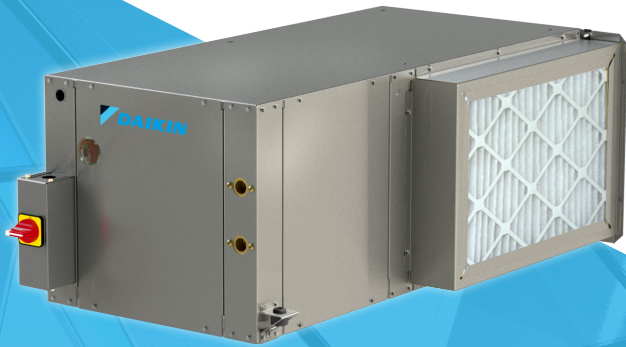


# SMARTSOURCE®

HORIZONTAL WATER SOURCE HEAT PUMP



- MODELS WSCH, WSDH, WSMH, WSNH, WSSH, WSTH
- SIZES 007 – 070 (1/2 TO 6 TONS)
- R-32 REFRIGERANT

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# Safety Information

## Hazard Identification

### DANGER

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

### WARNING

Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided.

### CAUTION

Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided.

### NOTICE

Notice indicates practices not related to physical injury.

**NOTE:** Indicates important details or clarifying statements for information presented in Figures or Tables.

## Safety Considerations

This manual provides installation and maintenance information for Daikin Applied SMARTSOURCE WSHP HORIZONTAL with a MicroTech® controller.

### NOTICE

Installation and maintenance are to be performed only by licensed, if required by local codes and regulations, or qualified personnel who are familiar with local codes and regulations and are experienced with this type of equipment.

A means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules for stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III.

### DANGER

**LOCKOUT/TAGOUT** all power sources prior to service, pressurizing, depressuring, or powering down the unit. Failure to follow this warning exactly can result in serious injury or death. Disconnect electrical power before servicing the equipment. More than one disconnect may be required to de-energize the unit. Be sure to read and understand the installation, operation, and service instructions within this manual.

### WARNING

Electric shock hazard. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded. Connections to and service of the MicroTech control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

### WARNING



This unit contains R-32, a class A2L refrigerant that is flammable. This unit should only be installed, serviced, repaired, and disposed of by qualified personnel licensed or certified in their jurisdiction to work with R-32 refrigerant. Installation and maintenance must be done in accordance with this manual. Improper handling of this equipment can cause equipment damage or personal injury.

For installation only in locations not accessible to the general public.

Be aware that R-32 refrigerant may not contain an odor. Place in a well ventilated area to prevent accumulation of refrigerant. When installing the unit in a small room, take measures to keep the refrigerant concentration from exceeding allowable safety limits. Excessive refrigerant leaks, in the event of an accident in a closed ambient space, can lead to oxygen deficiency.

Do not pierce or burn this unit.

Never use an open flame during service or repair. Never store in a room with continuously operating ignition sources (for example: open flames, an operating gas appliance, or and operating electric heater.), where there is ignitable dust suspension in the air, or where volatile flammables such as thinner or gasoline are handled.

Only use pipes, nuts, and tools intended for exclusive use with R-32 refrigerant in compliance with national codes (ASHRAE15 or IRC).

Do not mix air or gas other than R-32 in the refrigerant system. If air enters the refrigerant system, an excessively high pressure results, which may cause equipment damage or injury.

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

For more information, consult "[Refrigerant Information](#)" on page 63.

### WARNING

Polyolester Oil, commonly known as POE oil is a synthetic oil used in many refrigeration systems, and may be present in this Daikin Applied 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. Refer to the pipe manufacturer's recommendations to determine suitable applications of the pipe.

### WARNING

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, it may cause interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the owner will be required to correct the interference at the owner's own expense.

Daikin Applied disclaims any liability resulting from any interference or for the correction thereof.

**WARNING**

When moving flammable A2L refrigerant to/from the unit from an auxiliary tank, a grounding strap must be used. An electrical charge builds when halo-carbon refrigerant travels in a rubber hose. A grounding strap must be used between the auxiliary refrigerant tank and the unit's end sheet (earth ground), which will safely take the charge to the ground. A fire risk could occur if this procedure is not followed.

**CAUTION**

Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components. Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.








## UL Compliance Statements for Unit Work

- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available at hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space.
- Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards. Safety checks are necessary to ensure that the risk of ignition is minimized and "No Smoking" signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

- Equipment not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children shall not be allowed to play on or with equipment.
- If unit is permanently connected to water main; hose sets are not to be used.

## Unit Labels

Pictogram warning and informational labels may be present on the unit. Consult the table below for reference.

Label	Description
 Refrigerant class per ISO 817	WARNING - flammable refrigerant present
	Read the technical manual for service instructions
	WARNING - A2L low-burning velocity refrigerant present
	Pressurized medium present
	Ultraviolet (UV) radiation present
	Read the technical manual for instructions
	WARNING - flammable refrigerant present

# Introduction

## Model Nomenclature

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	27	28	29	30	31	32	33	34
W	SC	H	007	E	1	F	RS	C	M	T	P	A	Y	Y	1	YY	A	Y	Y	Y	Y	Y	S	S	Y	E	Y	Y

Category	Code Option	Code	=	Description
Product Category	1	W	=	Water Source Heat Pump
Model Type	2-3	SC	=	SmartSource Small Capacity Compact - 1 Stage
		SD	=	SmartSource Small Capacity Compact - 2 Stage (Sizes 024-070)
		SM	=	SmartSource Small Capacity Plus - 1 Stage
		SN	=	SmartSource Small Capacity Plus - 2 Stage (Sizes 024-060)
		SS	=	SmartSource Small Capacity Premium - 1 Stage
		ST	=	SmartSource Small Capacity Premium - 2 Stage (Sizes 024-070)
		Configuration	4	H
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
		036	=	36,000 Btuh Nominal Cooling
		042	=	42,000 Btuh Nominal Cooling
		048	=	48,000 Btuh Nominal Cooling
		060	=	60,000 Btuh Nominal Cooling
070	=	70,000 Btuh Nominal Cooling (WSCH, WSDH, WSSH & WSTH)		
Voltage	8	A	=	115/60/1 (Sizes 007-015)
		E	=	208-230/60/1 (Sizes 007-070)
		F	=	208-230/60/3 (Sizes 024-070)
		J	=	265/60/1 (Sizes 007-036)
		K	=	460/60/3 (Sizes 024-070)
		L	=	575/60/3 (Sizes 048-070)
Design Series (Vintage)	9	1	=	Design Series 1
Piping Hand	10	F	=	Front
Cabinet Configuration	11-12	LE	=	Left Hand Return / End Discharge
		LS	=	Left Hand Return / Straight Discharge
		RE	=	Right Hand Return / End Discharge
		RS	=	Right Hand Return / Straight Discharge
Water Coil Type	13	C	=	Copper Inner Tube (WSCH, WSDH, WSMH, & WSNH)
		G	=	Copper Inner Tube - Geothermal (WSCH, WSDH, WSMH, & WSNH)
		B	=	Brazed Plate Heat Exchanger (WSSH & WSTH)
		H	=	Brazed Plate Heat Exchanger - Geothermal (WSSH & WSTH)
		S	=	Cupronickel Inner Tube (WSCH, WSDH, WSMH, & WSNH)
		J	=	Cupronickel - Geothermal (WSCH, WSDH, WSMH, & WSNH)
Unit Control	14	M	=	MicroTech Unit Controller
		B	=	MicroTech Unit Controller + BACnet®

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	27	28	29	30	31	32	33	34
W	SC	H	007	E	1	F	RS	C	M	T	P	A	Y	Y	1	YY	A	Y	Y	Y	Y	Y	S	S	Y	E	Y	Y
<b>Category</b>		<b>Code Option</b>		<b>Code</b>		<b>=</b>		<b>Description</b>																				
Controller Options		15		T		=		Thermostat Control																				
				S		=		Sensor Control																				
Fan Motor Options		16		P		=		PSC (WSCH & WSMH)																				
				C		=		ECM Constant CFM (Sizes 015-070)																				
				T		=		ECM Constant Torque (WSCH, WSMH, & WSSH)																				
Insulation (Compressor Side and Air Side)		17		A		=		Standard - Fiberglass																				
				B		=		IAQ - Closed Cell Foam																				
				C		=		Sound Package - Dual Layer Fiberglass																				
				D		=		Sound Blanket + Fiberglass (Sizes 024-070)																				
				E		=		Sound Blanket + IAQ - Closed Cell Foam (Sizes 024-070)																				
				F		=		Sound Blanket + Sound Package - Dual Layer Fiberglass (Sizes 024-070)																				
Water Coil - Indoor Coil		18		Y		=		None																				
				W		=		Waterside Economizer																				
				H		=		Hydronic Heat																				
Dehumidification		19		Y		=		None																				
				R		=		Hot Gas Reheat (WSMH and WSSH Sizes 015-070, WSNH, WSTH)																				
				S		=		Simplified Dehumidification																				
Transformer		20		1		=		50VA Transformer																				
				2		=		75VA Transformer																				
Options		21-22		YY		=		None																				
				0A		=		Freeze Fault																				
				0C		=		Water Pressure Differential Switch (N/A for WSCH & WSMH Sizes 007-012)																				
				0F		=		Freeze Fault + Water Pressure Differential Switch (N/A for WSCH & WSMH Sizes 007-012)																				
Filter Racks & Filter		23		A		=		1" Rail - 1" Disposable Filter																				
				D		=		2" Rack - 2" MERV 8 Filter																				
				F		=		2" Bottom Access - 2" MERV 8 Filter																				
				H		=		4" Rack - 4" MERV 13 Filter																				
				J		=		4" Bottom Access - 4" MERV 13 Filter																				
Water Flow Options		24		Y		=		None																				
				A		=		Isolation Valve (NO) (N/A for WSCH, WSDH, WSMH, & WSNH Sizes 007-012)																				
				B		=		Isolation Valve (NC) (N/A for WSCH, WSDH, WSMH, & WSNH Sizes 007-012)																				
				C		=		Head Pressure Control - Refrigerant Tap																				

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	27	28	29	30	31	32	33	34
W	SC	H	007	E	1	F	RS	C	M	T	P	A	Y	Y	1	YY	A	Y	Y	Y	Y	Y	S	S	Y	E	Y	Y

Category	Code Option	Code	=	Description
Piping Package	25	Y	=	None
		A	=	Auto Flow Control - 1.5 GPM
		B	=	Auto Flow Control - 2.0 GPM
		C	=	Auto Flow Control - 2.5 GPM
		D	=	Auto Flow Control - 3.0 GPM
		E	=	Auto Flow Control - 4.0 GPM
		G	=	Auto Flow Control - 5.0 GPM
		H	=	Auto Flow Control - 6.0 GPM
		J	=	Auto Flow Control - 7.0 GPM
		K	=	Auto Flow Control - 8.0 GPM
		L	=	Auto Flow Control - 9.0 GPM
		M	=	Auto Flow Control - 10.0 GPM
		N	=	Auto Flow Control - 11.0 GPM
P	=	Auto Flow Control - 12.0 GPM		
Q	=	Auto Flow Control - 13.0 GPM		
S	=	Auto Flow Control - 15.0 GPM		
WSSH & WSTH Models Only				
Electric Heat Size	26	Y	=	None
		F	=	Electric Heat Control Harness - 24V Signal (Field Installed Duct Heater)
Electric Heat Control (Board Configuration)	27	Y	=	None
		B	=	Boilerless Electric Heat
		P	=	Primary Electric Heat (No Heat Pump Heating)
		S	=	Supplemental Heat
Cabinet Color	28	Y	=	Galvanized
		B	=	Textured Charcoal Bronze
		W	=	Off White
		S	=	Antique Ivory
		D	=	Cupola White
		V	=	Soft Grey
K	=	Putty Beige		
WSMH, WSNH, WSSH, & WSTH Models Only				
Standard or Special	29	S	=	Standard
		X	=	Special
Drain Pan Material	30	P	=	Plastic Drain Pan (N/A for Sizes 007-012 on WSCH, WSDH, WSMH, & WSNH)
		S	=	Stainless Steel Drain Pan
Electrical Options	31	Y	=	None
		D	=	Non-Fused Disconnect Switch
Corrosion Protection	32	Y	=	None
		C	=	Corrosion Protection
Future Use	33	Y	=	None

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	27	28	29	30	31	32	33	34
W	SC	H	007	E	1	F	RS	C	M	T	P	A	Y	Y	1	YY	A	Y	Y	Y	Y	Y	S	S	Y	E	Y	Y

Category	Code Option	Code	=	Description
Extended Warranty	34	Y	=	None
		V	=	1 Year Extended Compressor Only Parts Warranty
		W	=	1 Year Extended Refrigerant Circuit Parts Warranty
		M	=	1 Year Extended Compressor Only Parts Warranty with 1st Year Labor Allowance
		N	=	1 Year Extended Refrigerant Circuit Parts Warranty with 1st Year Labor Allowance
		S	=	1 Year Extended Complete Unit Parts Warranty with 1st Year Labor Allowance
		E	=	1 Year Extended Complete Unit Parts Warranty
		C	=	4 Year Extended Compressor Only Parts Warranty
		R	=	4 Year Extended Refrigerant Circuit Parts Warranty
		P	=	4 Year Extended Complete Unit Parts Warranty
		F	=	4 Year Extended Compressor Only Parts Warranty with 1st Year Labor Allowance
		H	=	4 Year Extended Refrigerant Circuit Parts Warranty with 1st Year Labor Allowance
		J	=	4 Year Extended Complete Unit Parts Warranty with 1st Year Labor Allowance
		L	=	First Year Labor Allowance
T	=	4 Year Extended Complete Unit Parts Warranty with 5 Year Labor Allowance		



# Installation

**⚠ 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, personal injury, or death. This equipment must be installed by experienced, trained personnel only.

**⚠ WARNING**

This appliance shall be installed in accordance with national wiring regulations (national electric code, Canadian electric code).

# Receiving and Handling

**⚠ CAUTION**

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

Carefully check equipment against the bill of lading to ensure all items have been received. Before unloading any unit, check the nameplate to make sure the voltage complies with the power supply available.

Inspect all units for damage upon arrival. If a unit has become dirty during shipment, carefully clean it prior to completing the inspection. Daikin Applied is not responsible for physical damage after the unit leaves the factory unless the contract with Daikin Applied states otherwise.

**NOTICE**

All units should be carefully inspected for damage when received. Report all loss or shipping damage using a claim form supplied by Daikin Applied.

**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.

**CONCEALED LOSS OR DAMAGE:** Concealed loss or damage means loss or damage which does not become apparent until the unit has been unpacked or unwrapped. The contents may be damaged in transit due to rough handling even though the exterior may not show damages. When the damage is discovered, make a written request for inspection by the carrier's agent within **five (5) days** of the delivery date and file a claim with the form provided by Daikin Applied. Refer to the Daikin Applied Freight Policy for further information.

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 (60°C) ambient.

The contractor shall cover the units to protect the machines during finishing of the building. This is critical while spraying fireproofing material on bar joists, sandblasting, spray painting and plastering. If plastic film is not available, the shipping carton may be modified to cover the units during construction.

# Operating Limits

## Environmental Limits

**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.

**NOTICE**

Altitude Limits: Maximum applied altitude not to exceed 3,000 m/9,843 ft.

**NOTICE**

The maximum water temperature is 120°F (49°C) and the minimum brine temperature is 25°F (-4°C). The maximum water pressure is 500 psi (3,447 kPa) through the coaxial coil and the minimum water pressure is 0 psi (0 kPa).

## Initial Unit Start-Up Temperature Range

**NOTICE**

This is not for continuous operation. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

## Standard range units

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

## Extended range units

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

**Table 1: Air Limits in °F (°C)**

Air Limits	Standard Range Units		Extended Range (Geothermal) Units	
	Cooling (DB/WB)	Heating	Cooling (DB/WB)	Heating
<b>Minimum Ambient Air</b> <sup>1</sup>	50°F (10°C)	50°F (10°C)	40°F (4°C)	40°F (4°C)
<b>Maximum Ambient Air</b> <sup>2</sup>	100°F/77°F (38°C/25°C)	85°F (29°C)	100°F/77°F (38°C/25°C)	85°F (29°C)
<b>Minimum Entering Air</b> <sup>1</sup>	65°F/55°F (18°C/13°C)	50°F (10°C)	65°F/55°F (18°C/13°C)	50°F (10°C)
<b>Common Design Entering Air</b>	75°F/63°F (24°C/17°C)	70°F (21°C)	75°F/63°F (24°C/17°C)	70°F (21°C)
<b>Maximum Entering Air</b> <sup>2</sup>	85°F/71°F (29°C/22°C)	80°F (27°C)	85°F/71°F (29°C/22°C)	80°F (27°C)


<sup>1</sup> 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.

<sup>2</sup> This is not for continuous operation. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

**Table 2: Fluid Limits**

Fluid Limits	Standard Range Units		Extended Range (Geothermal) Units	
	Cooling	Heating	Cooling	Heating
<b>Minimum Entering Fluid</b>	55°F (13°C)	55°F (13°C)	30°F (-1°C)	25°F (-4°C)
<b>Common Design Entering Fluid</b>	85-90°F (29-32°C)	70°F (21°C)	90°F (32°C)	35-60°F (1.5-16°C)
<b>Maximum Entering Fluid</b>	120°F (49°C)	90°F (32°C)	120°F (49°C)	90°F (32°C)
<b>Minimum GPM/Ton</b>	2.0			
<b>Nominal GPM/Ton</b>	3.0			
<b>Maximum GPM/Ton</b>	4.0			

**Antifreeze**

 <b>CAUTION</b>
Do not use an automotive-grade antifreeze. Industrial grade glycols must be used. Automotive antifreeze contains inhibitors which will cause plating on the copper tubes within the chiller evaporator. The type and handling of glycol used must be consistent with local codes.

Glycols and other alcohols are commonly used as antifreeze; however higher percentage mixtures of alcohols such as ethanol and methanol are not recommended due to increased flammability. Your local sales office should be consulted to determine the antifreeze best suited to your area. The use of antifreeze may impact system performance depending on its concentration and should be considered during initial system design. When antifreeze is added to the water system for freeze protection, recognize that the refrigerant suction pressure will be lower, capacity will be less, and water side pressure drop will be higher. The reduction in performance depends upon the antifreeze concentration and temperature.

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.

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 3 for the amount of antifreeze needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

**Table 3: 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)
<b>Propylene Glycol</b>	38%	25%	22%	15%
<b>Ethanol<sup>1</sup></b>	29%	25%	20%	14%
<b>Methanol</b>	25%	21%	16%	10%

<sup>1</sup> Must not be denatured with any petroleum product.

**Table 4: Antifreeze Correction Factors**

Ethylene Glycol					
	10%	20%	30%	40%	50%
<b>Cooling Capacity</b>	0.995	0.992	0.987	0.983	0.979
<b>Heating Capacity</b>	0.991	0.982	0.977	0.969	0.961
<b>Pressure Drop</b>	1.07	1.13	1.18	1.26	1.28
Propylene Glycol					
	10%	20%	30%	40%	50%
<b>Cooling Capacity</b>	0.99	0.98	0.97	0.96	0.95
<b>Heating Capacity</b>	0.987	0.975	0.962	0.942	0.93
<b>Pressure Drop</b>	1.07	1.15	1.25	1.37	1.42
Ethanol					
	10%	20%	30%	40%	50%
<b>Cooling Capacity</b>	0.991	0.951	–	–	–
<b>Heating Capacity</b>	0.995	0.96	–	–	–
<b>Pressure Drop</b>	1.035	0.96	–	–	–
Methanol					
	10%	20%	30%	40%	50%
<b>Cooling Capacity</b>	0.998	0.972	–	–	–
<b>Heating Capacity</b>	0.995	0.97	–	–	–
<b>Pressure Drop</b>	1.023	1.057	–	–	–

**NOTE:** Higher percentage mixtures of ethanol and methanol are not recommended due to increased flammability.

## Pre-Installation

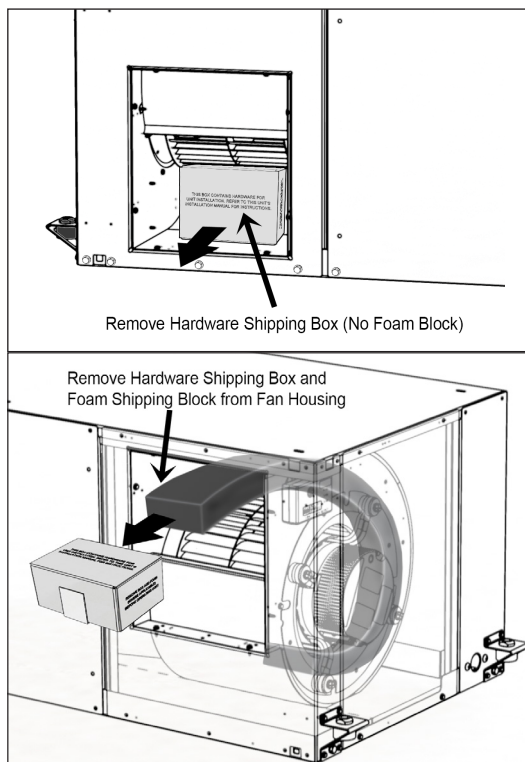
- To prevent damage, do not operate this equipment for supplementary ventilation, heating and cooling during the construction period.
- Inspect the carton for any specific tagging numbers indicated by the factory per a request from the installing contractor.

### NOTICE

Check the unit data plate for correct voltage (See Table 22), phase and capacity with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.

- If 460/60/3 unit includes a constant CFM ECM, verify that a 4-wire power supply is provided with a neutral wire to provide 265 volt electrical to the fan motor.
- Check the unit size against the plans to verify that the unit is being installed in the correct location.
- 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.
- Remove shipping brackets securing unit to skid.
- Change the airflow direction from straight discharge to end discharge or vice versa **before** the unit is installed in the ceiling. Refer to "Figure 2: Converting Discharge Air" on page 12.
- Remove all shipping blocks from the fan wheel if present. See Figure 1.

**Figure 1: Remove Foam Shipping Block From Fan Housing and Hardware Box, Applied Based on Fan Configuration**



## Discharge Air Conversion

A straight discharge unit may be converted to an end discharge by doing the following:

### ⚠ DANGER

Hazardous Voltage! Disconnect all electric power including remote disconnects before servicing. Failure to disconnect power before servicing can cause serious injury or death.

### ⚠ CAUTION

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

### NOTICE

The information covered in this section of the blower assembly orientation is typical of Daikin Applied units. Regardless, if you are changing end to straight or straight to end, the blower assembly has to turn 90 degrees and simultaneously rotate 180 degrees to achieve the proper orientation. Not all Daikin Applied units will have the same air discharge location but will have the same general results when following the instructions.

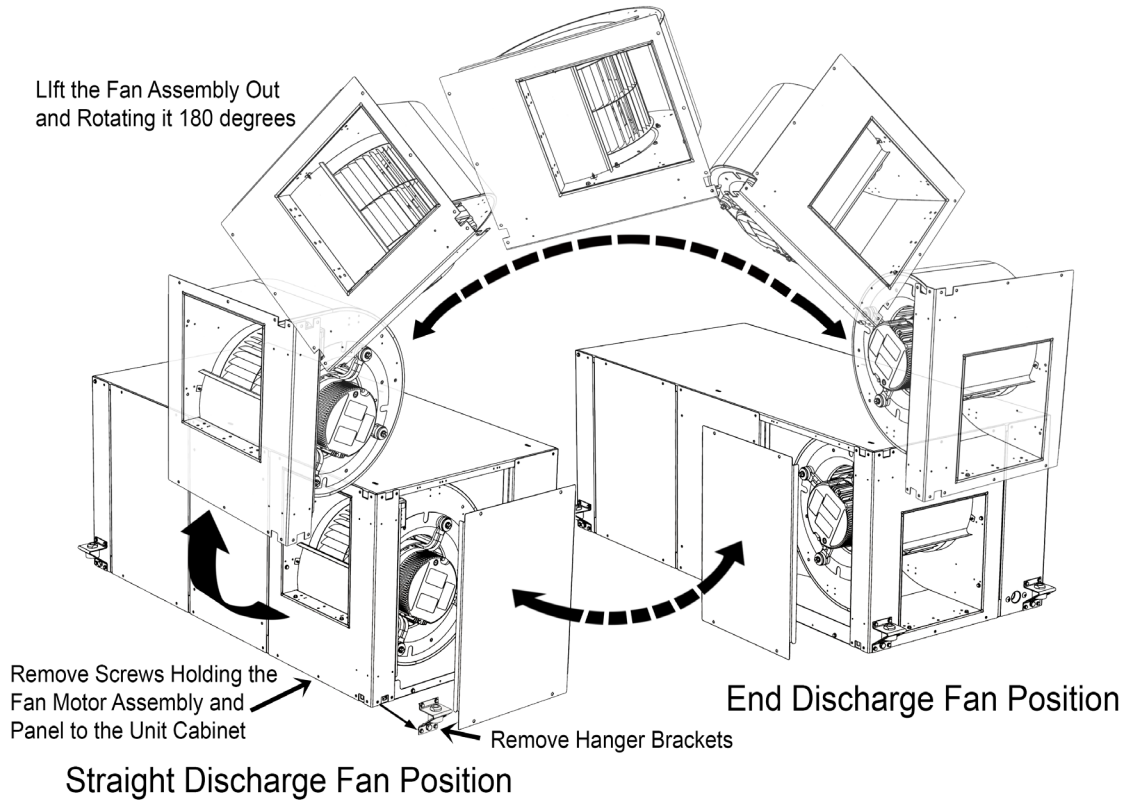
1. Perform conversion prior to installing the unit.
2. Remove the bolts securing the hanger bracket as indicated in Figure 2. Remove the (8) screws around the perimeter of the panel and fan assembly.

### NOTICE

Retain all screws for reinstalling.

3. Disconnect power wiring from the fan motor. ECMs will require removal of control wire plug.
4. Lift the fan assembly out rotating it 180 degrees and position it within the opening at the end of the unit. The fan motor should be accessible through the available access panel when installed properly.
5. Secure the fan assembly to the unit frame with the screws removed previously.
6. Reinstall the access panel in the fan motor access opening (Figure 2).

Figure 2: Converting Discharge Air



## Unit Location and Clearances

**WARNING**

Clearance should be maintained to meet local and national code requirements.

- Locate the unit in an area that allows for easy removal of the filter and access panels. Leave a minimum of 18" of clearance around the heat pump for easy removal of the entire unit (if necessary), and to perform routine maintenance, or troubleshooting. Provide sufficient room to make water, electrical and duct connections. See Figure 4.
- The contractor should make sure that adequate ceiling panel access exists, including clearance for hanger brackets, duct collars and fittings at water and electrical connections.
- Allow adequate room below the unit for a condensate trap and do not locate the unit above pipes.

**Legend for Figure 3**

No.	Description
1	Discharge air
2	Return air
3	Acoustic thermal duct lining - 10 feet
4	Low voltage wiring to unit control box
5	Line voltage to optional non-fused disconnect switch
6	Flexible duct collar(s)
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
10	Access to unit control box
11	LED annunciator sight glass to view unit operation status and faults

Figure 3: Horizontal Unit - Typical Installation in Ceiling

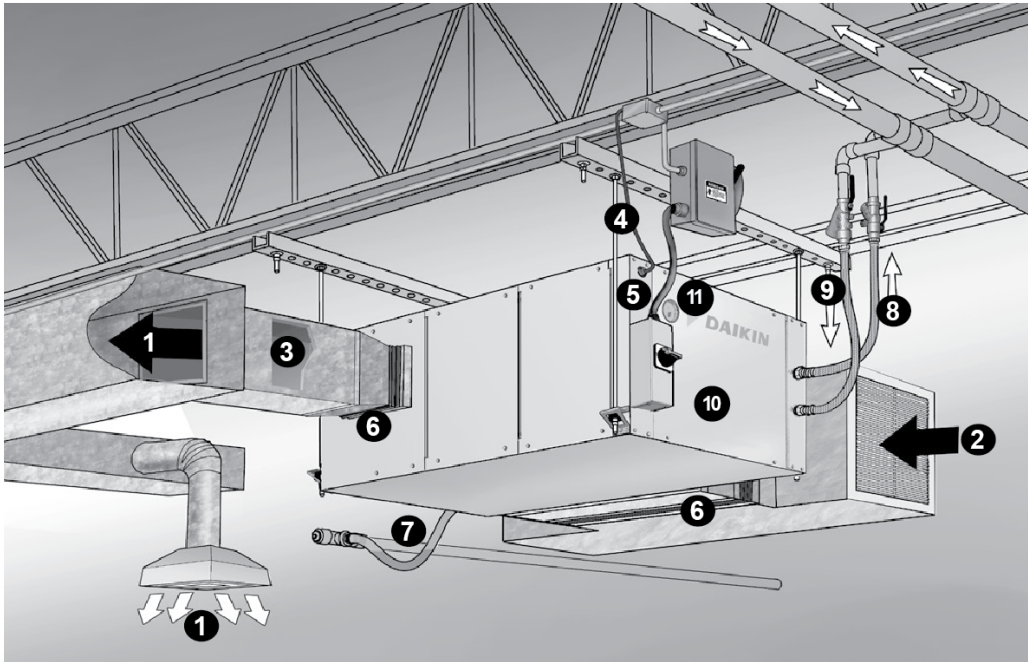
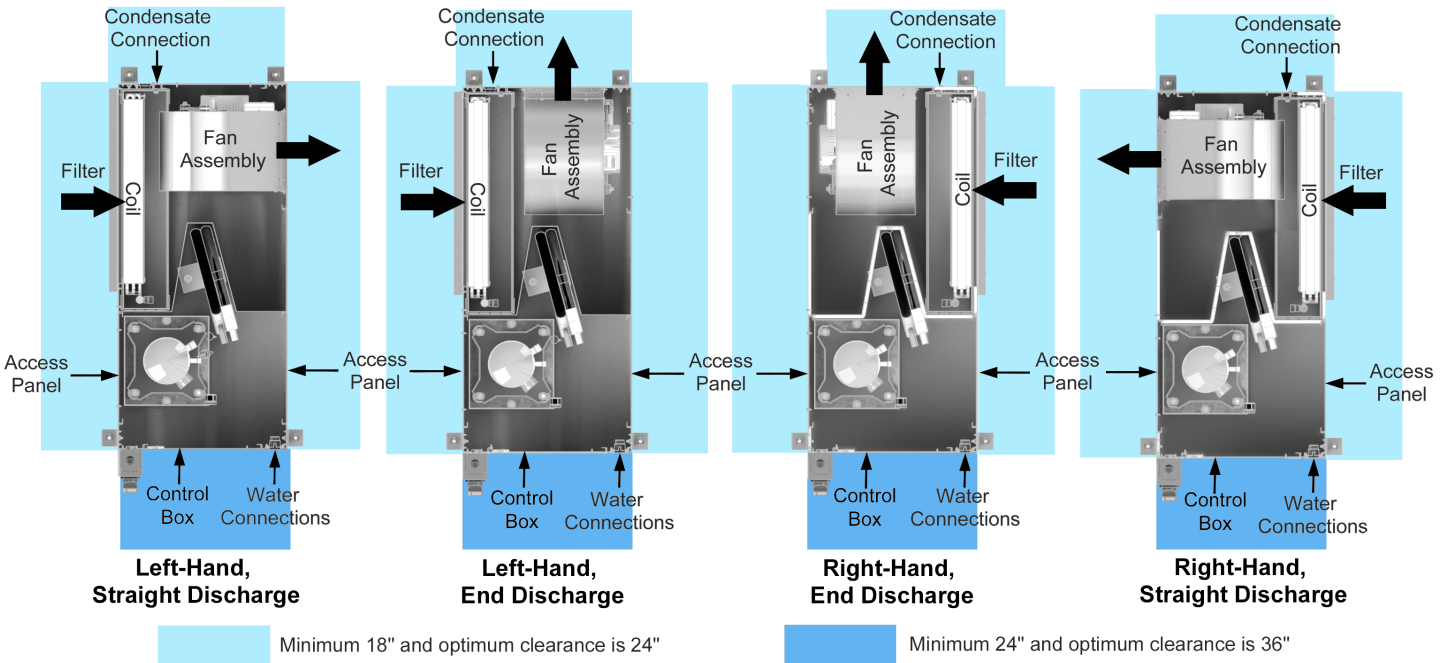


Figure 4: Recommended Clearances for Service Access



## Installing Hanger Rods and Hanger Kit

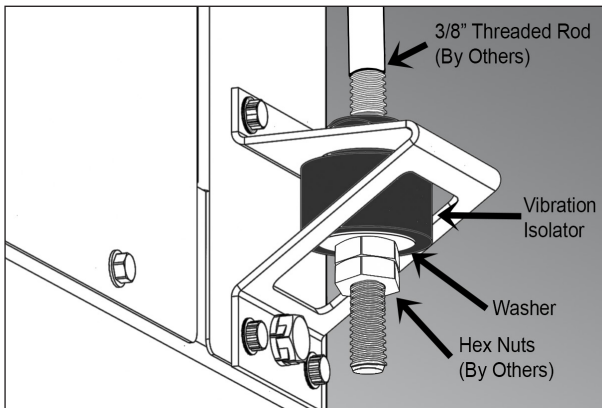
- Each unit is suspended from the ceiling by four threaded rods. The rods are attached to the unit corners by a hanger bracket through a rubber isolator.

