Installation and Maintenance Manual IM 1060-11

Group: **WSHP**
Part Number: **910394843**
Date: **June 2022**

Enfinity™ Large Capacity Horizontal Water Source Heat Pumps

CCH Standard Range & CCW Extended Range

Unit Sizes 072 – 120 (6 to 10 Tons) – R-410A Refrigerant

Hazard Identification Information

⚠ WARNING

This Installation and Maintenance bulletin is intended to provide the proper procedures for installing a Daikin Water Source Heat Pump. Failure to follow these procedures can cause property damage, severe personal injury or death. Additional, failure to follow these procedures can cause premature failure of this equipment or cause erratic unit operation, resulting in diminished unit performance. Disregarding these directions may further lead to suspension or revocation of the manufacturer's warranty.

⚠ DANGER

Dangers indicate a hazardous situation, which will result in death or serious injury if not avoided.

⚠ WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

⚠ CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

Note: *Indicates important details or clarifying statements for information presented.*

Category	Code Item	Code Position	Code Designation & Description
Product Category	**01**	**1**	*W* = Water Source Heat Pump
Product Identifier	**02**	**2-4**	CCH = Large Horizontal, Standard Range CCW = Large Horizontal, Geothermal Range
Design Series (Vintage)	**03**	**5**	2 = Design Series 2
Nominal Capacity	**04**	**6-8**	072 = 72,000 Btuh Nominal Cooling 096 = 96,000 Btuh Nominal Cooling 120 = 120,000 Btuh Nominal Cooling
Control Board Option	**05**	**9**	B = MicroTech® III Unit Controller A = DDC-Less Board (Alerton Rep Option)
Network Module Option	**06**	**10**	L = LON Module B = BACnet Y = None
Condensate Overflow Protection	**07**	**11**	S = Standard Overflow Sensor
Current Sensing Switches	**08**	**12**	Y = None
Freeze Fault Protection	**09**	**13**	F = Freeze Fault Protection
Voltage	**11**	**15**	F = 208/230-60-3 K = 460-60-3 L = 575-60-3
Options	**12**	**16**	Y = None P = Phase Monitor
Return Air	**13**	**17**	L = Left Hand Return Air
Discharge Air	**14**	**18**	E = End Discharge S = Straight Discharge
Blower Motor	**15**	**19-20**	01 = Belt Drive – Integral HP Motor 02 = High Static 03 = Ultra High Static 11 = Standard with VFD 12 = High Static with VFD 13 = Ultra High Static with VFD
Construction Type	**17**	**23**	A = Standard 1/2" Fiberglass Insulation B = Closed Cell Foam Insulation F = Standard 1/2" Fiberglass Insulation w/Compressor Sound Blankets G = Closed Cell Foam Insulation w/Compressor Sound Blankets
Water To Refrigerant Heat Exchanger Construction	**18**	**24**	C = Copper Inner Tube - Steel Outer Tube S = Cupro-Nickel Inner Tube - Steel Outer Tube
Options	**20**	**26-27**	AA = Hot Gas Reheat *(Not to be combined with WSE)* AB = Hot Gas Bypass YY = None
Piping Hand	**21**	**28**	R = Right Side Pipe Connections
Filter Options	**23**	**32-34**	SD2 = Standard 2 " Disposable filter M08 = Merv 8 in 2" frame M13 = Merv 13 in 4" frame N02 = No Filter with 2" Filter Rack (Low Leak) N00 = No Filter-No Filter Rack
Refrigerant	**26**	**40**	A = R-410A
Condensate Drain Pan	**27**	**41-42**	GL = Galvanized Steel SS = Stainless Steel
Control Transformer Option	**29**	**44-46**	075 = 75VA Control Transformer
Waterside Economizer	**35**	**59**	1 = Water Side Economizer w/Motorized Valve Control *(Not to be combined with HGRH)*

Receiving and storage

⚠ CAUTION

Sharp edges can cause personal injury. Avoid contact with them. Use care and wear protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

Upon receipt of the equipment, check carton for visible damage. Make a notation on the shipper's delivery ticket before signing. If there is any evidence of rough handling, immediately open the cartons to check for concealed damage. If any damage is found, notify the carrier within 48 hours to establish your claim and request their inspection and a report. The Warranty Claims Department should then be contacted.

Do not stand or transport the machines on end. For storing, each carton is marked with "up" arrows.

In the event that elevator transfer makes up-ended positioning unavoidable, do not operate the machine until it has been in the normal upright position for at least 24 hours.

Temporary storage at the job site must be indoor, completely sheltered from rain, snow, etc. High or low temperatures naturally associated with weather patterns will not harm the units. Excessively high temperatures, 140°F (60°C) and higher, may deteriorate certain plastic materials and cause permanent damage.

IMPORTANT

This product was carefully packed and thoroughly inspected before leaving the factory. Responsibility for its safe delivery was assumed by the carrier upon acceptance of the shipment. Claims for loss or damage sustained in transit must therefore be made upon the carrier as follows:

VISIBLE LOSS OR DAMAGE

Any external evidence of loss or damage must be noted on the freight bill or carrier's receipt, and signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusal to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

CONCEALED LOSS OR DAMAGE

Concealed loss or damage means loss or damage which does not become apparent until the product has been unpacked. The contents may be damaged in transit due to rough handling even though the carton may not show external damages. When the damage is discovered upon unpacking, make a written request for inspection by the carrier's agent within fifteen (15) days of the delivery date and file a claim with the carrier.

Pre-installation

⚠ CAUTION

The installer must determine and follow all applicable codes and regulations. This equipment presents hazards of electricity, rotating parts, sharp edges, heat and weight. Failure to read and follow these instructions can result in property damage, severe personal injury or death. This equipment must be installed by experienced, trained personnel only.

1. To prevent damage, do not operate this equipment for supplementary heating and cooling during the construction period.
2. Inspect the carton for any specific tagging numbers indicated by the factory per a request from the installing contractor. At this time the voltage, phase and capacity should be checked against the plans.
3. Check the unit size against the plans to verify that the unit is being installed in the correct location.
4. Before installation, check the available ceiling height versus the height of the unit.
5. Note the location and routing of water piping, condensate drain piping, and electrical wiring. The locations of these items are clearly marked on submittal drawings.
6. The installing contractor will find it beneficial to confer with piping, sheet metal, and electrical foremen before installing any unit.

Note: *Check the unit data plate for correct voltage with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.*

7. The contractor shall cover the units to protect the machines during finishing of the building. This is critical while spraying fireproofing material on bar joists, sandblasting, spray painting and plastering. If plastic film is not available, the shipping carton may be modified to cover the units during construction.
8. Remove all shipping blocks in the fan wheel (if required).
9. Change the airflow direction from straight discharge to end discharge or vice versa before the unit is installed in the ceiling. Refer to "Air discharge conversion procedure" on page 6.

Air discharge conversion procedure

Unit sizes 072 thru 120 straight discharge unit may be converted to an end discharge by doing the following:

Note: *No additional parts are required to perform this rework. The rework must not be performed while unit is in the ceiling, but on the floor or a work bench.*

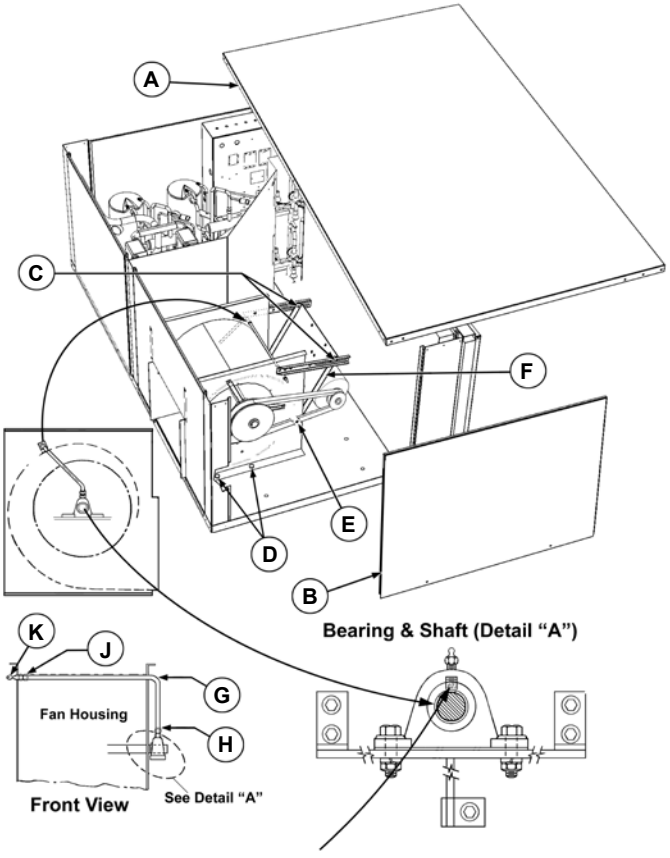
Estimated time: 1 Hour

⚠ CAUTION

Sharp edges can cause personal injury. Avoid contact with them. Use care and wear protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

1. Remove the top (**A**) and the end access panel (**B**)
2. Loosen the belt tension brackets (**C**) and roll the drive belt off the blower pulley and the adjustable sheave.
3. Remove the fixed pulley on the blower fan shaft.
4. Remove the four bolts (**D**) holding the blower housing in place to the unit base or bottom (2 each side).

Figure 1: Details for making fan blower conversion



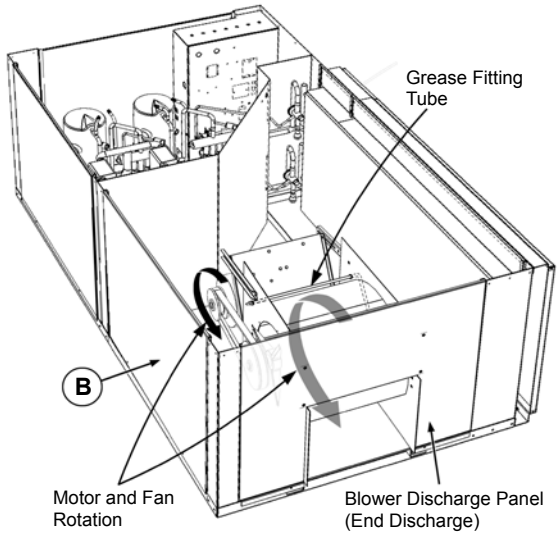
5. Remove the blower discharge panel mounting screws holding it in place to the corner post and side post.
6. With the all bolts and screws removed, lift out the blower assembly and place it on a workbench.
7. Remove the nuts, bolts and washers (**C** & **E**) that are holding the adjustable fan motor plate (**F**) to the blower housing. There are four sets of nuts, bolts and washers.
8. Rotate the motor and motor plate over end for end 180º putting the fan motor shaft on the opposite side of the blower housing. Reposition the nuts, bolts and washers that hold the motor plate and motor, leaving the adjustable nuts (**C**) loose for readjustment.
9. Remove the grease fitting tube (**G**) from the coupling tube (**H**). Remove the other end of the grease tube (**G**) at the coupling (**J**). Also remove the grease tube end (**K**). Save all for reinstallation.
10. Remove the fan shaft as one complete assembly and reinstall it from the opposite side of the housing assembly. Reassemble the motor mounting plate (**F**).
12. Reinstall in reverse order as in step 9 the grease tube (**G**). Note: The tube must be pushed through the bushing in the blower housing plate prior to coupling (**J**) and end fitting (**K**) are reattached.
13. Center the fan in the housing. Set the bearings (**Detail "A"**) and proper belt tension by referring to "Air balancing" on page 8.

⚠ WARNING

Do not overtighten the belt tension. Belts that are overtightened are the leading cause of blower assembly failure.

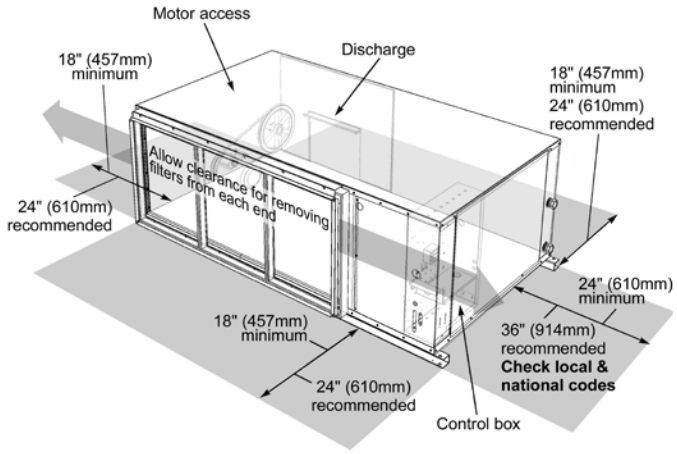
14. Lift the completed belt-drive blower assembly and locate it over the holes in the base pan. The belt and pulleys should now be facing the repositioned access panel (**B**).
15. Reinstall the access panels, power the unit and operate the blower to confirm proper fan rotation.

Figure 2: Unit converted to end discharge



Unit location

Figure 3: Unit clearances



1. Locate the unit in an area that allows for easy removal of the filter and access panels. Leave a minimum of 18" of clearance around the heat pump for easy removal, and to perform routine maintenance, or troubleshooting. Provide sufficient room to make water, electrical and duct connections.
2. The contractor should make sure that adequate ceiling panel access exists, including clearance for hanger brackets, duct collars and fittings at water and electrical connections.
3. Allow adequate room below the unit for a condensate trap and do not locate the unit above pipes.
4. Each unit is suspended from the ceiling by four threaded rods. The rods are attached to the unit corners by a hanger bracket through a rubber isolator.

⚠ CAUTION

Do not use rods smaller than shown in Figure 5. The rods must be securely anchored to the ceiling or to the bar joists.

5. Each unit is furnished with a hanger kit. The kit is shipped unassembled and includes hanger brackets, rubber isolators, washers, bolts and lock washers. Lay out the threaded rods per the dimension in Figure 5.
6. When attaching the hanger rods to the unit, a double nut is recommended since vibration could loosen a single nut. The installer is responsible for providing the hex nuts when installing hanger rods.
7. Leave minimum 3" (76 mm) extra threaded rod below the double nuts or minimum 3" (76 mm) clearance between top of unit and ceiling above to facilitate top panel removal for servicing.

Filter access

As standard, each unit is shipped with a 2" filter rack for side filter removal. For bottom removal push the filter up into top bracket to gain clearance of bottom bracket and remove the filter. Also, a sheet metal duct filter retainer can be fabricated when return air duct work is used.

Figure 4: 2" filter rack with return air duct flange dimensions

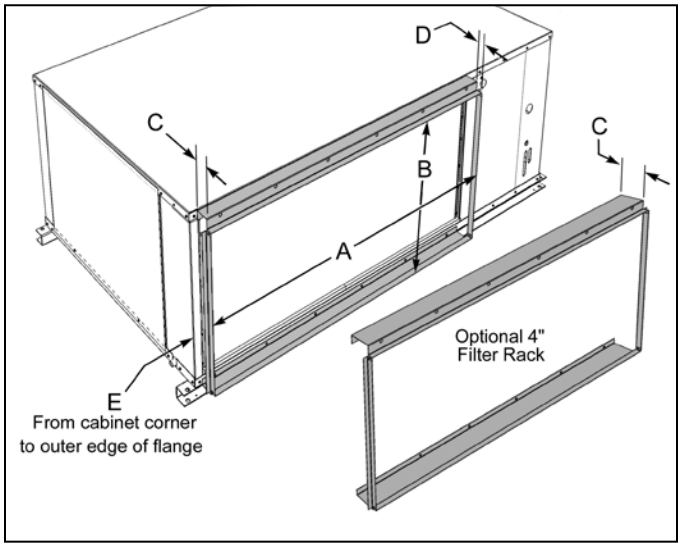
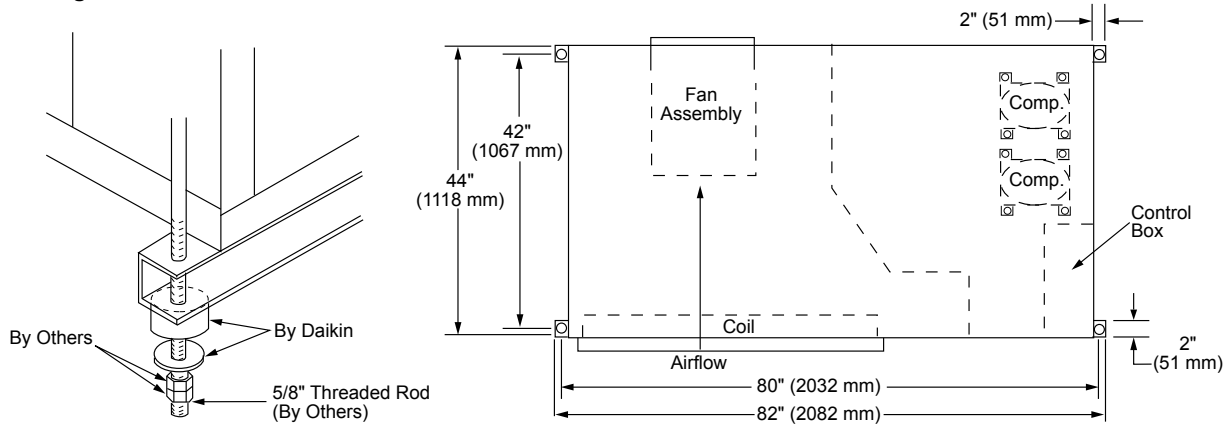


Table 1: Filter rack dimensions

A	B	C	D	E
55.10" (1400mm)	26.78" (680mm)	2.20" (56mm)	1.00" (25mm)	3.30" (84mm)
		Opt 4" Filter Rack		
		4.20" (107mm)		

Figure 5: Hanger brackets - Sizes 072 thru 120



Air balancing

Unit sizes 072 thru 120 are supplied with a variable pitch motor sheave to aid in airflow adjustment.

When the final adjustments are complete, the current draw of the motors should be checked and compared to the full load current rating of the motors. The amperage must not exceed the service factor stamped on the motor nameplate.

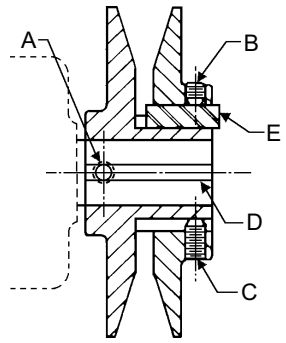
Sheave adjustment (see Figure 6)

1. All sheaves should be mounted on the motor or driving shaft with the setscrew “A” toward the motor
2. Be sure both driving and driven sheaves are in alignment and that shafts are parallel.
3. Fit internal key “D” between sheave and shaft, and lock setscrew “A” securely in place.

Adjusting

1. Loosen setscrews “B” and “C” in moving parts of sheave and pull out external key “E”. (This key projects a small amount to provide a grip for removing.)

Figure 6: Sheave adjustment detail

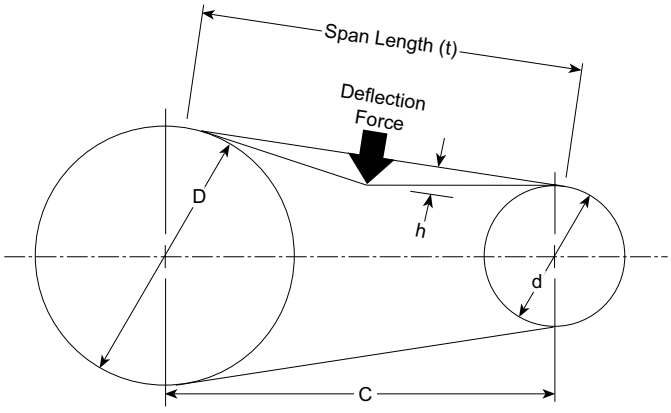


Key E projects to provide a grip for removing

Single Groove

2. Adjust sheave pitch diameter for desired speed by opening moving parts by half or full turns from closed position. Do not open more than five full turns.
3. Replace external key “E” and securely tighten setscrews “B” over key and setscrews “C” into keyway in fixed half of the sheave.
4. Put on belts and adjust belt tension to 4 lbs. – 0.7 lbs. (18N – 3N) for a 1⁄2" to 3⁄4" (13 mm to 19 mm) belt deflection height.
5. To determine the deflection distance from normal position, use a straightedge or stretch a cord from sheave to sheave to use as a reference line. On multiple-belt drives an adjacent undeflected belt can be used as a reference.
6. Future adjustments should be made by loosening the belt tension and increasing or decreasing the pitch diameter of the sheave by half or full turns as required. Readjust belt tension before starting drive.
7. Be sure that all keys are in place and that all setscrews are tight before starting drive. Setscrews and belt tension must be checked after 24 hours of operation.
8. When new V-belts are installed on a drive, the initial tension will drop rapidly during the first few hours. Check tension frequently during the first 24 hours of operation. Subsequent retensioning should fall between the minimum and maximum force.

