termination set too low	Adjust defrost termination setting higher and move defrost thermostat.
Ice build up in coil quickly	Fin spaced too narrow	Replace coil
	Evaporating temperature too low	Adjust expansion valve
	Decrease of air volume	Check fan and clean air filter
	Unit cooler capacity is too small	Replace unit cooler
Fan not operating	Main switch open	Close switch
	Blown fuses	Replace fuses. Check for short circuits or overload conditions
	Defective motor	Replace motor
	Defective timer or defrost thermostat	Replace defective component
	Unit in defrost cycle	Wait for completion of cycle
	Coil does not get cold enough to reset thermostat.	Adjust fan delay setting of thermostat.
Ice accumulating in drain panel	Defective heater	Replace heater
	Drain line plugged	Clean drain line
	Defective drain line heater	Replace heater
	Defective timer or defrost thermostat	Replace defective component.

Symptoms	Possible causes	Solution
Coil not clearing of frost during defrost cycle	Coil temperature not getting above freezing point during defrost.	Check heater operation
	Insufficient defrost period	Adjust timer or more defrost cycle
	Defrost cycle too short	Adjust defrost thermostat or timer for longer cycle
	Defective timer or defrost thermostat	Replace defective component
Ice accumulating on ceiling ,around evaporator, on fan guard, or blades.	Defrost time is too long	Adjust defrost termination thermostat.
	Not delaying fans after defrost period.	Check fan delaying thermostat
	Defective defrost thermostat or timer.	Replace defective component
	Too many defrosts	Reduce the number of defrosts

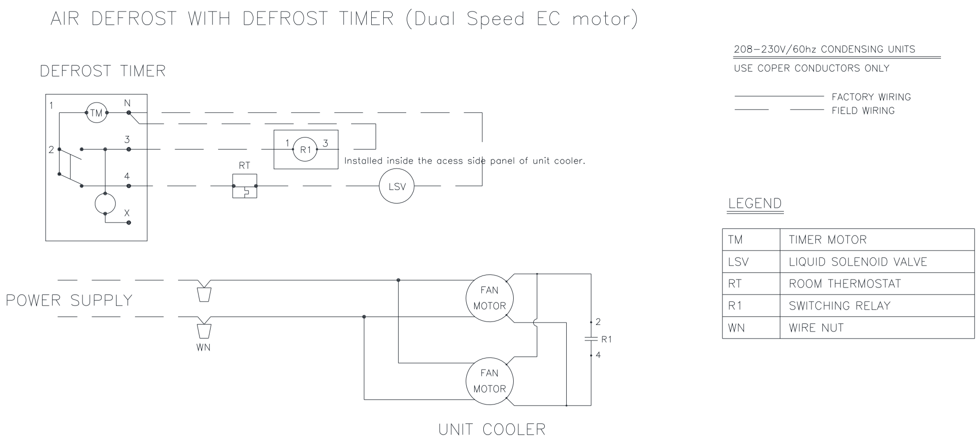
System troubleshooting.