**CAUTION**

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

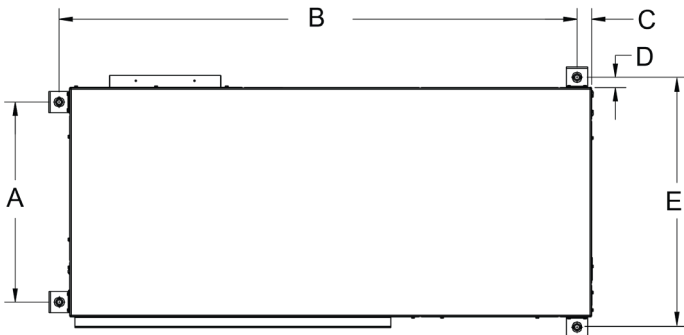
- Each unit is furnished with a hanger kit. The hanger brackets are assembled to the unit. The rubber isolators, washers, bolts and lock washers are shipped and packed with the unit. Lay out the field-provided threaded rods per the dimension according to Figure 5.
- When attaching the hanger rods to the unit, a double nut is recommended since vibration could loosen a single nut. The installer is responsible for providing the hex nuts when installing hanger rods.
- Make sure the unit is installed level and leave a minimum 3" (76 mm) extra threaded rod below the double nuts or minimum 3" (76 mm) clearance between top of unit and ceiling above to facilitate top panel removal for servicing.

Figure 5: Hanger Bracket Detail



## Hanger Bracket Locations

Figure 6: Hanger Bracket Locations Dimensions



**NOTE:** Left hand unit – straight discharge shown. Hanger bracket locations will remain the same on all units.

Table 5: WSCH, WSDH Hanger Brackets Dimensions for Figure 6

Unit Size	Dimensions (in)				
	A	B	C	D	E
007, 009, 012	16.7	33.6	1.4	1.0	20.9
015, 019	16.2	41.6			20.9
024, 030	17.2	42.5			21.9
036	18.7	48.5			23.4
042	18.7	48.5			23.4
048	21.2	53.6			25.9
060	21.2	53.6			25.9
070	21.2	64.5			25.9

Table 6: WSMH, WSNH Hanger Bracket Dimensions for Figure 6

Unit Size	Dimensions (in)				
	A	B	C	D	E
007, 009, 012	16.7	39.6	1.4	1.0	20.9
015, 019	17.2	42.5			21.9
024, 030	18.7	48.5			23.4
036	18.7	53.6			25.9
042	21.2	53.6			25.9
048	21.2	64.5			25.9
060	21.2	64.5			25.9
070	21.2	64.5			25.9

Table 7: WSSH, WSTH Unit Hanger Bracket Dimensions for Figure 6

Unit Size	Dimensions (in)				
	A	B	C	D	E
007, 009, 012	16.2	41.6	1.4	1.0	20.9
015, 019	18.7	48.6			20.9
024, 030	21.2	53.6			21.9
036	21.2	64.6			23.4
042	21.2	64.6			23.4
048	21.2	78.5			25.9
060	21.2	78.5			25.9
070	21.2	78.5			25.9

## Unit Corner Weights

Figure 7: Corner Weight Dimensions

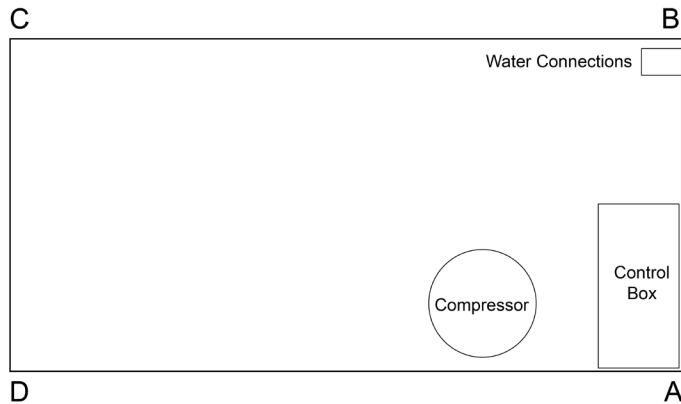


Table 8: WSCH, WSDH Unit Corner Weights, Percentage of Total Operating Weight (Base Unit Only) for Figure 7

Unit Size	Unit Weight (lbs)	Corner Weight % of Total Operating Weight			
		A	B	C	D
007, 009	98	22%	20%	28%	30%
012	103	22%	20%	28%	30%
015	141	29%	26%	22%	24%
019	149	31%	24%	20%	26%
024, 030	180	30%	25%	20%	25%
036	214	24%	21%	26%	29%
042	232	34%	22%	17%	26%
048	292	33%	23%	18%	26%
060	306	33%	23%	18%	26%
070	325	35%	23%	16%	25%

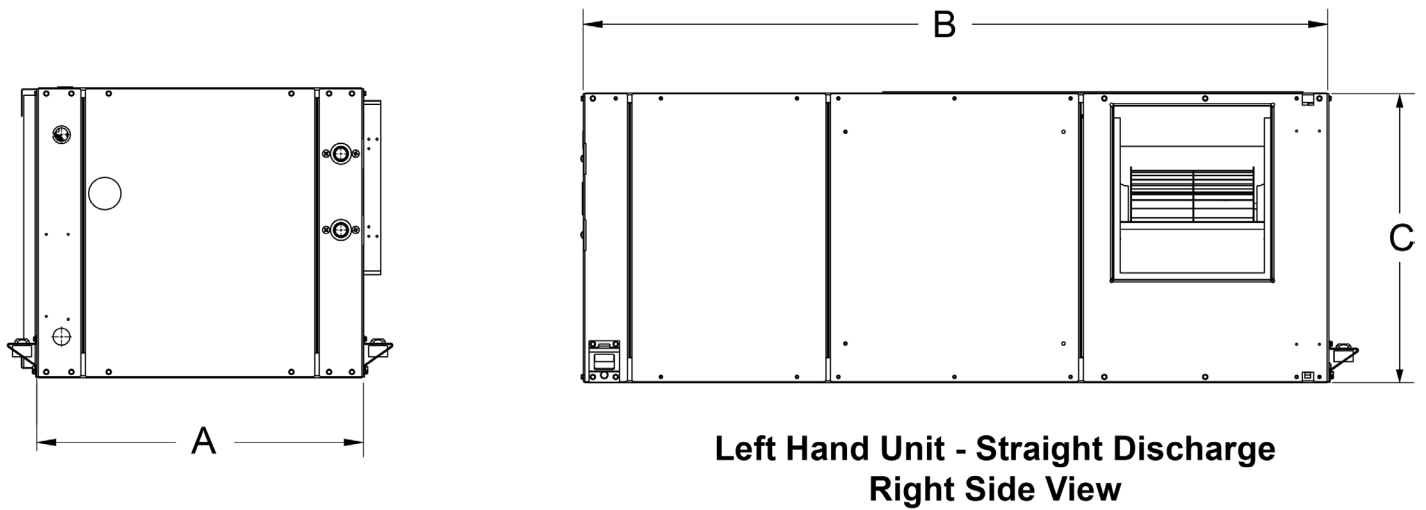
Table 9: WSMH, WSNH Unit Corner Weights, Percentage of Total Operating Weight (Base Unit Only) for Figure 7

Unit Size	Unit Weight (lbs)	Corner Weight % of Total Operating Weight			
		A	B	C	D
007	104	29%	29%	21%	21%
009	110	29%	29%	21%	21%
012	108	29%	29%	21%	21%
015	158	30%	25%	20%	25%
019	158	29%	25%	21%	24%
024, 030	212	32%	25%	19%	24%
036	227	32%	25%	19%	24%
042	276	33%	24%	18%	25%
048	302	35%	25%	17%	24%
060	306	34%	25%	17%	24%

Table 10: WSSH, WSTH Unit Corner Weights, Percentage of Total Operating Weight (Base Unit Only) for Figure 7

Unit Size	Unit Weight (lbs)	Corner Weight % of Total Operating Weight			
		A	B	C	D
007, 009	123	33%	25%	18%	24%
012	124	33%	24%	18%	25%
015	157	31%	27%	20%	23%
019	161	33%	25%	18%	24%
024	198	32%	25%	19%	24%
030	200	33%	25%	18%	24%
036	233	31%	25%	20%	24%
042	265	34%	24%	17%	24%
048	290	34%	25%	17%	23%
060	295	33%	25%	18%	24%
070	296	31%	25%	19%	24%

Figure 8: Overall Cabinet Dimensions



Left Hand Unit - Front View

Left Hand Unit - Straight Discharge  
Right Side View

Table 11: WSCH, WSDH Overall Cabinet Dimensions

Unit Size	Overall Cabinet Dimensions		
	Width	Depth	Height
	A	B	C
007, 009, 012	19.0	34.0	11.5
015, 019	19.0	42.0	17.0
024, 030	20.0	43.0	17.3
036, 042	21.5	49.0	19.0
048, 060	24.0	54.0	21.0
070	24.0	65.0	21.0

Table 13: WSSH, WSTH Overall Cabinet Dimensions

Unit Size	Overall Cabinet Dimensions		
	Width	Depth	Height
	A	B	C
007, 009, 012	19.0	42.0	17.0
015, 019	21.5	49.0	19.0
024, 030	24.0	54.0	19.0
036, 042	24.0	65.0	21.0
048, 060, 070	24.0	79.0	21.0

Table 12: WSMH, WSNH Overall Cabinet Dimensions

Unit Size	Overall Cabinet Dimensions		
	Width	Depth	Height
	A	B	C
007, 009, 012	19.0	40.0	11.5
015, 019	20.0	43.0	17.3
024, 030	21.5	49.0	19.0
036, 042	23.9	54.0	19.0
048, 060	23.9	64.9	21.0



# Water Piping

**WARNING**

Polyolester Oil, commonly known as POE oil is a synthetic oil used in many refrigeration systems, and may be present in this Daikin Applied 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. Refer to the pipe manufacturer's recommendations to determine suitable applications of the pipe.

## Pre-Installation Considerations

All units should be connected to supply and return piping in a two-pipe reverse return configuration which includes a flow control device so that flow requirements are met for each zone. 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. Refer to Figure 10.

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

1. The piping must comply with local codes. The piping can be steel or copper. Daikin Applied does not recommend the use of PVC/CPVC water piping.
2. A short, high pressure "flexible hose" is used to connect the unit to the building's hard piping and acts as a sound attenuator for both the unit operating noise and hydronic pumping noise.

3. One end of the hose should have a swivel fitting to facilitate removal of the unit for replacement or service.
4. Daikin Applied has optional hose kit combinations available to better facilitate system flow balancing. These flexible hoses reduce vibration between the unit and the rigid piping system. See Figure 9.

**NOTICE**

Hard or rigid piping directly to the unit water connections is not recommended. This piping arrangement will not provide noise or vibration isolation to the unit.

**NOTICE**

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.

Figure 9: Flexible Hose Kit #7

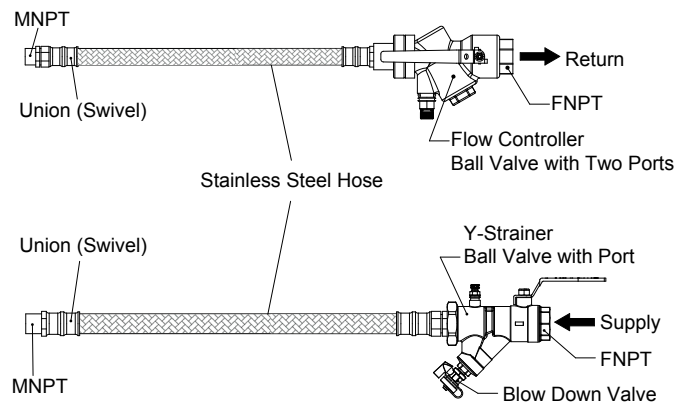
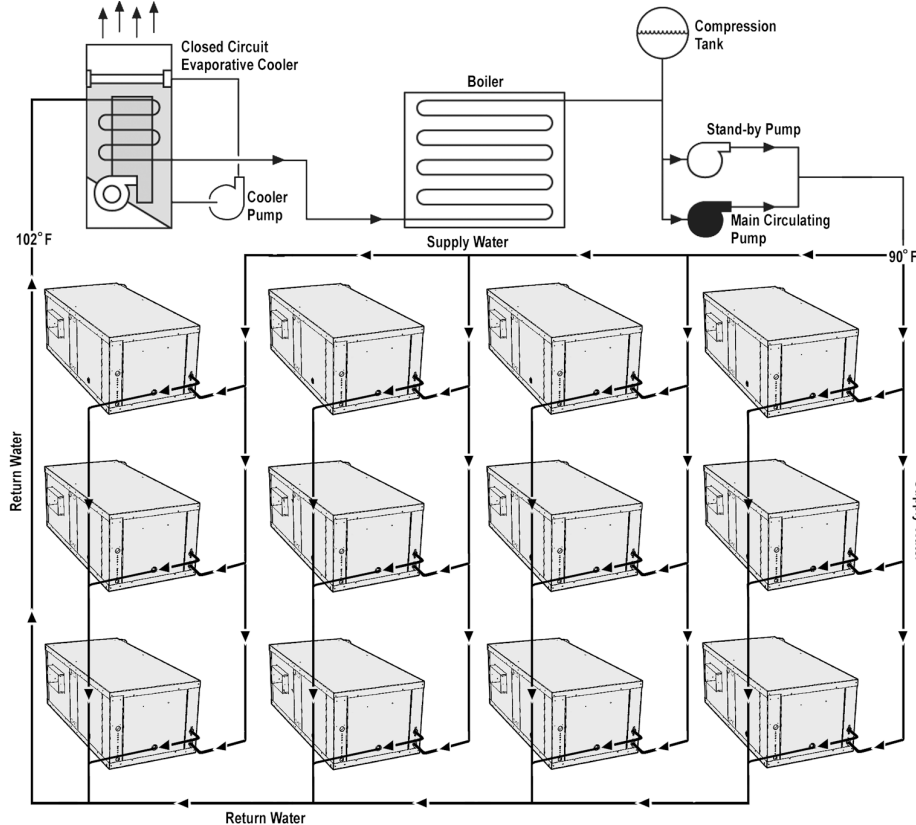


Figure 10: Example of a Reverse Return Piping System



5. 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 19. After the cleaning and flushing has taken place, the initial connection should have all valves wide open in preparation for water system flushing.
6. Supply and return shutoff valves are required at each unit to allow removal of a unit without the need to shut down the entire heat pump system. The return valve may be used for balancing and should have a "memory stop" so that it can be closed off and reopened to the proper position for the required flow.
7. Fixed flow devices are commercially available and can be installed to eliminate the need for memory stop shut off valves. Include Pressure/Temperature ports to allow the service technician to measure water flow and unit operation.

**NOTICE**

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.

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

**NOTICE**

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.

## Condensate Drain

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 1/8" per foot. An air vent is sometimes required after the trap to prevent air pockets, so the condensate will drain away from the unit. The vent should extend at least 1-1/4" above the unit condensate fitting. See Figure 11. 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, etc. Check the local Building or Plumbing Codes for the proper condensate requirements in your area.

## 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:

1. 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.

2. Corrosion – Decomposition of the metal caused by absorption of gases from the air. Corrosion may occur in any metal component of the system.
3. 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. For units with coaxial heat exchangers, refer to Table 14. For units with brazed plate heat exchangers (WSSH and WSTH), refer to Table 15 on page 19.

**NOTICE**

Units with a brazed plate heat exchanger must include a field provided and installed strainer with a minimum of a 20-mesh rating in the supply piping to prevent heat exchanger clogging. For units with a coaxial heat exchanger, the same 20-mesh strainer is recommended.

**Table 14: Water Quality Conditions and Applications for Units with a Coaxial Heat Exchanger**

Potential Problem	Chemical(s) or Condition	Range for Copper Heat Exchangers	Range for Cupronickel Heat Exchanger
Scaling	Calcium & Magnesium Carbonate	Less than 350 ppm	Less than 350 ppm
	pH Range	7 – 9	5 – 9
Corrosion	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 <sup>[4]</sup>
	Chlorine	Less than 0.5 ppm	Less than 0.5 ppm
	Hydrogen Sulfide	None Allowed	None Allowed
	Iron Oxide	Less than 1 ppm	Less than 1 ppm
Biological Growth	Iron Bacteria	None Allowed	None Allowed
Erosion	Suspended Solids	Less than 10 ppm	Less than 10 ppm
	Water Velocity	Less than 8 ft/s	Less than 12 ft/s

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

**NOTE 2:** Grains/gallon = ppm divided by 17.1.

**NOTE 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.

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

**Table 15: Water Quality Conditions and Applications for WSSH and WSTH Units with a Brazed Plate Heat Exchanger**

Potential Problem	Chemical(s) or Condition	Range for Brazed Plate Heat Exchanger	
		Sizes 007-012 (ANSI 304 Stainless Steel)	Sizes 015-070 (ANSI 316 Stainless Steel)
Scaling	Alkalinity	70-300 ppm	
	Total Hardness	70-200 ppm	
Corrosion	pH Range	7.5-9.0	
	Sulfate	Less than 70 ppm	
	Ammonium	Less than 2 ppm	
	Chlorides	Less than 50 ppm	Less than 300 ppm
	Free Chlorine	Less than 1 ppm	
	Hydrogen Sulfide	Less than 0.05 ppm	
	Free (Aggressive) Carbon Dioxide	Less than 5 ppm	
	Nitrate	Less than 100 ppm	
	Iron Oxide <sup>[1]</sup>	Less than 0.2 ppm	
	Aluminium	Less than 0.2 ppm	
	Manganese <sup>[1]</sup>	Less than 0.1 ppm	
	Electrical Conductivity	10-500 µS/cm	
Total Dissolved Solids	Less than 1000 ppm		
Biological Growth	Iron Bacteria	None Allowed	
Erosion	Water Velocity	Less than 8 ft/s	Less than 16 ft/s

**NOTE 1:** Iron and manganese are strong oxidants and may increase the risk for localized corrosion on stainless steels in combination with brazing material copper.

**NOTE 2:** Varying combinations of pH, TDS, calcium, alkalinity and water temperature can affect the likelihood of scaling. To determine if the system is at risk for scaling, use the Langelier Saturation Index.

## 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 12](#).

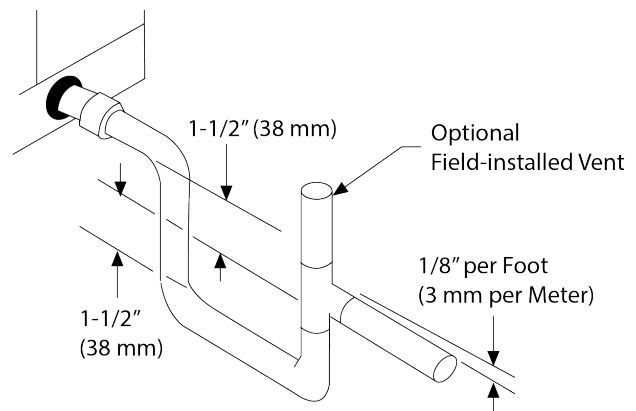
2. Fill the system at the city water makeup connection with all air vents open. After filling, close all air vents.

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

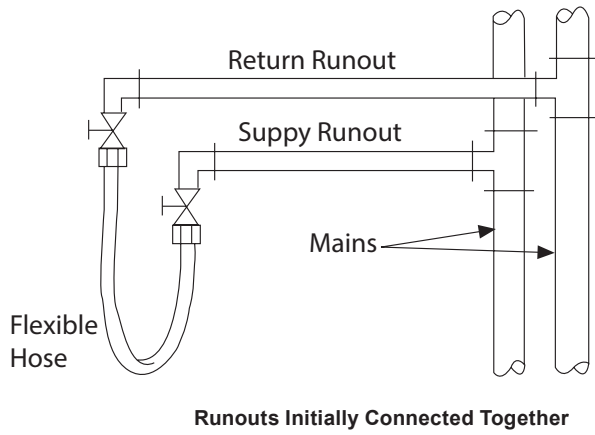
any leaks in the piping. Drains at the lowest point(s) in the system should be opened for initial flush and blowdown, making sure city water fill valves are set to make up water at the same rate. Check the pressure gauge at pump suction and manually adjust the makeup to hold the same positive steady 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. 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.
4. 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.
5. 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.

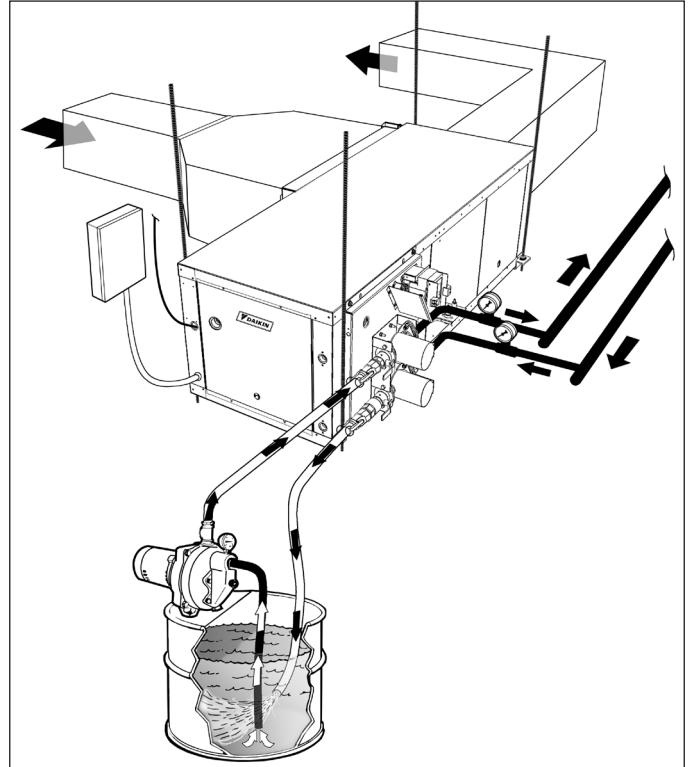
**Figure 11: Unit Condensate Drain Pipe Trap Detail**



**Figure 12: Supply and Return Runouts Connected Together**

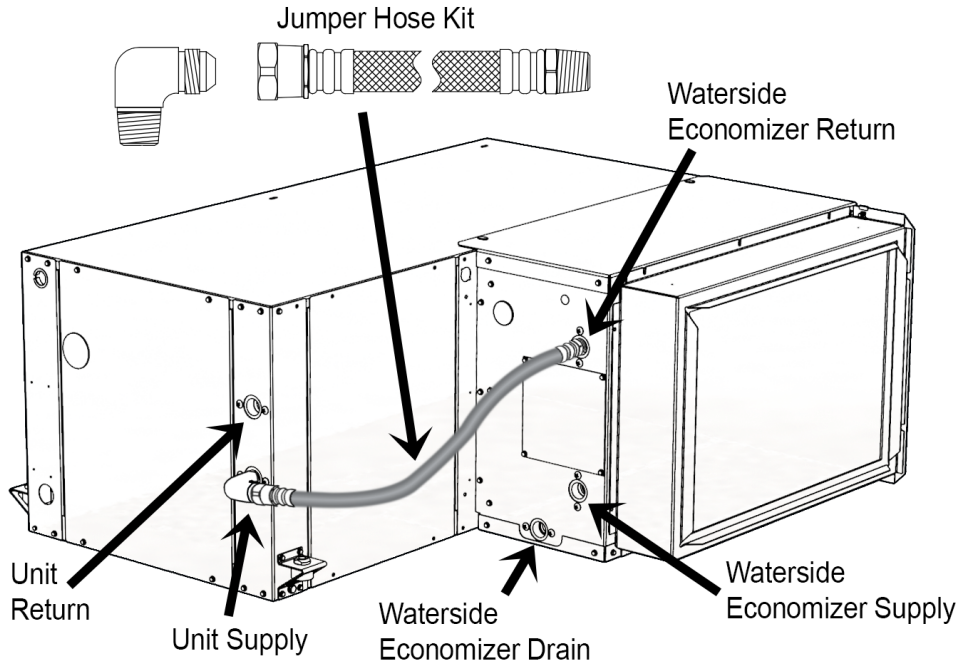


**Figure 13: Flushing the Loop**

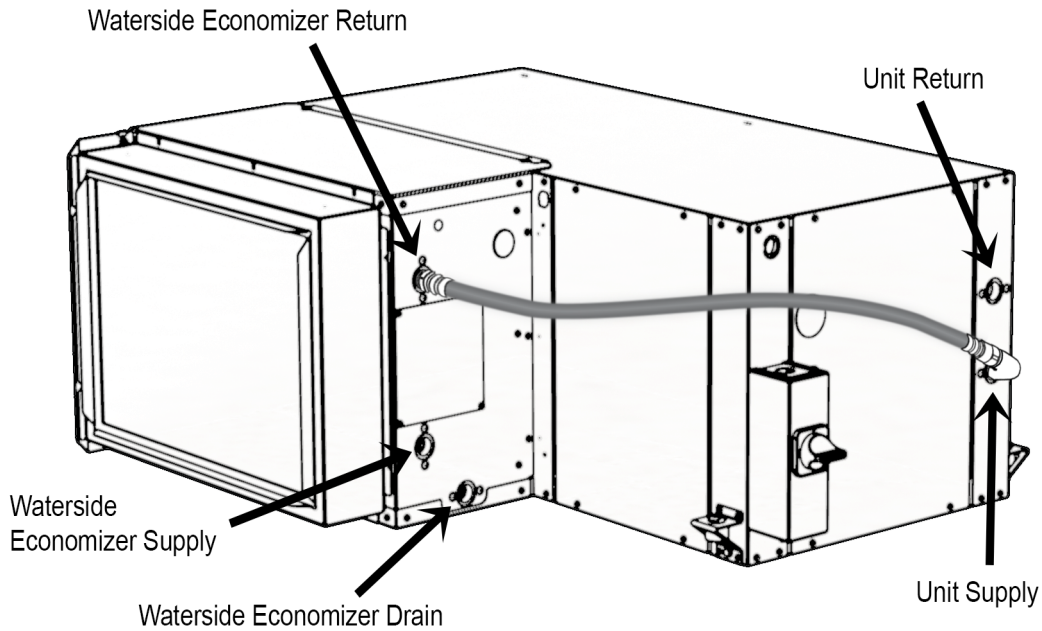


# Piping Considerations for Units with Waterside Economizer

Figure 14: Unit with Waterside Economizer Jumper Hose



## Right-Hand Unit With Waterside Economizer Jumper Hose



## Left-Hand Unit With Waterside Economizer Jumper Hose

**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.

Figure 15: Waterside Economizer Piping Locations and Dimensions

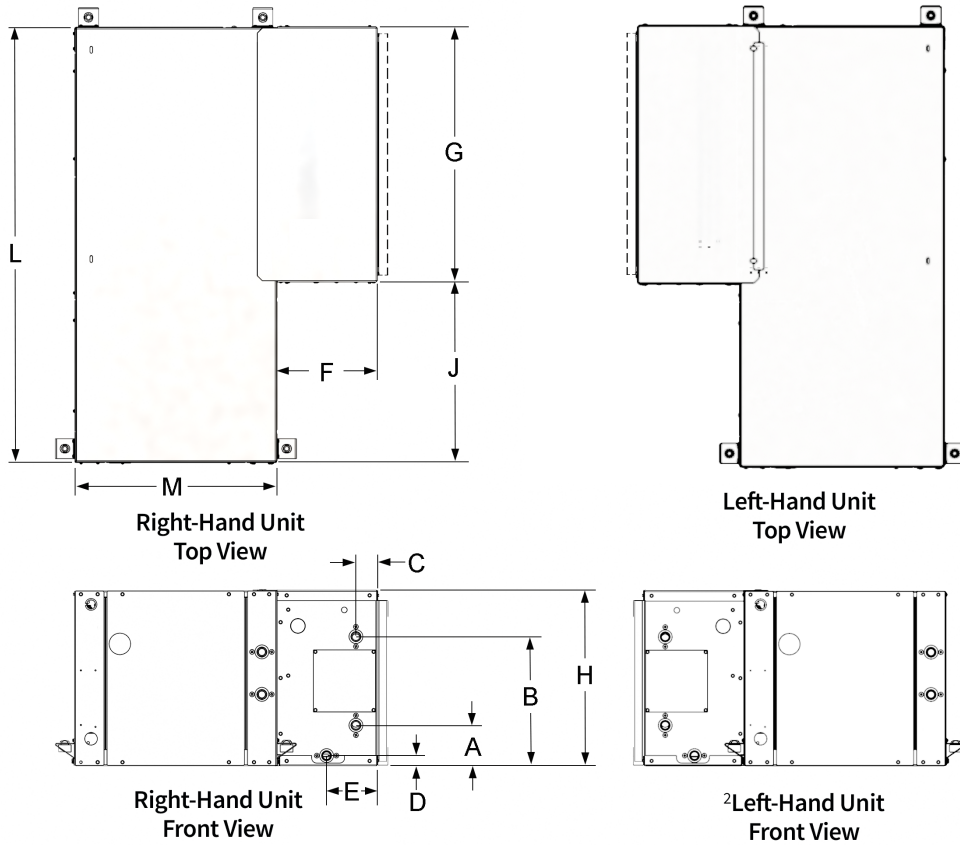


Table 16: Units with Waterside Economizer - Dimensions

	Unit Size	WSE Supply & Return Connections				WSE 3/4" FPT Condensate Drain		Waterside Economizer Overall Cabinet Section			Length L	Width M
		Connection Size (FPT)	A (Supply)	B (Return)	C	D	E	F	G	H		
WSCH, WSDH	007, 009, 012	1/2"	2.8	9.7	2.5	1.0	5.0	10.0	19.5	11.6	34.0	19.0
	015, 019	1/2"	4.0	12.5	2.0	1.0	5.0	10.0	25.5	17.1	42.0	19.0
	024, 030	3/4"	4.0	12.5	2.0	1.0	5.0	10.0	25.5	17.4	43.0	20.0
	036, 042	3/4"	3.5	13.5	2.0	1.0	5.0	10.0	31.0	19.1	49.0	21.5
	048, 060	1"	3.5	15.5	1.5	1.0	5.0	10.0	35.0	21.1	54.0	24.0
	070	1"	3.5	15.5	2.5	1.0	5.0	10.0	46.5	21.1	65.0	24.0
WSMH, WSNH	007, 009, 012	3/4"	2.4	9.3	2.5	1.0	5.0	10.0	25.5	11.6	40.0	19.0
	015, 019	3/4"	4.0	12.8	2.0	1.0	5.0	10.0	25.0	17.4	43.0	20.0
	024, 030	3/4"	3.5	13.5	2.0	1.0	5.0	10.0	31.0	19.1	49.0	21.5
	036, 042	1"	3.5	15.5	2.5	1.0	5.0	10.0	46.5	21.1	65.0	24.0
	048, 060	1"	3.5	15.5	2.5	1.0	5.0	10.0	46.5	21.1	65.0	24.0
WSSH, WSTH	007, 009, 012	1/2"	4.0	12.5	2.0	1.0	5.0	10.0	25.5	17.1	43.0	19.0
	015, 019	3/4"	3.5	13.5	2.0	1.0	5.0	10.0	30.5	19.1	49.0	21.5
	024, 030	1"	3.5	13.5	2.0	1.0	5.0	10.0	35.0	19.1	54.0	24.0
	036, 042	1"	3.5	15.5	2.5	1.0	5.0	10.0	46.0	21.1	65.0	24.0
	048, 060	1"	3.5	15.5	2.5	1.0	5.0	10.0	50.5	21.1	79.0	24.0
	070	1"	3.5	15.5	2.5	1.0	5.0	10.0	50.5	21.1	79.0	24.0

NOTE 1: All dimensions within ± 0.10 inches (2.5 mm).