Figure 7: Drive belt adjustment



$$h = \frac{t}{64}$$

$$t = \sqrt{C^2 - \left(\frac{D-d}{2}\right)}$$

Where: t = Span length, inches (mm)
C = Center distance, inches (mm)
d = Smaller sheave diameter, inches (mm)
h = Deflection height, inches (mm)

Note: The ratio of deflection to belt span is 1:64.

Aligning the fan and motor pulleys

1. Loosen the fan pulley setscrew and motor pulley setscrew. Refer to letter "A" in Figure 6.
2. Slide the pulleys along the shafts so that when a straight edge is pressed against the two pulleys they align, and the belt is parallel with the straight edge.
3. To make an angular alignment, loosen the motor mounting bolts and align the motor pulley. See Figure 8 for motor mounting bolts. Tighten the fan and motor pulley setscrews and the motor mounting bolts to torque specifications.
4. Recheck the belt tension.

Figure 8: Aligning the fan and motor pulleys

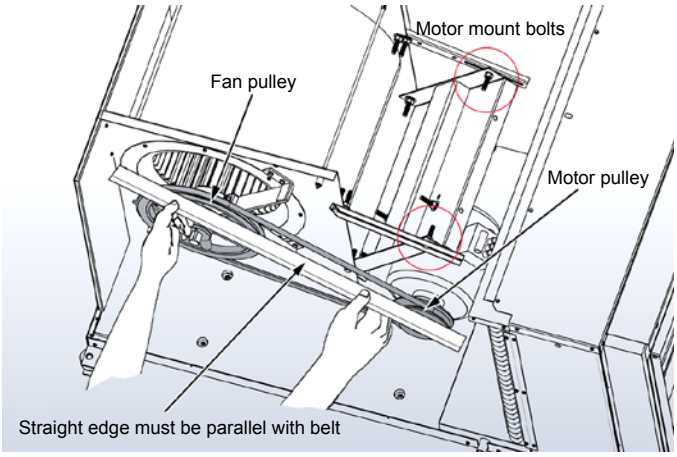


Table 2: Sheave adjustment settings

Unit Size	Motor HP	Motor Shaft Diameter	Motor RPM	0 Turns	1 Turn	1.5 Turns	2 Turns	3 Turns	4 Turns	5 Turns
072	1.5	0.625	1750	817	**788**	773	758	729	700	671
	3.0	1.125	1750	1085	1050	1033	1015	980	945	**910**
096	1.5	0.625	1750	904	875	**860**	846	817	788	758
	3.0	1.125	1750	1085	1050	1033	1015	980	945	**910**
120	3.0	1.125	1765	824	794	780	765	**735**	706	677
	5.0	1.125	1765	1111	1071	1051	1031	992	952	**912**

Note: *Bold numbers denote factory setting*

Factory Mounted Variable Frequency Drive (VFD)

Unit sizes 072 thru 290 may be supplied with an optional Variable Frequency Drive (VFD). All VFDs are factory programmed to operate at a constant speed of 60 Hz. To adjust this speed, consult the literature of the VFD manufacturer.

Note: *it is not recommended to exceed 60 Hz.*

Ductwork & attenuation

Discharge ductwork is normally used with these conditioners. Return air ductwork may also be required.

All ductwork should conform to industry standards of good practice as described in the ASHRAE Systems Guide.

The discharge duct system will normally consist of a flexible connector at the unit, a transition piece to the full duct size, a short run of duct and a trunk duct teeing into a branch duct with discharge diffusers as shown in Figure 10 on page 11. The transition piece must not have angles totaling more than 30° or severe loss of air performance can result.

Do not connect the full duct size to the unit without using a transition piece down to the size of the discharge collar on the unit. With metal duct material, the sides only of the elbow and entire branch duct should be internally lined with acoustic fibrous insulation for sound attenuation. Glass fiber duct board material is more absorbing and may permit omission of the canvas connector.

As a general recommendation, the acoustic fibrous insulation should be at least 1/2 inch thick over the entire duct run (Figure 10 on page 11). For better sound attenuation, line the last five diameters of duct before each register with a one-inch thick sound blanket. Elbows, tees and dampers can create turbulence or distortion in the airflow. Place a straight length of duct, 5 to 10 times the duct width, before the next fitting to smooth out airflow. Diffusers that are located in the bottom of a trunk duct can also produce noise. For this same reason, volume control dampers should be located several duct widths upstream from an air outlet.

For Hotel, Motel, Dormitory or Nursing Home applications that use a single duct discharge, a velocity of 500 to 600 fpm is suggested. These applications typically have static pressures as low as 0.05 inches of water and duct lengths approximately six feet in length. The discharge duct must be fully lined and have a square elbow without turning vanes. Return air ductwork can be connected to the standard filter rack. See Figure 4 on page 7 (side filter removal shown). The filter rack can be installed for bottom filter removal or side filter removal by locating the brackets. For side filter removal the brackets should be located on the bottom, left side, and top. For bottom filter removal the brackets should be mounted on the left side top and right side with the spring clips supporting the filter.

Do not use sheet metal screws directly into the unit cabinet for connection of supply or return air ductwork, especially return air ductwork which can hit the drain pan or the air coil. Return air for these applications should enter through a “low” sidewall filter grille and route up the stud space to a ceiling plenum. For horizontal heat pumps mounted from the ceiling, an insulated return plenum is sometimes placed at the return air opening to further attenuate line-of-sight sound transmission through return openings.

Figure 9: Return air and discharge air duct dimensions

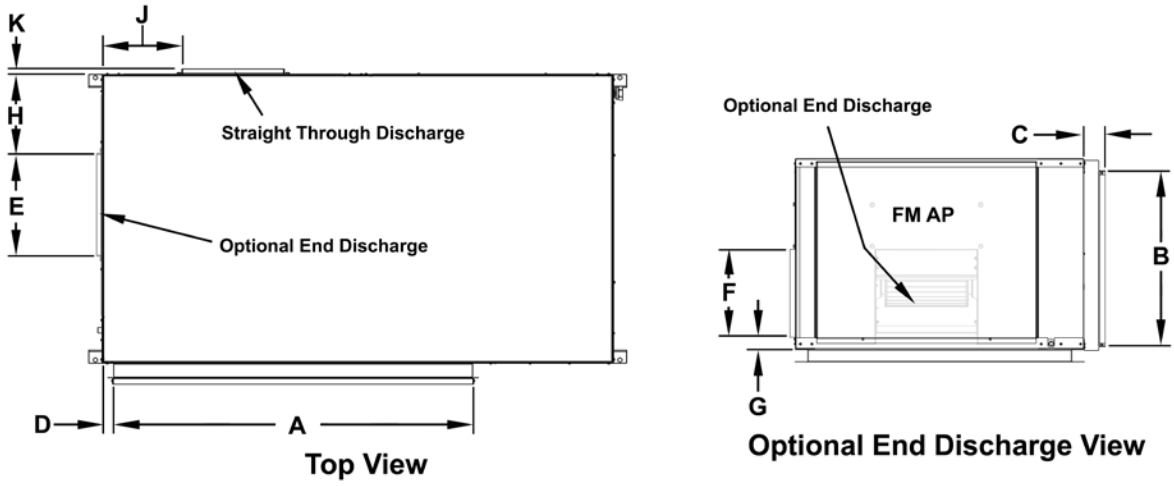


Table 3: Filter rack/return air duct flange dimensions

Unit Size	A	B	C	D	E	F	G	H	J	K
072 & 096	55.10" (1400mm)	26.65" (677mm)	3.20" (61mm)	1.50" (38mm)	15.64" (397mm)	13.42" (341mm)	1.75" (45mm)	12.18" (309mm)	12.18" (309mm)	.66" (17mm)
120					18.52" (470mm)	16.44" (418mm)		10.69" (272mm)	10.69" (272mm)	

Figure 10: Suggested supply ducting per ASHRAE and SMACNA publications

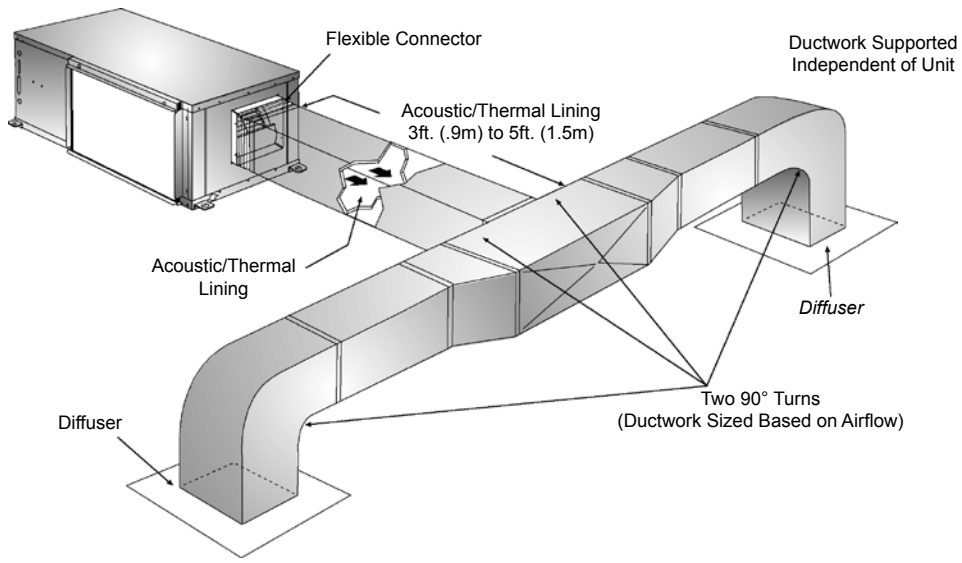
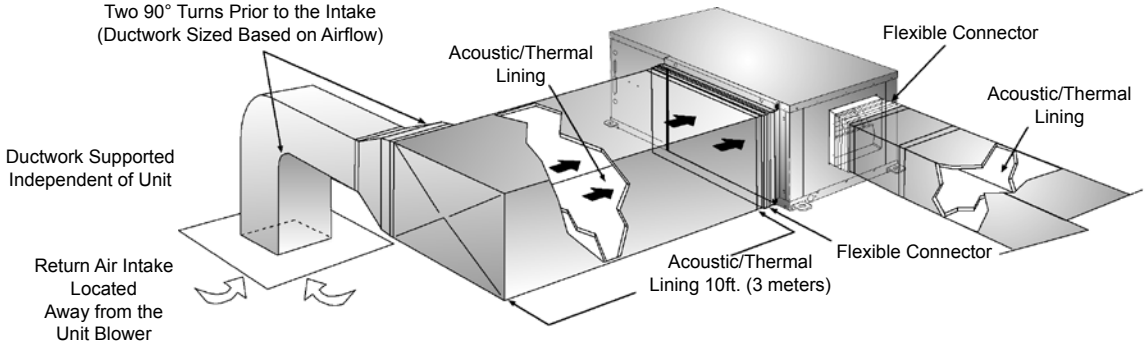


Figure 11: Suggested return ducting per ASHRAE and SMACNA publications



Ventilation air

Ventilation may require outside air. The temperature of the ventilation air must be controlled so that mixture of outside air and return air entering the conditioner does not exceed conditioner application limits. It is also typical to close off the ventilation air system during unoccupied periods (night setback).

The ventilation air system is generally a separate building subsystem with distribution ductwork. Simple introduction of the outside air into each return air plenum chamber reasonably close to the conditioner air inlet is not only adequate, but recommended. Do not duct outside air directly to the conditioner inlet. Provide sufficient distance for thorough mixing of outside and return air. See "Operating limits" on page 16.

Electrical data

General

1. Verify the compatibility between the voltage and phase of the available power and that shown on the unit serial plate. Line and low voltage wiring must comply with local codes or the National Electrical Code, whichever applies.
2. Apply correct line voltage to the unit. A 7⁄8" (22mm) hole and/or a 1-1⁄8" (29 mm) knockout is supplied on the side of the unit. A disconnect switch near the unit is required by code. Power to the unit must be sized correctly and have dual element (Class RK5) fuses or an HACR circuit breaker for branch circuit overcurrent protection. See the nameplate for correct ratings.
3. Three phase 50 cycle units, 380/50-3, require a neutral wire for 230/50-1 power to the fan circuit.
4. Connect the thermostat/subbase wiring with the power “off ” to the unit.
5. Field supplied relays installed on any Microtech III input terminals may introduce electrical noise. Never install relay coils in series, or parallel, to any Microtech III control input..

230-volt operation

All 208/230-volt three-phase units are factory wired for 208-volt operation. For 230-volt operation, the line voltage tap on the 24-volt transformer must be changed. Disconnect and cap the red lead wire and interchange it with the orange lead wire on the primary of the 24-volt transformer.

Table 4: Large horizontal unit

Unit Size	Voltage/Hz/Phase	Fan Motor (HP)	Compressor 1		Compressor 2		Fan Motor FLA	Total Unit FLA	Min. Volts	Min. Circuit Ampacity	Max. Fuse Size
	Volt		RLA	LRA	RLA	LRA					
072	208/230-60-3	1.5	13.2	88.0	13.2	88.0	5.0	31.4	187	34.7	45
	460-60-3	1.5	6.0	44.0	6.0	44.0	2.4	14.4	416	15.9	20
	575-60-3	1.5	4.2	30.0	4.2	30.0	2.0	10.4	520	11.5	15
	208/230-60-3	3.0	13.2	88.0	13.2	88.0	8.3	34.7	187	38.0	45
	460-60-3	3.0	6.0	44.0	6.0	44.0	3.8	15.8	416	17.3	20
	575-60-3	3.0	4.2	30.0	4.2	30.0	3.1	11.5	520	12.6	15
096	208/230-60-3	1.5	13.7	83.1	13.7	83.1	5.0	32.4	187	35.8	45
	460-60-3	1.5	6.2	41.0	6.2	41.0	2.4	14.8	416	16.4	20
	575-60-3	1.5	4.8	33.0	4.8	33.0	2.0	11.6	520	12.8	15
	208/230-60-3	3.0	13.7	83.1	13.7	83.1	8.3	35.7	187	39.1	45
	460-60-3	3.0	6.2	41.0	6.2	41.0	3.8	16.2	416	17.8	20
	575-60-3	3.0	4.8	33.0	4.8	33.0	3.1	12.6	520	13.8	15
120	208/230-60-3	3.0	15.6	110.0	15.6	110.0	8.3	39.5	187	43.4	50
	460-60-3	3.0	7.8	52.0	7.8	52.0	3.8	19.4	416	21.4	25
	575-60-3	3.0	5.8	38.9	5.8	38.9	3.1	14.7	520	16.2	20
	208/230-60-3	5.0	15.6	110.0	15.6	110.0	13.7	44.9	187	48.8	50
	460-60-3	5.0	7.8	52.0	7.8	52.0	6.2	21.8	416	23.8	25
	575-60-3	5.0	5.8	38.9	5.8	38.9	4.9	16.5	520	18.0	20

Piping

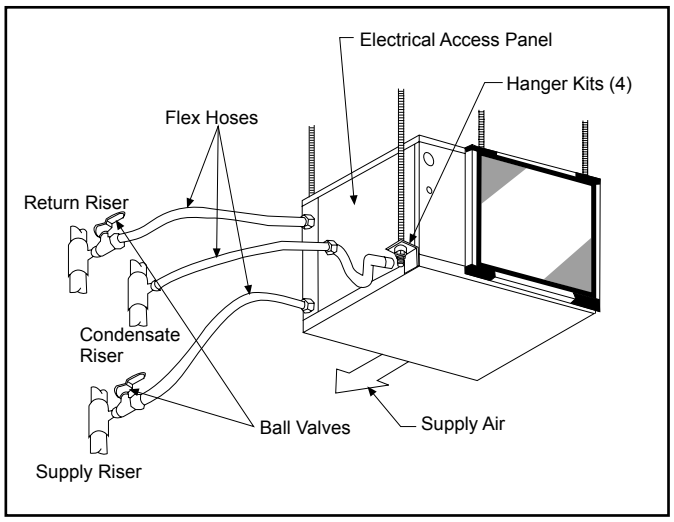
1. All units should be connected to supply and return piping in a two-pipe reverse return configuration. A reverse return system is inherently self-balancing and requires only trim balancing where multiple quantities of units with different flow and pressure drop characteristics exist in the same loop. Check for proper water balance by measuring differential temperature reading across the water connections. To insure proper water flow, the differential flow should be 10°F to 14°F (5°C to 8°C) for units in cooling mode. A direct return system may also work acceptably, but proper water flow balancing is more difficult to achieve and maintain.
2. The piping must comply with local codes.

⚠ WARNING

Polyolester Oil, commonly known as POE oil is a synthetic oil used in many refrigeration systems, and may be present in this Daikin product. POE oil, if ever in contact with PVC/CPVC will coat the inside wall of PVC/CPVC pipe causing environmental stress fractures. Although there is no PVC/CPVC piping in this product, please keep this in mind when selecting piping materials for your application, as system failure and property damage could result.

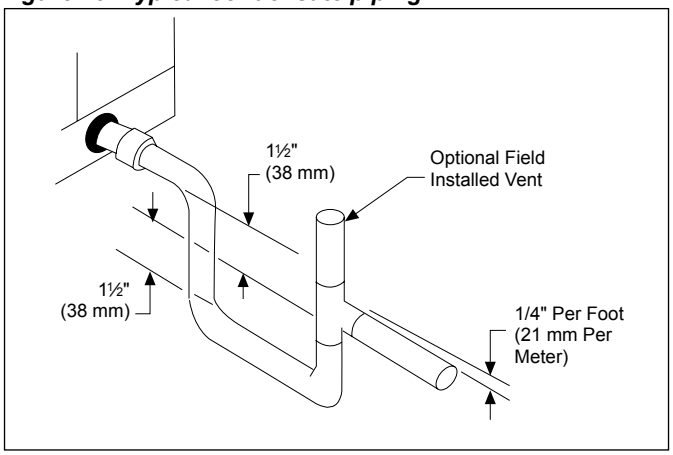
3. Supply and return runouts usually join the unit via short lengths of high pressure flexible hose which are sound attenuators for both unit operating noise and hydraulic pumping noise. One end of the hose should have a swivel fitting to facilitate removal for service. Hard piping can also be brought directly to the unit. This option is not recommended since no vibration or noise attenuation can be accomplished. The hard piping must have unions to facilitate unit removal. See Figure 12 for typical piping setup.

Figure 12: Typical piping



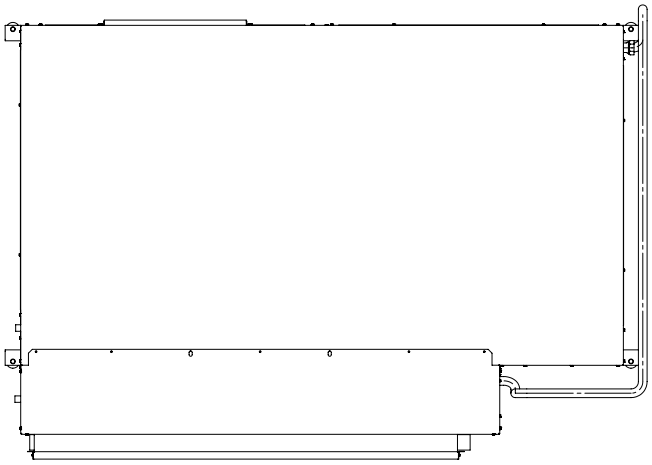
4. Some flexible hose threaded fittings are supplied with sealant compound. If not, apply Teflon tape to assure a tight seal.
5. Supply and return shutoff valves are required at each conditioner. The return valve is used for balancing and should have a “memory stop” so that it can always be closed off but can only be reopened to the proper position for the flow required.
6. No unit should be connected to the supply and return piping until the water system has been cleaned and flushed completely. After the cleaning and flushing has taken place, the initial connection should have all valves wide open in preparation for water system flushing.
7. Condensate piping should be installed per local codes. Each unit includes a condensate connection.
8. The condensate disposal piping must have a trap. The piping must be pitched away from the unit not less than ¼" per foot (21 mm per meter) (see Figure 13). Generally, the condensate trap is made of copper and soldered on the unit. A piece of vinyl hose from the trap to the drain line is used for simple removal. A complete steel or copper condensate system can also be used. Union fittings in the steel or copper lines should be applied to facilitate removal. Factory supplied condensate hose assemblies have pipe thread fittings to facilitate connection of a flexible vinyl or steel braided hose.
9. Do not locate any point in the drain system above the drain connection of any unit.
10. Automatic flow controlled devices must not be installed prior to system cleaning and flushing.
11. A high point of the piping system must be vented.
12. Check local code for the need for dielectric fittings.

