

BTR Series Between-The-Rail Unit Coolers

Operating and Installation Manual

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1 RECEIPT OF EQUIPMENT

1.1 INSPECTION

All equipment should be carefully checked for damage or shortages as soon as it is received. Each shipment should be carefully checked against the bill of lading. If any damage or shortage is evident, a notation must be made on the delivery receipt before it is signed and a claim should then be filed against the freight carrier. Inspection and claims are the responsibility of the recipient.

1.2 LOSS OF GAS HOLDING CHARGE

Each copper, steel, and stainless steel tube BTR unit is leak tested, evacuated to remove moisture and then shipped with a gas holding charge. Absence of this charge may indicate a leak has developed in transit. The system should not be charged with refrigerant until it is verified that there is no leak, or the source of the leak is located.

2 ASSEMBLY OF COMPONENTS

2.1 DIELECTRIC FLANGE UNION

Aluminum tube evaporators have aluminum flanged refrigerant connections. A dielectric flange union to attach steel pipe to the aluminum evaporator flange is provided in a separate box. The box should contain dielectric bolt gaskets, bolts, nuts, flange gasket, and mating steel socket weld flange. To avoid material damage during assembly, preweld a length of refrigerant pipe to the steel flange before assembly to the aluminum flange. See Section 6.2 for the aluminum to steel flange assembly drawing.

2.2 REFRIGERANT DISTRIBUTOR NOZZLE

For a direct expansion system, the BTR Series units already have the distributor nozzle installed. As a check, see that the nozzle is in the distributor, or the auxiliary hot gas tee for direct expansion halocarbon with hot gas defrosts, before installing the thermal expansion valve to the distributor or auxiliary hot gas tee.

2.3 EXPANSION VALVE (*Optional Item*)

Before hanging a unit with a direct expansion design, install the expansion valve and connect the equalizer tube. The expansion valve should be installed directly to the distributor body or as close as possible with no elbows or bends. To connect the expansion valve to the inlet of the distributor, or inlet of the auxiliary hot gas tee if provided, on direct expansion halocarbon units. Use a 50% silver alloy or 95-5 solder with oxy-acetylene torch adjusted to a reducing flame. Avoid application of excessive heat to the distributor body. **Steel expansion valves for ammonia requires the removal of the discharge tube.** Locate the expansion valve bulb on a horizontal length of suction line as close to the suction header as possible. Position the bulb in a 3, 4, 8, or 9 o'clock position. **Do not position the bulb on the top or the bottom of the pipe.** Clamp the bulb down flush and tight against the pipe and insulate. Never locate the bulb on a trap or downstream from a trap.

Expansion valves are NOT adjusted at the factory prior to shipment. It is important that the operation of the expansion valve be checked after the system has balanced out at the desired room temperature. If the coil is being starved it is necessary to reduce the superheat setting of the valve by turning the adjusting stem counter-clockwise. If the superheat is too low it is necessary to increase the superheat setting of the valve by turning the adjusting stem clockwise. It is recommended that for a 10°F to 12°F T.D. system, the valve be adjusted to maintain 5°F to 6°F of superheat.

3 RIGGING INSTRUCTIONS

A BTR unit tends to be a long and heavy object with the weight being equally distributed along the length of the unit. Jobsite requirements will affect the method of moving and lifting the unit into place and under no circumstances should the coil fins support the unit. The unit can be lifted using the shipping skid after the top and sides of the wood crate are removed and the drain pan is removed from its shipping position. Lifting units over ten feet long should be done with two lifting devices or use of steel beams under the wood skid. All hanger points on the unit should be used to support the unit from the ceiling.

4 UNIT LOCATION AND MOUNTING

4.1 UNIT LOCATION

The BTR unit should be located so that the airflow from the fans is unobstructed and equally distributed out each side of the unit. The return airflow for a BTR enters each side of the unit so product or structures should be located far enough away to not block the airflow.

If a narrow two or three fan unit has been ordered with defrost heaters a space is required either on the header end or the opposite for possible heater replacement. Figure 1 specifies the recommended access dimensions that are needed to remove the heaters from either end of the unit.

4.2 MOUNTING

The BTR units should be suspended with 1/2" diameter threaded STEEL hanger rods. Do not use nylon-threaded rods. Rods should have double nuts on the top and bottom. Adequate support must be provided to hold the weight of the unit. Refer to the unit drawing supplied with the unit or the catalog for the approximate unit weight and hanger locations. All hanger holes should be used to support the unit. **Do not temporarily support a unit using less than all hanger holes.** If the refrigeration system is direct expansion, the distributor orifice and expansion valve should be in place before the unit is hung to make piping installation easier later. See Sections 2.2 & 2.3

The narrow 24" wide units can be mounted directly to the ceiling as space is available to remove the motor and fan for maintenance. The wide 41.5" units however must have a minimum of eleven inches between the top of the hanger and the ceiling in order to perform maintenance on the motor and fan as shown in Figure 2.

IMPORTANT: Keep the 3/8" bolts, lock washers, and flat washers that were used to hold the skid-mounting bracket to the bottom of the unit. These parts will be used to mount the drain pan.

Unit height increases 5-1/4" due to Water Defrost or Expanded height side panels.

The body of the unit must be level in all directions to insure proper drainage of the pitched condensate drain pan.

