INSTALLATION & MAINTENANCE MANUAL

IM 1399

APRIL 2025

CLASSROOM UNIT VENTILATOR

- MODELS AHF, AHB, AHV, AHR
- SIZES 07 - 20 (750 TO 2000 CFM)
- R-32 REFRIGERANT

LEARN MORE AT **DAIKINAPPLIED.COM**

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 CLASSROOM UNIT VENTILATOR 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.

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to service, pressurizing, de-pressuring, 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.

This unit is equipped with a Refrigerant Detection System, and the system components, such as supply fans, may begin operation unexpectedly and without warning.

⚠ 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

Hazardous Voltage! Use copper conductors only. Unit terminals are not designed to accept other types of conductors. Failure to do so may cause damage to the equipment.

⚠ 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 88.

⚠ WARNING

The appliance is designed to activate leak mitigation airflow in the event a refrigerant leak is detected. This is required to ensure dilution and prevent stagnation of any leaked refrigerant. Always ensure the supply fans are able to operate freely. Always maintain proper airflow and do not allow filters, air inlets, or air outlets to become blocked.

⚠ 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.

⚠ 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

Cleaning agents may cause serious damage to internal components, such as aluminum coils and electronic controls, etc. Do not operate unit ventilator while building maintenance cleaning agents are in use.

⚠ CAUTION

Personal injury hazard. Wear protective gloves to avoid possible cuts and abrasions from exposed edges. Avoid contact with sharp edges.

⚠ 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.

NOTICE

This unit is not intended for use in laundry rooms.

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
	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

U	AHF	K	H10	A	S	65	A	B1	AT	26	G	Y	B	3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Category	Code Item	Code Option	Code Designation & Description			
Product Category	1	1	U	Unit Ventilators		
Model Type	2	2-4	AHB	Ceiling, Face & Bypass with Reheat	AHR	Ceiling, Valve Control with Reheat
			AHF	Ceiling, Face & Bypass	AHV	Ceiling, Valve Control
Design Series	3	5	9	Design J		
			K	Design K (for Units with R-32 Refrigerant Coil)		
Nominal Capacity	4	6-8	H07	High Static 750 cfm	V07	EC Motor, Variable Airflow 750 cfm
			H10	High Static 1000 cfm	V10	EC Motor, Variable Airflow 1000 cfm
			H13	High Static 1250 cfm	V13	EC Motor, Variable Airflow 1250 cfm
			H15	High Static 1500 cfm	V15	EC Motor, Variable Airflow 1500 cfm
			H20	High Static 2000 cfm	V20	EC Motor, Variable Airflow 2000 cfm
Voltage	5	9	A	115/60/1	D	208/60/3 (Electric Heat Required)
			C	208/60/1	H	230/60/3 (Electric Heat Required)
			G	230/60/1	K	460/60/3 (Electric Heat Required)
			J	265/60/1		
Coil Options	6	10	U [1]	2-Row CW/HW 2 pipe	V [5]	2-Row CW
	Numerical codes [#] include optional stainless steel drain pan.		D [2]	3-Row CW/HW 2 pipe	S [6]	3-Row CW
			E [3]	4-Row CW/HW 2 pipe	W [7]	4-Row CW
			F [4]	5-Row CW/HW 2 pipe	Y [8]	5-Row CW
			G [9]	DX	Z	None
			M [0]	DX for HP Operation		
Heating Options	7	11-12	12	3 Element Low Cap. Electric Heat	67	3-Row HW
			13	6 Element Low Cap. Electric Heat	68	Steam Low Cap.
			65	1-Row HW	69	Steam High Cap.
			66	2-Row HW	00	None
Hand Orientation	8	13	A	Same Hand LH	E	LH Heating/RH Cooling
			B	Same Hand RH	F	RH Heating/LH Cooling
			D	RH Electric Heat Only	R	Single Coil Left Hand
			G	RH Electric Heat / LH Cool	S	Single Coil Right Hand
Controls	9	14-15	##	MicroTech Controls (See Control Code Table Below)		

Control Features		Feature Selections							
Open Protocol	BACnet / Stand-Alone	•		•		•	•		
	LonMark		•		•			•	•
DCV	CO_2 Sensor			•	•		•		•
Factory Installed Keypad	LUI					•	•	•	•
		Control Code							
Economizer Control	Basic	B1	B5	B9	BD	BH	BL	BP	BT
	Expanded	E1	E5	E9	ED	EH	EL	EP	ET
	Leading-Edge	L1	L5	L9	LD	LH	LL	LP	LT

23	Field Mounted Controls (by Others)
17	Digital Ready

U	AHF	K	H10	A	S	65	A	B1	AT	26	G	Y	B	3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Category	Code Item	Code Option	Code Designation & Description			
Discharge	10	16-17	AH	Front Discharge Duct Collar - 36″ Length Unit	FD	Front Discharge Duct Collar - 40″ Length Unit
			AT	Front Discharge Double Deflection Grille - 36″ Length	FG	Front Discharge Double Deflection Grille - 40″ Length
			BD	Down Discharge Double Deflection Grille - 40″ Length		
Return Air/ Outside Air	11	18-19	25	Recirculation RA Bottom Grille- No RA/OA Dampers	28	RA Rear Duct Grille & OA Top Duct Collar
			26	RA Bottom Grille & OA Top Duct Collar	29	RA Rear Duct Grille & OA Rear Duct Collar
			27	RA Bottom Grille & OA Rear Duct Collar		
Power Connection	12	20	G	Box w/Switch		
			J	Box w/Switch, w/USB		
			K	Box w/Switch, w/SD		
			M	Box w/Switch, w/USB, w/SD		
Color	13	21	Y	Off White		
SKU Type	14	22	B	Standard Delivery		
Product Style	15	23	1	1st Style Change (No DX Coil)		
			2	R-410 Coil (Service Replacement)		
			3	R-32 Refrigerant		

Installation

Receiving and Handling

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.

Properly Identify Unit Ventilator(s)

To be sure the correct unit ventilator(s) is/are installed in the correct location(s). The installer must check the packing list and unit identification/tagging number(s) against the plans. Further, the unit data plate, located on the upper right front of the unit ventilator, contains specific information of standard components. (see "Model Nomenclature" on page 5).

Install this product in accordance with good engineering practices and workmanship, following these general instructions, plus the job-specific Daikin Applied submittal drawings provided for specific dimensions, unit arrangements, controls and electrical details, pipe stub-up locations, etc. Applicable tools for lifting, hook-up of piping, electrical and insulation are required.

- Before beginning installation, please read this publication in its entirety.
- Directions given in this bulletin for right and left sides assume a position facing the indoor side of the unit ventilator.
- Before beginning installation, if provided, remove the protective plastic film covering the unit painted panels.

⚠ WARNING

Plastic packaging is a suffocation hazard, dispose of properly. Keep away from children.

Storage

If equipment is stored for any length of time before installation, it should remain in its shipping packaging in a clean, dry, climate controlled area.

Lifting Unit

⚠ WARNING

Make sure lifting equipment can handle the weight of the unit safely. Personal injury may result if improper lifting and moving methods are used. (See Table 1 for approximate shipping weights).

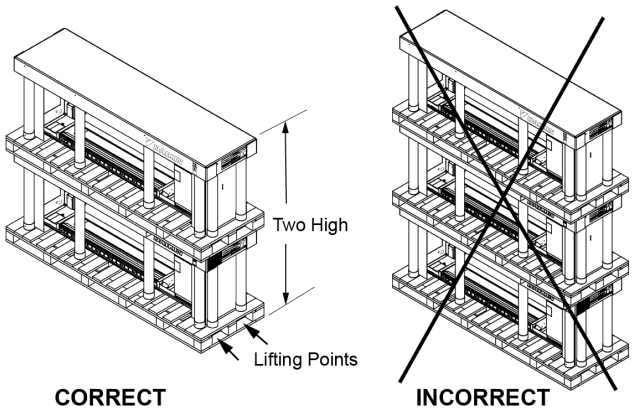
⚠ CAUTION

Use 72" length forklift tines, short tines will damage the unit bottom. Improper handling can damage internal components. Do not stand the unit on end or stack (see Figure 1 & Figure 2).

A forklift or other lifting device is needed to install this product. See Figure 1 and Figure 2. Unit comes with an Allen wrench and four (4) lagging washers in the envelope placed in the end compartment of the unit.

Figure 1: Forklift Lifting Requirements

Figure 2: Stack Units Maximum Two High As Shown



Lifting The Unit Into Position

Remove the two end panels to provide access to the mounting holes once the unit is lifted. If the installed location will not allow access through the end of the unit, remove the two hinged bottom panels instead of the end panels prior to placing on lifting device.

⚠ CAUTION

Apply protective material to lifting support(s) that come in contact with unit to prevent scratching or denting the unit. Support the unit across the entire length to prevent twisting or racking, throughout the process of mounting.

Figure 3: Suggested Lifting Method

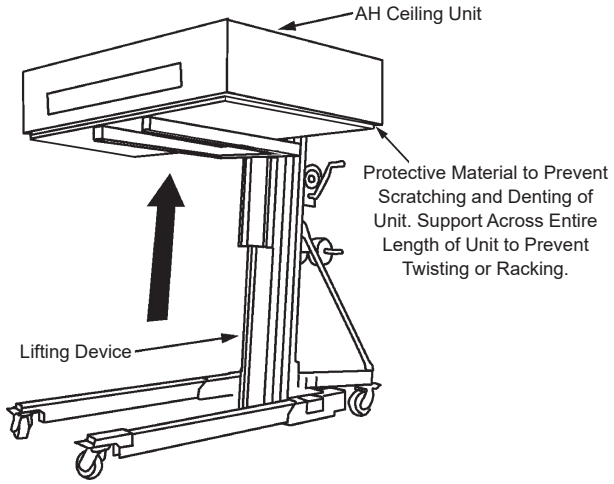


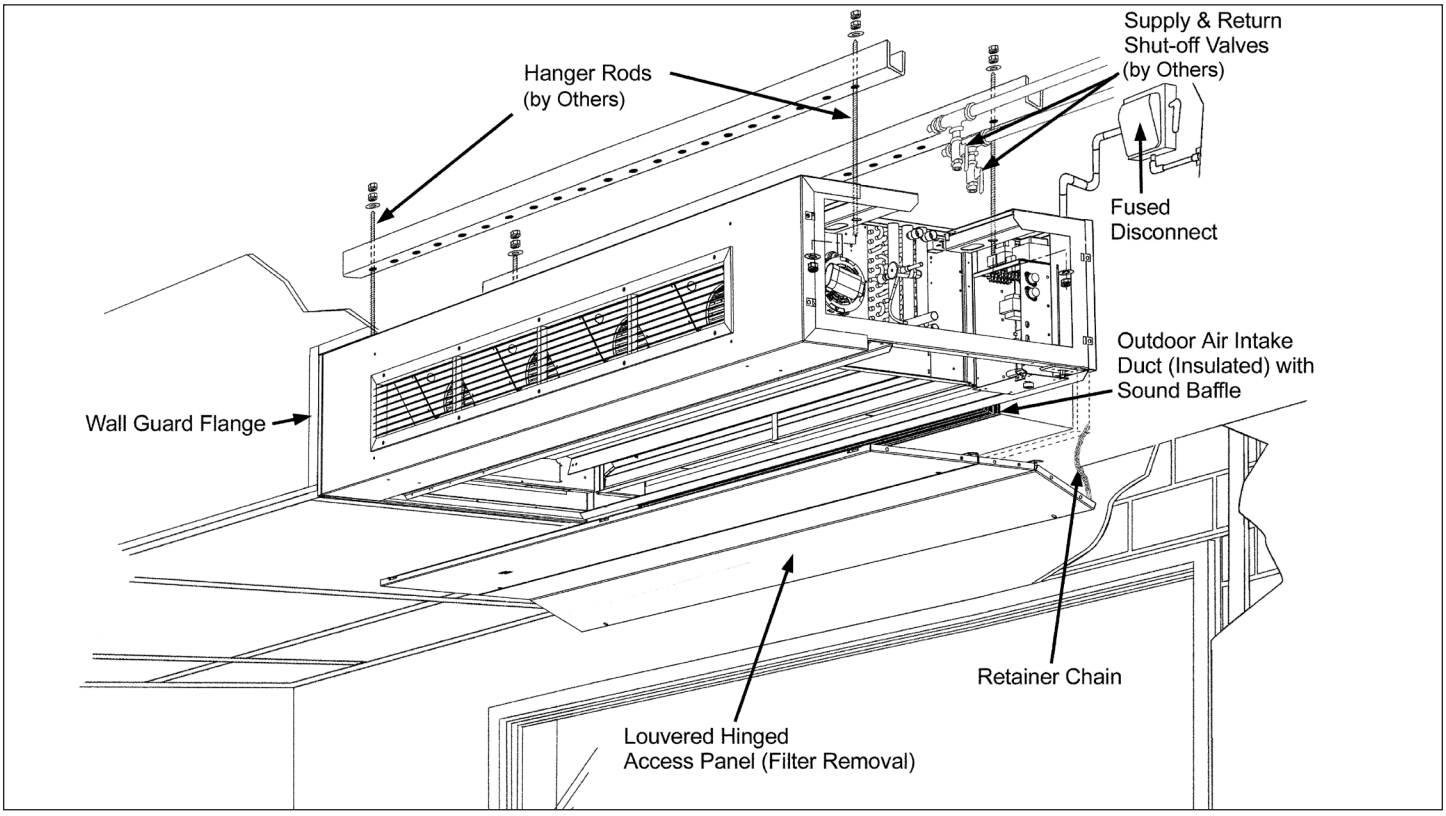
Table 1: Approximate Shipping Weights and Physical Data

Unit Nominal Capacity			H07, V07	H10, V10	H13, V13	H15, V15	H20, V20
Nominal Airflow - cfm (L/s)			750 (354)	1000 (472)	1250 (590)	1500 (708)	2000 (944)
Fan Data	Number of Fans		2	3	4	4	4
	Size in (mm)	Diameter	8.12 (206)	8.12 (206)	8.12 (206)	8.12 (206)	9½ (241)
		Width	8.25 (210)	8.25 (210)	8.25 (210)	8.25 (210)	6 (152)
Filter Data	(Quantity) Size	in	(1) 10 x 36½ x 1	(1) 10 x 48½ x 1	(1) 10 x 60½ x 1	(2) 10 x 36½ x 1	(2) 10 x 36½ x 1
		mm	254 x 927 x 25	254 x 1232 x 25	254 x 1587 x 25	254 x 927 x 25	254 x 914 x 25
	Area	ft² (m²)	2.54 (.24)	3.37 (.31)	4.20 (.39)	5.08 (.47)	5.08 (.47)
Shipping Weight lbs (kg)*	Discharge Air Arrangement	AH, AT	350 (159)	425 (193)	495 (225)	570 (259)	N/A
		FD, FG or BD	385 (179)	465 (211)	540 (245)	620 (281)	680 (309)
Coil Water Volume gal (L)	1-Row Coil		.25 (0.95)	.31 (1.17)	.38 (1.44)	.44 (1.67)	.44 (1.67)
	2-Row Coil		.45 (1.70)	.57 (2.16)	.69 (2.61)	.82 (3.10)	.82 (3.10)
	3-Row Coil		.64 (2.42)	.82 (3.10)	1.01 (3.82)	1.19 (4.50)	1.19 (4.50)
	4-Row Coil		.83 (3.14)	1.08 (4.09)	1.32 (5.00)	1.57 (5.94)	1.57 (5.94)
	5-Row Coil		1.03 (3.90)	1.34 (5.07)	1.64 (6.21)	1.95 (7.38)	1.95 (7.38)

NOTE: *Approximate weights based on Face and Bypass Damper Controlled Unit with 4- row cooling coil, high capacity hot water coil and MicroTech controls.

Unit Location

Figure 4: Typical Ceiling Installation (Soffit) (Plumbing Not Shown)



NOTICE

The ceiling unit must be installed at least 5.9 ft (1.8 m) above the ground.

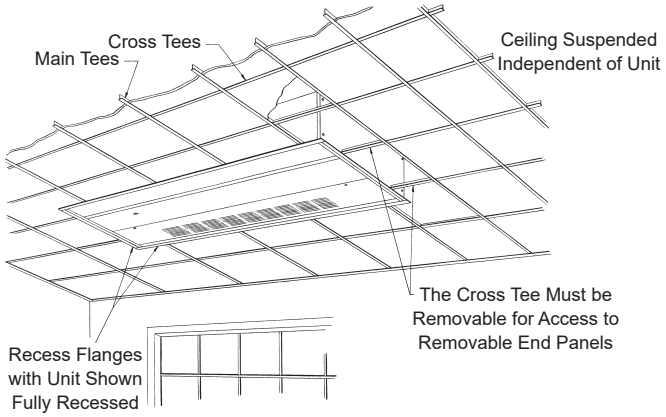
Wall Openings, Louvers, and VentiMatic™ Shutter

Prior to unit installation, be sure that the exterior wall openings and louvers, as applicable, are ready and in accordance with the job plans.

Horizontal ceiling units are typically installed in the ceiling (in close proximity to an outside wall) with a variety of exposures, including completely exposed, partially exposed, partially or fully recessed, or completely concealed, (see Figure 7). Each installation should contain a properly sized louver that is designed to let in fresh air while preventing water (such as rain) from getting past the louver and into the unit itself. A weather-tight seal keeps unwanted air and moisture from entering the occupied space. Follow typical installation methods for louvers / VentiMatic Shutter and flashing by others to prevent moisture and air infiltration damage. See Figure 10 through Figure 20, and Table 2 for various louver details.

Accessibility to fully recessed units should be considered, see Figure 4 and Figure 5.

Figure 5: Fully Recessed Unit



Before hanging the unit ventilator in place, if it is a cooling unit, check the condensate drain hand connection to be sure it is the same as the cooling coil hand of connection, and that it agrees with the drain stub-up. If necessary, move condensate drain cap to the opposite end. Drain pan can be sloped in direction of drain connection. Do not discard drain cap (Figure 8). Drain pan slope can be field adjusted front-to-back and left-to-right by removing and re-setting the adjustment screws on each side of the pan adjustment bracket.