Figure 13: Typical condensate piping

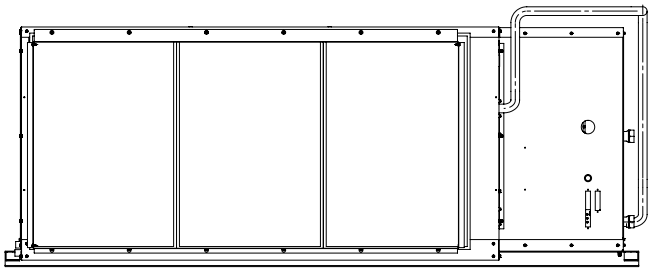


Typical WSE field provided and installed jumper piping routing details

Large horizontal unit – sizes 072-120, left-hand

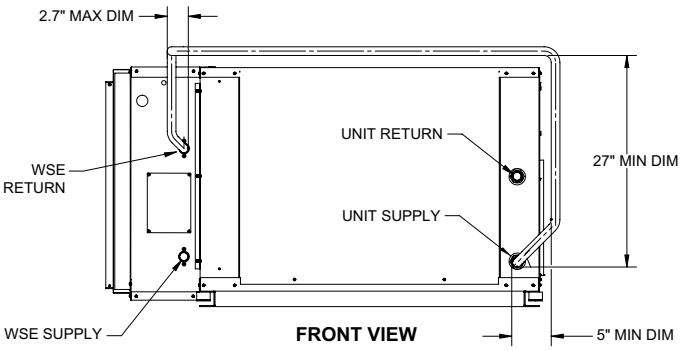


TOP VIEW



SIDE VIEW

IMPORTANT
Do not block access to removable access panels.

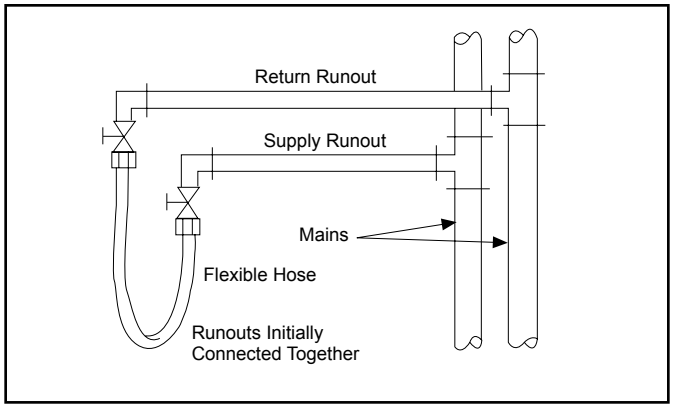


FRONT VIEW

Cleaning & flushing system

1. Prior to first operation of any conditioner, the water circulating system must be cleaned and flushed of all construction dirt and debris.
   If the conditioners are equipped with water shutoff valves, either electric or pressure operated, the supply and return runouts must be connected together at each conditioner location. This will prevent the introduction of dirt into the unit. See Figure 14.

Figure 14: Supply & return runouts connected together



2. Fill the system at the city water makeup connection with all air vents open. After filling, close all air vents. The contractor should start main circulator with the pressure reducing valve open. Check vents in sequence to bleed off any trapped air, ensuring circulation through all components of the system. Power to the heat rejector unit should be off, and the supplementary heat control set at 80°F (27°C). While circulating water, the contractor should check and repair any leaks in the piping. Drains at the lowest point(s) in the system should be opened for initial flush and blowdown, making sure city water fill valves are set to make up water at the same rate. Check the pressure gauge at pump suction and manually adjust the makeup to hold the same positive steady pressure both before and after opening the drain valves. Flush should continue for at least two hours, or longer if required, to see clear, clean drain water.

3. Shut off supplemental heater and circulator pump and open all drains and vents to completely drain down the system. Short circuited supply and return runouts should now be connected to the conditioner supply and return connections. Do not use sealers at the swivel flare connections of hoses.

4. Trisodium phosphate was formerly recommended as a cleaning agent during flushing. However, many states and localities ban the introduction of phosphates into their sewage systems. The current recommendation is to simply flush longer with warm 80°F (27°C) water.

5. Refill the system with clean water. Test the water using litmus paper for acidity, and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5). The specified percentage of antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Do not use automotive grade antifreeze.
   Once the system has been filled with clean water and antifreeze (if used), precautions should be taken to protect the system from dirty water conditions. Dirty water will result in system wide degradation of performance and solids may clog valves, strainers, flow regulators, etc. Additionally, the heat exchanger may become clogged which reduces compressor service life or causes premature failure.

6. Set the loop water controller heat add setpoint to 70°F (21°C) and the heat rejection setpoint to 85°F (29°C). Supply power to all motors and start the circulating pumps. After full flow has been established through all components including the heat rejector (regardless of season) and air vented and loop temperatures stabilized, each of the conditioners will be ready for check, test and start-up, air balancing, and water balancing.

Prior to start-up

Check the elevation and cleanliness of the condensate line. If the air is too dry for sufficient dehumidification, slowly pour enough water into the condensate pan to ensure proper drainage.

Start-up

⚠ CAUTION

Service technician, the fan may operate at any time without a signal from controls.

1. Open all valves to full open position and turn on power to the conditioner.

2. Set thermostat for “Fan Only” (unless JP2 is left open), by selecting “Off” at the system switch and “On” at the fan switch. If “Auto” fan operation is selected, the fan will cycle with the compressor. Check for proper air delivery.

3. Set thermostat to “Cool”. If the thermostat is an automatic changeover type, simply set the cooling temperature to the coolest position. On manual changeover types additionally, select “Cool” at the system switch.
   Many thermostats have time delays which protect the compressor(s) against short cycling. After a few minutes of operation, check the discharge for cool air delivery. Measure the temperature difference between entering and leaving water. It should be approximately

Start-up (continued)

1½ times greater than the heating mode temperature difference. For example, if the cooling temperature difference is 15°F (8°C), the heating temperature difference should have been 10°F (5°C).
Without automatic flow control valves, target a cooling temperature difference of 10°F to 14°F (5°C to 8°C) (under full load conditions) . Adjust the combination shutoff/balancing valve in the return line to a water flow rate which will result in the 10˚F to 14°F (5°C to 8°C) difference.

4. Set thermostat to "Heat." If the thermostat is the automatic changeover type, set system switch to the "Auto" position and depress the heat setting to the warmest selection. Some thermostats have built-in time delays which prevent the compressor from immediately starting. With most control schemes, the fan will start immediately. After a few minutes of compressor operation, check for warm air delivery at discharge grille. If this is a "cold building" start-up, leave unit running until return air to the unit is at least 65°F (18°C).
Measure the temperature difference between entering and leaving air and entering and leaving water. With entering water of 60°F to 80°F (16°C to 27°C), leaving water should be 6°F to 12°F (3.3°C to 6.6°C) cooler (under full load conditions) and the air temperature rise through the machine should not exceed 35°F (19°C). If the air temperature exceeds 35°F (19°C), then the water flow rate is inadequate.

5. If the heat pump does not operate, check the following points:

a. Is supply voltage to the machine compatible?

b. Is thermostat type appropriate?

c. Is thermostat wiring correct?

6. If the thermostat operates but stops after a brief period:

a. Is there proper airflow? Check for dirty filter, incorrect fan rotation (3-phase fan motors only), or incorrect ductwork.

b. Is there proper water flow rate within temperature limits? Check water balancing; backflush unit if dirt-clogged.

8. Check for vibrating refrigerant piping, fan wheels, etc.

9. Do not lubricate the fan motor during the first year of operation as it is pre lubricated at the factory.

10. Field supplied relays installed on the input terminals W1, W2, Y1, Y2 or G may introduce electrical noise. Never install relay coils in series with the inputs.

Operating limits

Environment

This equipment is designed for indoor installation only. Sheltered locations such as attics, garages, etc., generally will not provide sufficient protection against extremes in temperature and/or humidity, and equipment performance, reliability, and service life may be adversely affected.

Table 5: Air limits in °F (°C)

Air Limits	Standard Range Units		Extended Range Units	
	Cooling	Heating	Cooling	Heating
Minimum Ambient Air	50°F (10°C)	50°F (10°C)	40°F (4°C)	40°F (4°C)
Rated Ambient	80°F (27°C)	70°F (21°C)	80°F (27°C)	70°F (21°C)
Maximum Ambient Air	100°F (38°C)	85°F (29°C)	100°F (38°C)	85°F (29°C)
Minimum Entering Air[1, 2]	50°F (10°C)	50°F (10°C)	50°F (10°C)	40°F (4°C)
Rated Entering Air	80/67°F (27°/19°C)	70°F (21°C)	80/67°F (27°/19°C)	70°F (21°C)
Maximum Entering Air[1, 2]	100/83°F (38/28°C)	80°F (27°C)	100/83°F (38/28°C)	80°F (27°C)

Table 6: Water limits

Water Limits	Standard Range Units		Extended Range Units	
	Cooling	Heating	Cooling	Heating
Minimum Entering Water1, 2	55°F (13°C)	55°F (13°C)	30°F (-1°C)	20°F (-6°C)
Normal Entering Water	85°F (29°C)	70°F (21°C)	77°F (25°C)	40°F (4°C)
Maximum Entering Water	110°F (43°C)	90°F (32°C)	110°F (43°C)	90°F (32°C)
Minimum GPM/Ton	1.5			
Nominal GPM/Ton	3.0			
Maximum GPM/Ton	4.0			

Notes: [1] *Maximum and minimum values may not be combined. If one value is at maximum or minimum, the other two conditions may not exceed the normal condition for standard units. Extended range units may combine any two maximum conditions, but not more than two, with all other conditions being normal conditions.*
[2] *This is not a normal or continuous operating condition. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.*

Additional information for initial start-up standard range units CCH

Units are designed to start-up in an ambient of 50°F (10°C), with entering air at 50°F (10°C), with entering water at 70°F (21°C), with both air and water flow rates used in the ISO 13256-1 rating test, for initial start-up in winter.

Note: *This is not a normal or continuous operating condition. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.*

Extended range units CCW

Extended range heat pump units are designed to start-up in an ambient of 40°F (5°C), with entering air at 40°F (5°C), with entering water at 25°F (-4°C), with both air and water at flow rates used in the ISO 13256-1 rating test, for initial start-up in winter.

Note: *This is not a normal or continuous operating condition. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.*

Operating voltages

208/230-60-1 .....197 volts min.; 253 volts max.
265-60-1 .....238 volts min.; 292 volts max.
230-50-1 .....197 volts min.; 253 volts max.
460-60-3 .....414 volts min.; 506 volts max.
380-50-3 .....342 volts min.; 418 volts max.
575-60-3 .....515 volts min.; 632 volts max.

Note: *Voltages listed are to show voltage range. However, units operating with over-voltage and under-voltage for extended periods of time will experience premature component failure. Three phase system unbalance should not exceed 2%.*

Antifreeze correction factors

Table 7: Ethylene glycol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9950	0.9920	0.9870	0.9830	0.9790
Heating Capacity	0.9910	0.9820	0.9770	0.9690	0.9610
Pressure Drop	1.0700	1.1300	1.1800	1.2600	1.2800

Table 8: Propylene glycol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9900	0.9800	0.9700	0.9600	0.9500
Heating Capacity	0.9870	0.9750	0.9620	0.9420	0.9300
Pressure Drop	1.0700	1.1500	1.2500	1.3700	1.4200

Table 9: Methanol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9980	0.9720	–	–	–
Heating Capacity	0.9950	0.9700	–	–	–
Pressure Drop	1.0230	1.0570	–	–	–

Table 10: Ethanol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9910	0.9510	–	–	–
Heating Capacity	0.9950	0.9600	–	–	–
Pressure Drop	1.0350	0.9600	–	–	–

Start-up

1. Open all valves to full open position and turn on power to the conditioner.
2. Jumpers must be configured prior to connecting supply power. See Table 11 and Table 12 on page 19.

Note: *The settings of the hardware configuration jumpers are read when the controller is powered. Any changes to the jumper settings require cycling power to the controller or sending a controller a reboot command through the network communications.*

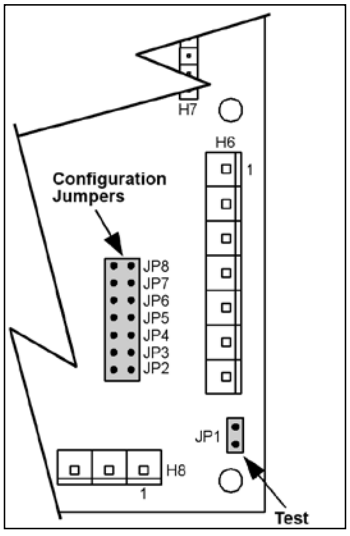
Table 11: MicroTech III controller configuration jumper settings

Baseboard Description	Jumper(s)	Jumper Setting	Function
Normal / Test Mode	JP1	Open	Normal Operation
		Shorted	Service / Test Mode
Fan Operation	JP2	Open	Continuous Fan Operation (On), when not operating in the unoccupied mode.
		Shorted	Cycling Fan Operation (Auto)
Loop Fluid	JP3 (see warning)	Open	Water Loop Fluid - Water freeze protection (factory default setting)
		Shorted	Glycol Loop Fluid - Systems with anti-freeze protection
Freeze Fault Protection	JP4	Open	None
		Shorted	Freeze fault protection enabled
Room Sensor Setpoint Potentiometer Range	JP5	Open	Short Range: -5 to +5 ºF (-2.78 to +2.78 ºC)
		Shorted	Long Range: 55 to 95ºF (12.78 to 35ºC)
Thermostat / Room Sensor	JP6	Open	Thermostat Control
		Shorted	Room Sensor Control
Compressor Availability	JP7 & JP8	JP7 Open	Both Compressors Available (default)
		JP8 Open	
		JP7 Shorted	One Compressor Available
		JP8 Open	
		JP7 Open	No Compressors Available
		JP8 Shorted	

⚠ WARNING

Jumper JP3 is factory provided in the open position. Extended range units require freeze protection down to 15 degrees. Jumper JP3 must be field configured.

Figure 15: Location of configuration jumpers on the MicroTech III unit controller

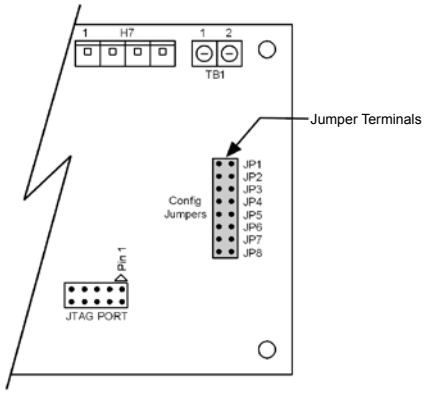


Note: *The settings of the hardware configuration jumpers are read when the controller is powered. Any changes to the jumper settings require cycling power to the controller or sending a controller a reboot command through the network communications.*

Table 12: I/O expansion module jumper settings

I/O Expansion Description	Jumper(s)	Jumper Setting		Model
Not Used	JP1	JP1	Open	–
Not Used	JP2	JP2	Open	–
Secondary Heating Options	JP3 & JP4	JP3	Open	None
		JP4	Open	
		JP3	Shorted	Supplemental Electric Heat
		JP4	Open	
		JP3	Open	Boilerless Electric Heat
		JP4	Shorted	
Cooling / Dehumidification Options	JP5 & JP6	JP5	Shorted	Without Hydronic Cooling
		JP6	Open	
		JP5	Open	Hydronic Cooling (Waterside Economizer)
		JP6	Shorted	
Not Used	JP7	JP7	Open	–
Lead Compressor Option	JP8	JP8	Open	Compressor #1 is Lead (factory default setting)
		JP8	Shorted	Compressor #2 is Lead

Figure 16: I/O expansion module configuration jumper terminals



3. Set thermostat to “Cool”. If the thermostat is an automatic changeover type, simply set the cooling temperature to the coolest position. On manual changeover types additionally, select “Cool” at the system switch.
Again, many conditioners have time delays which protect the compressor(s) against short cycling. After a few minutes of operation, check the discharge grilles for cool air delivery. Measure the temperature difference between entering and leaving water. It should be approximately 1½ times greater than the heating mode temperature difference. For example, if the cooling temperature difference is 15°F (8°C), the heating temperature difference should have been 10°F (5°C).
Without automatic flow control valves, target a cooling temperature difference of 10°F to 14°F (5°C to 8°C). Adjust the combination shutoff/balancing valve in the return line to a water flow rate which will result in the 10˚F to 14°F (5°C to 8°C) difference.

4. Set thermostat to “Heat.” If the thermostat is the automatic changeover type, set system switch to the “Auto” position and depress the heat setting to the warmest selection. Some conditioners have built-in time delays which prevent the compressor from immediately starting. With most control schemes, the fan will start immediately. After a few minutes of compressor operation, check for warm air delivery at discharge grille. If this is a “cold building” start-up, leave unit running until return air to the unit is at least 65°F (18°C). Measure the temperature difference between entering and leaving air and entering and leaving water. With entering water of 60°F to 80°F (16°C to 27°C), leaving water should be 6°F to 12°F (3.3°C to 6.6°C) cooler (under full load conditions) and the air temperature rise through the machine should not exceed 35°F (19°C). If the air temperature exceeds 35°F (19°C), then the water flow rate is inadequate.

5. Check the elevation and cleanliness of the condensate line. If the air is too dry for sufficient dehumidification, slowly pour enough water into the condensate pan to ensure proper drainage.

6. If the conditioner does not operate, check the following points:

a. Is supply voltage to the machine compatible?

b. Is thermostat type appropriate?

c. Is thermostat wiring correct?

7. If the thermostat operates but stops after a brief period:

a. Is there proper airflow? Check for dirty filter, incorrect fan rotation (3-phase fan motors only), or incorrect ductwork.

b. Is there proper water flow rate within temperature limits? Check water balancing; back-flush unit if dirt-clogged.

8. Check for vibrating refrigerant piping, fan wheels, etc.

9. Do not lubricate the fan motor during the first year of operation as it is pre-lubricated at the factory.

10. Field supplied relays installed on the input terminals W1, W2, Y1, Y2 or G may introduce electrical noise. Never install relay coils in series with the inputs.

Control options

The control enclosure houses the major operating electrical controls including the MicroTech III controller and I/O expansion module, control transformer, compressor relays and fan relay. Each component is easily accessed for service or replacement.

Three unique control choices are offered with the MicroTech III control system:

- Standalone operation using a MicroTech III controller and I/O expansion module
- MicroTech III controller with I/O expansion module and LonWorks® communication module
- MicroTech III controller with I/O expansion module and BACnet® communication module

Each option features direct quick-connect wiring to all unit-controlled components for “clean” wiring inside the control box. Each control circuit board receives power from a 75 VA transformer.