NOTE 2: Left-hand waterside economizer connections same as right-hand but opposite.

Figure 16: Unit Supply and Return Connection Sizes

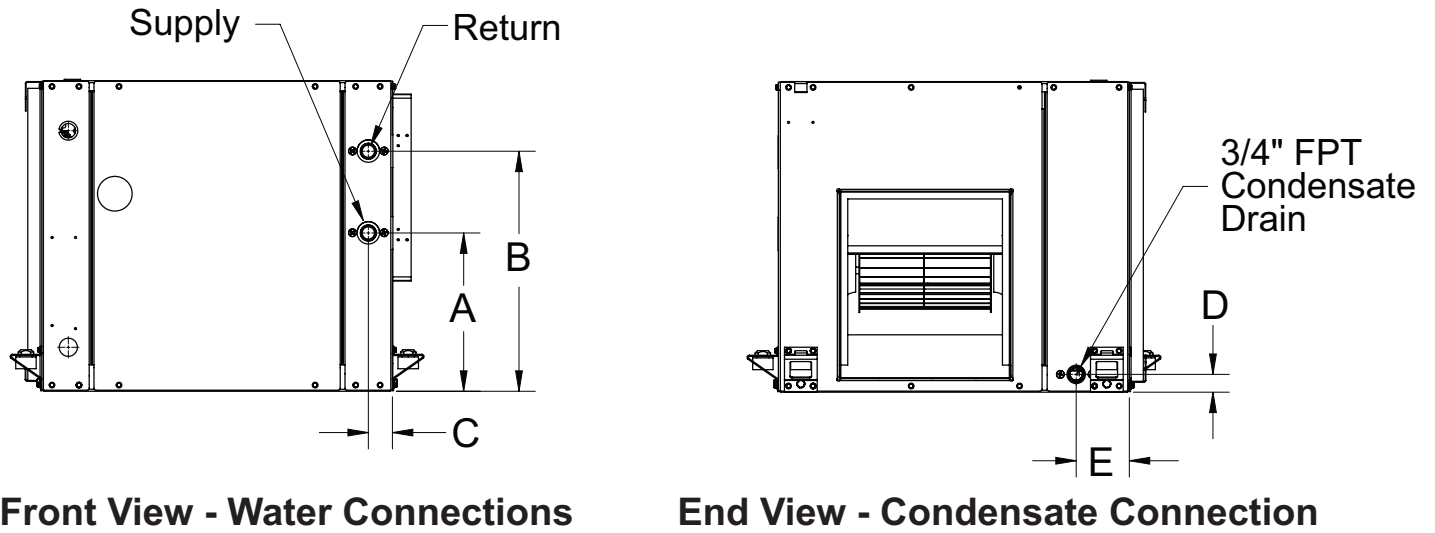


Table 17: Unit Supply, Return, and Condensate Dimensions

	Unit Size	Connection Size (FPT)	A	B	C		D	E
					Supply	Return		
WSCH, WSDH	007, 009, 012	1/2"	1.5	10.5	2.5	1.5	1.0	3.3
	015, 019	1/2"	8.0	11.5	1.5	1.5	1.0	3.3
	024, 030	3/4"	7.0	11.5	1.5	1.5	1.0	3.3
	036, 042	3/4"	9.7	14.5	1.5	1.5	1.0	3.3
	048, 060, 070	1"	10.8	14.5	1.5	1.5	1.4	3.3
WSMH, WSNH	007, 009, 012	1/2"	1.5	10.5	2.5	1.5	1.0	3.3
	015, 019	3/4"	7.0	11.5	1.5	1.5	1.0	3.3
	024, 030	3/4"	9.7	13.0	1.5	1.5	1.0	3.3
	036, 042	1"	10.8	14.5	1.5	1.5	1.0	3.3
	048, 060	1"	10.8	16.0	1.5	1.5	1.4	3.3
WSSH, WSTH	007, 009, 012	1/2"	3.0	9.0	1.5	1.5	1.0	3.3
	015, 019	1"	2.5	15.5	1.5	1.5	1.0	3.3
	024, 030	1"	2.5	15.5	1.5	1.5	1.4	3.3
	036, 042	1"	2.5	15.5	1.5	1.5	1.4	3.3
	048, 060, 070	1"	2.5	15.5	1.5	1.5	1.4	3.3

## Ductwork and Attenuation

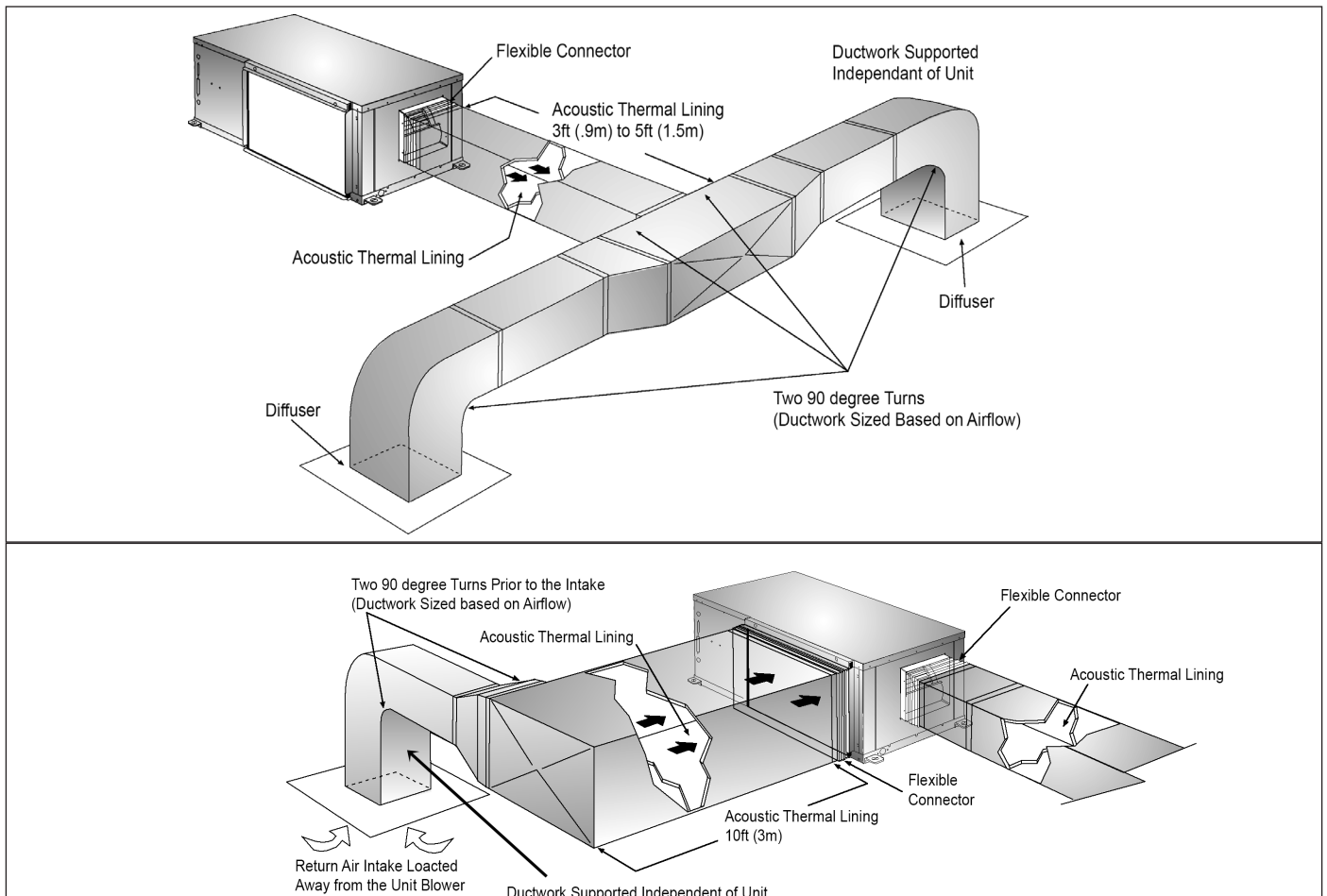
Discharge duct shall be used with these units. Where return air ductwork is required, the unit comes standard with a 1" thick, factory-installed disposable filter, mounted in a 2-sided filter rack. The filter can be easily removed from either side. A 2" deep 4-sided, gasketed filter rack is available as a factory-installed option to accept a 2" MERV 8 filter. Also available is a 4" deep, 4-sided, gasketed filter rack with 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 10 foot length of insulated duct
- and a trunk duct teeing into a branch circuit with discharge diffusers

**Figure 17: Typical Ducting for Horizontal Unit**



**NOTE 1:** Transformation to supply duct have maximum slope of 1" in 7".

**NOTE 2:** Square elbows with double thickness vanes may be substituted.

**NOTE 3:** Do not install ducts so that the air flow is counter to fan rotation. If necessary, turn fan section.

**NOTE 4:** Transformations and units must be adequately supported so no weight is on the flexible fan connection.



## Air Duct Connections

### WARNING

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

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

### NOTICE

It is recommended that a field supplied flexible (boot) connector is attached to the flanges to isolate vibration. See [Figure 18](#).

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.

### NOTICE

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.

**Figure 18: Bend Duct Flanges out 90 Degrees**

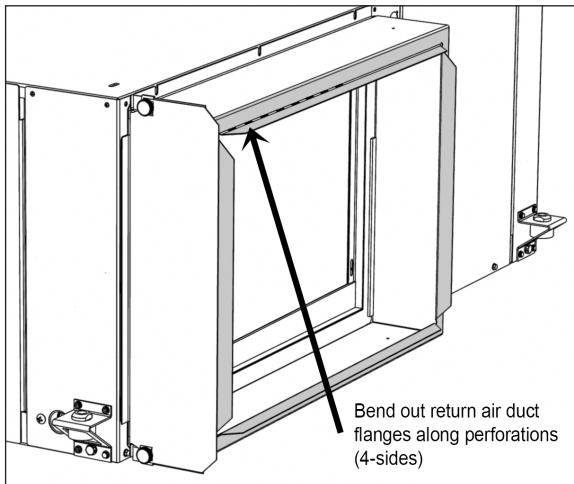


Figure 19: Filter Rack, Return Duct Collar Dimensions

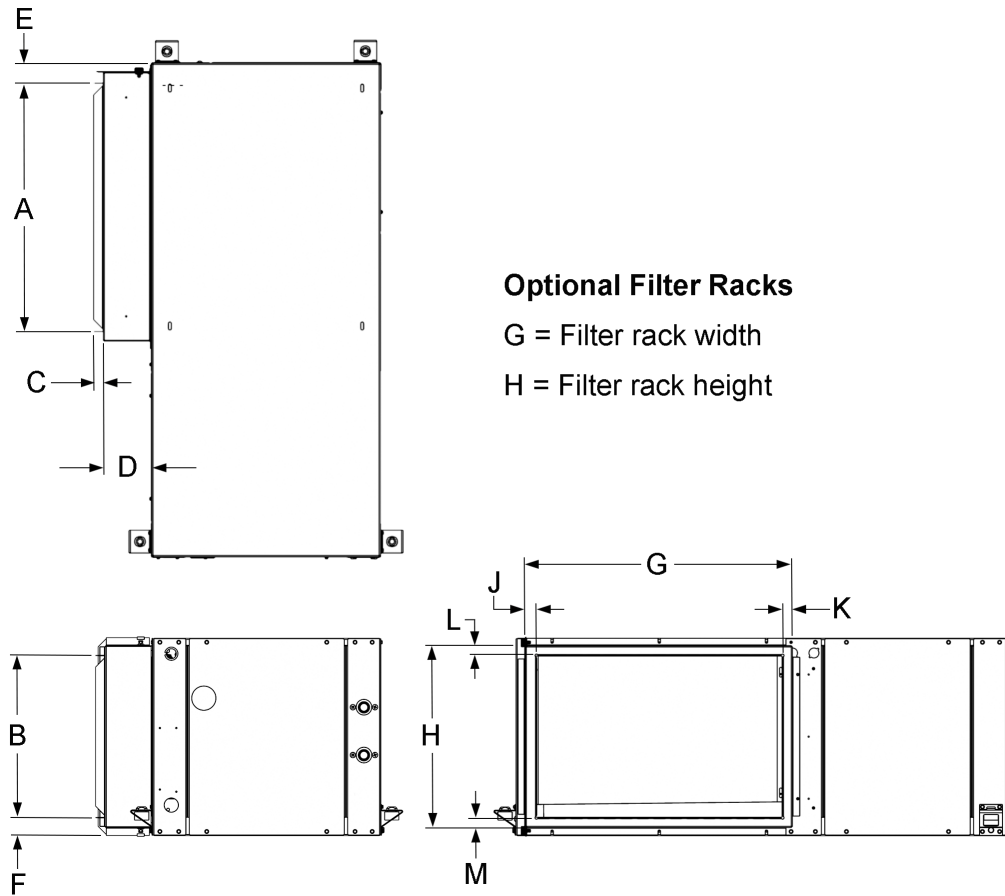


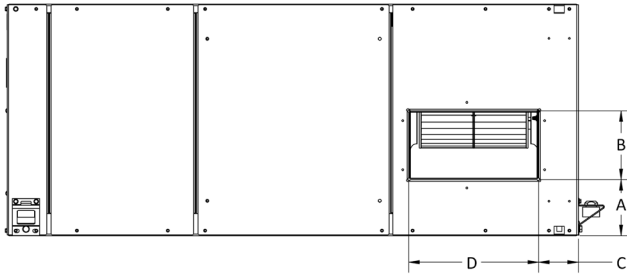
Table 18: Filter Rack, Return Duct Collar Dimensions for Figure 19

Unit	Unit Size	*A	*B	C	D		E	F	G	H	*J	*K	*L	*M
					2-inch	4-inch								
WSCH, WSDH	007, 009, 012	16.2	8.5	0.9	2.2	4.2	1.7	1.5	17.8	10.0	1.0	0.8	0.8	0.8
	015, 019	22.2	14.0	0.9	2.2	4.2	1.7	1.5	23.8	15.6	1.0	0.8	0.8	0.8
	024, 030	21.7	14.5	0.9	2.2	4.2	1.7	1.5	23.4	15.9	1.0	0.8	0.8	0.8
	036, 042	27.2	16.0	0.9	2.2	4.2	1.7	1.5	28.9	17.6	1.0	0.8	0.8	0.8
	048, 060	31.4	18.0	0.9	2.2	4.2	1.7	1.5	33.2	19.6	1.0	0.8	0.8	0.8
	070	44.2	18.0	0.9	2.2	4.2	2.0	1.5	44.9	19.6	1.0	0.8	0.8	0.8
WSMH, WSNH	007, 009, 012	22.2	8.5	0.8	2.2	4.2	1.7	1.5	23.8	10.0	1.0	0.8	0.8	0.8
	015, 019	21.7	14.5	0.8	2.2	4.2	2.0	1.5	23.4	15.9	1.0	0.8	0.8	0.8
	024, 030	27.2	16.0	0.8	2.2	4.2	1.7	1.5	28.9	17.6	1.0	0.8	0.8	0.8
	036, 042	31.4	16.0	0.8	2.2	4.2	1.7	1.5	33.1	17.6	1.0	0.8	0.8	0.8
	048, 060	43.2	18.0	0.8	2.2	4.2	2.0	1.5	44.9	19.6	1.0	0.8	0.8	0.8
WSSH, WSTH	007, 009, 012	22.0	14.0	0.8	2.2	4.2	1.7	1.5	24.0	15.6	1.0	0.8	0.8	0.8
	015, 019	27.1	16.0	0.8	2.2	4.2	1.7	1.5	29.0	17.6	1.0	0.8	0.8	0.8
	024, 030	31.4	16.0	0.8	2.2	4.2	1.7	1.5	33.1	17.6	1.0	0.8	0.8	0.8
	036, 042	43.2	18.0	0.8	2.2	4.2	1.7	1.5	44.9	19.6	1.0	0.8	0.8	0.8
	048, 060, 070	47.2	18.0	0.8	2.2	4.2	2.0	1.5	48.9	19.6	1.0	0.8	0.8	0.8

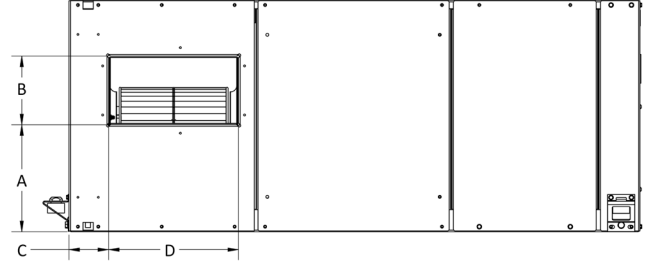
NOTE 1: \*Filter rack flange dimensions are to the outside edge of the flange when bent out to 90 degrees at perforations.

NOTE 2: Dimensions are approximate and dependent on degree of bend.

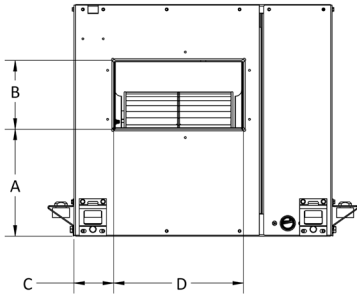
Figure 20: Discharge Air Duct Collar Connections



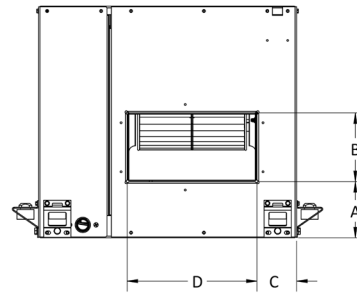
LH Straight Discharge



RH Straight Discharge



LH End Discharge



RH End Discharge

Table 19: Discharge Duct Collar Letter Dimensions for Figure 20

Unit	Unit Size	End Discharge						Straight Discharge					
		A		B	C	D		A		B	C	D	
		LH	RH			LH	RH	LH	RH			LH	RH
WSCH, WSDH	007, 009, 012	1.5	5.5	5.0	3.0	9.5	9.25	5.5	1.5	5.0	3.0	9.25	9.5
	015, 019	1.0	5.5	10.5	3.0	9.5	9.25	5.5	1.0	10.5	3.0	9.25	9.5
	024, 030	1.0	6.0	10.5	3.5	9.5	9.25	6.0	1.0	10.5	3.5	9.25	9.5
	036	1.5	7.5	10.5	4.5	9.5	9.25	7.5	1.5	10.5	4.5	9.25	9.5
	042	1.0	6.5	11.5	4.0	10.5	10.5	6.5	1.0	11.5	3.75	10.5	10.5
	048, 060	3.0	6.5	11.5	5.0	10.5	10.25	6.5	3.0	11.5	5.25	10.25	10.5
	070	2.5	5.0	13.5	4.5	13.0	13.0	5.0	2.5	13.5	4.5	13.0	13.0
WSMH, WSNH	007, 009, 012	5.5	1.5	5.0	3.0	9.5	9.25	1.5	5.5	5.0	3.0	9.25	9.5
	015, 019	1.0	6.0	10.5	3.5	9.5	9.25	6.0	1.0	10.5	3.5	9.25	9.5
	024, 030	1.0	8.0	10.5	5.0	9.5	9.25	8.0	1.0	10.5	5.0	9.25	9.5
	036	1.0	6.0	10.5	6.0	9.5	9.25	6.0	1.0	10.5	5.75	9.25	9.5
	042	1.0	6.5	11.5	5.5	10.5	10.5	6.5	1.0	11.5	5.25	10.5	10.5
	048	3.0	6.5	11.5	5.5	10.5	10.5	6.5	3.0	11.5	5.25	10.5	10.5
	060	3.0	5.0	11.5	4.5	13.0	13.0	5.0	3.0	11.5	4.5	13.0	13.0
WSSH, WSTH	007, 009, 012	8.0	4.0	5.0	3.0	9.5	9.25	4.0	8.0	5.0	3.0	9.25	9.5
	015, 019	1.5	7.5	10.5	4.5	9.5	9.25	7.5	1.5	10.5	4.5	9.25	9.5
	024, 030	2.5	6.0	10.5	6.0	9.5	9.25	6.0	2.5	10.5	5.75	9.25	9.5
	036	3.5	7.5	10.5	6.0	9.5	9.25	7.5	3.5	10.5	5.75	9.25	9.5
	042, 048	3.0	6.5	11.5	5.5	10.5	10.5	6.5	3.0	11.5	5.25	10.5	10.5
	060, 070	2.5	5.0	13.5	4.5	13.0	13.0	5.0	2.5	13.5	4.5	13.0	13.0

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

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

Figure 21: Horizontal Unit Electrical Locations

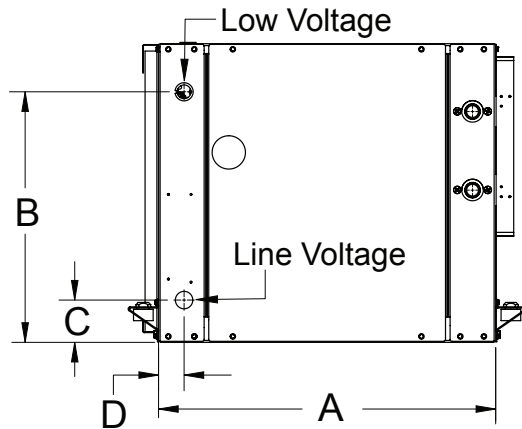


Table 20: Electrical Connections Locations for Figure 21

Unit	Unit Size	A Unit Width	B	C	D
WSCH, WSDH	007, 009, 012	19.0	10.4	2.6	1.6
	015, 019	19.0	15.7	2.7	1.6
	024, 030	20.0	15.9	2.7	1.6
	036, 042	21.5	15.9	2.7	1.6
	048, 060, 070	24.0	17.7	2.7	1.6
WSMH, WSNH	007, 009, 012	19.0	10.4	2.6	1.6
	015, 019	20.0	15.9	2.7	1.6
	024, 030	21.5	15.9	2.7	1.6
	036	23.9	15.9	2.7	1.6
	042	23.9	15.9	2.7	1.6
	048	23.9	17.7	2.7	1.6
	060	23.9	17.7	2.7	1.6
WSSH, WSTH	007, 009, 012	18.9	10.4	2.7	1.6
	015, 019	21.5	15.9	2.7	1.6
	024, 030, 036, 042, 048, 060, 070	24.0	17.7	2.7	1.6

# Field Installed Accessories

## Motorized Isolation Valve & Relay

### Motorized Isolation Valve

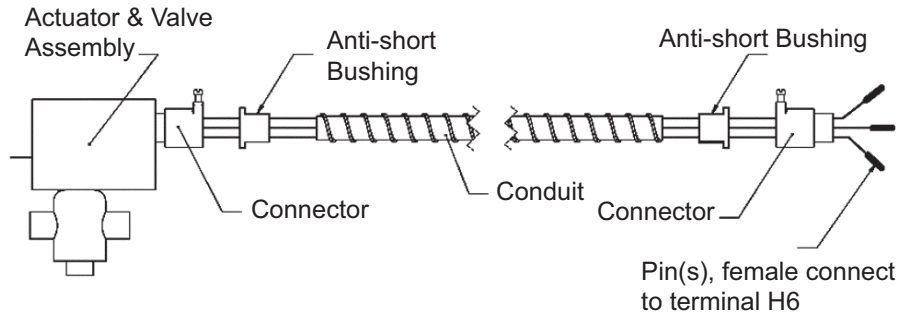
The motorized valve kit is available as a factory-installed or a field-installed option. Wired as shown in Figure 23, the motorized valve will open on a call for compressor operation. The motorized isolation valve actuator (ISO) has both a 24 V power connection and a 24V end switch connection. Valves are 1/2".

1. Install the supplied wire harness into plug H6 on the main control board.
2. Run wires between the ISO actuator and the supplied wire harness ends.
3. Connect N.O. & N.C. actuators as shown on the schematic.
4. 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.

**NOTICE**

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

Figure 22: Normally Opened, Power Closed Motorized Valve



### Pump Request Relay

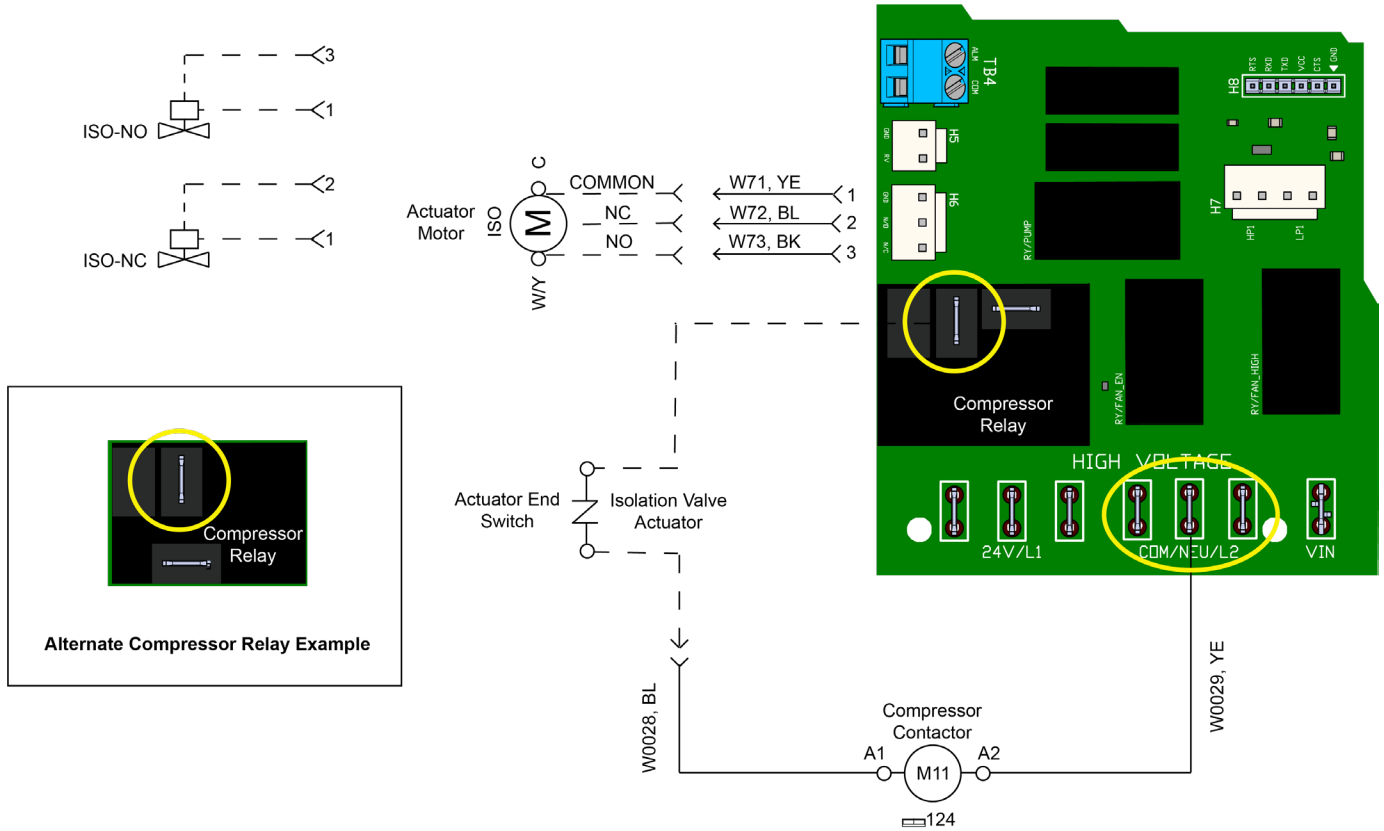
The MicroTech unit controller includes an internal Pump Request Relay connected to terminal H6 with three output connections. See Table 21 for control operation:

The output of the internal pump request relay is 24 VAC. The output is not available when the H6 connection is used to control a motorized valve.

