



Installation and Maintenance Manual

IM 1251-4

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SmartSource® Compact Vertical Water Source Heat Pump

Model GCV- Vertical Unit

Sizes 007 – 070



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1	2-3	4	5-7	8	9	10-11	12	13	14	15	16-17	18	19	20	21	22	23-24	25	26	
W	GC	V	007	E	1	LT	S	B	C	B	HG	1	1	P	F	S	75	C	D	
Category				Code Option		Code Designation		Description												
Product Category				1		W		=	Water Source Heat Pump											
Model Type				2-3		GC		=	Compact											
Configuration				4		V		=	Vertical											
Nominal Capacity				5-7		007		=	7,000 Btuh Nominal Cooling											
						009		=	9,000 Btuh Nominal Cooling											
						012		=	12,000 Btuh Nominal Cooling											
						015		=	15,000 Btuh Nominal Cooling											
						019		=	19,000 Btuh Nominal Cooling											
						024		=	24,000 Btuh Nominal Cooling											
						030		=	30,000 Btuh Nominal Cooling											
						042		=	42,000 Btuh Nominal Cooling											
						048		=	48,000 Btuh Nominal Cooling											
Voltage				8		A		=	115/60/1 (007-015)											
						E		=	208-230/60/1 (007-070)											
						F		=	208-230/60/3 (024-070)											
						J		=	265/60/1 (007-036)											
						K		=	460/60/3 (024-070)											
						L		=	575/60/3 (048-070)											
Design Series (Vintage)				9		1		=	Revision / Design Series 1											
Return Air / Discharge Air				10-11		LT		=	Left-Hand Return / Top Discharge											
						R		=	Right-Hand Return / Top Discharge											
Water Coil Type				12		C		=	Copper Inner Tube											
						S		=	Cupro-Nickel Inner Tube											
						G		=	Geothermal - Copper Inner Tube											
						J		=	Geothermal - Cupro-Nickel											
Unit Control				13		B		=	MicroTech III SmartSource Unit Controller											
						L		=	MicroTech III Unit Controller + LoN											
						B		=	MicroTech III Unit Controller + BACnet											
Fan Motor				14		P		=	PSC											
						C		=	ECM Constant CFM											
						T		=	ECM Constant Torque											
Insulation (Compressor Side / Airside)				15		B		=	Standard (1/2" Fiberglass, Entire Unit)											
						I		=	IAQ (Closed Cell Foam, Entire Unit)											
						D		=	Dual Layer Fiberglass (Entire Unit) (sizes 007-019)											
						F		=	Sound Blanket + Standard (1/2" Fiberglass)(sizes 024-070)											
						G		=	Sound Blanket + IAQ (Closed Cell Foam) (sizes 024-070)											
						H		=	Sound Blanket + Sound Package (1" Fiberglass / Dual Layer Fiberglass) (sizes 024-070)											
Options				16-17		WE		=	Waterside Economizer											
						HG		=	Hot Gas Reheat											
						HH		=	Hydronic Heat											
Filter & Racks				18		1		=	Standard 1" Rail - 1" Throwaway Filter											
						2		=	2" Rack - 2" Filter (MERV 8)											
						3		=	2" Rack - 2" Throwaway Filter											
						4		=	4" Rack - 4" Filter (MERV 13)											
						5		=	4" Rack - 2" Throwaway Filter											
Two-Way Motorized Valve				19		0		=	None											
						1		=	Isolation Valve (Normally Open)											
						2		=	Isolation Valve (Normally Closed)											
Electric Heat				20		0		=	None											
						P		=	Control for Electric Heat Single 24V Signal (Field Installed Duct Heater by Others)											
Freeze Fault Protection				21		0		=	None											
						F		=	Freeze Fault Protection											
Standard or Special				22		S		=	Standard											
						X		=	Special											
Transformer				23-24		50		=	50VA Transformer											
						75		=	75VA Transformer											
Corrosion Protection				25		0		=	None											
						C		=	Corrosion Protection											
Disconnect Switch				26		0		=	None											
						D		=	Disconnect Switch											

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.*

Safety, Receiving and Storage

⚠ CAUTION

Sharp edges can cause personal injury. Avoid contact with them.

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.

For storing, each carton is marked with "up" arrows.

The unit should be shipped or stored in the normal up-right position. 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. Units should not be installed in environments that fall below freezing or exceed 140°F ambient.

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.

⚠ WARNING

The installer must determine and follow all applicable local and national 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.

Pre-Installation Checklist

Check all that apply:

- ☐ To prevent damage, do not operate this equipment for supplementary ventilation, heating and cooling during the construction period.
- ☐ Inspect the carton for any specific tagging numbers indicated by the factory per a request from the installing contractor.
- ☐ Check the unit data plate for correct voltage, phase and capacity with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.

Table 1: Operating Voltages

Voltage	Minimum	Maximum
115/60/1	103	126
208-230/60/1	197	253
265/60/1	238	292
208-230/60/3	197	253
460/60/3	414	506
575/60/3	515	632

Note: Three-phase system imbalance shall not exceed 2%.

- ☐ If 460/60/3 unit includes a constant CFM EC motor verify that a 4-wire power supply is provided that includes a neutral wire providing 265 volt power to the fan motor.
- ☐ Check the unit size against the plans to verify that the unit is being installed in the correct location.
- ☐ Before installation, check the available ceiling height versus the height of the unit.
- ☐ 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.
- ☐ The installing contractor will find it beneficial to confer with piping, sheet metal, and electrical foremen before installing any unit.
- ☐ The contractor shall cover the units to protect the machines during building construction. 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.
- ☐ Remove shipping brackets securing unit to skid.

GCV Units

Table 2: Unit sizes 007 through 030

Description	Unit Size						
	007	009	012	015	019	024	030
Compressor Type	Rotary					Scroll	
Refrigeration Charge (Oz.)	19		18	28	29	32	39
Fan Wheel (D x W)	6" x 8"			9" x 7"			
PSC Fan Motor HP	1/10			1/6		1/4	1/3
EC Constant Torque Motor HP	1/10			1/3		1/3	
EC Constant CFM Motor HP	N/A			1/3		1/3 (1/2 for 460V)	
Water Connection Size (FPT)	1/2"					3/4"	
Coax Volume (Gal. @ 70°F)	0.07		0.09	0.11	0.12		0.22
Condensate Connection Size (FPT)	3/4						
Air Coil Face Area (Sq. Ft.)	1.17			1.83		2.29	
Filter Size (inches)	12" x 16" x 1"			16" x 20" x 1"		20" x 20" x 1"	
Operating Weight (Lbs.)	99	99	105	142	146	169	174
Shipping Weight (Lbs.)	127	127	133	170	174	197	202
Overall Cabinet Dimensions (W x D x H)	19 x 19 x 24			21.5 x 21.5 x 32		21.5 x 21.5 x 39	
Packaging + Pallet Weight (Lbs.)	28.47						
Waterside Economizer Section (Lbs.)	28			37		53	
Waterside Economizer Coil Volume (Gal.)	0.3	0.3	0.3	0.4	0.4	0.6	0.6
Hydronic Heat Section (Lbs.)	27			36		50	
Hydronic Heat Coil Volume (Gal.)	0.3			0.5		0.6	
Hot Gas Reheat (HGRH) (Lbs.)	N/A			10		12	

Table 3: Unit sizes 036 through 070

Description	Unit Size				
	036	042	048	060	070
Compressor Type	Scroll				
Refrigeration Charge (Oz.)	47.5	52	70	74	76
Fan Wheel (D x W)	9" x 7"	10" x 8"		11" x 10"	
PSC Fan Motor HP	1/3	1/2		3/4	
EC Constant Torque Motor HP	1/2		3/4	1	
EC Constant CFM Motor HP	1/2	3/4		1	
Water Connection Size (FPT)	3/4"		1"		
Coax Volume (Gal. @ 70°F)	0.35	0.43	0.48	0.64	
Condensate Connection Size (FPT)	3/4				
Air Coil Face Area (Sq. Ft.)	3.42		4.06		6.06
Filter Size (inches)	24" x 24" x 1"		24" x 30" x 1"		16" x 30" x 1" (Qty 2)
Operating Weight	193	205	272	288	317
Shipping Weight	221	233	307	323	352
Overall Cabinet Dimensions (W x D x H)	21.5 x 26 x 44		24 x 32.5 x 46		26 x 33.25 x 54.125
Packaging + Pallet Weight (Lbs.)	28.47		34.7		
Waterside Economizer Section (Lbs.)	56		58		60
Waterside Economizer Coil Volume (Gal.)	0.9	0.9	1.0	1.0	1.6
Hydronic Heat Section (Lbs.)	57		68		79
Hydronic Heat Coil Volume (Gal.)	0.9		1.0		1.6
Hot Gas Reheat (HGRH) (Lbs.)	14		16		18

Water Loop Application

Commercial systems typically include a number of units connected to a common piping system. Any unit plumbing maintenance work can introduce air into the piping system; therefore air elimination equipment is a major portion of the mechanical room plumbing. In piping systems expected to utilize water temperatures below 50°F [10°C], closed cell insulation is recommended on all piping surfaces to eliminate condensation (extended range units required). Metal to plastic threaded joints should never be used due to their tendency to leak over time. All SmartSource units include flush mounted FPT water connections integral to the unit corner post, which do not require a backup wrench.

A thread sealant is recommended to minimize internal fouling of the heat exchanger. Do not over tighten connections and route piping so as not to interfere with service or maintenance access. Hose kits are available from Daikin in different configurations for connection between the unit and the piping system. Depending upon selection, hose kits may include shut off valves, P/T plugs for performance measurement, high pressure stainless steel braided hose, "Y" type strainer with blow down valve, and/or "J" type swivel connection. Balancing valves and an external low pressure drop solenoid valve for use in variable speed pumping systems may also be included in the hose kit.

The piping system should be flushed to remove dirt, piping chips, and other foreign material prior to operation (see "Cleaning & Flushing System" on page 31. The water flow rates should be kept at approximately 3 GPM per nominal cooling ton (a 10°F temperature rise in cooling). To ensure proper maintenance and servicing, P/T ports are imperative for temperature and flow verification, as well as performance checks.

Water loop heat pump (cooling tower/boiler) systems typically utilize a common loop, maintained between 60 - 90°F [16 - 32°C]. The use of a closed circuit evaporative cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering may be necessary.

Ground-Loop Application

⚠ CAUTION

The following instructions represent industry accepted installation practices for closed loop earth coupled heat pump systems. Instructions are provided to assist the contractor in installing trouble free ground loops. These instructions are recommendations only. State/provincial and local codes MUST be followed and installation MUST conform to ALL applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

⚠ CAUTION

Ground loop applications require extended range equipment and optional refrigerant/water circuit insulation.

Pre-Installation

Prior to installation, locate and mark all existing underground utilities, piping, etc. Install loops for new construction before sidewalks, patios, driveways, and other construction has begun. During construction, accurately mark all ground loop piping on the plot plan as an aid in avoiding potential future damage to the installation.

Piping Installation

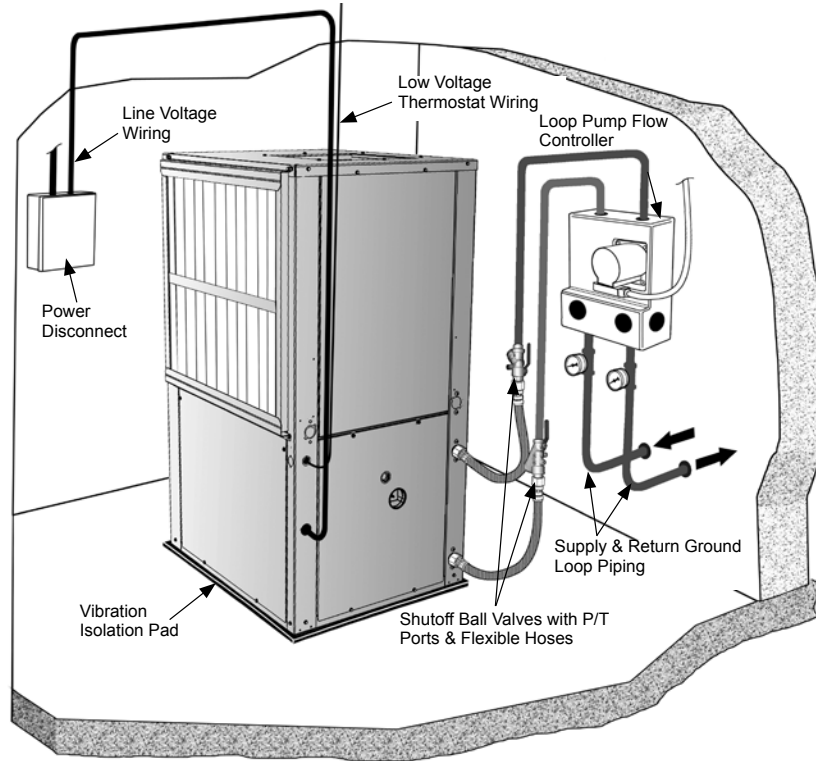
The typical closed loop ground source system is shown in [Figure 2 on page 8](#). All earth loop piping materials should be limited to polyethylene or equivalent per International Ground Source Heat Pump Association (IGSHPA)

Figure 1: Polyethylene fused piping



Galvanized or steel fittings should not be used at any time due to their tendency to corrode. All plastic to metal threaded fittings should be avoided due to their potential to leak in earth coupled applications. A flanged fitting should be substituted. P/T plugs should be used so that flow can be measured using the pressure drop of the unit heat exchanger.

Figure 2: Typical ground loop application (loop pump by others shown)



Earth loop temperatures can range between 25 and 110°F [-4 to 43°C]. The water flow rates should be kept at approximately 3 GPM per nominal cooling ton (a 10°F temperature rise in cooling).

Test individual horizontal loop circuits before backfilling. Test vertical U-bends and pond loop assemblies prior to installation. Pressures of at least 100 psi [689 kPa] should be used when testing. Do not exceed the pipe pressure rating. Test entire system when all loops are assembled.

Flushing the Earth Loop

Upon completion of system installation and testing, flush the system to remove all foreign objects and purge to remove all air.

Antifreeze

In areas where minimum entering loop temperatures drop below 50°F [10°C] or where piping will be routed through areas subject to freezing, antifreeze is required.

Alcohols and glycols are commonly used as antifreeze; however your local sales office should be consulted to determine the antifreeze best suited to your area. Freeze protection should be maintained to 15°F [9°C] below the lowest expected entering loop temperature. For example, if 30°F [-1°C] is the minimum expected entering loop temperature, the leaving loop temperature would be 22 to 25°F [-6 to -4°C] and freeze protection should be at 15°F [-10°C]. Calculation is as follows: 30°F - 15°F = 15°F [-1°C - 9°C = -10°C].

All alcohols should be premixed and pumped from a reservoir outside of the building when possible or introduced under the water level to prevent fumes. Calculate the total volume of fluid in the piping system. Then use the percentage by volume shown in [Table 5 on page 9](#) for the amount of antifreeze needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

Figure 3: Flushing the loop

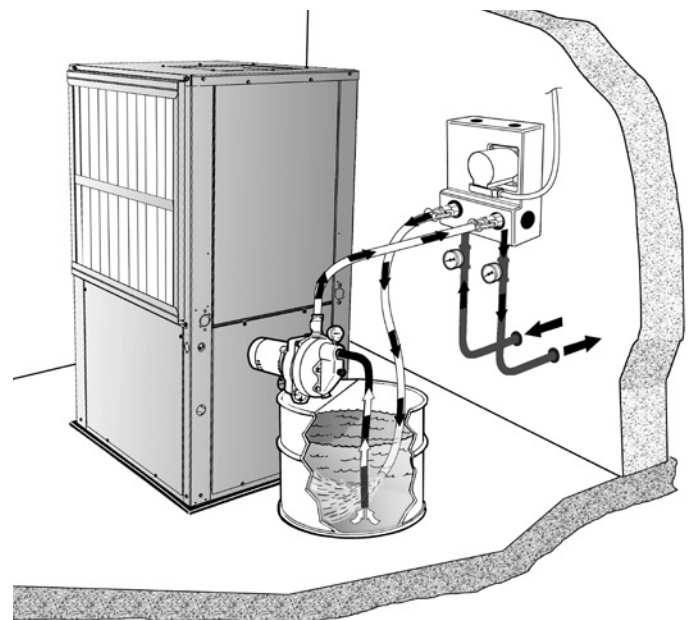


Table 4: Antifreeze percentage by volume

Type	Minimum Temperature for Low Temperature Protection			
	10°F [-12.2°C]	15°F [-9.4°C]	20°F [-6.7°C]	25°F [-3.9°C]
Methanol	25%	21%	16%	10%
100% USP food grade Propylene Glycol	38%	25%	22%	15%
Ethanol ¹	29%	25%	20%	14%

Note: ¹ Must not be denatured with any petroleum product.

Table 5: Antifreeze correction factors (for heat pump operation only)

Antifreeze % By Weight				
	15%	25%	35%	45%
Ethanol				
Cooling Capacity	0.985	–	–	–
Heating Capacity	0.9825	–	–	–
Pressure Drop	1.04	–	–	–
Ethylene Glycol				
Cooling Capacity	0.9935	0.9895	0.985	0.981
Heating Capacity	0.9865	0.9795	0.973	0.965
Pressure Drop	1.10	1.16	1.22	1.27
Methanol				
Cooling Capacity	0.985	–	–	–
Heating Capacity	0.9825	–	–	–
Pressure Drop	1.04	–	–	–
Propylene Glycol				
Cooling Capacity	0.985	0.975	0.965	0.955
Heating Capacity	0.981	0.9685	0.952	0.936
Pressure Drop	1.11	1.20	1.31	1.40

Ground-Water Application

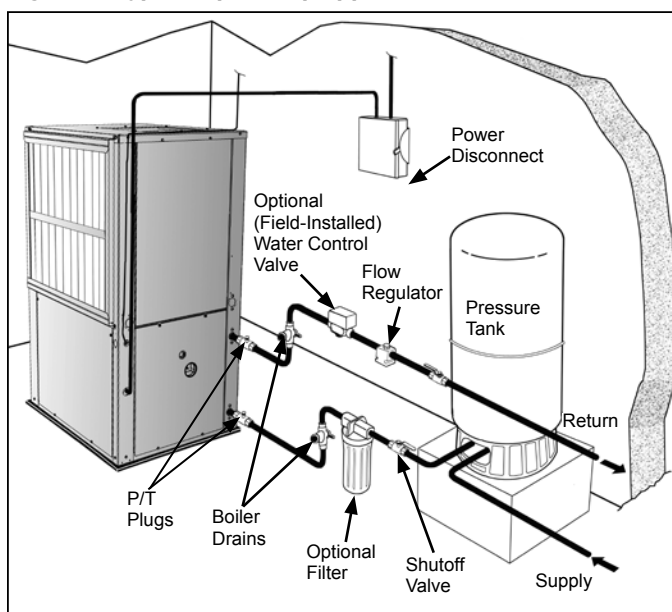
Open Loop - Ground Water Systems - Typical open loop piping is shown in Figure 4. Shut off valves should be included for ease of servicing. Boiler drains or other valves should be installed in the supply and return lines to allow cleaning of the heat exchanger. Shut off valves should be positioned to allow flow through the coax via the boiler drains without allowing flow into the piping system. P/T plugs should be used so that pressure drop and temperature can be measured. Piping materials should be limited to copper.

⚠ WARNING

PVC or CPVC should not be used as they are not compatible with the POE oils used in HFC-410A products and piping system failure and property damage may result.

Water quantity should be plentiful and of good quality. See "Water impurities, result & recommended water system application" on page 12 for water quality guidelines. The unit can be ordered with either a copper or cupro-nickel water heat exchanger. Consult Table 7 on page 12 for recommendations. Copper is recommended for open loop ground water systems that are not high in mineral content or corrosiveness. In conditions anticipating heavy scale formation or in brackish water, a cupro-nickel heat exchanger is recommended. In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, an open loop system is not recommended. Heat exchanger coils may over time lose heat exchange capabilities due to build up of mineral deposits. Heat exchangers must only be serviced by a qualified technician, as acid cleaning and special pumping equipment may be required.

Figure 4: Typical open loop application



Water Quality Standards - Table 7, "Water impurities, result & recommended water system application" on page 12 should be consulted for water quality requirements. Scaling potential should be assessed using the pH/Calcium hardness method. If the pH <7.5 and the calcium hardness is less than 100 ppm, scaling potential is low. If this method yields numbers out of range of those listed, the Ryznar Stability and Langelier Saturation indices should be calculated. Use the appropriate scaling surface temperature for the application, 150°F [66°C] for direct use (well water/ open loop); 90°F [32°F] for indirect use. A monitoring plan should be implemented in these probable scaling situations. Other water quality issues such as iron fouling, corrosion prevention and erosion and clogging should be referenced in Table 7 on page 12.

Expansion Tank and Pump - Use a closed, bladder type expansion tank to minimize mineral formation due to air exposure. The expansion tank should be sized to provide at least one minute continuous run time of the pump using its draw-down capacity rating to prevent pump short cycling. Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local building codes (e.g. recharge well, storm sewer, drain field, adjacent stream or pond, etc.). Most local codes forbid the use of sanitary sewer for disposal. Consult your local building and zoning department to assure compliance in your area.

Water Control Valve (Factory or field-installed option) - Note the placement of the water control valve in Figure 4. Always maintain water pressure in the heat exchanger by placing the water control valve(s) on the return line to prevent mineral precipitation during the off-cycle. Pilot operated slow closing valves are recommended to reduce water hammer. If water hammer persists, a mini-expansion tank can be mounted on the piping to help absorb the excess hammer shock. If a field provided motorized valve and actuator is utilized, ensure that the total 'VA' draw of the valve can be supplied by the unit transformer. For instance, a slow closing valve can draw up to 35VA. Units are furnished with a factory-installed 50 VA transformer. An optional 75VA transformer is also available. A typical pilot operated solenoid valve draws approximately 15VA (see Figure 46 on page 45).

Flow Control - Flow control can be accomplished by two methods. One method involves simply adjusting the field-provided ball valve or flow control valve on the return line. Measure the pressure drop through the unit heat exchanger, and determine flow rate from [Table 6](#). Since the pressure is constantly varying, two pressure gauges may be needed. Adjust the valve until the desired flow of 1.5 to 4 gpm, per ton [5.7 to 15.1 l/m, per kW] is achieved. A second method of flow control requires a flow control device mounted on the outlet of the flow control valve. This device is typically a brass fitting with an orifice of rubber or plastic material that is designed to allow a specified flow rate. On occasion, flow control devices may produce velocity noise that can be reduced by applying some back pressure from the ball valve located on the discharge line. Slightly closing the valve will spread the pressure drop over both devices, reducing the velocity noise.

Table 6: Water pressure drop

Unit Size	GPM	Pressure Drop, FOH
007	1.2	2.2
	1.8	4.0
	2.3	5.7
009	1.5	3.1
	2.3	5.7
	3.0	8.2
012	2.0	4.6
	3.0	8.2
	4.0	12.0
015	2.5	4.1
	3.8	7.6
	5.0	11.9
019	3.2	5.9
	4.8	11.0
	6.3	17.2
024	4.0	7.2
	6.0	12.5
	8.0	18.4
030	5.0	7.9
	7.5	14.5
	10.0	22.3
036	6.0	8.8
	9.0	16.7
	12.0	26.2
042	7.0	9.0
	10.5	16.2
	14.0	24.5
048	8.0	3.8
	12.0	7.6
	16.0	12.5

060	10.0	8.6
	15.0	16.0
	20.0	24.9
070	11.7	10.1
	17.5	20.1
	23.3	32.8

Water System Quality

The cleaning, flushing and chemical treatment of a water source heat pump system is fundamental to efficient operation and the life expectancy of the system.

Potential system problems produced by the use of water fall into three general categories:

- Scale formation** – Mineral deposits which result from the crystallization and precipitation of dissolved salts in the water. The deposits form an insulating barrier, reducing the heat transfer rate and impeding the circulation of fluids due to increased pressure drop.
- Corrosion** – Decomposition of the metal caused by absorption of gases from the air. Corrosion may occur in any metal component of the system.
- Organic growths** – Slime and algae which form under certain environmental conditions, and can reduce the heat transfer rate by forming an insulating coating or can promote corrosion by pitting.

The system water should be evaluated for degrees of impurity, with testing available from independent testing labs, health departments or state agencies.

[Table 7 on page 12](#) is a list of water characteristics, the potential impurities and their results and the recommended treatment.

Avoiding Potential Problems

As shown in [Table 7 on page 12](#), all water contains some degree of impurities which may affect the performance of a heat pump system. The use of a cupro-nickel coil can help avoid potential problems. Water flow rates should:

- Be high enough that the temperature rise through the heat exchanger does not exceed 12° F when operating in the cooling mode.
- Not exceed 4 GPM per nominal ton. Flow rates that have velocities of 10 feet per second or more may cause pipe erosion and heat exchanger failure.