Figure 1 Unit Dimensions BTR 20-50 Series

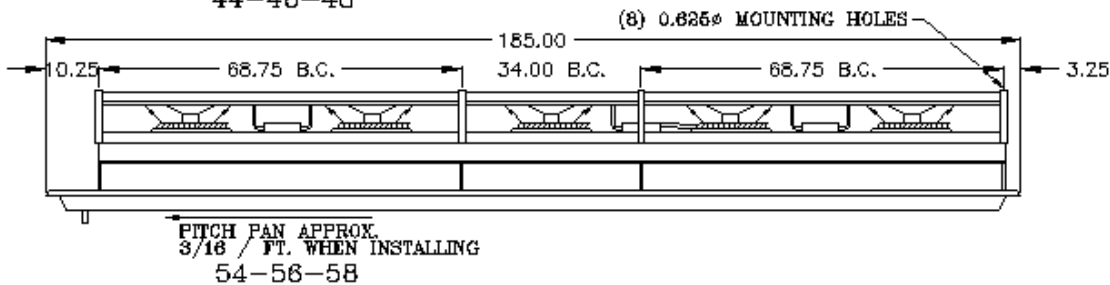
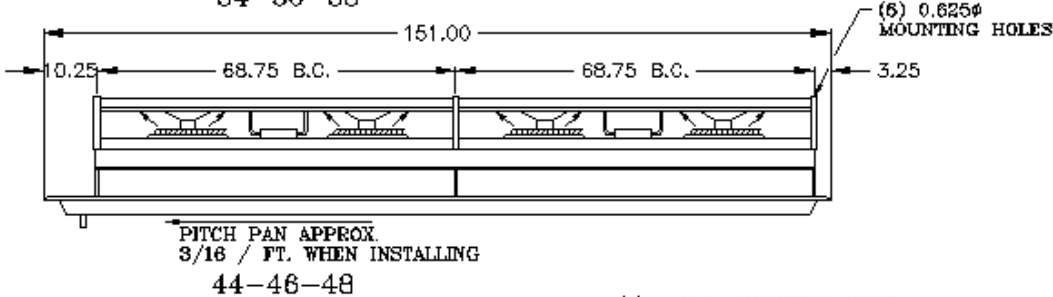
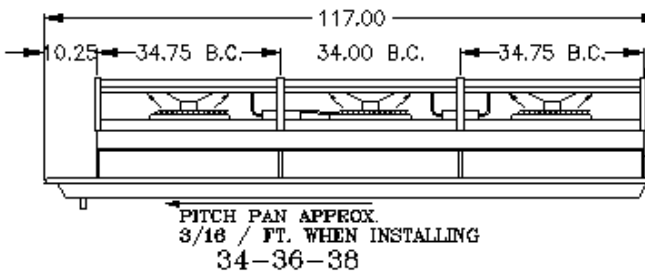
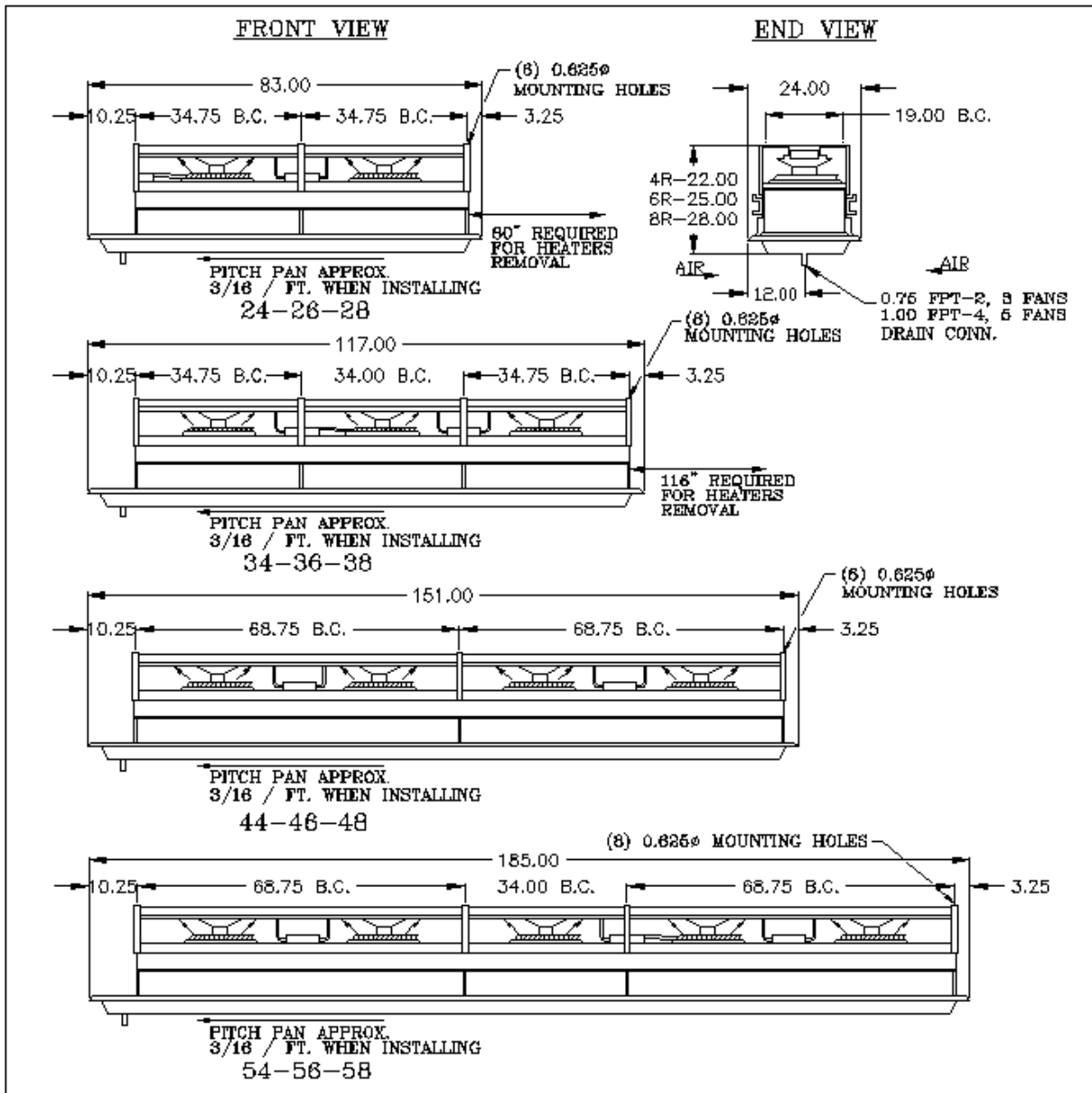
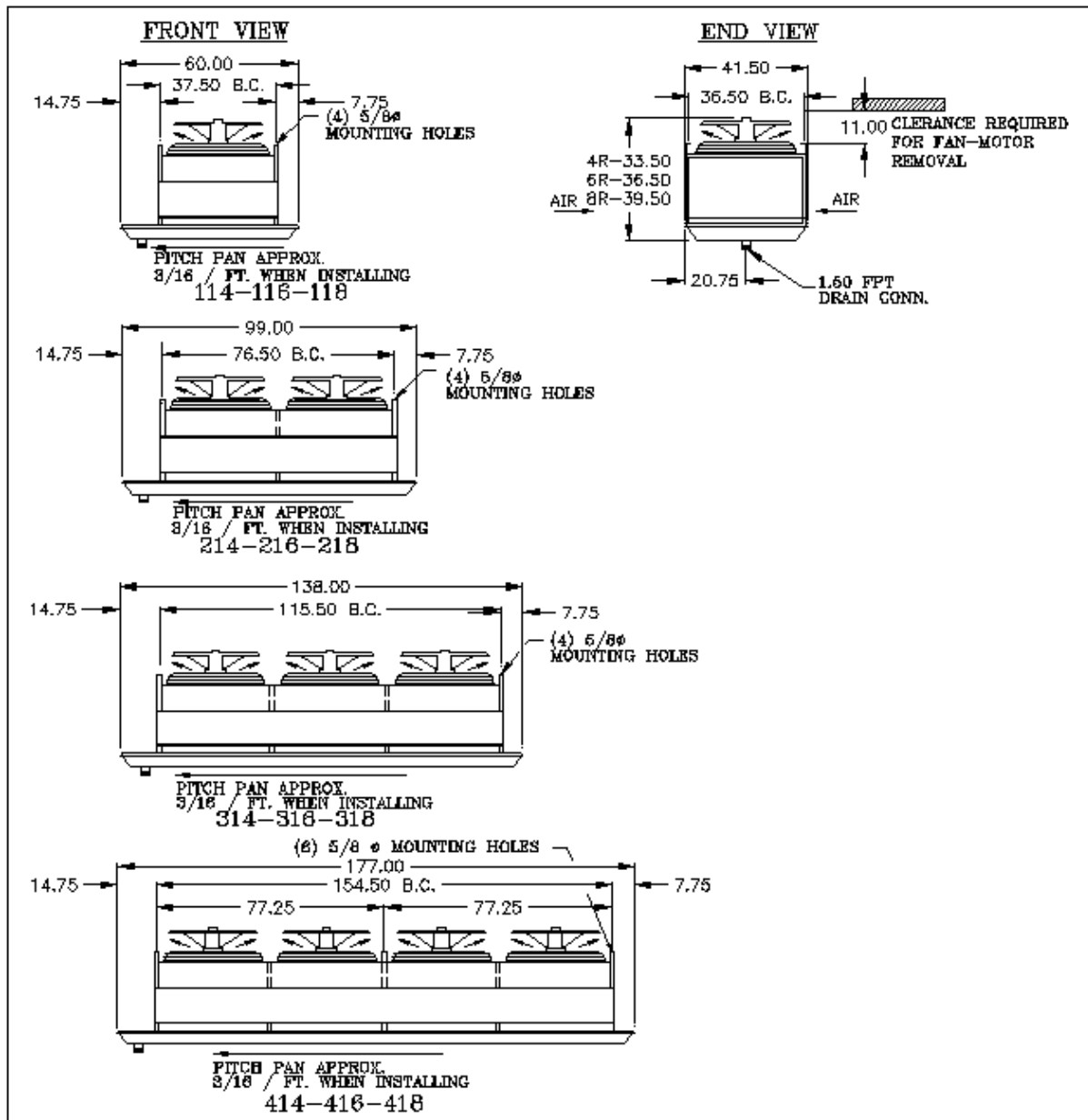