Table 21: Pump Request Relay

Terminal Connection	Signal	Output	Description
H6-1	Common	Ground	Pump Request - Common (Ground) Terminal
H6-2	24 VAC	N.O.	Pump Request - Normally Open (N.O.) Terminal. Energized when cooling or heating demand is required.
H6-3	24 VAC	N.C.	Pump Request - Normally Closed (N.C.) Terminal. Energized when cooling or heating demand is no longer required.

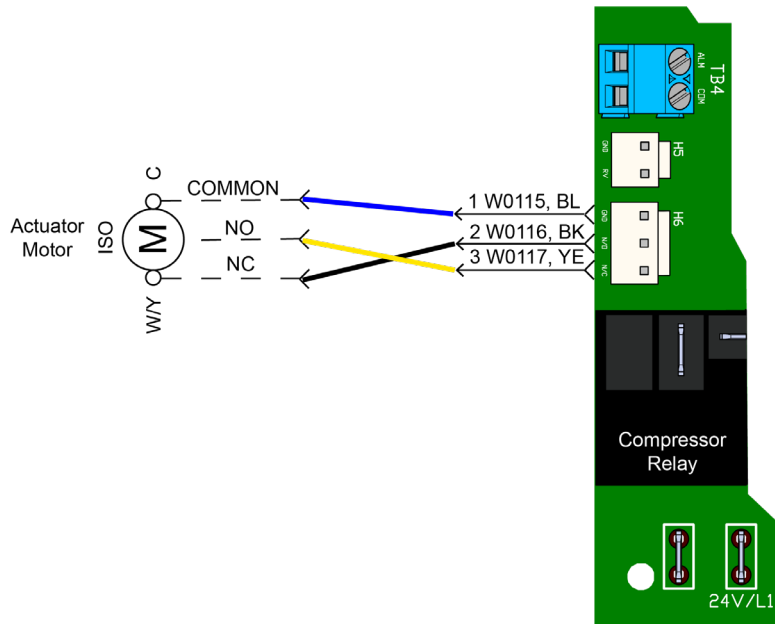
Figure 23: Motorized Valve Wiring



**NOTE 1:** Connectors on valve must be cut off and stripped back and the wires twisted to make connections to the H6 (IV/PR) terminals on the MT2300 controller.

**NOTE 2:** All plumbing connections are made the same, whether or not the unit has valve packages. Plumbing connections must conform with local piping and building codes. The ability to remove the unit in order to perform repairs is imperative.

Figure 24: MT2300 wiring to an existing motorized valve from a previously installed unit with MicroTech III controller



**NOTE:** If reusing a motorized valve on an existing Daikin Applied R-410A unit, the wiring harness for connections 1, 2, and 3 for the R32 product are different. Therefore, the wiring connections (Common, N.O., and N.C.) to the motorized valve must be rewired.

# Electrical

**⚠ WARNING**

All field installed wiring must comply with local and national electrical 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, personal injury, or death. This equipment must be installed by experienced, trained personnel only.

**⚠ WARNING**

Use copper conductors only. Conductor insulation must be rated for a minimum temperature of 167°F (75°C).

**⚠ CAUTION**

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

**Table 22: 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 1:** Three-phase system imbalance shall not exceed 2%.
- NOTE 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.
- NOTE 3:** All 208-230 volt single-phase and three-phase units are factory wired for 208 volt operation. When installing a 208-230 volt unit, ensure the correct wire is connected to the transformer.

## 230 Volt Operation

All 208-230 volt single-phase and three-phase units are factory wired for 208 volt operation. For 230 volt operation, the RED primary lead wire from the transformer must be disconnected from contactor, and replaced with the ORANGE wire from the transformer. See Figure 25.

## Three-Phase Line Voltage (208-230, 460, 575V)

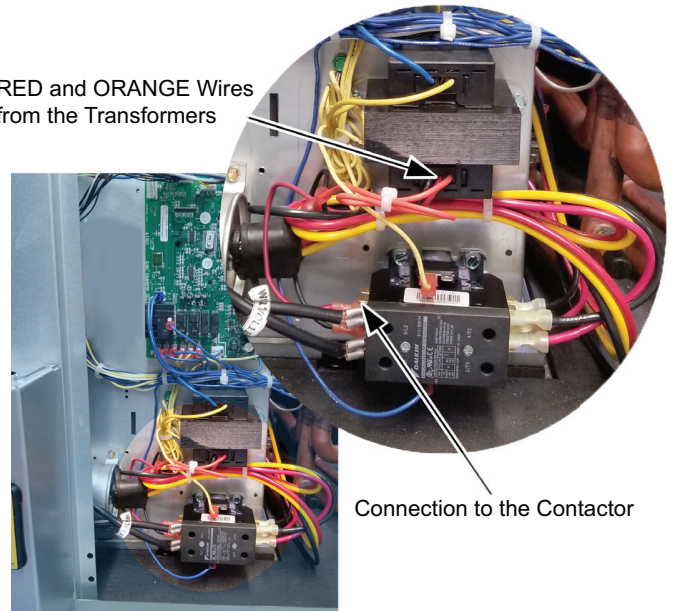
**⚠ DANGER**

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Hazardous voltage can cause serious injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

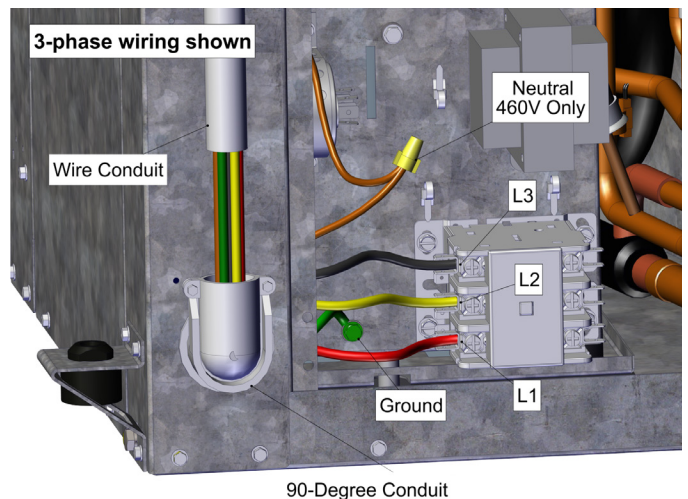
1. Route line voltage supply wiring through the lower 1-1/8" diameter knockout in the left corner post.
2. Wires should extend through the lower left side of the control box. Route wires through wire ties where provided.

3. Remove and discard the factory provided stripped wire leads from the left side unit contactor screw terminals (not shown).
4. Connect the field supplied wires to the left side contactor screw terminals as shown in Figure 26.
5. Connect ground wire to provided (green) ground screw.
6. Twist neutral wires and wire nut (460V units only).

**Figure 25: For 230 Volt Operation, Disconnect the RED Transformer Wire at the Contactor and Replace with the ORANGE Wire**



**Figure 26: Route Line Voltage Wires to Terminal Screws**



**NOTE:** Units without constant CFM ECM will not include a neutral conductor. For clarity, not all unit wires are shown in the unit line voltage connection area.

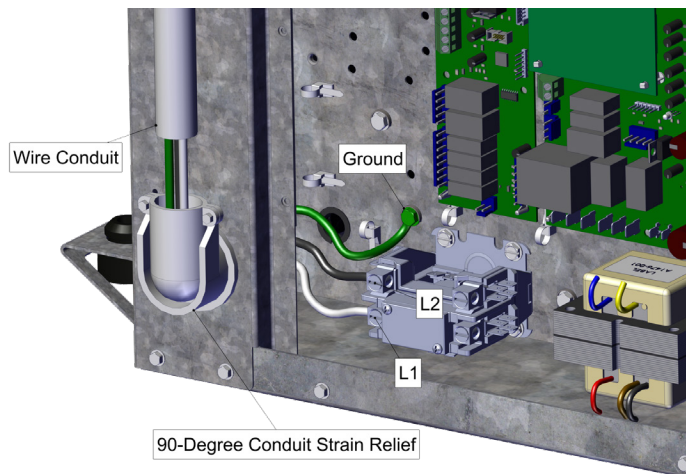
## Single Phase Line Voltage (115, 208-230, 265V)

### **⚠ DANGER**

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Hazardous voltage can cause serious injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

1. Route line voltage supply wiring through the lower 1-1/8" diameter electrical knockout in the left corner post.
2. Route wires through wire ties where provided.
3. Connect the field supplied wires to the left side contactor screw terminals as shown in [Figure 27](#).
4. Secure ground wire to (green) ground screw.

**Figure 27: Line Voltage Wiring Route to Wire Connections**



## Line Voltage Electrical Connections with Disconnect – 115-575V

### **⚠ DANGER**

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Hazardous voltage can cause serious injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

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 28](#).

### **NOTICE**

The disconnect location may vary depending on the return air handling. See [Figure 28](#). Right-hand unit shown, with switch mounted on the opposite corner post from return air.

460V units with constant CFM ECM require a neutral conductor. See number bubble "6" in [Figure 28](#).

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, if required.
7. Replace cover and secure with screws.

**Figure 28: 460V Wiring with Neutral Wire (Constant CFM ECM Only) to The Non-Fused Disconnect Switch**

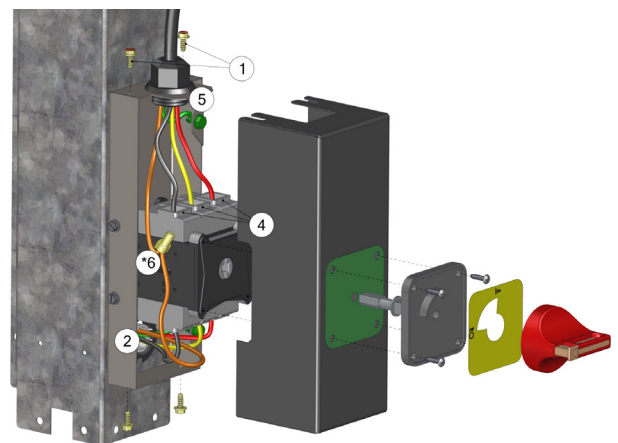




Figure 29: Optional Non-Fused Disconnect Switch Location and Dimensions

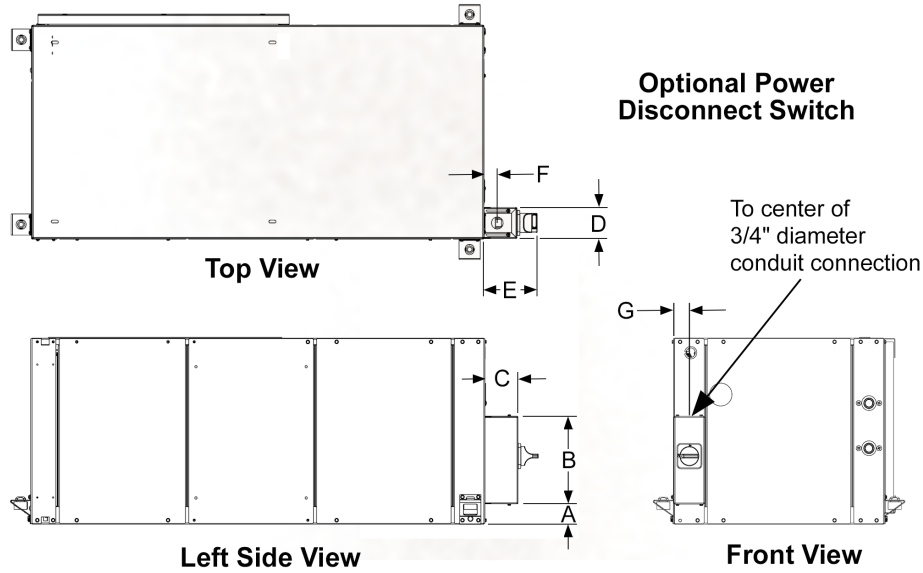


Table 23: Optional Non-Fused Disconnect Switch Location and Dimensions

Unit	A	B	C	D	E	F	G
WSCH, WSDH	1.75	8.1	3.1	3.0	4.7	1.0	1.5
WSMH, WSNH	1.75	8.25	3.0	3.0	4.7	1.0	1.5
WSSH, WSTH	1.75	8.25	3.0	3.0	4.7	1.0	1.5

## Low Voltage Wire Connections

### NOTICE

Never install relay coils in series or parallel with the thermostat inputs.

### NOTICE

Units equipped with dehumidification control require installation of a factory supplied return air sensor connected to I/O H4-3/4 terminal. See Figure 50 on page 50 for details.

1. Route the field-supplied low voltage wiring through the upper knockout in the left corner post as shown in Figure 21.
2. Secure the low voltage wire connections to the terminals shown in Figure 30 and Figure 31. Refer to "Typical Connections for Thermostats & Temperature Sensors Applications" on page 50 for I/O Expansion Module terminal TB1 connection.

Figure 30: Terminal Connections TB1 (Thermostat Control) and TB2 (Sensor Control) on the MicroTech Board

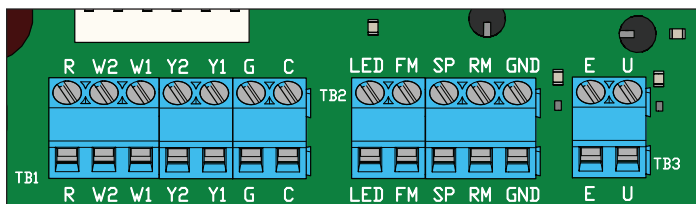
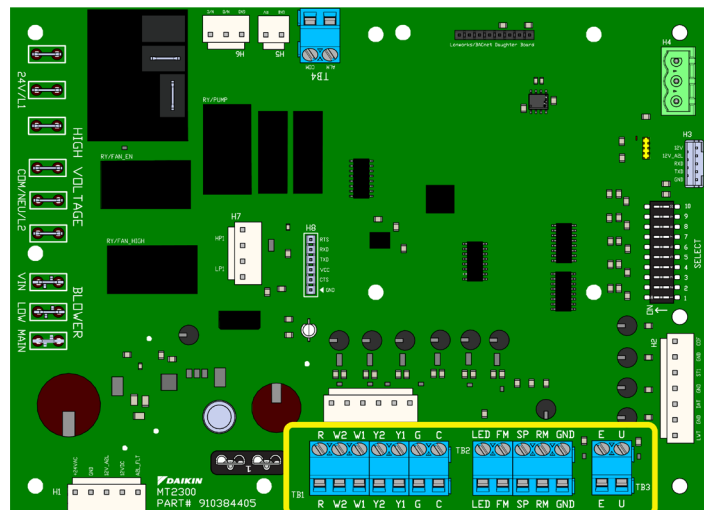


Figure 31: Terminal Connection Locations on the MicroTech Board



# Control Wiring Schematics

Figure 32: MicroTech Unit Control with PSC Motor - 208-230, 265, 460, 575 Volt

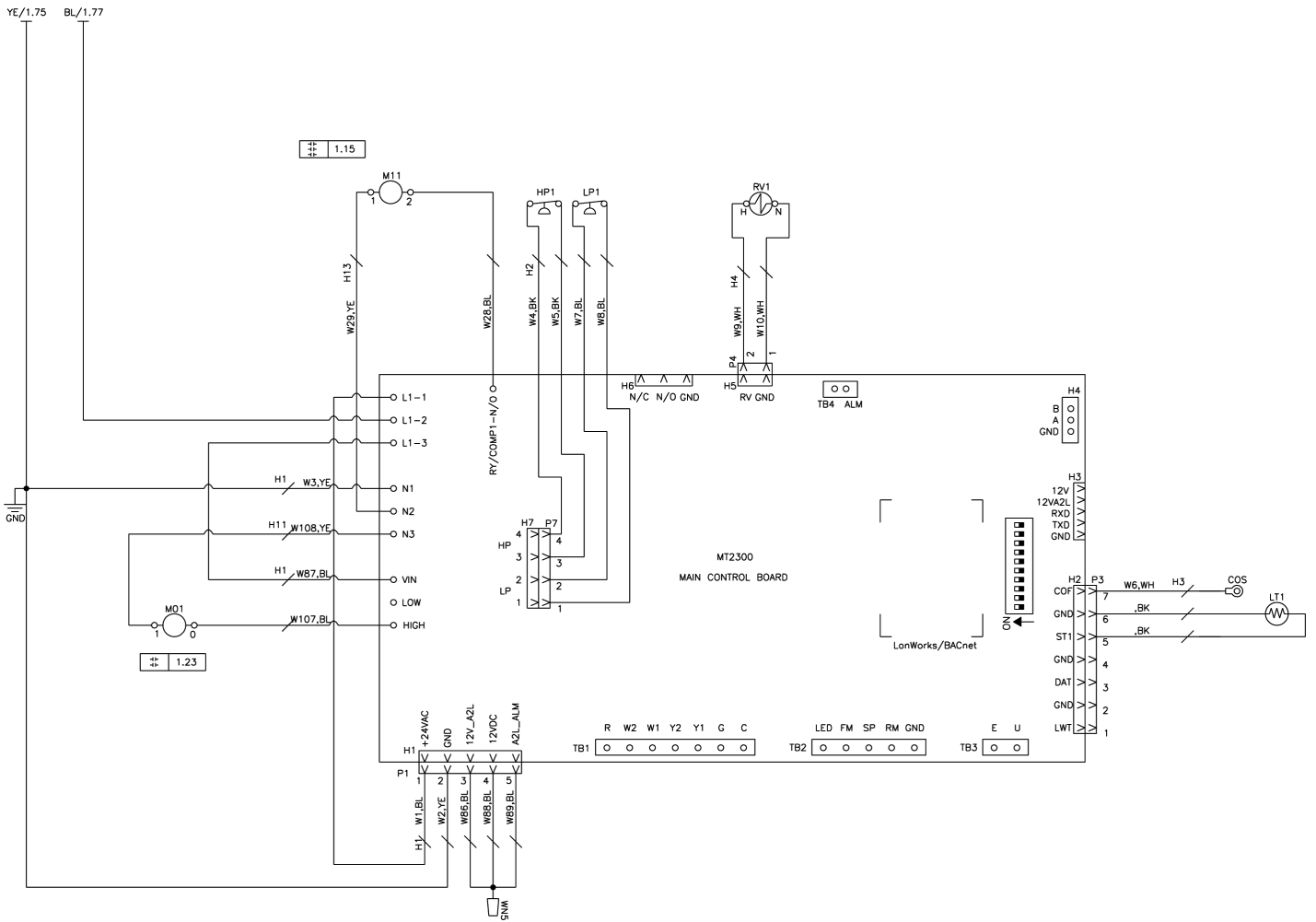


Figure 33: MicroTech Unit Control with Constant Torque ECM - 115 Volt - No Options

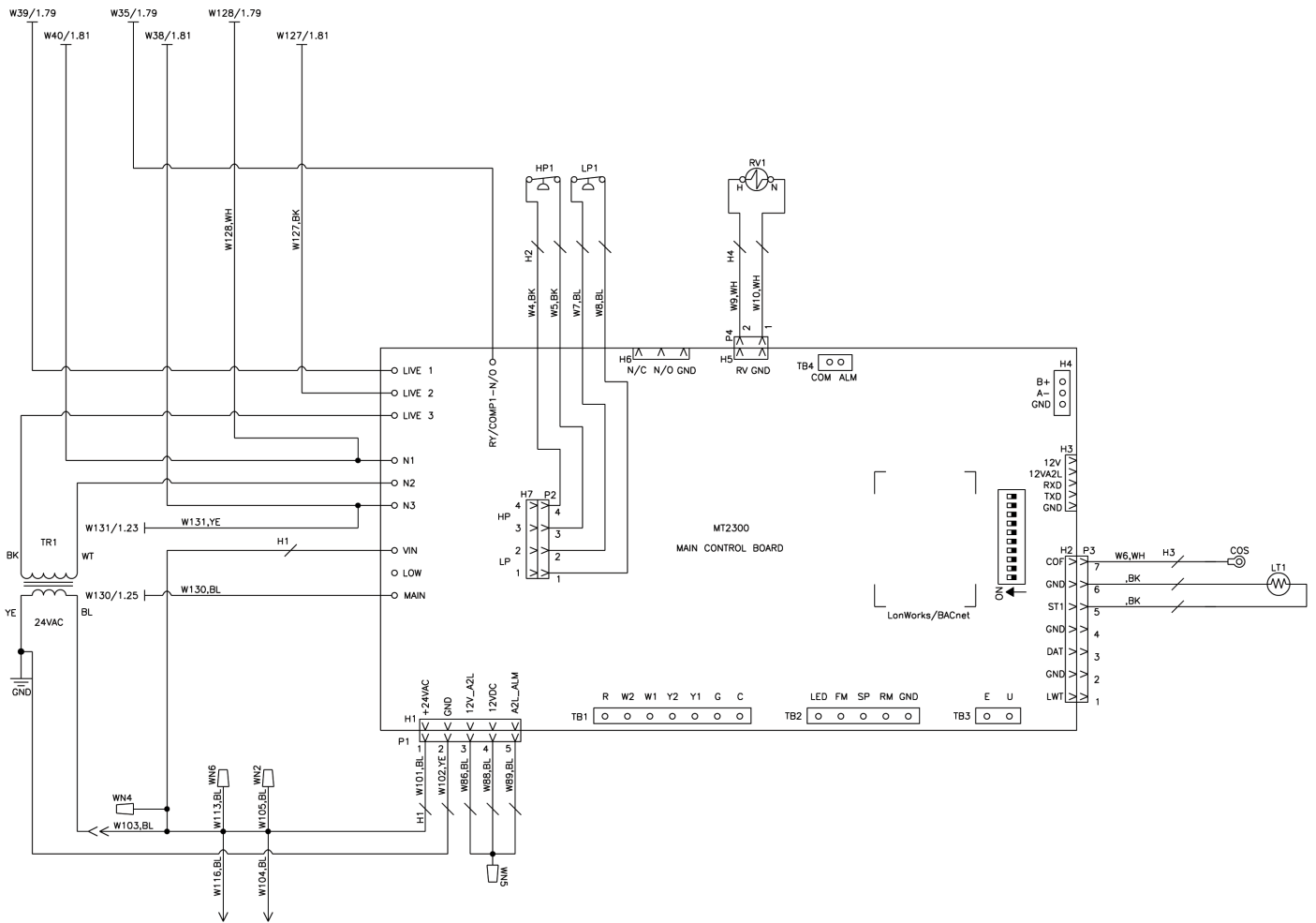


Figure 34: MicroTech Unit Control with Constant Torque ECM with Waterside Economizer