Figure 6: Move Condensate Drain Cap to Opposite End of Drain Stub-Up

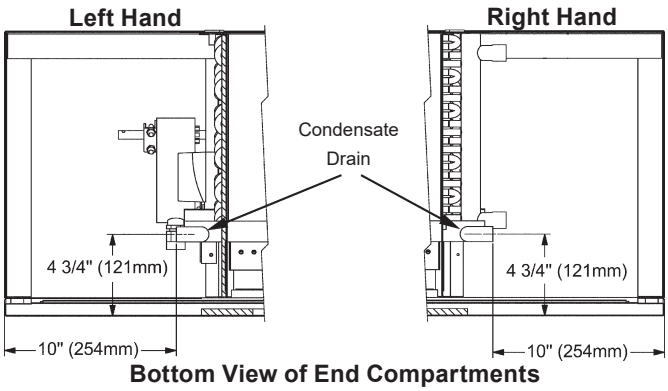


Figure 7: Ceiling Unit Arrangements

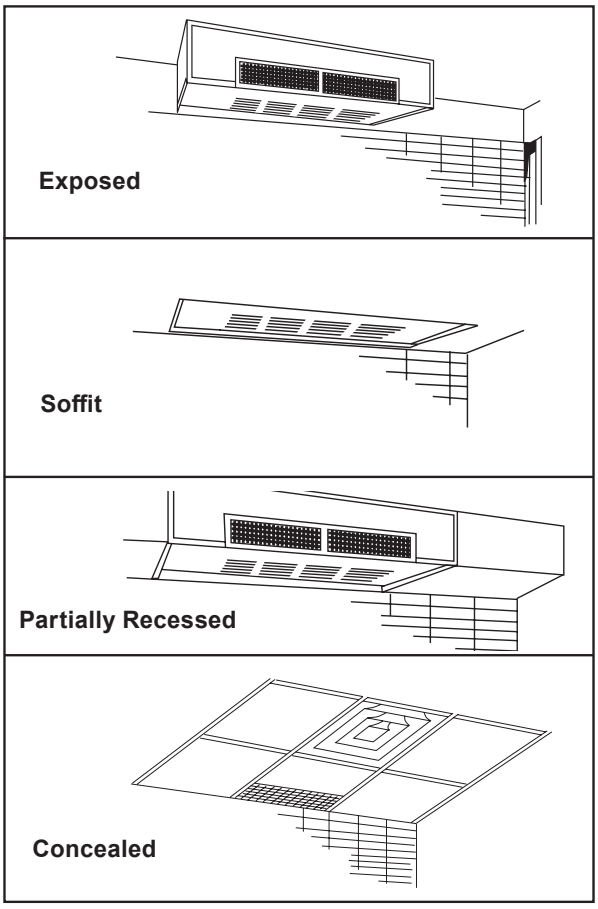
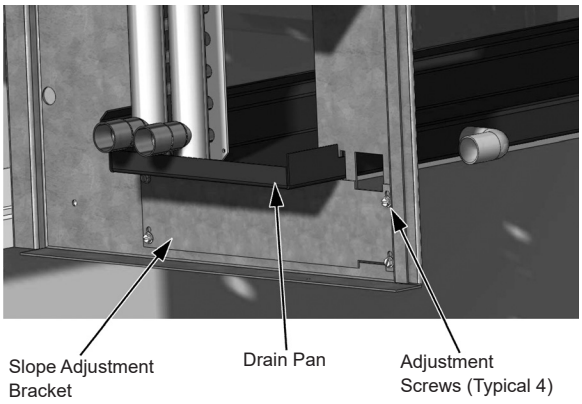


Figure 8: Field Adjustable Drain Pan Slope (Partial Assembly Drawing Shown)



VentiMatic™ Shutter Assembly

In many installations, a Daikin Applied VentiMatic Shutter Assembly is specified. See Figure 9. This one-way shutter is a continuously variable, gravity actuated, room exhaust vent that operates in direct response to positive static pressure. It opposes any airflow into the room and allows a slight positive pressure.

It is important that the VentiMatic shutter and unit ventilator louvers are mounted on the same wall. This neutralizes the effect of the wind. Forcing excess air into the room through the unit ventilator louver overcomes the same wind pressure that works to keep the VentiMatic shutter closed. This prevents room air exhausting from the room through the VentiMatic shutter.

Figure 9: VentiMatic Shutter Assembly

Note: *Bird screen and louver are shipped in one (1) piece.*

Installing Louvers

Louver Details

Figure 10: Horizontal and Vertical Blade Louvers, Without Flange (See Caution Below for Louver Blade Orientation and Drainage)

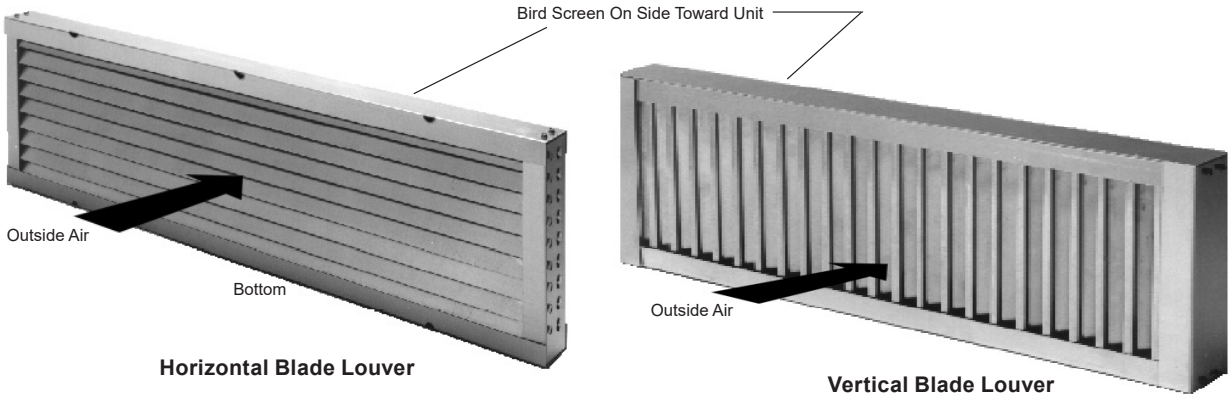
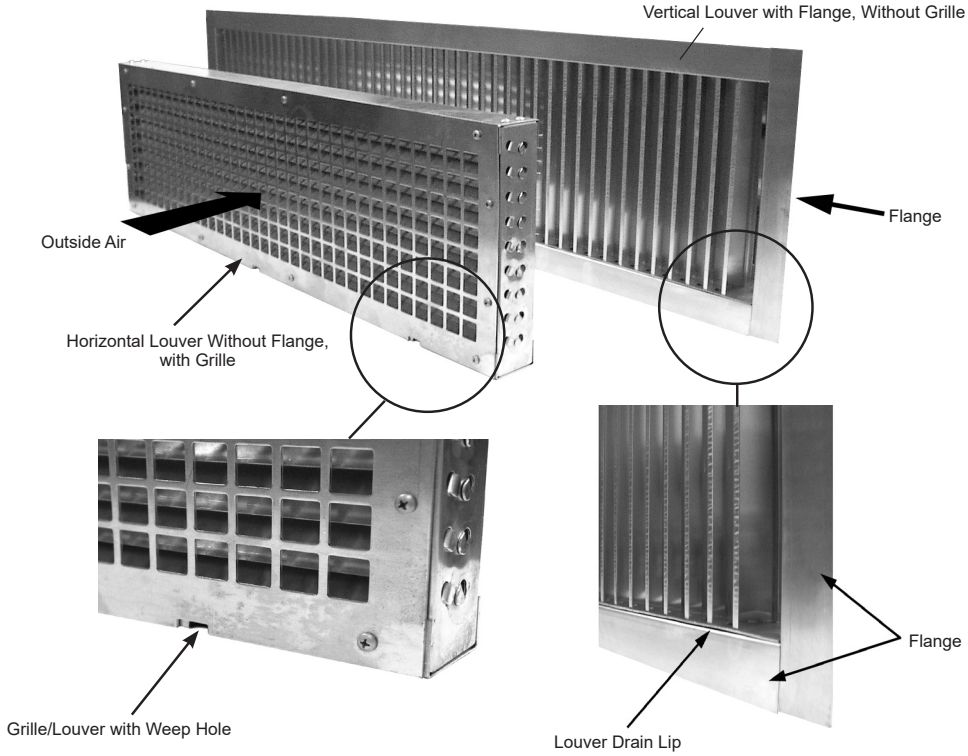


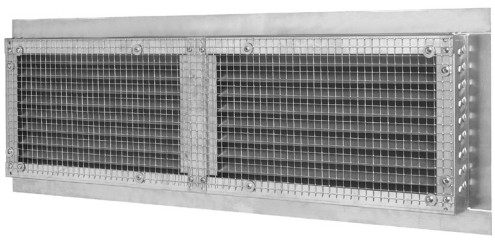
Figure 11: Horizontal and Vertical Blade Louvers, Without Flanges with Grille or with Flange Without Grille



⚠ CAUTION

Locate drain lip at bottom of vertical louver to allow proper drainage. For horizontal louvers, the louver blades should face down for proper drainage. Bird screen should always be on side toward unit.

Figure 12: Rear of Horizontal Blade Louver with Bird Screens and Flange



Typical Installation Methods

If the fresh air opening has not yet been made, see Figure 10 through Figure 20 for the recommended locations and the job-specific plans for the exact location. Follow local codes.

Cut the wall opening so that it is slightly larger than the louver being installed. For dimensions, see Table 2. If the opening is already there, measure to be sure there is a minimum of 3/8" (9 mm) clearance around all sides. For masonry installations, a lintel must be installed above all louvers.

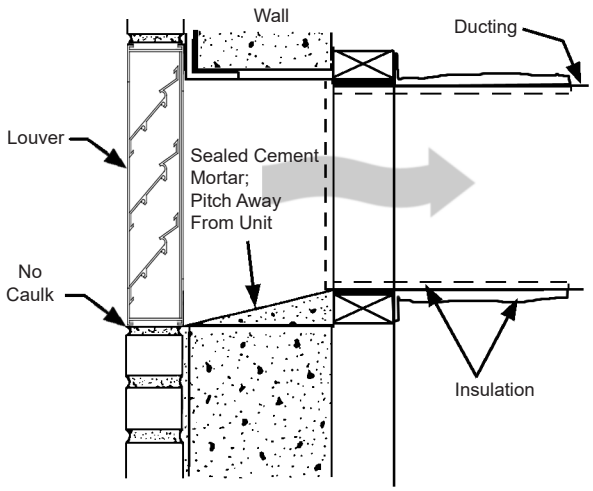
In most applications, the job specifications require ductwork connection between the louver and the unit. When using ductwork, properly caulk it to ensure a weather-tight seal. This is critical in preventing freeze-ups, cold drafts, and air infiltration. Be sure the wall is smooth, square, and provides a suitable mating surface (see Figure 13 & Figure 14).

Table 2: Recommended Wall Openings for Wall Louvers

B	C	Recommended Wall Openings For Wall Louvers		Maximum Number of VentiMatic Shutters Which Can Be Mounted On Standard Louver		VentiMatic Shutter(s) Air Capacity Maximum	
		Length	Height	24" Shutter	36" Shutter	cfm	L/s
24″ (610)	27″ (659)	24 5/8″ (613)	10 7/8″ (267)	1	0	500	236
36″ (914)	39″ (991)	36 5/8″ (918)	10 7/8″ (267)	0	1	750	354
48″ (1219)	51″ (1295)	48 5/8″ (1222)	10 7/8″ (267)	2	0	1000	472
60″ (1524)	63″ (1600)	60 5/8″ (1527)	10 7/8″ (267)	1	1	1250	590
72″ (1829)	75″ (1905)	72 5/8″ (1832)	19 7/8″ (495)	0	2	1500	708

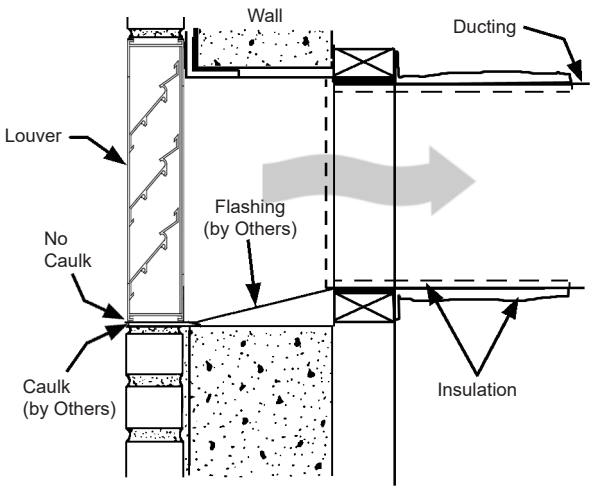
Before setting the louver, construct a sloping, sealed cement mortar base to drain unwanted moisture to the outside, (see Figure 13). Be sure the mortar base is 1" (25 mm) thick at the unit and tapers toward the louver. This is critical in preventing water leaks and air leaks under the unit. Be sure the sealed cement mortar base is smooth and flush with the interior wall.

Figure 13: Typical Louver Installation with Sloping Sealed Cement Mortar Base



If it is not possible to construct a sloping mortar base, then field-supplied flashing is required. See Figure 14. The flashing should terminate flush with the exterior of the building. Place a bead of caulk under the flashing to prevent moisture from wicking back to the unit. Do not caulk the joint between the louver and the flashing. This joint is designed to let unwanted moisture escape.

Figure 14: Typical Louver Installation with Flashing



⚠ CAUTION

Personal injury hazard. Wear protective gloves to avoid possible cuts and abrasions from exposed edges. Avoid contact with sharp edges.

See Figure 10 through Figure 20. Before setting the louver, be sure the drain lip (vertical louver) is at the bottom, horizontal louver blades face down and the bird screen is towards the unit. See Figure 10 and Figure 11. Place a heavy bead of caulk along the top and the two vertical sides of the louver, leaving the bottom uncaulked so that if moisture gets into the area between the louver and the unit, it can drain to the outside, unrestricted.

If the louver is supplied with flanges, (Figure 16) place an additional bead of caulk on the inside of the top and side flanges that come in contact with the building facade. Do not caulk the bottom flange. Place the louver in the opening and push it tight against the supplied building, fastening it to the exterior of the building using fasteners (by others) appropriate to the installation. Seal the top and sides with a waterproof caulk to make it weather-tight. Do not caulk the bottom of the louver; doing so might trap unwanted moisture behind the flange. (See Figure 16 and Figure 17.)

If the louver is supplied with no flanges, (Figure 17) place the louver in the opening so that it is recessed a minimum 1/16″ (2 mm) beyond the building facade or as directed in the architectural plans. If specified in the plans, secure the louver in the wall using mechanical fasteners (supplied by others) appropriate to the installation. (See Figure 15 for suggested fastening). With the louver solidly in place, run a bead of caulk around the perimeter of the louver to seal it weather-tight. Do not plug the weep holes (horizontal louver) or the drip line (vertical louver). This might restrict the flow of unwanted moisture to the outside.

If flashing was used instead of the sloping mortar base, caulk the flashing where it meets the inside of the opening between the louver and the unit. See Figure 14. This helps prevent moisture from getting under the flashing and into the room.

Figure 15: Suggested Method for Fastening Louver (Without Flange) Inside Wall Opening.

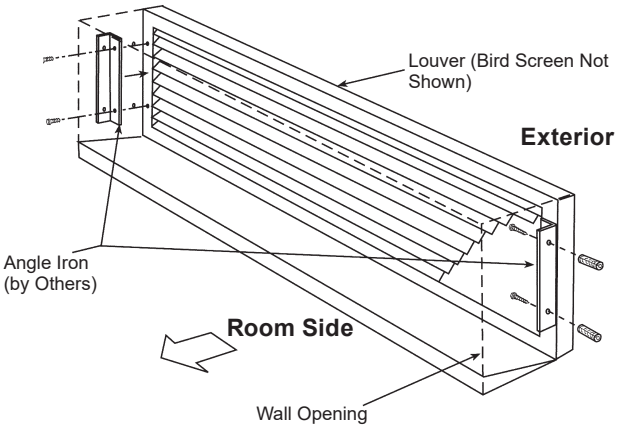


Figure 16: Vertical or Horizontal Blade Wall Intake Louver (Flanged) (Vertical Blade Shown)

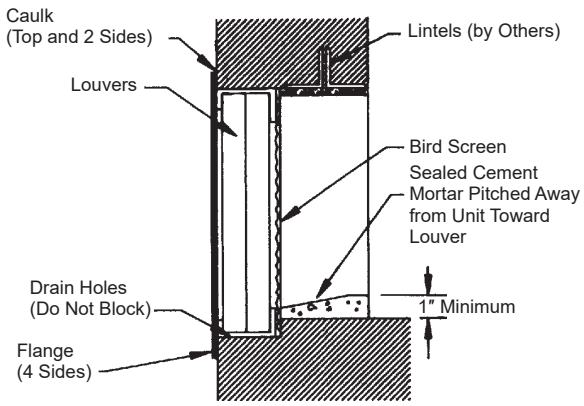
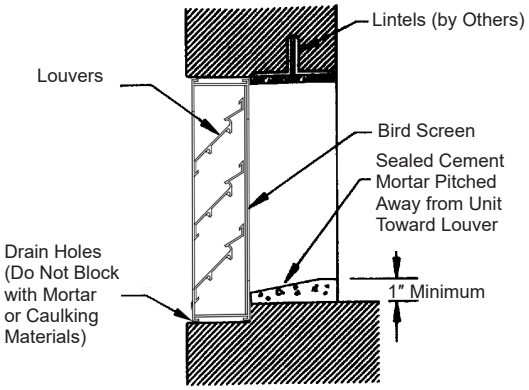


Figure 17: Vertical or Horizontal Blade Wall Intake Louver (Recessed Without Flange) (Horizontal Blade Shown)



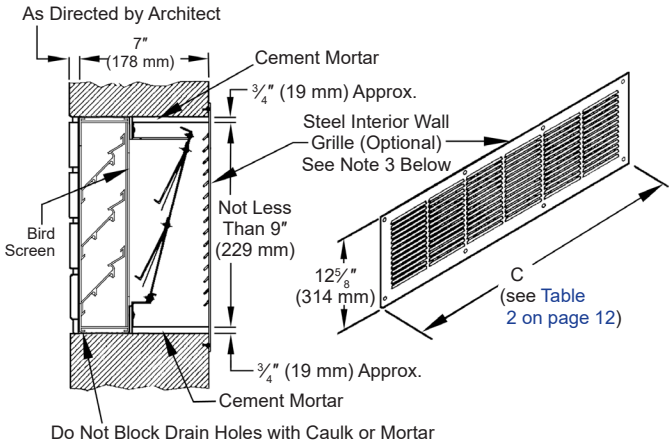
Installing the VentiMatic Shutter Assembly

The VentiMatic Shutter Assembly is mounted on an installed wall louver. For larger units with 100% ventilation air dampers, two VentiMatic Shutters may be mounted side by side on the same louver, see Figure 20.

The size and appearance of the wall louvers and the VentiMatic Shutter are identical, with or without optional grilles used with the unit ventilator.

When installing VentiMatic Shutter(s) on the wall louver, make sure all moving parts are free to operate unobstructed and placed level and plumb for proper operation. If optional steel interior wall grille is furnished, install as shown in Figure 18.

Figure 18: Louver, VentiMatic Shutter, Interior Wall Grille Details, Dimensions

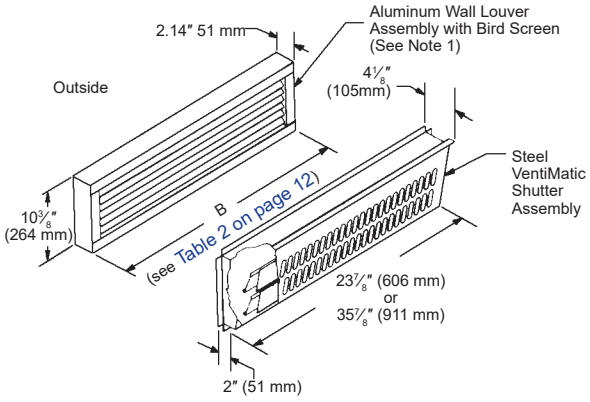


NOTE 1: Horizontal blade wall louver shown. Vertical blade wall louver also available with VentiMatic shutter.

NOTE 2: Optional exterior grille matches unit ventilator wall louver in material and design. Mounted on wall louvers.

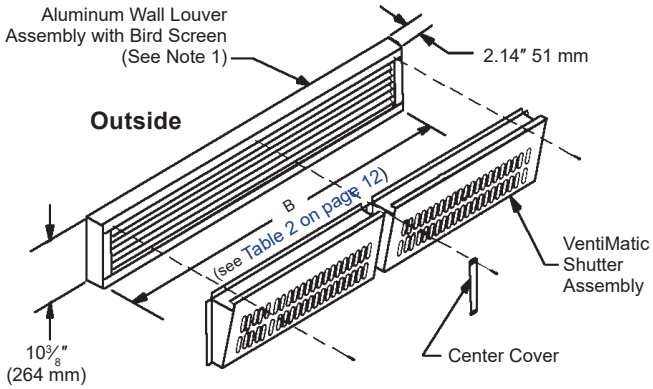
NOTE 3: Optional steel interior wall grille should be used to conceal the interior wall opening whenever the VentiMatic shutter is not located behind shelf cabinets or DraftStop enclosure. Hardware to mount the interior wall grille is not included.