Figure 2 Unit Dimensions BTR 11-41 Series



4.3 MOUNTING OF THE DRAIN PAN

Once the unit is mounted to the ceiling the drain pan can be installed. The drain connection is to be located on the refrigerant header end of the unit. Drain pans tend to be long bendable sheet metal items so proper support under the pan is required while lifting it into place. The pan is attached to the unit with formed stainless steel sheet metal brackets. Brackets shipped connected to the drain pan. Each tube support sheet on the unit will have a hole near the bottom corner with a captured nut on the fin side of the flange to which the factory-supplied bracket is attached. Use the 3/8" x 16 bolts plus the lock washers and flat washers that were saved when the unit was removed from the shipping skid. The brackets should be in the vertical down position, as far down as they will go, and bending away from the unit. Tighten the bolts hand tight only for now. Raise the drain pan to the brackets and attach with the factory supplied 1/4" x 20 bolts, lock washers, and flat washers. The screws are to be pushed through the drain pan from the outside and mated to the bracket, which has a thread cut into the small hole. The angle of the bottom of the bracket conforms with the angle of the inside of the drain pan. After the pan is bolted in place leave the header end brackets fully extended and raise the rear of the pan to adjust the

pitch so that it slopes 3/16" per foot of pan downwards toward the header end of the unit. Tighten all bolts to secure the pan.

5 REFRIGERANT WARNING

The use of any refrigerant can be dangerous under certain conditions. Where people or product can be exposed to hazardous conditions, daily inspections should be made for the detection of any defect or malfunction that could cause the escape of the refrigerant and cause harm. In the case of halocarbon refrigerants, electronic detection devices are available for sensing the presence of such refrigerants in the atmosphere.

Ammonia is a "self-alarmed" gas with its strong odor but detection devices are strongly recommended. People and product are a concern based on the concentration levels (ppm) of ammonia along with OSHA and EPA regulations. An ammonia gas detection device connected to an external alarm system to warn that a leak is occurring is recommended. Refer to local codes and Fire Department for additional local regulations.

Only experienced, qualified personnel should install, operate, and maintain detection and alarm equipment.

6 PIPING INSTALLATION

6.1 DRAIN LINE

The drain line should be as short and as steeply pitched as possible with a minimum of 3/16' drop per running foot. The drain line should be the same size, or larger, as the drain pan connection. A drain line trap should be installed to prevent warm moist air from migrating through the drain line. The trap should be located in the warmest and/or lowest section of the piping to avoid freezing and provide sufficient liquid head for flow through the trap. If the temperature surrounding the drain line is below freezing (32°F) it must be wrapped with a drain line heater and insulation. Be sure to also wrap the drain pan coupling. The drain line heater should be energized continuously, but to avoid the possibility of overheating, heat tape manufacturers recommend a thermostat be installed. Be sure to follow the manufacturer's recommendations. The drain line trap should be outside of the freezing space. See Figure 3.

A union at the drain pan connection is recommended for future servicing. The union should be located just outside the edge of the drain pan so that when the pan is lowered for cleaning or repair the drain line run is not in the way. Use two wrenches when tightening to prevent the drain fitting from twisting and damaging the drain pan. See Figure 4.

Long runs of drain line, i.e. more than a few feet, should be supported by hangers to avoid damage to the drain pan. For cleaning and inspecting the drain line, tees with plugs are recommended instead of elbows.

Figure 3 Drain Line

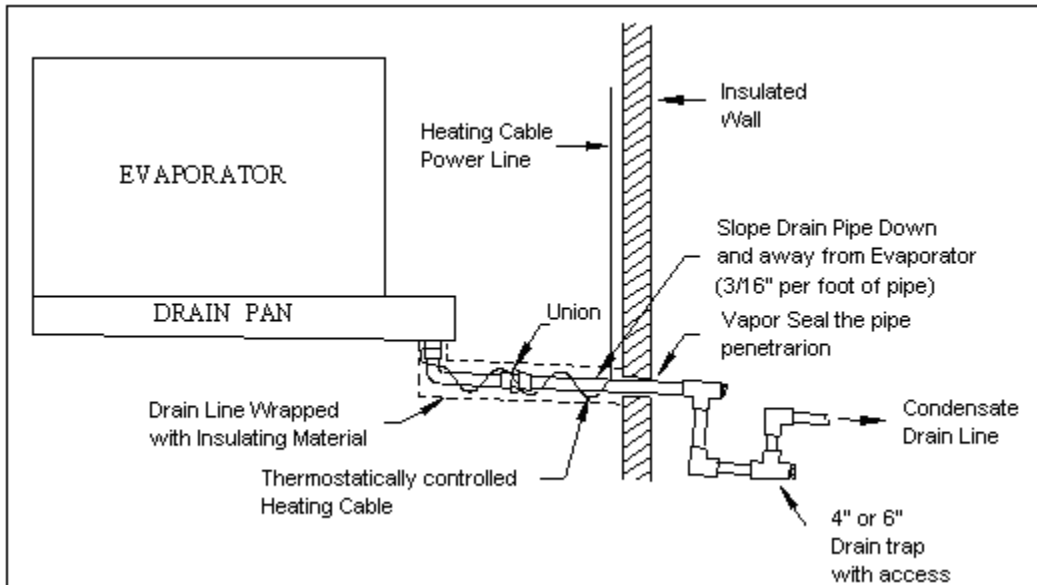
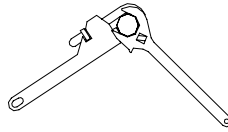


Figure 4 Pipe Joining



6.2 REFRIGERATION PIPING

Installation design must conform to all local and national codes, laws and regulations applying to the site of installation. In addition, safety codes for mechanical refrigeration, IIAR-2, ANSI/ASHRAE Std. 15, and ASME B31.5, should be followed as a guide to safe installation and operation practice. Refrigerant line sizes, piping support, and piping techniques should be obtained from published recognized refrigeration standards. Under no circumstances should the refrigerant connection size of the unit be used as the basis for sizing the lines.