Table 7: Water quality conditions & applications

Potential Problem	Chemical(s) or Condition	Range for Copper Heat Exchangers	Range of Cupronickel Heat Exchanger
Scaling	Calcium & Magnesium Carbonate	Less than 350 ppm	Less than 350 ppm
Corrosion	pH Range	7 – 9	5 – 9
	Total Dissolved Solids	Less than 1000 ppm	Less than 1500 ppm
	Ammonia, Ammonium Hydroxide	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonium Chloride, Ammonium Nitrate	Less than 0.5 ppm	Less than 0.5 ppm
	Calcium Chloride/ Sodium Chloride	Less than 125 ppm	Less than 125 ppm - Note 4
	Chlorine	Less than 0.5 ppm	Less than 0.5 ppm
	Hydrogen Sulfide	None Allowed	None Allowed
Biological Growth	Iron Bacteria	None Allowed	None Allowed
	Iron Oxide	Less than 1 ppm	Less than 1 ppm
Erosion	Suspended Solids	Less than 10 ppm	Less than 10 ppm
	Water Velocity	Less than 8 ft./s	Less than 12 ft./s

Notes: 1. Water hardness in ppm is equivalent to hardness in mg/L.

2. Grains/gallon = ppm divided by 17.1.

3. Copper and cupronickel heat exchangers are not recommended for pool applications for water outside the range of the table. Secondary heat exchangers are required for applications not meeting the requirements shown above.

4. Salt water applications (approx. 25,000 ppm) require secondary heat exchangers due to copper piping between the heat exchanger and the unit fittings.

Supply & Return Piping

Pre-Installation Considerations

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.

A direct return system may also work acceptably, but proper water flow balancing is more difficult to achieve and maintain.

- The piping must comply with local codes.

⚠ WARNING

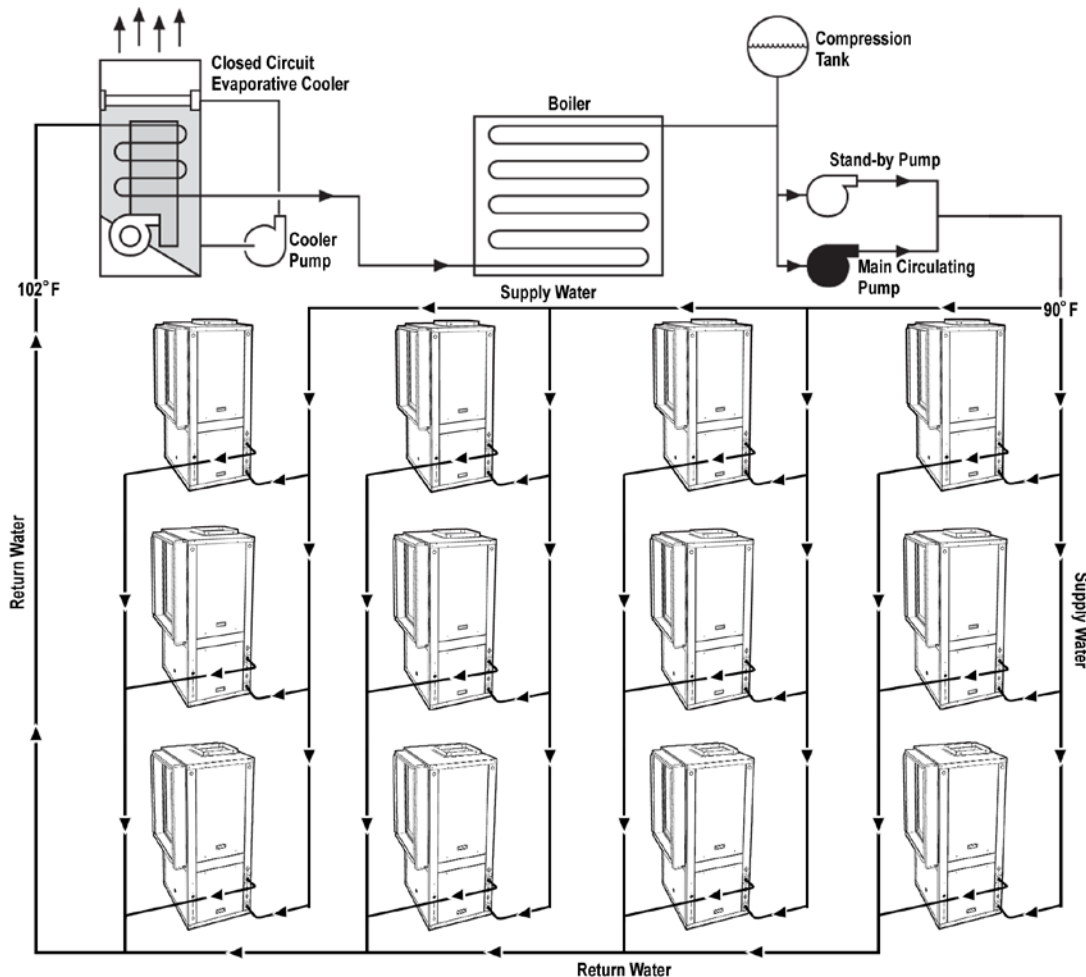
Polyolester Oil, commonly known as POE oil is a synthetic oil used in many refrigeration systems, and may be present in this Daikin product. POE oil, if ever in contact with PVC/CPVC will coat the inside wall of PVC/CPVC pipe causing environmental stress fractures. Although there is no PVC/CPVC piping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

Supply and return runouts usually join the unit via short lengths of high pressure flexible hose which are sound and vibration isolators for both unit operating noise and hydraulic pumping noise.

- One end of the hose should have a swivel fitting to facilitate removal for service.

Note: *Hard piping is not recommended since no vibration or noise attenuation can be accomplished.*

Figure 5: Example of a reverse return piping system



Installation Considerations

1. Locate the unit in conditioned space and avoid installation in corrosive environments. Allow clearance for easy removal of the filter and access panels, and enough space for service personnel to perform maintenance or repair.
2. Remove the Styrofoam shipping block under the fan housing before start-up. [Figure 6](#).
3. Make sure that sufficient access has been provided for installing and removing the unit, including clearance for duct collars and fittings at water and electrical connections (see [Figure 7](#)).
4. Unit condensate drains are not internally trapped. External trap is required for vertical units. Allow adequate room around the unit for condensate piping.
5. If the unit is installed in a confined space, such as a closet, provisions must be made for return air to freely enter the face of the unit's air coil.
6. It is recommended that the unit be located on top of a vibration absorbing material to minimize vibration and noise. The isolation pad should be the same

size as the base of the unit, to prevent unit structural damage (see [Figure 8 on page 15](#)).

Figure 6: Remove styrofoam shipping block

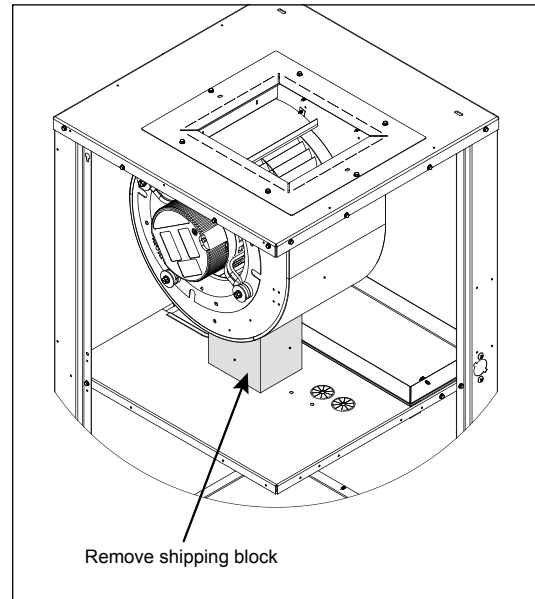


Figure 7: Recommended clearances for service access

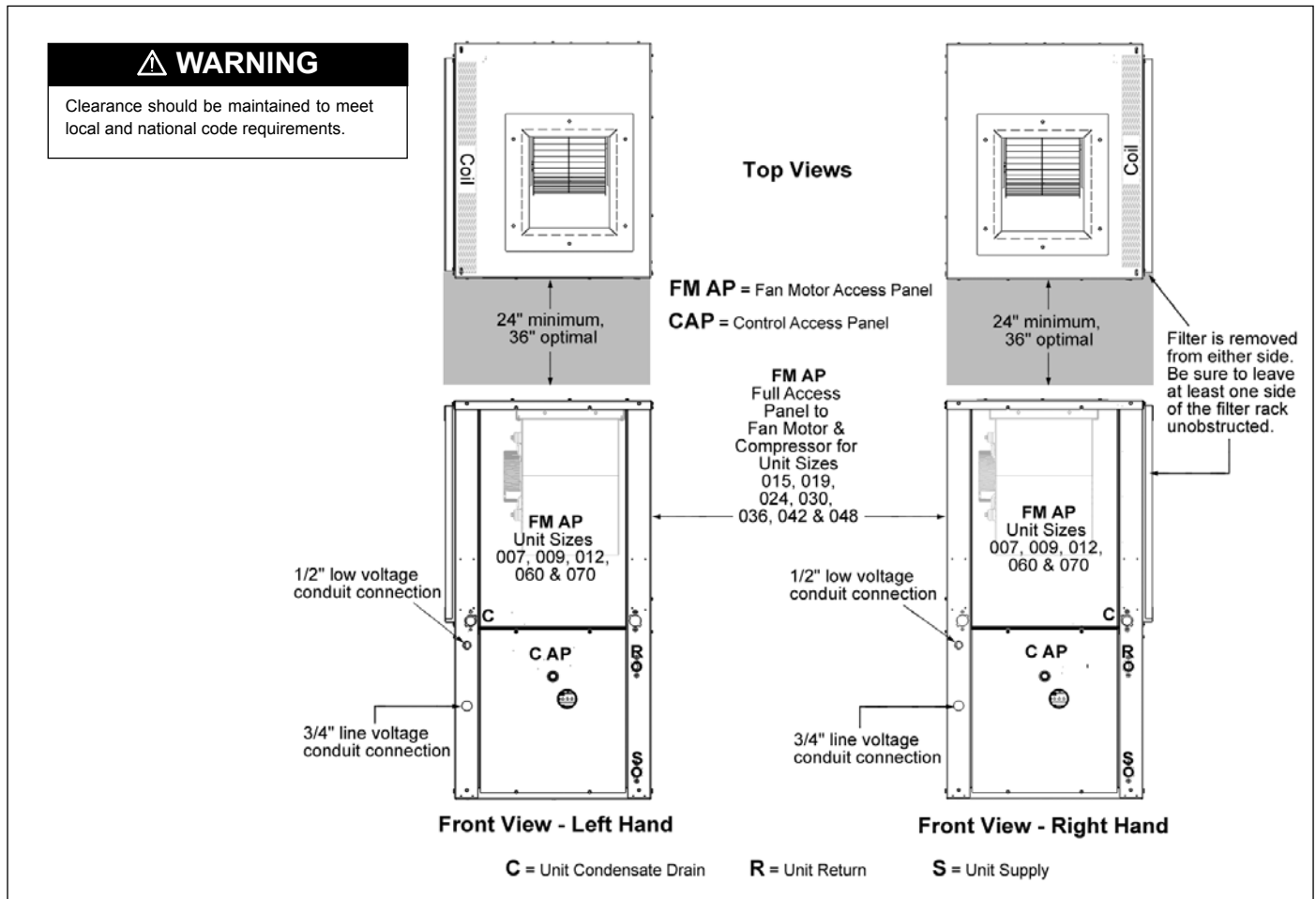
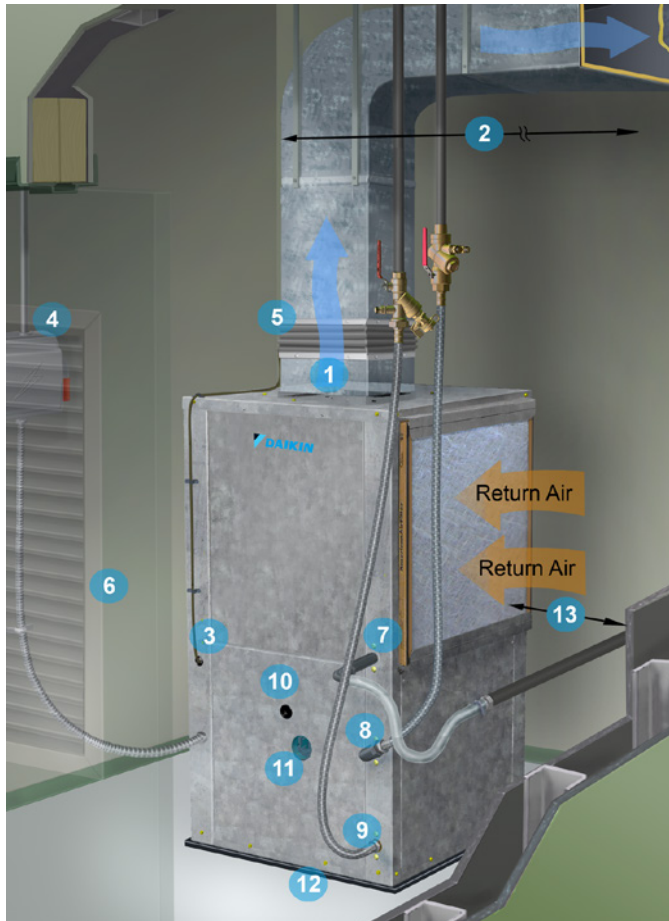


Figure 8: Vertical unit - typical installation in small mechanical room or closet



1. Discharge air
2. Acoustic thermal duct lining - 10 feet
3. Low voltage wiring to unit control box
4. Line voltage disconnect
5. Flexible duct collar
6. Louvered closet door
7. Condensate drain (field-supplied trap)
8. Flexible, braided, stainless steel return hose with flow controller/ball valve with port

9. Flexible, braided, stainless steel supply hose with Y-strainer/ball valve with port
10. Access to unit control box
11. LED annunciator lights sight glass to view unit operation status and faults
12. Full vibration isolation pad between unit and floor
13. Minimum distance between return air (filter) and wall for non-ducted return applications
 - Size 007-012 – 5 inches
 - Size 015-024 – 5 inches
 - Size 030-036 – 6 inches
 - Size 042-048 – 8 inches
 - Size 060-070 – 10 inches

Ductwork and Attenuation

Discharge duct shall be used with these units. Where return air ductwork is required, the unit comes standard with a 1" thick, factory-installed disposable filter, mounted in a 2-sided filter rack. The filter can be easily removed from either side. A 2" deep 4-sided, gasketed filter rack is available as a factory-installed option to accept a 2" disposable, or a Merv 8 filter. Also available a 4" deep, 4-sided, gasketed filter rack with a 2" disposable or a 4" Merv 13 filter.

All ductwork should conform to industry standards of good practice as described in ASHRAE Systems Guide. A field supplied discharge duct system will normally consist of:

- a flexible connector at the unit
- a 90-degree elbow without vanes
- a 10 foot length of insulated duct
- and a trunk duct teeing into a branch circuit with discharge diffusers

Discharge Duct Collar Dimensions

Figure 9: GCV discharge duct collar location

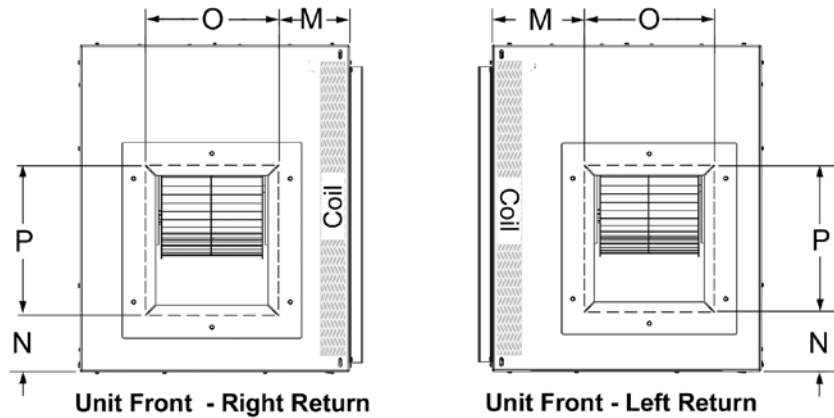
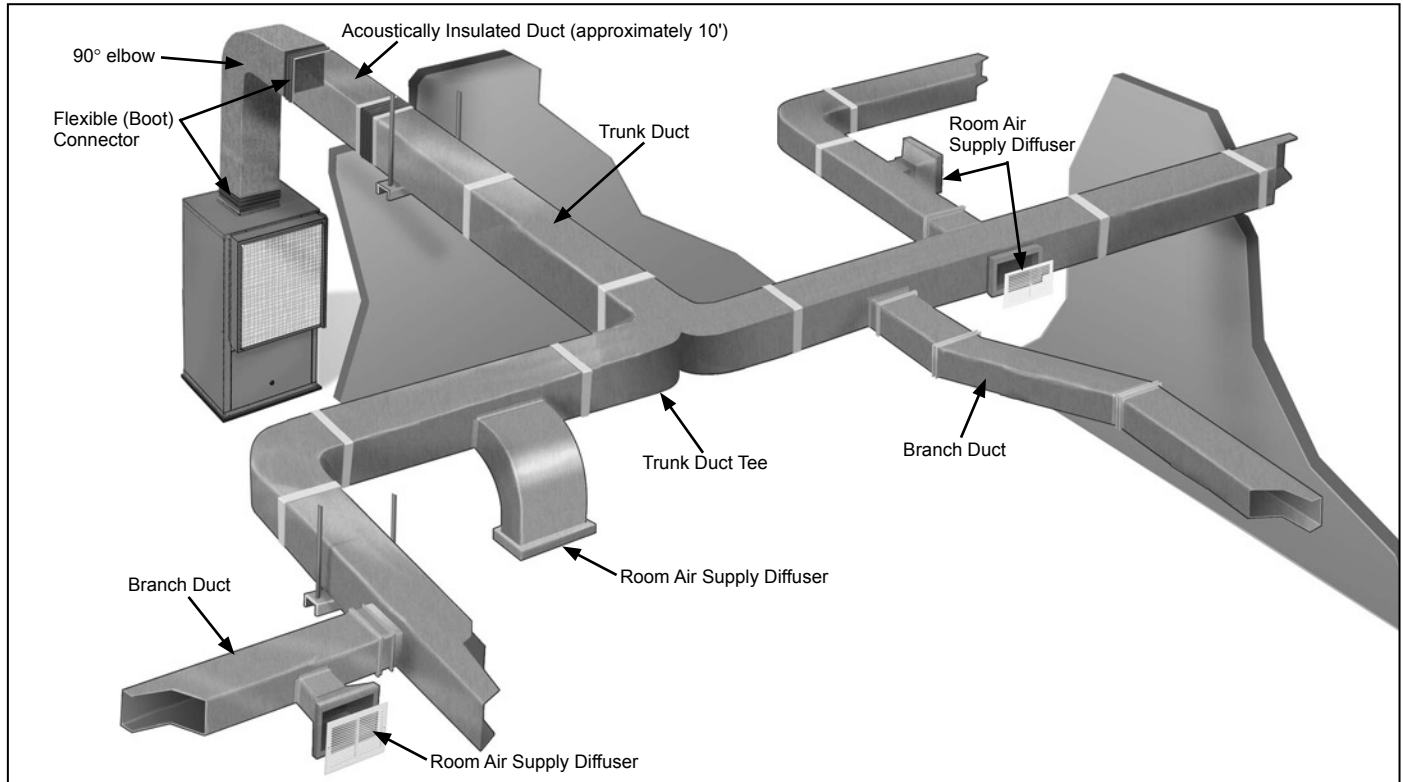


Table 8: Discharge duct collar dimensions

Unit Size	Discharge Duct Collar Connection Opening - in inches							
	M		N		O		P	
	Right-Hand	Left-Hand	Right-Hand	Left-Hand	Right-Hand	Left-Hand	Right-Hand	Left-Hand
007, 009, 012	11.63	6.07	4.87	4.87	4.84	4.84	9.30	9.30
015, 019	7.21	7.95	3.84	3.84	9.19	9.19	10.33	10.33
024, 030	7.21	7.95	3.84	3.84	9.19	9.19	10.33	10.33
036	6.40	8.20	3.84	3.84	9.19	9.19	10.33	10.33
042	5.84	7.45	4.94	4.94	10.31	10.31	11.33	11.33
048	8.03	9.08	6.25	6.25	10.31	10.31	11.33	11.33
060	5.62	5.74	9.6	9.60	13.55	13.55	12.98	12.98
070	7.49	9.24	9.98	9.98	13.55	13.55	12.98	12.98

Note: All duct dimensions are referenced from the outside edge of the flange. Dimensions are approximate as the discharge duct flanges are bent up along the perforated edges by the installing contractor.

Figure 10: Typical ducting for vertical unit

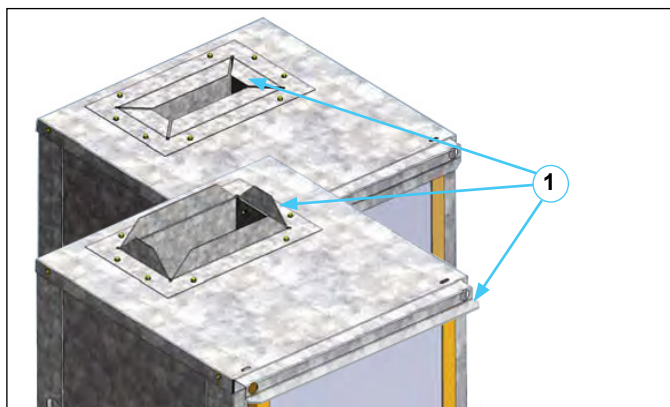


- Notes:**
1. Transformation to supply duct have maximum slope of 1" in 7".
 2. Square elbows with double thickness vanes may be substituted.
 3. Do not install ducts so that the air flow is counter to fan rotation. If necessary, turn fan section.
 4. Transformations and units must be adequately supported so no weight is on the flexible fan connection.

Air Duct Connections

1. Bend the perforated supply and return air duct flanges out 90 degrees with wide duct pliers.

Figure 11: Bend duct flanges out 90 degrees



Note: It is recommended that a field supplied flexible (boot) connector is attached to the flanges to isolate vibration. See Figure 10.

2. Connect the flexible boot connector and duct to the flanges. Screws used to secure supply duct should be inserted in the duct flange only.

Note: Screws should not be installed through the unit cabinet. Installation of screws through the unit cabinet may contact with refrigerant piping voiding warranty. The unit cabinet should not be cut or altered for installation of accessories.

WARNING

If for any reason the perforated supply or return duct flanges are not required, they must be bent out 90 degrees or removed.

Return Air Filter Rack Assembly & Duct Collar Connections – Left -Hand

Figure 12: GCV return air duct collars locations and dimensions - left-hand

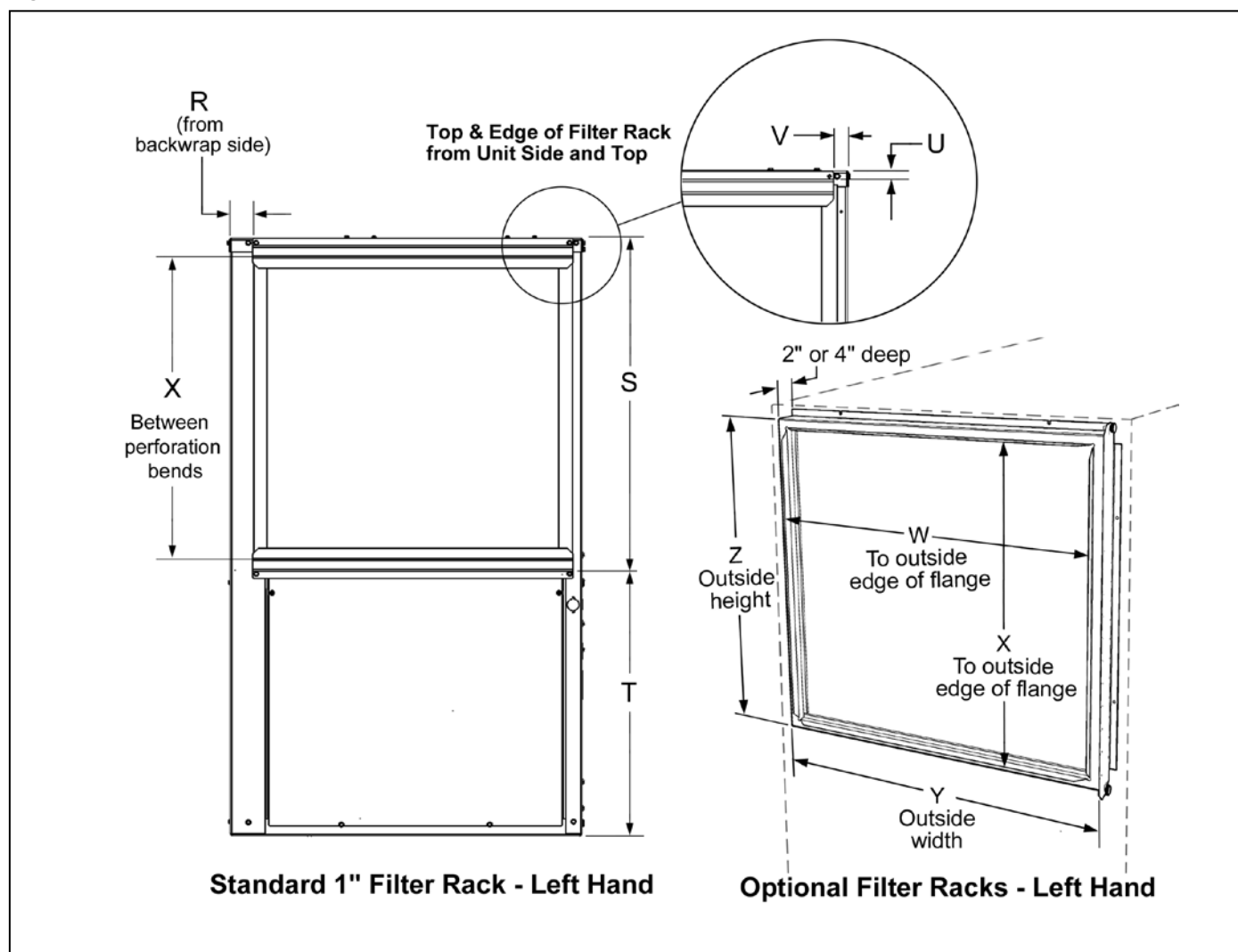


Table 9: Filter rack dimensions for left-hand unit in Figure 12.