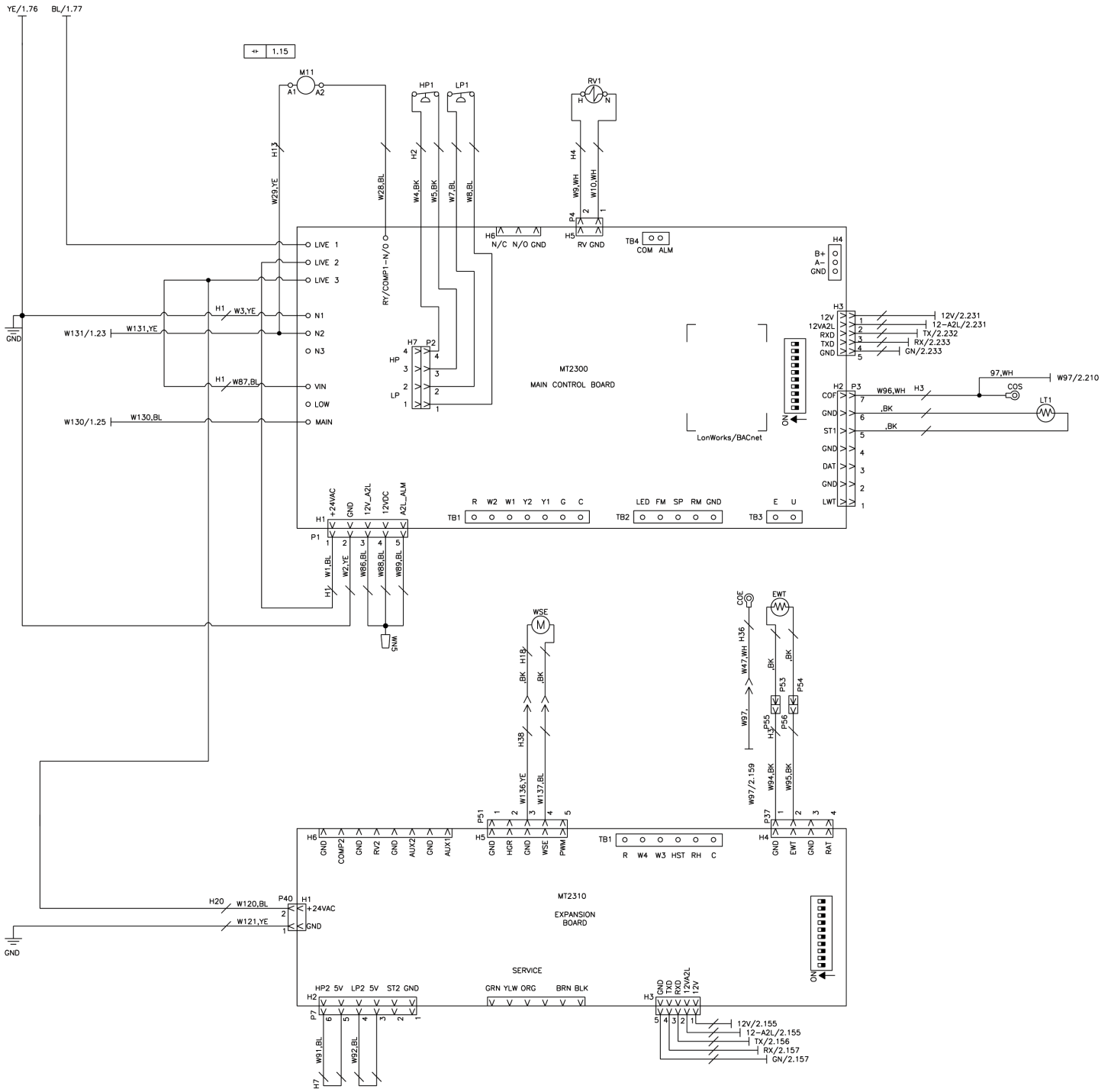


Figure 35: MicroTech Unit Control with Constant CFM ECM with Hot Gas Reheat

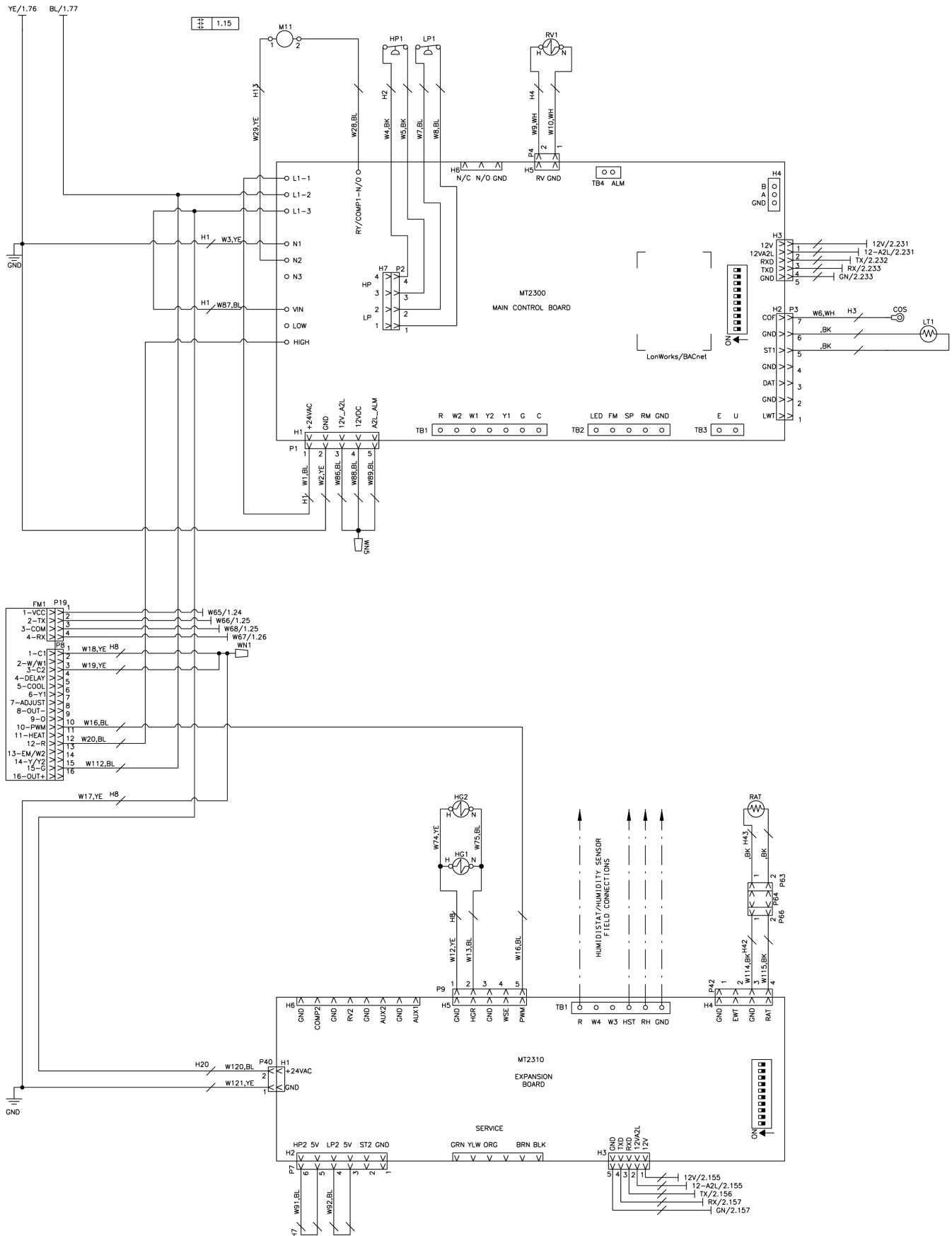


Figure 36: MicroTech Unit Control with Constant CFM ECM - 2-Stage Unit

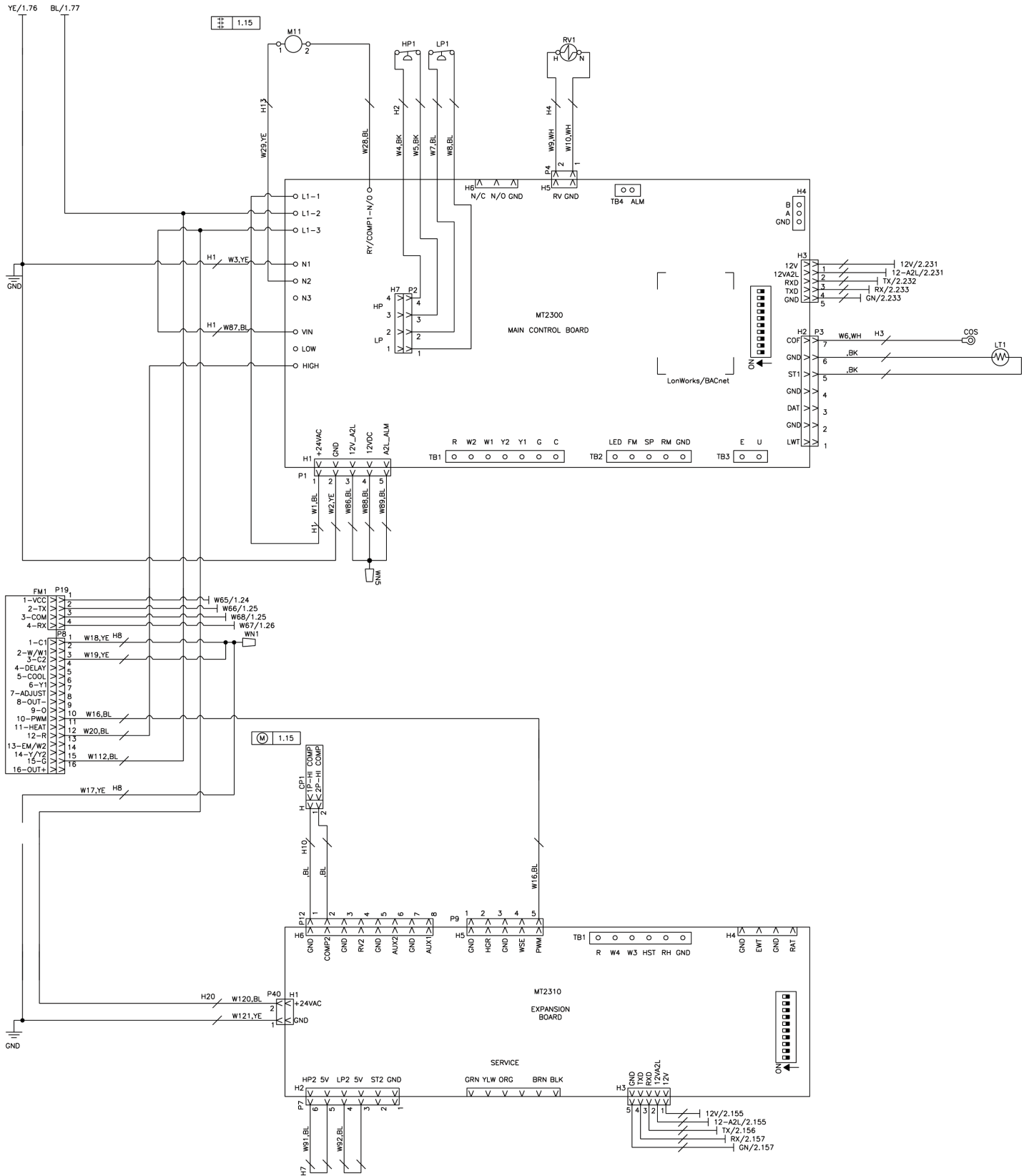


Figure 37: MicroTech Unit Control with Constant CFM ECM with Electric Heat Control Wiring

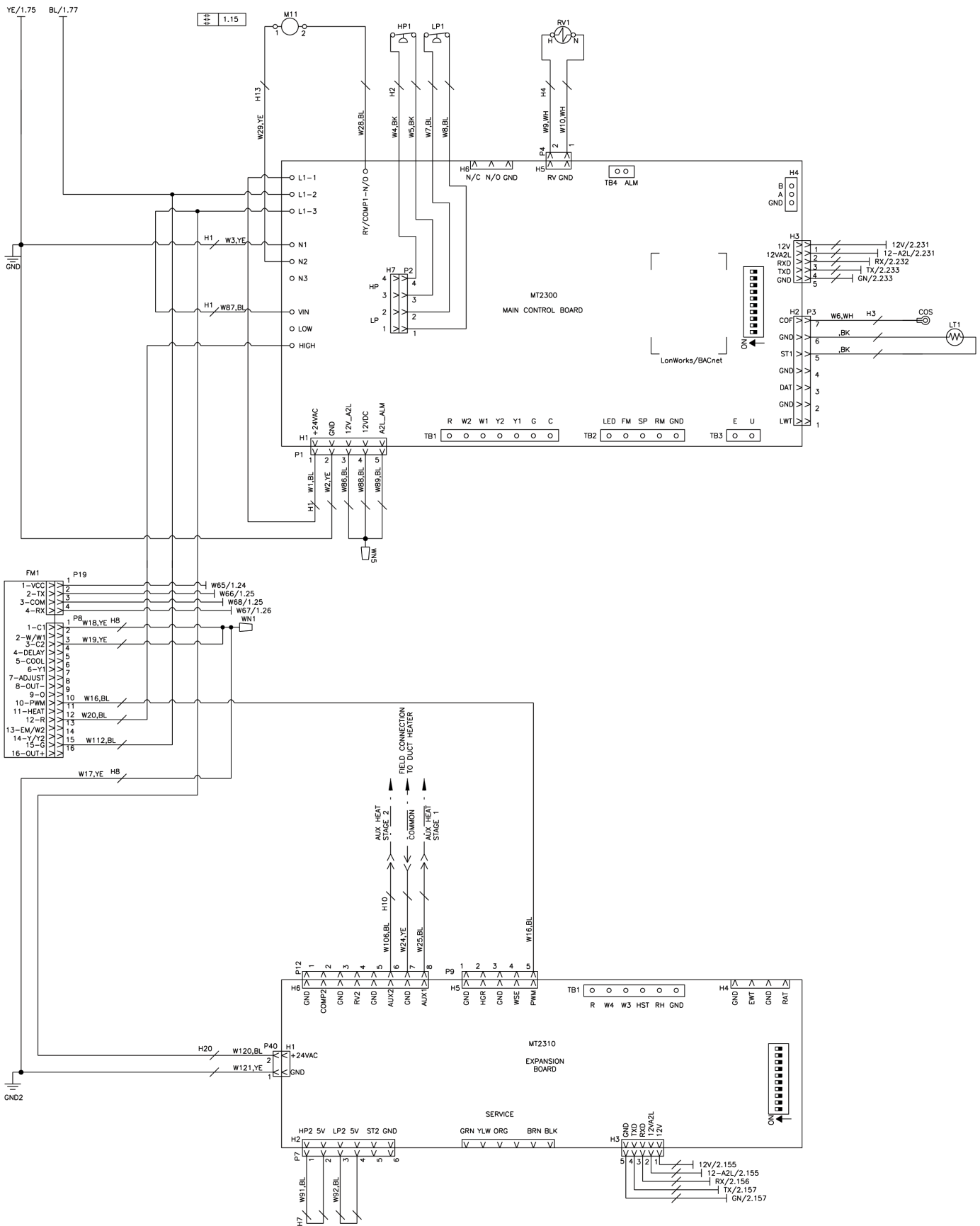
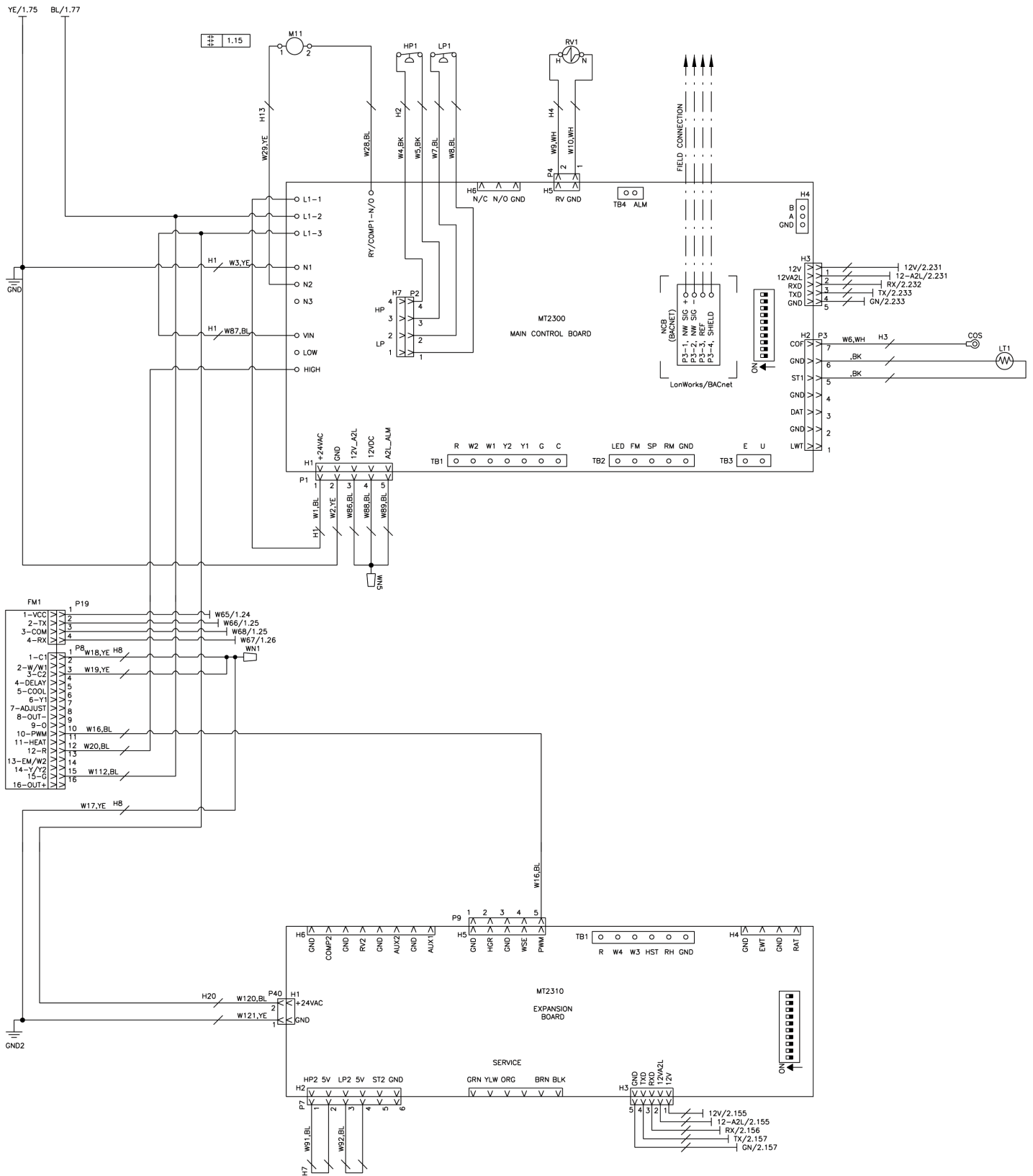


Figure 38: MicroTech Unit Control with Constant CFM ECM with BACnet Communication Module