Figure 19: Single VentiMatic Shutter & Wall Louver



Decorative Exterior Grille also Available (See Note 2)
(Bird Screen Not Shown)

Figure 20: Two VentiMatic Shutters & Wall Louver



Decorative Exterior Grille Also Available
(See Note 2) (Bird Screen Not Shown)

Typical Discharge Air Arrangements

NOTICE

1. For all recessed applications (full or partial) it is necessary to carefully examine both the inlet air and the discharge air physical locations. This must be done for each location individually and in combination with each other to ensure they are compatible with the specific installation.
2. Duct collars shipped loose for field installation not by Daikin Applied.
3. It is important also to verify there is sufficient clearance to open and remove the bottom access panels and end panels for routine maintenance.
4. All dimensions approximated.

36" Deep Unit (750 to 1500 CFM)

Figure 21: Arrangement AT Unit Mounted Plenum with Front Discharge Double Deflection Grille

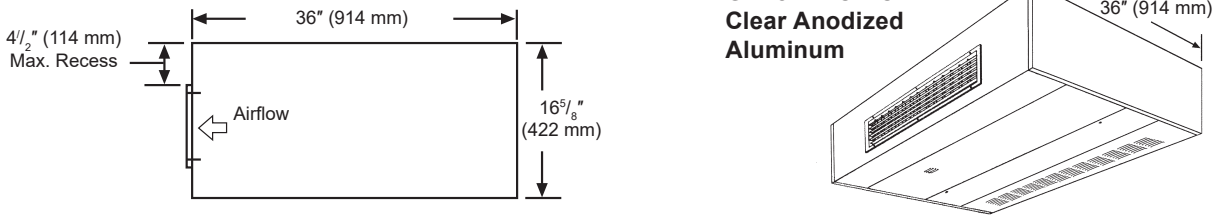
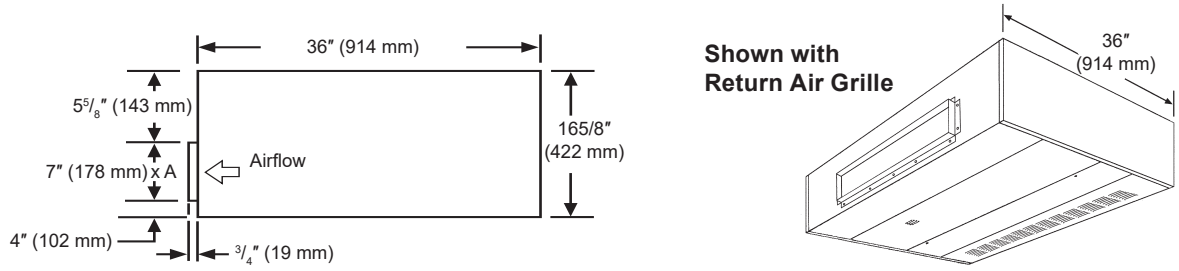
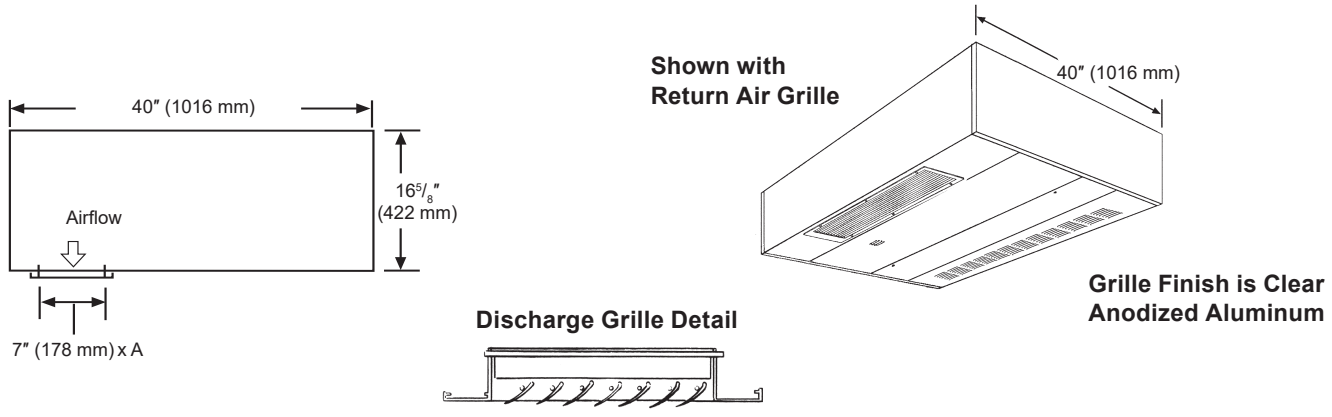


Figure 22: Arrangement AH Unit Mounted Plenum with Front Discharge Duct Collar



40" Deep Unit (750 to 2000 CFM)

Figure 23: Arrangement BD Bottom Discharge with Double Deflection Grille



40" Deep Unit (2000 CFM)

Figure 24: Arrangement FG Unit Mounted Plenum with Front Discharge Double Deflection Grille

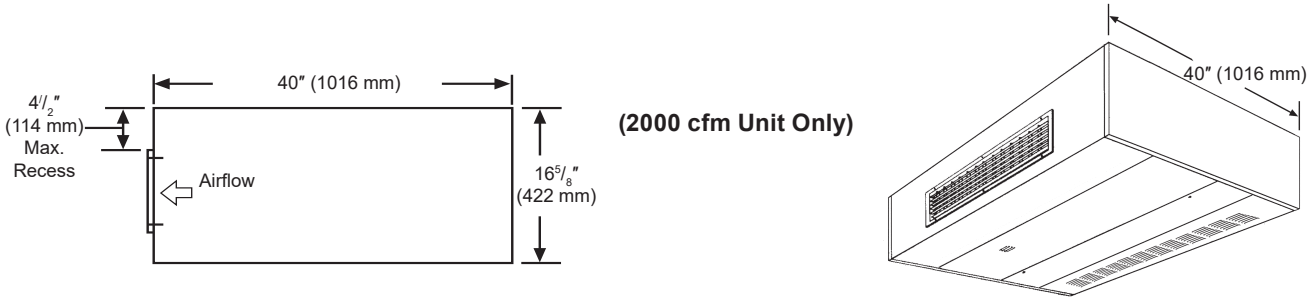
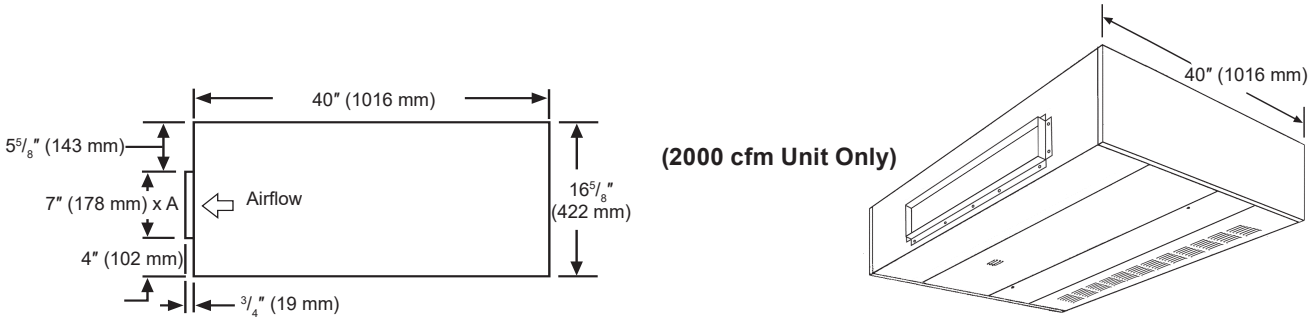


Figure 25: Arrangement FD Unit Mounted Plenum with Front Discharge Duct Collar



Intake Air Arrangements

Figure 26: Arrangement 25 Recirculating Room Air (No Room Air/Outside Air Dampers)

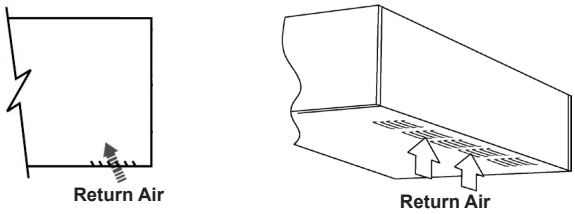


Figure 27: Arrangement 26 Return Air Bottom Grille/Outdoor Air Top Duct Collar

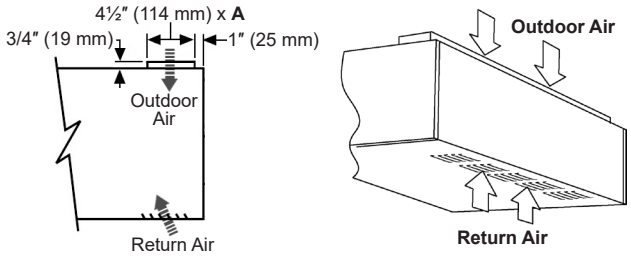


Figure 28: Arrangement 27 Return Air Bottom Grille/Outdoor Air Rear Duct Collar

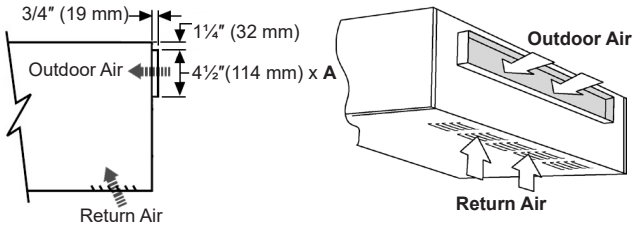


Figure 29: Arrangement 28 Return Air Rear Duct Collar/ Outdoor Air Top Duct Collar

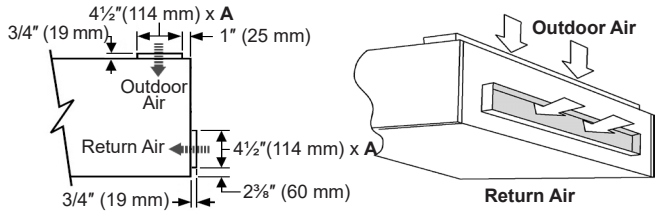


Figure 30: Arrangement 29 Return Air Rear Duct Collar/ Outdoor Air Rear Duct Collar

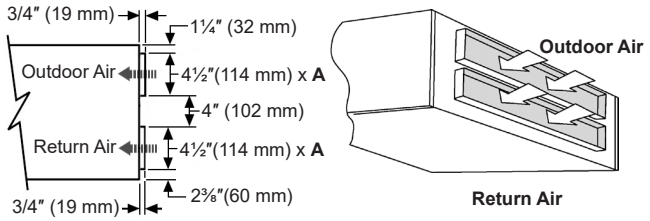


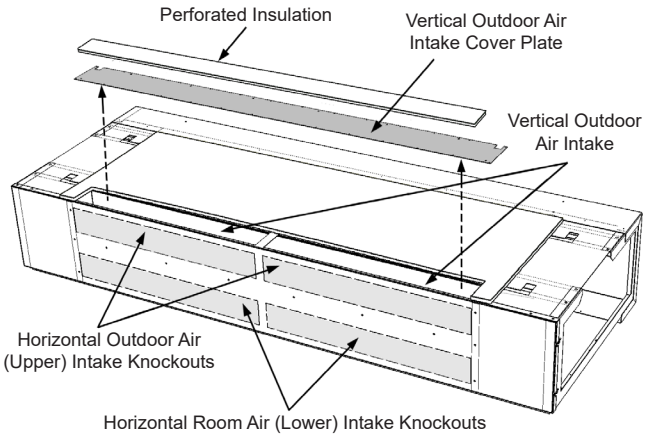
Table 3: Dimensions

Unit Series		H07, V07	H10, V10	H13, H13	H15, V15	H20, V15
A	in	36	48	6 0	72	72
	mm	914	1219	1524	1829	1829

NOTE: All dimensions approximated.

Intake Air Knockouts

Figure 31: Room Air Horizontal (Lower) Intake Knockouts, Horizontal Outdoor Air (Upper) Intake Knockouts and Vertical Outdoor Air Intake Opening with Cover Plate



NOTE 1: For all recessed applications (full or partial) it is necessary to carefully examine both the inlet air and the discharge air physical locations. This must be done for each location individually and in combination with each other to ensure they are compatible with the specific installation.

NOTE 2: Duct collars shipped loose for field installation not by Daikin Applied.

NOTE 3: It is important also to verify there is sufficient clearance to open and remove the bottom access panels and end panels for routine maintenance.

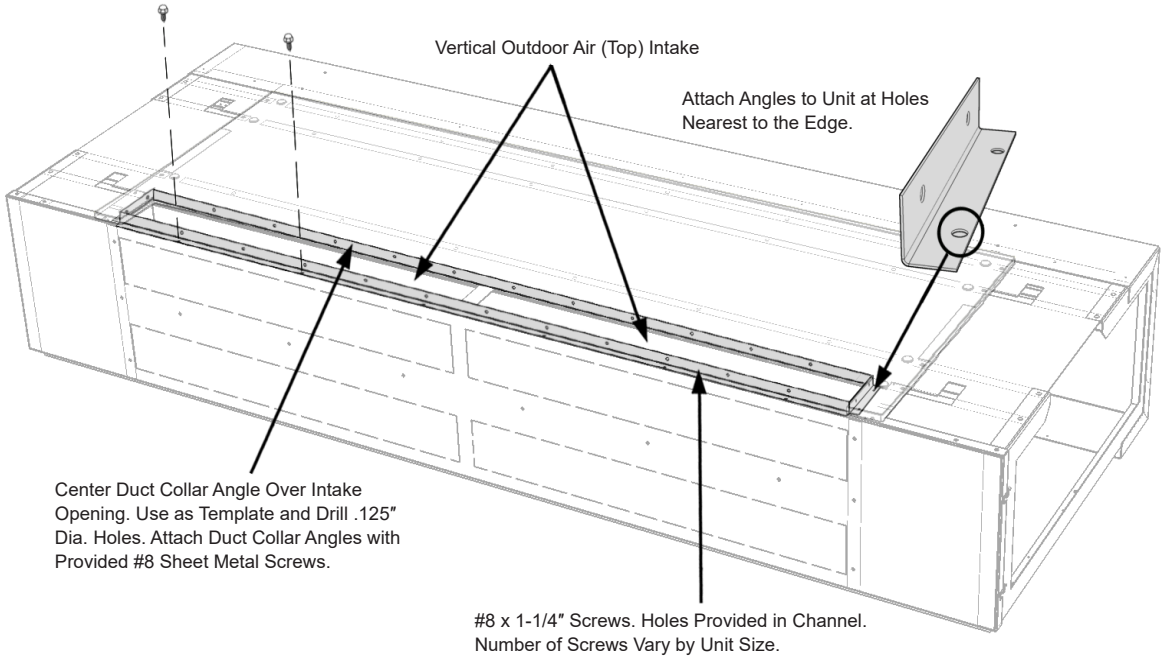
NOTE 4: The horizontal return air (lower) intake and horizontal outdoor air (upper) intake knockouts are factory provided and must be removed by the installing contractor based on job specifications.

NOTE 5: The vertical outdoor air (top) intake cover plate is factory provided and must be removed by the installing contractor when top outdoor air ventilation intake is required.

Vertical Outdoor Air (Top) Intake Duct Collar Installation

Remove the portion of the perforated insulation covering the vertical outdoor intake cover plate. Remove the screws securing the cover plate (number of screws vary by unit size). Remove the cover plate and install the duct flange as shown in Figure 32.

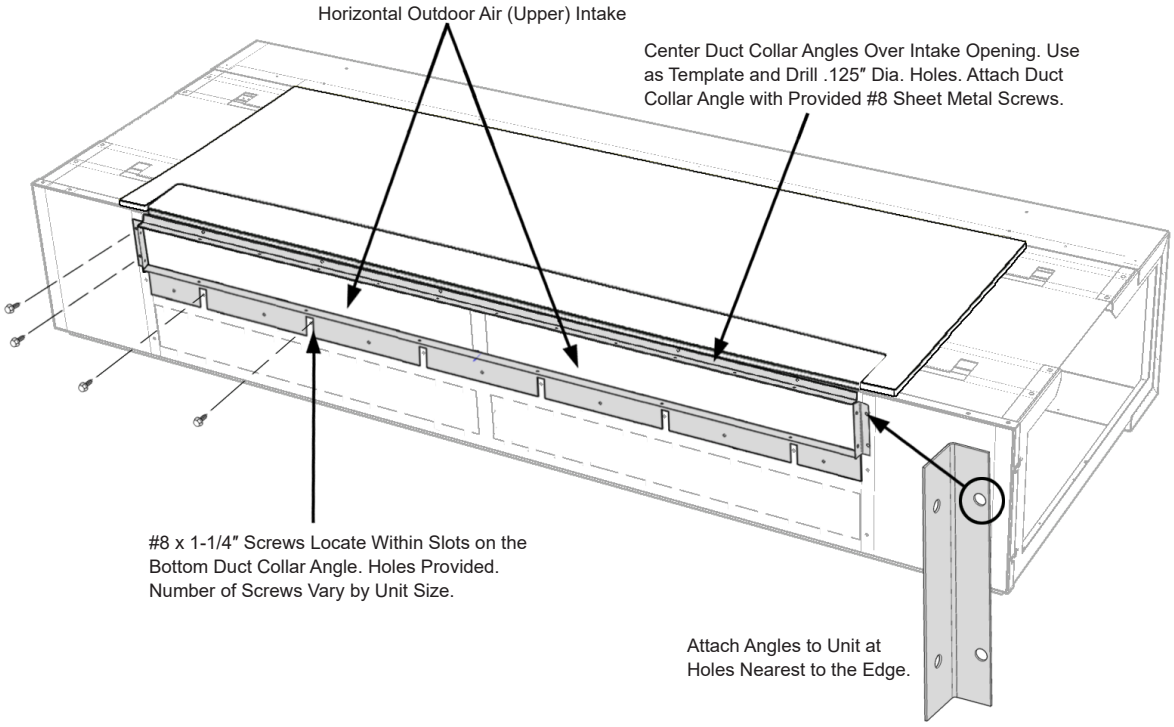
Figure 32: Vertical Outdoor Air (Top) Intake Duct Collar Details



Horizontal Outdoor Air (Upper) Intake Duct Collar Installation

Remove the upper knockout panel using a hammer and flat screw driver or punch. Install the duct flange as shown in Figure 33 or Figure 35 on page 19.

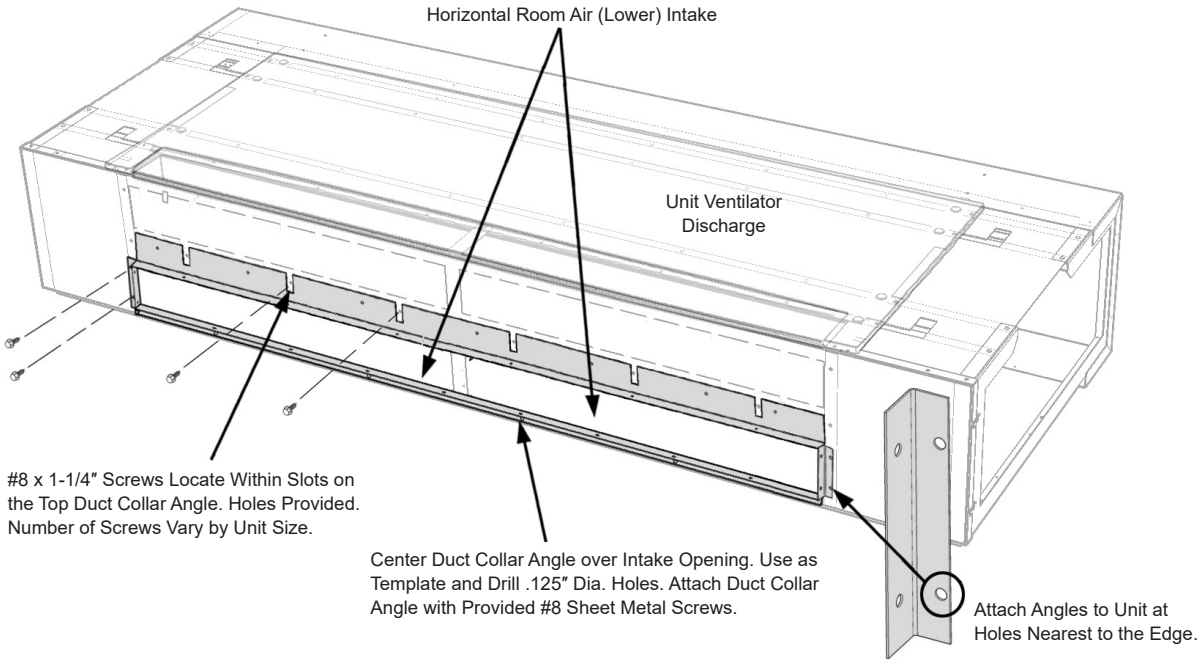
Figure 33: Horizontal Outdoor Air (Top) Intake Duct Collar Details



Horizontal Room Air (Lower) Intake Duct Collar Installation

Remove the lower knockout panel using a hammer and flat screw driver or punch. Install the duct flange as shown in Figure 34.