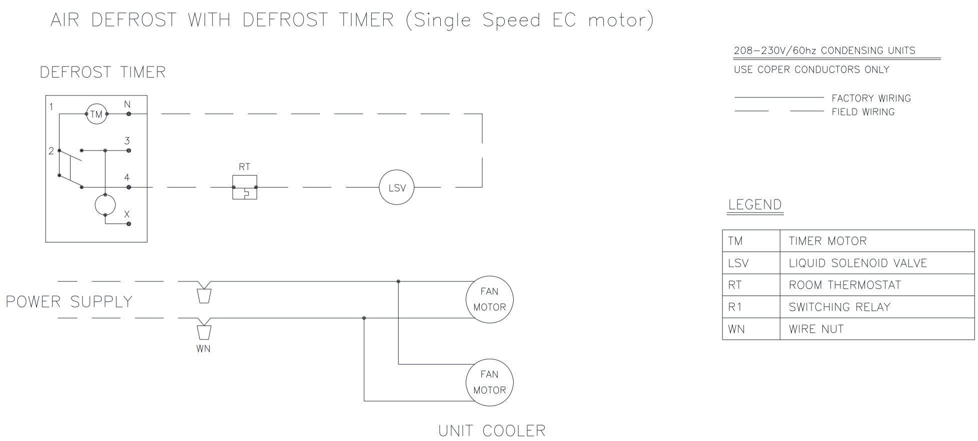
symptoms	Possible causes	Solution
Compressor not running	Main switch open	Close switch
	Blown fuse	Check electrical circuits and motor winding for shorts or grounds. Replace fuse after fault is corrected.
	Loose wiring	Check all wire junctions. Tighten all terminal screws.
	System cable shut down	Replace shutdown cable.
	Thermal overload tripped	Overloads are automatically reset. Check unit when unit come back on line.
	Defective contactor or contactor coil	Replace or repair
	System shut down by safety devices.	Check cause of shut down
	Liquid line solenoid not open	Repair or replace coil
Noisy Compressor	Flooding of liquid refrigerant into crankcase	Check expansion valve setting
	Improper piping support on suction or liquid line.	Relocate add hangers.
	Worn compressor.	Replace compressor
High discharge pressure.	Non-condensable in system.	Remove non-condensable.
	Too much refrigerant	Remove excess refrigerant
	Discharge shut off valve partially closed	Open valve
	Fan not running	Check electrical circuit and fuse.
	Dirty condenser coil	Clean condenser coil
Low discharge pressure.	Faulty condenser temperature controls	Check head pressure control
	Suction shut off valve partially closed	Open valve
	Insufficient refrigerant	Check leaks. Add charge.
	Low suction pressure	See corrective steps for low suction pressure.

symptoms	Possible causes	Solution
High suction pressure	Excessive loads	Reduce load.
	Expansion valve overfeeding.	Check bulb location and clamping. Adjust superheat.
Low suction pressure.	Lack of refrigerant.	Check for leaks. Add charge.
	Evaporator dirty or iced	Clean and defrost.
	Clogged liquid line filter drier.	Replace filter drier.
	Expansion valve malfunctioning.	Check and reset for proper superheat.
	Condensing temperature too low.	Check and replace head pressure control
	Improper expansion valve.	Check for proper expansion valve.
Compressor thermal protector switch open.	Operating beyond design conditions	Add facilities so that conditions are within allowable limits.
	Discharge valve partially closed	Open valve.
	Dirty condenser coil	Clean coil
	Overcharged refrigerant	Reduce charge.
Compressor loses oil	Lack of refrigerant	Check for leaks and add refrigerant
	Excessive compression ring blow by.	Replace compressor.
	Refrigerant flood back.	Maintain proper superheat at compressor.
	Improper piping or traps.	Correct piping.
Little or no oil pressure	Clogged suction oil strainer.	Clean.
	Excessive liquid in crankcase.	Check crankcase heater. Adjust expansion valve. Check the solenoid valve.
	Low oil pressure safety switch defective.	Replace.
	Oil pump reversing gear stuck in wrong position.	Reverse direction of compressor rotation.
	Worn bearings.	Replace compressor.
	Low oil level.	Add oil.
	Loose fitting on oil lines.	Check and tighten system.
	Pump housing gasket leaks.	Peplace gasket.

Field Wiring.

Diagram 1. Typical wiring diagram for single evaporator with or without defrost timer.





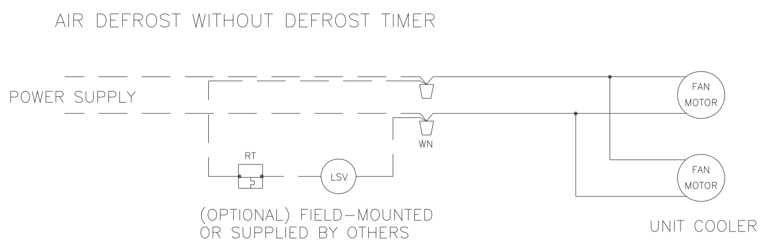


Diagram 2. Typical diagram for single evaporator defrost timer only.