Unit Size	Standard Filter Rails Location (in inches)			Offset from unit side & top		Optional Filter Racks Flange Opening Dimensions (in inches)		Standard Filter Rails Between 90-Degree Perforation bends	Optional Filter Racks Outside Dimensions (in inches)	
	R	S	T	U	V	W (width)	X (height)	X (height)	Y (width)	Z (height)
007, 009, 012	1.75	12.78	11.22	0.58	0.78	15.38	10.26	10.44	17.23	11.94
015, 019	1.46	16.78	15.22	0.58	0.95	18.01	14.26	14.44	19.85	15.94
024, 030	1.46	16.78	15.22	0.58	0.95	18.03	18.01	18.19	19.88	19.69
036	1.73	24.35	19.65	0.58	0.74	22.45	21.82	22.00	24.30	23.50
042	1.73	24.35	19.65	0.58	0.74	22.45	21.82	22.00	24.30	23.50
048	1.49	24.34	21.66	0.58	0.92	28.02	20.69	22.13	31.00	23.50
060	1.49	24.34	21.66	0.58	0.92	28.02	20.69	22.13	31.00	24.34
070	1.98	32.84	21.29	0.58	0.74	29.45	30.32	*30.50	31.29	32.00

Notes: 1. Filter rack flange dimensions are to the outside edge of the flange.

* Unit size 070 uses two (2) filters when standard filters are selected, where dimension "X" (height) = the overall outside edge dimension.

Return Air Filter Rack Assembly & Duct Collar Connections – Right -Hand

Figure 13: GCV return air duct collars locations and dimensions - right -hand

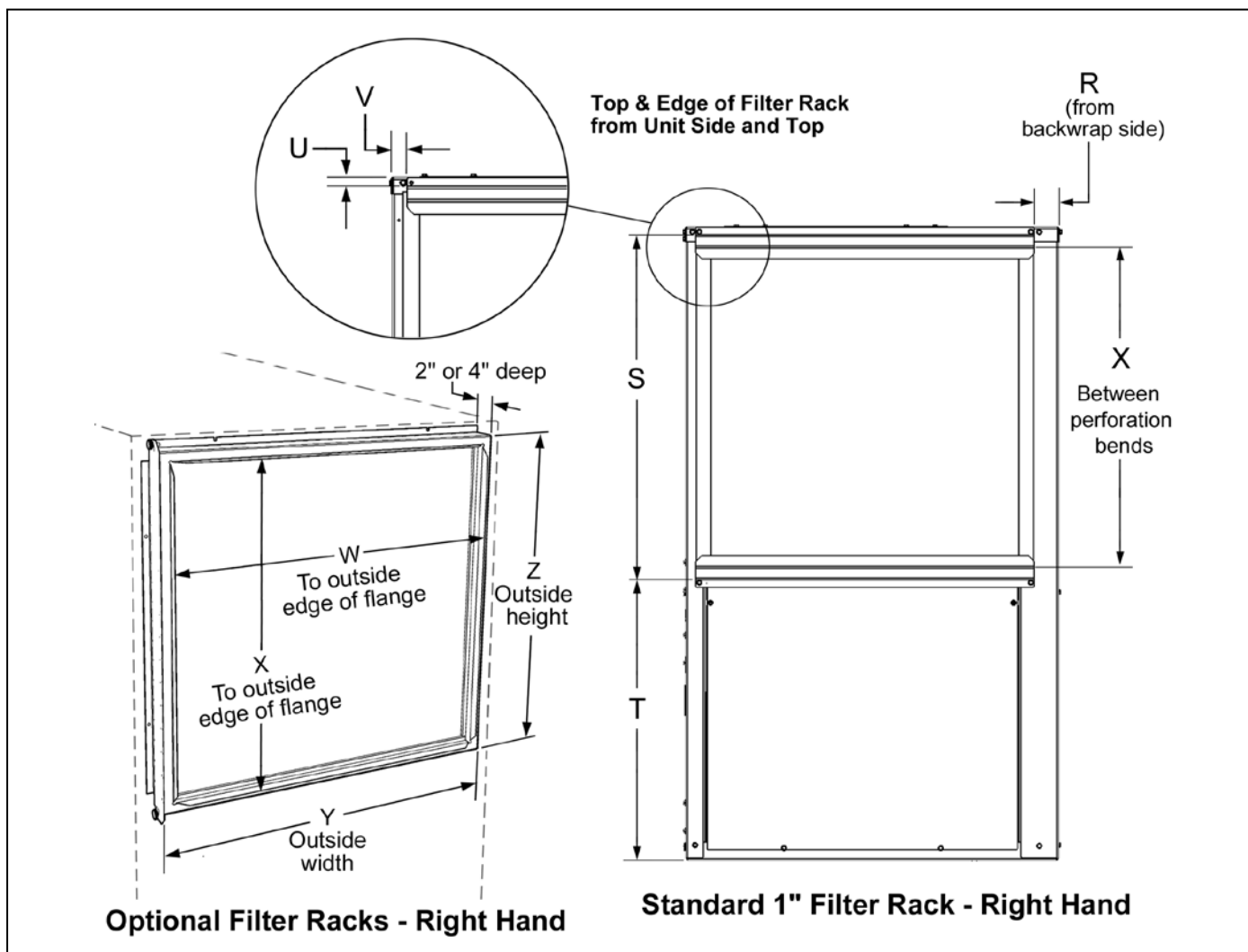


Table 10: Filter rack dimensions for right-hand unit in Figure 13.

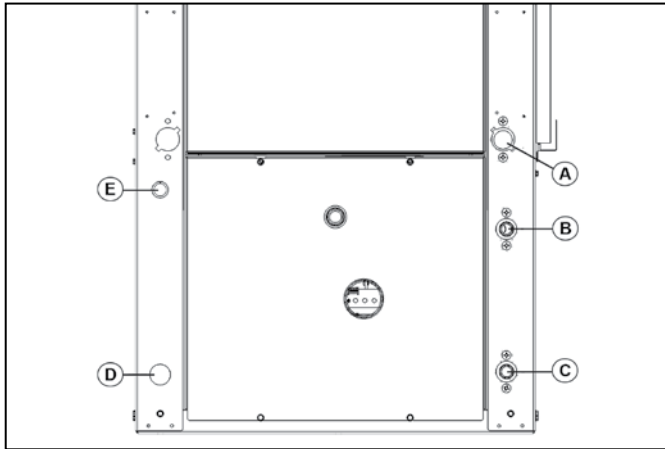
Unit Size	Standard Filter Rails Location (in inches)			Offset from unit side & top		Optional Filter Racks Flange Opening Dimensions (in inches)		Standard Filter Rails Between 90-Degree Perforation bends	Optional Filter Racks Outside Dimensions (in inches)	
	R	S	T	U	V	W (width)	X (height)	X (height)	Y (width)	Z (height)
007, 009, 012	1.75	12.78	11.22	0.58	0.78	15.38	10.26	10.44	17.23	11.94
015, 019	1.46	16.78	15.22	0.58	0.95	18.01	14.26	14.44	19.85	15.94
024, 030	1.46	16.78	15.22	0.58	0.95	18.03	18.01	18.19	19.88	19.69
036	1.73	24.35	19.65	0.58	0.74	22.45	21.82	22.00	24.30	23.50
042	1.73	24.35	19.65	0.58	0.74	22.45	21.82	22.00	24.30	23.50
048	1.49	24.34	21.66	0.58	0.92	28.02	20.69	22.13	31.00	23.50
060	1.49	24.34	21.66	0.58	0.92	28.02	20.69	22.13	31.00	24.34
070	1.98	32.84	21.29	0.58	0.74	29.45	30.32	*30.50	31.29	32.00

Notes: 1. Filter rack flange dimensions are to the outside edge of the flange. Dimensions are approximate as the return air duct flanges are bent out along the perforations by the installing contractor.

* Unit size 070 uses two (2) filters, when standard filters are selected, where dimension "X" (height) = the overall outside edge dimension.

Piping & Electrical Connections

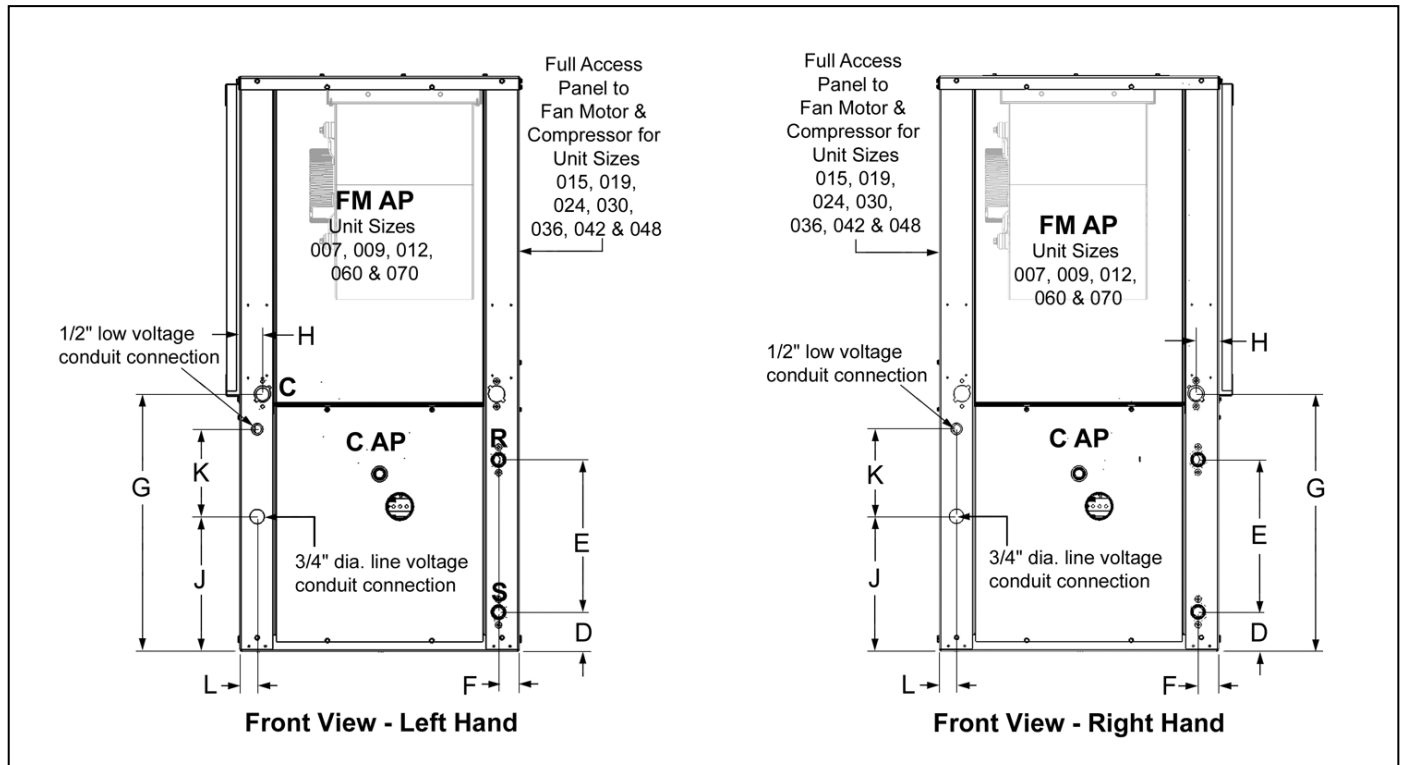
Figure 14: Vertical unit wiring & piping locations



- A- Condensate (right-hand unit shown)
- B- Water return
- C- Water supply
- D- Line voltage unit power (right-hand unit shown)
- E- Low voltage control Wiring (electric entrance)

Note: Condensate drain connection on left-hand unit is located on opposite corner post.

Figure 15: GCV piping & electrical connections locations



Legend: C AP = Control Access Panel FM AP = Fan Motor Access Panel

Table 11: Standard model GCV unit dimensions

Unit Size	Pipe Connections				3/4" FPT Condensate Drain		Electrical Entry Locations		
	Connection Size (FPT)	D	E	F	G	H	J	K	L
007, 009, 012	1/2"	2.67	6.31	1.61	12.00	1.73	2.51	6.81	1.25
015, 019	1/2"	3.30	7.62	1.57	15.71	1.73	6.26	6.75	1.31
024, 030	3/4"	3.26	7.98*	1.57	18.95	1.73	9.57	6.75	1.31
036	3/4"	3.00	11.66	1.57	19.71	1.73	10.32	6.75	1.31
042	3/4"	3.00	11.66	1.57	19.71	1.73	10.32	6.75	1.31
048	1"	4.38	11.84	1.57	21.75	1.73	12.32	6.75	1.31
060	1"	4.38	11.84	1.57	21.75	1.73	12.32	6.75	1.31
070	1"	4.38	11.84	1.57	21.75	1.73	12.32	6.75	1.31

Note: All dimensions within ± 0.10 inches.

* Unit size 030 ordered with an optional factory-installed 2-way motorized valve, dimension "E" = 4.68"

Electrical Connections

⚠ WARNING

All field installed wiring must comply with local and national electric codes. 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.

⚠ CAUTION

Fasteners should not be screwed into and penetrate the unit enclosure to avoid damage to internal electrical and mechanical components.

⚠ WARNING

Use copper conductors only. Conductors must be minimum 75°C.

Table 12: Operating voltages

Voltage	Minimum	Maximum
115/60/1	103	126
208-230/60/1	197	253
265/60/1	238	292
208-230/60/3	197	253
460/60/3	414	506
575/60/3	515	632

Note: Three-phase system imbalance shall not exceed 2%.

- Use a short length of flexible conduit at the unit connection to minimize and isolate vibration to the building. All conduit should be supported to avoid contact with unit cabinet or immediate building structure to prevent unnecessary noise.

⚠ CAUTION

All electrical connections should be checked for tightness as they may come loose during shipment.

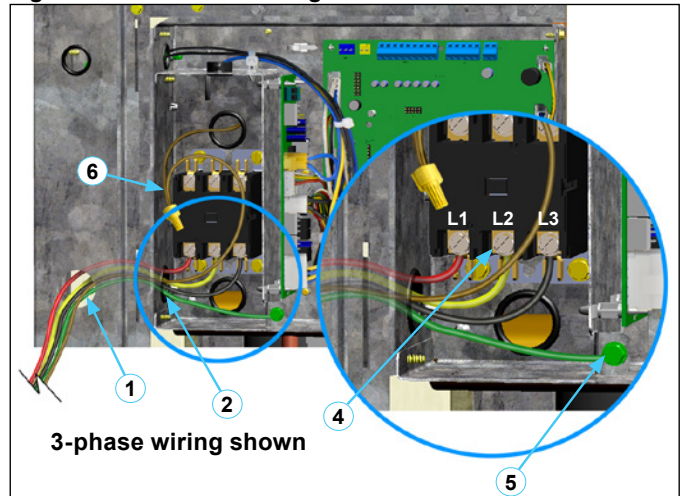
Line Voltage – 208-230, 460, 575V

- Route line voltage supply wiring through the lower 1-1/8" diameter knockout in the left corner post.
- Wires should extend through the lower left side of the swing-out control box.
- Remove and discard the factory provided stripped wire leads from the bottom unit contactor screw terminals (not shown).
- Connect the field supplied wires to the lower contactor screw terminals as shown in Figure 16.
- Connect ground wire to provided (green) ground screw
- Twist neutral wires and wire nut (460V units only)

230 Volt Operation

All 208-230 volt single-phase and three-phase units are factory wired for 208 volt operation. For 230 phase 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

Figure 16: Route line voltage wires to terminal screws.

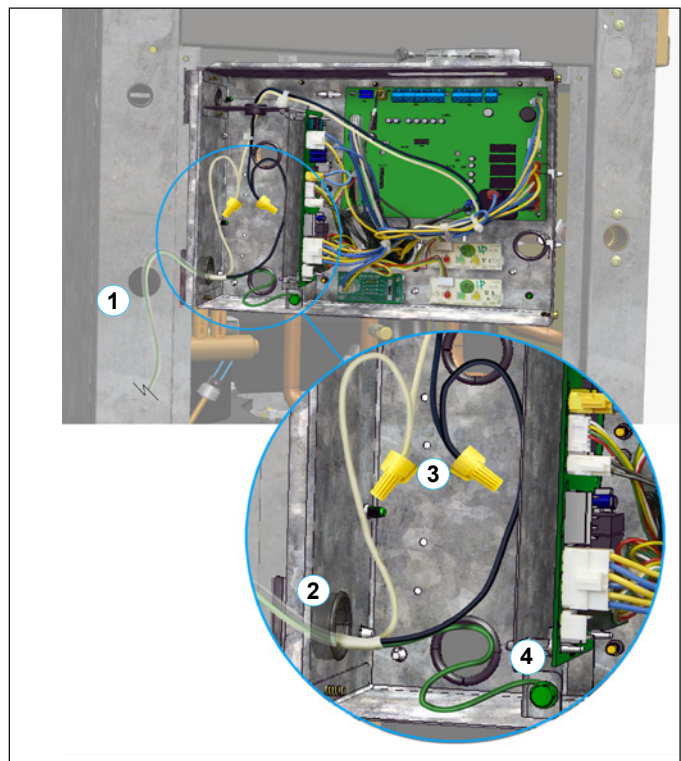


Note: Units without constant EC motor will not include a neutral conductor. For clarity, not all unit wires are shown in the unit line voltage connection area.

Line Voltage – 115V

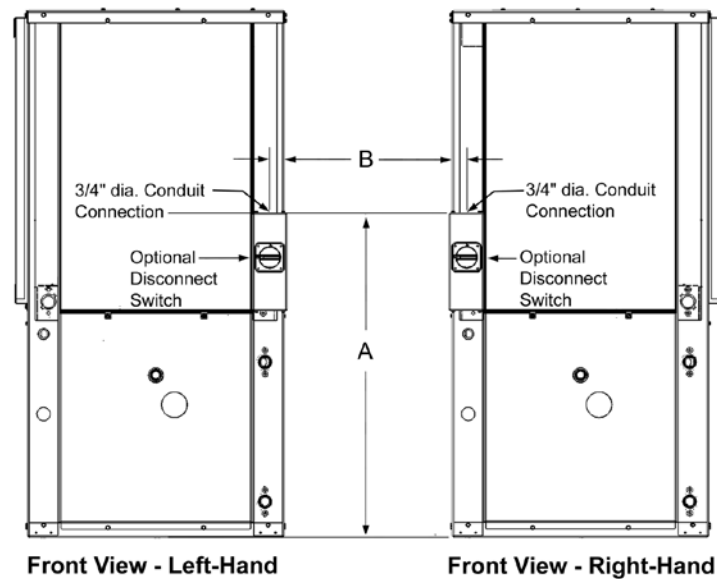
- Route line voltage supply wiring through the lower 1-1/8" diameter electrical knockout in the left corner post. Figure 17.
- Continue to route wires through the lower left side of the swing-out control box.
- Connect and wire nut the supply wires to provided unit leads as shown in Figure 17.
- Secure ground wire to (green) ground screw.

Figure 17: Line voltage wiring route to wire connections



GCV Unit With Non-Fused Disconnect Switch

Figure 18: Unit with optional non-fused disconnect switch



Unit Size	A	B
007, 009, 012	19-3/8"	1"
015, 019	23-1/8"	1-1/8"
024, 030	18-1/4"	
036, 042	26-3/8"	
048, 060, 070	29-1/8"	

Line Voltage Electrical Connections With Disconnect – 115-575V

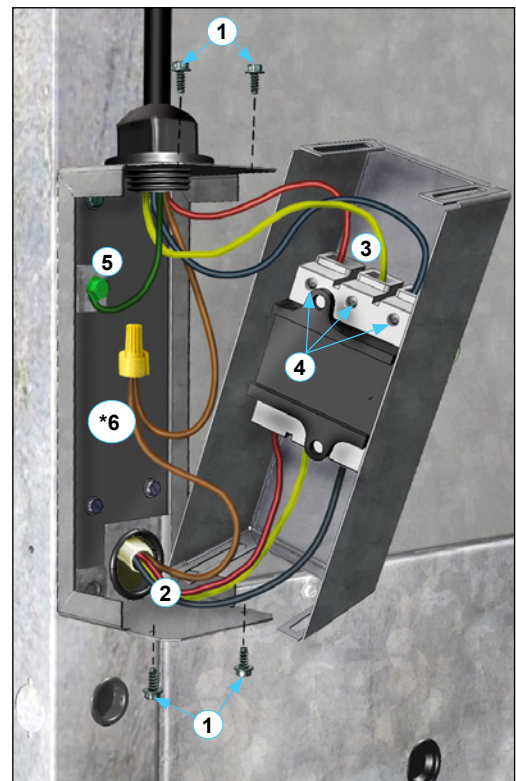
When units are equipped with the optional non-fused disconnect switch, the line voltage supply is brought in through the top of the junction box. Disconnect location and dimension details are provided in Figure 18.

Note: 1. The disconnect location may vary depending on the return air handling. See Figure 19. Right-hand unit shown, with switch mounted on the opposite corner post from return air.
2. 460V units with constant CFM EC motor require a neutral conductor. See #6 in Figure 19.

1. Remove screws from the top and bottom locations on the disconnect switch cover.
2. These are the factory-installed wires from the switch to the line voltage terminals in the unit control box.
3. Connect wires to the upper unused terminals.
4. Tighten terminal screws to secure wires.
5. Connect ground wire to provided green ground screw.
6. Connect field provided neutral conductor. (*constant CFM EC motors only)

Replace cover and secure with screws.

Figure 19: 460V wiring with neutral wire (*constant CFM EC motors only) to the non-fused disconnect switch



Low Voltage Wire Connections

Procedure

- Note:**
1. Never install relays coils in series with the thermostat inputs.
 2. Units equipped with dehumidification and using thermostat control require installation of a factory supplied return air sensor connected to H9 terminal. See Figure 25 on page 24 for details.
1. Remove screw shown in Figure 20 to allow control box to swing out for easy access.
 2. Route the field-supplied low voltage wiring through the upper knockout in the left corner post as shown in Figure 20.
 3. Pass the low voltage wiring through the upper electrical bushing located on the left side of the swing-out control box.
 4. Secure the low voltage wire connections to the terminals. A cutout is provided in the top of the control box to allow visibility to the terminal labels, Figure 21.
 5. Install screw shown in Figure 20 to hold control box in operating position after connections are complete and wire terminals have been checked for tightness.