# Line Voltage Wiring Schematics

Figure 39: 115V/60Hz/1Ph with PSC Motor

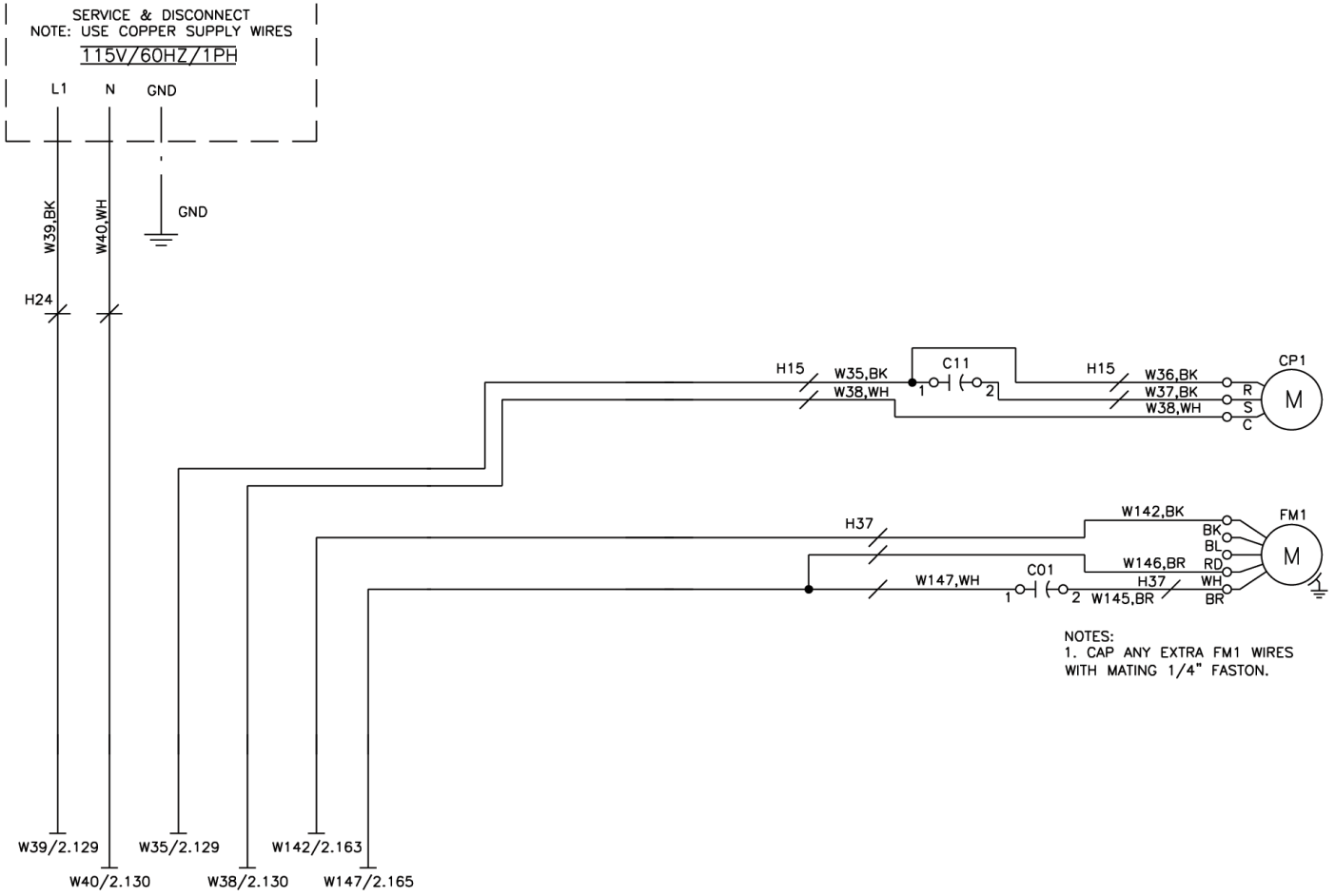


Figure 40: 115V/60Hz/1Ph with Constant Torque ECM

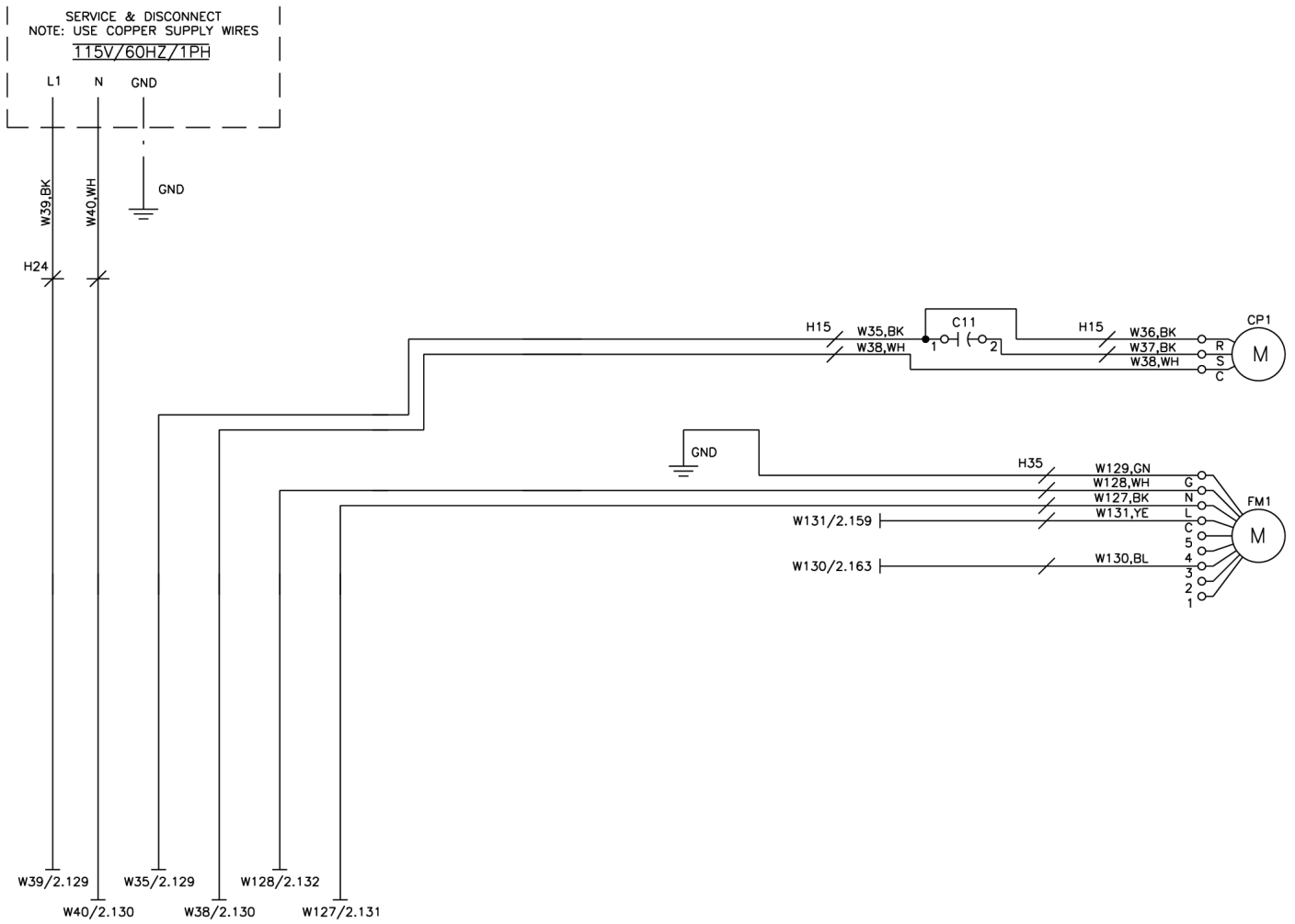


Figure 41: 265V/60Hz/1Ph with Constant Torque ECM

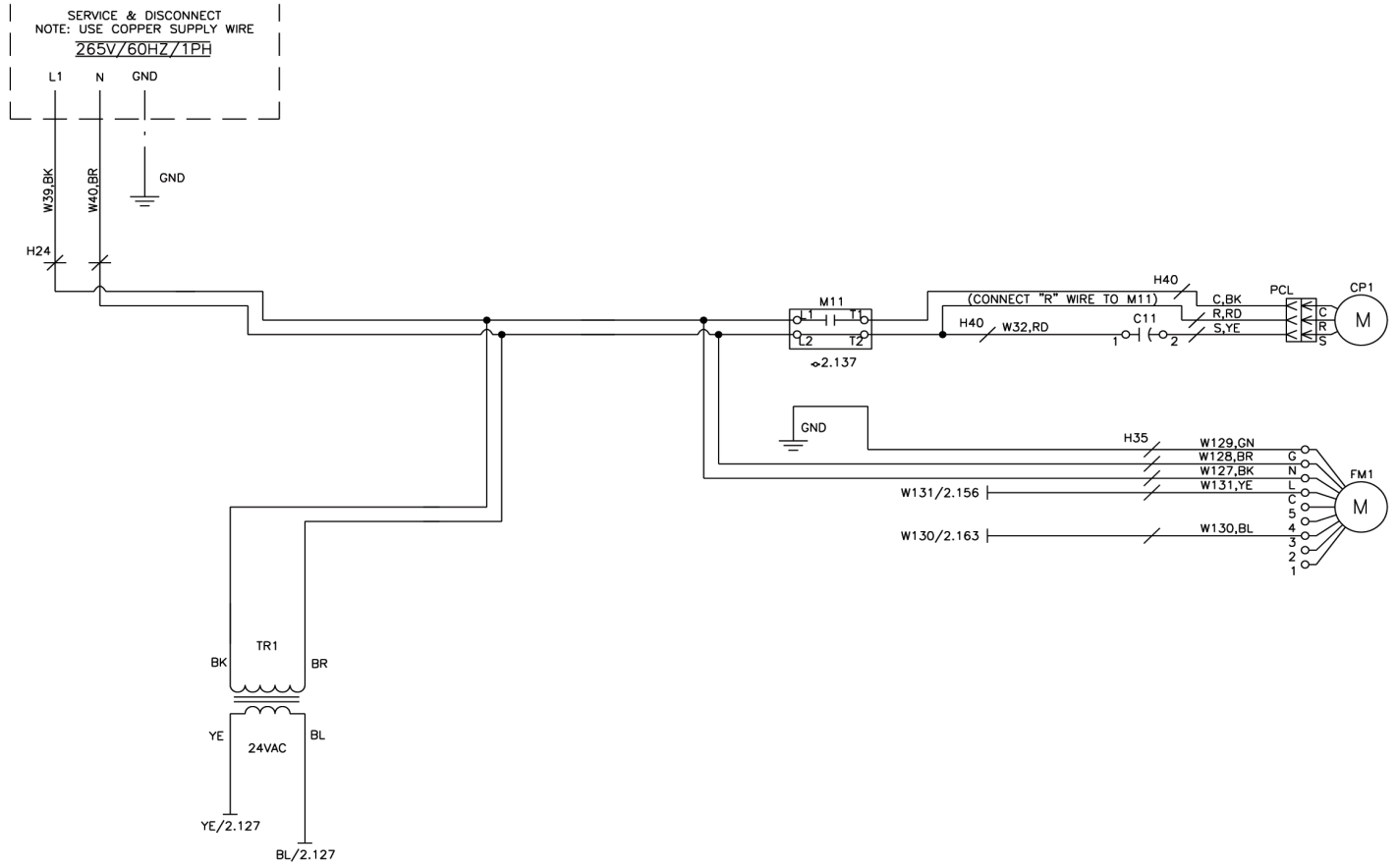


Figure 42: 208-230V/60Hz/3Ph with Constant Torque ECM

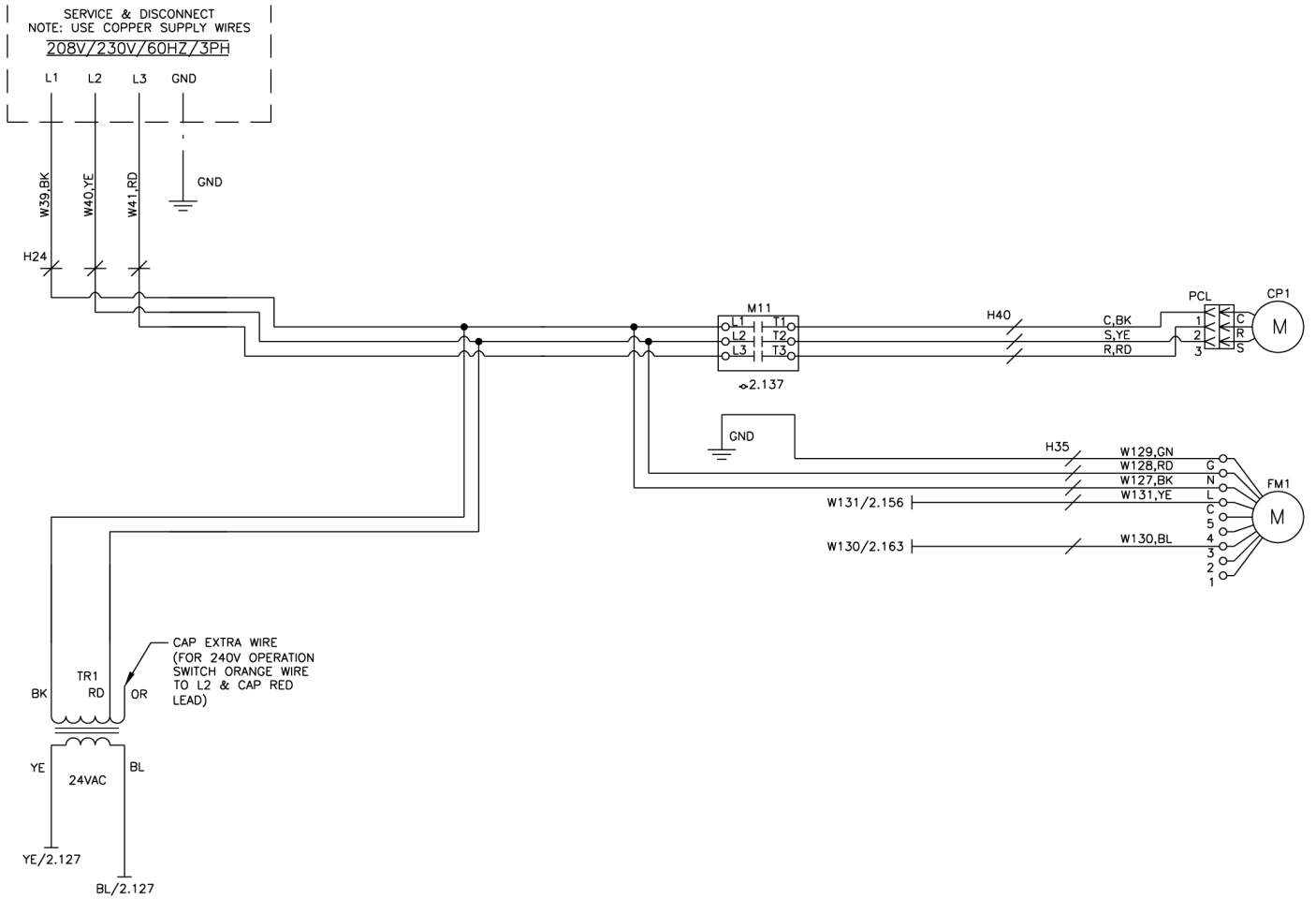


Figure 43: 265V/60Hz/1Ph, 208-230V/60Hz/1Ph with PSC Motor

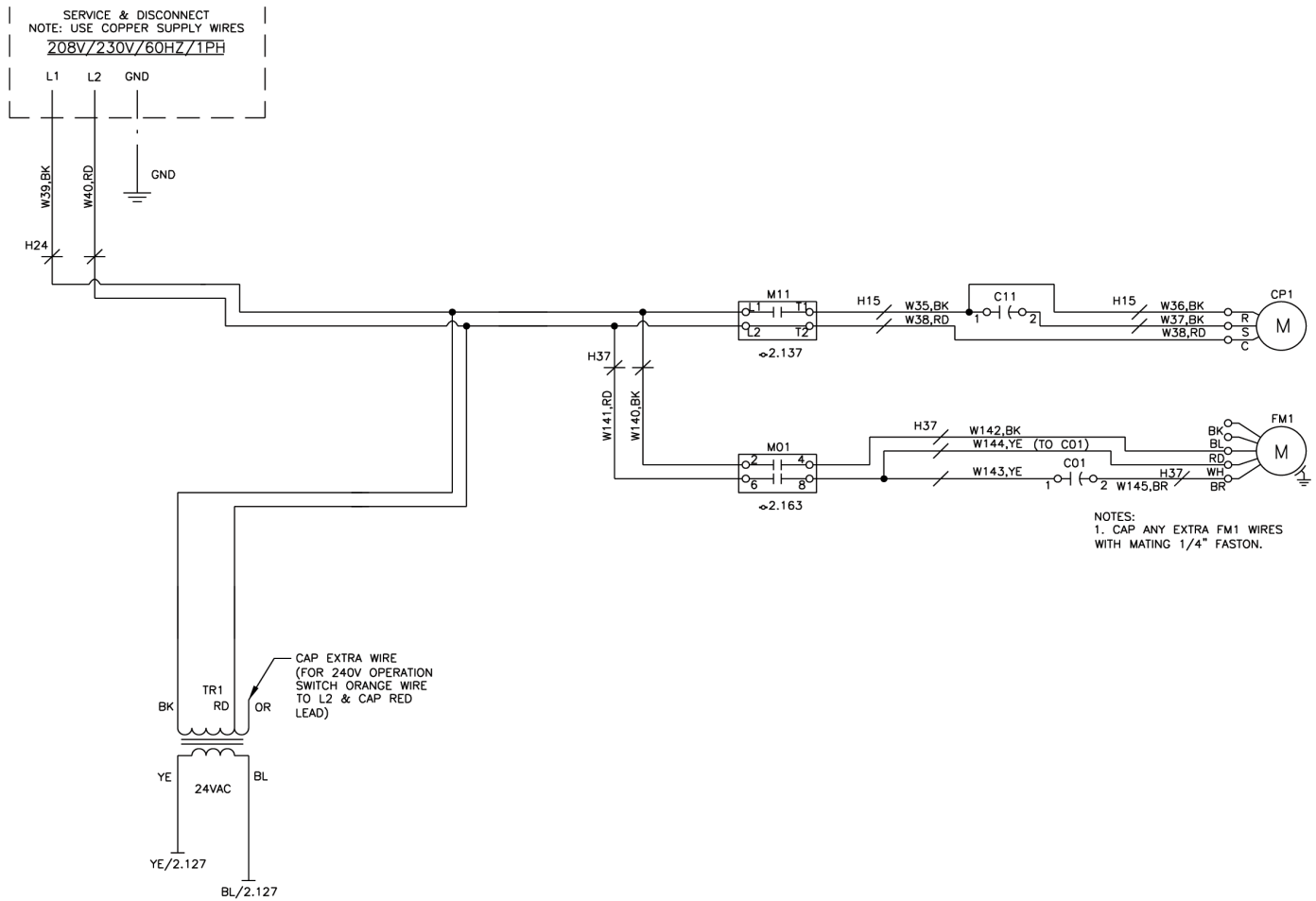


Figure 44: 460V/60Hz/3Ph, 575V/60Hz/3Ph, 208-230V/60Hz/3Ph with PSC Motor

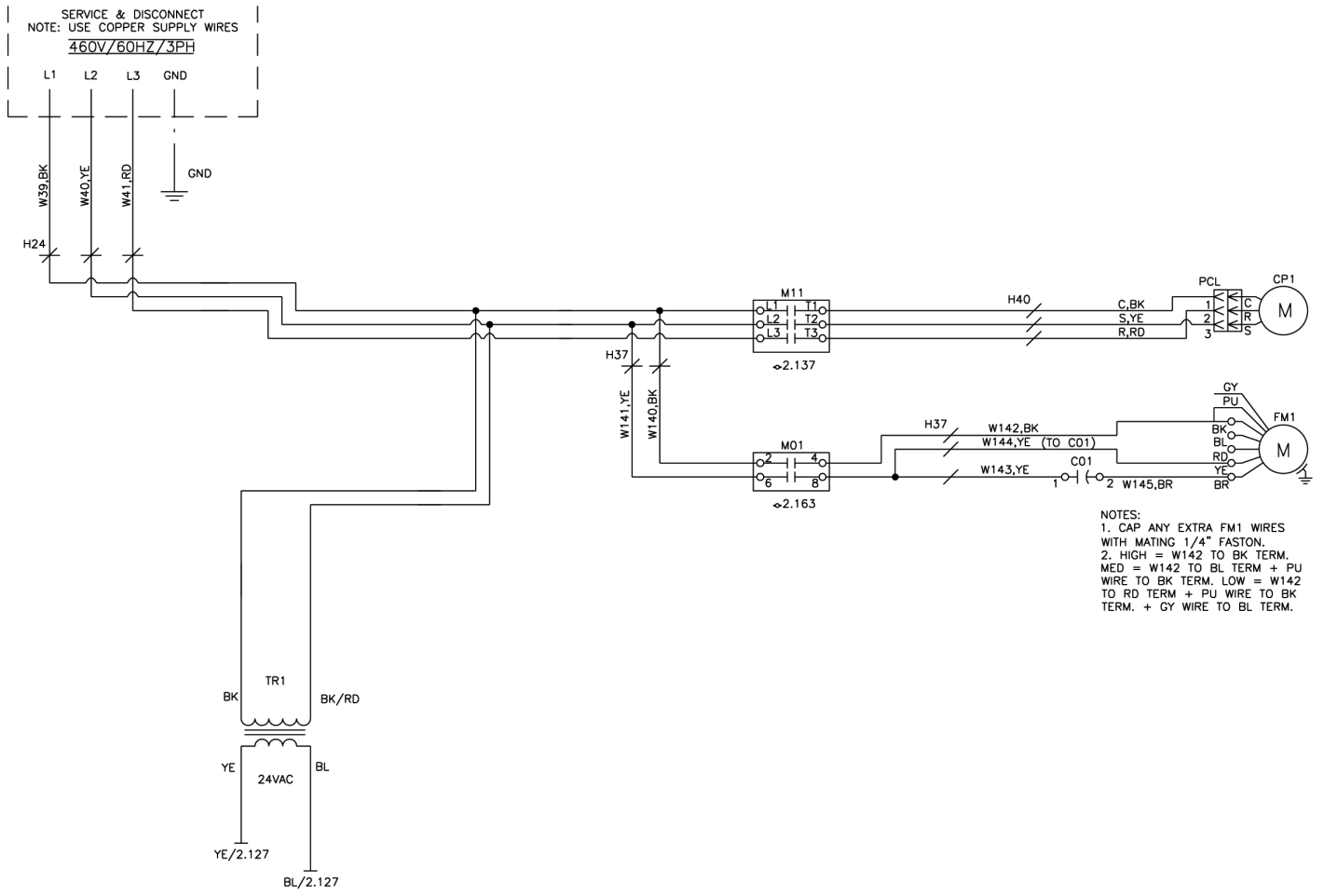


Figure 45: 208-230V/60Hz/3Ph with Constant CFM ECM 2-Stage

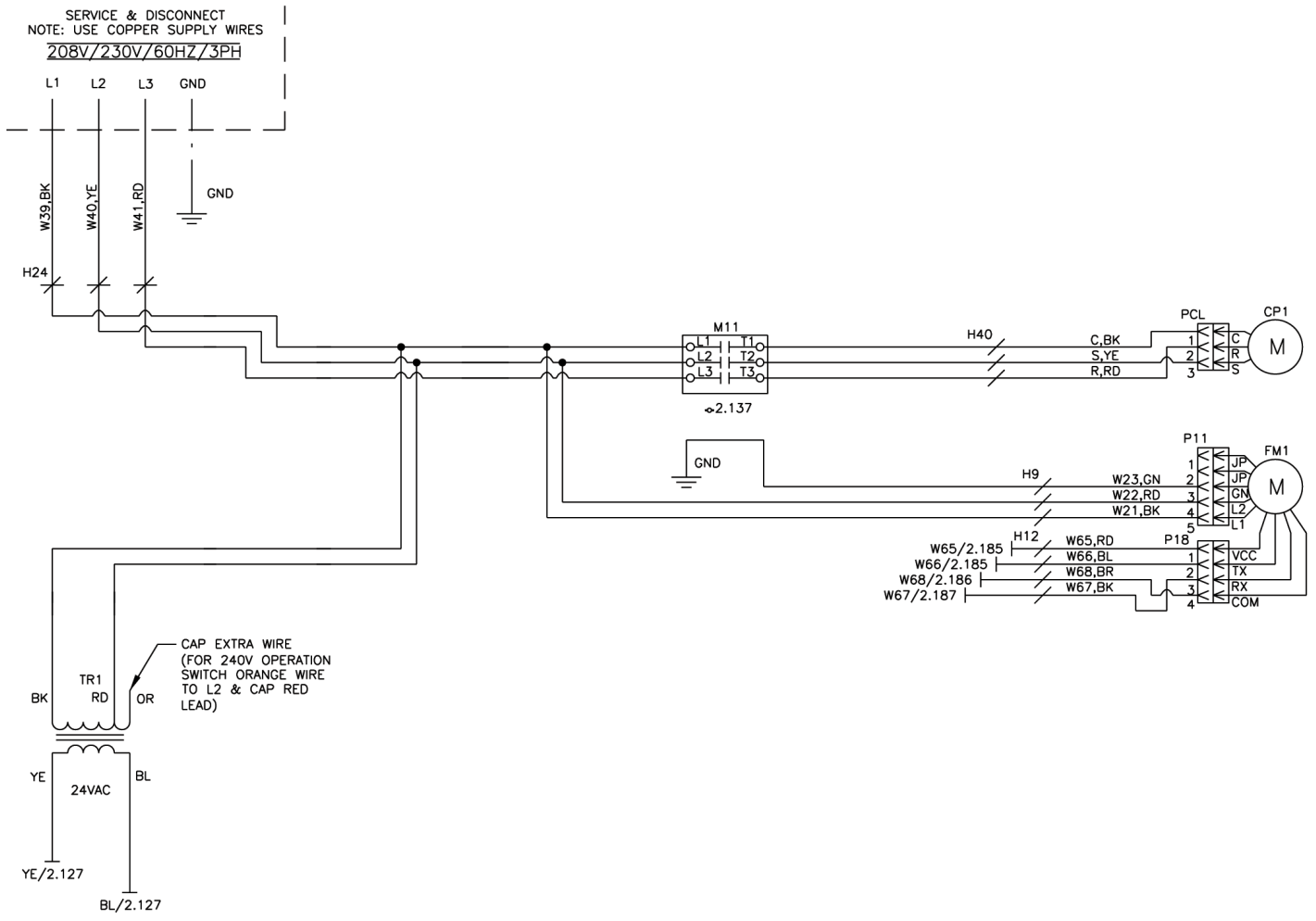
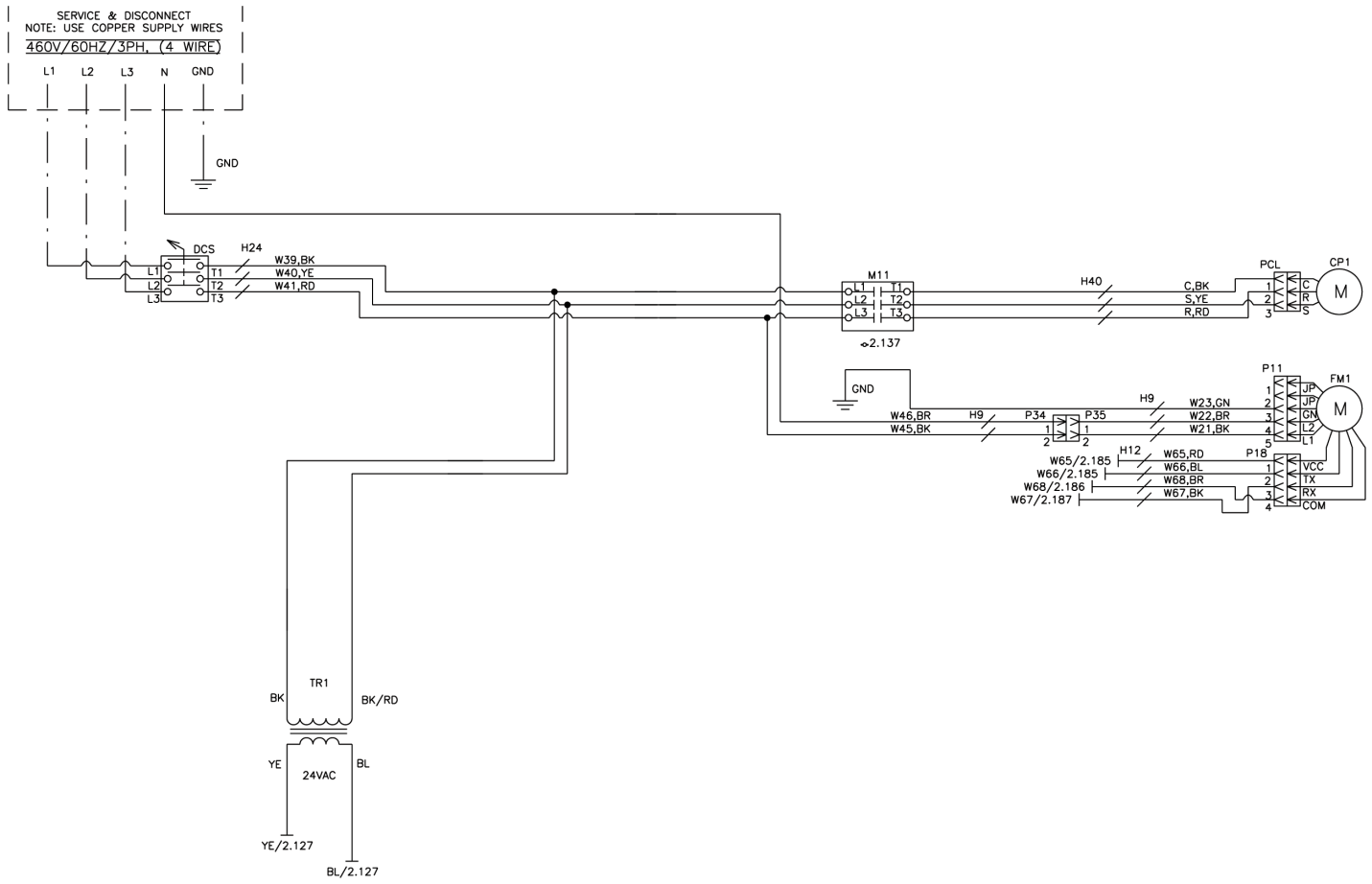


Figure 46: 460V/60Hz/3Ph with Constant CFM ECM with Electric Heat Control





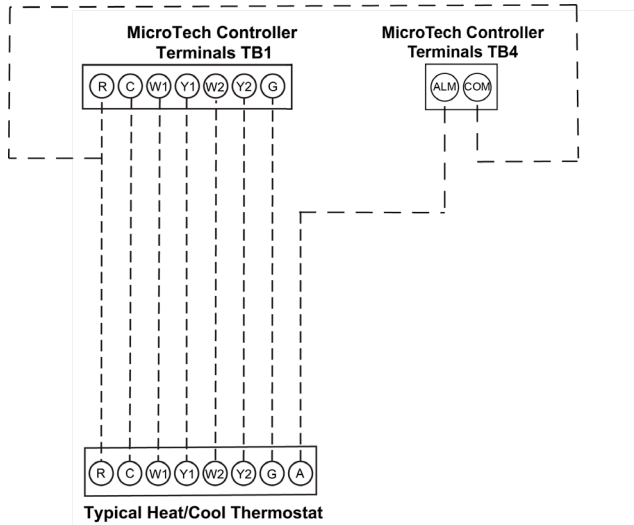
## Wiring Schematics Legend for "Control Wiring Schematics"

LEGEND			
<b>ADR</b>	Aquastat, Discharge Refrigerant	<b>M11-1</b>	Compressor 1, 2 Contactor
<b>AHL</b>	Aquastat High Limit	<b>M70,71</b>	Secondary Heat Contactor
<b>AN1,2</b>	LED Annunciator, Circuit 1, 2	<b>MCB</b>	Main Control Board
<b>C01-04</b>	Fan Motor 1-4 Capacitor	<b>NCB</b>	Network Control Board
<b>C11-12</b>	Compressor 1,2 Capacitor	<b>OLP</b>	Overload Protector - Compressor Motor
<b>CP1,2</b>	Compressor 1, 2	<b>P1-^</b>	Wire Plug
<b>COE</b>	Condensate Overflow Protection Sensor - WSE	<b>PCL</b>	Wire Plug Assy - Compressor Power
<b>COS</b>	Condensate Overflow Protection Sensor	<b>PCL2</b>	Wire Plug Assy - 2 Stage Comp Ctrl
<b>DAT</b>	Discharge Air Temperature Sensor	<b>PDS</b>	Pressure Differential Switch
<b>DCS</b>	Disconnect Switch	<b>PL1,2</b>	Loop Pump 1,2
<b>DSH</b>	Desuperheater Pump	<b>R15</b>	Relay, Field Contacts, Alarm Output
<b>DSS</b>	Desuperheater Shutoff Switch	<b>R20</b>	Relay, Loop Pump
<b>EB1</b>	Expansion Control Board 1	<b>R25</b>	Relay, Hot Gas Reheat
<b>EB2</b>	Expansion Control Board 2 - Fan Speed Ctrl	<b>RAT</b>	Return Air Temperature Sensor
<b>EH1</b>	Electric Heat	<b>RV1,2</b>	Reversing Valve 1, 2
<b>EWT</b>	Entering Water Temperature Sensor	<b>TB1</b>	Terminal Block, Line Voltage
<b>FM1-4</b>	Fan Motor 1-4	<b>TB2</b>	Terminal Block, 24V
<b>FU1-4</b>	Fuse 1-4	<b>TB3</b>	Terminal Block, EH1 Line Voltage
<b>GND</b>	Ground	<b>TR1</b>	Transformer - Control
<b>H1-^</b>	Wire Harness	<b>TR2</b>	Transformer - Fan Motor
<b>HG1,2</b>	Hot Gas Reheat Valve Actuator	<b>TR3</b>	Transformer - Loop Pump
<b>HP1,2</b>	High Pressure Switch 1, 2	<b>TSL</b>	Thermostat, Wireless
<b>HUM</b>	Humidistat Sensor	<b>TSW</b>	Thermostat, Wired (Unit Mounted)
<b>HYH</b>	Hot Water Heat Valve Actuator	<b>W0001</b>	Wire
<b>ISO</b>	Water Flow Isolation Valve Actuator	<b>W1-^</b>	Wire
<b>LAT</b>	Leaving Air Temperature Sensor	<b>WH001</b>	Wire Harness
<b>LP1,2</b>	Low Pressure Switch 1, 2	<b>WN1</b>	Wire Nut
<b>LT1,2</b>	Compressor Suction Line Temperature Sensor 1, 2	<b>WN1-^</b>	Wire Nut
<b>LWT</b>	Leaving Water Temperature Sensor	<b>WP001</b>	Wire Plug
<b>M01-04</b>	Fan Motor Contactor 1-4	<b>WSE</b>	Waterside Economizer Actuator

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

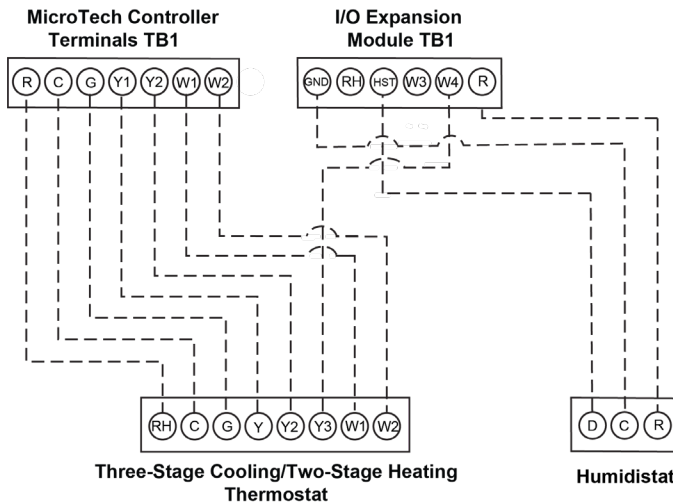
# Typical Connections for Thermostats & Temperature Sensors Applications

**Figure 47: Wiring Example of Typical Heat/Cool Thermostat Connections**



**NOTE:** For single stage operation, wire Y1 from thermostat to Y2 terminal on the MicroTech control board.

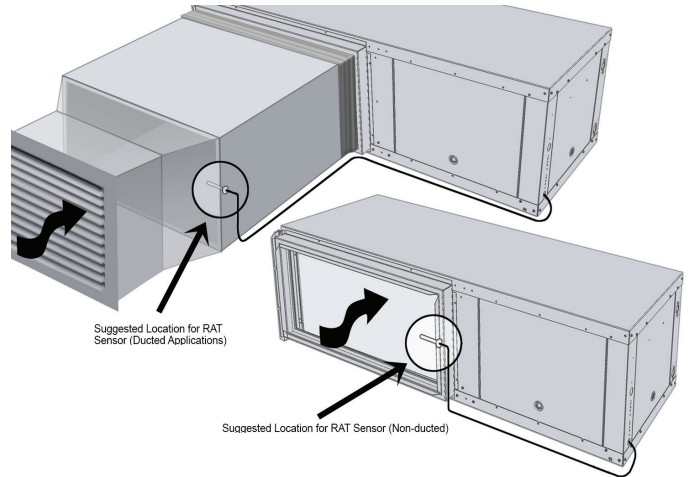
**Figure 48: Wiring Example for Three-Stage Thermostat with Waterside Economizer and Hot Gas Reheat**



**NOTE 1:** For dehumidification with waterside economizer applications, the W4 connection On I/O Expansion Module is used as the third stage of cooling and to achieve rated capacity.

**NOTE 2:** W4 connection on MicroTech Controller should be used to achieve rated capacity.

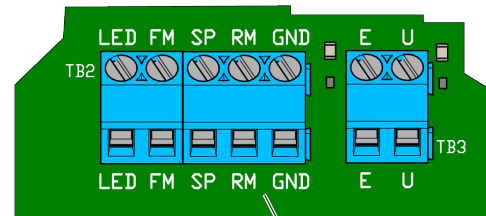
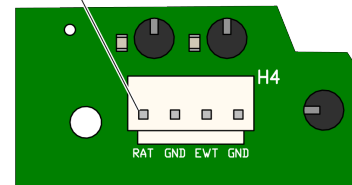
**Figure 49: Return Air Temperature Sensor (RAT) locations**



**Figure 50: Units Equipped with Dehumidification and Thermostat Control**



H4-4 Return Air Temp (RAT) for units with the I/O Expansion Board



TB2 RM and GND on the main MicroTech board

**NOTE 1:** For units with the I/O expansion board, the factory supplied return air sensor (RAT) connects to I/O H4-3/4 terminal. For units without an I/O expansion board, the RAT can be wired to the RM and GND inputs of TB2 located on the main MicroTech board.

**NOTE 2:** If connecting the RAT to the room sensor's input, note that the BACnet will register a reading for local space temperature instead of return air temperature.

Figure 51: Basic Room Sensor Wiring

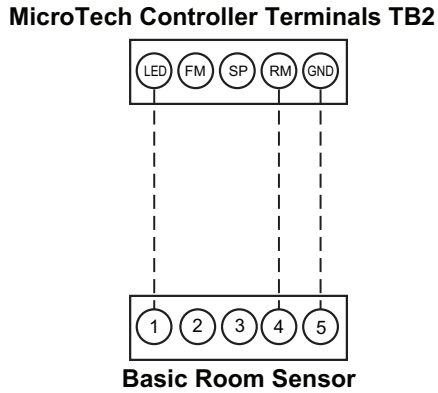


Figure 52: Example Wiring of SmartSource MicroTech Board to Basic Temperature Sensor Wiring

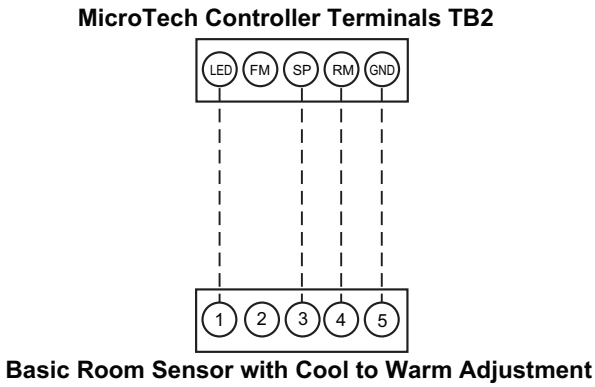


Figure 53: Room Sensor with Temperature Adjustment Wiring

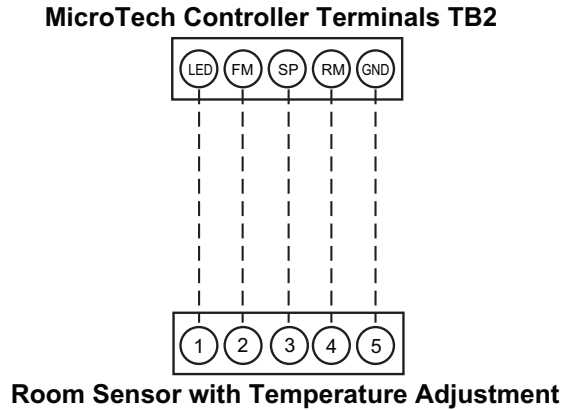
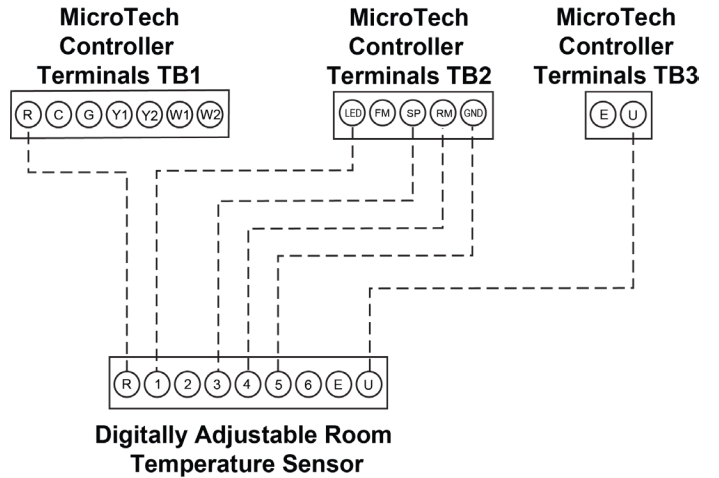
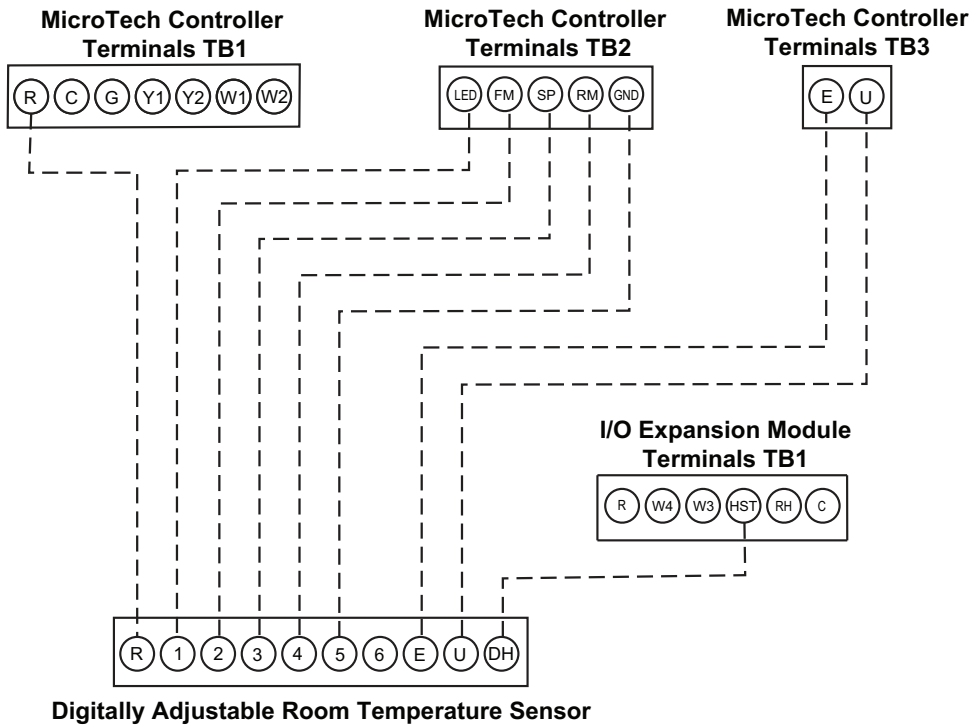


Figure 54: Digitally Adjustable Room Temperature Sensor Wiring



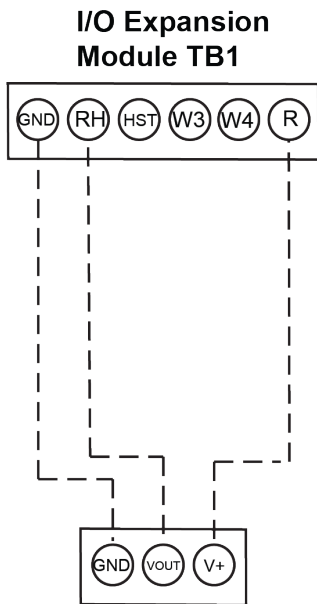
**Figure 55: Digitally Adjustable Room Temperature and Humidity Sensor Wiring**



**Digitally Adjustable Room Temperature Sensor**

**NOTE:** Terminal TB1 is used for optional dehumidification operation.

**Figure 56: Analog Humidity Sensor Wiring**



**Analog Relative Humidity Sensor**

**NOTE:** Analog humidity sensors are intended to be used in conjunction with a building management system to allow monitoring of relative humidity levels and adjustment of relative humidity setpoints for dehumidification. For standalone controller applications, a humidistat is recommended.

# Operation

## 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 68.

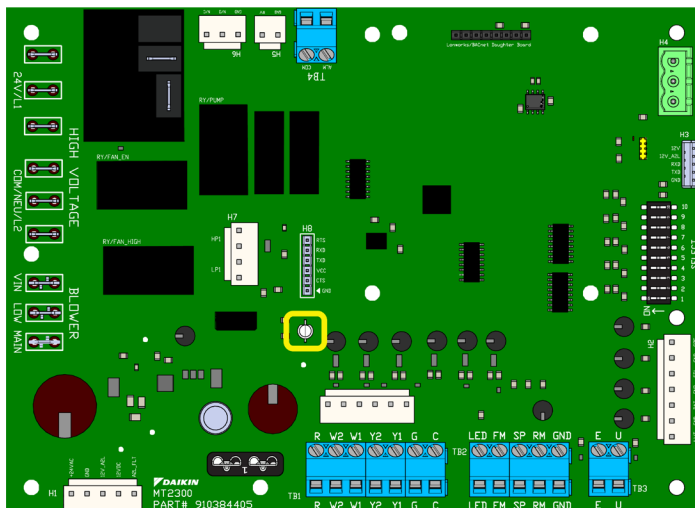
## MT2300 Board LED Indicator

When the unit controller is communicating a certain fault or mode, the LED indicator will flash a designated pattern or sequence. See Figure 57 for the location of the MT2300 board LED indicator. Table 24 gives a description of the LED activity. Refer to OM 1364 for additional information.