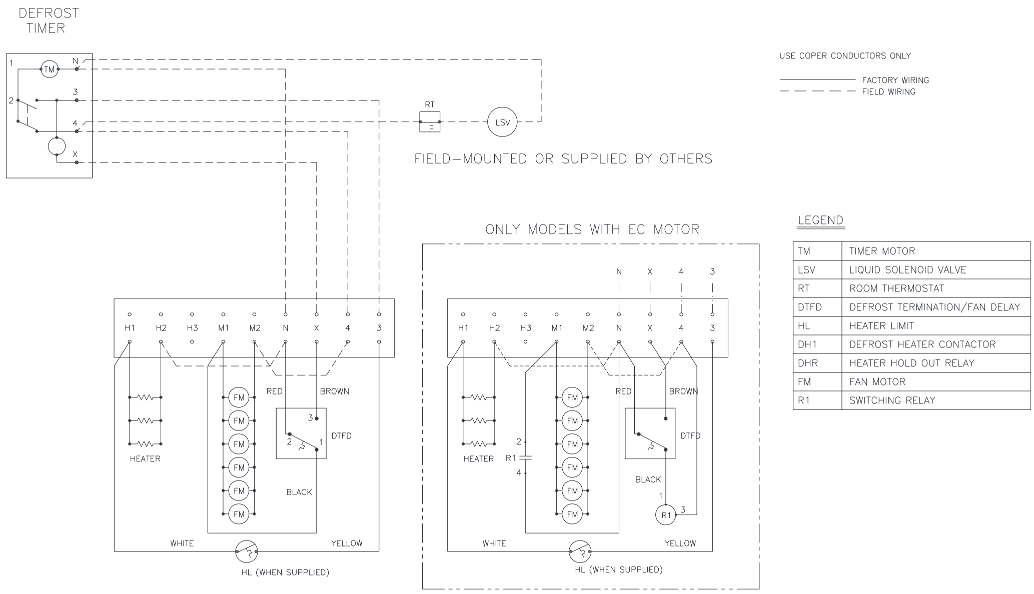
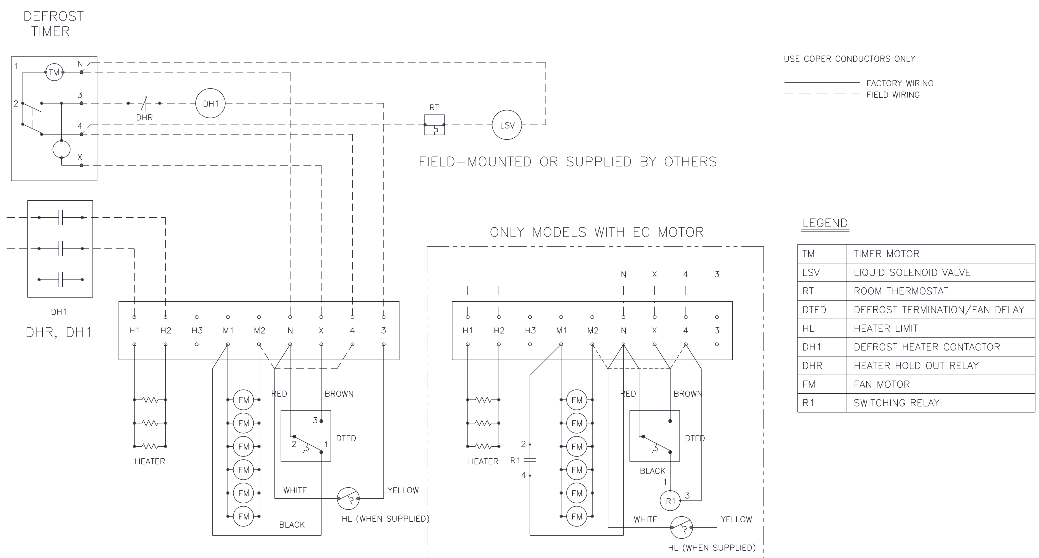


Diagram 3. Typical diagram for single evaporator with defrost timer and single phase heater contactor.



NOTE

DHR, DH1 : FIELD-MOUNTED OR SUPPLIED BY OTHERS
Refer to the "unit cooler wiring diagram" and attach it to the applicable model.

Diagram 4. Typical diagram for single evaporator with defrost timer and 3-phase heater contactor.