Figure 20: Low voltage wiring route & connections

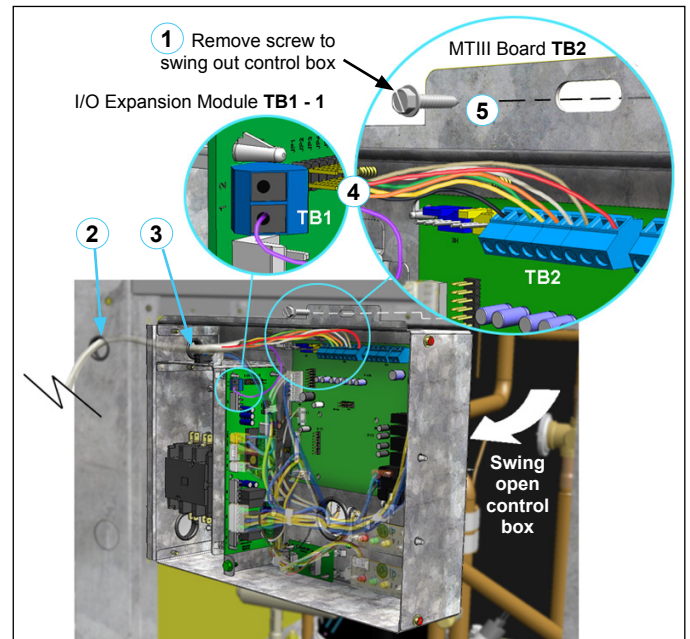


Figure 21: Terminal connections to TB2 (thermostat control) on the MTIII board as seen through cutout in top of control box

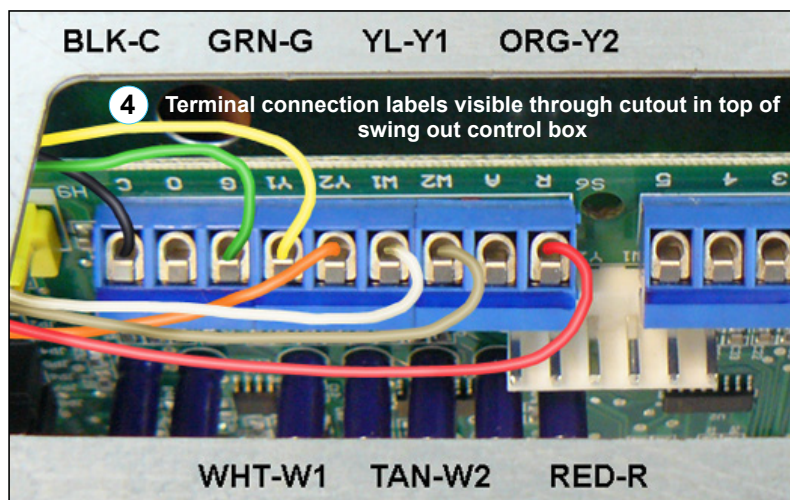
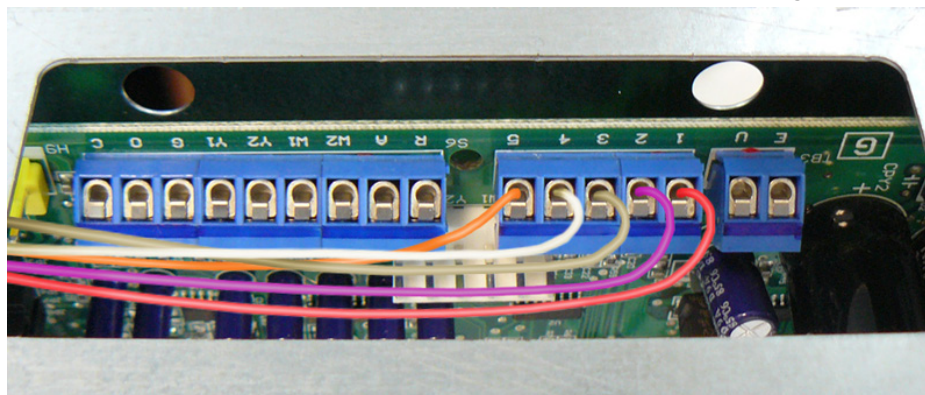
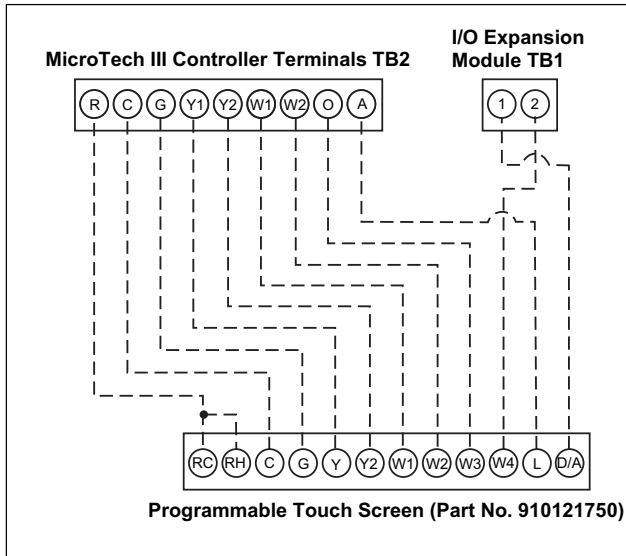


Figure 22: Terminal connections to TB1 (sensor control) on the MTIII board as seen through cutout in top of control box



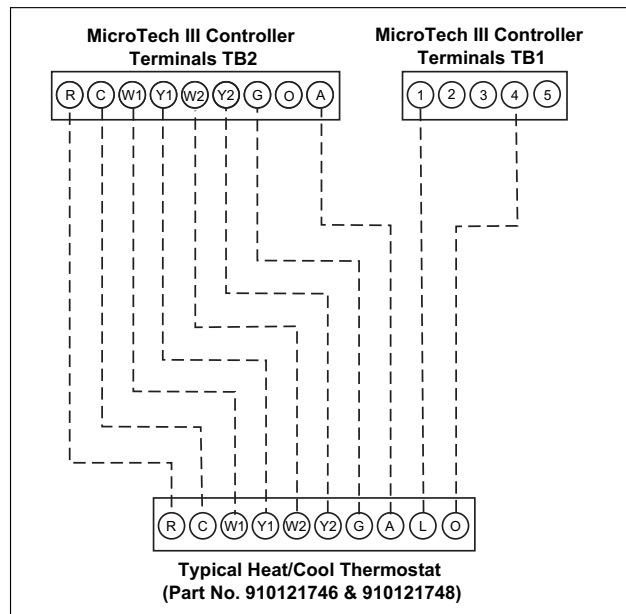
Typical Connections For Thermostats & Temperature Sensors Applications

Figure 23: Wiring example for two-stage thermostat with electrical heat and hot gas reheat. (Y2 connection on Microtech III controller should be used to achieve rated capacity)



Note: Terminal TB1-1 is used for optional dehumidification or WSE operation.

Figure 24: Wiring example of typical heat/cool thermostat connections (Part No.s 910121746 and 910121748)



Note: When remote reset of a lockout condition is required at the wall thermostat, it will be necessary to utilize a conductor between terminal "O" on the wall thermostat to "TB1 terminal 4" on the MicroTech III unit controller (non-programmable stat only).

Figure 25: Units equipped with dehumidification and thermostat control. Factory supplied return air sensor connects to H9 terminal.

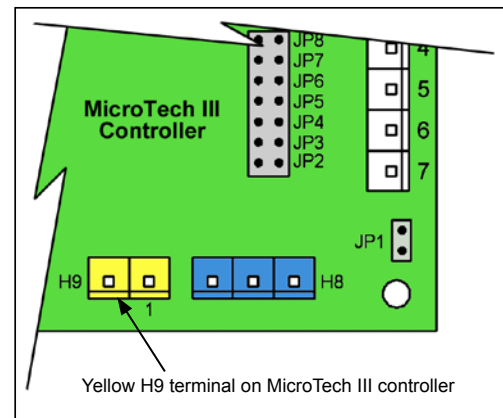
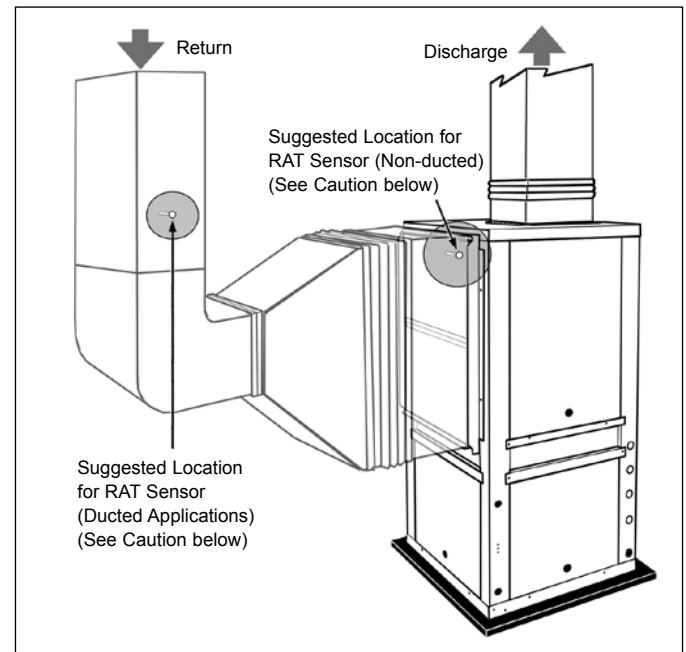


Figure 26: Return Air Temperature Sensor (RAT) locations



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.

Note: For single stage operation wire Y1 from thermostat to Y2 terminal on the Microtech III control board.

Figure 27: Basic room sensor wiring

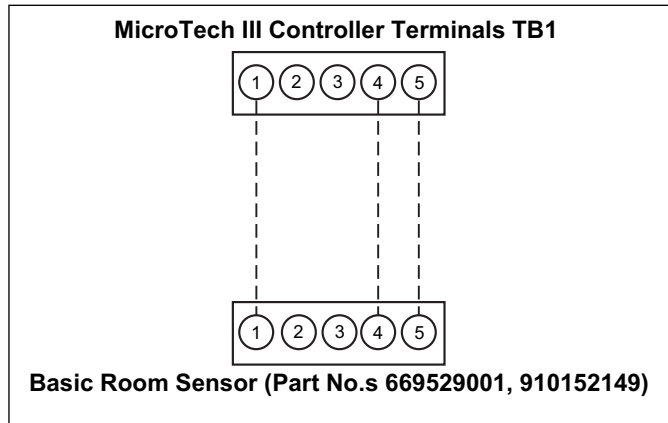


Figure 28: Example wiring of SmartSource MicroTech III board to basic temperature sensor wiring

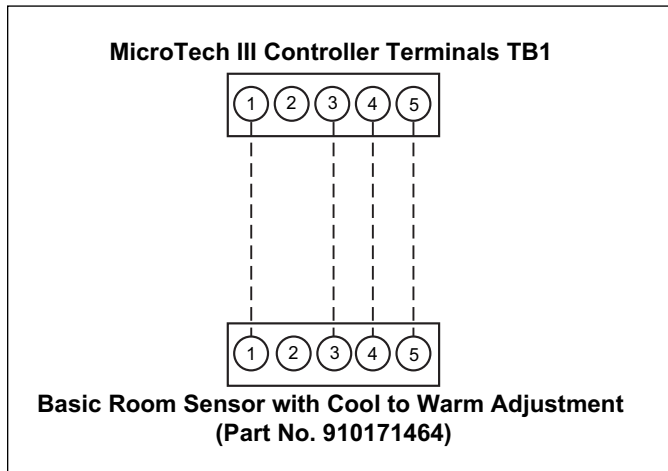


Figure 29: Room sensor with temperature adjustment wiring

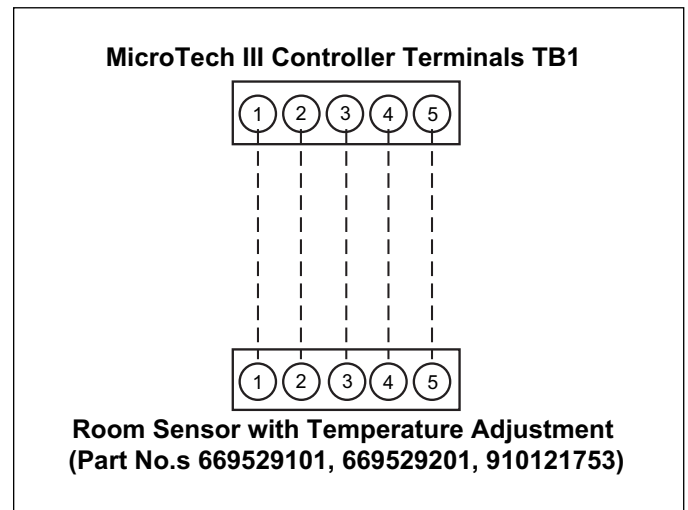


Figure 30: Digitally adjustable room temperature sensor wiring

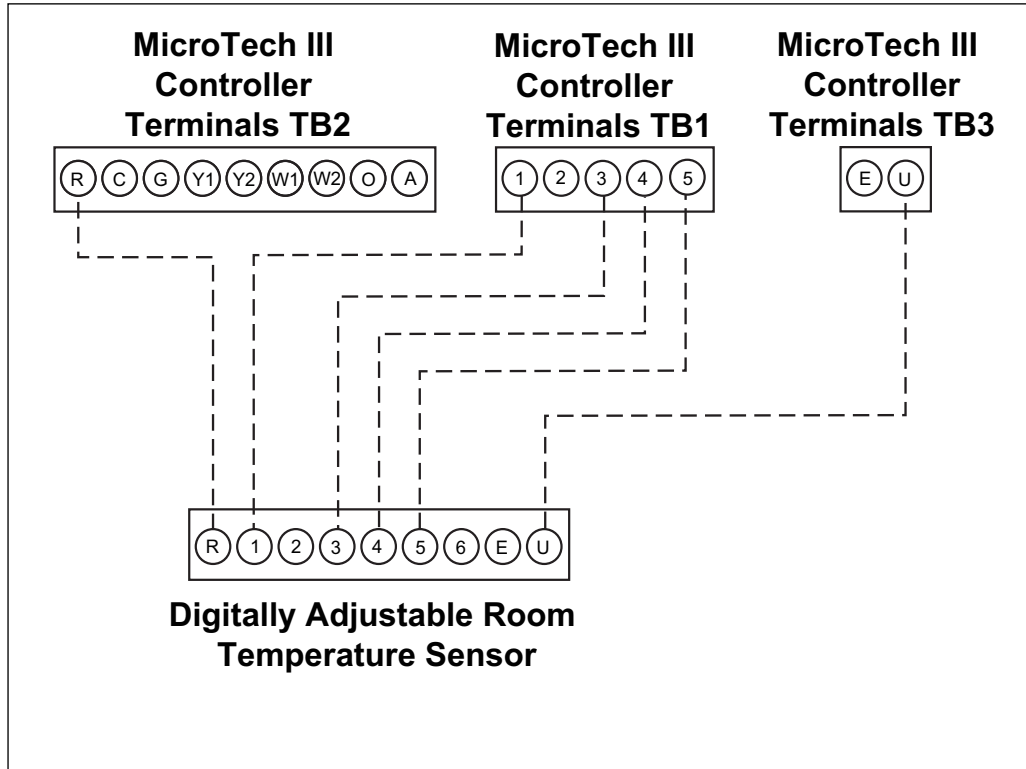
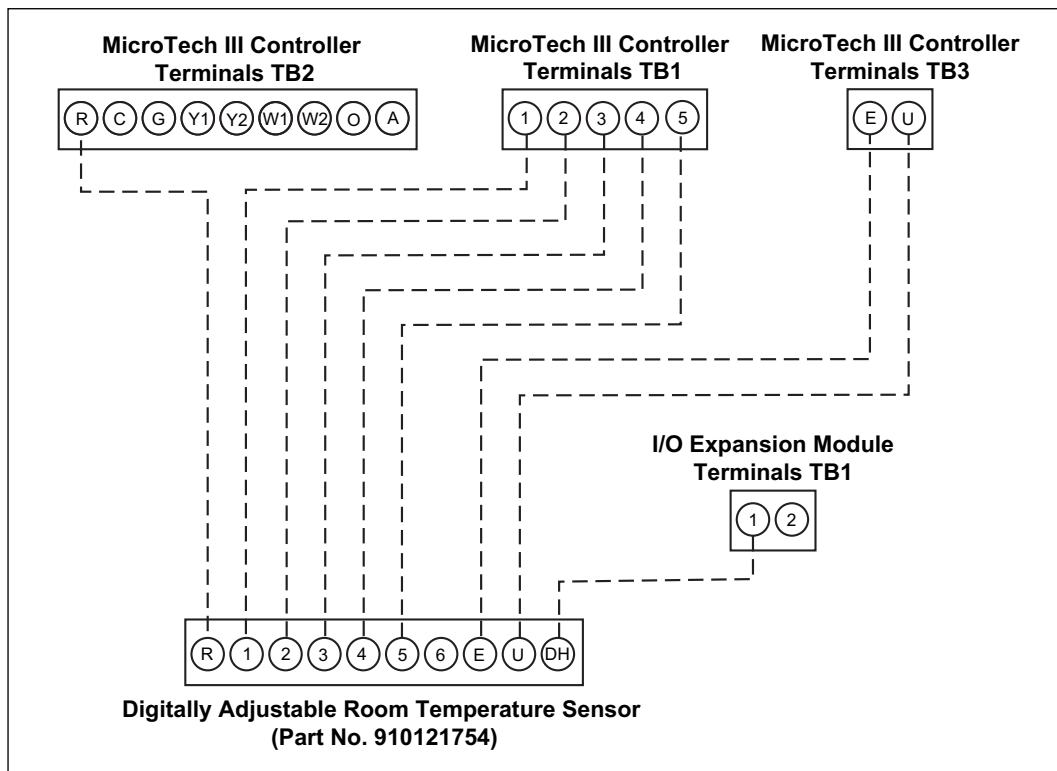


Figure 31: Digitally adjustable room temperature and humidity sensor wiring



Note: Terminal TB1-1 is used for optional dehumidification operation.

Piping Connections

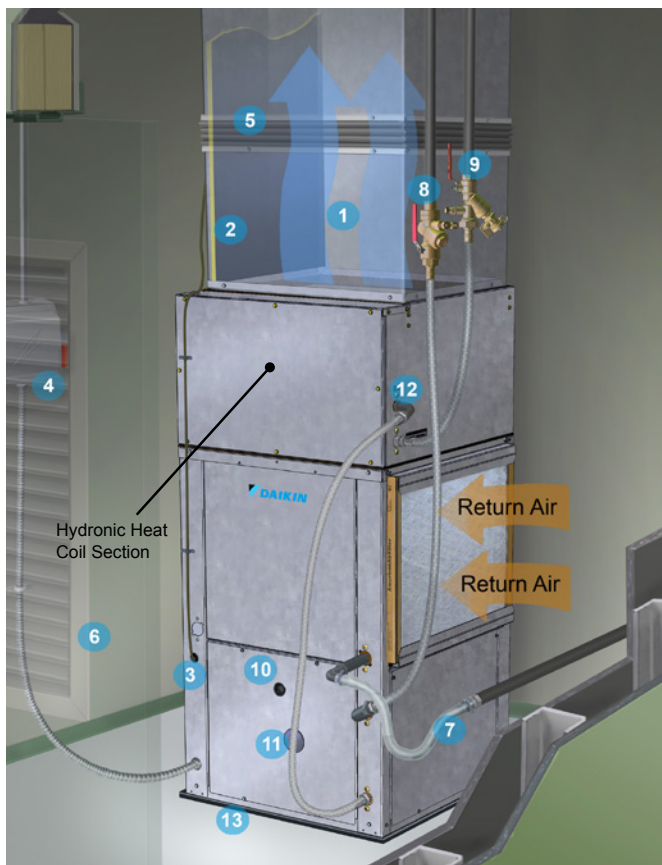
Unit With Hydronic Heat Coil

Typical Installation

When installing the unit with a hydronic heat section, the same location criteria described for the standard unit application apply. Although hydronic unit piping requires single inlet, outlet and a "jumper" connection as shown in [Figure 32](#)

Note: Some flexible hose pipe thread fittings are supplied with sealant compound requiring no additional sealant. If not, apply Teflon tape to assure a tight seal. Flared end connections do not require the use of any sealants.

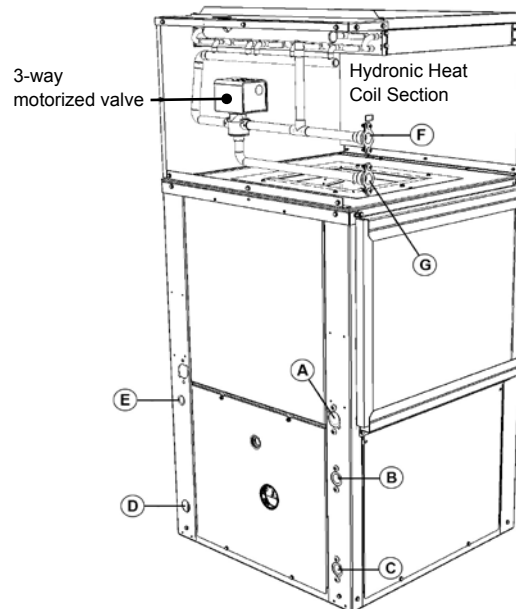
Figure 32: Typical closet installation - with hydronic heat, non-ducted application



1. Discharge air
2. Acoustic thermal duct lining - 10 feet
3. Low voltage wiring to unit control box
4. Line voltage disconnect
5. Flexible duct collar
6. Louvered closet door
7. Condensate drain with trap
8. Flexible, braided, stainless steel return hose with flow controller/ball valve with port
9. Flexible, braided, stainless steel supply hose with Y-strainer/ball valve with port to hydronic section supply

10. Access to unit control box
11. LED annunciator lights sight glass to view unit operation status and faults
12. Flexible, braided, stainless steel jumper from the hydronic return connection to the unit supply connection
13. Full vibration isolation pad between unit and floor

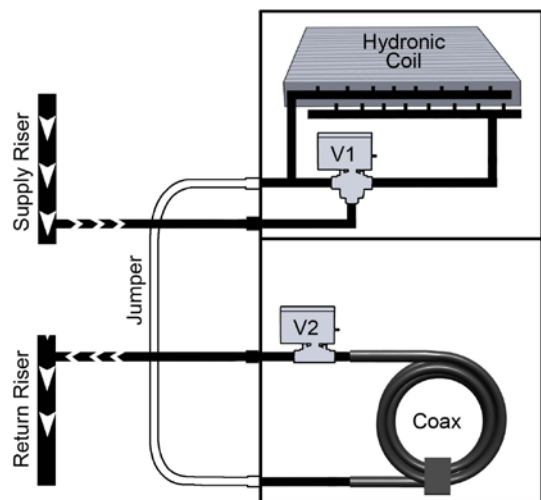
Figure 33: Hydronic heat unit wiring & piping locations



- | | |
|----------------------------------|--------------------------|
| A- Condensate (right-hand shown) | E- Low voltage - control |
| B- Water return | F- Hydronic water return |
| C- Water supply | G- Hydronic water supply |
| D- Line voltage - unit power | |

Note: [Figure 33](#) and [Figure 34](#) show a slab type hydronic coil, as on sizes 007 through 019. Unit sizes 024 through 070 hydronic coil is an "A" configuration type.

Figure 34: Piping schematic

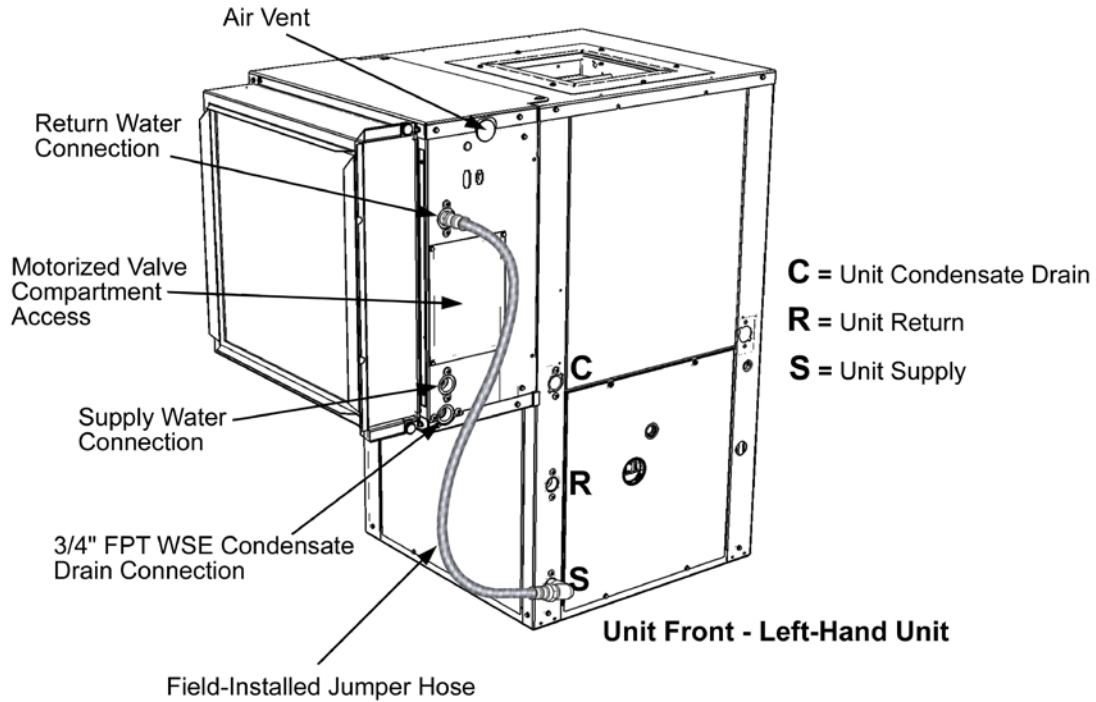


Note: Two valves allow for cooling and heating, V1, 3-way motorized valve (factory installed) and V2 (factory or field-installed option) 2-way motorized valve (no water flow through the unit when there is no call for heating or cooling).

Piping Connections

Unit With Waterside Economizer

Figure 35: Vertical unit with WSE piping locations



Note: The economizer package incorporates its own drain pan to collect condensate from the coil. This pan **MUST** be independently trapped and can be piped into the drain line for the heat pump. See [Figure 37 on page 30](#).