Table 13: Control options

Control	Description	Application	Protocol
MicroTech III  (Standalone) Unit Controller with I/O Expansion Module 	The MicroTech III controller is a standalone microprocessor-based control board conveniently located in the unit control enclosure for easy accessibility. The board is designed to provide thermostat control of a Water Source Heat Pump using a two-stage wall thermostat. The unit controller provides unit-wide control of the WSHP and control of the first refrigerant circuit.	Each unit controller is factory programmed, wired, and tested for complete control of single zone, standalone operation of your Daikin Water Source Heat Pump.	Unit-mounted or wall-mounted thermostat or room sensor
	The I/O Expansion Module is an extension of the Microtech III controller and provides control of the second refrigerant circuit. External LED status lights display fault conditions to provide easy troubleshooting and diagnosis of the second circuit.	Allows for: Control of second refrigeration circuit, secondary heating options and cooling/dehumidification options.	
LonWorks  Communication Module	The MicroTech III control system accepts a plug-in LonWorks communication module to provide network communications and added functionality to easily integrate with an existing BAS. The communication module can be factory- or field-installed and is tested with all logic required to monitor and control the unit.	LonTalk application protocol is designed for units that are integrated into a LonWorks communication network for centralized scheduling and management of multiple heat pumps.	LonMark 3.4 Certified
BACnet  Communication Module	The MicroTech III controller accepts a plug-in BACnet communication module to provide network communications and added functionality to easily integrate with an existing BAS. The communication module can be factory- or field-installed and is tested with all logic required to monitor and control the unit.	Designed to be linked with a centralized building automation system (BAS) through a BACnet communications network for centralized scheduling and management of multiple heat pumps.	BACnet MS/TP

MicroTech® III controller

⚠ DANGER

To avoid electrical shock, personal injury or death, be sure that field wiring complies with local and national fire, safety, and electrical codes, and voltage to the system is within the limits shown in the job-specific drawings and unit electrical data plate(s). Power supply to unit must be disconnected when making field connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

General use and information

All Microtech III controller inputs must be operated by dry contacts powered by the control board's power terminals. No solid state devices (Triacs) may be used to operate the Microtech III controller inputs. No outside power source may be used to operate the Microtech III controller inputs.

The MicroTech III control system includes two microprocessor-based control boards conveniently located in the unit control box for easy access through a removable access panel. The standalone controls are a hard wired interface and provides all the necessary field connections. The board can be wired for 24-volt AC output to the wall thermostat by using terminals R & C. Two sets of LED annunciators are located on the front of the unit chassis to allow quick check of the unit operating status.

MicroTech III unit protections & LED fault status annunciation

Assumes cycle fan operation-not continuous fan operation:

- **Start-up –** The unit will not operate until all the inputs and safety controls are checked for normal conditions.
- **Cooling mode** – On an initial call for stage 1 cooling, the fan will energize, the pump request will energize, and the 45 second flow timer will start. When the compressor minimum off, and random startup timers are expired, the lead compressor will start the stage 1 cooling settings. If room setpoint conditions are not satisfied, the lag compressor will start, which is stage 2 cooling settings. When the room setpoint conditions are satisfied, the lag compressor will shut off first followed by the lead compressor when all cooling requests are satisfied. If fan cycling is enabled, the fan will turn off once room setpoint conditions are satisfied.
- **Waterside economizer –** This mode requires the optional factory-installed waterside economizer. A hydronic economizer coil, 3-way water valve and temperature sensor are added to the unit. The purpose of this mode is to satisfy some or all of the cooling demand by using the loop water, which is often reduced to 50°F or less via the cooling tower to achieve sufficient cooling performance.

  When a call for 1st stage cooling is engaged, with the entering loop water below the economizer changeover temperature, the H8 output on the MicroTech III board is activated to open the motorized valve allowing water flow to the equipment. The compressor is locked out, the 3-way water valve opens to allow cool loop water to flow through the economizer coil. The fan starts after 30 seconds (unless it is already on thru activation of the G terminal by the thermostat fan switch "on"). On a further demand for cooling, stage 2; the 1st compressor will start in the cooling mode. On a further demand for cooling the second compressor will energize. The waterside economizer mode will not be activated if the entering water temperature is below 35°F and an alarm (fault) signal will be generated.
  When the room setpoint conditions are satisfied, the compressor will shut off, the 3-way valve will close and the fan will either shut off (fan switch "auto") or continue to run (fan switch "on"). The minimum off timer of 360 seconds starts. If the loop temperature increases above the changeover temperature, waterside economizer mode will be suspended and the unit will resume normal mechanical cooling mode with stage 1 of the thermostat now starting the compressor.
- **Dehumidification mode –** Uses hot gas reheat with a 2-stage thermostat and humidistat for precise humidity control.
- **Hot gas reheat with temperature control –** If the space temperature setpoint is satisfied, but the space humidity is above the humidity setpoint, the dehumidification mode is activated. The fan will energize, the pump request will energize, the 45 second flow timer will start, the compressor minimum off, and random startup timers expire, the hot gas reheat valve opens sending hot gas to the reheat coil, the lead compressor energizes, and after 180 seconds the lag compressor energizes. Return air is cooled and reheated to near space temperature. A call for cooling will close the hot gas reheat valve and the unit will resume normal cooling operation. If the space cooling and heating temperature setpoints are satisfied, but the humidity falls below the space humidity setpoint, the dehumidification mode is suspended.
- **Heating mode** – On an initial call for heating, the fan will energize, the pump request will energize, the 45 second flow timer will start. After the flow, compressor minimum off, and random startup timers are expired, the lead compressor will start at stage 1 heating settings; the reversing valve shall energize 5 seconds after the lead compressor turns on. If room setpoint conditions are not satisfied, the lag compressor will operate at stage 2 heating settings. When the room setpoint conditions are satisfied, the compressor will shut off. If fan cycling is enabled, the fan will turn off, once room setpoint conditions are satisfied.

Supplemental electric heat control

The supplemental electric heating option provides additional stages of heating that can be used in conjunction with compressor heating, or exclusively if the compressor is not available for heating.

General rules

- Supplemental electric heater and the compressor may operate simultaneously.
- Minimum compressor ON and OFF timers do not apply to electric heat control.

Operation

Fan main output: will turn ON when:

- Any auxiliary heat output is energized.
- For 30 fixed seconds after all auxiliary heat outputs have been de-activated.

Electric heat outputs: are allowed to energize when either condition exists:

- Inter-stage ON timer must be expired.
- Compressor is not available for heating.

When compressor is available

- Auxiliary heat stage #1 output energizes upon activation of heating – stage #3.
- Auxiliary heat stage #2 output energizes upon activation of heating – stage #4.

When compressor is unavailable

- Auxiliary heat stage #1 output energizes upon activation of heating – stage #1.
- Auxiliary heat stage #2 output energizes upon activation of heating – stage #3.

■ **Boilerless heat control** –Turns on the heater when the entering water temperature is less than setpoint (default is 55°F), the temperature set point is adjustable through the network.
For geothermal applications the heater turns on when the entering water temperature is less than setpoint (default 28°F).

Note: *In both cases the compressor is shut down.*

■ **Short cycle protection & random start –** After power cycle or deactivation of certain alarms, or when leaving the unoccupied mode, a new random compressor start-delay time between 300 and 360 seconds is generated. The random start timer prevents compressors in different units from starting simultaneously. Compressor minimum OFF 360 sec) and compressor minimum ON (180 sec) timers prevent compressor short cycling.

■ **Unoccupied mode –** A simple “grounded” signal between terminals U and C (no power source required), puts the unit into the unoccupied mode for night setback operation.

■ **Inter-staging timer –** A default value of 5 minutes between staging of compressors, this feature minimizes short cycling of compressors and improves comfort.

■ **Override mode –** A switch on the deluxe automatic changeover thermostat can be activated during the unoccupied mode to put the unit back into the occupied mode for two hours for after-hours heating or cooling.

■ **Motorized valve/pump restart –** The IV/PR (H8) terminals on the The MicroTech III unit controller are used to energize (open) a motorized valve or start a water pump to get water circulating prior to starting the compressor on call for heating or cooling. Lead compressor operation shall be delayed a minimum of 45 seconds, after the motorized valve/isolation valve output energizes to allow for supply water flow.

■ **Brownout protection –** The MicroTech III unit controller measures the input voltage and will suspend compressor and fan operation if the voltage falls below 80% of the unit nameplate rated value. Two external LED status are generated and an output is available to a "fault" LED at the thermostat.

■ **Emergency unit shutdown** – A simple grounded signal puts the unit into the shutdown mode. Remote shutdown is provided so that when properly connected to a water loop controller or remote switch, the emergency shutdown input can be used to shut down the water source heat pump. Compressor and fan operations are suspended, and an a unique two external LED status is generated.

■ **Condensate overflow protection (cooling & dehumidification modes only)** – The MicroTech III unit controller incorporates a liquid sensor at the top of the drain pan. When the unit senses a high condensate water level for 60 consecutive seconds while in the cooling or dehumidification modes the unit enters the "Off Alarm" machine state. The dehumidification or cooling mode operation will immediately be de-energized as well as the pump output.

- **Thermostat fault reset (preferred method) –** A feature to reset some lockouts like high pressure and/or low temperature remote from the unit is available. When the cause of the fault condition has been fixed, repaired or resolved, the unit can be reset from the thermostat. To reset the fault, move the system switch on the thermostat from its current position (Heat/Auto/Cool) to the Off position and back to its original position two times within 30 seconds. The unit will now be reset. The intelligent reset counter and the 24 hour timer are cleared.

  ⚠ CAUTION

  Some thermostats have internal timers greater than 30 seconds that delay their switching capabilities. Defeating their internal timers may be required to reset the fault using the thermostat.

  Alternatively, the thermostats shown in Figure 23 on page 33 have an optional “reset” feature, by activating the reset feature and adding a wire from terminal O to terminal TB1, pin 4, on the MicroTech III board.

- **Reset of automatic lockouts (alternate method) -** A feature to reset some lockouts like high pressure and/or low temperature at the unit is available. When the cause of the fault condition has been fixed, repaired or resolved, the unit can be reset at the unit. Apply a grounded signal to the tenant override input (screw terminal connection at TB1, pin 4) for a minimum of 10 seconds. The unit will now be reset. Alternatively, dropping power to the unit from the disconnect switch and re-applying power will reset the unit.

- **Intelligent alarm reset** – The Intelligent Reset feature helps to minimize nuisance trips of automatic lockouts caused by low-temperature faults. This feature clears faults the first two times they occur within a 24-hour period and triggers an automatic lockout on the 3rd fault. The fault remains active until the alarm is manually cleared. At the end of the 24 hour period, all counts for that specific intelligent reset alarm are cleared to zero only if the occurrence counter is presently less than the value of three. The 24-hour period and alarm counts are stored in memory that is cleared when power is cycled.

- **Selectable lead compressor** – The lead compressor selection provides a method to utilize circuit 2 if repairs are required on circuit 1. This is not intended for normal equipment operation. The jumper setting JP8 in the I/O expansion board is used to configure the “Lead Compressor” settings.

- **Lead compressor fail replacement** – Upon detection of a lead compressor fault and the lag compressor is available, the selected lead compressor will be “failed replaced” by the lag compressor. Lead compressor will immediately be de-energized by ignoring the compressor minimum ON timer. Lag compressor will energize in place of the failed lead compressor, when the lag compressor minimum OFF timer has expired. Reversing valve for the lag compressor will be positioned, if necessary, 5 seconds after the lag compressor starts up.

- **Equipment protection control –** The MicroTech III controller receives separate input signals from the refrigerant high-pressure switch and the low suction line temperature sensor. In a high-pressure situation, compressor operation is suspended. In a low temperature situation, the unit goes into a defrost cycle where the unit is put into cooling operation for 60 seconds until the coaxial heat exchanger is free of ice. Each switch generates its own unique LED status.

Table 14: MicroTech III unit controller terminals locations and descriptions

H1 – 1	24	24 VAC Power Input
H1 – 2	C	24 VAC common
H2 – 1	SL1	Fan Output – Switched L1
H2 – 2		Blank Terminal
H2 – 3	N	Fan Output – Neutral
H3 – 1	HP1-1	Comp High Pressure Switch (HP1) Input Terminal 1
H3 – 2	HP1-2	Comp High Pressure Switch (HP1) Input Terminal 2
H4 – 1	1	Discharge Air Temp Sensor – Common
H4 – 2		Discharge Air Temp Sensor – Signal
H4 – 3		Leaving Water Temp Sensor – Common
H4 – 4		Leaving Water Temp Sensor – Signal
H5 – 1	1	I/O Expansion Module Common (Gnd)
H5 – 2		I/O Expansion Module Common (Gnd)
H5 – 3		I/O Expansion Module +5 VDC
H5 – 4		I/O Expansion Module SPI CE1
H5 – 5		I/O Expansion Module SPI CLK
H5 – 6		I/O Expansion Module SPI OUT
H5 – 7		I/O Expansion Module SPI IN
H5 – 8		I/O Expansion Module +12 VDC
H5 – 9		I/O Expansion Module 24 VAC
H5 – 10		I/O Expansion Module 24 VAC
H5 – 11		No Connection
H5 – 12		No Connection
H6 – 1	1	Condensate Overflow Signal Input
H6 – 2		Compressor Suction Temp Sensor (LT1) – Common
H6 – 3		Compressor Suction Temp Sensor (LT1) – Signal
H6 – 4		Compressor Low Pressure Switch (LP1) – Source Voltage
H6 – 5		Compressor Low Pressure Switch (LP1) – Signal
H6 – 6		Reversing Valve – Common
H6 – 7		Reversing Valve – Output
H7 – 1	1	No Connection
H7 – 2		No Connection
H7 – 3		Red LED Output
H7 – 4		Green LED Output
H7 – 5		Yellow LED Output
H7 – 6		Red-Green-Yellow LED Common
H8 – 1	1	Isolation Valve/Pump Request Relay N/O
H8 – 2		Isolation Valve/Pump Request Relay N/C
H8 – 3		24 VAC Common
H9 – 1	1	Return Air Temp – Signal
H9 – 2		Return Air Temp* – Common
TB1 – 1	1	Room Sensor – Status LED Output
TB1 – 2	2	Room Sensor – Fan Mode & Unit Mode Switches
TB1 – 3	3	Room Sensor – Setpoint Adjust Potentiometer
TB1 – 4	4	Room Sensor – Room Temp Sensor & Tenant Override
TB1 – 5	5	Room Sensor – DC Signal Common
TB2 – 1	R	24 VAC
TB2 – 2	A	Alarm Output
TB2 – 3	W2	Thermostat – Heat Stage #2 (W2) Input
TB2 – 4	W1	Thermostat – Heat Stage #1 (W1) Input
TB2 – 5	Y2	Thermostat – Cool Stage #2 (Y2) Input
TB2 – 6	Y1	Thermostat – Cool Stage #1 (Y1) Input
TB2 – 7	G	Thermostat – Fan Input
TB2 – 8	O	Thermostat – Heat Stage #3 (W3) Input
TB2 – 9	C	24 VAC Common
TB3 – 1	E	Emergency Shutdown Input
TB3 – 2	U	Unoccupied Input
L1 – 1	L1 - 1	24 VAC Power in
L1 – 2	L1 - 2	
L1 – 3	L1 - 3	
N1	N1	24 VAC Common
N2	N2	
N3	N3	
CN_LON1 – 1	CN_LON1	GND
CN_LON1 – 2		+ 5 VDC
CN_LON1 – 3		SPI CE (SPI Select To Communications Board)
CN_LON1 – 4		SPI CLK (Master Clock)
CN_LON1 – 5		SPI OUT (MOSI)
CN_LON1 – 6		SPI IN (MISO)
CN_LON1 – 7		INT0 (SPI Ready To Baseboard)
CN_LON1 – 8		No Connection

* *Can have return air temperature sensor connected at H9 while the room sensor is connected to TB1, pin 4 (room temp sensor and tenant override)*

Note: *A random start delay time between 300 and 360 seconds is generated at power up.*

Figure 17: MicroTech III unit controller terminal locations

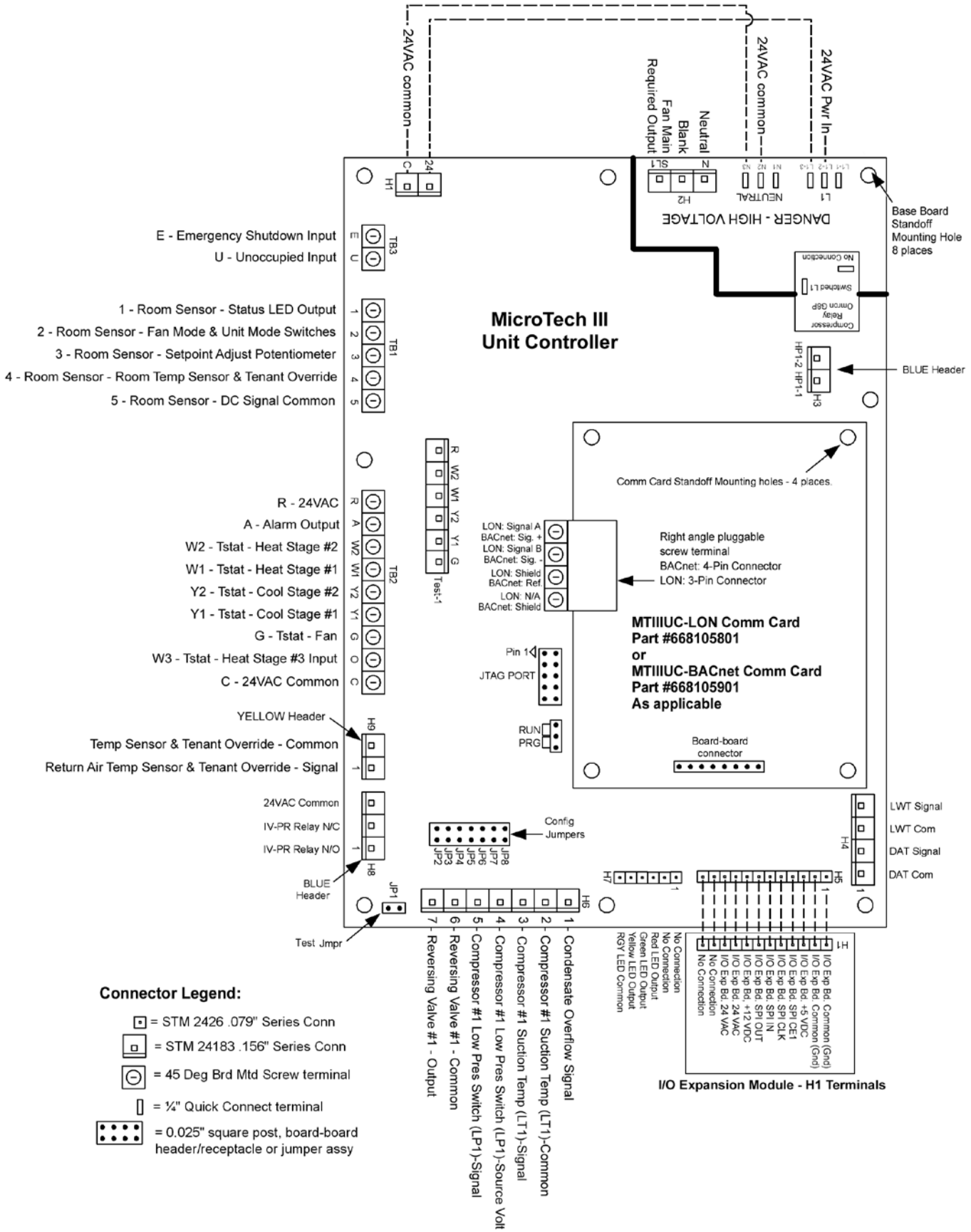
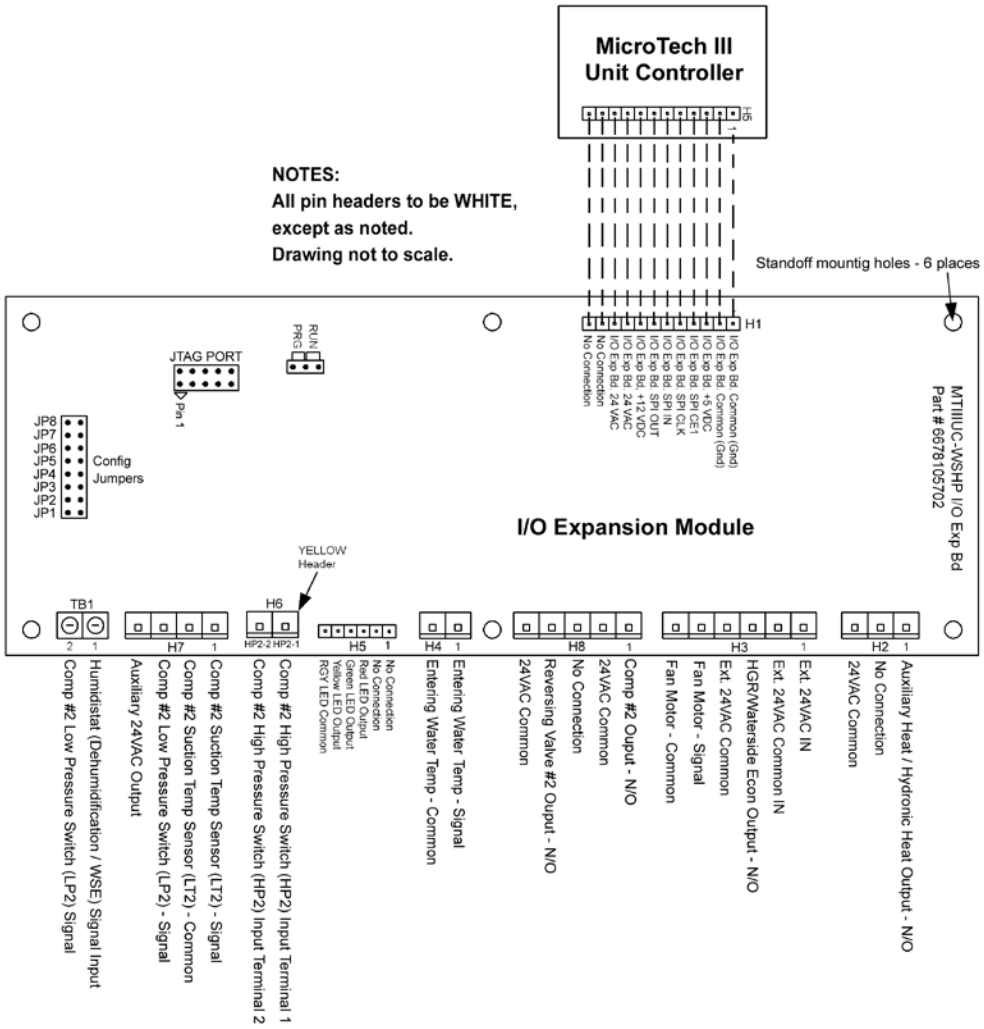