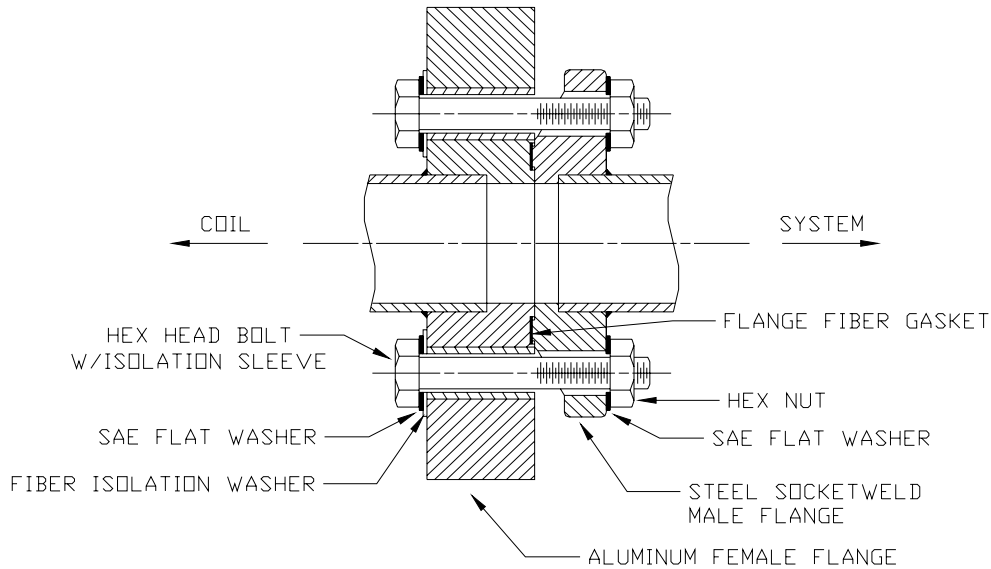
IMPORTANT:

The BTR units have not been designed to carry the weight of any external piping or valves. Improper support of external piping and valves may result in unit breakage and refrigerant leakage.

The horizontal suction line should slope away from the unit. Vertical suction risers on halocarbon systems require a properly sized "P" trap at the foot of the riser for proper oil return, and thermostatic expansion valve operation.

Aluminum tube units will have aluminum flanged refrigeration connections. Steel Companion flanges with bolts, nuts, and gaskets are shipped loose with the unit. Weld the steel flange to the refrigeration piping or a long stub before bolting to the aluminum flange to avoid heat damage to the aluminum flange and gaskets. See Figure 5 for an assembled view of the aluminum/steel connection.

Figure 5 Aluminum Flange Assembly



6.3 HOT GAS INTERPIPING

If the unit was ordered with hot gas defrost for coil only the drawing shipped with the unit will contain the piping connection locations for the hot gas inlet and the condensate relief.

If the unit was ordered with hot gas to be used in the coil and drain pan the unit includes flanged and gasketed hot gas connections on the drain pan but it does not include the hot gas interpiping between the coil and pan. The recommended interpiping arrangement is to pipe the hot gas into one of the drain pan connections then run a pipe between the other drain pan connection to a check valve and then to the coil hot gas inlet as shown on the drawing sent with the unit.

6.4 EVACUATION AND LEAK TEST

When all refrigeration connections have been completed, the entire system must be tested for leaks and then evacuated.

7 ELECTRICAL

FOR SAFETY BEFORE SERVICING:

If the BTR Series unit is equipped with an electrical power disconnect switch make sure the switch is in the "OFF" position before working on the unit, preferably locked out in this position.

7.1 FIELD MOTOR WIRING

Field wiring should comply with NEC and local codes. The power supply voltage, phase and frequency must match what is shown on the unit data plate. Wire each motor so that the fan rotation is counter-clockwise, when looking from above the unit.

Motors with internal overload protections are factory wired to stainless steel Nema 1 junction boxes located on the top of the casing. All fan motors can be cycled with one contactor. Fan guards have a bath coating of black vinyl PVC for corrosion resistance.

BTR 20, 30, 40 & 50 Series

- 18" diameter propeller fans with composite blades and aluminum hubs.

Single phase 50-60 Hertz 115 or 208-230 Volts, 1/6 Hp, two speed 1100/830 RPM-tapped winding capacitor start motors

BTR 11, 21, 31 & 41 Series

- 30" diameter propeller fans with composite blades and aluminum hubs.

Three phase 50-60 Hertz 208-230, 380, 460 or 575 Volts, 1/2 Hp totally enclosed (TEAO), single speed 1140 RPM. Optional 115/230 single phase or two speed three phase motors are available.

See Figure 6, 7, 8, 9 for typical unit wiring. See wiring diagram supplied with unit.

7.2 ELECTRICAL DATA

Table 1 Motor Electrical Data

HP	Voltage	PH	HZ	RPM HI/LO	Speed	FLA Each	FLA Total				
							2 fan	3 fan	4 fan	5 fan	
BTR 20-50											
1/6	115	1	50/60	1110/830	2	2.82	-	5	7.5	10	12.5
1/6	208/230	1	50/60	1110/830	2	1.42	-	2.5	3.75	5	6.25
BTR 11-41											
							1 fan	2 fan	3 fan	4 fan	
1/2	115	1	50/60	1075	1	7.8	7.8	15.6	1 x 7.8*	1 x 15.6*	-
1/2	208/230	1	50/60	1075	1	3.9	3.9	7.8	1 x 15.6*	1 x 15.6*	-
1/2	208/230	3	50/60	1140	1	1.96	1.96	3.92	5.88	7.84	-
1/2	380	3	50/60	1140	1	1.1	1.1	2.2	3.3	4.4	-
1/2	460	3	50/60	1140	1	0.98	0.98	1.96	2.94	2.94	-
1/2	575	3	60	1140	1	0.76	0.76	1.52	2.28	3.04	-
1/2	208/230	3	50/60	1140/850	2	1.9	1.9	3.8	5.7	7.6	-
1/2	460	3	50/60	1175/850	2	0.87	0.87	1.74	2.61	3.48	-