Waterside Economizer Dimensions

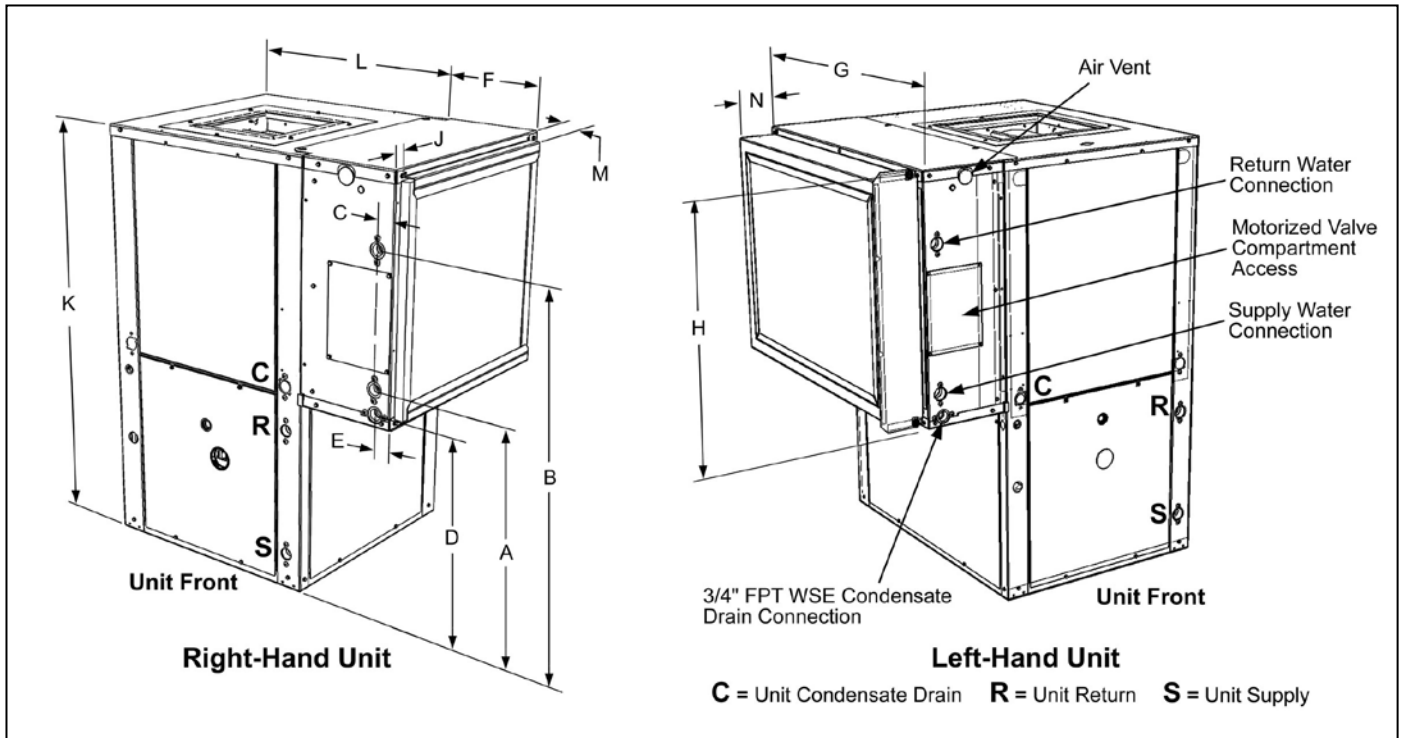


Table 13: Model GCV unit with waterside economizer - dimensions

Unit Size	Supply & Return Connections				3/4" FPT Condensate Drain		Waterside Economizer Overall Cabinet Section			J	K	L	Standard 1" Deep Filter Rack	Optional Filter Racks	
	Connection Size (FPT)	A	B	C	D	E	F	G	H				M	N Optional 2" Deep	N Optional 4" Deep
007, 009, 012	1/2"	13.26	21.46	1.65	11.68	1.65	9.00	19.00	13.42	1.28	24.00	19.00	1.00	2.125	4.125
015, 019	3/4"	17.50	29.46	1.65	17.51	1.65	9.00	21.50	17.42	1.28	32.00	21.50			
024, 030	3/4"	20.86	32.50	1.53	18.74	1.40	9.00	21.50	21.42	0.91	39.00	21.50			
036, 042	3/4"	25.87	37.50	1.40	19.68	1.40	9.00	26.00	25.42	1.20	44.00	21.50			
048, 060	1"	24.00	38.88	1.40	21.68	1.65	9.00	32.50	25.42	1.20	46.00	24.00			
070	1"	27.85	45.87	1.40	21.80	1.65	9.00	33.25	33.42	1.36	54.13	26.00			

Note: All dimensions within ± 0.10 inches (2.5 mm).

Note: Do not over-torque fittings. The maximum torque without damage to fittings is 30 foot pounds. If a torque wrench is not available, use as a rule of thumb, finger tight plus one quarter turn.

1. No unit should be connected to the supply and return piping until the water system has been cleaned and flushed completely, see "Cleaning & Flushing System" on page 31. After the cleaning and flushing has taken place, the initial connection should have all valves wide open in preparation for water system flushing.
2. Supply and return shutoff valves are required at each unit. The return valve can be used for balancing. When used it should have a "memory stop" so that it can be closed off, and reopened to the proper position for the required flow.

Condensate Drain Connection

A field provided condensate trap must be installed on each water source heat pump. Condensate removal piping must be pitched away from the unit not less than 1/4" per foot. The vent should extend at least 1-1/4" above the unit condensate fitting. A vent is required after the trap so that the condensate will drain away from the unit. The vent can also act as a clean out if the trap becomes clogged. To avoid having waste gases entering the building, the condensate drain should not be directly piped to a drain/waste/vent stack. See local codes for the correct application of condensate piping to drains

Figure 36: Unit condensate drain pipe trap detail

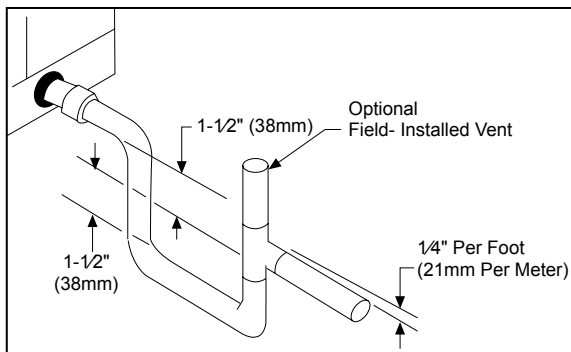
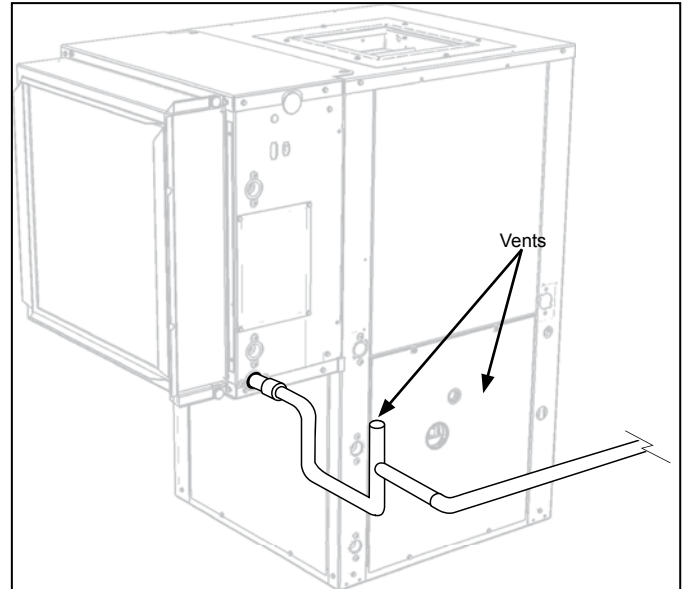


Figure 37: Unit condensate drain pipe detail with waterside economizer option



Note: Improper trapping can lead to several problems. If the trap is too tall, negative pressure will prevent drainage, causing condensate backup. If the trap is too short the seal will be destroyed or nonexistent, producing the same effect as a non-trapped system.

3. Each water source heat pump is provided with a 3/4" FPT flush mount fitting for connection of a condensate drain. A complete steel or copper condensate system can be used. Steel or copper or condensate piping should be insulated to prevent sweating.
4. Do not locate any point in the drain system above the condensate drain connection of any unit.

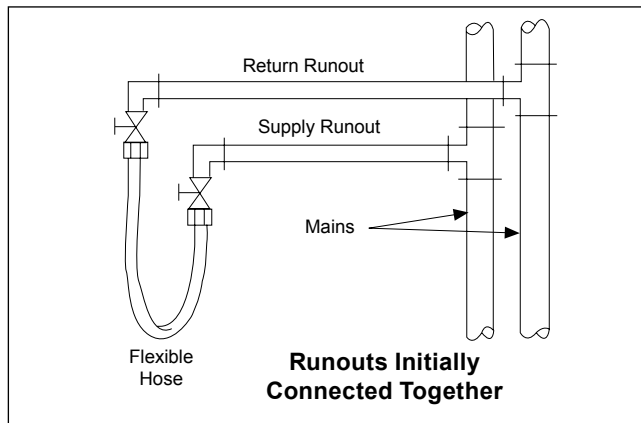
It may be necessary to manually fill the trap at system startup, or to run the unit for sufficient time to build a condensate seal. The condensate trap and condensate piping drainage should be free of any foreign debris. Debris can prevent proper drainage and unit operation and result in condensate buildup.

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 38.

Figure 38: 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.

Table 14: MicroTech III SmartSource unit controller terminals & descriptions

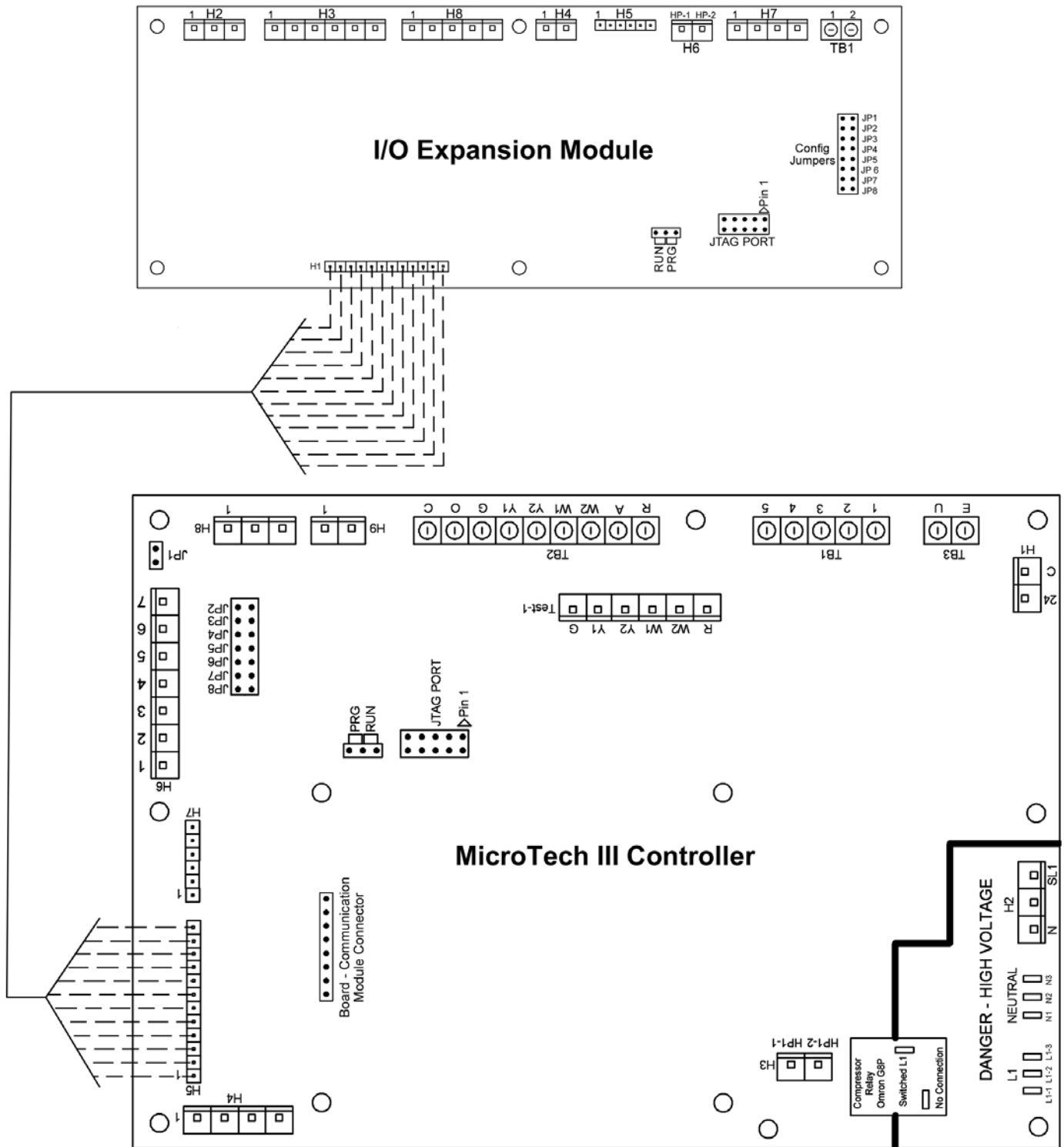
H1 – 1	24	24 VAC Power Input
H1 – 2	C	24 VAC common
H2 – 1	SL1	Fan Main Required Output – Switched L1
H2 – 2		Blank Terminal
H2 – 3	N	Fan Main Required Output – Neutral
H3 – 1	HP1-1	Comp High Pressure Switch (HP1) Input Terminal 1
H3 – 2	HP1-2	Comp High Pressure Switch (HP1) Input Terminal 2
H4 – 1	1	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	Connections to I/O Expansion Board
H5 – 2		
H5 – 3		
H5 – 4		
H5 – 5		
H5 – 6		
H5 – 7		
H5 – 8		
H5 – 9		
H5 – 10		
H5 – 11		
H5 – 12		
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 Sensor – Signal
H9 – 2		Return Air Sensor – 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	Thermostat – 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	Line Voltage Terminal 1
L1 – 2	L1 - 2	Line Voltage Terminal 2
L1 – 3	L1 - 3	Line Voltage Terminal 3
N1	N1	Neutral Terminal 1
N2	N2	Neutral Terminal 2
N3	N3	Neutral Terminal 3

I/O expansion module connectors/terminals

H1 – 1	1	Connections to Main Board
H1 – 2		
H1 – 3		
H1 – 4		
H1 – 5		
H1 – 6		
H1 – 7		
H1 – 8		
H1 – 9		
H1 – 10		
H1 – 11		
H1 – 12		
H2 – 1	1	Auxiliary Heat Stage #2 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		ECM Fan Motor Variable Speed Signal Output
H3 – 6		ECM Fan Motor Variable Speed Signal – 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	Jumper Wire Connection
H6 – 2	HP2-2	Jumper Wire Connection
H7 – 1		Fan Speed Table Row Select – Signal
H7 – 2		Fan Speed Table Row Select – Common
H7 – 3		Thermostat – Heat Stage #4 (W4) Input – Signal
H7 – 4		Auxiliary 24 VAC Out
H8 – 1	1	Compressor – High Capacity Output – N/O
H8 – 2		24 VAC Common
H8 – 3		No Connection
H8 – 4		Auxiliary Heat Stage #1 / Hydronic Heat Output N/O (24 VAC)
H8 – 5		24 VAC Common
TB1 – 1	1	Humidistat Signal Input
TB1 – 2	2	Thermostat - Heat Stage #4 (W4) Input – Signal

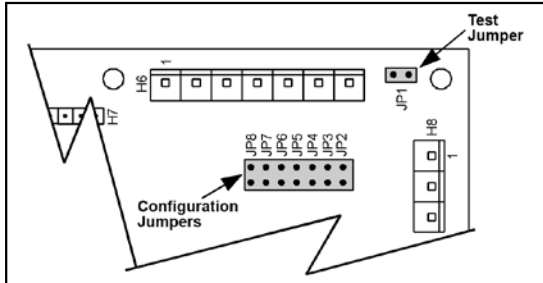
Figure 39: MicroTech SmartSource unit controller & I/O expansion module



Note: Refer to [Table 14 on page 32](#) for terminal descriptions

Jumper Configuration Settings

Figure 40: Configuration jumpers location



⚠ WARNING

Proper antifreeze/water solution is required to minimize the potential of fluid freeze-up. Jumper JP3 is factory set for water freeze protection with the jumper open. Operation at fluid temperatures below 32°F with anti-freeze protection requires JP3 to be field configured for the jumper closed. If unit is employing a fresh water system (no anti-freeze protection), it is extremely important that JP3 jumper setting remains in the open position (factory default setting) in order to shut down the unit at the appropriate water temperature to protect your heat pump from freezing. Failure to do so can result in unit damage, property damage and will void unit warranty.

Table 15: MicroTech III main board jumper settings and descriptions

Jumper	Description	Options
JP1	Mode	Open for normal operation mode
		Shorted for service/test operation mode
JP2	Fan operation	Open for continuous fan operation, when not in unoccupied mode.
		Shorted for cycling fan operation
JP3 (See Warning)	Freeze Protection	Open for water freeze protection
		Shorted for systems with anti-freeze protection (15°F (9°C))
JP4	Freeze Fault Protection	Open for none
		Shorted to enable freeze fault protection based on Leaving Water Temperature (LWT)
JP5	Set point adjustment range only applies to network controls with a room temperature sensor	Open for adjustment range of -5.0° to +5.0° F
		Shorted for 55° to 95° F adjustment range
JP6	Room control type	Open for thermostatic room control
		Shorted for room temperature sensor control, MicroTech III only.
JP7	Compressor heating source	Open to enable compressor heating
		Shorted to disable compressor heating
JP8	I/O expansion module	Open when I/O expansion module is not needed
		Shorted when I/O expansion module is required

Table 16: I/O expansion module jumper settings

I/O Expansion Description	Jumper(s)	Setting	Model
Fan Row Select for Operating Modes: • Fan Only • Hydronic Heating • Waterside Economizer	JP1 & JP2	JP1 = Open JP2 = Open	Fan Row "A" Selected
		JP1 = Shorted JP2 = Open	Fan Row "B" Selected
		JP1 = Open JP2 = Shorted	Fan Row "C" Selected
		JP1 = Shorted JP2 = Shorted	Fan Row "D" Selected
Secondary Heating Options	JP3 & JP4	JP3 = Open JP4 = Open	None
		JP3 = Shorted JP4 = Open	Supplemental Electric Heat
		JP3 = Open JP4 = Shorted	Boilerless Electric Heat
		JP3 = Shorted JP4 = Shorted	Hydronic Heat
Dehumidification Options / Waterside Economizer	JP5 & JP6	JP5 = Open JP6 = Open	None
		JP5 = Shorted JP6 = Open	Hot Gas/Water Reheat (HGR)
		JP5 = Open JP6 = Shorted	Waterside Economizer
Not Used	JP7	JP7 = Open	—
Compressor Capacity Option	JP8	JP8 = Open JP8 = Shorted	Single-Stage Capacity Dual-Stage Capacity

MicroTech® III SmartSource Unit Controller

The MicroTech III SmartSource unit controller allows thermostat, Daikin sensor and DDC standalone operation. The R (24VAC) terminal is used to operate thermostat inputs G, Y1, Y2, W1, W2, W3, W4 and TB1-1. The C (0VAC) terminal is used to control inputs U, E and O. No external power sources may be used to operate the MicroTech III controller. All units must be properly grounded per local code requirements.

NOTICE

For information on sequence of operation and troubleshooting refer to OM 1149-xx.

Remote Reset of Automatic Lockouts

The Remote Reset feature provides the means to remotely reset automatic lockouts. There are (3) means to reset an automatic lockout condition:

- Using the thermostat create 2 demands for capacity within 30 seconds
- Press the Room Sensor or Thermostat Timed Override/Reset Button for more than 10 seconds
- Turn the unit power off

When the cause of the fault condition has been cleared, and the unit transitions from not requiring any capacity to needing any capacity twice within 30 seconds (accomplished by user manipulation of the Heat/Cool/Auto/Off switch on the thermostat), an alarm reset equivalent to a tenant override button reset is generated. The intelligent reset counter and the 24 hour timer are cleared when this type of alarm reset is generated.

Note: *This feature only applies to thermostat controlled systems.*

For room sensor controlled units, pressing the “Override” or “Reset” button for more than 10 seconds will apply a ground signal to the tenant override in(screw terminal connection at TB1 pin 4) will clear the lockout alarm once the cause of the fault condition has been cleared.

A unit power cycle can also be used to clear an automatic lockout if the conditions causing the fault have been cleared.

Table 17: MicroTech III SmartSource unit controller fault & status LED's

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 High Pressure	Fault	OFF	OFF	Flash
Compressor Low Pressure	Fault	OFF	OFF	ON
Compressor Suction Temp Sensor Fail	Fault	Flash	Flash	ON
Compressor Low Suction Temp	Fault	Flash	OFF	OFF
Freeze Fault Detect	Fault	Flash	OFF	Flash
Room Temp Sensor Fail (Room Sensor Control Only)	Fault	Flash	Flash	ON
Leaving Water Temp Sensor Fail	Fault	Flash	Flash	ON
Condensate Overflow	Fault	ON	OFF	OFF
Serial EEPROM Corrupted	Fault	ON	ON	ON
Waterside Economizer Low Temp Cutout (WSE Control & Call for Cooling)	Mode	Flash	ON	Flash
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: *Mode/faults are listed in order of priority.*

Table 18: I/O expansion module fault & status LED's

Description	Type	Yellow	Green	Red
Baseboard Communication Fail	Fault	Flash	OFF	Flash
Entering Water Temp Sensor Fail (Boilerless Electric Heat or Waterside Economizer Only or Hydronic Heat)	Fault	ON	OFF	Flash
Low Entering Water Temperature (No Display On Boilerless Electric Heat)	Fault	OFF	ON	Flash
Fan is OFF	Mode	OFF	ON	OFF
Fan Running at Low Speed (0 to 33%) Duty Cycle	Mode	OFF	Flash	OFF
Fan Running at Medium Speed (34 to 66%) Duty Cycle	Mode	ON	Flash	OFF
Fan Running at High Speed (67 to 100%) Duty Cycle	Mode	Flash	Flash	OFF

Table 19: Fault recovery and reset

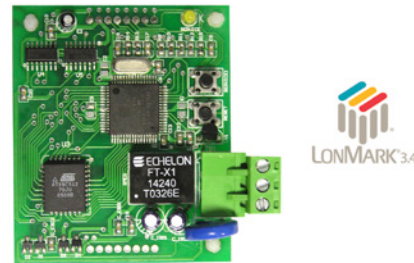
Fault Description	Auto Recovery	Tenant Override Button Reset	Network Reset
I/O Expansion Communication Fail	Yes	No	No
Invalid Configuration	No	No	No
Low Voltage Brownout	Yes	No	Yes
All Sensor Failures	No	No	Yes
Compressor High Pressure	No	Yes	Yes
Compressor Low Pressure	No	Yes	Yes
Compressor Low Suction Temp or Freeze Fault Detect (Heating and Cooling Modes)	Yes ¹	Yes	Yes
Compressor Low Suction Temp or Freeze Fault Detect (Dehumidification Mode)	Yes	Yes	Yes
Condensate Overflow	Yes	No	Yes
Low Entering Water Temp	Yes	No	No
Serial EEPROM Corrupted	No	No	No
Waterside Economizer Low Temp Cutout	Yes	No	No

Note: ¹ Indicates auto recover is subject to intelligent alarm reset. Alarm auto recovers on first two occurrences, locked out on third within 24 hour period. See "Intelligent Alarm Reset" on page 32 for further details.