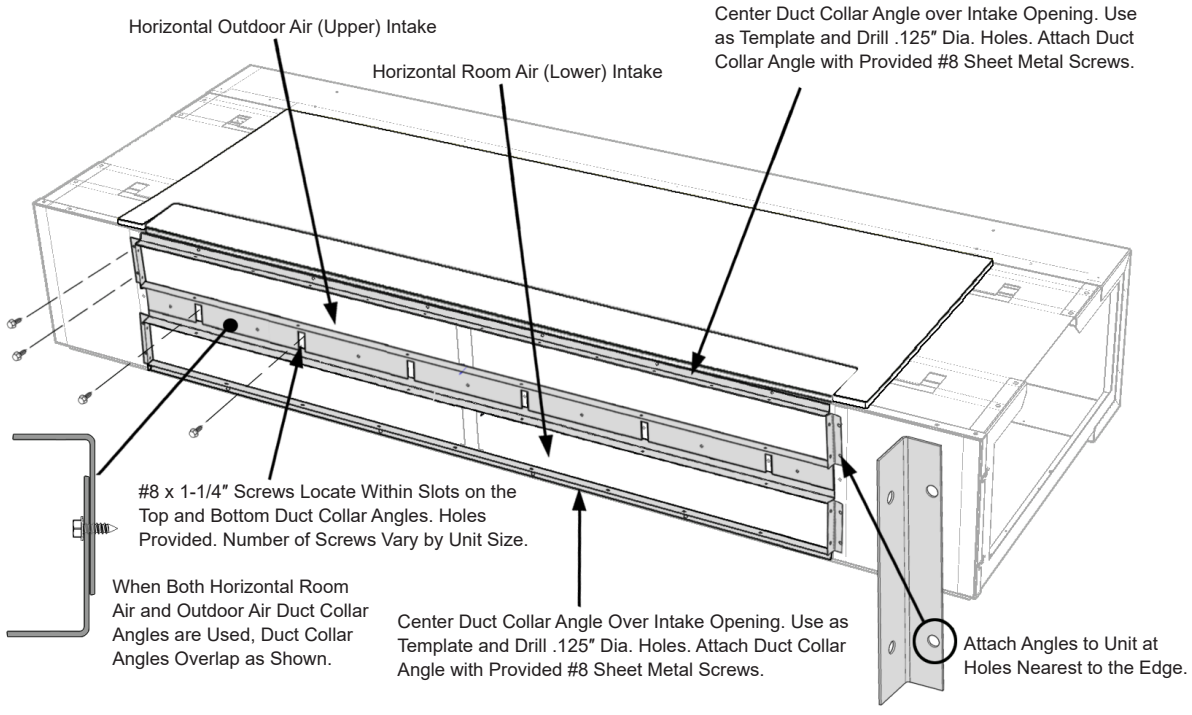
Figure 34: Horizontal Room Air (Lower) Intake Duct Collar Details



Horizontal Room Air (Lower) Intake and Horizontal Outdoor Air (Upper) Intake Duct Collars Installation

Remove the lower knockout panel and the upper knockout panel using a hammer and flat screw driver or punch. Install the duct flanges as shown in Figure 35.

Figure 35: Horizontal Room Air (Lower) Intake Duct Collar and Horizontal Outdoor Air (Upper) Intake Details



Duct System Considerations

NOTICE

The following general suggestions are offered only to stress their importance; however, there are additional important factors that must be considered. Assistance in the design of ductwork can be found in the ASHRAE Handbook and SMACNA publications, as well as other recognized authorities.

Proper acoustics is often a design requirement for schools. Most of the problems that are associated with HVAC generated sound can be avoided by properly selecting and locating the components of the system. There are some general do's and don'ts:

The following suggestions can reduce the amount of sound that reaches the occupied room:

- Use flexible duct connections.
- Make the discharge duct the same size as the unit discharge opening for the first five feet.
- Line the first 5 feet of the supply duct.
- Make two 90-degree turns in the supply and return ducts.
- Keep duct velocity low and follow good duct design procedures.
- Mount and support the ductwork independent of the unit.
- Line the first five feet of the return duct.
- Locate the return air intake away from the unit discharge.
- Provide multiple discharges.
- Restrict use of high pressure drop flexible ducting.
- Size the outdoor air and return air ducts to handle 100% of the total cfm to accommodate economizer or morning warm-up operation.

NOTICE

If a supply air duct with improper duct work is placed too close to the unit discharge, it will result in substantial noise. Avoid such forms of connections when designing ductwork where sound attenuation is critical. Figure 36 through Figure 38 shows suggested duct considerations per SMACNA and ASHRAE.

Sound control applies to the return side of the duct design as well as the supply side. Figure 37 illustrates suggested installation of return-air duct. Note the return air opening, and the sizing and changes in direction of the ductwork. Figure 38 illustrates suggested installation of outdoor air ducting.

Figure 36: Discharge Air Duct Work

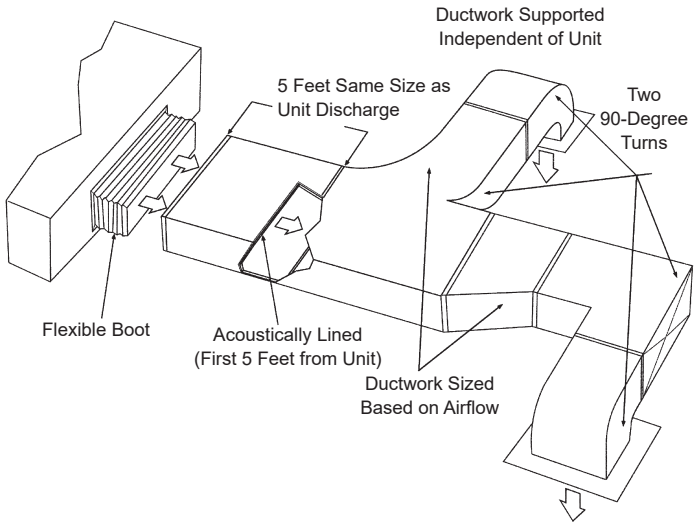


Figure 37: Intake/Return Air Duct Work

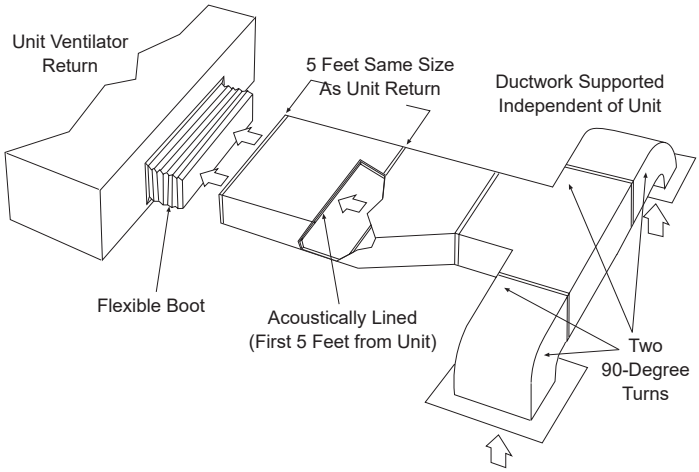


Figure 38: Outdoor Air Intake and Insulated Duct Work

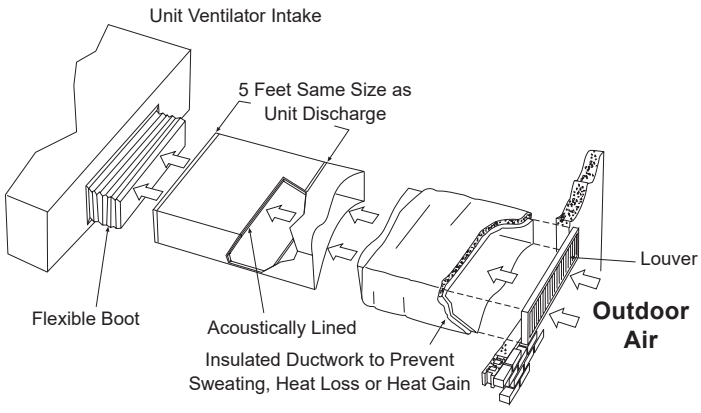
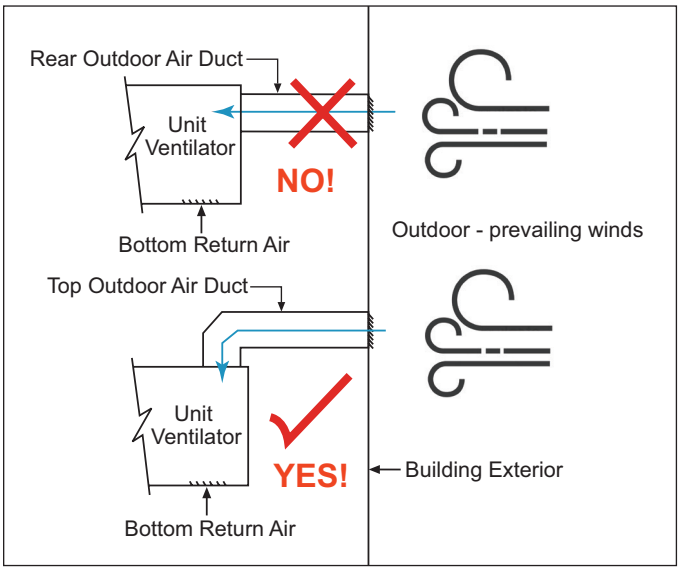


Figure 39: Outdoor Air Arrangement with Prevailing Winds



⚠ CAUTION

Avoid a rear outdoor return air arrangement, where strong prevailing winds have a direct path into the unit ventilator outdoor air opening. Strong air turbulence can cause undesirable sound levels, unit operating issues, and property damage.

Anchoring The Ceiling Unit Ventilator

Anchor the unit using the four unit mounting holes. The unit must be suspended from these holes (Figure 41). Do not attempt to suspend the unit at any other locations. When hanging the horizontal unit ventilator, the unit should be level both front to back and side to side. This aids in condensate removal from the drain pan, and reduction of sound and vibration. Use an 8 foot level to determine the unit is not twisted or pitched.

⚠ CAUTION

Unit must be anchored to an internal ceiling column or other suitable support. Anchoring the unit improperly can result in personal injury, damage to property, and impact unit performance.

Refer to Figure 4 on page 9 and Figure 41 and attach the unit ventilator to the ceiling through the four (4) 7/8″ (22.2 mm) diameter mounting holes provided, using field-supplied fasteners appropriate to the ceiling construction and the washers provided in the brown envelope with these instructions. The envelope also contains an Allen wrench to provide access to the unit. These holes must be used to suspend the unit. Do not attempt to suspend the unit from any other points. Hanger rods are normally used to suspend the unit, (see Figure 4 on page 9).

It is the responsibility of the installer to provide mounting hardware in accordance with local codes.

⚠ CAUTION

Ensure that the unit is properly level and not twisted. Use the unit mounting holes. Do not attempt to suspend the unit from any other points. A twisted and unleveled unit will cause poor performance due to vibration.

Use an 8 foot level to ensure front to back and side to side are level. Twisting can result in unit vibration due to rotating components (fans, fan shaft, and motor) being out of alignment. This can also cause premature motor failure.

Ceiling unit ventilators can be mounted in a variety of exposures including: completely exposed, partially exposed, partially or fully recessed, or completely concealed (see Figure 7 on page 10). For partially and fully recessed units, wall guard flanges are a standard accessory to provide a finished appearance at the ceiling (Figure 40).

One-inch duct collars are provided for field duct attachment to the supply-air outlet. The duct collars are field installed. Locate the unit ventilator as close as practical to the outdoor air intake opening. Insulate the outdoor air duct to reduce sweating or temperature rise (see Figure 38 on page 20).

Assemble recess flange and then attach to ceiling T bar or plaster board. Recess flange must not make contact with unit, to prevent transmission of any vibration (Figure 40).

NOTICE

Do not attach or hang the ceiling off of the unit ventilator.

Figure 40: Install Ceiling Unit Flange

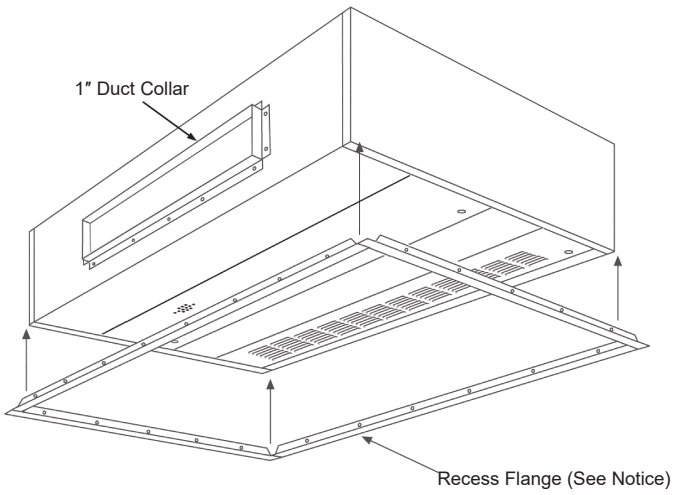
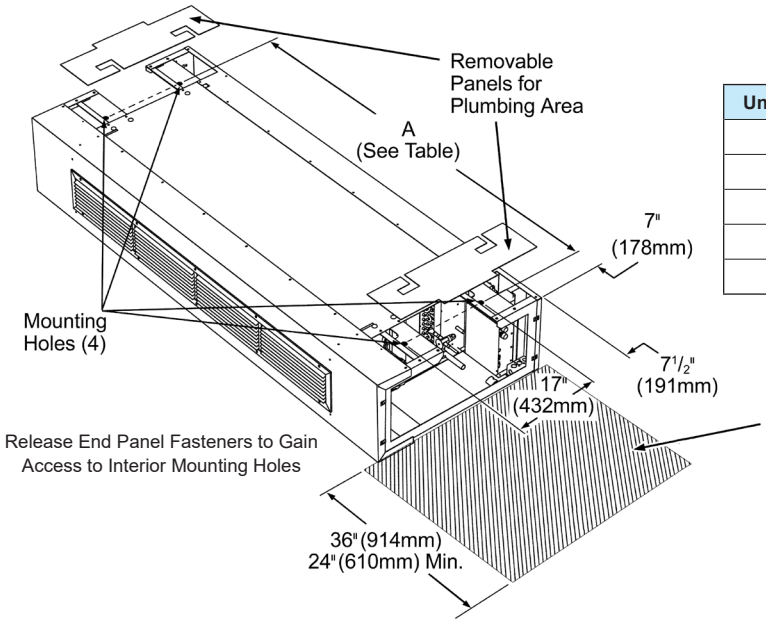


Figure 41: Mounting Hole Locations



Unit Nominal Capacity	Dimension "A"
H07, V07	48″ (1219)
H10, V10	60″ (1524)
H13, V13	72″ (1829)
H15, V15	84″ (2134)
H20, V20	84″ (2134)

Note:
Shaded Area = 36″ Horizontal Clearance Recommended at Right End for Service (24″ Minimum). Amount of Recess Must Consider Location of End Panel Fasteners. Recess Flanges Must Not Interfere with Access to These Fasteners.

Make Piping Connections

⚠ CAUTION

Be sure the hot and chilled water supply and return system are thoroughly flushed and cleaned before connecting piping to the unit ventilator. Debris in the lines can damage the unit.

For All Systems – Valves, Brazing and Insulating

Be sure to install the control valve(s) on the correct unit ventilator. Indiscriminate mixing of valves in the field can result in valves improperly sized for the desired flow rate, which can result in poor operation and coil freezeups. Install control valve so there is at least 2" (51 mm) minimum clearance to remove the actuator from the valve body.

Be certain that the control valve is installed correctly, with its orientation vertical. Valves should be installed at least 5 degrees off center.

⚠ CAUTION

Be certain that the control valves are installed with the proper port orientation to provide proper flow and fail safe operation. Incorrect installation can result in improper unit operation, and/or the possibility of coil freeze-up.

With future servicing considerations in mind, use standard, field-supplied shutoff valves and union connections; this permits easy removal of the coil or control valve if servicing is required.

⚠ WARNING

While brazing, have an extinguisher readily available. Wear appropriate eye and hand protection. Ensure all areas with shared ventilation have ample fresh air ventilation.

Proper ventilation is required for brazing. When brazing, use quenching rags, shields, or other steps to protect unit ventilator components from overheating damage (melting insulation and damage to valves, wiring, electronics, sensors, etc.).

Before filling, be sure to flush all piping adequately so that all debris is removed. Debris can prevent proper valve operation, resulting in overheating, overcooling, etc.

Ensure proper insulation of supply and return piping. Proper insulation prevents loss of unit ventilator capacity, overheating of end compartment, and / or moisture dripping.

The piping to and from the unit must be protected from outside air and freeze conditions. The piping must be suitably insulated for condensation or heat loss or gain. Penetrations entering the unit end compartments must be fitted/sealed for unit integrity.

Water Coil Connections

Hook up water piping in accordance with Figure 42 and Figure 43 for hot water and chilled water coil connections. Refer to drawings in "Coil Connection Locations" on page 24 through page 29 for specific coil arrangement.

⚠ CAUTION

Failure to install water piping to coils properly can result in improper unit operation and coil freeze-ups.

NOTICE

Use piping shut off valves and connection unions for future servicing to the coil supply and return stubs, instead of hard piping. This permits easy removal of the coil or control valve if servicing is required.