Table 24: MT2300 Board LED Indicator Sequence

LED Activity	Type	Color	Description
1 Flash	Mode	Green	No Call for Heating/Cooling/Dehumidification
2 Flash	Mode	Green	Call for Cooling
3 Flash	Mode	Green	Call for Heating
4 Flash	Mode	Green	Call for Fan Only

Figure 57: LED Indicator on MT2300 Board



### Check as completed:

**NOTICE**

To prevent compressor cycling and all compressors from starting up together after loss of power, the required minimum on/off time default is 300 seconds plus the random restart of 0 to 60 seconds.

- 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.  
Check the unit controller LED indicator for "Fan Only" mode operation.
- 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.
- Check the unit controller LED indicator for "Cool" mode operation.
- 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. 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).
- Check the unit controller LED indicator for "Heat" mode operation.
- 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:
  - Is supply voltage to the machine compatible?
  - Is thermostat type appropriate?
  - Is thermostat wiring correct?
- If the unit operates but stops after a brief period:
  - Is there proper airflow? Check for dirty filter, incorrect fan rotation (3-phase fan motors only), or incorrect ductwork.
  - Is there proper water flow rate within temperature limits? Check water balancing; back flush unit if dirt-clogged.
- Check for refrigerant piping rubbing against cabinet or other piping causing vibration. Check fan wheels, set screws, shaft, etc.

## Controls

**Table 25: MicroTech 2300 Unit Controller Connector and Terminal Descriptions**

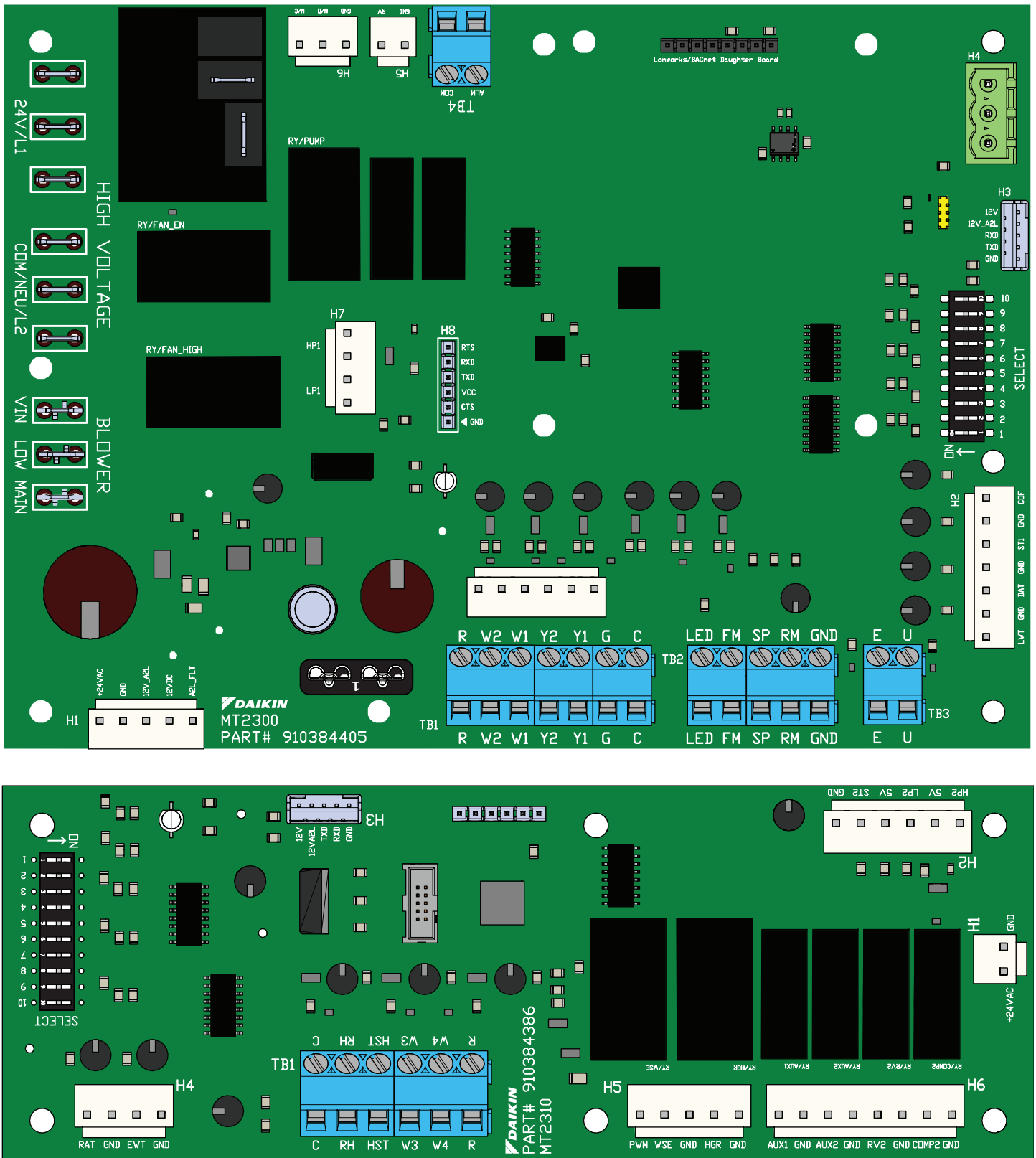
Connector	I/O	Type	Signal	Description
H1-1	+24VAC	Power	VAC	Control Power Voltage
H1-2	GND	Power	Ground	Control Power Common
H1-3	12V_A2L	Input	VDC	A2L Sense Voltage
H1-4	12 VDC	Output	VDC	A2L Mitigation Voltage
H1-5	A2L_ALM	Input	Digital	A2L Fault Alarm
H2-1	LWT	Input	Analog	Leaving Water Temperature
H2-2	GND	REF	Common	
H2-3	DAT	Input	Analog	Discharge Air Temperature
H2-4	GND	REF	Common	
H2-5	ST1	Input	Analog	Comp1 Suction Temperature
H2-6	GND	REF	Common	
H2-7	COF	Input	Analog	Condensate Overflow
H3-1	12V	Output	VDC	Base/Expansion Board Interface
H3-2	12V_A2L	Output	VDC	
H3-3	RXD	COM	UART	
H3-4	TXD	COM	UART	
H3-5	GND	COM	UART	
H4-1	B(+)	COM	N/A	Future Use
H4-2	A(-)	COM	N/A	
H4-3	GND	COM	N/A	
H5-1	GND	REF	Common	Comp1 Reversing Valve
H5-2	RV	Output	24 VAC	
H6-1	GND	REF	Common	Pump Request- Common (Ground) Terminal
H6-2	NO	Output	24 VAC	Pump Request - Normally Open Terminal for Normally Closed Valves
H6-3	NC	Output	24 VAC	Pump Request - Normally Closed Terminal for Normally Open Valves
H7-1,2	LP1	Input	Digital	Comp1 Low Pressure
H7-3,4	HP1	Input	Digital	Comp1 High Pressure
TB1-1	R	Output	24 VAC	Thermostat 24 VAC Power
TB1-2	W2	Input	24 VAC	Thermostat Heat Stage 2
TB1-3	W1	Input	24 VAC	Thermostat Heat Stage 1
TB1-4	Y2	Input	24 VAC	Thermostat Cool Stage 2
TB1-5	Y1	Input	24 VAC	Thermostat Cool Stage 1
TB1-6	G	Input	24 VAC	Thermostat Fan

Connector	I/O	Type	Signal	Description
TB1-7	C	REF	Common	Thermostat Common
TB2-1	LED	Output	5 VDC	Room Sensor LED
TB2-2	FM	Input	Analog	Room Sensor Fan/Mode
TB2-3	SP	Input	Analog	Room Sensor Setpoint Adjust
TB2-4	RM	Input	Analog	Room Sensor Air Temp / Tenant Override
TB2-5	GND	REF	Common	Room Sensor Common
TB3-1	E	Input	Digital	Emergency Shutdown
TB3-2	U	Input	Digital	Unoccupied Sensor
TB4-1,2	ALM	Output	Digital	Alarm Output - Contact Closure
BLOWER	VIN	Input	VAC	Blower Motor Voltage
BLOWER	LOW	Output	VIN	Blower Motor Low Speed
BLOWER	MAIN	Output	VIN	Blower Motor High Speed or ECM
LIVE (Relay)	Comp1	Output	L1/24V	Compressor Stage 1
LIVE x 3	24V/L1	Input	VAC	COMP1 Line1 Control Voltage
LIVE x 3	COM/NEU/L2	Input	VAC	COMP1 Line2 Control Voltage
Daughter Board	BACnet	COM	SPI	BACnet MS/TP Only

**Table 26: MT2310 I/O Board Connectors and Terminals**

Connector	I/O	Type	Signal	Description
H1-1	GND	Power	Ground	Control Power Common
H1-2	+24VAC	Power	VAC	Control Power Voltage
H2-1	GND	REF	Common	Comp2 Suction Temperature
H2-2	ST2	Input	Analog	
H2-3,4	LP2	Input	Digital	Comp2 Low Pressure
H2-5,6	HP2	Input	Digital	Comp2 High Pressure
H3-1	12V	Input	VDC	Base/Expansion Interface
H3-2	12V_A2L	Input	VDC	
H3-3	TXD	COM	UART	
H3-4	RXD	COM	UART	
H3-5	GND	REF	Common	
H4-1	RAT	Input	Analog	Return Air Temperature
H4-2	GND	REF	Common	
H4-3	EWT	Input	Analog	Entering Water Temperature
H4-4	GND	REF	Common	
H5-1	GND	REF	Common	Hot Gas Reheat Valve
H5-2	HGR	Output	24 VAC	
H5-3	GND	REF	Common	Waterside Economizer Valve
H5-4	WSE	Output	24 VAC	
H5-5	PWM	Output	PWM	Variable Speed Blower Motor
H6-1	GND	REF	Common	Compressor Stage 2
H6-2	COMP2	Output	24 VAC	
H6-3	GND	REF	Common	Comp2 Reversing Valve
H6-4	RV2	Output	24 VAC	
H6-5	GND	REF	Common	Auxiliary Heat 2
H6-6	AUX2	Output	24 VAC	
H6-7	GND	REF	Common	Auxiliary Heat 1 / Hydronic Heat
H6-8	AUX1	Output	24 VAC	
TB1-1	C	REF	Common	Input Common
TB1-2	RH	Input	Analog	Space Relative Humidity
TB1-3	HST	Input	24VAC	Humidistat
TB1-4	W3	Input	24VAC	Thermostat - Stage 3 Heat
TB1-5	W4	Input	24VAC	Thermostat - Stage 4 Heat or Stage 3 Cool
TB1-6	R	Output	24 VAC	Thermostat - 24 VAC Power

Figure 58: MicroTech2300 Unit Controller and MicroTech 2310 I/O Expansion Board Terminal Location

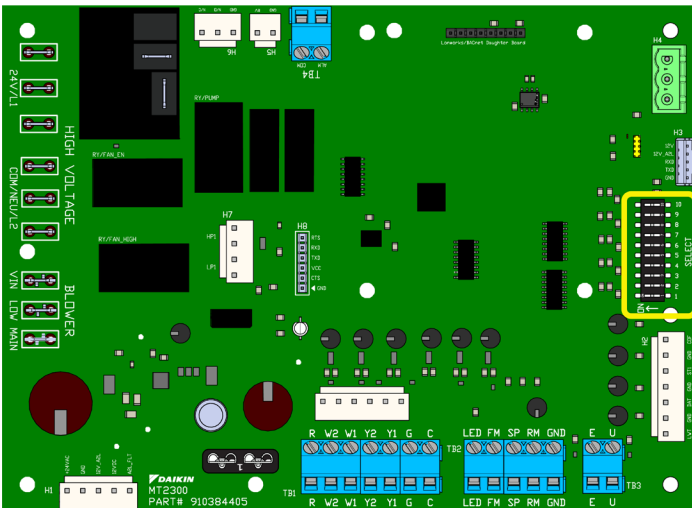


# Configuration DIP Switches

**WARNING**

Proper antifreeze/water solution is required to minimize the potential of fluid freeze-up. Switch SW3 is factory set for water freeze protection with the switch closed. Operation at fluid temperatures below 32°F (0°C) with anti-freeze protection requires SW3 to be field configured for the switch on. If unit is employing a fresh water system (no anti-freeze protection), it is extremely important that SW3 switch setting remains in the off 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 or property damage and will void unit warranty.

Figure 59: Location of Configuration DIP Switches on the MT2300 Unit Controller



**CAUTION**

The MT2300 unit controller incorporates static sensitive devices. A static charge from touching the device can damage the electronic components. To help prevent damage during service, use static discharge wrist straps. Static discharge wrist straps are grounded to the heat pump chassis through a 1M ohm resistor.

Table 27: MT2300 Main Board DIP Switch Settings

Switch	Description	Position	Model/Options
SW1	Normal/Test Mode	SW1 = OFF (0)	Normal Operation
		SW1 = ON (1)	Service/Test Mode
SW2	Fan Operation	SW2 = OFF (0)	Continuous Fan Operation (On)
		SW2 = ON (1)	Cycling Fan Operation (Auto)
SW3 <sup>1</sup>	Loop Fluid	SW3 = OFF (0)	Water Loop Fluid
		SW3 = ON (1)	Glycol Loop Fluid
SW4	Freeze Fault Detect (FFD)	SW4 = OFF (0)	Disabled FFD
		SW4 = ON (1)	Enabled FFD with LWT sensor installed
SW5	Room Sensor Setpoint Adjust Range	SW5 = OFF (0)	Short Range -5 to +5 F (-2.78 to +2.78 C)
		SW5 = ON (1)	Long Range 55 to 95 F (12.78 to 35 C)

Switch	Description	Position	Model/Options
SW6	Thermostat/Room Sensor Control	SW6 = OFF (0)	Thermostat Control
		SW6 = ON (1)	Room Sensor Control
SW7/SW8 <sup>2</sup>	Single Compressor Heating Source	SW7 = OFF (0)	Allow Compressor in Heating Mode
		SW7 = ON (1)	Disable Compressor in Heating Mode
	Single Compressor I/O Expansion Module	SW8 = OFF (0)	I/O Expansion Module Not Required
		SW8 = ON (1)	I/O Expansion Module is Required
	Two Compressor Availability	SW7 = OFF (0) SW8 = OFF (0)	Both Compressors Available (Automatic Compressor Fail Replace)
		SW7 = ON (1) SW8 = OFF (0)	Lead Compressor Available (Lag Compressor is Off-Line)
		SW7 = OFF (0) SW8 = ON (1)	No Compressors Available
SW9	WSHP Base Board Application Select	SW9 = OFF (0)	Single Compressor WSHP Application
		SW9 = ON (1)	Two Compressor Application
SW10	Discrete/Variable Speed Fan Select	SW10 = OFF (0)	Fan Single (Fan Main Output) or Variable (PWM) Speed
		SW10 = ON (1)	Dual Speed Fan (Low & High Discrete Outputs)

- See Warning under "Configuration DIP Switches" for DIP switch 3 (SW3) setting information.
- The functionality of SW7 and SW8 depends on the setting of SW9. If SW9 is OFF, SW7 and SW8 will be for Heating Source and I/O Expansion Module functionality. If SW9 is ON, SW7 and SW8 will be for Compressor Availability functionality.

Figure 60: MT2310 I/O Expansion DIP Switches

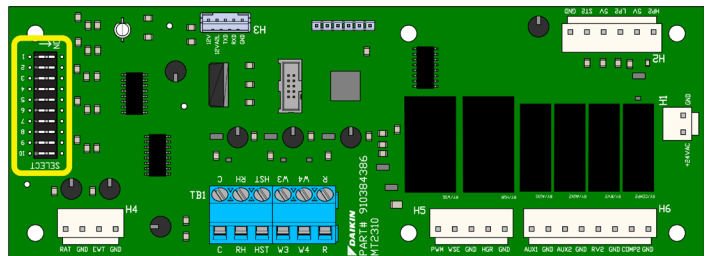


Table 28: MT2310 I/O Expansion Module DIP Switch Settings

Switch	Description	Position	Model/Options
SW1-4	Variable Fan Speed Row Selection	0000 to 1111 Binary	Variable Speed Fan Row Selection (1 to 16), used when "nciVsNetCnfgEn" is set to "Disable" the network override.
SW5/SW6	Secondary Heating Options	SW5 = OFF (0) SW6 = OFF (0)	None
		SW5 = ON (1) SW6 = OFF (0)	Supplemental Electric Heat
		SW5 = OFF (0) SW6 = ON (1)	Boilerless Electric Heat
		SW5 = ON (1) SW6 = ON (1)	Hydronic Heating



Switch	Description	Position	Model/Options
SW7	Hot Gas Reheat (HGRH)	SW7 = OFF (0)	HGRH Disabled
		SW7 = ON (1)	HGRH Enabled
SW8	Waterside Economizer (WSE)	SW8 = OFF (0)	Waterside Economizer Disabled
		SW8 = ON (1)	Waterside Economizer Enabled
SW9	WSHP I/O Expansion Application Select	SW9 = OFF (0)	Single Compressor Application
		SW9 = ON (1)	Two Compressor Application
SW10	Single Compressor: Speed	SW10 = OFF (0)	Single Speed Compressor
		SW10 = ON (1)	Dual Speed Compressor
	Two Compressor: Lead Compressor Select	SW10 = OFF (0)	Compressor #1 is Lead
		SW10 = ON (1)	Compressor #2 is Lead

**NOTE:** The functionality of SW10 depends on the setting of SW9. If SW9 is OFF, SW10 will be for Single Compressor Speed. If SW9 is ON, SW10 will be for Lead Compressor Select.

## MicroTech SmartSource Unit Controller

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

### NOTICE

For information on sequence of operation and troubleshooting refer to OM 1364.

## Remote Reset of Automatic Lockouts

The Remote Reset feature provides the means to remotely reset automatic lockouts. There are three (3) ways to accomplish a unit reset once the fault condition has been remedied:

- Using the thermostat cycle from cool or heat to off and back to heat or cool two times within 30 seconds
- Press the Room Sensor or Thermostat Timed Override/Reset Button for more than 10 seconds
- Turn the unit power off and wait 10 seconds to turn back on.

When the cause of the fault condition has been remedied, and the unit is cycled from not requiring heating or cooling to needing heating or cooling 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.

### NOTICE

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 Room Temperature Sensor connection at TB2 pin 4, RS clearing the lockout alarm once the cause of the fault condition has been remedied.

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

**Table 29: MT2300 Unit Controller Status LEDs**

LED Activity	Type	Color	Description
Steady ON	Fault	Yellow	MCU Not Programmed
Steady ON	Fault	Red	MCU Hardware Failure
1 Flash	Fault	R–Y–G	Invalid Configuration
2 Flash	Fault	R–Y–G	Incompatible Software
1 Flash	Fault	R–Y	I/O Exp Board Communications Fail
1 Flash	Mode	G–Y	Service / Test Mode Active
Rapid Flash	Fault	Red	A2L Mitigation – Refrigerant Leak
1 Flash	Fault	Red	Compressor #1 High Pressure
2 Flash	Fault	Red	Compressor #1 Low Pressure
3 Flash	Fault	Red	Compressor #1 Suction Temp Sensor Fail
4 Flash	Fault	Red	Compressor #1 Low Suction Temp
5 Flash	Fault	Red	Compressor #2 High Pressure
6 Flash	Fault	Red	Compressor #2 Low Pressure
7 Flash	Fault	Red	Compressor #2 Suction Temp Sensor Fail
8 Flash	Fault	Red	Compressor #2 Low Suction Temp
9 Flash	Fault	Red	A2L Mitigation – Control Board Without Power
10 Flash	Fault	Red	Compressor #1 High Discharge Temp
11 Flash	Fault	Red	Compressor #2 High Discharge Temp
Rapid Flash	Mode	Yellow	A2L Mitigation – Refrigerant Sensor Fail
1 Flash	Fault	Yellow	Compressor Low Voltage Brownout
2 Flash	Fault	Yellow	Freeze Fault Detect (FFD)
3 Flash	Fault	Yellow	Control Temp Sensor Fail
4 Flash	Fault	Yellow	Entering Water Temp Sensor Fail
5 Flash	Fault	Yellow	Leaving Water Temp Sensor Fail
6 Flash	Fault	Yellow	Relative Humidity Sensor Fail
7 Flash	Fault	Yellow	Condensate Overflow
8 Flash	Fault	Yellow	Space Temp Sensor Fail
9 Flash	Fault	Yellow	Return Air Temp Sensor Fail
Rapid Flash	Mode	Green	Emergency Shutdown
1 Flash	Mode	Green	No Call for Heating / Cooling / Dehumidification
2 Flash	Mode	Green	Call for Cooling
3 Flash	Mode	Green	Call for Heating

LED Activity	Type	Color	Description
4 Flash	Mode	Green	Call for Fan Only
5 Flash	Mode	Green	Unoccupied Mode Active
6 Flash	Mode	Green	Call for Dehumidification
7 Flash	Mode	Green	Low Entering Water Temp
8 Flash	Mode	Green	HGR Low Return Air Temp Cutout
9 Flash	Mode	Green	WSE Low Temp Cutout

**Table 30: MT2310 I/O Expansion Board Status LEDs**

LED Activity	Type	Color	Description
1 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan OFF
2 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 0 to 20%
3 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 21 to 30%
4 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 31 to 40%
5 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 41 to 50%
6 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 51 to 60%
7 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 61 to 70%
8 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 71 to 80%
9 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 81 to 90%
10 Flash	Mode <sup>1</sup>	Green	Variable Speed Fan ON: 91 to 100%
Steady ON	Fault	Yellow	MCU Not Programmed
Steady ON	Fault	Red	MCU Hardware Failure
1 Flash	Fault	R-Y-G	Invalid Configuration
2 Flash	Fault	R-Y-G	Incompatible Software
1 Flash	Fault	R-Y	Base Board Communications Failure
Rapid Flash	Fault	Red	A2L Mitigation - Alarm Condition

<sup>1</sup> When the BACnet network is overriding the fan speed DIP switch selection, the LED interval color will be yellow instead of OFF.

**Table 31: Priority Level of Faults and Modes with Resets**

Alarm Enumeration (BACnet)	Fault	Indication	Reset <sup>1</sup>
1	No Alarm	Normal operation	NA
2	MT2310 Communication Failure	Single compressor unit with SW #8 set to ON position	A
3	Incompatible Software	Incorrect Software Part or Version Numbers	P
4	Invalid Configuration	Base & IO Exp Application Mismatch or MT2310 detected but not required (SW #8)	P
5	A2L Alarm	A2L refrigerant leak detected	A
6	A2L Error - Power	A2L mitigation control is not powered	A
7	Compressor Low Voltage	"Brownout" condition exists	A
8	Comp #1 High Pressure	Compressor #1 high pressure switch opened	T,N
9	Comp #2 High Pressure	Compressor #2 high pressure switch opened	T,N

Alarm Enumeration (BACnet)	Fault	Indication	Reset <sup>1</sup>
10	Comp #1 Low Pressure	Compressor #1 low pressure switch opened	T,N
11	Comp #2 Low Pressure	Compressor #2 low pressure switch opened	T,N
12	Comp #1 Suction Temp Sensor	Compressor #1 suction temp sensor failure	N
13	Comp #2 Suction Temp Sensor	Compressor #2 suction temp sensor failure	N
14	Leaving Water Temp (LWT) Sensor	LWT sensor not present (SW #4 = ON)	N
15	Freeze Fault Detect (FFD)	LWT sensor temp below freeze setpoint (SW #4 = ON)	T,N
16	Comp #1 Low Suction Temp (ST1)	ST1 sensor temp below minimum setpoint	A,T,N <sup>2</sup>
17	Comp #2 Low Suction Temp (ST2)	ST2 sensor temp below minimum setpoint	A,T,N <sup>2</sup>
18	A2L Error - Sensor	A2L sensor lost communication or reported failure	A
19	Control Temp Sensor Failure	Room Temp and Return Air Temp sensor failures	N
20	Entering Water Temp (EWT) Sensor Failure	EWT sensor reading "out of range"	N
21	Room Temp Sensor Failure	Room temp sensor reading "out of range"	N
22	Return Air Temp Sensor Failure	RAT sensor reading "out of range"	N
23	Space RH Sensor Failure	Space RH sensor reading "out of range"	N
24	Low Entering Water Temp (EWT)	EWT sensor reading below minimum setpoint	A
25	Condensate Overflow	Condensate overflow sensor indicates water present	A,N
26	Waterside Economizer (WSE) Low Temp	WSE temp sensor reading below minimum setpoint	A

<sup>1</sup> "A" = Auto Reset, "T" = Tenant Override Button Reset, "N" = Network Reset, "P" = power cycle only

<sup>2</sup> Low suction temperature faults have "Intelligent Reset" logic - 3 faults in a 24 hour period disables the auto reset function.

**Table 32: I/O Expansion Module Configuration Switch**

Fan Speed Row	Switch 1	Switch 2	Switch 3	Fan Only <sup>1</sup>	Cool Stage 1	Cool Stage 2	Heat Stage 1	Heat Stage 2
1	OFF	OFF	OFF	20%	80%	100%	80%	100%
2	ON	OFF	OFF	20%	70%	90%	70%	90%
3	OFF	ON	OFF	20%	60%	80%	60%	80%
4	ON	ON	OFF	20%	50%	70%	50%	70%
5	OFF	OFF	ON	20%	65%	85%	65%	85%
6	ON	OFF	ON	20%	55%	75%	55%	75%
7	OFF	ON	ON	20%	50%	65%	50%	65%
8	ON	ON	ON	20%	50%	55%	50%	55%

<sup>1</sup> When in Fan Only (SW4) mode, OFF = 20% and ON = Cool Stage 1 speed (heat or cool mode fan speeds not affected).

## Fan Speed Configuration Switches (SW1, SW2, SW3)

Configuration Switches on the I/O expansion module allow 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 setting on the fan speed configuration switches represents settings 1-8. See [Table 32 on page 58](#) for the complete list of fan speed selector switch settings. Additionally SW3 can be used to reduce the CFM setting. Setting the SW3 to On will reduce the out put signal by 15% of it's maximum value, with a minimum output of 50% of the maximum value while heating, cooling, or dehumidifying.

### BACnet Communication Module

On units with an optional BACnet communication module, fan speeds can be set through network communications to 1% resolution of duty cycle. For hydronic or compressorized modes, the range is 50-100%, and for fan only mode, the range is 10-100%. When enabled, the network fan speed settings will override the local configuration switches. When the MT2310 status LED interval is yellow instead of Off, this indicates that the network is overriding the fan speed settings.

### 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 SW1 and SW2 switches at setting 3 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 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.

## Fan Only Speed Configuration Switch (SW4)

In addition to the SW1, SW2, and SW3 switches, all units have the capability to set Fan Only CFM values independent to those associated with other modes of operation using the SW4 switch. When the SW4 switch is Off the fan only speed will be fixed at the speed associated with a low 20% duty cycle output. When the SW4 switch is On, the Fan Only speed will match the speed for the Stage 1/Low CFM output.

For example, unit size 036 with SW1 and SW2 switches set at Setting #3, SW3 set at Off, and SW4 set at On, will deliver 1200 CFM at stage 2 compressor operation mode, 1050 CFM at stage 1 compressor operation, 1350 CFM in electric heat mode, 1050 CFM in fan only mode, 975 CFM in dehumidification mode, 1050 CFM in hydronic heat mode, and 1050 CFM in waterside economizer mode.

Figure 61: SW1 & SW2 Location on The I/O Expansion Module

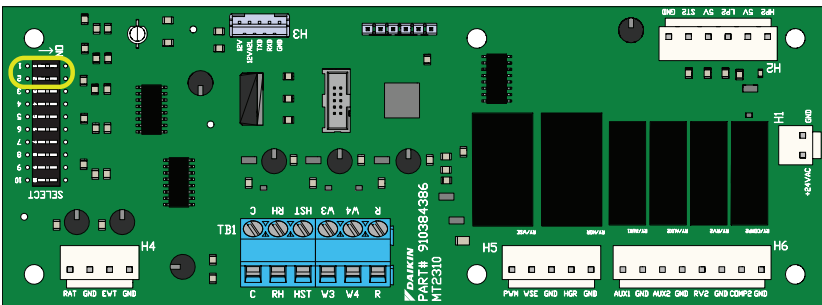


Table 33: Representative Data for Size 036, Constant CFM

Unit Size	Fan Setting	Maximum ESP (in. wg.) <sup>2</sup>	<sup>1</sup> Low CFM Heat	<sup>1</sup> High CFM Heat	<sup>1</sup> Low CFM Cool	<sup>1</sup> High CFM Cool	Dehumidification	Electric Heat	Fan Only SW4 On	Fan Only SW4 Off	Hydronic Heat	Waterside Economizer
036	Fan Speed 1	0.7	1200	1350	1200	1350	1125	1350	1200	750	1200	1200
	Fan Speed 2		1125	1275	1125	1275	1050	1350	1125	750	1125	1125
	Fan Speed 3		1050	1200	1050	1200	975	1350	1050	750	1050	1050
	Fan Speed 4		975	1125	975	1125	975	1350	975	750	975	975
	Fan Speed 5		1088	1238	1088	1238	1013	1350	1088	750	1088	1088
	Fan Speed 6		1013	1163	1013	1163	975	1350	1013	750	1013	1013
	Fan Speed 7		975	1088	975	1088	975	1350	975	750	975	975
	Fan Speed 8		975	1013	975	1013	975	1350	975	750	975	975

<sup>1</sup> 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.

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

## MT2300 Controller with an Optional BACnet Communication Module



For installation and operation information on MT2300 unit controller and other ancillary components, see:

- OM 1364 - MT2300 Unit Controller with MT2310 I/O Expansion Board MicroTech Controller
- IM 955 - MicroTech Wall Sensor For Use with MicroTech SmartSource Unit Controller
- IM 956 - Temperature Sensors for Units with MicroTechIII or MT2300 Unit Controller and LonWorks® or BACnet Communication Module
- IM 1363 - MicroTech MT2300 Water Source Heat Pump Unit Controller BACnet MS/TP Communication Module
- ED 19129 - MicroTech MT2300 Water Source Heat Pump Unit Controller BACnet Protocol Information

Daikin Applied water source heat pumps are available with an optional BACnet MS/TP communication module that is designed to communicate over a BACnet MS/TP communications network to a building automation system (BAS). It can be factory or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the water source heat pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the water source heat pump.