Table 15: I/O expansion module terminals locations and descriptions

H1 – 1	1	I/O Expansion Board Common (Gnd)
H1 – 2		I/O Expansion Board Common (Gnd)
H1 – 3		I/O Expansion Board +5 VDC
H1 – 4		I/O Expansion Board SPI CE1
H1 – 5		I/O Expansion Board SPI CLK
H1 – 6		I/O Expansion Board SPI IN
H1 – 7		I/O Expansion Board SPI OUT
H1 – 8	1	I/O Expansion Board +12 VDC
H1 – 9		I/O Expansion Board 24 VAC
H1 – 10		I/O Expansion Board 24 VAC
H1 – 11		No Connection
H1 – 12		No Connection
H2 – 1	1	Auxiliary Heat / Hydronic Heat Output – N/O
H2 – 2		No Connection
H2 – 3		24 VAC Common
H3 – 1	1	Ext. 24 VAC In
H3 – 2		Ext. 24 VAC Common In
H3 – 3		HGR / Waterside Economizer Output – N/O
H3 – 4		Ext. 24 VAC Common
H3 – 5		Fan Motor – Signal
H3 – 6		Fan Motor – Common
H4 – 1	1	Entering Water Temp Sensor – Signal
H4 – 2		Entering Water Temp Sensor – Common
H5 – 1	1	No Connection
H5 – 2		No Connection
H5 – 3		Red LED Output
H5 – 4		Green LED Output
H5 – 5		Yellow LED Output
H5 – 6		Red-Green-Yellow LED Common
H6 – 1	HP2-1	Comp #2 High Pressure Switch (HP2) Input Terminal 1
H6 – 2	HP2-2	Comp #2 High Pressure Switch (HP2) Input Terminal 2
H7 – 1		Comp #2 Suction Temp Sensor (LT2) – Signal
H7 – 2		Comp #2 Suction Temp Sensor (LT2) – Common
H7 – 3		Comp #2 Low Pressure Switch (LP2) – Signal
H7 – 4		Auxiliary 24VAC Output
H8 – 1	1	Compressor #2 Output – N/O
H8 – 2		24 VAC Common
H8 – 3		No Connection
H8 – 4		Reversing Valve #2 Output – N/O
H8 – 5		24 VAC Common
TB1 – 1	1	Humidistat (Dehumidification / WSE) Signal Input
TB1 – 2	2	Comp #2 Low Pressure Switch (LP2) – Signal

Figure 18: I/O expansion module terminals locations



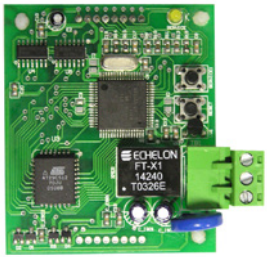
MicroTech® III controller with LONWORKS® or BACnet® communication module

Each Enfinity Large Horizontal Water Source Heat Pump can be equipped with a LonWorks or BACnet communication module. The LONWORKS module is LONMARK 3.4 certified and designed to communicate over a LONWORKS communications network to a Building Automation System (BAS). The BACnet module is designed to communicate over a BACnet MS/TP communications network to a building automation system. Both communication modules are microprocessor-based and can be factory or field-installed.

The communication modules are programmed and tested with all the logic required to monitor and control the unit. Optional wall sensors may be used with the communication modules to provide limited local control of the Horizontal Water Source Heat Pump. The MicroTech III controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the Water Source Heat Pump.

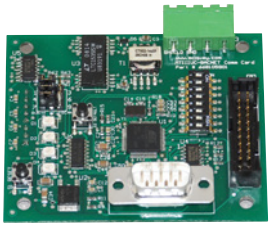
MicroTech III LONWORKS communication module

The LONWORKS communication module is designed for units that are integrated into a LONWORKS communication network for centralized scheduling and management of multiple heat pumps.



MicroTech III BACnet communication module

Designed to be linked with a centralized building automation system (BAS) through a BACnet communications network for centralized scheduling and management of multiple heat pumps.



MicroTech III controller with communication modules features

The MicroTech III controller with LONWORKS or BACnet communication module orchestrates the following unit operations:

- Enable heating and cooling to maintain space temperature setpoint based on a room sensor setting
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

An on-board status LED indicates the status of the MicroTech III LONWORKS or BACnet module.

The MicroTech III unit controller with communication module includes:

- Return Air Temperature sensor (RAT) (field-installed)
- Discharge Air Temperature sensor (DAT) (field-installed)
- Leaving Water Temperature sensor (LWT)

⚠ CAUTION

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication modules provide network access to setpoints for operational control

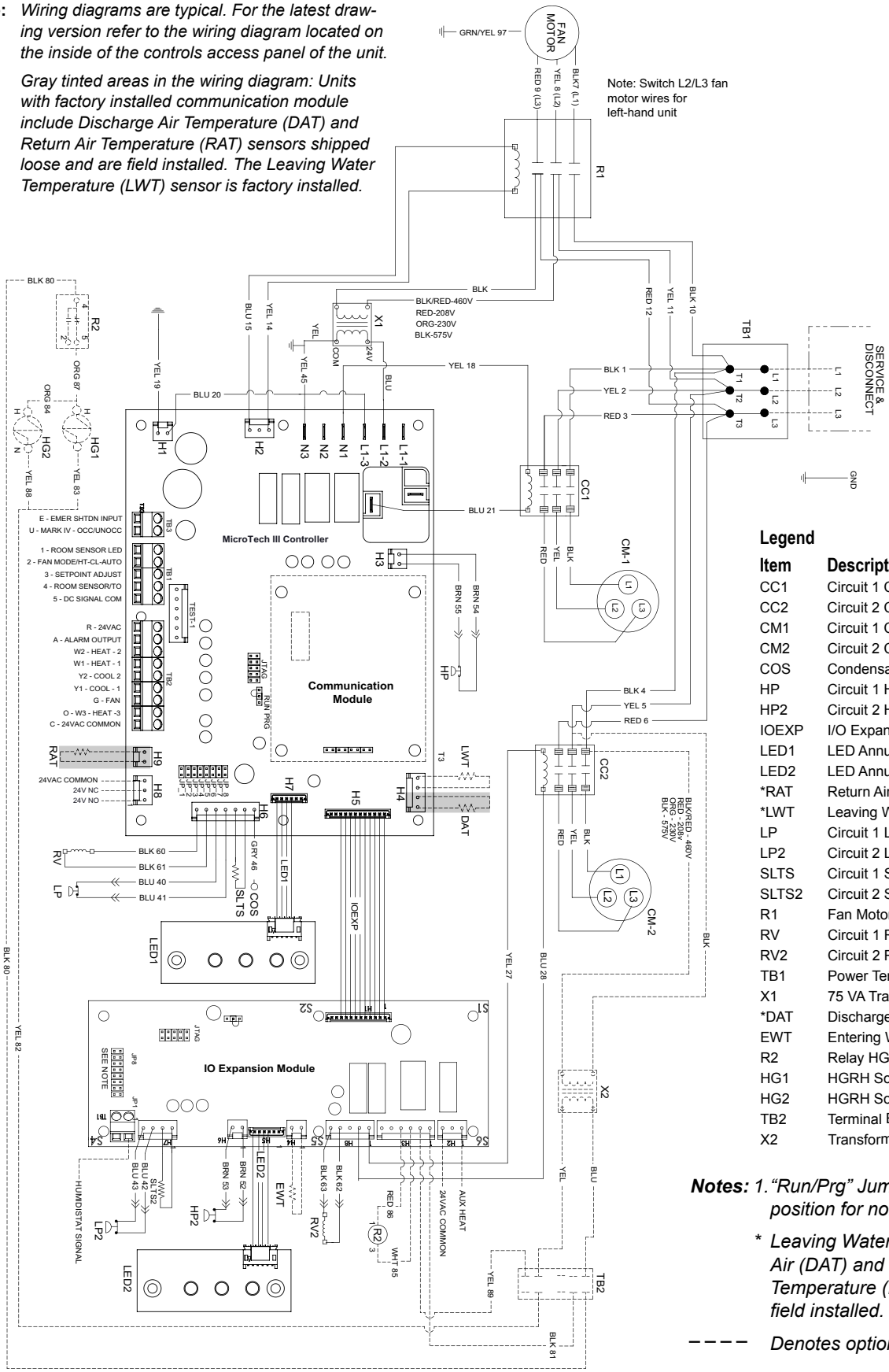
Available wall sensors include:

- Room sensor
- Room sensor with LED status and tenant override button
- Temperature sensor with LED status, timed-override button; ±5°F setpoint adjustment
- Room sensor with LED status, timed-override button, 55° to 95°F setpoint adjustment
- Room sensor with digital display, timed override button, occupancy button; ±5°F setpoint adjustment or 55 to 95°F temperature setpoint and dehumidification control

MicroTech III controller with I/O expansion module with hot gas reheat (HGRH) 208/230, 460, 575-60-3 (1.5 hp or less)

Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.



Legend

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
HP2	Circuit 2 High Pressure Switch
IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
*RAT	Return Air Temp Sensor
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
LP2	Circuit 2 Low Pressure Switch
SLTS	Circuit 1 Suction Line Temp Sensor
SLTS2	Circuit 2 Suction Line Temp Sensor
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
*DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
R2	Relay HGRH
HG1	HGRH Solenoid 1
HG2	HGRH Solenoid 2
TB2	Terminal Block
X2	Transformer 24VAC Output

Notes: *1."Run/Prg" Jumper to be in "Run" position for normal operation*

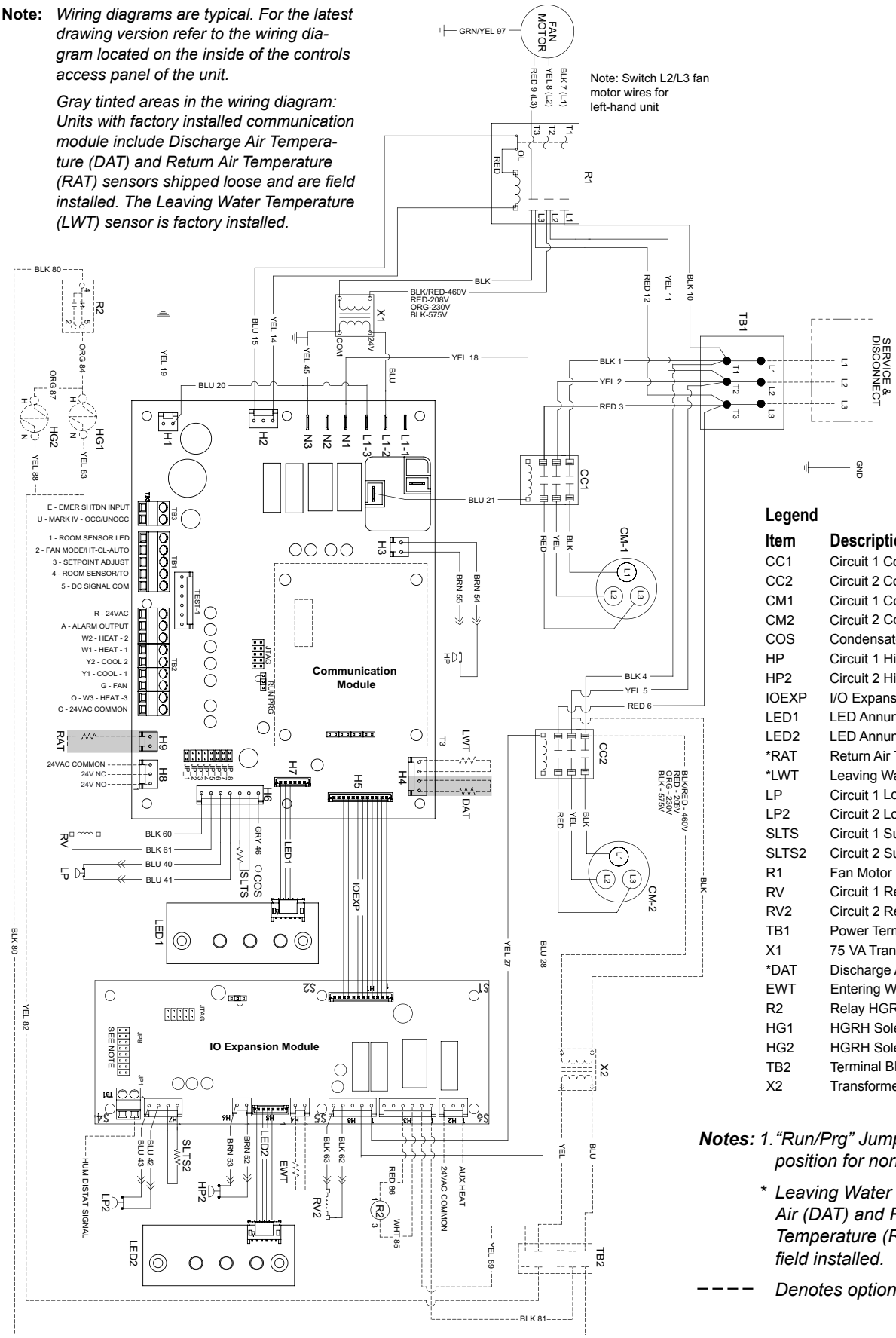
** Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.*

– – – – *Denotes optional feature*

MicroTech III controller with I/O expansion module with hot gas reheat (HGRH) 208/230, 460, 575-60-3 (greater than 1.5 hp)

Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.



Legend

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
HP2	Circuit 2 High Pressure Switch
IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
*RAT	Return Air Temp Sensor
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
LP2	Circuit 2 Low Pressure Switch
SLTS	Circuit 1 Suction Line Temp Sensor
SLTS2	Circuit 2 Suction Line Temp Sensor
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
*DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
R2	Relay HGRH
HG1	HGRH Solenoid 1
HG2	HGRH Solenoid 2
TB2	Terminal Block
X2	Transformer 24VAC Output

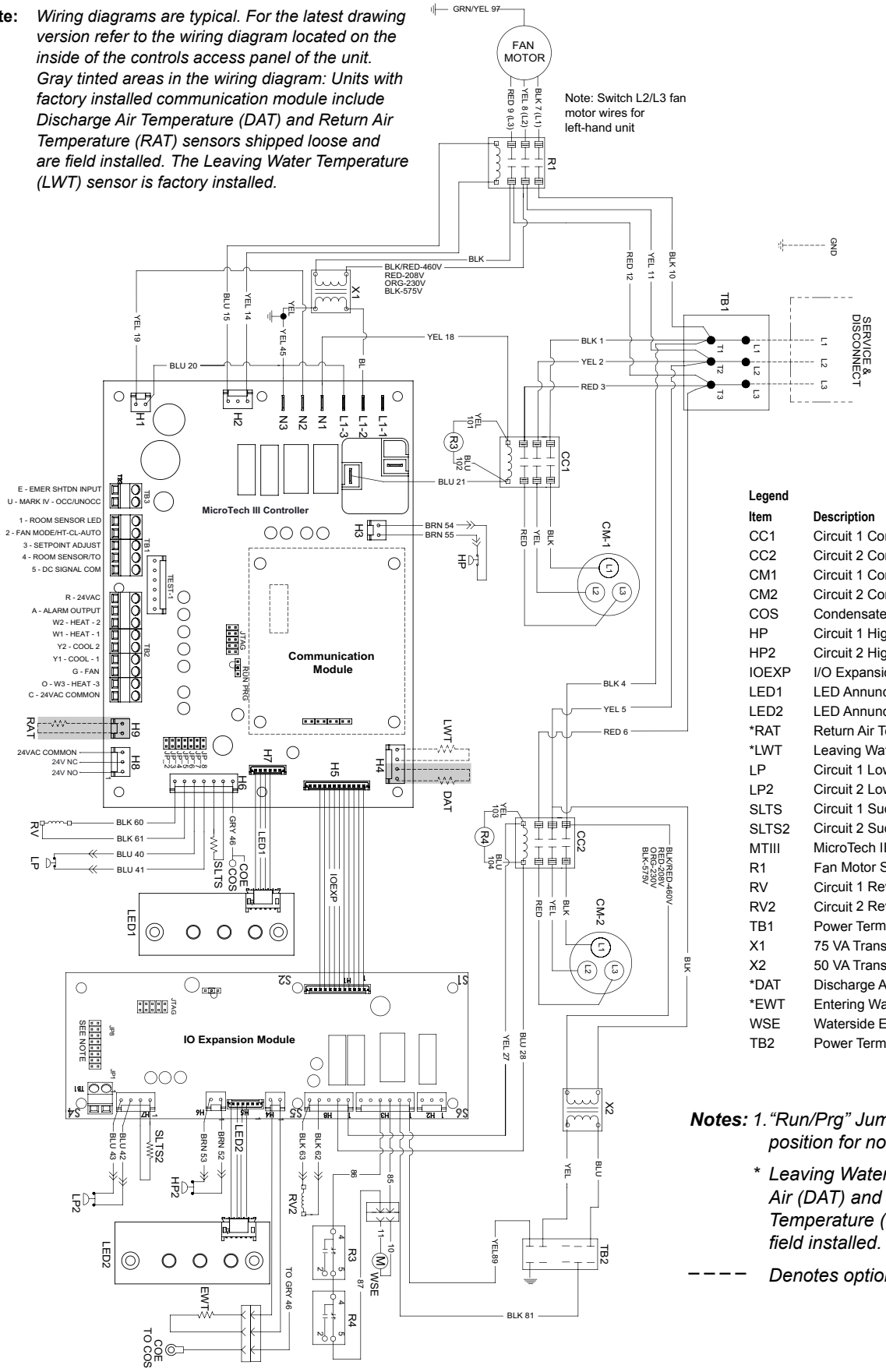
Notes: *1."Run/Prg" Jumper to be in "Run" position for normal operation*

** Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.*

– – – – *Denotes optional feature*

MicroTech III controller with I/O expansion module – with waterside economizer 208/230, 460, 575-60-3

Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit. Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.*