MicroTech SmartSource Controller with LonWorks® Communication Module

For installation and operation information on LONWORKS Communication Module and other ancillary control components, see:

- IM 927 - MicroTech III Water Source Heat Pump LONWORKS Communication Module
- IM 933 - LonMaker Integration Plug-in Tool: For use with the MicroTech III SmartSource Unit Controller
- IM 955 - MicroTech III Wall Sensor for use with MicroTech III SmartSource Unit Controller
- IM 956 - Temperature Sensors for Units with MicroTech® III Unit Controller and LONWORKS® or BACnet® Communication Module

Figure 41: LONWORKS communication module


MicroTech SmartSource Controller with BACnet® Communication Module

For installation and operation information on MicroTech III SmartSource unit controller and other ancillary components, see:

- IM 928 - MicroTech III BACnet Communication Module
- OM 931 - MicroTech III SmartSource Unit Controller for Water Source Heat Pumps Operation and Maintenance Manual
- IM 955 - MicroTech III Wall Sensor For use with MicroTech III SmartSource Unit Controller
- IM 956 - Temperature Sensors for Units with MicroTech® III Unit Controller and LONWORKS® or BACnet® Communication Module

Figure 42: MicroTech III BACnet water source heat pump snap-in communication module


Fan Performance for Standard PSC Motor - 208V Operation

Table 20: PSC motor CFM values

Unit Size	Setting	Rated Airflow	External Static Pressure (in-H ₂ O) [Dry Coil and STD Filter] (inches of water column)													
			.05	.10	.20	.30	.40	.45	.50	.60	.70	.80	.90	1.0	1.1	1.2
007	High	250	394	388	374	350	313	291	266	215						
	Medium		331	329	321	302	267	244	220							
	Low		289	287	281	264	231	209	186							
009	High	300	432	424	407	385	351	330	305	246						
	Medium		358	352	342	323	290	269	245							
	Low		317	312	300	278	245	224								
012	High	400	432	424	407	385	351	330	305							
	Medium		358	352	342	323	290									
	Low		317	312	300											
015	High	500	732	736	709	667	625	605	583	521	400					
	Medium		705	673	638	612	573	544	507	413						
	Low		611	599	575	543	498	468	433							
019	High	600	732	736	709	667	625	605	583	521						
	Medium		705	673	638	612	573	544	507							
	Low		611	599	575	543	498	468	433							
024	High	800	931	940	945	934	906	887	863	802	726	632				
	Medium		789	797	802	796	777	763	747	704	650	584				
	Low		695	706	717	714	696	682	664	618						
030	High	1000	1289	1270	1211	1147	1093	1069	1045	984	872					
	Medium		1194	1185	1140	1086	1037	1014	991	932	826					
	Low		1089	1079	1049	1016	980	960	936	869	755					
036	High	1200	1369	1359	1331	1292	1240	1209	1173	1088	980	843				
	Medium		1224	1221	1210	1187	1151	1126	1097	1023	924					
	Low		1078	1083	1084	1073	1049	1031	1009	949	859					
042	High	1400	1698	1695	1688	1679	1663	1652	1639	1602	1553	1490	1414	1327	1230	1126
	Medium		1422	1421	1420	1419	1417	1414	1410	1396	1371	1331	1272	1187	1071	
	Low		1179	1191	1205	1211	1213	1212	1209	1201	1185	1154	1103	1021		
048	High	1600	1698	1695	1688	1679	1663	1652	1639	1602	1553	1490	1414	1327	1230	1126
	Medium		1422	1421	1420	1419	1417	1414	1410	1396	1371	1331	1272	1187		
	Low		1179	1191	1205	1211	1213	1212	1209	1201	1185	1154				
060	High	2000	2265	2267	2252	2214	2156	2122	2084	2000	1909	1815	1721	1632	1551	1482
	Medium		1962	1964	1957	1937	1905	1886	1864	1816	1761	1703	1642	1581	1521	1464
	Low		1703	1702	1697	1687	1673	1664	1654	1629	1597	1559	1512	1458		
070	High	2300	2265	2267	2252	2214	2156	2122	2084	2000	1909	1815	1721			
	Medium		1962	1964	1957	1937	1905	1886	1864	1816	1761	1703				
	Low		1703	1702	1697	1687										

- Notes:**
- Speed adjustment is done at terminal strip on the motor. Refer to unit schematic.
 - Gray tinted areas, outside recommended operating range.
 - Refer to schematic supplied with the unit for wiring as supplied by the factory. Wire colors BK = hi, BL = med & RD = low.

Fan Speed Selector Switch

A 4-position fan speed selector switch located in the control box allows CFM settings to be field adjustable. Fan speed control optimizes unit fan speed based on thermostat/room sensor inputs. The fan speed switch allows for manually setting an optimal fan speed specific to the application requirements. Each position on the fan speed switch represents settings 1-4. See [Table 21](#) below, [Table 23 on page 40](#) and [Table 22 on page 39](#) for the complete list of fan speed selector switch settings.

Figure 43: 4-position fan speed selector switch



Fan Performance For Optional Constant Torque Motor (Sizes 007–012)

Table 21: Constant torque motor CFM values

Unit Size	Setting	Function	External Static Pressure (in-H ₂ O) [Dry Coil and STD Filter] (inches of water column)													
			0	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70
007	Setting 4	Stage 2	350	333	322	310	297	283	269	254	239	224				
	Setting 3		316	302	292	280	266	250	234	218						
	Setting 2		277	268	258	246	231	215								
	Setting 1		237	232	223	211										
	Setting 4	Stage 1	316	302	292	280	266	250	234	218						
	Setting 3		277	268	258	246	231	215								
	Setting 2		237	232	223	211										
	Setting 1		237	232	223	211										
	A	Fan Only, Hydronic Heat and WSE	316	302	292	280	266	250	234	218	202	186	170	156	144	134
	B		277	268	258	246	231	215	198	180	163	147	132	119	109	102
	C		237	232	223	211	196	179	162	144	126	110	96	85	77	74
	D*		173	173	166	155	141	126	109	92	76	62	50			
009	Setting 4	Stage 2	398	377	367	356	344	333	321	308	295	282	268	253	238	222
	Setting 3		367	348	337	326	313	300	287	272	258	243	229	214		
	Setting 2		331	316	305	293	279	264	249	233	217					
	Setting 1		292	281	271	259	244	228	212							
	Setting 4	Stage 1	367	348	337	326	313	300	287	272	258	243	229	214		
	Setting 3		331	316	305	293	279	264	249	233	217					
	Setting 2		292	281	271	259	244	228	212							
	Setting 1		292	281	271	259	244	228	212							
	A	Fan Only, Hydronic Heat and WSE	367	348	337	326	313	300	287	272	258	243	229	214	199	184
	B		331	316	305	293	279	264	249	233	217	202	186	172	159	147
	C		292	281	271	259	244	228	212	194	177	161	146	133	122	113
	D*		229	225	216	204	189	173	155	137	120	104	90	79	72	69
012	Setting 4	Stage 2	475	460	452	442	432	421	410	399	389	378	369	360	353	347
	Setting 3		455	435	426	416	406	396	386	375	364	353	342	331	319	307
	Setting 2		430	409	398	388	378	367	356	345	334	322	309	296	281	
	Setting 1		402	381	370	359	348	337	325	313	300	286				
	Setting 4	Stage 1	455	435	426	416	406	396	386	375	364	353	342	331	319	307
	Setting 3		430	409	398	388	378	367	356	345	334	322	309	296	281	
	Setting 2		402	381	370	359	348	337	325	313	300	286				
	Setting 1		402	381	370	359	348	337	325	313	300	286				
	A	Fan Only, Hydronic Heat and WSE	455	435	426	416	406	396	386	375	364	353	342	331	319	307
	B		430	409	398	388	378	367	356	345	334	322	309	296	281	266
	C		402	381	370	359	348	337	325	313	300	286	273	258	243	227
	D*		354	337	326	314	301	288	273	259	244	229	214	199	185	171

Notes: 1. Gray tinted areas, outside recommended operating range.

2. Units are shipped at setting 3 (standard). Speed adjustment is done by 4-position switch in the control box.

3. The unit is capable of high-low fan performance through the use of a 2-stage thermostat wired to specific terminals for High-Low CFM fan performance. Standard operation with a 1-stage thermostat is indicated as stage 2 fan performance.

* Exception - WSE operates at row "C" airflows.

Fan Performance For Optional Constant CFM EC Motor (Sizes 015–070)

Table 22: Single stage units with constant CFM EC motor

Unit Size	MicroTech III Unit Controller								I/O Expansion Module			
	Setting	Maximum ESP (in. wg.) ²	¹ Low CFM Heat	¹ High CFM Heat	¹ Low CFM Cool	¹ High CFM Cool	Dehumidification	Electric Heat	Setting	Fan Only	Hydronic Heat	Water-side Economizer
015	4 (High)	0.7	500	560	500	560	470	560	A	500	500	500
	3 (Standard)		440	500	440	500	400	560	B	440	440	440
	2 (Medium)		375	440	375	440	375	560	C	375	375	375
	1 (Low)		375	375	375	375	375	560	D	280	280	375
019	4 (High)	0.7	600	675	600	675	560	675	A	600	600	600
	3 (Standard)		525	600	525	600	490	675	B	525	525	525
	2 (Medium)		450	525	450	525	450	675	C	450	450	450
	1 (Low)		450	450	450	450	450	675	D	340	340	450
024	4 (High)	0.7	800	900	800	900	750	900	A	800	800	800
	3 (Standard)		700	800	700	800	650	900	B	700	700	700
	2 (Medium)		600	700	600	700	600	900	C	600	600	600
	1 (Low)		600	600	600	600	600	900	D	450	450	600
030	4 (High)	0.7	1000	1125	1000	1125	940	1125	A	1000	1000	1000
	3 (Standard)		875	1000	875	1000	820	1125	B	875	875	875
	2 (Medium)		750	875	750	875	750	1125	C	750	750	750
	1 (Low)		750	750	750	750	750	1125	D	570	570	750
036	4 (High)	0.7	1200	1350	1200	1350	1130	1350	A	1200	1200	1200
	3 (Standard)		1050	1200	1050	1200	975	1350	B	1050	1050	1050
	2 (Medium)		900	1050	900	1050	900	1350	C	900	900	900
	1 (Low)		900	900	900	900	900	1350	D	680	680	900
042	4 (High)	0.7	1400	1575	1400	1575	1310	1575	A	1400	1400	1400
	3 (Standard)		1225	1400	1225	1400	1140	1575	B	1225	1225	1225
	2 (Medium)		1050	1225	1050	1225	1050	1575	C	1050	1050	1050
	1 (Low)		1050	1050	1050	1050	1050	1575	D	790	790	1050
048	4 (High)	0.7	1640	1850	1640	1850	1530	1850	A	1640	1640	1640
	3 (Standard)		1425	1640	1425	1640	1320	1850	B	1425	1425	1425
	2 (Medium)		1220	1425	1220	1425	1220	1850	C	1220	1220	1220
	1 (Low)		1220	1220	1220	1220	1220	1850	D	900	900	1220
060	4 (High)	0.7	2000	2250	2000	2250	1890	2250	A	2000	2000	2000
	3 (Standard)		1750	2000	1750	2000	1640	2250	B	1750	1750	1750
	2 (Medium)		1500	1750	1500	1750	1500	2250	C	1500	1500	1500
	1 (Low)		1500	1500	1500	1500	1500	2250	D	1140	1140	1500
070	4 (High)	0.7	2050	2300	2050	2300	1920	2400	A	2050	2050	2050
	3 (Standard)		1790	2050	1790	2050	1670	2400	B	1790	1790	1790
	2 (Medium)		1540	1790	1540	1790	1540	2400	C	1540	1540	1540
	1 (Low)		1540	1540	1540	1540	1540	2400	D	1160	1160	1540

Notes: ¹ The unit is capable of high-low fan performance through the use of a 2-stage thermostat wired to specific terminals for High-Low CFM fan performance. Standard operation with a 1-stage thermostat is indicated as High CFM fan performance.

² Applications up to 1.0" ESP (in. wg.) are possible. However, increased fan noise should be anticipated and appropriate noise attenuation should be considered.

3. See page 42 for CFM jumper setting detail.

Fan Performance For Optional Constant Torque EC Motor (Sizes 015–070)

Table 23: Constant torque EC motor CFM values

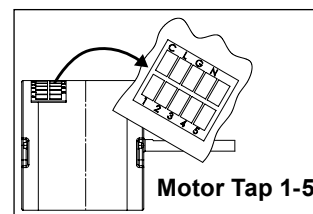
Unit Size	Motor Tap ³	Rated Airflow	External Static Pressure (in-H ₂ O) [Dry Coil and STD Filter] (inches of water column)											
			.05	.10	.20	.30	.40	.45	.50	.60	.70	.80	.90	1.0
015	5 (High)	500	770	757	725	694	668	657	644	606	531	383		
	4 (High)		645	633	602	567	533	516	499	459	402			
	3 (Standard)		598	585	548	505	463	444	425	389				
	2 (Medium)		554	542	510	470	428	406	385					
	1 (Low)		530	513	473	428	384	363						
019	5 (High)	600	800	787	760	730	698	681	663	627	591	557	528	508
	4 (High)		749	737	709	676	643	625	607	569	526	474		
	3 (Standard)		700	686	653	619	585	568	551	507	442			
	2 (Medium)		662	646	616	583	544	522	497	446				
	1 (Low)		613	589	555	520	475	449	421					
024	5 (High)	800	1208	1201	1170	1130	1090	1068	1044	978	867	676		
	4 (High)		940	930	903	873	847	836	824	798	755	675		
	3 (Standard)		902	891	864	836	811	800	789	764	724	654		
	2 (Medium)		868	860	825	787	760	751	745	731	691	588		
	1 (Low)		832	823	786	746	715	705	697	680	644			
030	5 (High)	1000	1182	1164	1137	1113	1078	1054	1024	946	842	716		
	4 (High)		1139	1121	1095	1073	1047	1029	1006	939	836			
	3 (Standard)		1084	1075	1050	1025	1001	986	969	914	814			
	2 (Medium)		1038	1028	1003	978	955	943	929	884	797			
	1 (Low)		998	984	956	930	905	893	880	844	787			
036	5 (High)	1200	1493	1485	1445	1390	1332	1302	1270	1197	1091	921		
	4 (High)		1413	1404	1377	1340	1296	1270	1241	1168	1068	927		
	3 (Standard)		1332	1322	1299	1274	1247	1230	1210	1153	1061	916		
	2 (Medium)		1263	1252	1223	1195	1172	1161	1148	1112	1043	912		
	1 (Low)		1215	1203	1176	1149	1127	1117	1105	1072	1011	897		
042	5 (High)	1400	1585	1572	1541	1507	1476	1461	1446	1417	1385	1343	1285	1200
	4 (High)		1560	1548	1517	1484	1451	1436	1421	1391	1360	1320	1265	1184
	3 (Standard)		1533	1520	1490	1458	1427	1412	1398	1368	1337	1297	1244	1168
	2 (Medium)		1467	1453	1423	1392	1361	1346	1331	1301	1270	1234	1192	1137
	1 (Low)		1409	1395	1366	1335	1304	1289	1273	1240	1206	1170	1133	1094
048	5 (High)	1600	1789	1781	1758	1730	1704	1692	1682	1664	1647	1625	1588	1524
	4 (High)		1730	1719	1696	1672	1650	1639	1628	1608	1586	1561	1529	1487
	3 (Standard)		1699	1694	1673	1645	1614	1599	1585	1560	1537	1515	1490	1455
	2 (Medium)		1637	1625	1604	1586	1568	1559	1548	1526	1501	1474	1447	1423
	1 (Low)		1610	1600	1578	1556	1533	1522	1510	1487	1462	1437	1411	1383
060	5 (High)	2000	2329	2313	2274	2234	2197	2180	2165	2136	2105	2062	1994	1884
	4 (High)		2252	2235	2195	2153	2115	2097	2081	2050	2018	1975	1911	1809
	3 (Standard)		2179	2162	2123	2083	2045	2028	2012	1981	1948	1904	1838	1734
	2 (Medium)		2102	2084	2047	2011	1977	1960	1944	1910	1871	1825	1766	1686
	1 (Low)		2014	1995	1959	1925	1891	1873	1854	1814	1769	1720	1668	1612
070	5 (High)	2300	2432	2413	2370	2325	2282	2262	2244	2210	2180	2147	2108	2053
	4 (High)		2407	2388	2346	2301	2259	2239	2221	2187	2156	2124	2087	2037
	3 (Standard)		2381	2361	2318	2276	2237	2219	2202	2170	2138	2105	2065	2013
	2 (Medium)		2348	2327	2285	2244	2205	2187	2169	2135	2102	2068	2029	1980
	1 (Low)		2303	2281	2240	2200	2163	2145	2127	2092	2057	2021	1981	1937

Notes: 1. Gray tinted areas, outside recommended operating range.

2. Units are shipped at setting 3 (standard), setting 5 (high) for unit size 070.

Speed adjustment is done at motor terminal strip

3. Motor speed adjustments can be made by moving wire to appropriate motor tap 1-5.



Fan Performance For Optional Constant Torque EC Motor (Sizes 007–012)

Table 24: Fan only settings and performance for hydronic heat operation and *waterside economizer

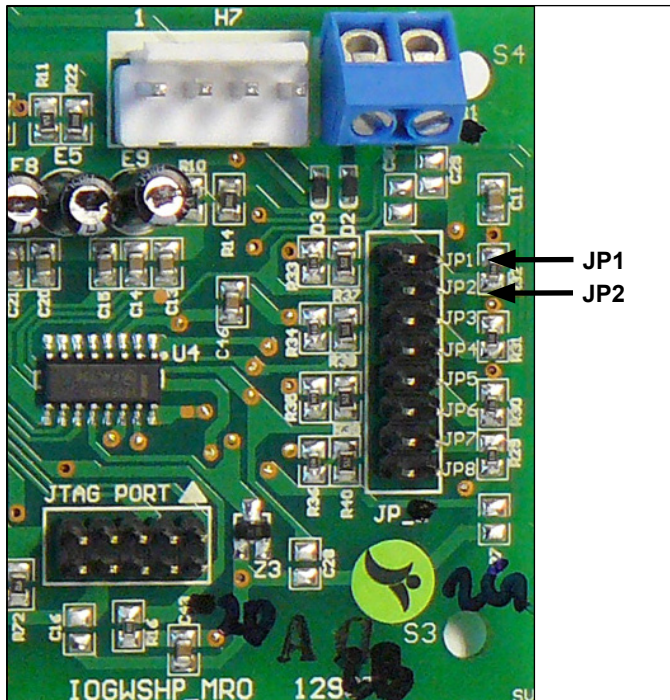
Unit Size	Setting	Function	External Static Pressure (in-H ₂ O) [Dry Coil and STD Filter] (inches of water column)													
			0	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70
007	A	Fan Only, Hydronic Heat and WSE	316	302	292	280	266	250	234	218	202	186	170	156	144	134
	B		277	268	258	246	231	215	198	180	163	147	132	119	109	102
	C		237	232	223	211	196	179	162	144	126	110	96	85	77	74
	D ¹		173	173	166	155	141	126	109	92	76	62	50			
009	A	Fan Only, Hydronic Heat and WSE	367	348	337	326	313	300	287	272	258	243	229	214	199	184
	B		331	316	305	293	279	264	249	233	217	202	186	172	159	147
	C		292	281	271	259	244	228	212	194	177	161	146	133	122	113
	D ¹		229	225	216	204	189	173	155	137	120	104	90	79	72	69
012	A	Fan Only, Hydronic Heat and WSE	455	435	426	416	406	396	386	375	364	353	342	331	319	307
	B		430	409	398	388	378	367	356	345	334	322	309	296	281	266
	C		402	381	370	359	348	337	325	313	300	286	273	258	243	227
	D ¹		354	337	326	314	301	288	273	259	244	229	214	199	185	171

Notes: ¹ Exception; Waterside economizer operates at row "C" airflows.

2. Refer to [Figure 44 on page 42](#) for location of jumpers JP1 and JP2 on the I/O expansion module.

Table 25: I/O expansion module jumper configuration

I/O Expansion module configuration		
Setting	JP1	JP2
A	Open	Open
B	Shorted	Open
C	Open	Shorted
D	Shorted	Shorted

Figure 44: JP1 & JP2 location on the I/O expansion module


Jumper Settings on I/O Expansion Module

In addition to the 4-position switch, all units have the capability to set CFM values independent to those associated with compressor operation. Independent CFM values can be set for fan only, dehumidification, waterside economizer and hydronic heat from the jumper pins JP1 and JP2 on the I/O expansion module. The jumper pin configurations represent settings A, B, C and D. See [Table 25](#). These settings establish unique CFM settings for the four previously mentioned mode of operation. See [Table 21 on page 38](#) and [Table 24 on page 41](#) under the I/O Expansion Module. For example, unit size 036 with the 4-position switch set at Setting #3 and the I/O expansion module jumper set at D, will deliver 1200 CFM at stage 2 compressor operation mode, 1050 CFM at stage 1 compressor operation, 1350 CFM in electric heat mode, 700 CFM in fan only mode, 975 CFM in dehumidification mode, 680 CFM in hydronic heat mode and 900 CFM in waterside economizer mode.

Fan Speed Selector Switch

A 4-position fan speed selector switch located in the control box allows maximum CFM settings to be field adjustable. Fan speed control optimizes unit fan speed (CFM) based on thermostat/room sensor inputs. The fan speed switch allows for manually setting an optimal CFM specific to the application requirements. Each position on the fan speed switch represents settings 1-4. See [table 14 on page 61](#) for the complete list of fan speed selector switch settings.

Figure 45: 4-position fan speed selector switch


Variable CFM

All units have the capability to deliver variable CFM based on the thermostat wiring. By using a multi-stage wall thermostat, the unit can deliver lower CFM as the space temperature is satisfied. For example, unit size 024 with the 4-position switch set a #3, I/O expansion module JP1/JP2 jumpers set at B and a 3-stage cooling wall thermostat will deliver 650 CFM at stage 1 cooling, 700 CFM at stage 2 cooling and 800 CFM at stage 3 cooling. All of this is accomplished by wiring the thermostat to the appropriate terminal on the MicroTech III controller terminal strip. The variable CFM feature allows for improved humidity levels by increasing latent cooling capacity through reduced CFM. Here, we are attempting to satisfy cooling at the lowest airflow, 650 CFM, but having the capability to deliver higher airflow, 800 CFM, if needed.

Table 26: Standard CFM settings

Unit Size 024	Standard CFM Settings (Compressor is ON)		
Fan Setting	High CFM Cooling Stage 3	Low CFM Cooling Stage 2	Dehumidification Mode Stage 1
#3	800	700	650

Information for Initial Start-up

CAUTION

Units must be checked for water leaks upon initial water system start-up. Water leaks may be a result of mishandling or damage during shipping. Failure by the installing contractor to check for leaks upon start-up of the water system could result in property damage.

Check, Test & Start Procedure

NOTICE

Complete the "Water Source Heat Pump Equipment Check, Test and Start Form" on page 38.

Check As Completed:

- ☐ Open all valves to full open position and turn on power to the unit.
- ☐ Set thermostat for "Fan Only" operation 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.
- ☐ 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 units 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. To insure proper water flow, measure the temperature difference between entering and leaving water. The temperature differential should be 10°F to 14°F (5°C to 8°C) for units in cooling mode. 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
- ☐ 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 units 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, 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.
- ☐ 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.
- ☐ If the unit 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?
- ☐ If the unit 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.
- ☐ Check for vibrating refrigerant piping, fan wheels, etc.

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.

Air Limits

Table 27: Air limits in °F (°C)

Air Limits	Standard Range Units		Extended Range (Geothermal) Units	
	Cooling	Heating	Cooling	Heating
Minimum Ambient Air ¹	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 ²	100°F (38°C)	85°F (29°C)	100°F (38°C)	85°F (29°C)
Minimum Entering Air ¹	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 ²	100/83°F (38/28°C)	80°F (27°C)	100/83°F (38/28°C)	80°F (27°C)

Fluid Limits

Table 28: Fluid limits

Fluid Limits	Standard Range Units		Extended Range (Geothermal) Units	
	Cooling	Heating	Cooling	Heating
Minimum Entering Fluid	55°F (13°C) ³	55°F (13°C)	30°F (-1°C)	20°F (-6°C)
Normal Entering Fluid	85°F (29°C)	70°F (21°C)	77°F (25°C)	40°F (4°C)
Maximum Entering Fluid	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.

³ Unit with waterside economizer option can operate in economizer cooling mode down to 40°F (4°C).

Motorized Isolation Valve

The motorized valve kit is available as a factory-installed or a field-installed option.

Wired as shown in Figure 46, the motorized valve will open on a call for compressor operation.

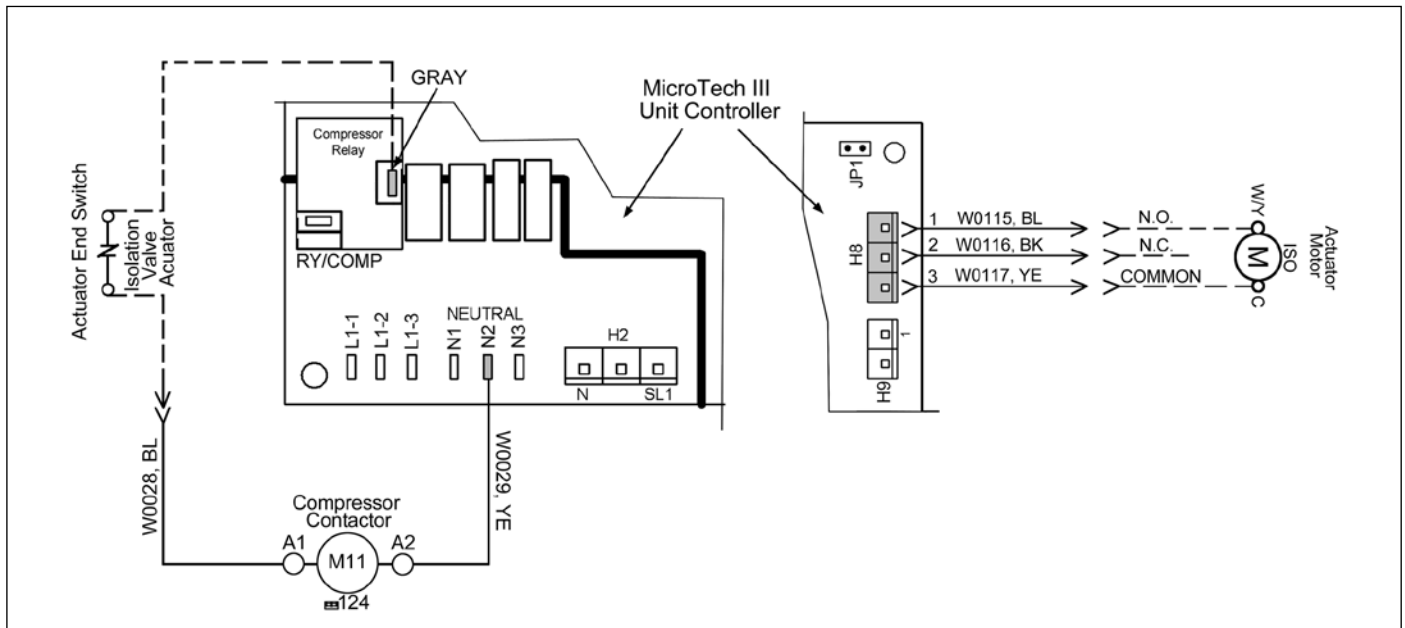
The motorized isolation valve actuator (ISO) has both a 24V power connection and a 24V end switch connection.