The module makes operational data and commands available on a communications network using BACnet objects and properties:

- The network cable is a shielded twisted-pair cable
- Network communications run up to 76.8 Kbps
- DIP switches on the controller enable the MS/TP MAC address to be set in the range 0-127
- Four green status LEDs on the communication module indicate communication activity on the MS/TP communication network and with the unit controller

**The MT2300 unit controller with BACnet MS/TP communication module orchestrates the following unit operations:**

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

**The MT2300 unit controller with an optional communication module includes:**

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

### NOTICE

Refer to IM 956 for details to install RAT & DAT sensors.

The communication module provides access to setpoints for operational control.

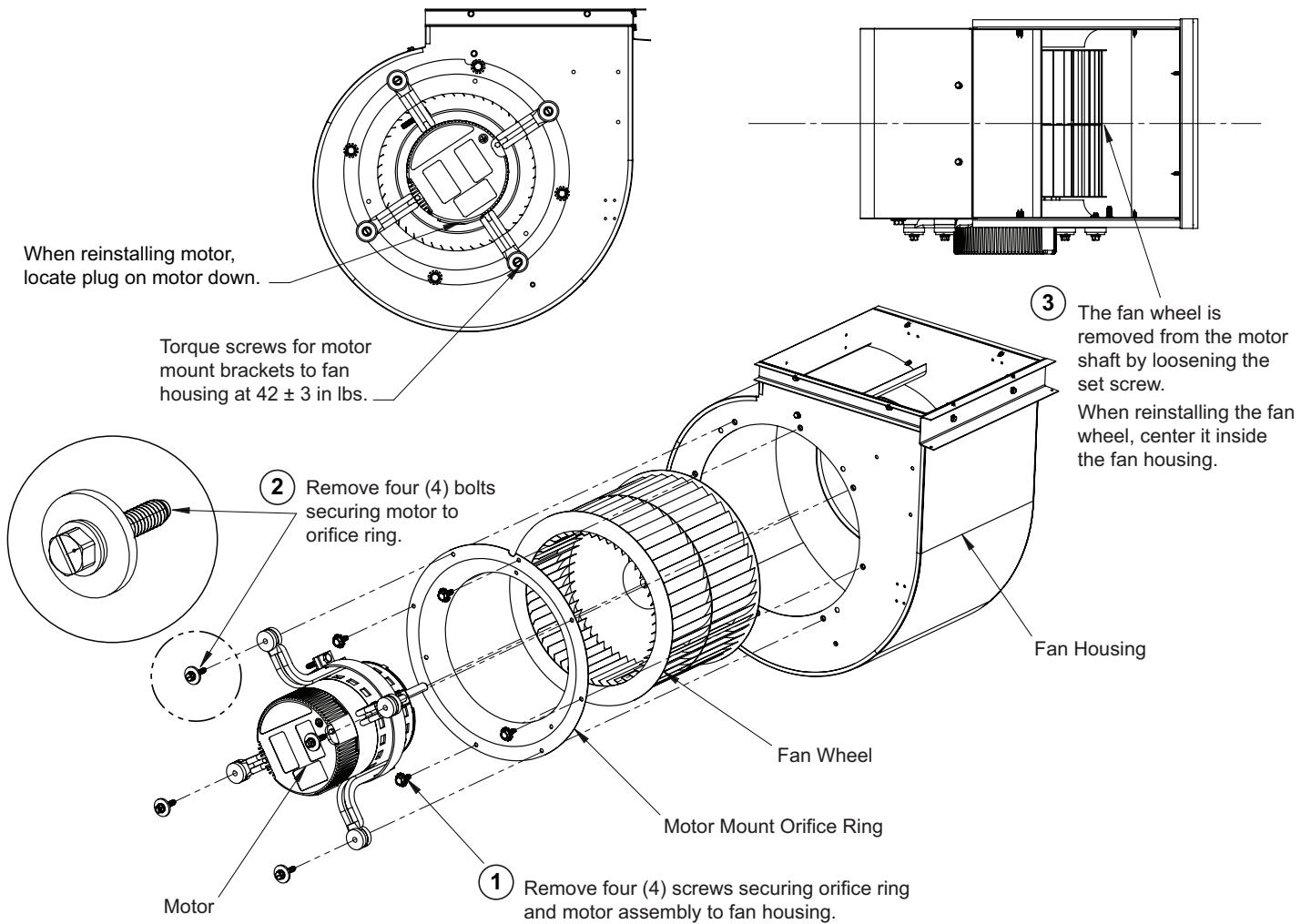
**Available wall sensors include:**

- Room sensor with LED status and tenant override button
- Room sensor with LED status, tenant override button, and  $\pm 5^{\circ}\text{F}$  setpoint adjustment
- Room sensor with LED status, tenant override button,  $55^{\circ}$  to  $95^{\circ}\text{F}$  ( $13^{\circ}$  to  $35^{\circ}\text{C}$ ) setpoint adjustment

# Maintenance

1. Normal maintenance on all units is generally limited to filter changes. Units are provided with permanently lubricated motors and require no oiling even though oil caps may be provided.
2. Filter changes are required at regular intervals. The time period between changes will depend upon the project requirements. Some applications such as motels produce a lot of lint from carpeting and linen changes, and will require more frequent filter changes. Check filters at 60-day intervals for the first year until experience is acquired. If light cannot be seen through the filter when held up to sunlight or a bright light, it should be changed. A more critical standard may be desirable.
3. The condensate drain pan should be checked annually and cleaned and flushed as required.
4. Record performance measurements of volts, amps, and water temperature differences (both heating and cooling). A comparison of logged data with start-up and other annual data is useful as an indicator of general equipment condition.
5. Periodic lockouts almost always are caused by air or water problems. The lockout (shutdown) of the unit is a normal protective result. Check for dirt in the water system, water flow rates, water temperatures, airflow rates (may be a dirty filter), and air temperatures. If the lockout occurs in the morning following a return from night setback, entering air below machine limits may be the cause.
6. Should motor replacement become necessary in the future, refer to [Figure 62](#) for the motor removal process.

**Figure 62: Disassemble Motor Orifice Ring and Motor Mount Screws From Fan Housing**



# Troubleshooting

**Table 34: Troubleshooting Refrigeration Circuit**

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

## Troubleshooting the Water Source Heat Pump Unit

### Compressor runs in short cycle

- Check wiring - loose or broken and check for faulty connection.
- Check relays and contacts, also capacitor and wiring.
- Check high pressure switch, low pressure switch and low temperature switch to see if unit is cycling on the safety.
- Check to see if the reversing valve is not hung up and is operating correctly.
- Check condensate overflow switch in cool/dehumidification mode of operation.
- Check thermostat or room sensor for proper location.

### Neither fan, nor compressor runs and all LED lights are off

- Unit control, check thermostat for correct wiring or faulty thermostat.
- Wire may be loose or broken. Replace or tighten wires.
- Fuse may be blown, circuit breaker is open.
- Low voltage, check power supply voltage.

### Fan operates, compressor does not

- Check wiring - loose or broken and check for bad connection.
- High or Low pressure lockout:
  - a. Cool mode, check water flow
  - b. Heating mode, check air flow
  - c. Check reversing valve for proper valve position

- Check compressor overload - make sure it is closed.
- Check compressor to ground, or for internal short to ground.
- Compressor winding may be open. Check continuity with ohm meter.

### Compressor attempts to start but does not



- Check compressor wiring for defective wiring or loose connection.
- Check for defective compressor internal windings with ohm meter.
- Check for faulty compressor capacitor.
- Check for lock rotor amp draw.

### Insufficient cooling or heating

- Check thermostat for improper location.
- Check for proper air flow - filter could be dirty.
- Check blower assembly for dirt or faulty fan motor capacity.
- Check for low refrigerant charge.
- Check amp draw on blower assembly.
- Check for proper water flow and delta T (°F).

# Refrigerant Information

## Refrigerant Guidelines

 <b>WARNING</b>	
 <b>A2L</b>	This unit contains R-32, a class A2L refrigerant that is flammable. This unit should only be installed, serviced, repaired, and disposed of by qualified personnel licensed or certified in their jurisdiction to work with R-32 refrigerant. Installation and maintenance must be done in accordance with this manual. Improper handling of this equipment can cause equipment damage or personal injury.
For installation only in locations not accessible to the general public.	
Be aware that R-32 refrigerant may not contain an odor. Place in a well ventilated area to prevent accumulation of refrigerant. When installing the unit in a small room, take measures to keep the refrigerant concentration from exceeding allowable safety limits. Excessive refrigerant leaks, in the event of an accident in a closed ambient space, can lead to oxygen deficiency.	
Do not pierce or burn this unit.	
Never use an open flame during service or repair. Never store in a room with continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater), where there is ignitable dust suspension in the air, or where volatile flammables such as thinner or gasoline are handled.	
Only use pipes, nuts, and tools intended for exclusive use with R-32 refrigerant in compliance with national codes (ASHRAE15 or IRC).	
Do not mix air or gas other than R-32 in the refrigerant system. If air enters the refrigerant system, an excessively high pressure results, which may cause equipment damage or injury.	
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.	

## Lubrication

R-32 should be used only with polyolester (POE) oil. The HFC refrigerant components in R-32 will not be compatible with mineral oil or alkylbenzene lubricants. R-32 systems will be charged with the OEM recommended lubricant, ready for use with R-32.

## Competence of Personnel

Information of procedures additional to usual information for refrigerating equipment installation, repair, maintenance and decommission procedures is required when equipment with flammable refrigerants is affected.

The training of these procedures is carried out by national training organizations or manufacturers that are accredited to teach the relevant national competency standards that may be set in legislation. The achieved competence should be documented by a certificate.

## **WARNING**

Service on this equipment is to be performed by qualified refrigeration personnel familiar with equipment operation, maintenance, correct servicing procedures, and the safety hazards inherent in this work. Causes for repeated tripping of equipment protection controls must be investigated and corrected. Disconnect all power before doing any service inside the unit. If refrigerant leaks from the unit, there is a potential danger of suffocation since refrigerant will displace the air in the immediate area. Servicing this equipment must comply with the requirements of all applicable industry related published standards and local, state and federal, statutes, regulations and codes in regards to refrigerant reclamation and venting. Avoid exposing refrigerant to an open flame or other ignition source.

Maintaining and servicing R-32 refrigerant should only be performed as recommended by this manual and by personnel licensed or certified in their jurisdiction to handle A2L refrigerants. Dismantling the unit and treatment of the refrigerant, oil, and additional parts must be done in accordance with the relevant local, state, and national regulations.

Only use tools meant for use on R-32 refrigerant, such as a gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, or refrigerant recovery equipment.

The following guidelines align with UL Standard 60335-2-40.

## Maintenance and Repair

- Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with **FLAMMABLE REFRIGERANTS**.
- Ensure sufficient ventilation at the repair place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.
- When brazing is required, the following procedures shall be carried out in the right order:
  - Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
  - Evacuate the refrigerant circuit.
  - Remove parts to be replaced by cutting, not by flame.
  - Purge the braze point with nitrogen during the brazing procedure.
  - Carry out a leak test before charging with refrigerant.
- Reassemble sealed enclosures accurately. If seals are worn, replace them.
- Check safety equipment before putting into service.

## Checks to the refrigerating equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times

the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- the actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- the ventilation machinery and outlets are operating adequately and are not obstructed;
- if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- marking to the equipment continues to be visible and legible. Markings that are illegible shall be corrected; and
- refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

### Checks to electrical devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- that no live electrical components and wiring are exposed while charging, recovering or purging the system; and
- that there is continuity of earth bonding.

### Sealed electrical and intrinsically safe components

- All sealed electrical components shall be replaced.
- All intrinsically safe components must be replaced.

### Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

## Leak Detection

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. NEVER use the following when attempting to detect flammable refrigerant leaks:

- A halide torch (or any other detector using a naked flame); or
- Substances containing chlorine.

### Detection of flammable refrigerants

The following leak detection methods are deemed acceptable for all refrigerant systems:

- Electronic leak detectors may be used to detect refrigerant leaks. For FLAMMABLE REFRIGERANTS, the sensitivity of electronic leak detectors may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. Examples of leak detection fluids are:
  - bubble method; or
  - fluorescent method agents.
- If a leak is suspected, all open flames shall be removed/ extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to instructions in "[Pressure Testing and Refrigerant Evacuation](#)".

## Pressure Testing and Refrigerant Evacuation

- Make sure that air or any matter other than R-32 refrigerant does not get into the refrigeration cycle.
- If refrigerant gas leaks occur, ventilate the room/area as soon as possible.
- R-32 should always be recovered and never released directly into the environment.
- Only use tools meant for use on R-32 refrigerant (such as a gauge manifold, charging hose, or vacuum pump adapter).

### Removal and evacuation

When breaking into the refrigerant circuit to make repairs, or for any other purpose, conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration.

- The following procedure shall be adhered to:
  - i. safely remove refrigerant following local and national regulations - see "[Recovery](#)" section;
  - ii. purge the circuit with inert gas;
  - iii. evacuate;



- iv. purge with inert gas;
- v. open the circuit by cutting (if flammable refrigerant) or brazing.
- The refrigerant charge shall be recovered into the correct recovery cylinders according to local and national codes. For equipment containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the equipment safe for flammable refrigerants. This process might need to be repeated several times.
- Compressed air or oxygen shall not be used for purging refrigerant systems.
- For equipment containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
- Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

## Handling and Storage

### Conditions for safe storage

- Requirements to be met by storerooms and receptacles:
  - Store only in unopened original receptacles
  - Store in a cool and dry location
- Further information about storage conditions:
  - Keep container tightly sealed
  - Store in cool, dry conditions in well sealed receptacle
  - Protect from heat and direct sunlight
- Maximum storage temperature: 40°C (104°F)

### Fire and explosion protection information

Open and handle refrigerant receptacle with care. Keep ignition sources away. Do not smoke. Protect against electrostatic charges. Waste air is to be released into the atmosphere only via suitable separators.

## Commissioning

- Ensure that the floor area is sufficient for the refrigerant charge or that the ventilation duct is assembled in a correct manner.
- Connect the pipes and carry out a leak test before charging with refrigerant.
- Check safety equipment before putting into service.

### Charging procedures

In addition to conventional charging procedures and specific unit charging guidelines, the following requirements shall be followed:

- Ensure that contamination of different refrigerants does not occur when using charging equipment.

- Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigerating system.
- Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

## Decommissioning

- If the safety is affected when the equipment is put out of service, the refrigerant charge shall be removed before decommissioning.
- Ensure sufficient ventilation at the equipment location.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark.
- Remove the refrigerant according to details in "Recovery" section. If recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
- Ensure all isolation valves on the equipment are closed off.

## Labeling

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For equipment containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

## Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e., special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, FLAMMABLE REFRIGERANTS. If in doubt, the manufacturer should be consulted. In addition,

a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that **FLAMMABLE REFRIGERANT** does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

### Recovery procedure

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant.

It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure, ensure that
  - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
  - all personal protective equipment is available and being used correctly;
  - the recovery process is supervised at all times by a competent person;
  - recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scale before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80% volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.

10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

## Disposal

- Waste treatment method recommendation:
  - Must be specially treated adhering to official regulations
  - Incineration in an adequate incinerator is recommended
  - Uncleaned packaging disposal must be made according to official regulations
- Ensure sufficient ventilation at the working place
- The following procedure shall be adhered to:
  - i. safely remove refrigerant following local and national regulations - see "[Recovery](#)" section;
  - ii. evacuate the refrigerant circuit;
  - iii. purge the refrigerant circuit with nitrogen gas for 5 minutes;
  - iv. evacuate again; and
  - v. If compressors are to be removed, cut out the compressor and drain the oil.

## Typical Refrigeration Cycles

### Cooling Refrigeration Cycle

When the wall thermostat is calling for COOLING, the reversing valve is de-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.

### 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 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.

Figure 63: Cooling Mode

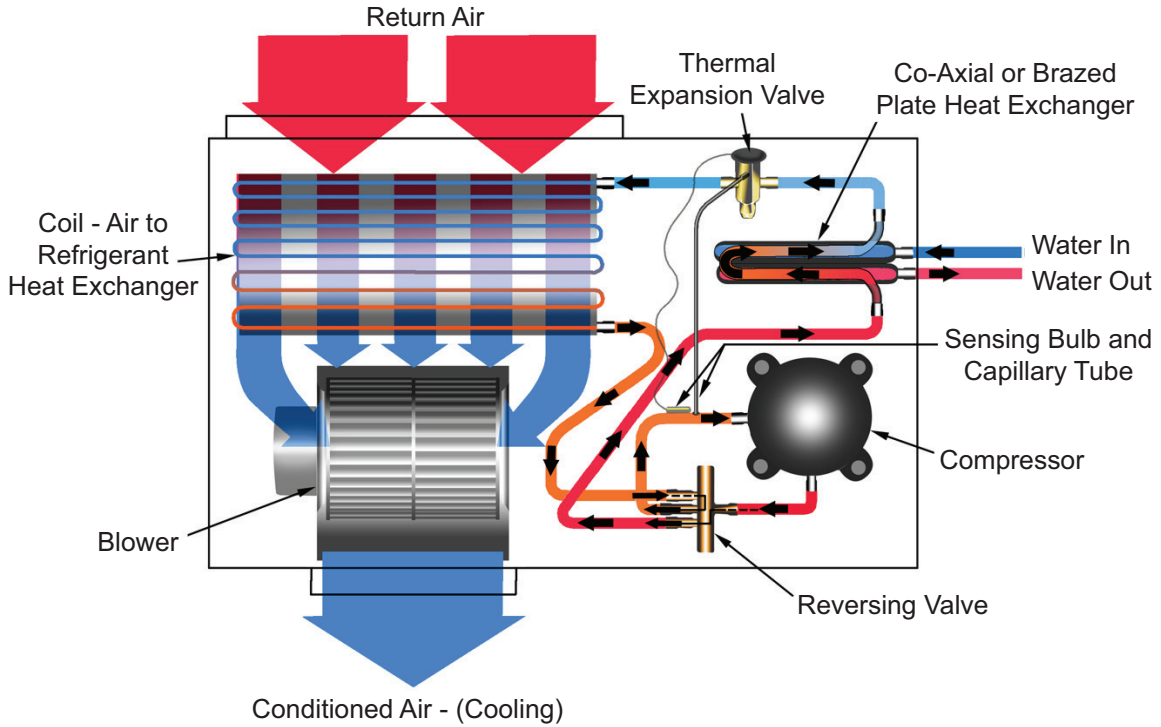
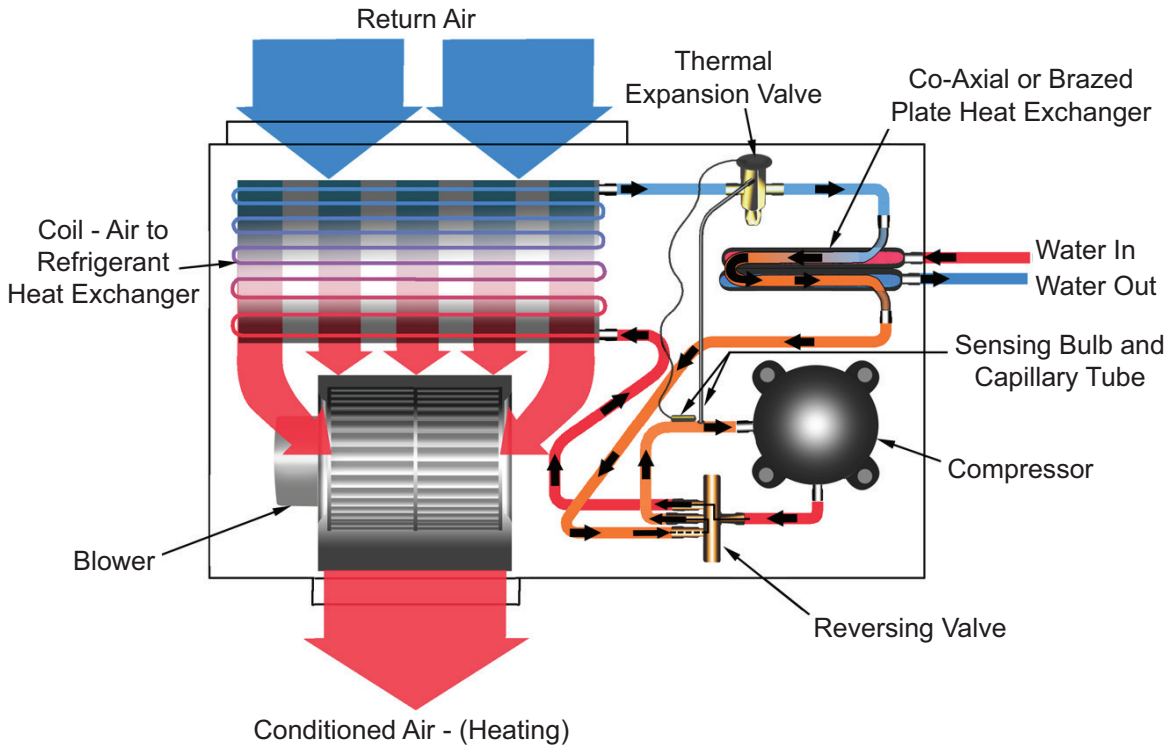


Figure 64: Heating Mode



# Appendix

## Warranty Registration Form

<b>Warranty - Check, Test and Start</b>  <b>Water Source Heat Pump Equipment Check, Test and Start Form</b>	Form: 5F-4239
	Group: <b>ATS</b>
	Date: <b>February 2025</b>
	Supersedes: <b>WS-CTS-00.01</b>

This form must be completely filled out and the record retained by the sales representative or the owner in order to comply with the terms of the Daikin Applied warranty.

### Installation Data

Job Name \_\_\_\_\_ Check, Test & Start Date \_\_\_\_\_

City or Town \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Who is Performing CTS \_\_\_\_\_

#### Equipment Type (Check all that apply)

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.)**

### Essential Items Check

A. Voltage Check \_\_\_\_\_ Volts    Loop Temp. \_\_\_\_\_ °F Heating    System Water P.H. Levels \_\_\_\_\_  
Set For \_\_\_\_\_ °F Cooling

B. Yes	No	Condition	Comments
<input type="checkbox"/>	<input type="checkbox"/>	Loop Water Flushed Clean _____	
<input type="checkbox"/>	<input type="checkbox"/>	Closed Type Cooling Tower _____	
<input type="checkbox"/>	<input type="checkbox"/>	Water Flow Rate to Heat Pump Balanced _____	
<input type="checkbox"/>	<input type="checkbox"/>	Standby Pump Installed _____	
<input type="checkbox"/>	<input type="checkbox"/>	System Controls Functioning _____	
<input type="checkbox"/>	<input type="checkbox"/>	Outdoor Portion of Water System Freeze Protected _____	
<input type="checkbox"/>	<input type="checkbox"/>	Loop System Free of Air _____	
<input type="checkbox"/>	<input type="checkbox"/>	Filters Clean _____	
<input type="checkbox"/>	<input type="checkbox"/>	Condensate Traps Installed _____	

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

Outdoor Air to Heat Pumps: \_\_\_\_\_  
  Other Conditions Found: \_\_\_\_\_

Please include any suggestions or comments for Daikin Applied: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### Above System is in Proper Working Order

**Note:** This form must be retained. If a warranty claim is submitted, this form will need to be sent to the warranty administrator before any service money can be released.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature for Sales Representative

\_\_\_\_\_  
Signature for Customer

#### For Internal Use

Release: \_\_\_\_\_

SM \_\_\_\_\_

CTS \_\_\_\_\_

T \_\_\_\_\_

\_\_\_\_\_  
Service Manager Approval

\_\_\_\_\_  
Date

# Warranty Registration Form

## 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: _____	
<b>Complete equipment data from measurements taken at the locatons indicated on the drawing below.</b>	

Equipment Data	
<b>Flow Rate</b>	<b>EWP - LWP = ΔP</b>
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.	
<b>Caution ΔP ≠ GPM</b>	
<b>Note: A conversion table must be used to find GPM from (Delta) ΔP measurements.</b>	

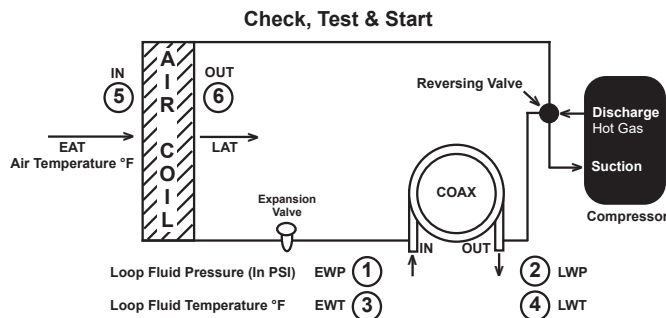
<b>Loop Fluid Temperature Rise / Drop through Coaxial Heat Exchanger</b>	<b>EWT - LWT = ΔT</b>
③ EWT - °F Out _____ minus	④ LWT - °F Out _____ equals Fluid ΔT _____
ΔT is the rise or drop in the fluid temperature as it passes through the Coaxial.	

<b>Air Temperature Rise / Drop through the air coil</b>	<b>ΔT x CFM x 1.08 = BTUH Sensible</b>
⑤ EAT - °F In _____ minus	⑥ LAT - °F Out _____ equals Air ΔT _____

**Note 1: Perform Check, Test and Start-Up in the Cooling Mode Only.**

**Note 2: For units with multi-stage compressor operation, verify that the unit is in second stage before logging the requested information.**

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



# Warranty Registration Form

## Commercial Check, Test and Start Worksheet

(Complete all equipment measurements indicated for each unit per installation on page 2)

	Model	Serial #	H.P. #	EWT ③	LWT ④	EWP ①	LWP ②	EAT ⑤	LAT ⑥	Volts	Amps Cooling	Check Air Filter and Coil	Comments (more comments on back)
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
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39.													
40.													
41.													
42.													

# Limited Product Warranty



**DAIKIN APPLIED AMERICAS INC.  
LIMITED PRODUCT WARRANTY  
(United States and Canada)**

## **WARRANTY**

Daikin Applied Americas Inc. dba Daikin Applied ("Company") warrants to contractor, purchaser and any owner of the product (collectively "Owner") that, subject to the exclusions set forth below Company, at its option, will repair or replace defective parts in the event any product manufactured by Company, including products sold under the brand name Daikin and used in the United States or Canada, proves defective in material or workmanship within twelve (12) months from initial startup or eighteen (18) months from the date shipped by Company, whichever occurs first. Authorized replacement parts are warranted for the remainder of the original warranty. All shipments of such parts will be made FOB factory, freight prepaid and allowed. Company reserves the right to select carrier and method of shipment. In addition, Company provides labor to repair or replace warranty parts during Company normal working hours on products with rotary screw compressors or centrifugal compressors. Warranty labor is not provided for any other products.

Company must receive the Registration and Startup Forms for products containing motor compressors and/or furnaces within ten (10) days of original product startup, or the ship date and the startup date will be deemed the same for determining the commencement of the warranty period and this warranty shall expire twelve (12) months from that date. For additional consideration, Company will provide an extended warranty(ies) on certain products or components thereof. The terms of the extended warranty(ies) are shown on a separate extended warranty statement.

No person (including any agent, sales representative, dealer or distributor) has the authority to expand the Company's obligation beyond the terms of this express warranty or to state that the performance of the product is other than that published by Company.

## **EXCLUSIONS**

1. If free warranty labor is available as set forth above, such free labor does not include diagnostic visits, inspections, travel time and related expenses, or unusual access time or costs required by product location.
2. Refrigerants, fluids, oils and expendable items such as filters are not covered by this warranty.
3. This warranty shall not apply to products or parts : (a) that have been opened, disassembled, repaired, or altered, in each case by anyone other than Company or its authorized service representative; (b) that have been subjected to misuse, abuse, negligence, accidents, damage, or abnormal use or service; (c) that have not been properly maintained; (d) that have been operated or installed, or have had startup performed, in each case in a manner contrary to Company's printed instructions; (e) that have been exposed, directly or indirectly, to a corrosive atmosphere or material such as, but not limited to, chlorine, fluorine, fertilizers, waste water, urine, rust, salt, sulfur, ozone, or other chemicals, contaminants, minerals, or corrosive agents; (f) that were manufactured or furnished by others and/or are not an integral part of a product manufactured by Company; or (g) for which Company has not been paid in full.
4. This warranty shall not apply to products with rotary screw compressors or centrifugal compressors if such products have not been started, or if such startup has not been performed, by a Daikin Applied or Company authorized service representative.

## **SOLE REMEDY AND LIMITATION OF LIABILITY**

THIS WARRANTY CONSTITUTES THE SOLE WARRANTY MADE BY COMPANY. COMPANY'S LIABILITY TO OWNER AND OWNER'S SOLE REMEDY UNDER THIS WARRANTY SHALL NOT EXCEED THE LESSER OF: (i) THE COST OF REPAIRING OR REPLACING DEFECTIVE PRODUCTS; AND (ii) THE ORIGINAL PURCHASE PRICE ACTUALLY PAID FOR THE PRODUCTS. COMPANY MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, REGARDING PREVENTION OF MOLD/MOULD, FUNGUS, BACTERIA, MICROBIAL GROWTH, OR ANY OTHER CONTAMINATES. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT AND UNDER NO CIRCUMSTANCE SHALL COMPANY BE LIABLE TO OWNER OR ANY THIRD PARTY FOR INCIDENTAL, INDIRECT, SPECIAL, CONTINGENT, CONSEQUENTIAL, DELAY OR LIQUIDATED DAMAGES FOR ANY REASON, ARISING FROM ANY CAUSE WHATSOEVER, WHETHER THE THEORY FOR RECOVERY IS BASED IN LAW OR IN EQUITY, OR IS UNDER A THEORY OF BREACH CONTRACT OR WARRANTY, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE. THE TERM "CONSEQUENTIAL DAMAGE" INCLUDES, WITHOUT LIMITATION, THOSE DAMAGES ARISING FROM BUSINESS INTERRUPTION OR ECONOMIC LOSS, SUCH AS LOSS OF ANTICIPATED PROFITS, REVENUE, PRODUCTION, USE, REPUTATION, DATA OR CROPS.

## **ASSISTANCE**

To obtain assistance or information regarding this warranty, please contact your local sales representative or a Daikin Applied office.

Form No. 933-430285Y-01-A (11/2023)  
Part No. 043028500 Rev.0F

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