Legend

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
HP2	Circuit 2 High Pressure Switch
IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
*RAT	Return Air Temperature
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
LP2	Circuit 2 Low Pressure Switch
SLTS	Circuit 1 Suction Line Temp Sensor
SLTS2	Circuit 2 Suction Line Temp Sensor
MTIII	MicroTech III Main Board
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
X2	50 VA Transformer
*DAT	Discharge Air Temp Sensor
*EWT	Entering Water Temp Sensor
WSE	Waterside Economizer
TB2	Power Terminal Block

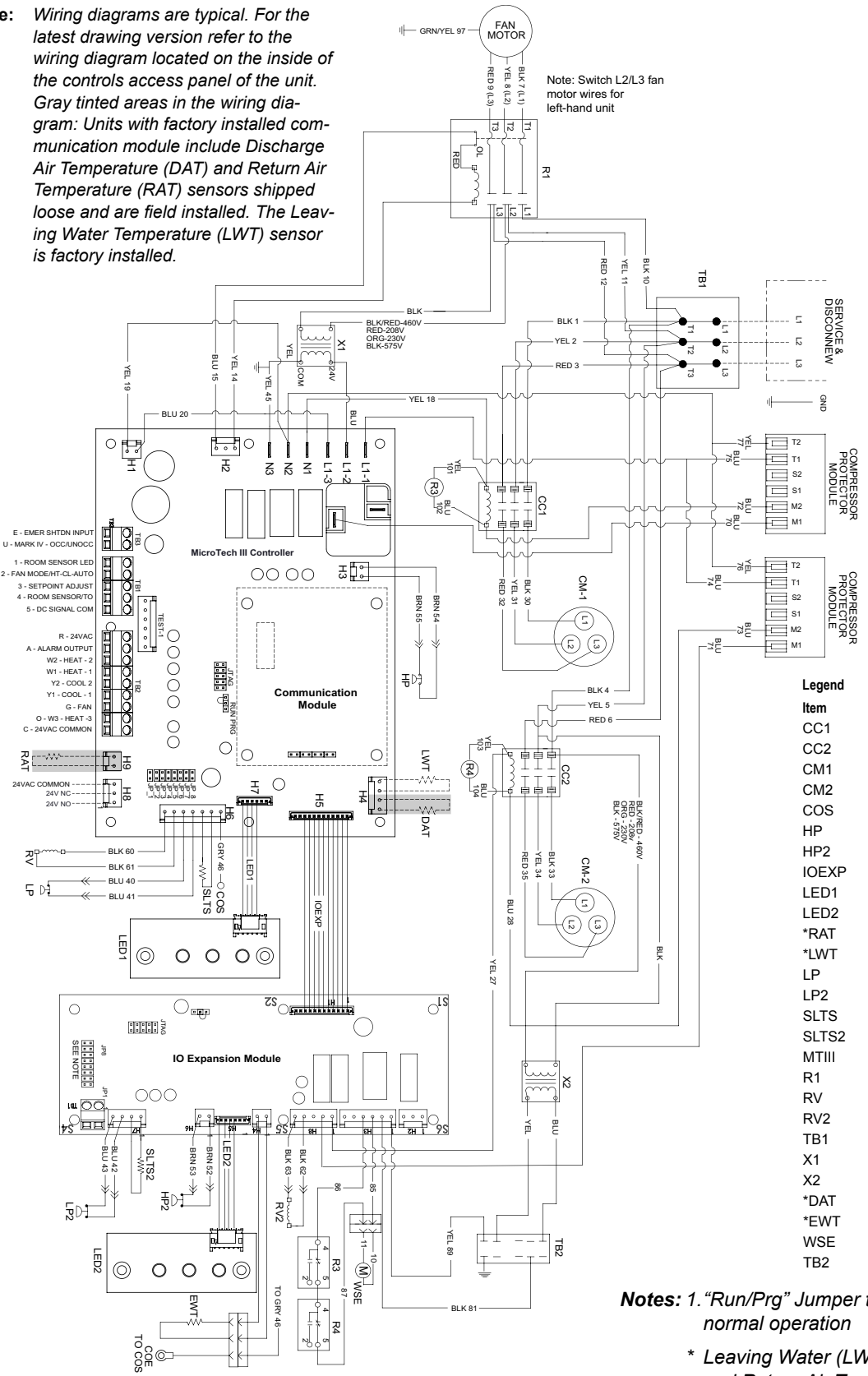
Notes: *1."Run/Prg" Jumper to be in "Run" position for normal operation*

** Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.*

– – – – *Denotes optional feature*

MicroTech III controller with I/O expansion module – with waterside economizer 208/230, 460, 575-60-3

Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit. Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.*



Legend

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
HP2	Circuit 2 High Pressure Switch
IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
*RAT	Return Air Temperature
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
LP2	Circuit 2 Low Pressure Switch
SLTS	Circuit 1 Suction Line Temp Sensor
SLTS2	Circuit 2 Suction Line Temp Sensor
MTIII	MicroTech III Main Board
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
X2	50 VA Transformer
*DAT	Discharge Air Temp Sensor
*EWT	Entering Water Temp Sensor
WSE	Waterside Economizer
TB2	Power Terminal Block

Notes: *1."Run/Prg" Jumper to be in "Run" position for normal operation*

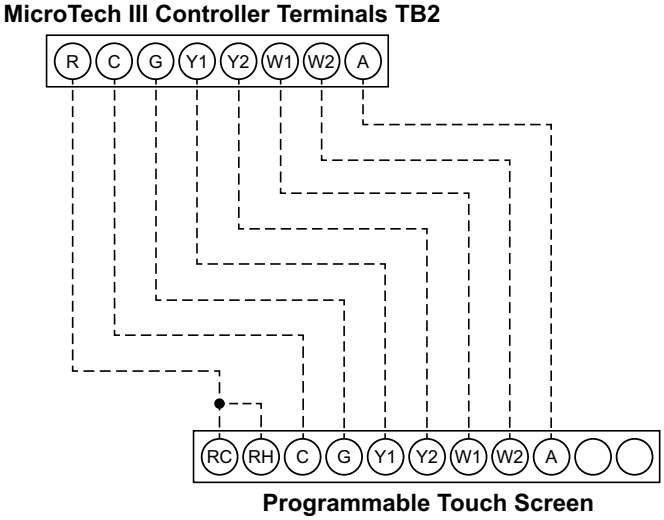
** Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.*

– – – – *Denotes optional feature*

Typical Connections For Thermostats & Temperature Sensors

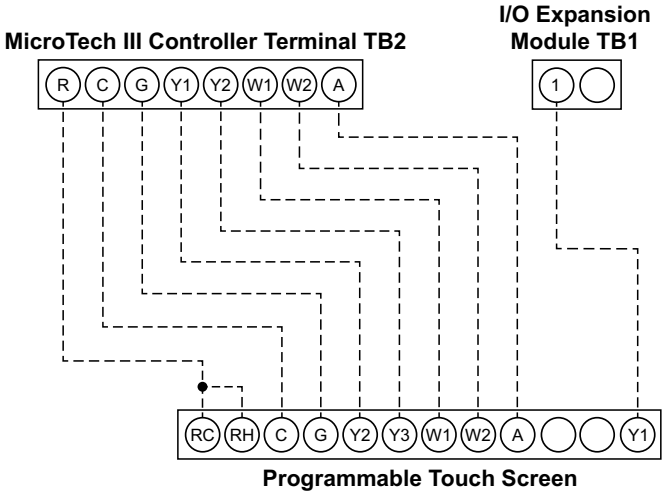
Thermostats & Remote Sensors Used with MicroTech III –Standalone Operation

Figure 19: Programmable Electronic Thermostat 2 Heat/2 Cool, 7-Day Programmable, Auto Changeover, Hardwired – P/N 910193126 & Wi-Fi P/N 910193131



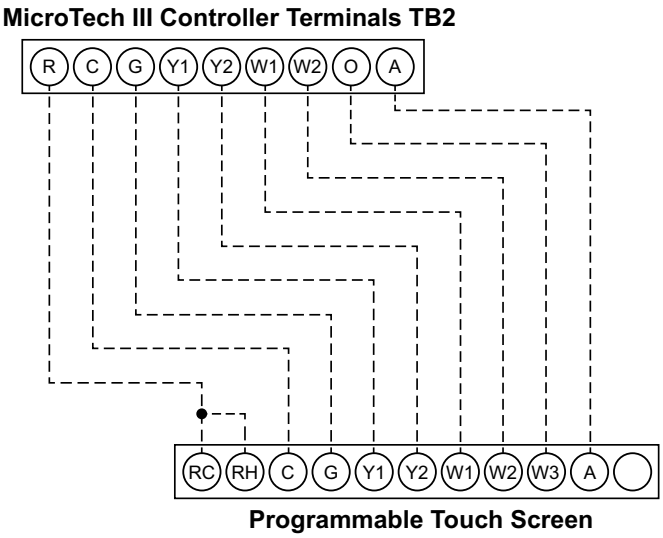
Notes: *Includes thermostat and wall plate Refer to IO manual 910193126*

Figure 20: Programmable Electronic Thermostat 2 Heat/3 Cool, 7-Day Programmable, Auto Changeover, Hardwired – P/N 910193127 & Wi-Fi P/N 910193132



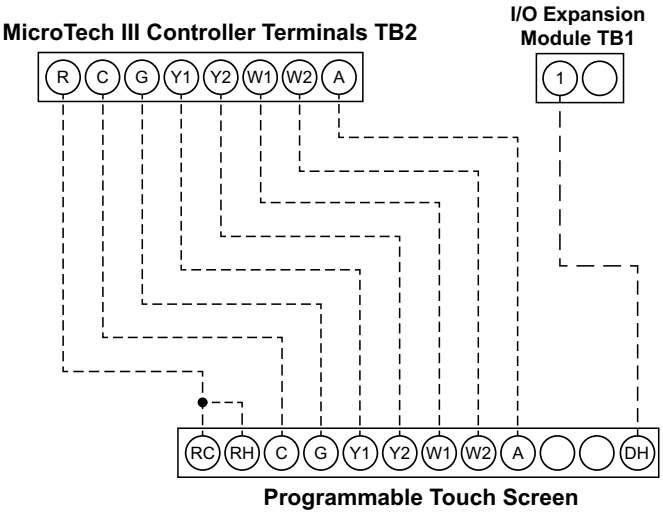
Notes: *Includes thermostat and wall plate Refer to IO manual 910193127*

Figure 21: Programmable Electronic Thermostat 3 Heat/2 Cool, 7-Day Programmable, Auto Changeover, Hardwired – P/N 910193128 & Wi-Fi P/N 910193133



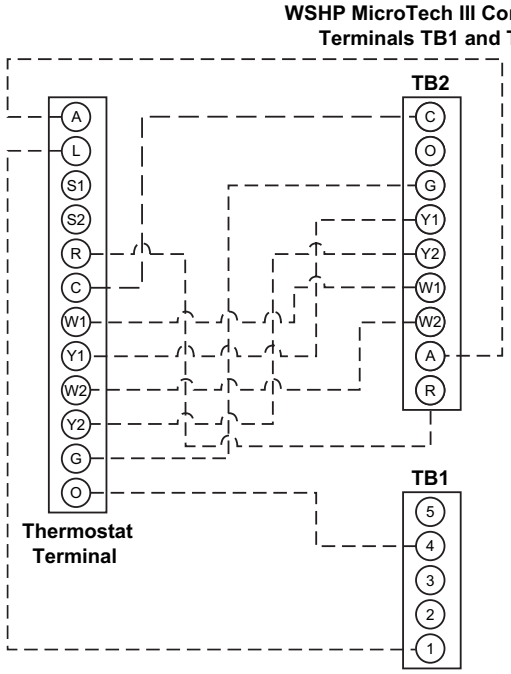
Notes: *Includes thermostat and wall plate Refer to IO manual 910193128*

Figure 22: Programmable Electronic Thermostat 2 Heat/2 Cool, 7-Day Programmable, Dehumidification, Auto Changeover, Hardwired – P/N 910193129 & Wi-Fi P/N 910193134



Notes: *Includes thermostat and wall plate Refer to IO manual 910193129*

Figure 23: Programmable & Non-Programmable Electronic Thermostats 2 Heat/2 Cool, Auto Changeover, Hardwired – P/N 910121746 & P/N 910121748



Notes: *Includes thermostat and wall plate. Refer to 910121746 or 910121748 Install Manual.*

Figure 24: Remote Room Sensor Used With Thermostats 910121746 & 910121748 – P/N 107096010

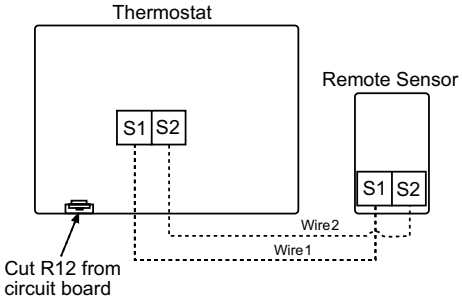
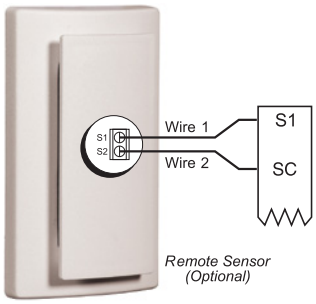


Figure 25: Remote Room Sensor Used With Thermostats 910193126, 910193127, 910193128, 910193129, 910193131, 910193132, 910193133, 910193134 – P/N 667720401



Sensors used with MicroTech III control Building Automated System Operation

Figure 26: Digitally Adjustable Display Sensor (6-button) – P/N 910121754

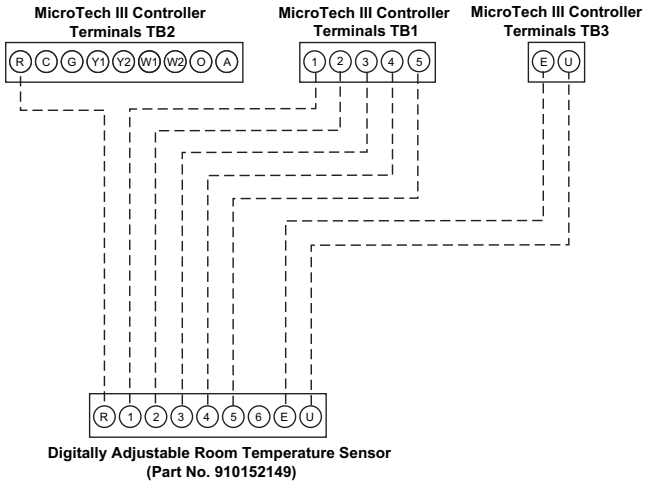


Figure 27: Digitally Adjustable Display Sensor (4-button) – P/N 910152147

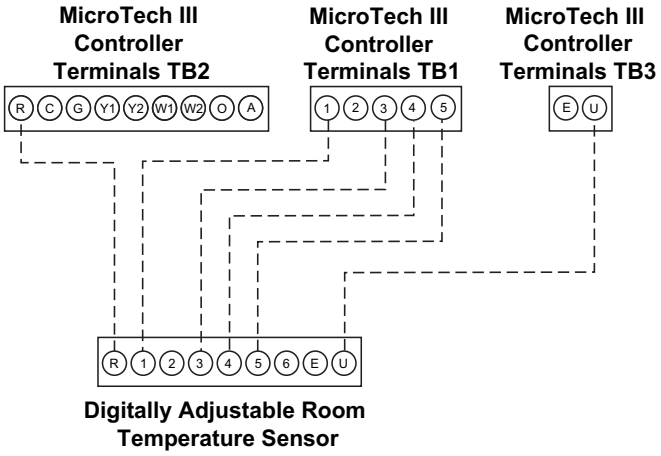


Figure 28: Cool/Warm Adjustable Sensor – P/N 910171464

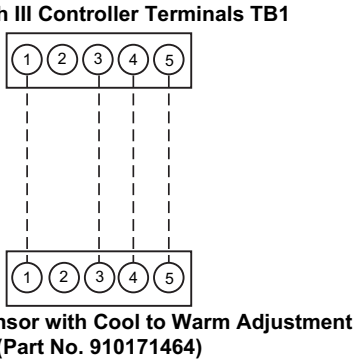
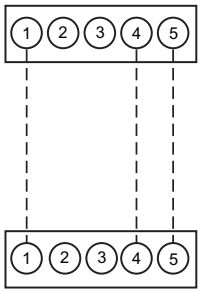


Figure 29: Basic sensor – P/N 910152149

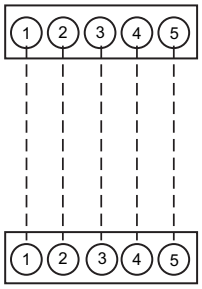
MicroTech III Controller Terminals TB1



Basic Room Sensor (Part No.s 669529001, 910152149)

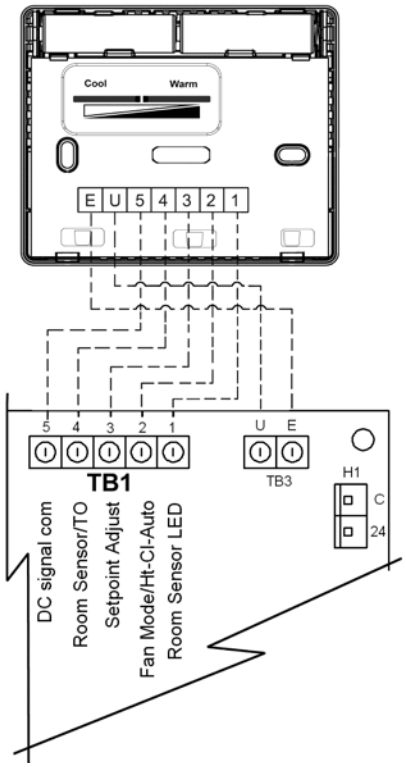
Figure 30: Room sensor with temperature adjustment wiring

MicroTech III Controller Terminals TB1



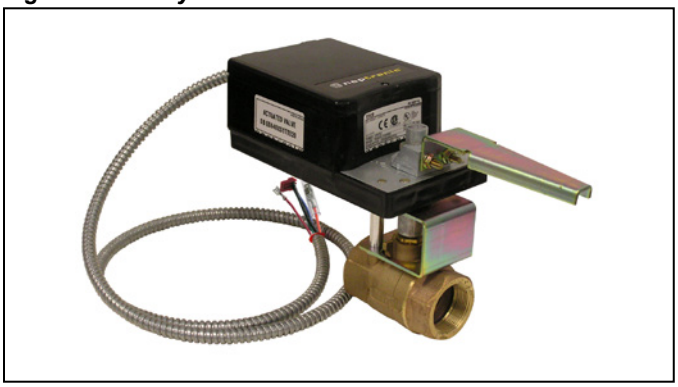
Room Sensor with Temperature Adjustment (Part No.s 669529101, 669529201, 910121753)

Figure 31: Adjustable Cool/Warm with Occupancy Switch – P/N 910121753



2-way motorized isolation valve

Figure 32: 2-way motorized isolation valve



Used in variable pumping type applications, the valve actuator is wired and typically piped in the return water line. The 2-way motorized water valve kit includes the valve body, actuator and wire harness. The 24VAC valve actuator must be wired directly to terminal block H8 on the MicroTech III controller. See Figure 34 on page 35 for wiring details. The valve will only energize on a call for heating or cooling. The 1-1/4" valve is rated for 300 psig (2068 kPa and the 1-1/2" valve is rated for 150 psig (1034 kPa).