Figure 42: Hot Water Coil Connections

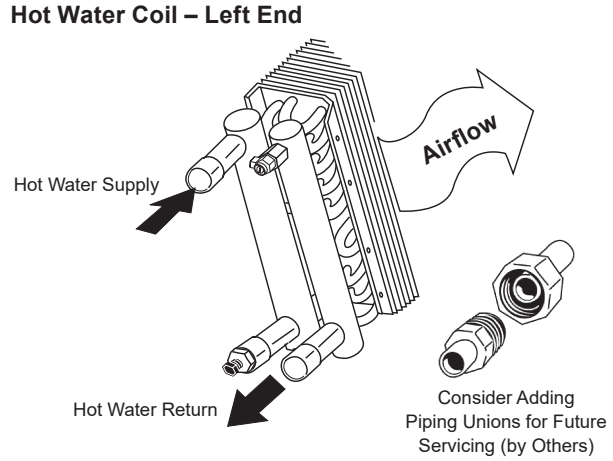


Figure 43: Chilled Water Coil Connections

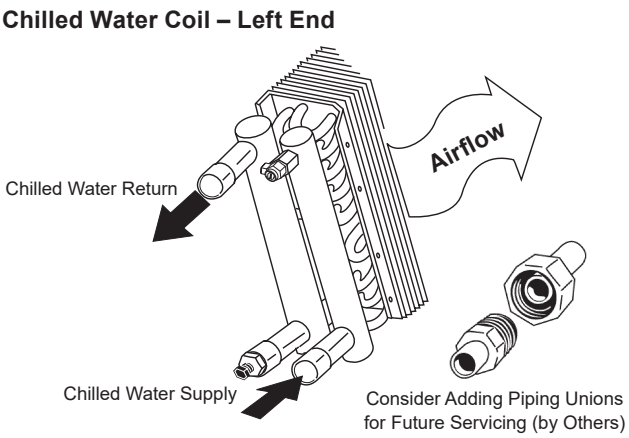
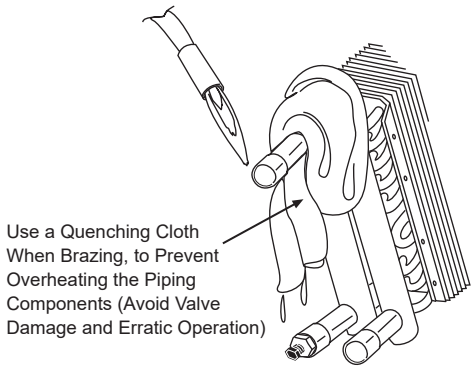


Figure 44: Protect Components From Overheating Before Brazing



2-Pipe Chilled Water/Hot Water Systems Install Water-in Temperature Sensor (OCT)

After making the piping connections, securely attach and insulate the water-in temperature sensor (OCT) to the water coil supply line (Refer to "Typical Piping Arrangements" on page 34). The sensor should be located on the water supply line in an area where there is continuous water flow. The sensor hangs loose in the same end compartment as the coil connections. This sensor must be attached correctly for proper unit operation.

⚠ WARNING

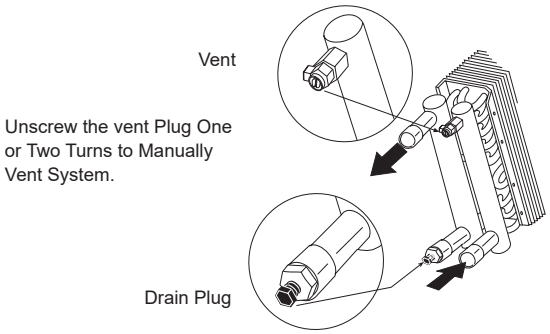
Water system under pressure. Keep face and body parts well away from vent. Water pressure can result in severe personal injury.

⚠ CAUTION

This unit has an auto air vent.

1. To vent manually at initial operation: unscrew knurled head (counter-clockwise) one or two turns. After manual venting, tighten (clockwise) knurled head firmly. The auto vent will work automatically.
2. The first time it is put into operation, a few drops of water may escape, afterwards the auto vent will be tight.
3. If dirt has entered the knurled head: disassemble, clean, and screw back in firmly (a built-in check valve will prevent leakage).

Figure 45: Auto Vent and Drain Plug (Chilled Water Coil Shown)



Suggested Condensate Trapping

Daikin Applied cooling unit ventilators are designed for condensate removal into a condensate disposal system. Do not connect the unit drain connection so that condensate exits to the outside and/or is exposed to freezing temperatures. The installer is responsible for any damage that might be caused from freezing condensate. In applications with an end compartment auxiliary drain pan, see the installation instructions shipped with the auxiliary drain pan itself.

NOTICE

Each unit application is unique. Trapping may vary, or may not be required for some applications.

Consideration should be given to trapping when a pressurized air system is providing air to the unit. The condensate trap provides for discharge of water from the unit ventilator drain pan during the cooling mode. The water seal (water level in the condensate trap), prevents the flow of air from the unit ventilator end compartment into the coil section during normal operation.

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.

The trap should be constructed of 7/8″ clear plastic piping. The condensate piping from the drain trap must be sloped to facilitate proper drainage. The clear plastic trap should be clamped and removable for cleaning. It may be necessary to manually fill the trap at system start-up, 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. Foreign debris can prevent proper operation resulting in condensate buildup.

Figure 46: Recommended Condensate Piping

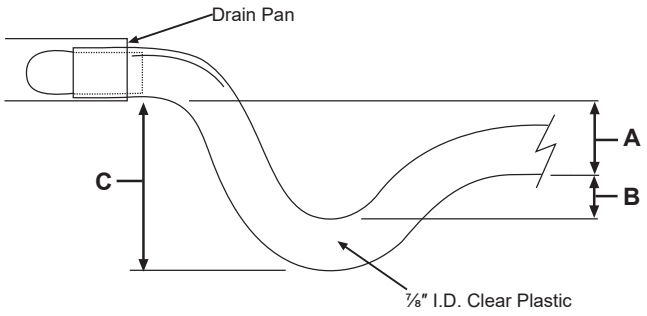
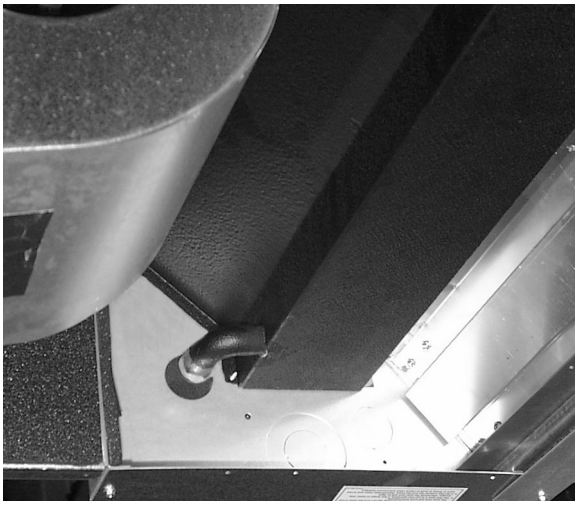


Table 4: Condensate Drain Static Pressures

	A	B	C
High Static	1½″	3/4″	3⅛″

Figure 47: Condensate Drain Viewed From Bottom of Unit with Hinged Access Door Open



Coil Connection Locations

Heating Only

NOTICE

1. Unless otherwise noted left hand connections are the same as right hand connections.
2. Right-hand connections shown in figures.

NOTICE

1. All coils have the same end supply and return connections.
2. All water coil connections are ⅞" I.D. (female) sweat and all steam coils are 1⅛" (female) sweat connections. All coil connections terminate 9" (229mm) from the end of the unit.
3. Steam coils have a factory installed pressure equalizing valve and a 24" (610 mm) long pressure equalizing line which terminates in a ½" M.P.T. fitting.
4. Condensate connection is same end as coil connections, but is field reversible. Drain can be sloped in field.
5. All dimensions are approximated.

Figure 48: Hot Water Heating Only Unit (Coils 65, 66, 67)

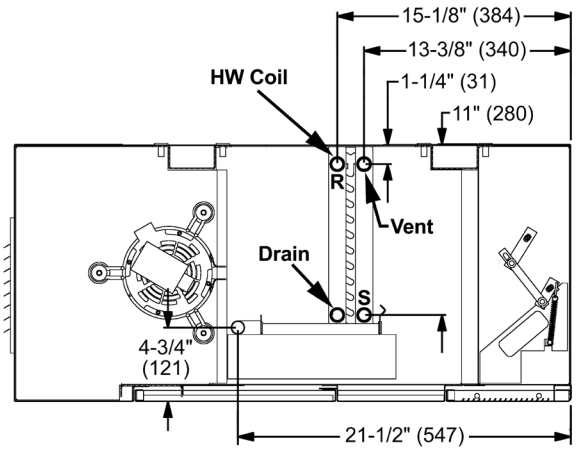


Figure 49: Steam Heating Only Unit (Coils 68, 69)

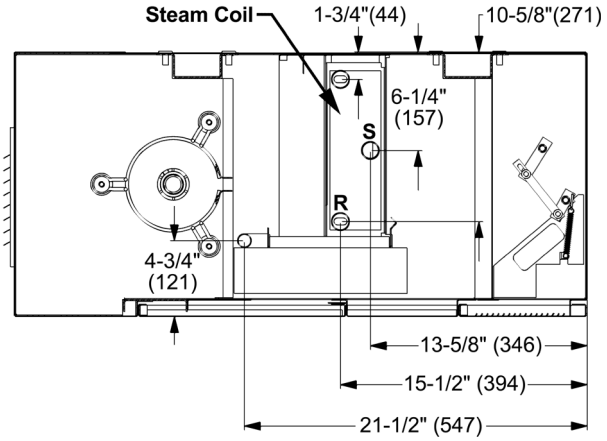
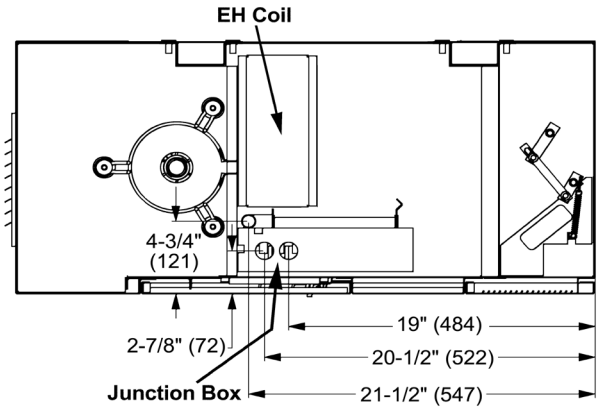


Figure 50: Electric Heating Only Unit (Coils 12, 13)



NOTE: This arrangement available on AHV units only.

Table 5: Heating Only – Coil Position / Combinations in Air Stream

First Position in Air Stream	Second Position in Air Stream	Face and Bypass	Valve	
		AHF	AHV	AHV Elec.
65, 66, 67	Z	X	X	
Z	68, 69	X	X	
Z	12, 13			X

NOTE: X indicates available. One coil per position.

Heating Coils	Cooling Coils
65 = 1-row Hot Water Coil	Z = None
66 = 2-row Hot Water Coil	
67 = 3-row Hot Water Coil	
68 = Low Capacity Steam Coil	
69 = High Capacity Steam Coil	
12 = Low Electric Heat Coil	
13 = High Electric Heat Coil	

Cooling Only

NOTICE

1. Linear dimensions referenced from rear of unit. Right hand views shown, dimensions are identical for left-hand configurations. Connection hand is determined by facing discharge air grille.
2. R = Return, S = Supply
3. Numerical codes [#] denote optional stainless steel drain pan (cooling coils).

NOTICE

1. All coils have the same end supply and return connections.
2. All water stubs are 7/8" I.D. (female) sweat and all steam coils are 11/8" (female) sweat connections. All coil connections terminate 9" (229 mm) from the end of the unit.
3. Steam coils have a factory installed pressure equalizing valve and a 24" (610 mm) long pressure equalizing line which terminates in a 1/2" M.P.T. fitting.
4. Steam/hot water connections may be same end as cooling coil connections, but they are recommended to be opposite end to facilitate piping. (Must be opposite end when using Daikin Applied controls.)
5. Cooling condensate connection is same end as cooling coil connections, but is field reversible. Drain can be sloped in field.
6. All dimensions are approximated.
7. DX coils (G[9] and M[0]) have female sweat connections. Interconnecting tube by others. See Table 7 for correct tubing size.

Figure 51: Chilled Water Cooling Only Unit (Coils V[5], S[6], W[7], Y[8])

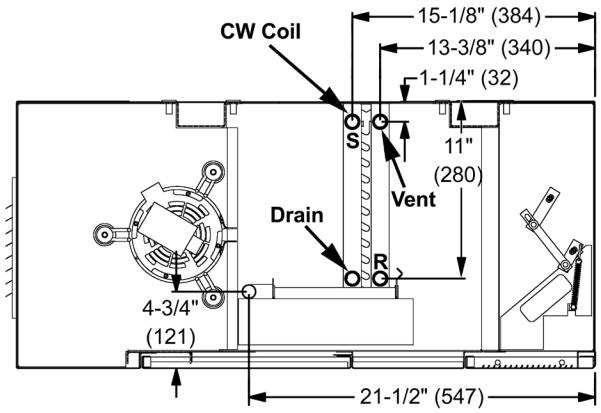


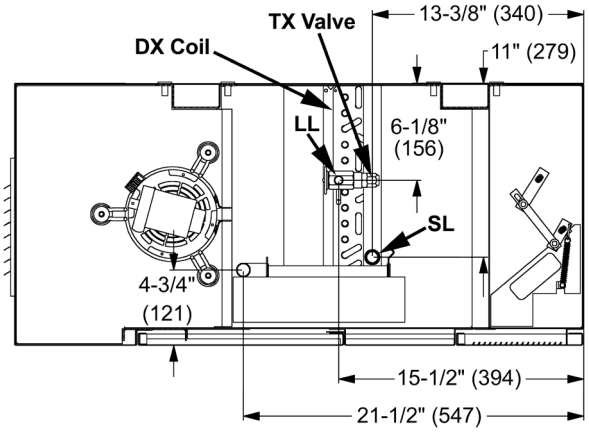
Table 6: Cooling Only – Coil Position / Combinations in Air Stream

First Position in Air Stream	Second Position in Air Stream	Face and Bypass	Valve
		AHF	AHV
V, S, W, Y, 5, 6, 7, 8	00	X	X
G, M, 9, 0	00		X

NOTE: X Indicates Available. One coil per position.

Heating Coils	Cooling Coils
00 = None	V or 5 = 2-row CW Coil
	S or 6 = 3-row CW Coil
	W or 7 = 4-row CW Coil
	Y or 8 = 5-row CW Coil
	G or 9 = Direct Expansion Coil
	M or 0 = DX with HP Operation

Figure 52: Direct Expansion Cooling Only Unit (Coil G[9], M[0])



NOTE: This arrangement available on AHV units only.

Table 7: DX Coil G[9], M[0] Connection Tubing

Unit Series	H07, V07	H10, V10	H13, V13	H15, V15
Suction Line O.D. (mm)	3/4″ (19)	3/4″ (19)	7/8″ (22)	7/8″ (22)
Liquid Line O.D. (mm)	1/4″ (6.35)	1/4″ (6.35)	3/8″ (10)	3/8″ (10)

Chilled Water and Heating Coils

Figure 53: Chilled/Hot Water (2-pipe) Unit (Coils U[1], D[2], E[3], F[4])

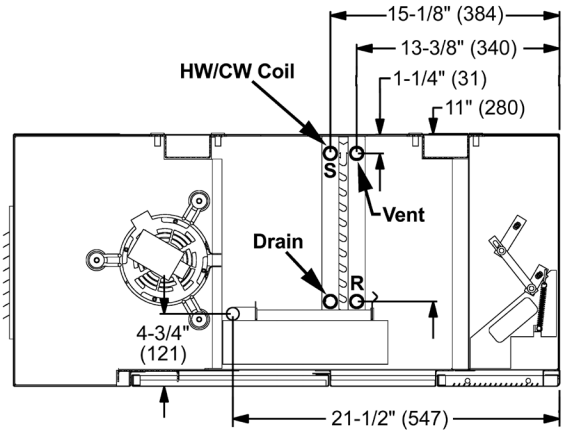
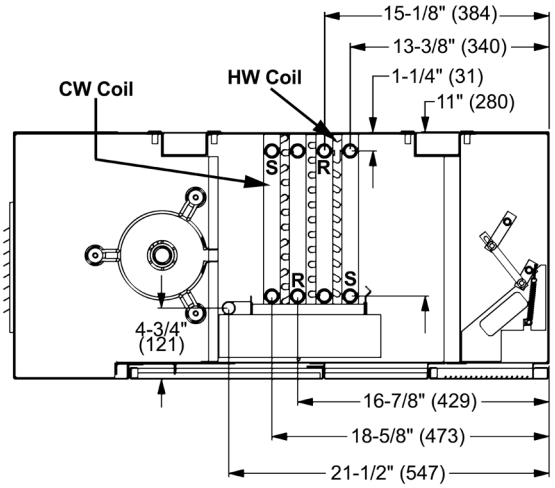


Figure 54: Chilled and Hot Water Unit (Cooling Coils V[5], S[6], W[7] Y[8]; Heating Coils 65, 66, 67)



NOTICE

1. All coils have the same end supply and return connections.
2. All water coil connections are ⅞" I.D. (female) sweat and all steam coils are 1⅛" (female) sweat connections. All coil connections terminate 9" (229 mm) from the end of the unit.
3. Steam coils have a factory installed pressure equalizing valve and a 24" (610 mm) long pressure equalizing line which terminates in a ½" M.P.T. fitting.
4. Steam/hot water connections may be same end as cooling coil connections, but they are recommended to be opposite end to facilitate piping. (Must be opposite end when using MicroTech controls.)
5. Condensate connection is same end as cooling coil connections, but is field reversible. Drain can be sloped in field.
6. Electric heating coil power connections are right end only. Junction box has 1" (25 mm) and 2" (51 mm) (trade size) knockouts, 10½" (267 mm) from right end of the unit.
7. All dimensions are approximated.

Figure 55: Chilled Water & Steam Unit (Cooling Coils V[5], S[6]; Heating Coils 68, 69)

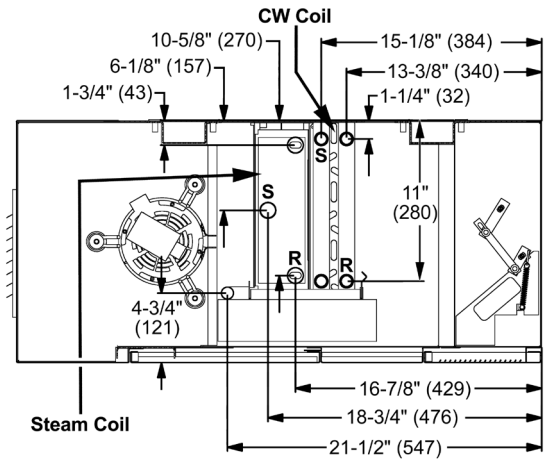
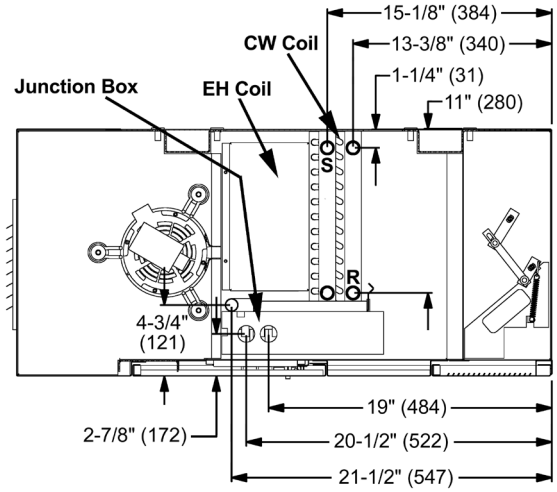


Figure 56: Chilled Water (1st Position) & Electric Heating (Cooling Coils V[5], S[6], W[7]; Heating Coil 12, 13)



NOTE: Electric heat, right hand only. Chilled water left hand only.