* - Two circuit wiring required

Figure 6 Typical 1-Speed Wiring BTR 11-41 Series

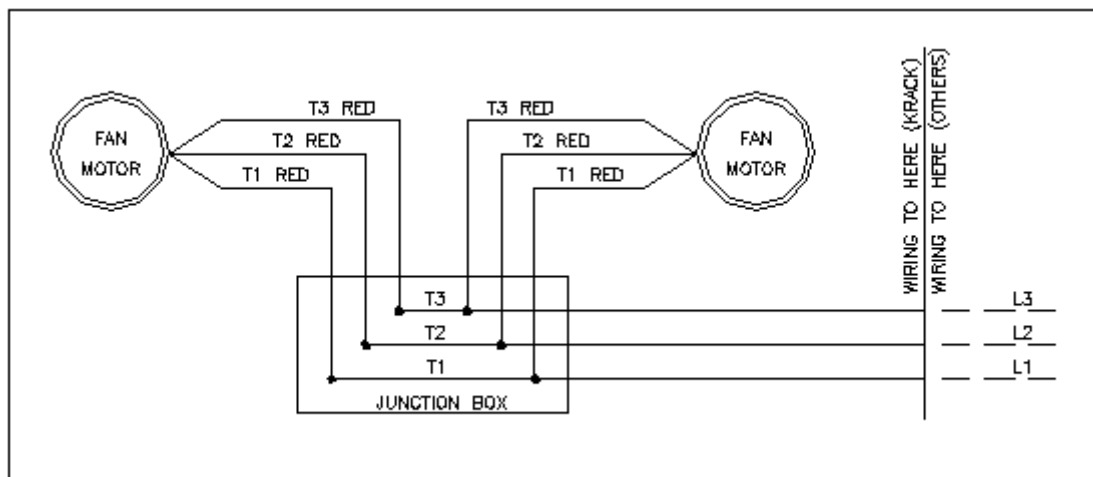
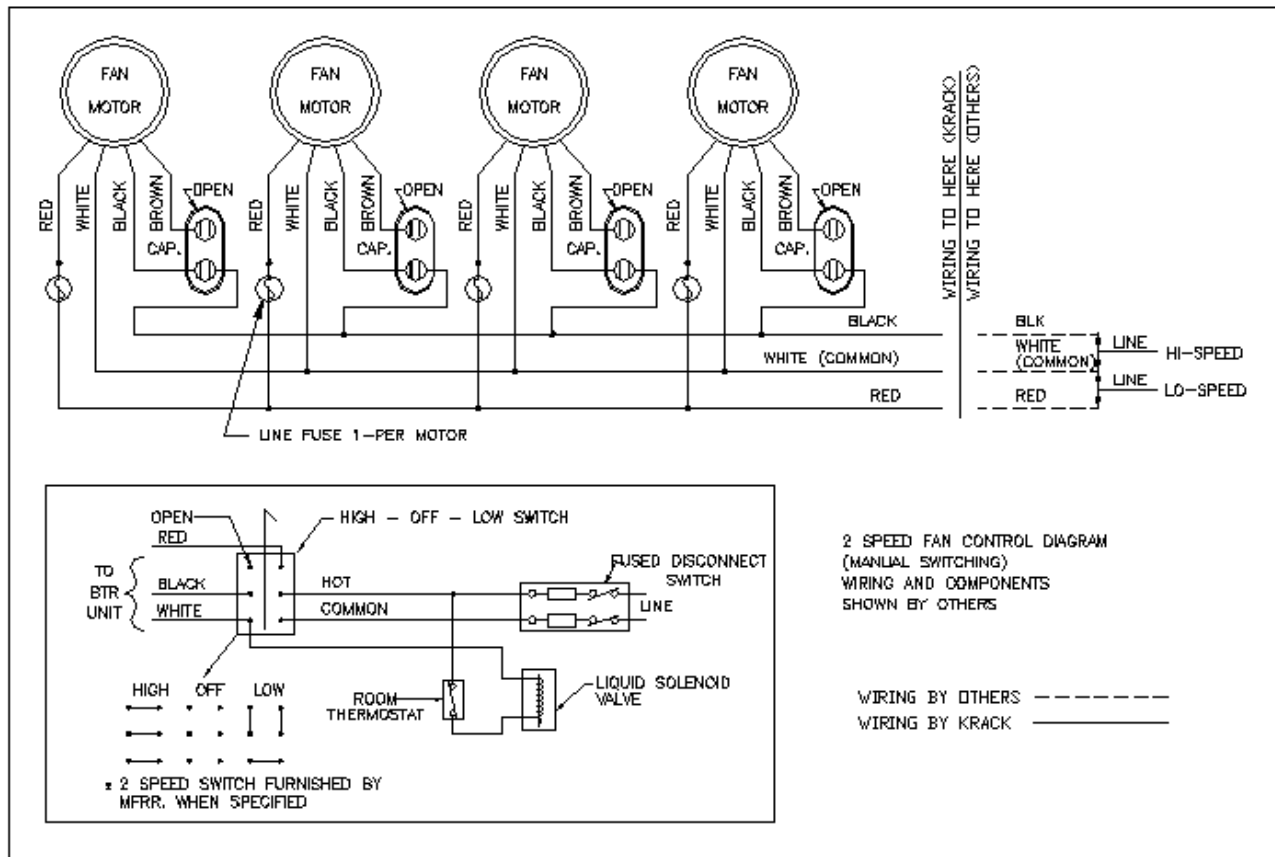
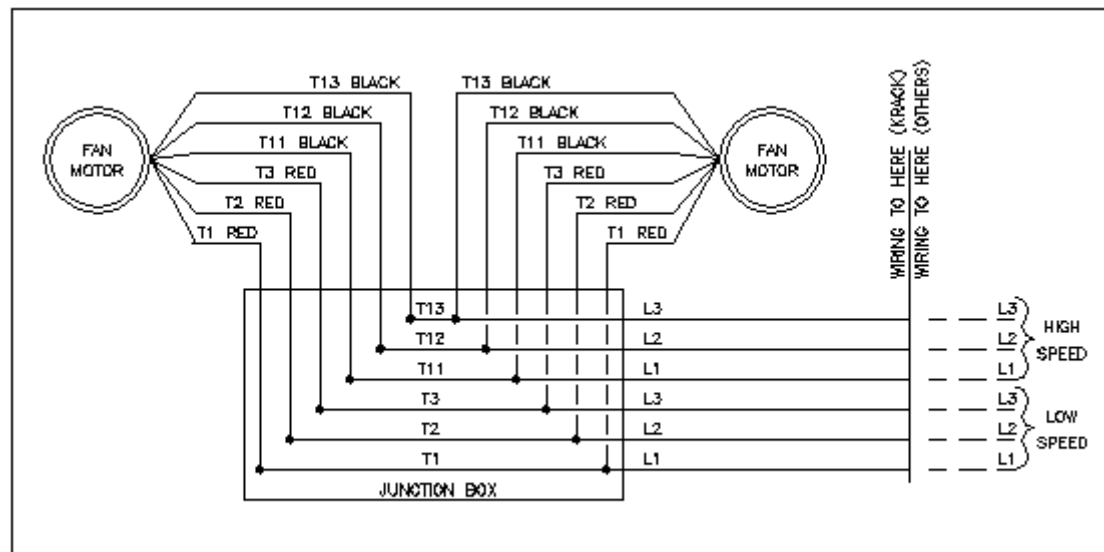


Figure 7 Typical 2-Speed Wiring BTR 20-50 Series



Motors recommended to be started in Hi-Speed.