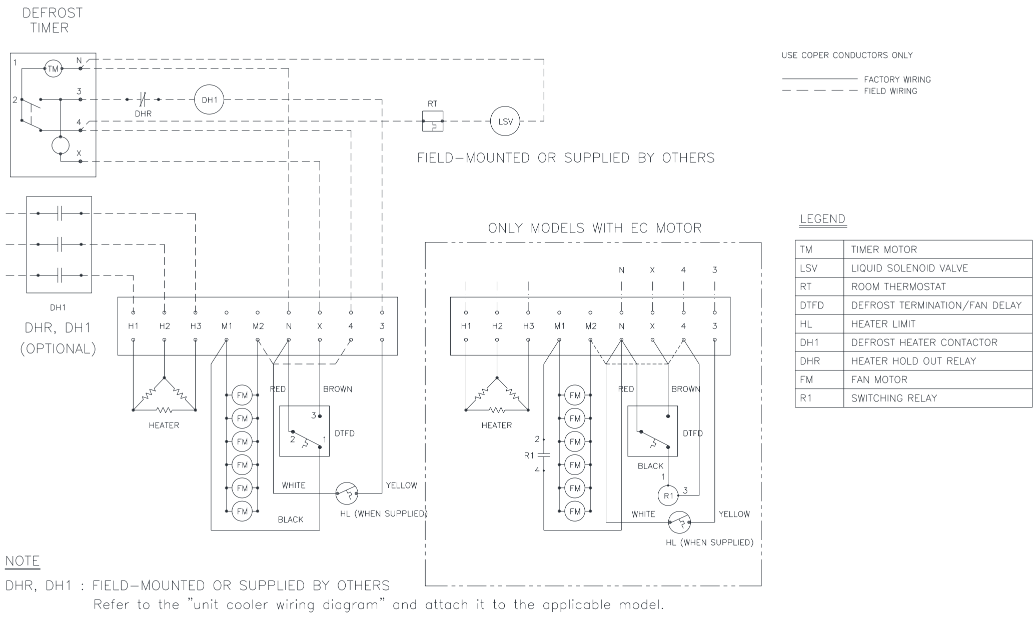
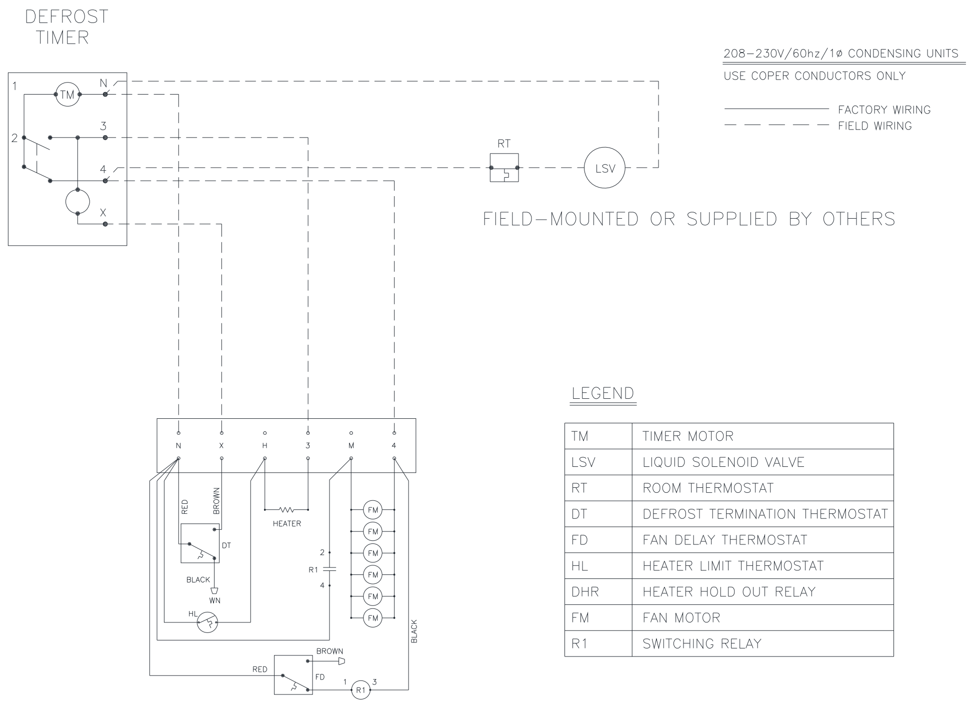


Diagram 5. Typical diagram for single evaporator defrost timer only (TTE-TYPE).



Turbo air
REFRIGERATOR MANUFACTURER

4184E. Conant street
Long Beach, CA 90808
FAX : 310-900-1008
Toll Free : 888-900-1002
(U.S.A & Canada)
http://www.turboairinc.net