Figure 57: Chilled Water & Hot Water Unit (Cooling Coils V[5], S[6], W[7], Y[8]; Heating Coils 65, 66, 67)

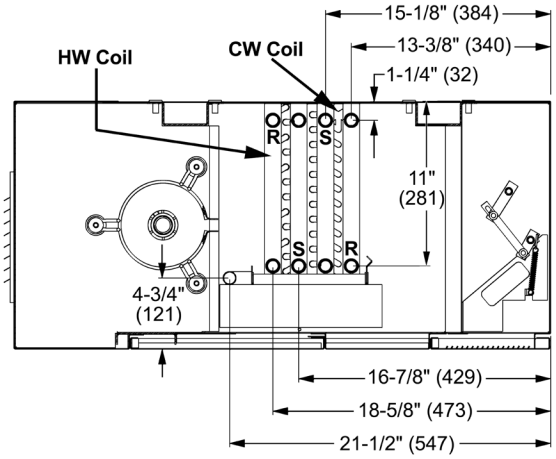


Table 8: Heat / Cool Coil Position / Combinations In Air Stream

First Position in Air Stream	Second Position in Air Stream
U, D, E,F, 1, 2, 3, 4	00
65, 66, 67	V, S, 5, 6
65, 66	W, 7
65	Y, 8
V, S, 5, 6	68, 69
V, S W, 5, 6, 7	12, 13

Heating Coils	Cooling Coils
65 = 1-row Hot Water Coil	U or 1 = 2-row CW/HW 2-pipe
66 = 2-row Hot Water Coil	D or 2 = 3-row CW/HW 2-pipe
67 = 3-row Hot Water Coil	E or 3 = 4-row CW/HW 2-pipe
68 = Low Capacity Steam Coil	F or 4 = 5-row CW/HW 2-pipe
69 = High Capacity Steam Coil	V or 5 = 2-row CW Coil
12 = Low Electric Heat Coil	S or 6 = 3-row CW Coil
13 = High Electric Heat Coil	W or 7 = 4-row CW Coil
00 = None	Y or 8 = 5-row CW Coil

Reheat

NOTICE

1. Unless otherwise noted left hand connections are the same as right hand connections.
2. Right-hand connections shown in figures.
3. R = Return, S = Supply
4. Numerical codes [#] denote optional stainless steel drain pan (cooling coils).

Figure 58: Chilled Water and Steam Unit (Cooling Coils V [5], S[6]; Heating Coils 68, 69)

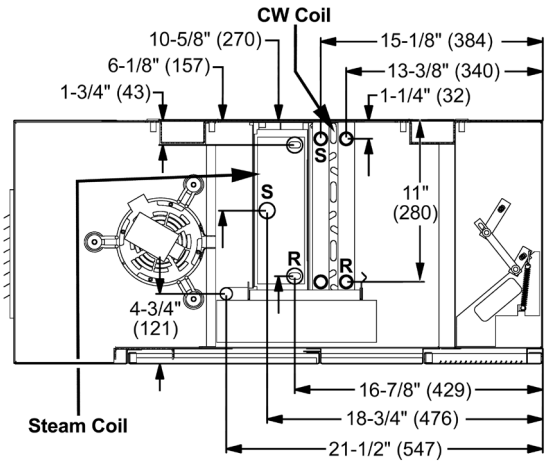
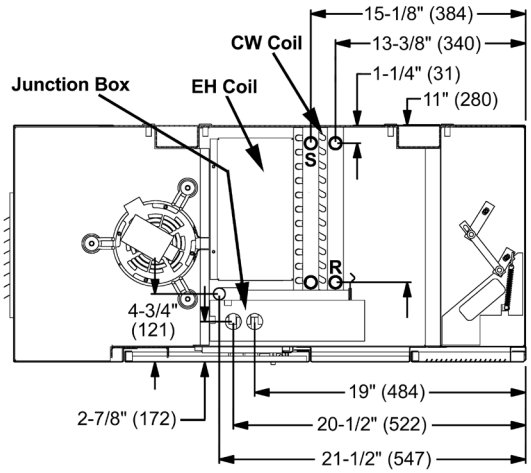


Figure 59: Chilled Water (1st Position) & Electric Heating (Cooling Coils V[5], S[6], W[7]; Heating Coil 12, 13)



NOTE: Electric heat, right hand only. Chilled water left hand only.

Figure 60: Direct Expansion and Hot Water Unit (Cooling Coil G[9], M[0], Heating Coils 65, 66, 67)

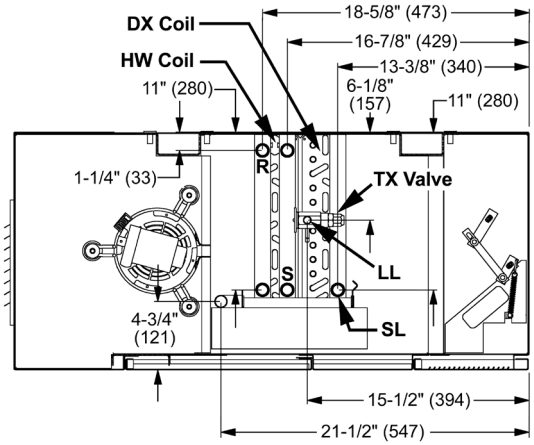


Table 9: Reheat Coil Position / Combinations In Air Stream

		Face and Bypass	Valve	
First Position in Air Stream	Second Position in Air Stream	AHB	AHR	AHR Elec.
V, S, 5, 6	65, 66, 67, 68, 69	X	X	
W, 7	65, 66	X	X	
Y, 8	65	X	X	
G, M, 9, 0	65, 66, 67 68, 69		X	
G, M, 9, 0	12, 13			X
V, S, W, 5, 6, 7	12, 13			X

NOTE: "X" Indicates available. One coil per position.

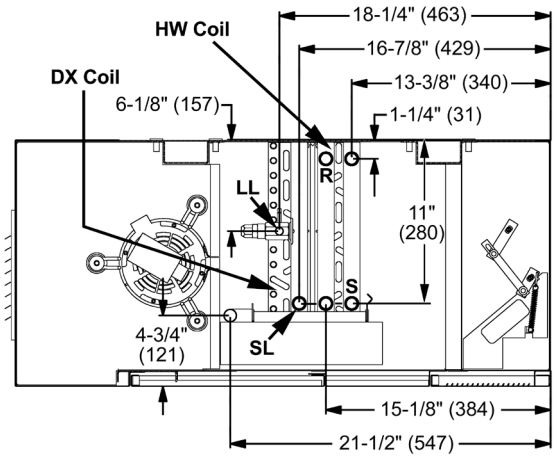
Heating Coils	Cooling Coils
65 = 1 Row Hot Water Coil	V or 5 = 2 Row CW Coil
66 = 2 Row Hot Water Coil	S or 6 = 3 Row CW Coil
67 = 3 Row Hot Water Coil	W or 7 = 4 Row CW Coil
68 = Low Capacity Steam Coil	Y or 8 = 5 Row CW Coil
69 = High Capacity Steam Coil	G or 9 = Direct Expansion Coil
12 = Low Electric Heat Coil	M or 0 = DX for HP Operation
13 = High Electric Heat Coil	

Direct Expansion (DX)

NOTICE

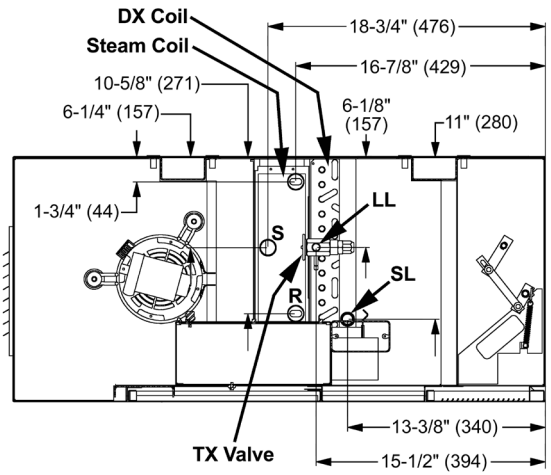
1. Unless otherwise noted left hand connections are the same as right hand connections.
2. Right-hand connections shown in figures.
3. R = Return, S = Supply, L = Liquid Line, S = Suction Line, EH = Electric Heat
4. Numerical codes [#] denote optional stainless steel drain pan (cooling coils).

Figure 61: Direct Expansion with Hot Water Unit (Cooling Coil G[9], M[0]) (Heating Coils 65, 66, 67)



NOTE: Direct Expansion (DX) coils have female sweat connections. Interconnecting tubing is by others. See Table 10 for correct tubing size.

Figure 62: Direct Expansion and Steam Unit (Cooling Coil G[9], M[0]) (Heating Coils, 68, 69)



NOTE: Direct Expansion (DX) coils have female sweat connections. Interconnecting tubing is by others. See Table 10 for correct tubing size.

Table 10: DX Coil (G[9], M[0]) Connection Tubing

Unit Series	H07, V07	H10, V10	H13, V13	H15, V15
Suction Line O.D. in (mm)	3/4″ (19)	3/4″ (19)	7/8″ (22)	7/8″ (22)
Liquid Line O.D. in (mm)	3/4″ (6.35)	1/4″ (6)	3/8″ (10)	3/8″ (10)

NOTE 1: All coils have the same end supply and return connections.

NOTE 2: All water stubs are ⅞″ I.D. (female) sweat and all steam coils are 1⅛″ (female) sweat connections. All coil connections terminate 9″ (229 mm) from the end of the unit.

Figure 63: Direct Expansion and Electric Heating Unit (Cooling Coils G[9], M[0]) (Heating Coils 12, 13)

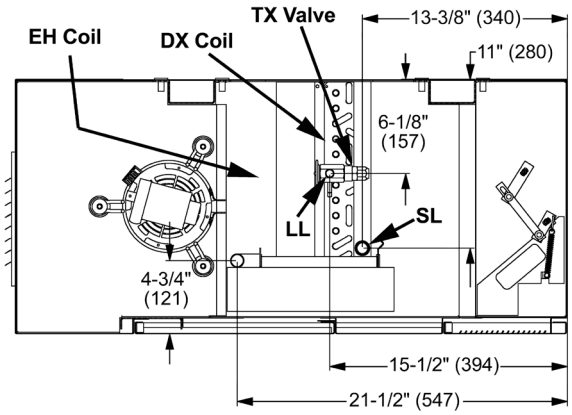


Table 11: Heat / Cool Coil Position / Combinations In Air Stream

First Position in Air Stream	Second Position in Air Stream
G, M, 9, 0	68, 69
G, M, 9, 0	12, 13
65, 66, 67	G, M, 9, 0

Heating Coils	Cooling Coils
65 = 1 Row Hot Water Coil	G or 9 = Direct Expansion Coil
66 = 2 Row Hot Water Coil	M or 0 = DX for HP Operation
67 = 3 Row Hot Water Coil	
68 = Low Capacity Steam Coil	
69 = High Capacity Steam Coil	
12 = Low Electric Heat Coil	
13 = High Electric Heat Coil	

Typical Valve Packages

The optional factory-supplied Daikin Applied control valve(s) for water applications are either 2-way or 3-way type. The control valve(s) are shipped separately from the unit ventilator itself to help avoid shipping damage to the piping of the connection stub from the weight of the valve and to provide the installer with maximum flexibility in making the field piping connection. Before proceeding, see Figure 64 through Figure 84 as applicable, as well as the job-specific piping drawings.

NOTICE

1. See label furnished on 2-way valve to determine direction of flow through the valve.
2. Adhere to the port orientation shown for the 3-way valve.
3. For hot water applications and chilled water/hot water (2-pipe) applications, the 2-way valve furnished is normally piped open to the coil; the 3-way valve is piped normally open to the coil.
4. For chilled water applications, the 2-way valve furnished is normally piped closed to the coil; the 3-way valve is piped normally closed to the coil.
5. The 3-way valve is generally selected for diverting water back to the return main, where a constant pump head pressure is required.
6. All water coil stubs are 7/8" I.D. female sweat. Coil connections terminate 9" (229 mm) from the end of the unit. Hot water connections may be same end as cooling coil connections, but are recommended to be at opposite ends from each other. When using MicroTech controls, they must be at opposite ends.

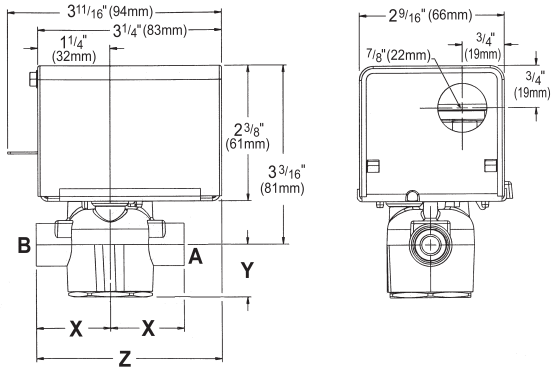
Face & Bypass EOC Valves

2-Way EOC Valve

When piping the 2-Way EOC valve, refer to label to determine the direction of flow. The valve should be installed so that there is a 2″ (51 mm) minimum clearance to remove the actuator from the valve body. Provide unions for removal of unit coil and/or control valve as a future service consideration. Hot water connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping.

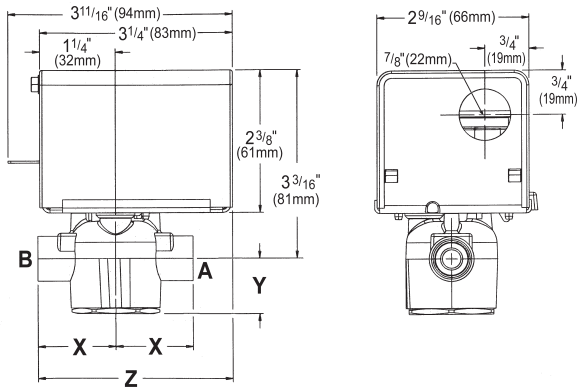
When using MicroTech controls, coil connections must be opposite end. The EOC valve accessory must be field installed on the unit for which it was selected.

Figure 64: 2-Way EOC Valve Dimensions



Connection	Cv	X	Y	Z
3/4″ (19 mm) FNPT	7.5	1 11/16″ (43mm)	15/16″ (24 mm)	3 5/8″ (92 mm)

Figure 65: 2-Way EOC Steam Valve Dimensions



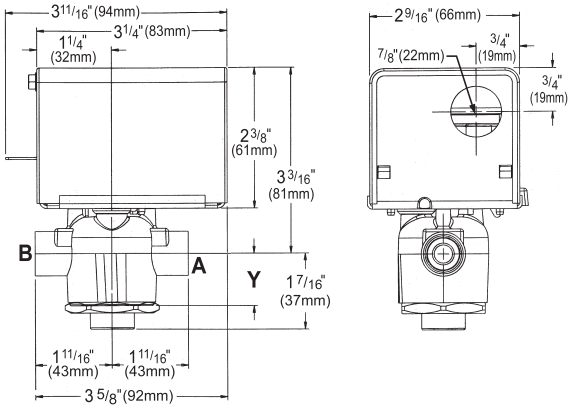
Connection	Cv	X	Y	Z
1″ (25 mm) FNPT	8.0	1 7/8″ (47 mm)	1″ (25 mm)	3 11/16″ (94 mm)

3-Way EOC Valve

When piping the 3-Way EOC valve, refer to label to determine the direction of flow. The valve should be installed so that there is a 2″ (51 mm) minimum clearance to remove the actuator from the valve body. Provide unions for removal of unit coil and/or control valve as a future service consideration. Hot water connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping.

When using MicroTech controls, coil connections must be opposite end. The EOC valve accessory must be field installed on the unit for which it was selected.

Figure 66: 3-Way EOC Valve Dimensions



Connection	Cv	Y
3/4″ (19 mm) FNPT	5.0	15/16″ (24 mm)

Table 12: EOC Actuator Specifications

Control	2 Position
Electrical	24 VAC, 50/60 Hz
Stroke	Power Stroke 9 to 11 seconds Spring return 4 to 5 seconds
Ambient	32°F to 125°F (0°C to 52°C)

Table 13: F&BP EOC Valve Body Specifications

	2-Way Valve	3-Way Valve
Connections	3/4″ FNPT, 1″ FNPT	3/4″ FNPT
Static Pressure	300 psi (2100 kPa)	300 psi (2100 kPa)
Close-Off Pressure	13 & 15 psi (90 & 103 kPa)	13 psi (90 kPa)
Temperature	32°F to 200°F (0°C to 93°C)	32°F to 200°F (0°C to 93°C)

2-Way Modulating Valve (Chilled Water, Hot Water or Combination)

Two-way modulating control valves for MicroTech are designed to regulate the flow of chilled water, hot water or the combination. They consist of a nickel plated brass body and stainless steel ball valve and stem, with a spring return proportional actuator. The optional valve accessory is shipped separately from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 67: 2-Way Modulating Valve Dimensions

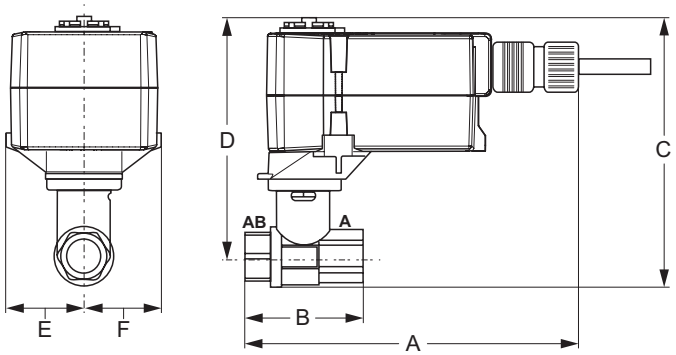


Table 14: 2-Way Actuator Specifications (CW, HW, CW/HW)

Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, ±10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2″ conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC, 0.5 mA max
Angle of Rotation	Max. 95°, 90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	95 sec
Running Time (Fail-Safe)	<25 sec
Ambient Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 15: 2-Way Valve Body Specifications (CW, HW, CW/HW)

Service	chilled, hot water, up to 60% glycol
Flow Characteristic	equal percentage
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Media Temperature Range (Water)	0°F to 250°F [-18°C to 120°C]
Max Differential Pressure (Water)	50 psi (345 kPa)
Close-Off Pressure	200 psi

Table 16: 2-Way Modulating Valve 1/2" – Dimensions (CW, HW, CW/HW)

Valve Part No.	Cv	Connection Size	A	B	C	D	E	F
B209	0.8	1/2″	6.59″ (167 mm)	2.38″ (60 mm)	4.9″ (124 mm)	4.32″ (110 mm)	1.53″ (38 mm)	
B210	1.2							
B211	1.9							
B212	3.0		6.59″ (167 mm)	2.38″ (60 mm)	5.48″ (139 mm)	4.71″ (120 mm)	1.53″ (38 mm)	
B213	4.7							
B214	7.4							

Table 17: 2-Way Modulating Water Valve 1/2" – Pressure Drop (CW, HW, CW/HW)

			Pressure Drop Across the Valve									
2-Way CCV Part No.	Cv Maximum Rating	Connection Size	1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
B209	0.8	1/2″	0.8	1.1	1.4	1.6	1.8	2.0	2.1	2.3	2.4	2.5
B210	1.2		1.2	1.7	2.1	2.4	2.8	2.9	3.2	3.4	3.6	3.8
B211	1.9		1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
B212	3.0		3.0	4.2	5.2	6.0	6.8	7.3	7.9	8.5	9.0	9.5
B213	4.7		4.7	6.6	8.1	9.4	11	12	12	13	14	15
B214	7.4		7.4	10	13	15	17	18	20	21	22	23

2-Way Modulating Valve (Steam) - 1/2"

Two-way modulating control valves for MicroTech are designed to regulate the flow of steam. They consist of a nickel plated brass body and stainless steel ball valve and stem, with a spring return, proportional actuator. The optional valve accessory is shipped separately from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 68: 2-Way Modulating Valve (Steam) Dimensions

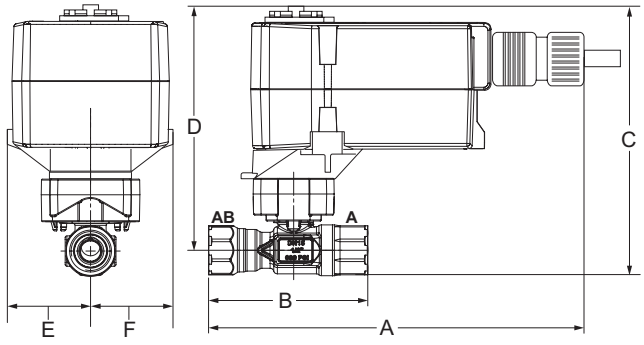


Table 18: 2-Way Actuator Specifications (Steam) – 1/2"

Power Supply	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2″ conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC, 0.5 mA max
Angle of Rotation	Max. 95°, 90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	95 sec
Running Time (Fail-Safe)	<25 sec
Ambient Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 19: Valve Body Specifications (Steam) – 1/2"