Install the supplied wire harness into plug H8 on the main control board. Run wires between the ISO actuator and the supplied wire harness ends.

Connect N.O. & N.C. actuators as shown on the schematic. The end switch should be wired in series with the 24V compressor signal wire. Connect the end switch wires as shown in the schematic. The end switch will close when the valve is fully open.

Note: For detailed installation instructions for the motorized valve, refer to IM 1151.

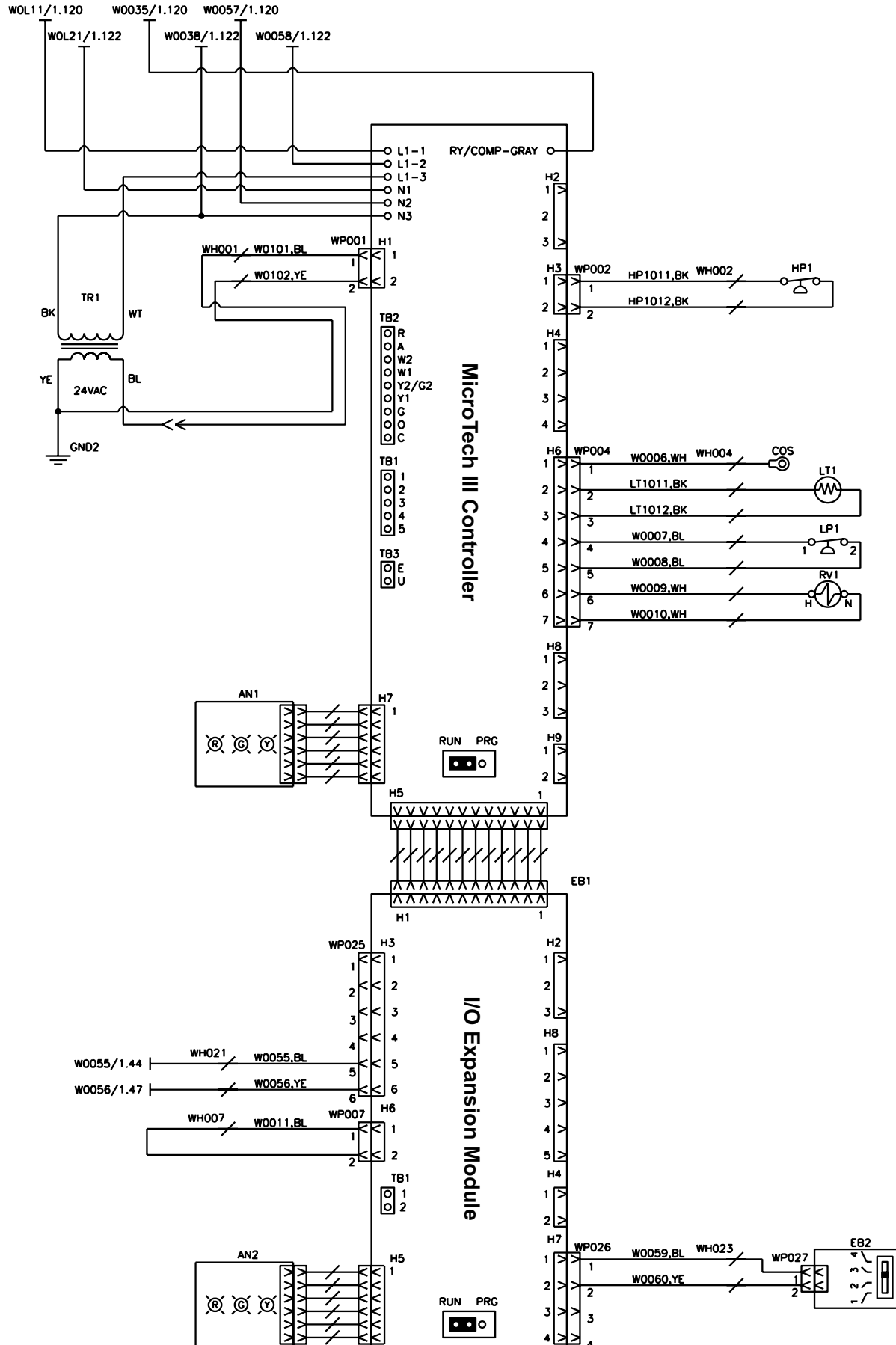
Figure 46: Motorized valve wiring



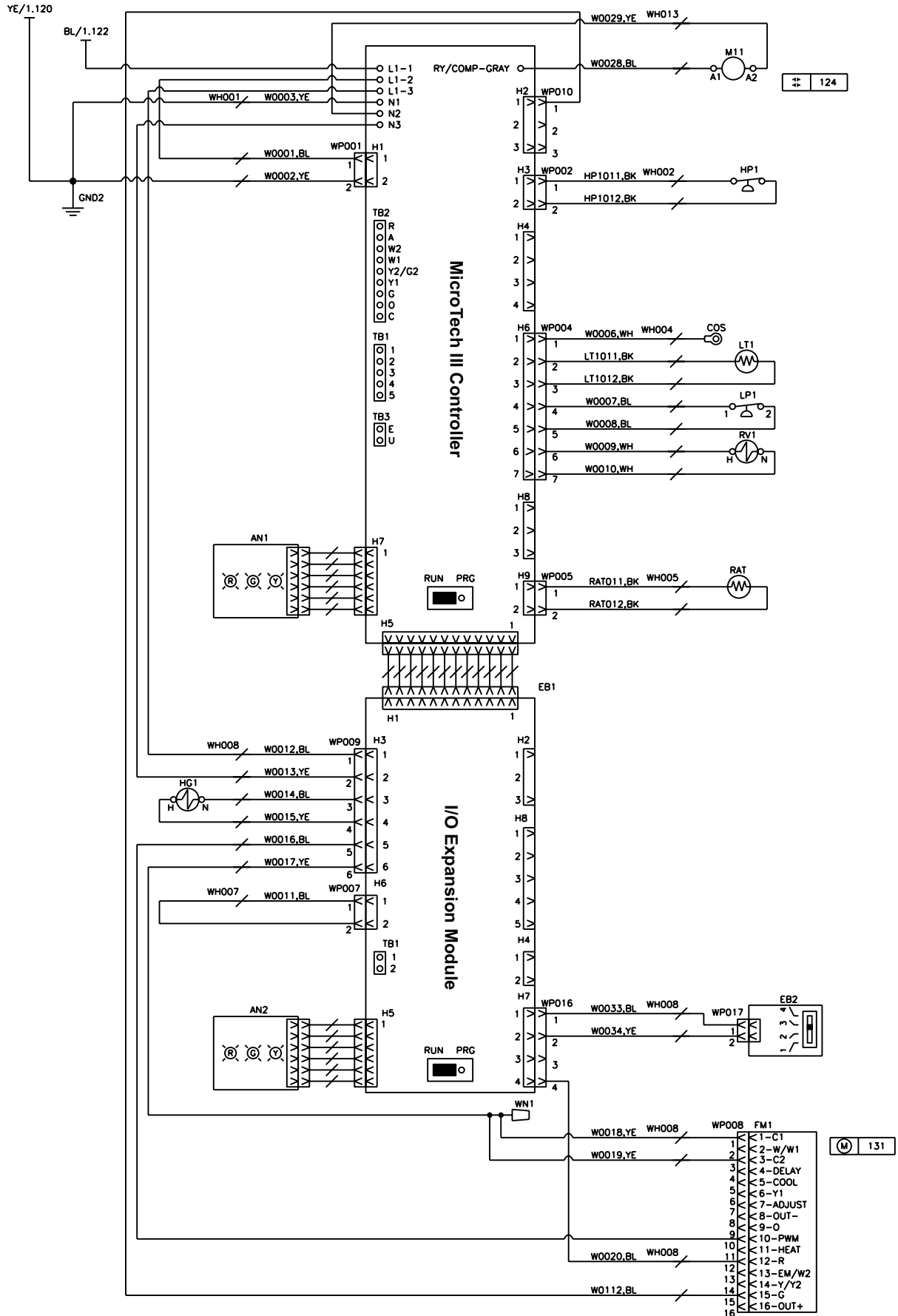
The diagram illustrates the wiring for the MicroTech III Controller. Key components and connections include:

- Power and Grounding:**
 - YE/1.120 and BL/1.122 lines enter from the top left.
 - GND2 is connected to the bottom left.
- MicroTech III Controller:**
 - Terminal block TB2 (R, A, W2, W1, Y2/G2, G, O, C) is connected to the top left.
 - Terminal block TB1 (1, 2, 3, 4, 5) is connected to the bottom left.
 - Terminal block TB3 (E, U) is connected to the bottom left.
- Relays and Switches:**
 - WP001 (H1, 1, 2) is connected to the top left.
 - WP002 (H3, 1, 2) is connected to the top left.
 - WP004 (H6, 1, 2, 3, 4, 5, 6, 7) is connected to the top left.
 - WP110 (H2, 1, 2, 3) is connected to the top left.
- Other Components:**
 - M11, M01, HP1, LT1, LP1, RV1, and AN1 are connected to the top left.
 - RY/COMP-GRAY is connected to the top left.
 - W0001, W0002, W0003, W0006, W0007, W0008, W0009, W0010, W0107, W0108, W0028, W0029, W0101, W0102, W0103, W0104, W0105, W0106, W0107, W0108, W0109, W0110, W0111, W0112, W0113, W0114, W0115, W0116, W0117, W0118, W0119, W0120, W0121, W0122, W0123, W0124, W0125, W0126, W0127, W0128, W0129, W0130, W0131, W0132, W0133, W0134, W0135, W0136, W0137, W0138, W0139, W0140, W0141, W0142, W0143, W0144, W0145, W0146, W0147, W0148, W0149, W0150, W0151, W0152, W0153, W0154, W0155, W0156, W0157, W0158, W0159, W0160, W0161, W0162, W0163, W0164, W0165, W0166, W0167, W0168, W0169, W0170, W0171, W0172, W0173, W0174, W0175, W0176, W0177, W0178, W0179, W0180, W0181, W0182, W0183, W0184, W0185, W0186, W0187, W0188, W0189, W0190, W0191, W0192, W0193, W0194, W0195, W0196, W0197, W0198, W0199, W0200, W0201, W0202, W0203, W0204, W0205, W0206, W0207, W0208, W0209, W0210, W0211, W0212, W0213, W0214, W0215, W0216, W0217, W0218, W0219, W0220, W0221, W0222, W0223, W0224, W0225, W0226, W0227, W0228, W0229, W0230, W0231, W0232, W0233, W0234, W0235, W0236, W0237, W0238, W0239, W0240, W0241, W0242, W0243, W0244, W0245, W0246, W0247, W0248, W0249, W0250, W0251, W0252, W0253, W0254, W0255, W0256, W0257, W0258, W0259, W0260, W0261, W0262, W0263, W0264, W0265, W0266, W0267, W0268, W0269, W0270, W0271, W0272, W0273, W0274, W0275, W0276, W0277, W0278, W0279, W0280, W0281, W0282, W0283, W0284, W0285, W0286, W0287, W0288, W0289, W0290, W0291, W0292, W0293, W0294, W0295, W0296, W0297, W0298, W0299, W0300, W0301, W0302, W0303, W0304, W0305, W0306, W0307, W0308, W0309, W0310, W0311, W0312, W0313, W0314, W0315, W0316, W0317, W0318, W0319, W0320, W0321, W0322, W0323, W0324, W0325, W0326, W0327, W0328, W0329, W0330, W0331, W0332, W0333, W0334, W0335, W0336, W0337, W0338, W0339, W0340, W0341, W0342, W0343, W0344, W0345, W0346, W0347, W0348, W0349, W0350, W0351, W0352, W0353, W0354, W0355, W0356, W0357, W0358, W0359, W0360, W0361, W0362, W0363, W0364, W0365, W0366, W0367, W0368, W0369, W0370, W0371, W0372, W0373, W0374, W0375, W0376, W0377, W0378, W0379, W0380, W0381, W0382, W0383, W0384, W0385, W0386, W0387, W0388, W0389, W0390, W0391, W0392, W0393, W0394, W0395, W0396, W0397, W0398, W0399, W0400, W0401, W0402, W0403, W0404, W0405, W0406, W0407, W0408, W0409, W0410, W0411, W0412, W0413, W0414, W0415, W0416, W0417, W0418, W0419, W0420, W0421, W0422, W0423, W0424, W0425, W0426, W0427, W0428, W0429, W0430, W0431, W0432, W0433, W0434, W0435, W0436, W0437, W0438, W0439, W0440, W0441, W0442, W0443, W0444, W0445, W0446, W0447, W0448, W0449, W0450, W0451, W0452, W0453, W0454, W0455, W0456, W0457, W0458, W0459, W0460, W0461, W0462, W0463, W0464, W0465, W0466, W0467, W0468, W0469, W0470, W0471, W0472, W0473, W0474, W0475, W0476, W0477, W0478, W0479, W0480, W0481, W0482, W0483, W0484, W0485, W0486, W0487, W0488, W0489, W0490, W0491, W0492, W0493, W0494, W0495, W0496, W0497, W0498, W0499, W0500, W0501, W0502, W0503, W0504, W0505, W0506, W0507, W0508, W0509, W0510, W0511, W0512, W0513, W0514, W0515, W0516, W0517, W0518, W0519, W0520, W0521, W0522, W0523, W0524, W0525, W0526, W0527, W0528, W0529, W0530, W0531, W0532, W0533, W0534, W0535, W0536, W0537, W0538, W0539, W0540, W0541, W0542, W0543, W0544, W0545, W0546, W0547, W0548, W0549, W0550, W0551, W0552, W0553, W0554, W0555, W0556, W0557, W0558, W0559, W0560, W0561, W0562, W0563, W0564, W0565, W0566, W0567, W0568, W0569, W0570, W0571, W0572, W0573, W0574, W0575, W0576, W0577, W0578, W0579, W0580, W0581, W0582, W0583, W0584, W0585, W0586, W0587, W0588, W0589, W0590, W0591, W0592, W0593, W0594, W0595, W0596, W0597, W0598, W0599, W0600, W0601, W0602, W0603, W0604, W0605, W0606, W0607, W0608, W0609, W0610, W0611, W0612, W0613, W0614, W0615, W0616, W0617, W0618, W0619, W0620, W0621, W0622, W0623, W0624, W0625, W0626, W0627, W0628, W0629, W0630, W0631, W0632, W0633, W0634, W0635, W0636, W0637, W0638, W0639, W0640, W0641, W0642, W0643, W0644, W0645, W0646, W0647, W0648, W0649, W0650, W0651, W0652, W0653, W0654, W0655, W0656, W0657, W0658, W0659, W0660, W0661, W0662, W0663, W0664, W0665, W0666, W0667, W0668, W0669, W0670, W0671, W0672, W0673, W0674, W0675, W0676, W0677, W0678, W0679, W0680, W0681, W0682, W0683, W0684, W0685, W0686, W0687, W0688, W0689, W0690, W0691, W0692, W0693, W0694, W0695, W0696, W0697,

MicroTech III Unit Control with Constant Torque EC Motor - 115 Volt - No Options



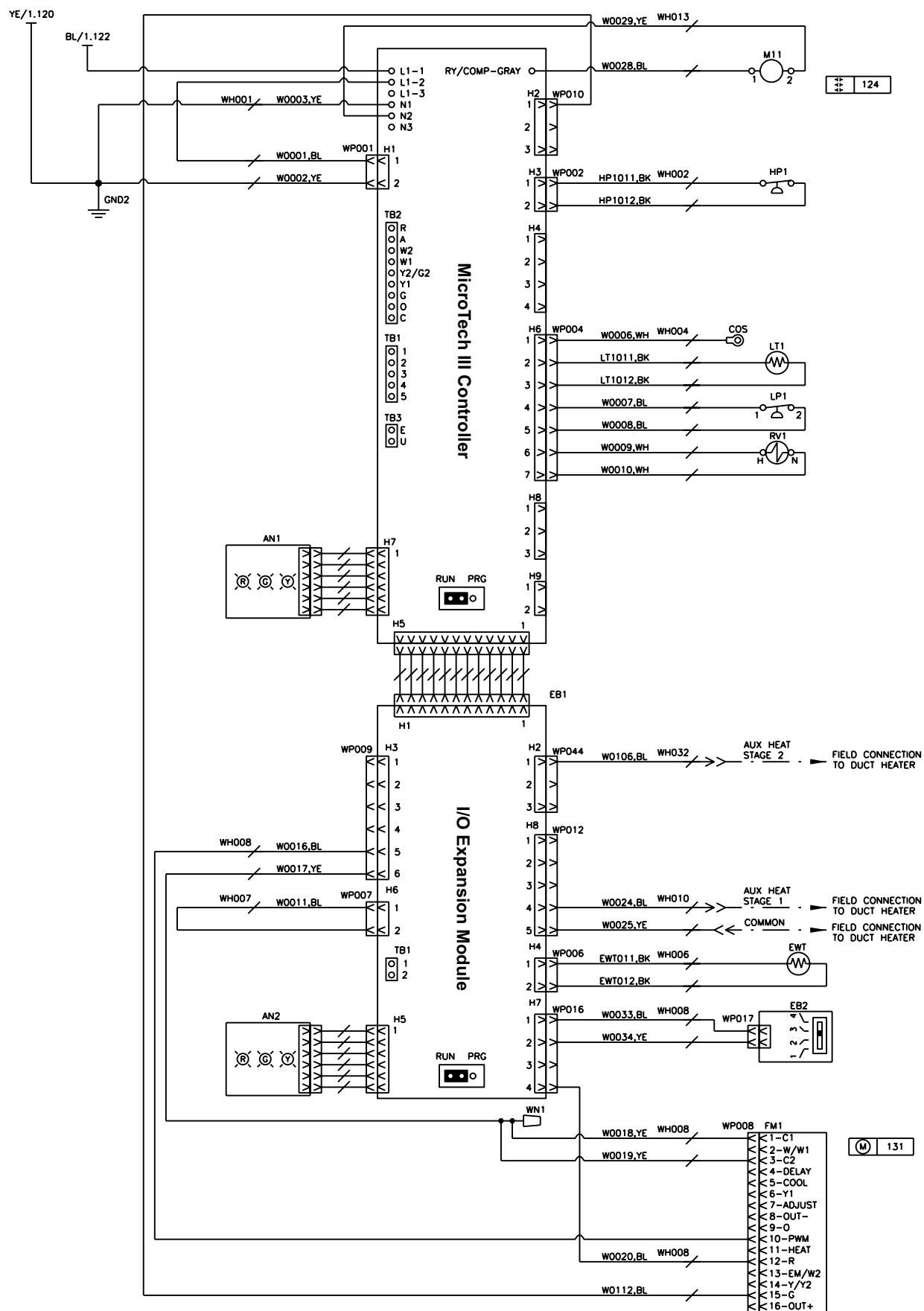
MicroTech III Unit Control with Constant CFM EC Motor with Hot Gas Reheat



IM 1251-4



MicroTech III Unit Control with Constant CFM EC Motor with Electric Heat Control Wiring



The diagram shows two motor control circuits. The top circuit is for Motor CP1, which has three terminals: R (Run), S (Stop), and C (Common). It is powered by a 115V/60Hz/1PH supply through a service disconnect. The L1 line passes through a fuse WOL11,BK and a switch WH024 before reaching terminal R. The N line passes through a fuse WOL21,WI and a switch WH024 before reaching terminal S. A ground connection is shown. The bottom circuit is for Motor FM1, which has five terminals: BK (Black), BL (Blue), RD (Red), WT (White), and BR (Brown). It is powered by a 115V/60Hz/1PH supply through a service disconnect. The L1 line passes through a fuse WOL11,BK and a switch WH024 before reaching terminal BK. The N line passes through a fuse WOL21,WI and a switch WH024 before reaching terminal WT. A ground connection is shown.

SERVICE & DISCONNECT
NOTE: USE COPPER SUPPLY WIRES
115V/60HZ/1PH

L1 N GND

WOL11,BK WOL21,WI

WH024

WOL11/2.130 WOL21/2.132

WH015 W0035,BK W0038,WI

C11 OLP

WH015 W0036,BK W0037,BK W0048,WI

CP1 M

R S C

W0142/2.143 W0143/2.147

WH037 W0142,BK W0144,YE (TO C01) W0143,YE

C01

WH037 W0145,BR

FM1 M

BK BL RD WT BR

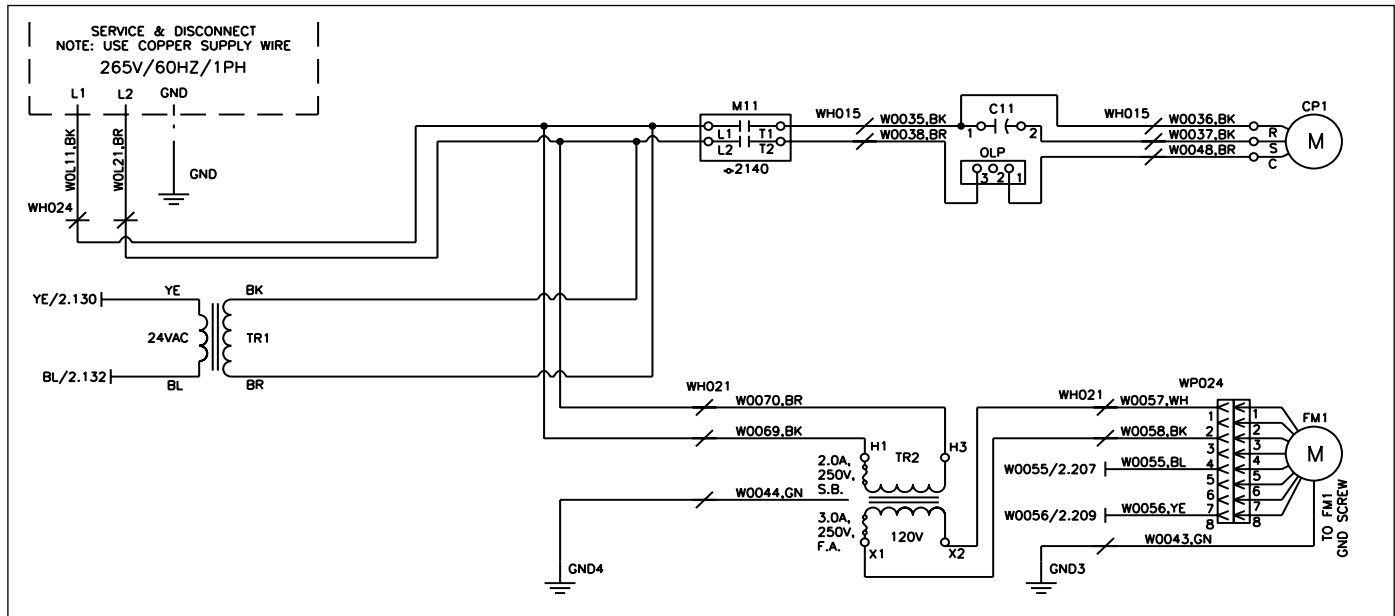
NOTES: 1. CAP ANY EXTRA FM1 WIRES WITH MATING 1/4" FASTON.