Figure 8 Wiring 2-Speed BTR 11-41 Series



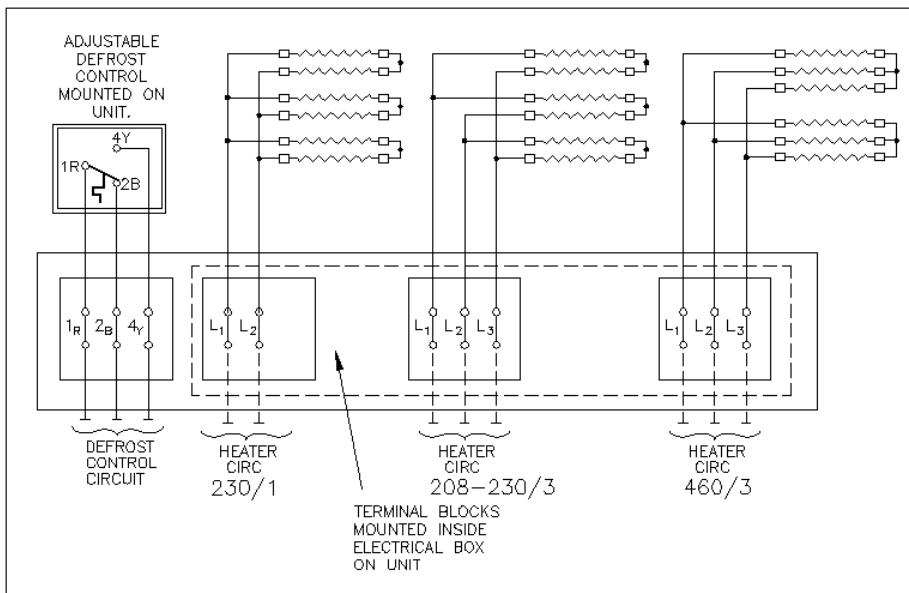
7.3 DEFROST HEATER WIRING

Electrical defrost heaters 230/1/60, 208-230/3/60, and 460/3/60 Voltages with Fan delay and Defrost Terminations thermostat factory wired to common terminal blocks, terminal blocks mounted inside electrical box on the unit. Available models BTR Series 20-50 listed are limited 2 or 3 fans, 4 or 6 rows. Tubular heaters are located under the coil face, between coil and drain pan, and efficiently defrost the coil from the bottom to the top. Drain pan is not heated.

Table 2 BTR 24, 26, 34, 36 Electrical Defrost Data

Model	Total kW	Total Amps			
		230V/1PH	208V/3PH	230V/3PH	460V/3PH
24 & 26	4.8	20.9	13.9	12.1	6
34 & 36	7.2	31.1	20.9	18.1	9

Figure 9 Electrical Defrost Wiring Diagram 230/1/60, 208-230/3/60, 460/3/60



7.4 SUGGESTED NO DEFROST SEQUENCE OF OPERATION

Used for units with a suction temperature above freezing.

- When the room thermostat calls for cooling, refrigerant begins flowing to the unit.
- The fan motor is energized.
- When the thermostat is satisfied, refrigerant stops flowing to the unit. The fan motor is de-energized.

7.5 SUGGESTED AIR DEFROST SEQUENCE OF OPERATION

Used for units with a suction temperature below freezing, but a room temperature above +36°F.

- A defrost timer is wired into the fan motor control.
- The timer turns off the liquid line solenoid valve at a predetermined time, but the fan motors continue to operate.
- The fan motors continue to run so that the room air temperature melts the coil frost.
- At a second predetermined time, the timer energizes the liquid solenoid valve and refrigeration resumes.

The timer settings are to be programmed per the need of each evaporator.

7.6 SUGGESTED ELECTRIC DEFROST SEQUENCE OF OPERATION

Used for units with a suction temperature below freezing. The Electric Defrost cycle is time clock initiated and temperature terminated. Three or four defrost cycles per 24 hour period are typical. The following sequence is based on the Paragon 8145 or equal time clock.

- A. Power is supplied to the defrost timer.
- B. The defrost termination thermostat is off and the defrost heaters are off.
- C. The unit operates in cooling mode.
- D. Upon initiation of the defrost cycle the time clock turns off the liquid line solenoid valve.
- E. After a site determined time period the timer de-energizes the fan motors and energizes the defrost heaters.
- F. The heaters, positioned on the bottom surface of the coil, heat up the fins directly to melt the accumulated frost.
- G. When the coil reaches the temperature setting of the defrost termination thermostat the thermostat opens the defrost circuit to cut off power to the heaters.
- H. The defrost timer energizes the liquid line solenoid valve allowing refrigerant to flow into the unit, cooling the coil and refreezing any remaining condensate drops that are still present.
- I. The fan motor is started through the fan delay thermostat temperature setting, putting the unit in the cooling cycle.

The timer settings and the adjustable defrost termination fan delay thermostat settings are to be programmed per the need of each evaporator.

7.7 SUGGESTED HOT GAS DEFROST SEQUENCE OF OPERATION

Used for units with a suction temperature below freezing. The Hot Gas Defrost cycle is time clock initiated and terminated. The following sequence is based on the Hansen Frost Master or equal time clock.

- A. Power is supplied to the defrost timer.
- B. The unit operates in the cooling cycle.
- C. Upon initiation of the defrost cycle, the defrost time clock turns off the liquid line solenoid valve. The fan motor(s) continues to operate to boil off the remaining refrigerant in the coil tubes.
- D. After a predetermined time period the defrost timer de-energizes the fan motor(s) and energizes the hot gas supply solenoid valve. Note that larger units may also have a “soft defrost” solenoid to slowly pressurize the coil, which will open before the main hot gas supply solenoid.
- E. Hot gas flows into the unit and warms up the tubes and fins (and drain pan if a hot gas pan was supplied), melting the accumulated frost.
- F. Approximately eight to twelve minutes after starting the hot gas defrost cycle the defrost time clock should de-energize the hot gas supply solenoid valve. If the unit is in defrost for a much longer period of time the condensate on the tubes and fins could “steam” and refreeze on the fan cabinet, fan(s), or venturi causing maintenance problems.
- G. The defrost time clock should energize the vent solenoid, allowing any remaining high pressure gas to escape the coil.
- H. The defrost timer energizes the liquid line and suction line solenoid valves allowing refrigerant to flow into the unit, cooling the coil and refreezing any remaining condensate drops that are still present.
- I. The fan motor is energized after a preset fan delay in the time clock and the unit is in the cooling cycle.

The timer settings are to be programmed per the need of each evaporator.

7.8 SUGGESTED WATER DEFROST SEQUENCE OF OPERATION

Used for units with a suction temperature below freezing. The Water Defrost cycle is time clock initiated and terminated.

- A. Power is supplied to the defrost timer.

- B. The unit operates in the cooling cycle.
- C. Upon initiation of the defrost cycle, the defrost time clock turns off the liquid line solenoid valve. The fan motor(s) continues to operate to boil off the remaining refrigerant in the coil tubes.
- D. After a predetermined time period the defrost timer de-energizes the fan motor(s) and energizes the water supply solenoid valve.
- E. Water flows onto the unit and warms up the tubes, fins, and drain pan, melting the accumulated frost.
- F. Approximately ten minutes after starting the water defrost cycle the defrost time clock should de-energize the water supply solenoid valve.
- G. The defrost time clock should provide a delay to allow the remaining water to drip off of the coil surface.
- H. The defrost timer energizes the liquid line solenoid valve allowing refrigerant to flow into the unit, cooling the coil and refreezing any remaining condensate drops that are still present.
- I. The fan motor is energized after a preset fan delay in the time clock and the unit is in the cooling cycle.