Figure 33: Power open, power closed motorized valve

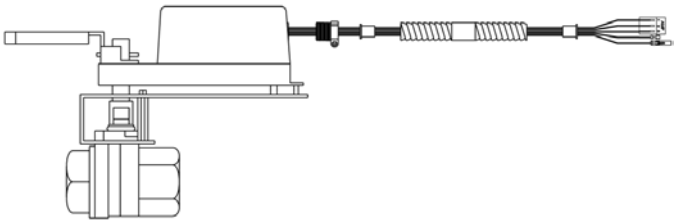


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Figure 34: 2-way motorized valve wiring to MicroTech III controller

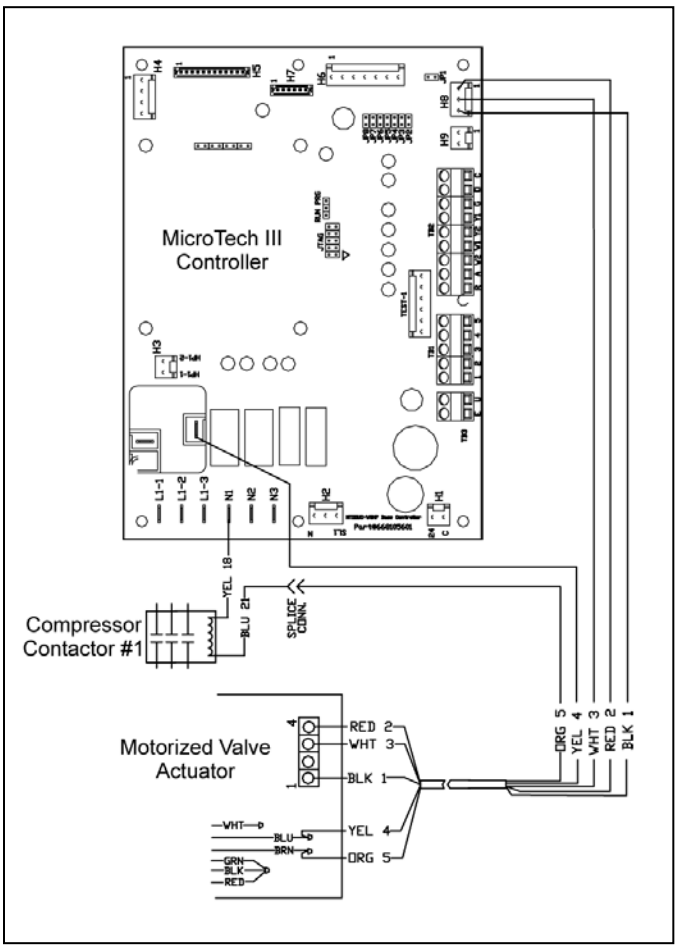
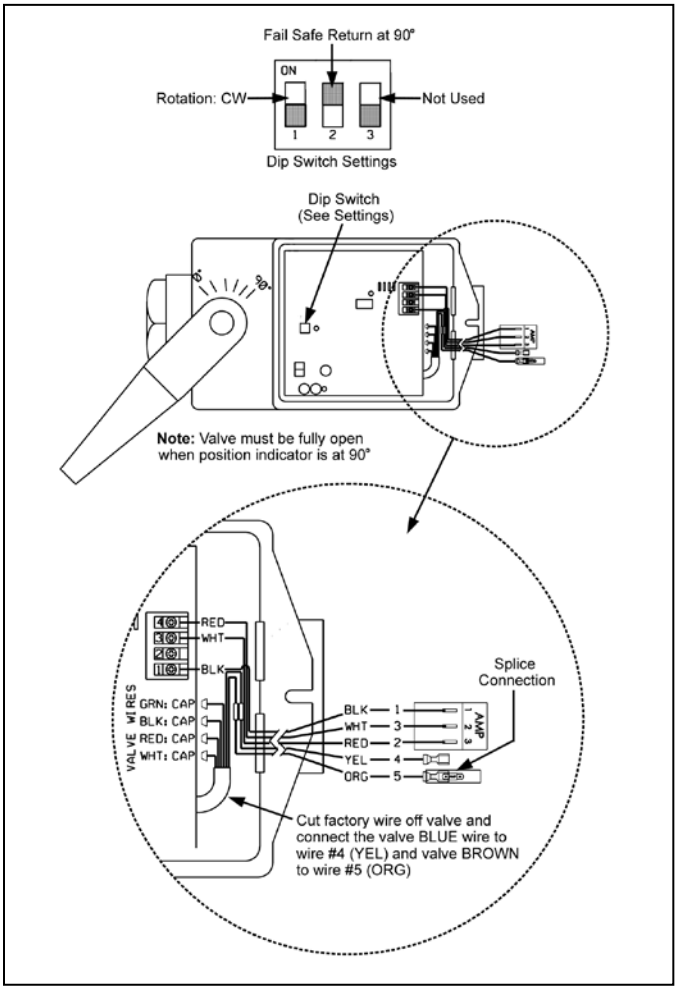


Figure 35: 2-way motorized valve wiring details



MicroTech III unit controller and I/O expansion module status LED's and fault outputs

Table 16: MicroTech III controller status LED's & fault outputs

Description	Type*	Yellow	Green	Red
I/O Expansion Communication Fail	Fault	ON	Flash	Flash
Invalid Configuration	Fault	Flash	Flash	OFF
Low Voltage Brownout	Fault	OFF	Flash	OFF
Emergency Shutdown	Mode	OFF	Flash	OFF
Compressor #1 High Pressure (HP1)	Fault	OFF	OFF	Flash
Compressor #1 Low Pressure (LP1)	Fault	OFF	OFF	ON
Compressor #1 Suction Temp Sensor Fail	Fault	Flash	Flash	ON
Freeze Fault Detect (Freeze Fault Protection Only)	Fault	Flash	OFF	Flash
Compressor #1 Low Suction Temp (LT1)	Fault	Flash	OFF	OFF
Room Temp Sensor Fail (with Room Sensor Control Only)	Fault	Flash	Flash	ON
Leaving Water Temp Sensor Fail (Freeze Fault Protection Only)	Fault	Flash	Flash	ON
Condensate Overflow (Cooling & Dehumidification Modes Only)	Fault	ON	OFF	OFF
Serial EEPROM Corrupted	Fault	ON	ON	ON
Service Test Mode Enabled	Mode	Flash	Flash	Flash
Unoccupied Mode	Mode	ON	ON	OFF
Occupied, Bypass, Standby, or Tenant Override Modes	Mode	OFF	ON	OFF

Note: ** The MicroTech III baseboard LED's mode / faults are listed in order of priority.*

Table 17: I/O expansion module status LED's & fault outputs

Description	Type	Yellow	Green	Red
Baseboard Communication Fail	Fault	OFF	Flash	Flash
Compressor #2 High Pressure (HP2)	Fault	OFF	OFF	Flash
Compressor #2 Low Pressure (LP2)	Fault	OFF	OFF	ON
Compressor #2 Low Suction Temp (LT2) Sensor Fail	Fault	Flash	Flash	ON
Compressor #2 Low Suction Temp (LT2)	Fault	Flash	OFF	OFF
Entering Water Temp Sensor Fail (with Boilerless Electric Heat and Waterside Economizer)	Fault	ON	OFF	Flash
Low Entering Water Temperature (No Display with Boilerless Electric Heat)	Fault	OFF	ON	Flash
Fan is OFF	Mode	OFF	ON	OFF
Fan is ON	Mode	OFF	Flash	OFF

Note: *Mode / Faults are listed in order of priority.*

MicroTech III unit controller LED faults and remedy

Table 18: I/O expansion communication fail

Description	Type	Yellow	Green	Red
I/O Expansion Communication Fail	Fault	ON	Flash	Flash

- *Verify connection of 12 wire cable between H5 on the main board and H1 on the I/O expansion board is fully engaged in the connector.*
- *Verify run program jumper on the I/O expansion board is installed in the run position.*
- *Replace the run jumper with a spare jumper.*
- *Replace I/O expansion board.*

Table 19: Invalid configuration

Description	Type	Yellow	Green	Red
Invalid Configuration	Fault	Flash	Flash	OFF

- *Verify jumper selection on both the main board and I/O expansion board. Jumper selections must be verified using the jumper configuration setting outline in this manual.*

Table 20: Low voltage brownout / emergency shutdown

Description*	Type	Yellow	Green	Red
Low Voltage Brownout	Fault	OFF	Flash	OFF
Emergency Shutdown	Mode	OFF	Flash	OFF

** Same LED display for both conditions*

- *Verify the E terminal is not connected to common. Remove wire, if connected, and LED should change to solid green only.*
- *Confirm the low voltage supply is between 19-32VAC at the H1 terminal of the main board. If the low voltage supply is out of range, verify the unit supply voltage matches the nameplate voltage and the correct transformer primary wire has been selected.*

Table 21: Compressor high pressure

Description	Type	Yellow	Green	Red
Compressor High Pressure	Fault	OFF	OFF	Flash

- *Verify high pressure switch is connected to terminal H3 on the main board.*
- *Check for continuity of the high pressure switch.*

If the high pressure fault resets when power is recycled:

- *Check water flow (cooling operation)*
- *Check airflow (heating operation)*
- *Entering water and air temperatures should be within the operating limits.*

Table 22: Compressor low pressure

Description	Type	Yellow	Green	Red
Compressor Low Pressure	Fault	OFF	OFF	ON

- *Loose wire connection on low pressure circuit*
- *Failed low pressure switch*
- *Unit is low on charge*

Table 23: Compressor suction temp sensor fail, room temp sensor fail, leaving water temp sensor fail

Description	Type	Yellow	Green	Red
Compressor Suction Temp Sensor Fail	Fault	Flash	Flash	ON
Room Temp Sensor Fail (Room Sensor Control Only)	Fault	Flash	Flash	ON
Leaving Water Temp Sensor Fail	Fault	Flash	Flash	ON

- *Check connection of low suction temperature sensor on terminal H6 pins 2 and 3.*
- *Check resistance of low suction temperature sensor, leaving water temperature sensor, and room sensor or return air sensor. All sensors are 10kohm thermistor @77°F.*
- *Return air sensor and room sensor shall not be connected simultaneously.*

Table 24: Compressor low suction temp

Description	Type	Yellow	Green	Red
Compressor Low Suction Temp	Fault	Flash	OFF	OFF

- *Check water flow (heating operation)*
- *Check airflow (cooling operation)*
- *Entering water and air temperatures should be within the operating limits.*

Table 25: Freeze fault detect

Description	Type	Yellow	Green	Red
Freeze Fault Detect	Fault	Flash	OFF	Flash

- *Low entering water temperature (below 35°F standard range or 13.5°F extended range)*

Table 26: Condensate overflow

Description	Type	Yellow	Green	Red
Condensate Overflow	Fault	ON	OFF	OFF

- *Poor condensate drain*
- *Check the resistance to ground on condensate wire. This should be open if there is no water in the pan.*

Table 27: Serial EEPROM corrupted

Description	Type	Yellow	Green	Red
Serial EEPROM Corrupted	Fault	ON	ON	ON

- *Replace main board*

Table 28: Waterside economizer low temp cutout (WSE control & call for cooling)

Description	Type	Yellow	Green	Red
Waterside Economizer Low Temp Cutout (WSE Control & Call for Cooling)	Mode	Flash	ON	Flash

- *Water temperature is below 35°F.*

Table 29: Service test mode enabled

Description	Type	Yellow	Green	Red
Service Test Mode Enabled	Mode	Flash	Flash	Flash

- *Jumper JP1 is shorted for test mode operation.*

Table 30: Unoccupied mode

Description	Type	Yellow	Green	Red
Unoccupied Mode	Mode	ON	ON	OFF

- *Terminal U on main control board is connected to common from external source.*

Table 31: Occupied, bypass, standby, or tenant override modes

Description	Type	Yellow	Green	Red
Occupied, Bypass, Standby, or Tenant Override Modes	Mode	OFF	ON	OFF

- *Unit is operating normal. It may currently have a control signal or ready to operate when a control signal is active.*

I/O expansion module LED faults and remedy

Table 32: Baseboard communication fail

Description	Type	Yellow	Green	Red
Baseboard Communication Fail	Fault	Flash	OFF	Flash

- *Verify jumper JP8 on main board is shorted.*
- *Verify connection of cable between H5 on main board and H1 on I/O expansion board.*

Table 33: Compressor #2 high pressure

Description	Type	Yellow	Green	Red
Compressor #2 High Pressure	Fault	OFF	OFF	Flash

- *Verify high pressure switch is connected to terminal HP2 on the I/O expansion.*
- *Check for continuity of the high pressure switch.*

If the high pressure fault resets when power is recycled:

- *Check water flow (cooling operation)*
- *Check airflow (heating operation)*
- *Entering water and air temperatures should be within the operating limits*

Table 34: Compressor #2 low pressure

Description	Type	Yellow	Green	Red
Compressor #2 Low Pressure	Fault	OFF	OFF	ON

- *Loose wire connection on low pressure circuit*
- *Failed low pressure switch*
- *Circuit #2 is low on charge*

Table 35: Compressor #2 low suction temp

Description	Type	Yellow	Green	Red
Compressor #2 Low Suction Temp	Fault	Flash	OFF	OFF

- *Check water flow (heating operation)*
- *Check airflow (cooling operation)*
- *Entering water and air temperatures should be within the operating limits.*

Table 36: Compressor #2 low suction temp

Description	Type	Yellow	Green	Red
Compressor #2 Low Suction Temp	Fault	Flash	OFF	OFF

- *Check water flow (heating operation)*
- *Check airflow (cooling operation)*
- *Entering water and air temperatures should be within the operating limits.*

Table 37: Compressor suction temp sensor fail

Description	Type	Yellow	Green	Red
Compressor Suction Temp Sensor Fail	Fault	Flash	OFF	OFF

- *Check connection of low suction temperature sensor on terminal H7 pins 1 and 2.*
- *Check resistance of low suction temperature sensor. All sensors are 10kohm thermistor @77°F.*

Table 38: Entering water temp sensor fail (boilerless electric heat or waterside economizer only)

Description	Type	Yellow	Green	Red
Entering Water Temp Sensor Fail (Boilerless Electric Heat or Waterside Economizer Only)	Fault	ON	OFF	Flash

- *Verify connections at terminals H4 on the I/O expansion board*
- *Verify resistance of EWT thermistor is 10K @ 77°F.*

Table 39: Low entering water temperature (no display on boilerless electric heat)

Description	Type	Yellow	Green	Red
Low Entering Water Temperature (No Display On Boilerless Electric Heat)	Fault	OFF	ON	Flash

- *Verify entering water temperature is greater than set point.*

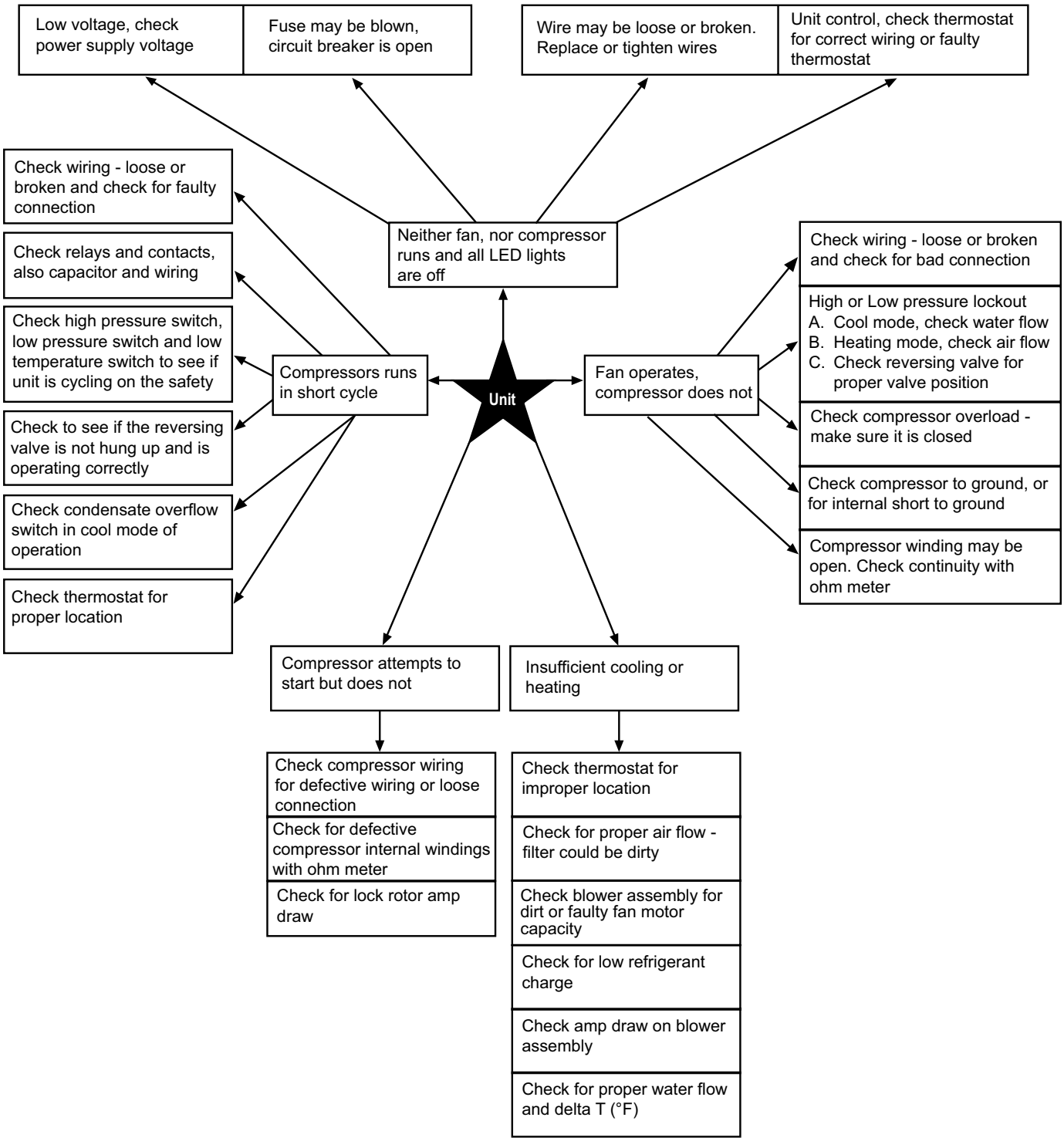
Troubleshooting refrigeration circuit

Figure 36: Troubleshooting refrigeration circuit

Symptom	Head Pressure	Suction Pressure	Compressor Amp Draw	Super Heat	Subcooling	Air Temp Differential	Water (loops) Temp Differential	Safety Lock Out
Charge Undercharge System (Possible Leak)	Low	Low	Low	High	Low	Low	Low	Low Pressure
Overcharge System	High	High	High	Normal	High	Normal Low	Normal	High Pressure
Low Air Flow Heating	High	High	High	High Normal	Low	High	Low	High Pressure
Low Air Flow Cooling	Low	Low	Low	Low Normal	High	High	Low	Low Temp
Low Water Flow Heating	Low Normal	Low Normal	Low	Low	High	Low	High	Low Temp
Low Water Flow Cooling	High	High	High	High	Low	Low	High	High Pressure
High Air Flow Heating	Low	Low	Low	Low	High	Low	Low	Low Temp
High Air Flow Cooling	Low	High	Normal	High	Low	Low	Normal	High Pressure
High Water Flow Heating	Normal	Low	Normal	High	Normal	Normal	Low	High Pressure
High Water Flow Cooling	Low	Low	Low	Low	High	Normal	Low	Low Temp
TXV Restricted	High	Low	Normal Low	High	High	Low	Low	

Troubleshooting the water source heat pump unit

Figure 37: Troubleshooting guide - unit operation



Lubrication

R-410A should be used only with polyester (POE) oil. The HFC refrigerant components in R-410A will not be compatible with mineral oil or alkylbenzene lubricants. R-410A systems will be charged with the OEM recommended lubricant, ready for use with R-410A.

Charging

Due to the zeotropic nature of R-410A, it should be charged as a liquid. In situations where vapor is normally charged into a system, a valve should be installed in the charging line to flash the liquid to vapor while charging.

Make certain that the recycle or recovery equipment used is designed for R-410A. The pressure of R-410A refrigerant is approximately 60 percent greater than that of R-22. Pressure gauges require a range up to 800 PSIG high side and 250 PSIG low side. Recovery cylinders require a 400 PSIG rating – do not put R-410A in a 300 PSIG rated cylinder.

⚠ WARNING

Recycle/recovery equipment must be designated for R-410A. R-410A pressure is greater than R-22. Improper equipment can cause severe injury or death.

Note: *Because a water source heat pump operates under a wide range of water and air temperatures, the values printed below are to be taken as suggested pressure and temperatures.) All Daikin water source heat pumps are designed for commercial use. The units are designed for the cooling mode of operation and fail safe to cooling. The reversing valve is energized for the heating mode of operation.*

Superheat	*Head pressure*	*Water Delta T*
8 to 14 degrees	335-355 PSIG	10° to 14°

Note: All information above is based on ISO standard 13256-1 and tested at these conditions.