SERVICE & DISCONNECT
NOTE: USE COPPER SUPPLY WIRES
115V/60HZ/1PH

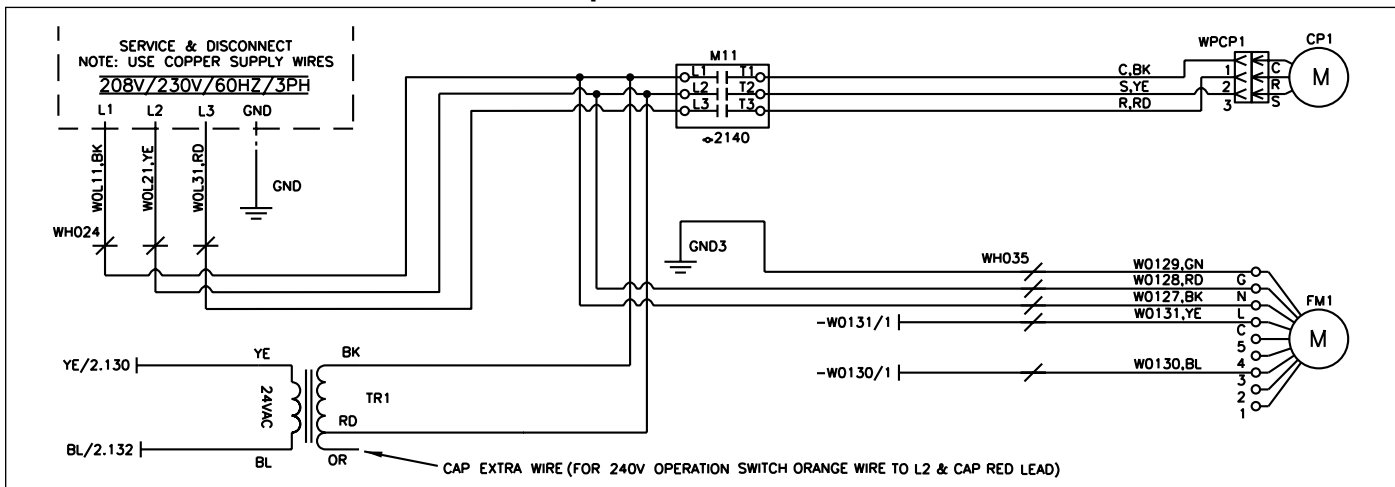
Wiring connections for the 115V/60Hz/1PH unit:

- Service & Disconnect:** L1 (WOL11,BK), N (WOL21,WH), GND.
- CP1 Motor:**
 - WOL11/2.130 to WOL11,BK
 - WOL21/2.132 to WOL21,WH
 - W0035/2.130 to WH015, then W0035,BK to C11 (1)
 - C11 (2) to WH015, then W0036,BK to R, W0037,BK to S, and W0038,BK to C.
 - W0038/2.132 to W0038,WH to OLP (3)
 - OLP (2) to W0038,WH to OLP (1)
- FM1 Motor:**
 - W0057/2.130 to WH021, then W0057,WH to WP024 (1)
 - W0058/2.132 to WH021, then W0058,BK to WP024 (2)
 - W0055/2.210 to W0055,BL to WP024 (3)
 - W0056/2.212 to W0056,YE to WP024 (4)
 - W0043,GN to GND3 to WP024 (5)
 - WP024 (6) to FM1 (1)
 - WP024 (7) to FM1 (2)
 - WP024 (8) to FM1 (3)
 - FM1 (4) to FM1 (5)
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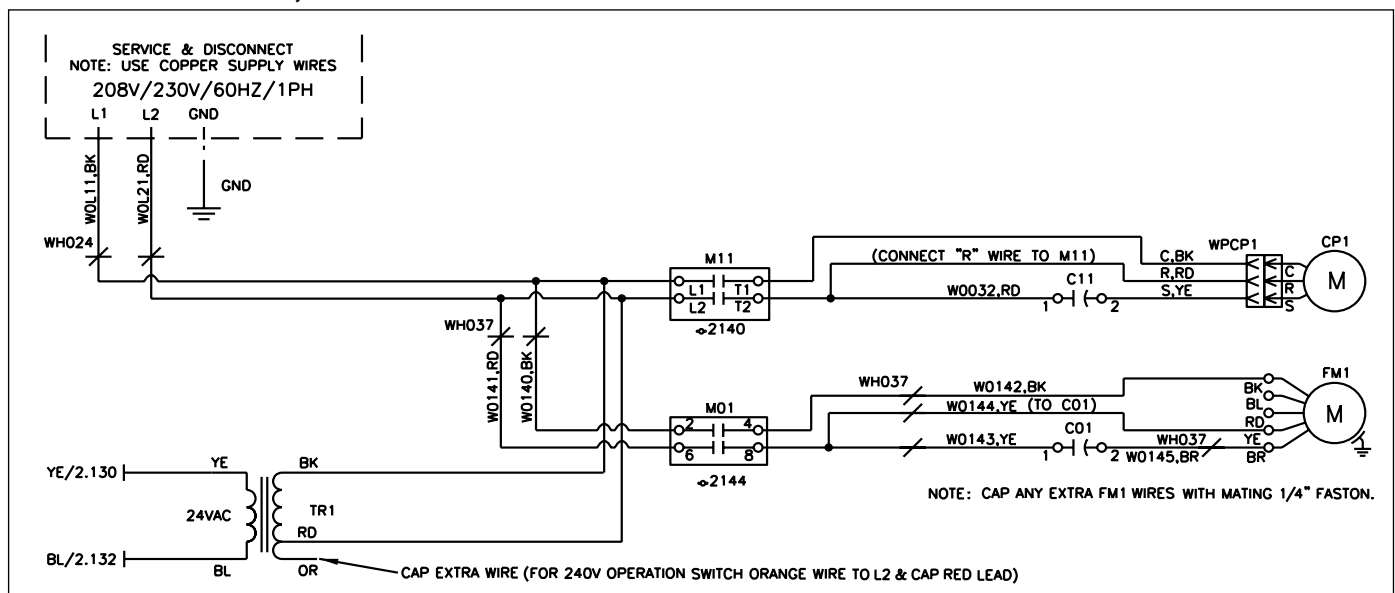
265V/60Hz/1Ph With Constant Torque EC Motor



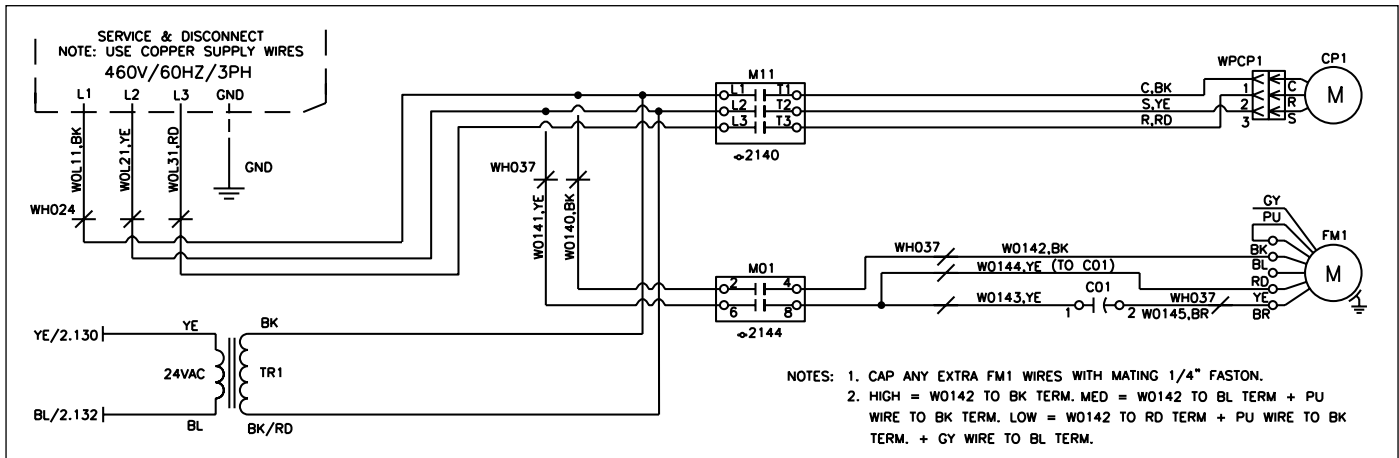
208-230V/60Hz/3Ph With Constant Torque EC Motor



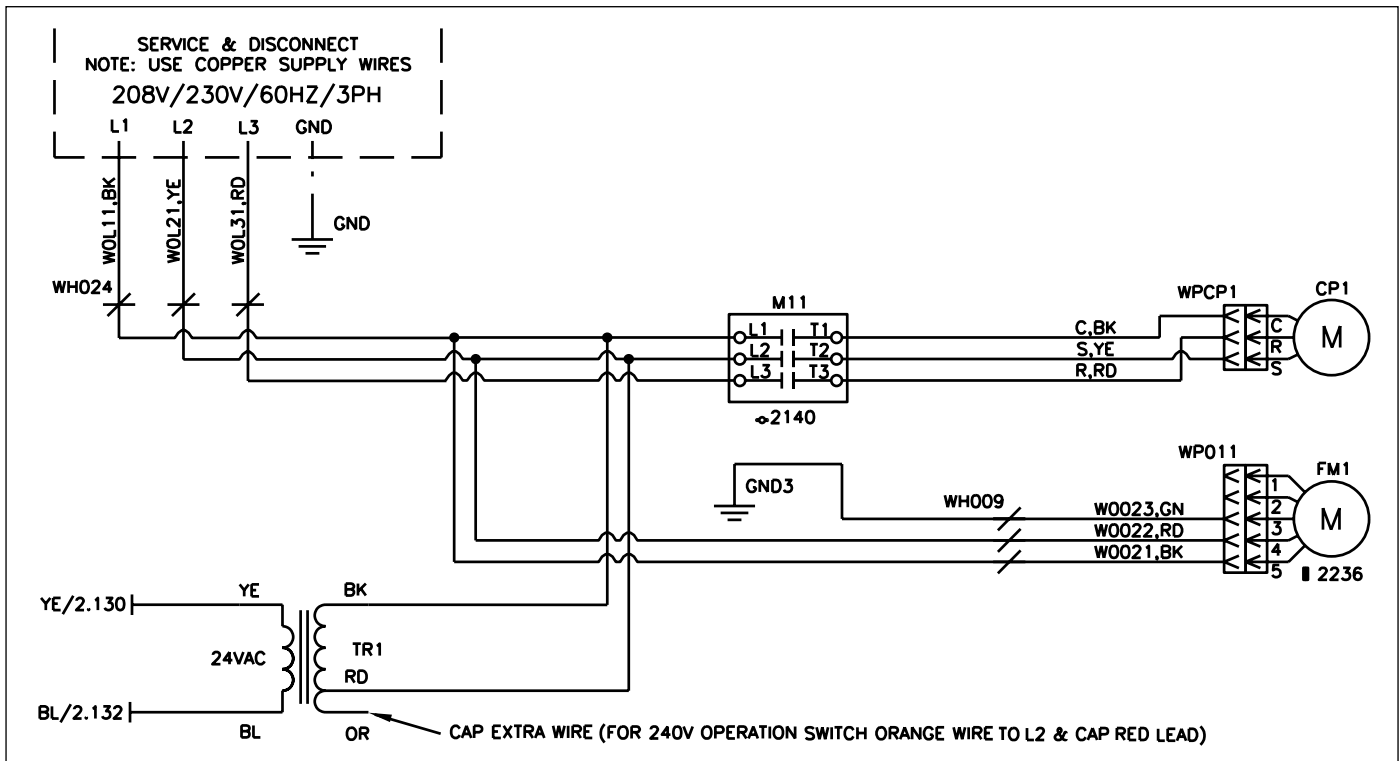
265-277V/60Hz/1Ph, 208-230V/60Hz/1Ph With PSC Motor



460V/60Hz/3Ph, 575V/60Hz/3Ph, 208-230V/60Hz/3Ph With PSC Motor



208-230V/60Hz/3Ph, With Constant CFM EC Motor



SERVICE & DISCONNECT
NOTE: USE COPPER SUPPLY WIRES
460V/60HZ/3PH, (4 WIRE)

L1 L2 L3 N GND

WH024

WOL11, BK

WOL21, YE

WOL31, RD

GND

M11

T1

T2

T3

2140

GND3

W0046, BR

WH009

WPO34

WPO35

WH009

W0023, GN

W0022, BR

W0021, BK

WPCP1

C, BK

S, YE

R, RD

CP1

FM1

2236

24VAC

TR1

YE/2.130

BL/2.132

BL

BK

BK/RD

Note: *Devices in legend may or may not be on unit.*

AN1, 2	LED Annunciator	LT1	Compressor Suction Line Temperature Sensor
CO1	Fan Motor 1 Capacitor	LWT	Leaving Water Temperature Sensor
C11	Compressor 1 Capacitor	M01	Fan Motor Contactor
CP1	Compressor 1	M11	Compressor 1 Contactor
COE	Condensate Overflow Protection Sensor - WSE	MCB	Main Control Board
COS	Condensate Overflow Protection Sensor	NCB	Network Control Board
DAT	Discharge Air Temperature Sensor	OLP	Overload Protector - Compressor Motor
DCS	Disconnect Switch	RAT	Return Air Temperature Sensor
EB1	Expansion Control Board 1	RV1	Reversing Valve
EB2	Expansion Control Board 2 - fan speed ctrl	TR1	Transformer - Control
EWT	Entering Water Temperature Sensor	TR2	Transformer - Fan Motor
FM1	Fan Motor 1	W0001	Wire
GND	Ground	WH001	Wire Harness
HG1	Hot Gas Reheat Valve Actuator	WN1	Wire Nut
HP1	High Pressure Switch	WP001	Wire Plug
HYH	Hot Water Heat Valve Actuator	WSE	Waterside Economizer Actuator

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.

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.

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 both heating and cooling 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°

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

2. Operating conditions shall be within the limits established in [Table 27](#), and [Table 28 on page 44](#).

Motor Removal - Unit Sizes 015-048

Figure 47: Remove screws securing fan housing to mounting rails

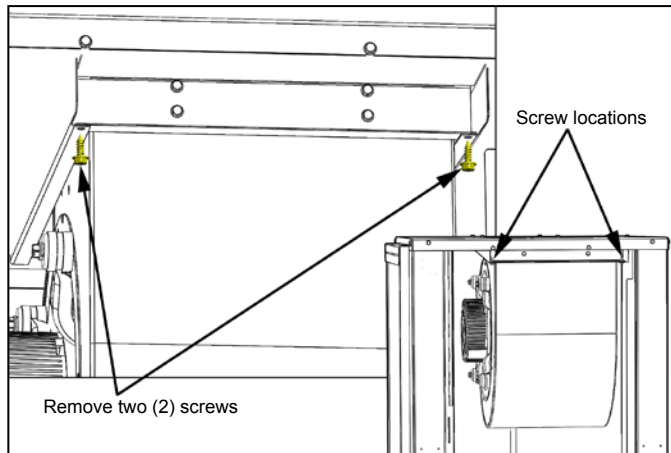
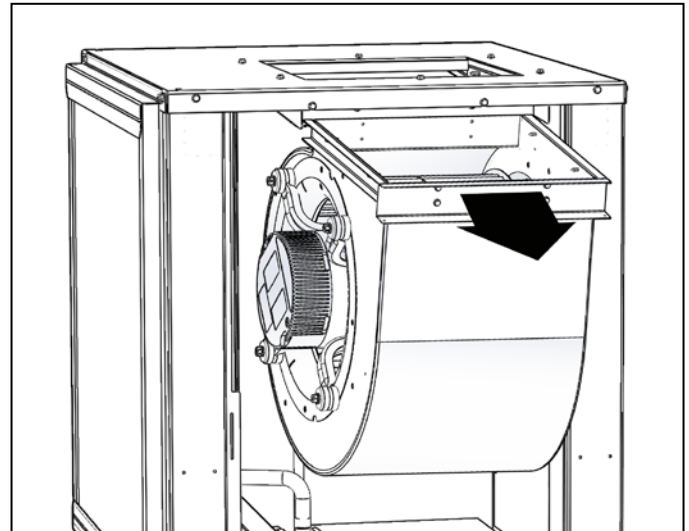


Figure 48: Slide out fan & motor housing assembly



Note: Disconnect power wiring plug from motor

Figure 49: Disassemble motor orifice ring & motor mount screws from fan housing

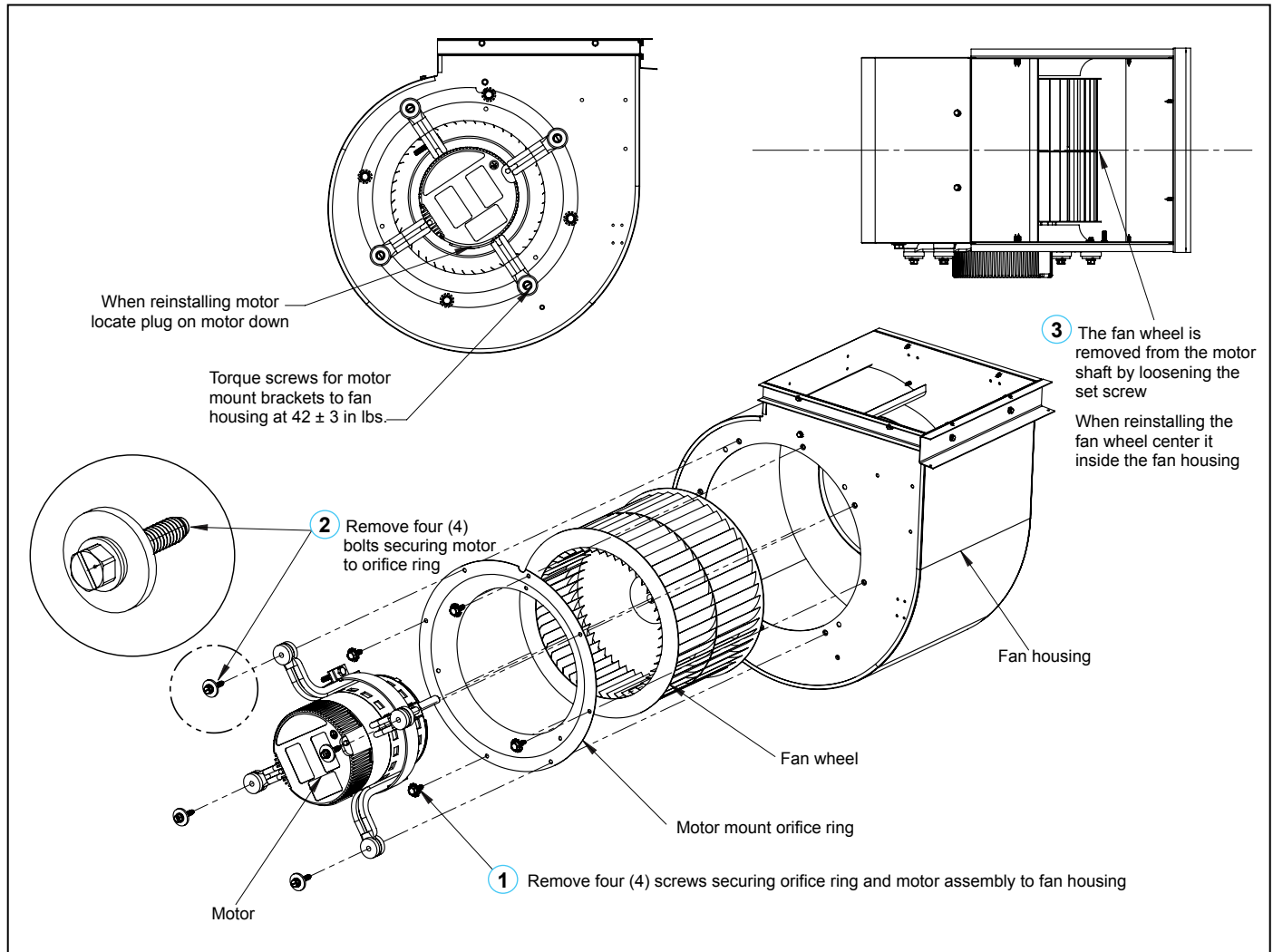
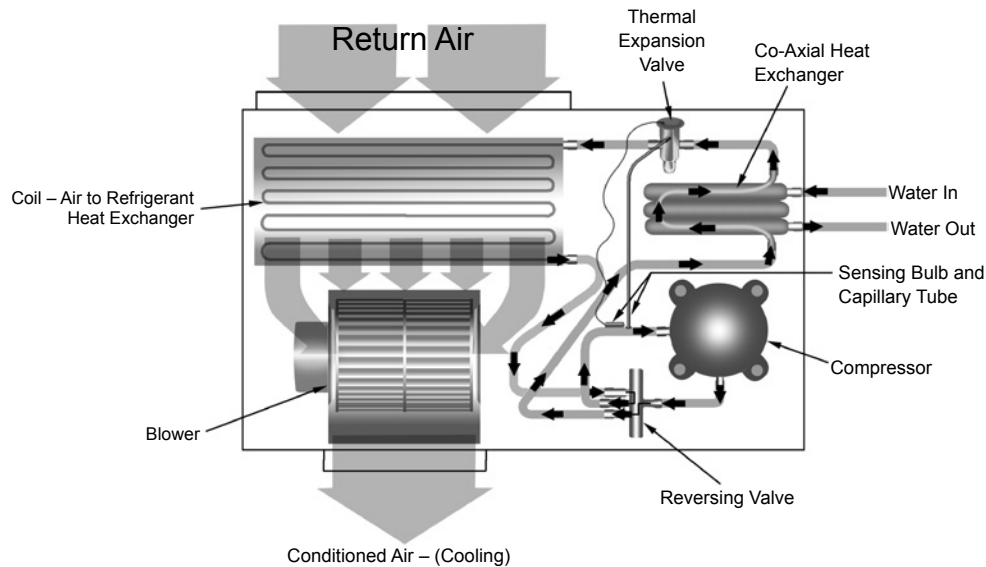


Table 29: Troubleshooting refrigeration circuit

Symptom	Head Pressure	Suction Pressure	Compressor Amp Draw	Super Heat	Subcooling	Air Temp Differential	Water (Loops) Temp Differential	Safety Lock Out
Charge	Low	Low	Low	High	Low	Low	Low	Low Pressure
Undercharge System (Possible Leak)								
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	

Typical Refrigeration Cycles

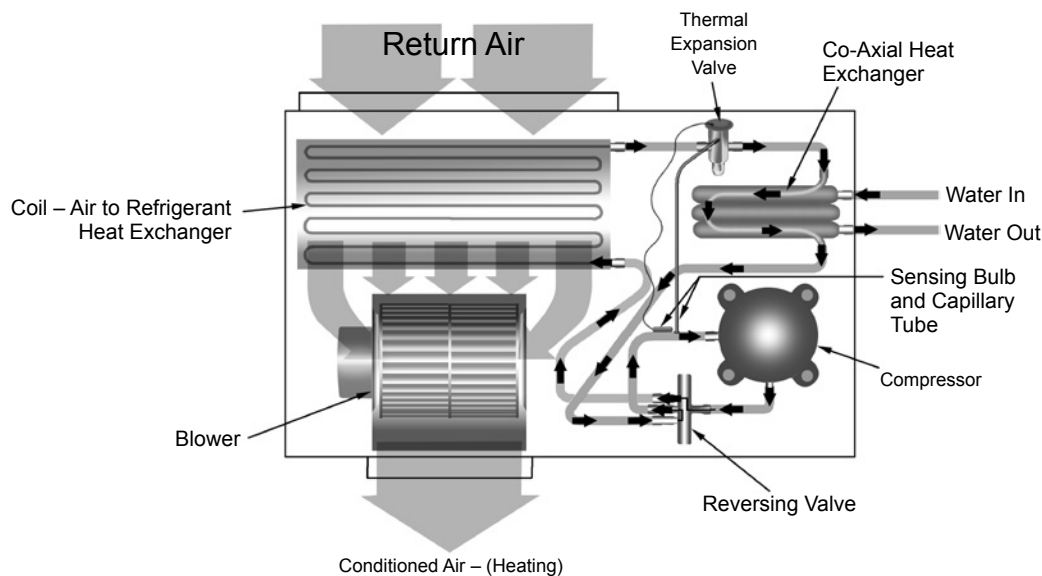
Figure 50: Cooling mode



Cooling Refrigeration Cycle

When the wall thermostat is calling for COOLING, the reversing valve is energized and directs the flow of the refrigerant (hot gas) leaving the compressor to the water-to-refrigerant heat exchanger. Here 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 (TXV) and then to the air-to-refrigerant heat exchanger coil. The liquid then evaporates becoming 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 51: Heating mode



Heating Refrigeration Cycle

When the wall thermostat is calling for HEATING, the reversing valve is energized and directs the flow of the refrigerant (hot gas) leaving the compressor to the air-to-refrigerant heat exchanger coil. Here the heat is removed by the air passing over the surfaces of the coil and the hot gas condenses to become a liquid. The liquid then flows through a thermal expansion valve (TXV) then to the water-to-refrigerant heat exchanger. The liquid then evaporates becoming 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.



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.

Job Name _____ Check, Test & Start Date _____

City or Town _____ State _____ Zip _____

Who is Performing CTS

☐ Closed Loop ☐ Open Loop

General Contractor

☐ Geothermal ☐ Other (specify) _____

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

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: _____

For Internal Use

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

Release:

SM

CTS

T

Service Manager Approval

Date _____

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

IM 1251-4



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 locations indicated on the drawing below.

Equipment Data

Flow Rate

$$\text{EWP} - \text{LWP} = \Delta P$$

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 specification catalog. **Caution $\Delta P \neq \text{GPM}$**

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

Loop Fluid Temperature Rise / Drop through Coaxial Heat Exchanger

$$\text{EWT} - \text{LWT} = \Delta T$$

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.

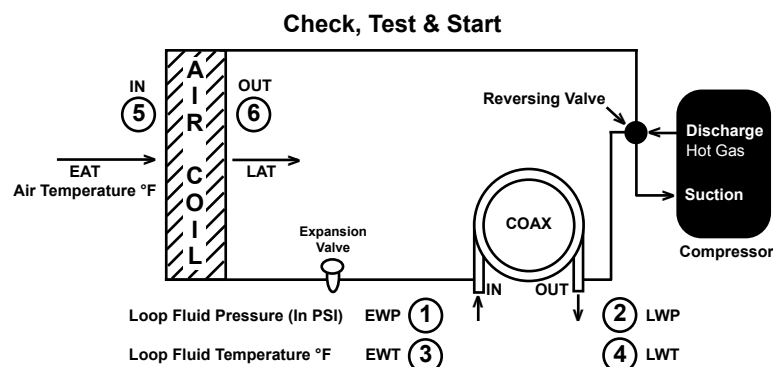
Air Temperature Rise / Drop through the air coil

$$\Delta T \times \text{CFM} \times 1.08 = \text{BTUH Sensible}$$

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



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 Cool- ing	Check Air Filter and Coil	Comments
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
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Part No. _____



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.