Service	high temperature hot water/low pressure steam, up to 60% glycol
Flow Characteristic	A-port equal percentage
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Max Inlet Pressure (Steam)	15 psi
Media Temperature Range (Water)	60°F to 266°F [16°C to 130°C]
Media Temperature Range (Steam)	250°F [120°C]
Maximum Differential Pressure (Steam)	15 psi
Max Differential Pressure (Water)	60 psi partially open ball, 116 psi full open
Close-Off Pressure	200 psi

Table 20: 2-Way Modulating Steam Valve 1/2" – Dimensions

Valve Part No.	Cv	Connection Size	A	B	C	D	E	F
B215HT073	0.73	1/2″	7.32″ (186 mm)	3.33″ (85 mm)	5.8″ (147 mm)	5.3″ (135 mm)	1.52″ (39 mm)	1.52″ (38.5 mm)
B215HT186	1.86							

Table 21: 2-Way Modulating Steam Valve 1/2" – Pressure Drop

			Pressure Drop Across the Valve					
2-Way CCV Part No.	Cv Maximum Rating	Connection Size	2 psi	3 psi	4 psi	5 psi	10 psi	15 psi
B215HT073	0.73	1/2″	10.99	13.71	16.11	18.33	28.03	36.74
B215HT186	1.86		22.34	34.93	41.06	46.70	71.42	93.60

3-Way Modulating Valve (Chilled Water, Hot Water or Combination)

Three-way modulating control valves for MicroTech are designed to regulate the flow of hot or chilled water or the combination. They consist of a nickel plated brass body and stem with chrome plated brass ball valve, with a spring return, proportional actuator. The optional valve accessory is shipped separate from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 69: 3-Way Modulating Valve (Chilled Water, Hot Water or Combination) Dimensions

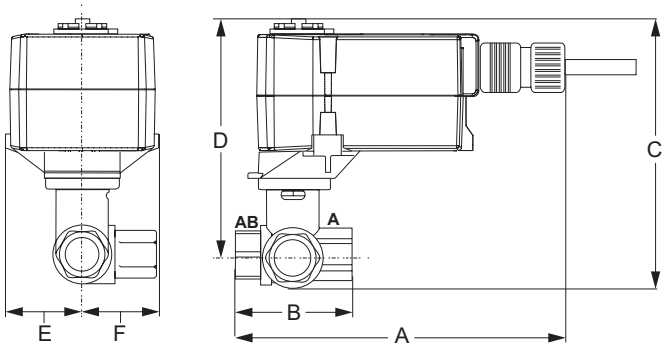


Table 22: 3-Way Actuator Specifications (CW, HW, CW/HW)

Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, ±10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2″ conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC, 0.5 mA max
Angle of Rotation	Max. 95°, 90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	95 sec
Running Time (Fail-Safe)	<25 sec
Ambient Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 23: 3-Way Valve Body Specifications (CW, HW, CW/HW)

Service	chilled, hot water, up to 60% glycol
Flow Characteristic	A-port Equal percentage; B-port modified linear for constant flow
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Media Temperature Range (Water)	0°F to 250°F [-18°C to 120°C]
Max Differential Pressure (Water)	50 psi (345 kPa)
Close-Off Pressure	200 psi

Table 24: 3-Way Modulating Valve 1/2" – Dimensions

Valve Part No.	Cv	Connection Size	A	B	C	D	E	F
B309(B)	0.8	1/2″	6.59″ (167 mm)	2.38″ (60 mm)	4.9″ (124 mm)	4.32″ (110 mm)	1.53″ (38 mm)	1.2″ (31 mm)
B310(B)	1.2							
B311(B)	1.9							
B312(B)	3.0		6.59″ (167 mm)	2.38″ (60 mm)	4.9″ (124 mm)	4.71″ (120 mm)	1.53″ (38 mm)	1.29″ (33 mm)
B313(B)	4.7							

Table 25: Modulating 3-Way Hot Water, Chilled Water or 2-Pipe CW/HW Valve 1/2" – Pressure Drop

			Pressure Drop Across the Valve									
3-Way CCV Part No.	Cv Maximum Rating	Connection Size	1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
B309(B)	0.8	1/2″	0.8	1.	1.4	1.6	1.8	2.0	2.	2.3	2.4	2.5
B310(B)	1.2		1.2	1.7	2.	2.4	2.8	2.9	3.2	3.4	3.6	3.8
B311(B)	1.9		1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
B312(B)	3.0		3.0	4.2	5.2	6.0	6.8	7.3	7.9	8.5	9.0	9.5
B313(B)	4.7		4.7	6.6	8.1	9.4	11	12	12	13	14	15

Steam Modulating Valve Selection

The steam modulating control valve is expected to vary the quantity of steam through the coil. Any movement of the valve stem should produce some change in the steam flow rate. To select a modulating steam valve:

1. Obtain the supply steam inlet pressure.
2. Determine the actual heat requirement of the space to be heated.

Table 26: Modulating 2-Way, Normally Open, Steam Valves – Pressure Drop

			Pressure Drop Across the Valve					
2-Way CCV Part No.	**Cv Maximum Rating**	**Connection Size**	**2 psi**	**3 psi**	**4 psi**	**5 psi**	**10 psi**	**15 psi**
B215HT073	0.73	1/2"	10.99	13.71	16.11	18.33	28.03	36.74
B215HT186	1.86		22.34	34.93	41.06	46.70	71.42	93.60

2-Way and 3-Way Hot Water and Chilled Water Modulating Valve Selection

The unit ventilator control valve is expected to be able to vary the quantity of water that flows through the coil in a modulating fashion. Any movement of the valve stem should produce some change in the amount of water that flows through the coil. Oversized control valves cannot do this. For example, assume that when the control valve is fully open, the pressure drop through the coil is twice as great as the drop through the valve. In this case, the control valve must travel to approximately 50% closed before it can begin to have any influence on the water flow through the coil. The control system, no matter how sophisticated, cannot overcome this. Oversized control valves can also result in "hunting" which will shorten the life of the valve and actuator and possibly damage the coil.

To correctly select the proper Chilled Water Modulating Valve:

1. Determine the flow of water and the corresponding pressure drop through the coil.
2. Obtain the pressure difference between the supply and return mains.
3. Select a valve size (Cv) from Table 26, on the basis of taking 50% of the available pressure difference (at design flow) between the supply and return mains at the valve location. The valve should have a pressure drop greater than that of the coil.

Formula to Calculate Cv

Q = Capacity in gallons per minute

Cv = Valve sizing coefficient determined experimentally for each style and size of valve, using water at standard conditions as the test fluid

ΔP = Pressure differential in psi

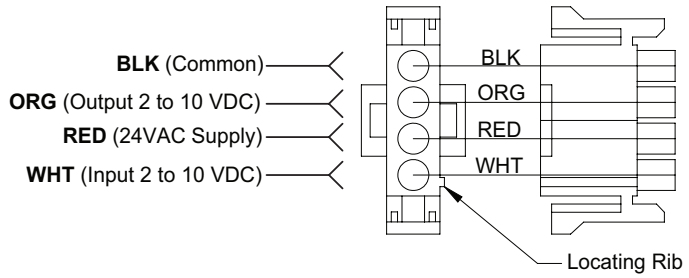
G = Specific gravity of fluid (water at 60°F = 1.0000)

$$Cv = Q\sqrt{\frac{G}{\Delta P}}$$

⚠ CAUTION

Care must be taken with modulating valves to provide proper water flow. In freezing conditions, water flow must be maintained through the heating coil or a suitable freeze-prevention solution employed to prevent freeze-up. Similarly, the cooling coil must be drained or a suitable freeze-prevention solution employed.

Figure 70: Actuator Wiring



NOTE: The actuator spring returns the valve to the open position when the actuator is de-energized (off).

Typical Piping Arrangements

Mount heating valve actuators in an upright position above the centerline of the valve body and pipe actuators normally open to the coil. Modulating valve actuators for hot water applications may be positioned above the valve body a maximum of 75 degrees from the vertical. For steam applications only, mount the modulating valve actuator above the valve body at 45 degrees from the vertical. Two-position, End of Cycle (EOC) valves used with face and bypass damper controlled units may be positioned above the valve body a maximum of 85 degrees from the vertical.

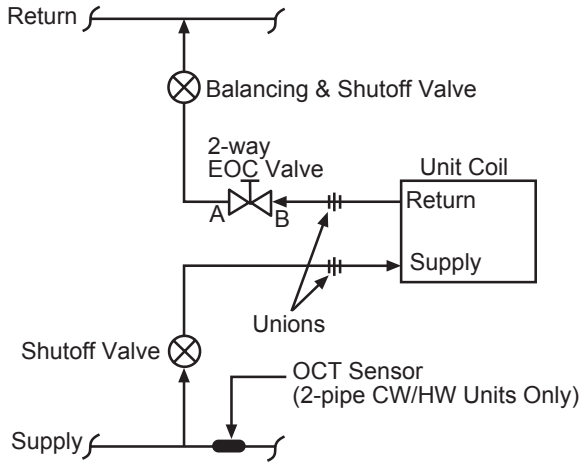
All control valves are shipped loose to help avoid shipping damage to the piping or the coil connection stub from the weight of the valve and to provide the installing contractor with maximum flexibility in making the field piping connections. Refer to Daikin Applied factory instruction sheet shipped with the unit for port orientation and a piping schematic.

Control valves must be installed on the units in which they are shipped. Indiscriminate mixing of valves among units can result in valves not properly sized for the desired flow rate. Install control valves so that there is 2″ (51 mm) minimum clearance to remove the actuator from the valve body. As a future service consideration, provide unions for removal of the unit coil and/or the control valve.

Heating – Hot Water EOC Valve Piping

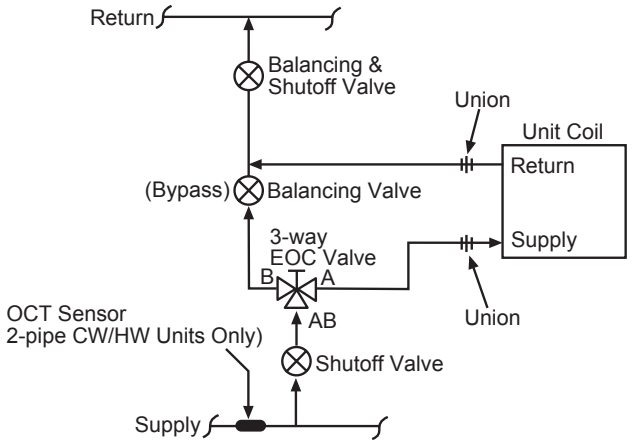
The 2-way EOC hot water or 2-pipe Chilled Water/Hot Water valve is furnished normally open to the coil. When the valve is de-energized (off) there is full flow through the coil. Energizing the valve shuts off the water flow.

Figure 71: 2-Way EOC, Normally Open, Hot Water or 2-Pipe Chilled Water/Hot Water Valve Piping



The 3-way hot water or 2-pipe CW/HW valve is furnished normally open to the coil. When the valve is de-energized (off) there is full flow through the coil. Energizing the valve allows the water to bypass the coil.

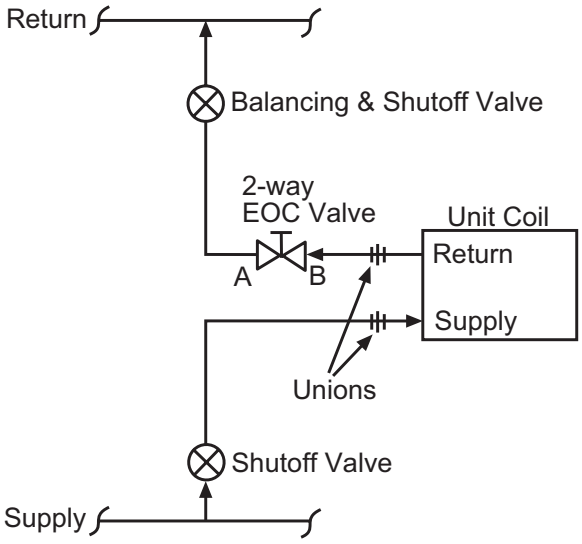
Figure 72: 3-Way EOC, Normally Open, Hot Water or 2-Pipe Chilled Water/Hot Water Valve Piping



Cooling – Chilled Water EOC Valve Piping

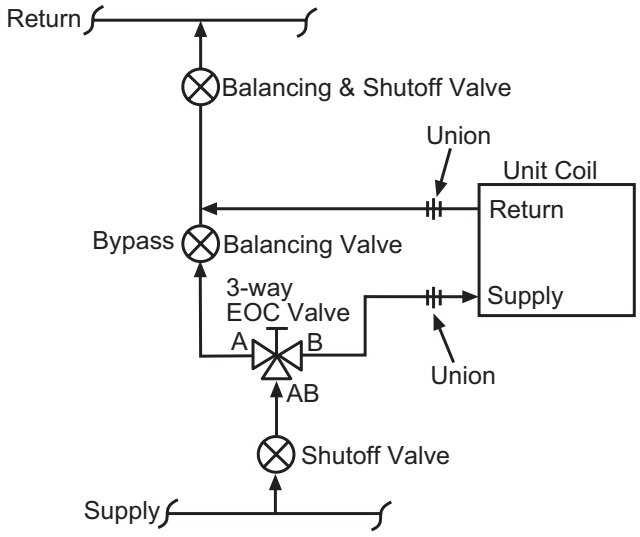
The 2-way EOC CW valve is furnished normally closed to the coil. When the valve is de-energized (off) there is no flow through the coil. Energizing the valve allows flow through the coil.

Figure 73: 2-Way EOC, Normally Closed, Chilled Water Valve Piping



The 3-way EOC Chilled Water valve is furnished normally closed to the coil. When the valve is de-energized (off) the flow bypasses the coil. Energizing the valve allows flow through the coil.

Figure 74: 3-Way EOC, Normally Closed, Chilled Water Valve Piping

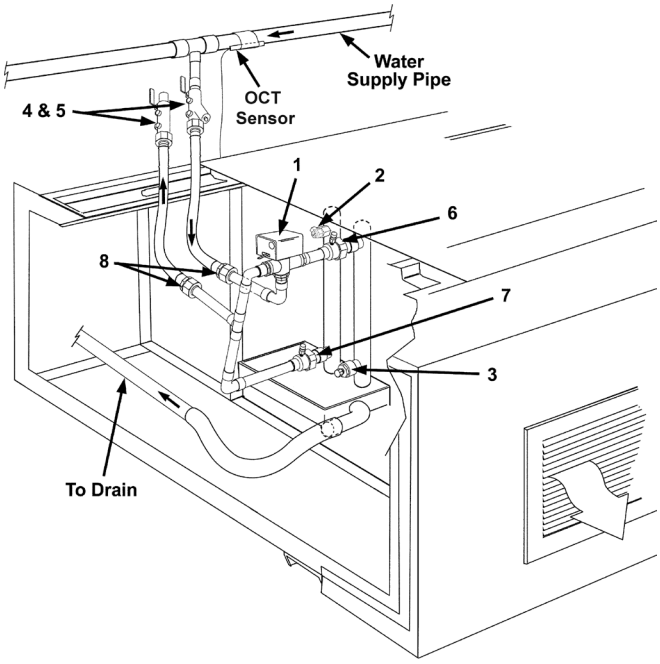


Typical Water Coil Piping - EOC Valve Piping

NOTICE

1. All piping, fittings, and unions by others (not Daikin Applied) except as noted.
2. Supply and return coil connection and stub-up unions by others.

Figure 75: Face and Bypass with 3-Way EOC Valve



NOTE: Chilled water piping shown. Refer to coil connection arrangement drawings to identify supply and return connections for other hydronic coils.

Legend for Figure 75	
1	Three-way EOC control valve (Daikin Applied accessory or by others)
2	Coil (auto) air vent (Daikin Applied)
3	Coil drain (Daikin Applied)
4	Shutoff valve (by others)
5	Balancing shutoff valve(s) (by others)
6	Supply-coil connection (Daikin Applied) and stub-up union (by others)
7	Return-coil connection (Daikin Applied) and stub-up union (by others)
8	Unions (by others)

Typical Steam – Modulating Valve Piping

The optional factory supplied Daikin Applied MicroTech 2-way Modulating steam valve is furnished normally open to the coil. When the valve is de-energized (off) there is full flow through the coil. Energizing the valve reduces the steam flow in a modulating fashion. Before proceeding, see Figure 76 through Figure 78, as well as the job-specific piping drawings.

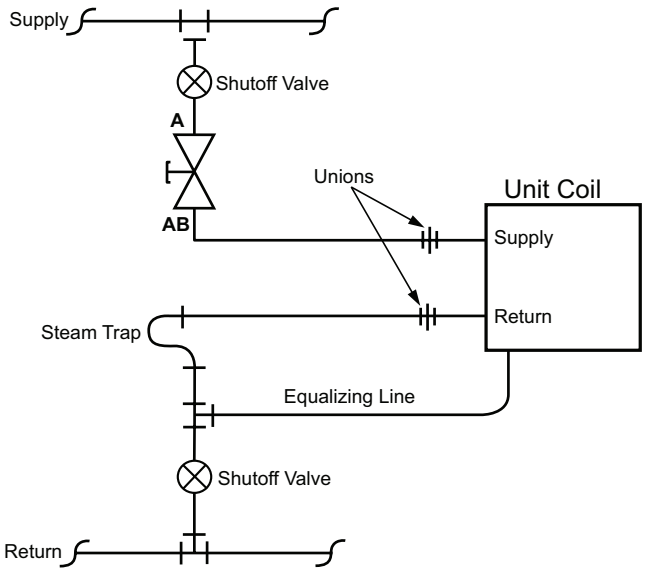
⚠ CAUTION

Refer to the arrow on the modulating valve body to determine the direction of flow. If the valve is mounted improperly, the unit will not operate properly and damage to the valve can result.

Install the valve so that there is a 2″ (51 mm) minimum clearance to remove the actuator form the valve body. Provide unions for removal of unit coil and/or control valve as a future service consideration.

Steam connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping. When using MicroTech controls, they must be opposite end. The modulating valve accessory must be field installed on the unit for which it was selected.

Figure 76: Typical 2-Way Steam Modulating Valve Piping



For Steam Systems

The optional factory-supplied Daikin Applied MicroTech Modulating Control Valve for steam applications is the 2-way type. It is shipped separately from the unit ventilator To help avoid shipping damage, yet provide the installer with maximum flexibility in making the field piping connection.

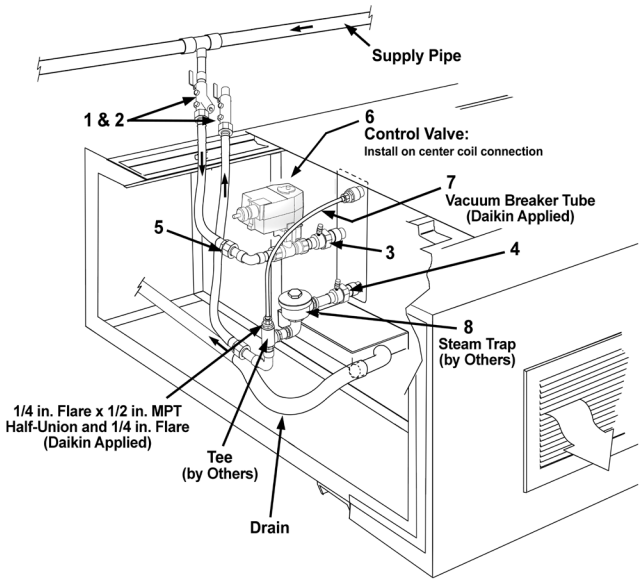
For steam applications, the 2-way, angle pattern valve furnished is normally piped open to the coil. All steam coils are 1-1/8″ (34 mm) female sweat connections. Coil connections terminate 9″ (229 mm) from the end of the unit.

Steam coils have a factory-installed pressure equalizing valve and a 24″ (610 mm) long pressure equalizing line that terminates in a 1/2″ M.P.T. fitting.