The timer settings are to be programmed per the need of each evaporator.

7.9 SUGGESTED WATER WASH SEQUENCE OF OPERATION

Used for units manufactured with water wash spray nozzles for coil cleaning.

- A. When the unit is to be washed using the Water Wash system the liquid line solenoid valve is to be closed. The unit fans are allowed to run to boil off the remaining liquid in the evaporator.
- B. Once the liquid inside the evaporator is boiled off the fans are de-energized.
- C. The water supply valve is opened to let water flow into the Water Wash manifold and onto the evaporator coil surface. The water supply line at the evaporator is to be at 5 psig for correct water distribution.
- D. Once the unit has been washed the water supply valve is closed. The unit should be allowed to drip off most of the water before the unit is put into refrigeration.
- E. Put evaporator back into refrigeration service.

The water supply valve to be operated by the site personnel.

8 OPERATION

8.1 PRE-START UP

After the installation is completed, a review of the following items should be preformed before the system is placed into operation:

- A. Check electrical connections, fan bushing set screws, motor mount bolts, coil flange bolts, drain pan flange bolts, and all other fasteners for tightness. If required, be sure the thermostatic expansion valve bulb is properly located, strapped, and insulated.
- B. For systems with a defrost time clock check the timer to see that it is set for the correct time of day and the starting pins have been installed (normally two or three sets per day). Defrost should be scheduled when the freezer doors are not likely to be open.
- C. When the unit is first started the room temperature is typically above the contact closing temperature of the fan delay thermostat, if a fan delay thermostat is provided for Electric Defrost units (see that particular units electrical diagram). The fans may remain off for a lengthy period of time. To prevent this delay it is permissible to install a temporary jumper wire between terminals "1R" and "2B". Once the room temperature is below +25°F the jumper wire should be removed.
- D. The motors for all BTR units are permanently lubricated from the motor manufacturer.

8.2 OPERATION CHECKOUT

With the system operating, check the motor supply voltage. The voltage must be within +/- 10% of the voltage marked on the unit nameplate and the phase to phase unbalance should be 2% or less.

LISTEN CAREFULLY to the unit to make sure there are no unusual sounds. Sounds such as a noisy motor, the fan(s) scraping on the housing, or loose fasteners allowing parts to rattle need to be addressed immediately before continued unit operation.

Check the room THERMOSTAT setting. Be sure it functions properly.

For RECIRCULATED refrigeration systems the hand expansion valve should be opened slowly until either condensate or frost forms on the return bends from the bottom to the top of the coil. A good indicator is when the defrost relief valve reads 5 PSI above suction pressure.

For FLOODED refrigeration systems check to make sure the float valve is working properly and allows refrigerant into the drum to the appropriate level when the level is sufficiently low. If a hand expansion valve has been added, the valve should be set to allow liquid make up 70% of the time.

For DIRECT EXPANSION systems let the system balance out at the desired room temperature and check the operation of the expansion valve by properly measuring the superheat at the sensing bulb. As much as thirty minutes may be required for the new balance to take place after an adjustment is made.

For BRINE or WATER COOLING systems keep the closest vent to the coil open while the fluid fills the coil to allow trapped air to escape. Close the vent valve once fluid flows out of the valve and check for water hammer in the coil.

With HOT GAS DEFROST systems allow the coil to frost, then manually advance the defrost timer to initiate a defrost cycle. Observe the defrost cycle to see if all controls are functioning properly and that the coil is clear of all frost before the system returns to refrigeration. Adjust the time clock pins if necessary. Reset the defrost timer to the correct time of day. A defrost cycle is only needed when the frost build up is such that it impedes the airflow through the coil. The defrost requirements will vary on each installation and may change depending on the time of the year and other conditions.

With ELECTRIC DEFROST systems allow the coil to frost then manually advance the defrost timer to initiate a defrost cycle. Observe the defrost cycle to see if all controls are functioning properly and that the coil is clear of all frost before the system returns to refrigeration. Adjust the time clock pins if necessary. Reset the defrost timer to the correct time of day. A defrost cycle is only needed when the frost build up is such that it impedes the airflow through the coil. The defrost requirements will vary on each installation and may change depending on the time of the year and other conditions.

With WATER DEFROST systems allow the coil to frost then manually advance the defrost timer to initiate a defrost cycle. Observe the defrost cycle to see if all controls are functioning properly and that the coil is clear of all frost before the system returns to refrigeration. Adjust the time clock pins if necessary. Reset the defrost timer to the correct time of day. A defrost cycle is only needed when the frost build up is such that it impedes the airflow through the coil. The defrost requirements will vary on each installation and may change depending on the time of the year and other conditions.

9 MAINTENANCE

A preventive maintenance schedule should be established as soon as the BTR Series unit is installed. The unit should be inspected periodically for proper operation and build up of frost and debris.

WARNING: All power to the evaporator must be off before cleaning or performing maintenance.

9.1 DRAIN PAN

Inspect and clean the drain pan to insure free drainage of condensate. The drain pan should be cleaned regularly with warm water and soap.

If the drain pan needs to be removed, support the long dimension of the pan from underneath with a minimum of two 4x4s for one and two fan units, or two 6x6s for three, four and five fan units, so the outer sheet metal skin does not buckle and become damaged. **Do not point load the center of the support beam.** For longer pans more than one lifting device may be needed to keep the pan balanced when lifting. If the drain pan uses hot gas defrost make sure the coil is completely pumped out and isolated with hand valves to prevent refrigerant from escaping to the atmosphere. Remove the hot gas piping or electric wires if the unit has a hot gas or an electric defrost drain pan. Remove the drain line so that it is out of the way of the pan when it is being lowered. Remove the drain pan attachment bolts from the bottom of the evaporator unit and slowly lower the pan from the unit. Assemble pan in reverse order. Replace hot gas interpiping gaskets before tightening flange bolts.

9.2 COIL AND CABINET

Clean the coil, fan cabinet, fan(s), and fan guard(s) with warm water and soap. A low pressure water hose is recommended to avoid water entering into electrical components and causing equipment failure.

The evaporator coil should be checked once a month for proper defrosting. Many variables affect coil frosting such as room temperature, type of product being stored or processed, how often new product is brought in, and the length of time the door to the room remains open. Summer conditions of high humidity can cause heavier frost loads and it may be necessary to change the number of defrost cycles seasonally.

9.3 MODEL 20 TO 50 FAN AND MOTOR REPLACEMENT

Make sure the electrical power to the evaporator is turned off at the disconnect switch, preferably with a lockout, tag-out procedure before any work is performed. Remove the electrical power wires to the motor, marking the wires for placement on the new motor if the motor is being replaced. Mark the location of the fan hub on the motor shaft before removing the fan. Loosen the set screw holding the fan in place with a 1/8" Allen wrench and lower the fan onto the coil fins. On a standard unit the fan cannot be removed from the cabinet without removing the motor, but if the cabinet was built with removable side panels for cleaning then the fan can be removed from the side of the cabinet without moving the motor. Once the old fan is removed deburr the motor shaft if necessary. Place the new fan with the hub up onto the motor shaft to the location of the mark. Tighten the Allen screw.