General maintenance

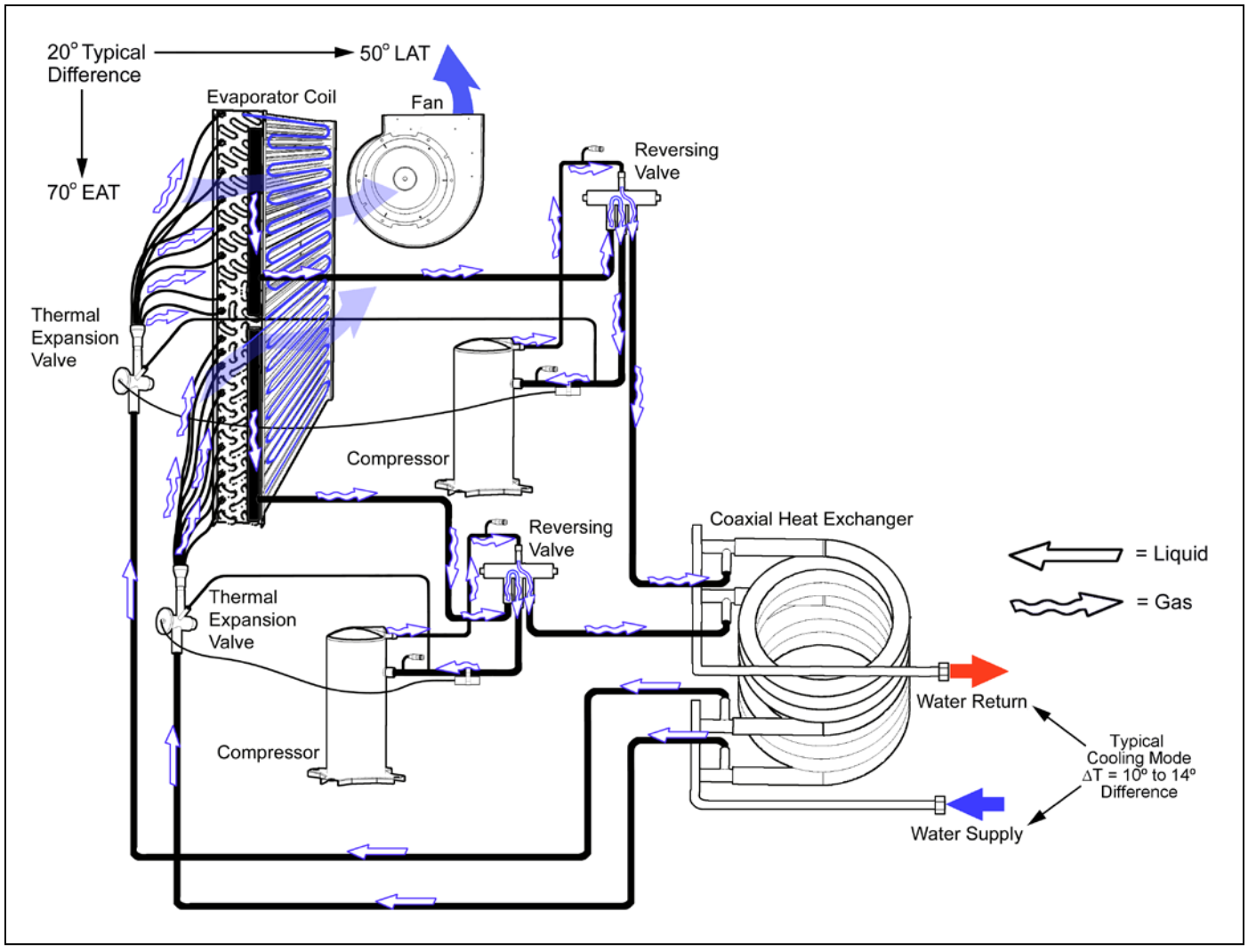
1. Normal maintenance on all units is generally limited to filter changes. Units are provided with permanently lubricated motors and require no oiling even though oil caps may be provided.
2. Filter changes are required at regular intervals. The time period between changes will depend upon the project requirements. Some applications such as motels produce a lot of lint from carpeting and linen changes, and will require more frequent filter changes. Check filters at 60-day intervals for the first year until experience is acquired. If light cannot be seen through the filter when held up to sunlight or a bright light, it should be changed. A more critical standard may be desirable.
3. The condensate drain pan should be checked annually and cleaned and flushed as required.
4. Record performance measurements of volts, amps, and water temperature differences (both heating and cooling). A comparison of logged data with start-up and other annual data is useful as an indicator of general equipment condition.
5. Periodic lockouts almost always are caused by air or water problems. The lockout (shutdown) of the unit is a normal protective result. Check for dirt in the water system, water flow rates, water temperatures, airflow rates (may be a dirty filter), and air temperatures. If the lockout occurs in the morning following a return from night setback, entering air below machine limits may be the cause.
6. Fan shaft bearings should be periodically greased using any good quality lithium or lithium complex base grease, using mineral oil, conforming to NLGI grade 2 consistency, and an oil viscosity of 455-1135SUS at 100°F (100-200 cSt at 40°C). Compatibility of grease is critical. Lubricatable bearings are supplied with grease fittings or zerks for ease of lubrication with hand or automatic grease guns. Always wipe the fitting and grease nozzle clean.

Typical cooling refrigeration cycle – dual compressors

Note: *Typical temperature readings are at full load conditions at ISO-13256 for boiler-tower applications.*

When the wall thermostat calls for COOLING, the reversing valve (de-energized) directs the flow of the refrigerant, a hot gas, from the compressor to the water-to-refrigerant heat exchanger (coaxial heat exchanger). There, the heat is removed by the water, and the hot gas condenses to become a liquid. The liquid then flows through a thermal expansion valve to the air-to-refrigerant heat exchanger coil (evaporator). The liquid then evaporates and becomes a gas, at the same time absorbing heat and cooling the air passing over the surfaces of the coil. The refrigerant then flows as a low pressure gas through the reversing valve and back to the suction side of the compressor to complete the cycle.

Figure 38: Cooling refrigeration cycle



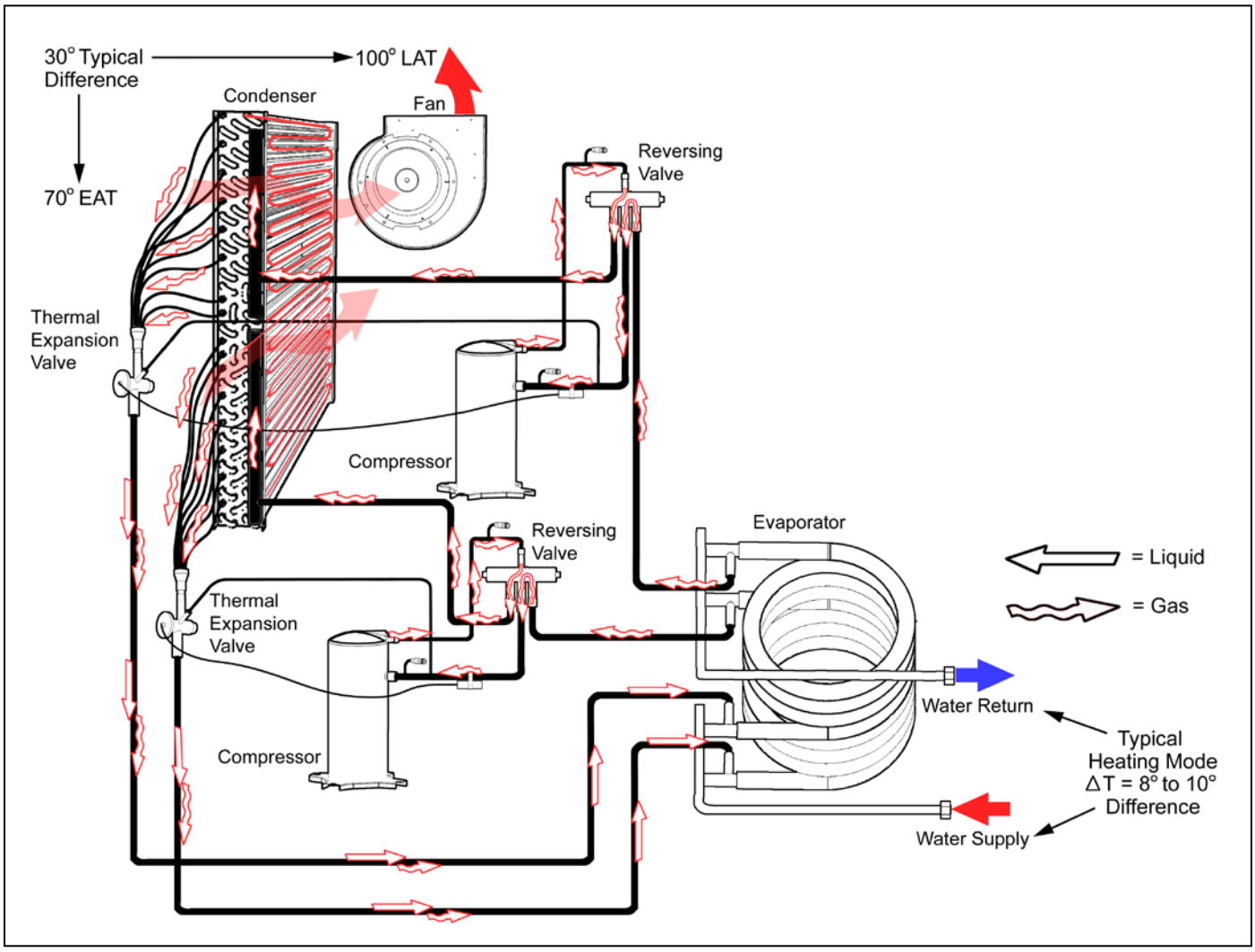
Typical heating refrigeration cycle – dual compressors

Note: *Typical temperature readings are at full load conditions at ISO-13256 for boiler-tower applications.*

When the wall thermostat calls for HEATING, the reversing valve (energized) directs the flow of the refrigerant, a hot gas, from the compressor to the air-to-refrigerant heat exchanger coil (condenser).

There, the heat is removed by the air passing over the surfaces of the coil and the hot gas condenses and becomes a liquid. The liquid then flows through a thermal expansion valve to the water-to-refrigerant heat exchanger (evaporator). The liquid then evaporates and becomes a gas, at the same time absorbing heat and cooling the water. The refrigerant then flows as a low pressure gas through the reversing valve and back to the suction side of the compressor to complete the cycle.

Figure 39: Heating refrigeration cycle

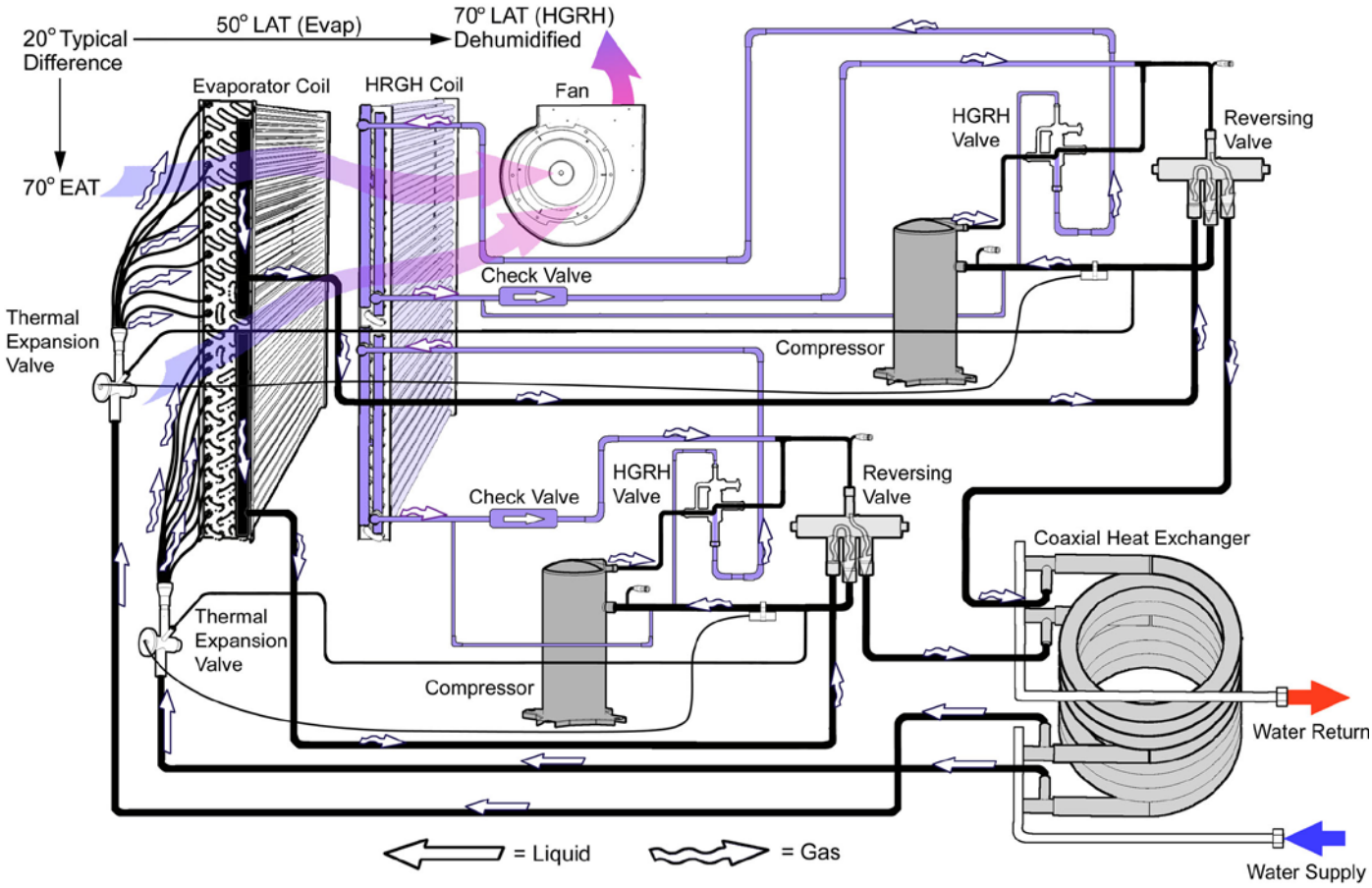


Typical hot gas reheat refrigeration cycle – dual compressors

When the DEHUMID setting is not satisfied and COOLING has been satisfied the reversing valve remains (de-energized) but the hot gas reheat (HGRH) valve is (energized). This directs the flow of the refrigerant, a hot gas, from the compressor through the hot gas reheat (HGRH) coil thus heat is removed from the refrigerant gas to reheating the cooled air from the evaporator coil.

Then the refrigerant flows to the water-to-refrigerant heat exchanger (coaxial heat exchanger). There, the heat is removed by the water, and the hot gas condenses to become a liquid. The liquid then flows through a thermal expansion valve to the air-to-refrigerant heat exchanger coil (evaporator). The liquid then evaporates and becomes a gas, at the same time absorbing heat and cooling the air passing over the surfaces of the coil. The refrigerant then flows as a low pressure gas through the reversing valve and back to the suction side of the compressor to complete the cycle.

Figure 40: Hot gas reheat refrigeration cycle



DAIKIN

Water source heat pump equipment check, test and start form

This form must be completed and submitted within ten (10) days of start-up to comply with the terms of the Daikin warranty. Forms should be returned to Daikin Warranty Department.

Installation Data

Job Name _____ Check, Test & Start Date _____

City or Town _____ State _____ Zip _____

Who is Performing CTS _____

General Contractor _____

Equipment Type (Check all that apply)

☐ Closed Loop ☐ Open Loop

☐ Geothermal ☐ Other (specify)_____

Essential Items Check of System – *Note:* *"No" answers below require notice to installer by memorandum (attached copy.)*

Essential Items Check

A. Voltage Check_____ Volts Loop Temp._____ °F Heating Set For _____ °F Cooling System Water P.H. Levels _____

B. Yes	No	Condition	Comments
☐	☐	Loop Water Flushed Clean	
☐	☐	Closed Type Cooling Tower	
☐	☐	Water Flow Rate to Heat Pump Balanced	
☐	☐	Standby Pump Installed	
☐	☐	System Controls Functioning	
☐	☐	Outdoor Portion of Water System Freeze Protected	
☐	☐	Loop System Free of Air	
☐	☐	Filters Clean	
☐	☐	Condensate Traps Installed	

Note: "No" answers below require notice to installer by memorandum (attached copy.)

☐	☐	Outdoor Air to Heat Pumps:	
☐	☐	Other Conditions Found:	

Please include any suggestions or comments for Daikin Applied: _____

_____

_____

_____

Above System is in Proper Working Order

Note: *This form must be filled out and sent to the warranty administrator before any service money can be released.*

_____
Date

_____
Signature for Sales Representative

_____
Signature for Customer

For Internal Use

Release:

SM _____

CTS _____

T _____

_____
Service Manager Approval

_____
Date

Form WS-CTS-00.01 (Rev. 4/14)

Unit check / equipment data

Installation Data

Job Name _____ Check Test Date: _____

City _____ State _____ Zip _____

Daikin Model # _____

Daikin Serial # _____ Job site Unit ID # (HP #)_____

General Contractor:_____ Mechanical Contractor:_____

Technician Performing Start-Up: Name_____ Employer:_____

Complete equipment data from measurements taken at the locatons indicated on the drawing below.

Equipment Data

Flow Rate **EWP - LWP = ΔP**

(1) EWP - PSI In _____ minus (2) LWP - PSI Out _____ equals ΔP _____

The first step in finding GPM is to subtract leaving water pressure from entering water pressure. The difference between the two is referred to as ΔP. ΔP can be converted to GPM by looking in the equipment specificaton catalog. **Caution ΔP ≠ GPM**

Note: A conversion table must be used to find GPM from (Delta) ΔP measurements.

Loop Fluid Temperature Rise / Drop through Coaxial Heat Exchanger **EWT - LWT = ΔT**

(3) EWT - °F Out_____ minus (4) LWT - °F Out_____ equals Fluid ΔT _____

ΔT is the rise or drop in the fluid temperature as it passes through the Coaxial.

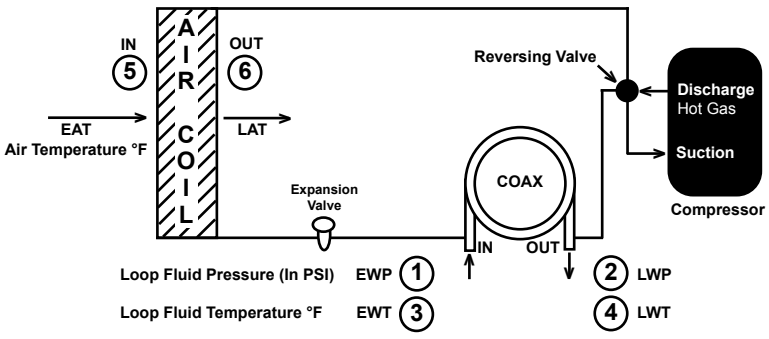
Air Temperature Rise / Drop through the air coil **ΔT x CFM x 1.08 = BTUH Sensible**

(5) EAT - °F In_____ minus (6) LAT - °F Out _____ equals Air ΔT_____

Note: Perform Check, Test and Start-Up in the Cooling Mode Only.

EWT - Entering Water Temperature
EWP - Entering Water Pressure
EAT - Entering Air Temperature
Δ- Delta (Differential)
LWT - Leaving Water Temperature
LWP - Leaving Water Pressure
LAT - Leaving Air Temperature
CFM - Cubic Feet/Minute
BTUH - British Thermal Units/Hour

Check, Test & Start



Form No._____

Commercial check, test and start worksheet

(Complete all equipment measurements indicated for each unit per installation on previous page)

	Model	Serial #	H.P. #	EWT ③	LWT ④	EWP ①	LWP ②	EAT ⑤	LAT ⑥	Volts	Amps Cooling	Check Air Filter and Coil	Comments (more comments on next sheet)
1.													
2.													
3.													
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41.													
42.													

Part No._____

Notes / Comments

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Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. Refer to Form 933-430285Y. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787).
To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.