If the motor is to be replaced, mark the fan location and remove the fan as described above. Remove two of the nuts holding the motor to the top support then hold onto the motor so that it doesn't damage the coil. Remove the other two nuts and lower the motor through the air distribution cone, then take the motor out of the unit. Replace the new motor in the reverse order and install the fan as described before.

9.4 MODEL 11 TO 41 FAN AND MOTOR REPLACEMENT

Make sure the electrical power to the evaporator is turned off at the disconnect switch, preferably with a lock-out, tag-out procedure before any work is performed. Remove the electrical power wires to the motor, marking the wires for placement on the new motor if the motor is being replaced. The air deflector is held in place by four supports that sit on bolts on the fan panel. Remove the four nuts and remove the deflector and supports from the unit. The weight of the motor is supported on two galvanized tubes anchored to each side of the cabinet. Remove the four screws holding the motor supports on the fan cabinet. Note for reassembly that the smaller screw is used in the lower hole. Remove the entire motor/fan/guard assembly off of and away from the BTR unit.

Mark the location of the fan on the motor shaft, then loosen the set screw holding the fan onto the shaft with a 5/32" Allen wrench. Remove the fan. If the fan is the only item being replaced then deburr the

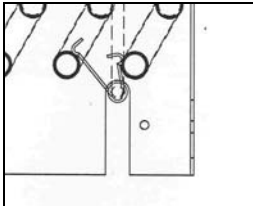
motor shaft if necessary and slide the new fan on the shaft to the mark made earlier, hub toward the motor. Tighten the fan set screw. Reattach the motor/fan/guard assembly onto the unit in the reverse order as its removal.

If the motor is to be replaced, after marking the fan location mark the existing motor location in the belly band holding the motor to the fan guard. Support the motor. Loosen the single bolt that is holding the bellyband onto the motor. The motor will slip out of the fan assembly. Mark the new motor and shaft in the same locations as marked on the old motor. Place the fan on the new motor shaft, hub toward the motor, to the mark on the shaft and tighten the fan screw. Slide the new motor up into the bellyband to the mark on the motor. Make sure the electrical terminal on the new motor is facing the wiring harness on the unit. Tighten the bellyband bolt. Reattach the motor/fan/guard assembly onto the unit in the reverse order as its removal.

9.5 ELECTRIC DEFROST HEATER REPLACEMENT

Make sure the electrical power to the evaporator and defrost heater circuits are turned off at the disconnect switch, preferably with a lock-out, tag-out procedure before any work is performed. Remove the drain pan. Remove the heater wiring of the defective heater from the terminal blocks on each end of the unit, noting the wiring locations. Remove the sheet metal plate on each tube support sheet at the two ends of the unit. The heaters have spring type clips holding them to the coil tubes. Grasp the heater rod near each retainer clip and pull downwards to dislodge the clip from the tubes. Position the replacement heater rod in the empty tube support sheet slots and install the retainer clips. Install the sheet metal end pieces and rewire the heaters to the terminal blocks. Test the defrost heaters to see that the new heater will work. Replace the drain pan.

Figure 10 Defrost Heater Retainer Clip



10 REPLACEMENT PARTS LIST

Following are the major replacement parts of the standard BTR Series units. The full Model Number, Serial Number, and voltage will be necessary to identify the correct replacement part.

Table 3 Motors

Model	Part Number	HP	Voltage	HZ	PH	RPM LO/HI Speed	FLA	Air Over Enclosure	Descript	Capacitor
BTR 20-50	11050A	1/6	115	50/60	1	920/1110	2.82	ODP	2SP2WD	Less Capacitor
	11051A	1/6	208-230	50/60	1	920/1110	1.42	ODP	2SP2WD	Less Capacitor
BTR 11-41	11096	1/2	208/230	50/60	3	1140	1.96	TEAO	1speed	-
	11096	1/2	460	50/60	3	1140	0.98	TEAO	1speed	-
	11506	1/2	575	60	3	1140	0.76	TEAO	1speed	-
	11080	1/2	115	50/60	1	1075	7.8	TEAO	1speed	E311130
	11080	1/2	208/230	50/60	1	1075	3.9	TEAO	1speed	10326
	11096	1/2	380	50/60	3	950	1.1	TEAO	1 speed	-
	11508	1/2	460	60	3	850/1175	0.87	TEAO	2SP2WD	-
	E310112	1/2	208-230	60	3	850/1140	1.9	TEFC	2SP2WD	-

Table 4 Standard Parts

Description Fans q-ty	Q-ty per Unit					Part Number	
	1	2	3	4	5	BTR 20-50	BTR 11-41
Fan	1	2	3	4	5	11179	E206386
Fan Guard	1	2	3	4	-	-	22848
Fan Guard Support	2	4	6	8	-	-	22648
Belly Band Motor Mount (3 PH)	1	2	3	4	-	-	22850
Belly Band Motor Mount (1 PH)	1	2	3	4	-	-	22849
Fan Panel	1	2	3	4	5	22001	22851
Air Deflector	1	2	3	4	5	22015	22870
Air Deflector Support	4	8	12	16	20	-	22898
Unit Hanger Bar	-	3	4	3	4	22010	-
Unit Hanger Bar	4	4	4	6	-	-	22858
Drain Pan Supports (BTR 20-50)	-	6	8	6	8	22009	-
Drain Pan Supports (BTR 11-41)	4	4	8	6	-	-	22874

Table 5 Motor Support Channel and Drain Pans

Description Fans q-ty	Part Number				
	1	2	3	4	5
Motor Support Channel (BTR 20-50)	-	22054	22055	22508	22509 & 22510
Drain Pan IA/IHGC (BTR 20-50)	-	22826D	22827D	22828D	22829D
Drain Pan IA/IHGC (BTR 11-41)	22692D	22693D	22694D	22691D	-
Drain Pan HGS (BTR 20-50)	-	22819D	22820D	22821D	22822D
Drain Pan HGS (BTR 11-41)	22685D	22686D	22687D	22684D	-

Replacement Hot Gas Drain Pans do not include companion flanges, gaskets, bolts, or nuts.

Table 6 BTR 24, 26, 34, 36 Electric Defrost Coil Heaters

Part No	Coil Heaters	Q-ty	Voltage
E101933	HTR-COIL 800W 115V 2 Fans	6	208-230/1/3
E101939	HTR-COIL 800W 265V 2 Fans	6	460/3
E101935	HTR-COIL 1200W 115V 3 Fans	6	208-230/1/3
E101941	HTR-COIL 1200W 265V 3 Fans	6	460/3

DEFROST TERMINATION THERMOSTAT: P/N E205004

11 MAINTENANCE DATA

Date Performed	Drain Pan Inspection & Cleaning	Cabinet and Coil Inspection & Cleaning	Motor Inspection	Fan Inspection	Electric Heater Inspection	Water Defrost Pan Inspection