Steam connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping. When using MicroTech controls, they must be opposite end.

See Figure 76 through Figure 78. Connect the 1/4″ (6.35 mm) vacuum breaker tube to the downstream return line. Make this connection downstream of the trap outlet.

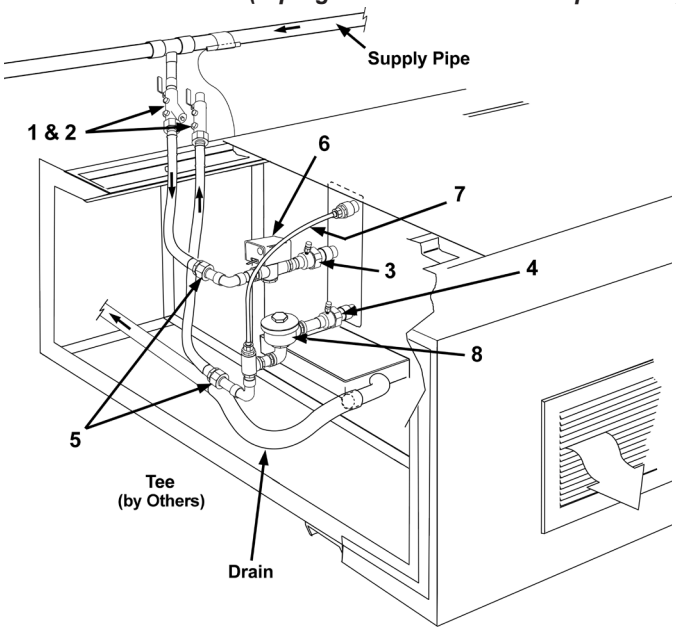
Figure 77: 2-Way Steam Modulating Valve Control - Same End Drain Connection (Coils 68/69)



Legend for Figure 77	
1	Shutoff valves (by others)
2	Shutoff valves (by others)
3	Supply-coil connection (Daikin Applied) and stub-up union (by others)
4	Return-coil connection (Daikin Applied) and stub-up union (by others)
5	Supply union connection (by others)
6	Two-way steam modulating control valve (Daikin Applied accessory or by others)
7	Vacuum breaker tube (Daikin Applied)
8	Float and thermostatic steam trap (by others)

Steam Coil Piping

Figure 78: Face and Bypass with 2-Way EOC Valve - Same End Drain Connection (Piping Within Unit End Compartment)



Legend for Figure 78	
1	Shutoff valves (by others)
2	Shutoff valves (by others)
3	Supply-coil connection (Daikin Applied) and stub-up union (by others)
4	Return-coil connection (Daikin Applied) and stub-up union (by others)
5	Supply and return union connections (by others)
6	Two-way EOC steam control valve (Daikin Applied accessory or by others)
7	Vacuum breaker tube (Daikin Applied)
8	Float and thermostatic steam trap (by others)

Heating – Modulating Valve Piping

Hot Water (or 2-pipe CW/HW)

When piping the modulating valve, refer to the arrows on the modulating valve body to determine the direction of flow. Install the valve so that there is a 2″ (51 mm) minimum clearance to remove the actuator form the valve body. Provide unions for removal of unit coil and/or control valve as a future service consideration. Hot water connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping. When using Daikin Applied MicroTech controls, coil connections must be opposite end. The modulating valve accessory must be field installed on the unit for which it was selected.

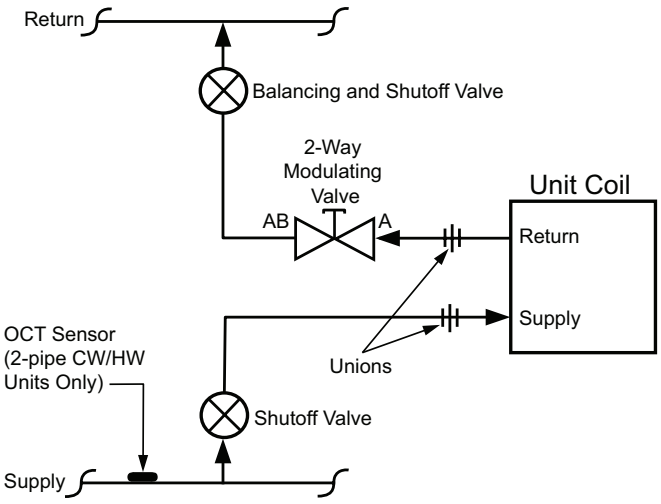
⚠ CAUTION

Refer to the arrows on the modulating valve body to determine the direction of flow. If the valve is mounted improperly, the unit will not operate properly and damage to the valve can result.

2-Way Modulating, Normally Open, Hot Water or 2-Pipe CW/HW – Typical

The 2-way Modulating hot water (or 2-pipe CW/HW) valve is furnished normally open to the coil. When the valve is de-energized (off) there is full flow through the coil. Energizing the valve reduces the volume of water flow in a modulating fashion.

Figure 79: 2-Way Modulating Valve Control, Normally Open, Hot Water or 2-Pipe Chilled Water/Hot Water Piping

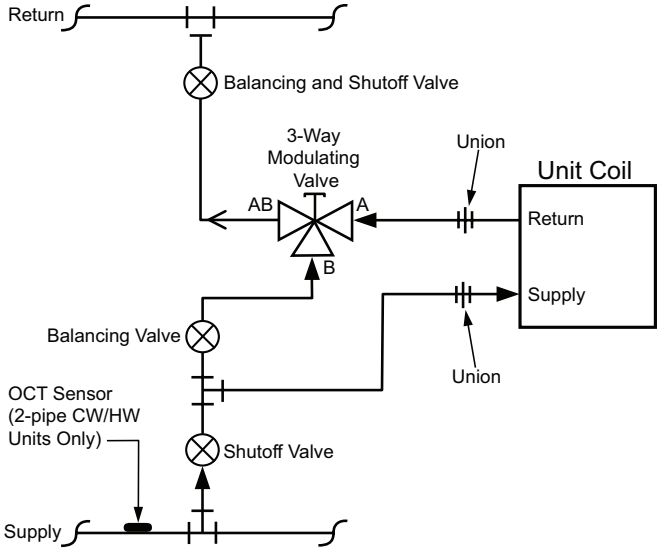


NOTE: Actuator to be configured for A port to be normally open.

3-Way Modulating, Normally Open, Hot Water or 2-Pipe CW/HW – Typical

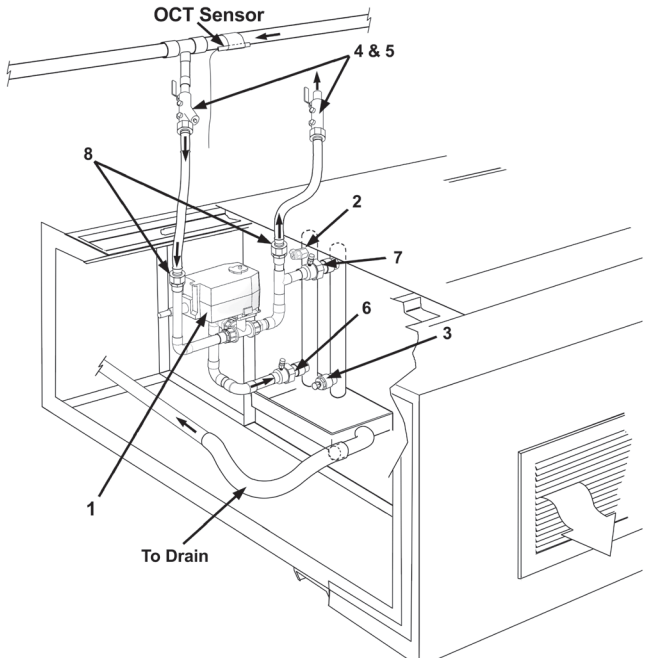
The 3-way Modulating hot water (or 2-pipe CW/HW) valve is furnished normally open to the coil. When the valve is de-energized (off) there is full flow through the coil. Energizing the valve allows a varying amount of water to bypass the coil.

Figure 80: 3-Way Modulating Valve Control



NOTE: The A port is always piped to the coil. Actuator to be configured for A port to be Normally Open.

Figure 81: 3-Way Modulating Valve Control (Hot Water Coil Shown)



Legend for Figure 81	
1	Three-way modulating control valve (Daikin Applied accessory or by others)
2	Coil (Auto) air vent (Daikin Applied)
3	Coil drain (Daikin Applied)
4	Shutoff valves (by others)
5	Balancing shutoff valve(s) (by others)
6	Supply-coil connection (Daikin Applied) and stub-up union (by others)
7	Return-coil connection (Daikin Applied) and stub-up union (by others)
8	Flexible hoses swivel connections (by others)

Cooling – Modulating Valve Piping

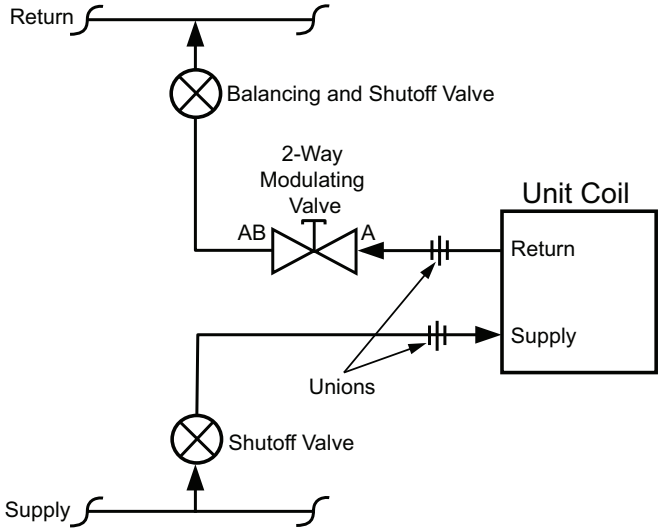
2-Way Modulating, Normally Closed, Chilled Water – Typical

The 2-way Modulating chilled water valve is furnished normally closed to the coil. When the valve is de-energized (off) there is no flow through the coil. Energizing the valve allows flow through the coil in a modulating fashion.

⚠ CAUTION

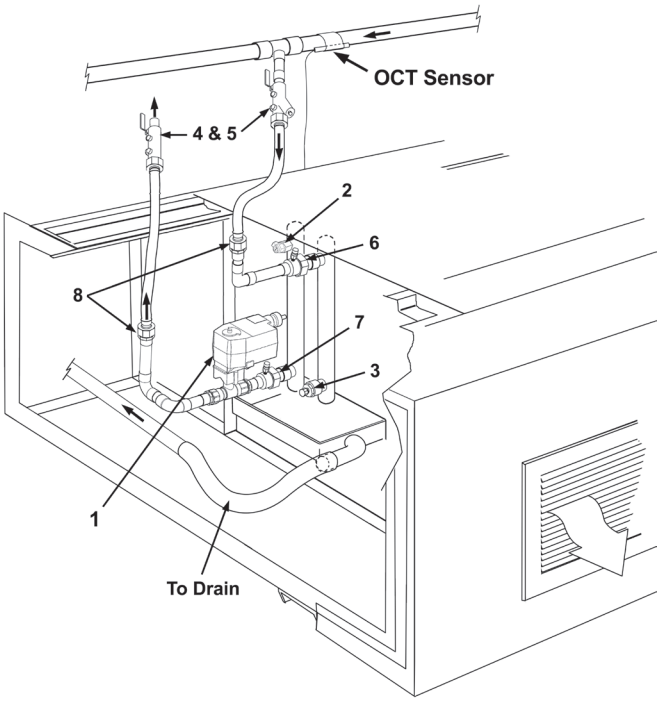
Refer to the arrows on the modulating valve body to determine the direction of flow. If the valve is mounted improperly, the unit will not operate properly and damage to the valve can result.

Figure 82: 2-Way Modulating Valve Control, Normally Closed, Chilled Water Piping



NOTE: Actuator to be configured for A port to be normally closed.

Figure 83: 2-Way Modulating, Normally Closed Chilled Water Valve Piping

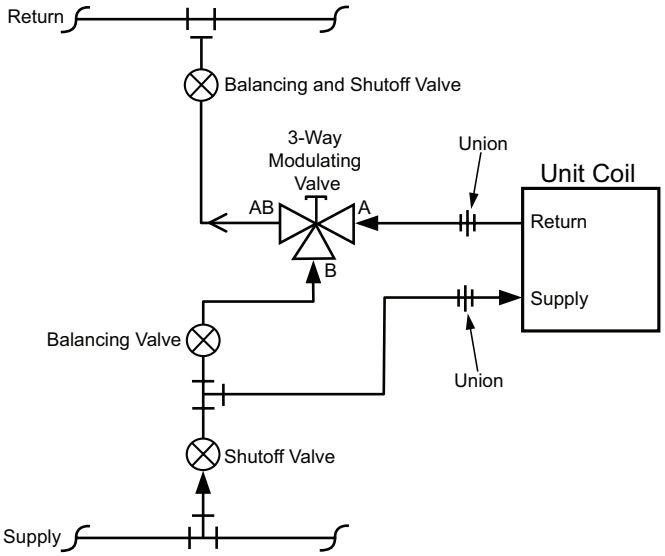


Legend for Figure 83	
1	Two-way modulating control valve (Daikin Applied accessory or by others)
2	Coil (Auto) air vent (Daikin Applied)
3	Coil drain (Daikin Applied)
4	Shutoff valves (by others)
5	Balancing shutoff valve(s) (by others)
6	Supply-coil connection (Daikin Applied) and stub-up union (by others)
7	Return-coil connection (Daikin Applied) and stub-up union (by others)
8	Flexible hoses swivel connections (by others)

3-Way Modulating, Normally Closed, Chilled Water – Typical

The 3-way Modulating chilled water valve is furnished normally closed to the coil. When the valve is de-energized (off) the flow bypasses the coil. Energizing the valve allows flow through the coil in a modulating fashion.

Figure 84: 3-Way Modulating Valve Control, Normally Closed, Chilled Water Piping



NOTE: The A port is always piped to the coil. Actuator to be configured for A port to be Normally Closed.

Condensate Piping

Daikin Applied cooling unit ventilators are designed for condensate removal into a condensate disposal system. Do not connect the unit drain connection so that condensate exits to the outside and/or is exposed to freezing temperatures. **Installer is responsible for any damage that might be caused from freezing condensate.** In applications with an end compartment auxiliary drain pan, see the installation instructions shipped with the auxiliary drain pan itself.

Direct Expansion R-32 (DX) Piping

DX coils have O.D. sweat connections. Interconnecting tubing is field-supplied. See Table 27 and job-specific drawings for correct tubing sizes.

Table 27: DX Coil (G) Connection Tubing

Unit Series	H07, V07	H10, V10	H13, H13	H15, V15
Suction Line O.D. in (mm)	¾ (19)	¾ (19)	⅞ (22)	⅞ (22)
Liquid Line O.D. in (mm)	¼ (6.35)	¼ (6)	⅜ (10)	⅜ (10)

NOTE 1: All coils have the same end supply and return connections.

NOTE 2: All water stubs are 7/8″ I.D. (female) sweat and all steam coils are 1⅛″ (female) sweat connections. All coil connections terminate 9″ (229 mm) from the end of the unit.

⚠ CAUTION

Wrap TXV valve with a quenching cloth and remove bulb from suction line to avoid valve damage while brazing.

Proper ventilation is required for brazing. When brazing, use quenching rags, shields, or other steps to protect unit ventilator components from overheating damage (melting insulation, also damage to valves, wiring, electronics, sensors, etc.).

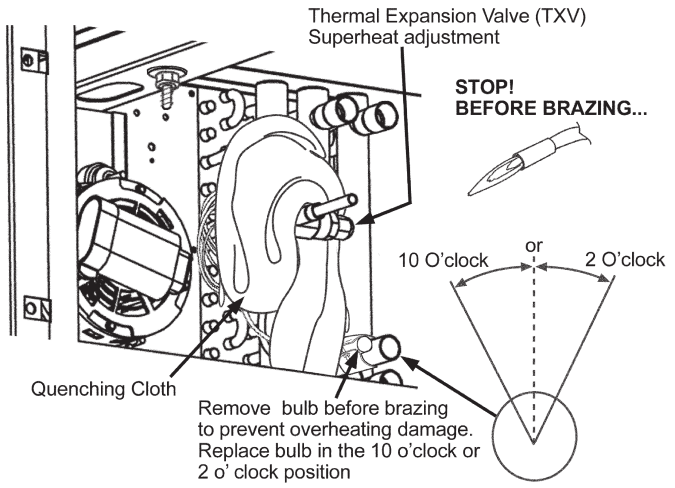
During brazing, bleed nitrogen through the piping. Using field-supplied material suitable for insulating refrigerant lines, wrap the thermal expansion valve (TXV) bulb and the piping between the TXV and the point where it enters the coil with at least one thickness of the material. Likewise, insulate the suction line. (See Figure 86 through Figure 89 for typical piping and wiring.)

Provide proper insulation of supply and return piping. Proper insulation prevents loss of unit ventilator capacity, overheating of end compartment, and / or moisture dripping (see Figure 86 & Figure 87).

NOTICE

Check that refrigerant pressure taps are installed in piping end compartment for proper charging and setting of the TXV valve.

Figure 85: TXV Valve Piping Detail (Right Hand Shown)



⚠ CAUTION

STOP Before Brazing! Use a quenching cloth when brazing to prevent overheating the TXV valve body which could result in valve damage and erratic operation.

Unit Ventilator Split Systems Guidelines

⚠ CAUTION

Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected. Failure to do so may result in equipment failure.

The following provides basic guidelines that will provide proper system cooling and operation of an R-32 commercial DX/hot water system for school applications. DX system components must be matched and sized correctly (not oversized) for the load.

The DX system **must** incorporate the following, provided by others, for proper operation:

- Size piping per ASHRAE Refrigeration Handbook (correct refrigerant and compressor oil flow), see Table 28 on page 41.
- Use clean sealed refrigerant grade piping (prevent system contamination).
- Install liquid line filter drier (clean/dry system to prevent damage of operating components), see Figure 88 on page 41.
- Install liquid line sight glass (indicates refrigerant dryness and if liquid in liquid line - do not use the sight glass to determine when refrigerant system is charged correctly), see Figure 88 on page 41.
- Install pressure taps on the unit ventilator's liquid line and suction lines for subcooling and superheat measurements at the unit ventilator, see Figure 88 on page 41.
- Install high pressure switch at condensing unit wired in condenser control system (protects compressor and refrigerant system from excessive pressures - condenser fan failure or overcharging), see Figure 89 on page 42.
- Install low pressure switch at condensing unit wired in the condenser control system (low refrigerant pressure switch protects the system under low refrigerant suction conditions), see Figure 89 on page 42.
- Install low ambient temperature switch at condensing unit wired in the condenser control system (locks out mechanical cooling below 60°F - proper system operation and free economizer usage), see Figure 89 on page 42.
- Incorporate Compressor Time Delay (5 minute) in condensing unit control system (reduces excessive compressor cycling), see Figure 89 on page 42.
- Single phase compressors - consider hard start kits to overcome non-equalized pressure in refrigerant lines.
- Incorporate Low Refrigerant Temperature Sensor (T4) in condensing unit control system (T4 protects the system under low refrigerant suction conditions), see Figure 89 on page 42.
- UV fans must continue to run upon Low Refrigerant Temperature trip of T4 (controls by others) or ICT (MicroTech) (evaporator airflow dissipates residual low coil surface temperatures - suction pressures raised, coil frosting reduced), see Figure 89 on page 42.
- UV fans must continue to run for set time period during unoccupied mode after satisfaction of the space. sensor (dissipates residual low evaporator coil surface temperatures - reducing coil frosting).
- Lock the face and bypass damper (actuator spring return to full face when de-energized) in the full face position during mechanical cooling (full air through evaporator coil reduces low refrigerant suction conditions, potential coil frosting).
- When brazing, bleed nitrogen through piping (reduced oxides and blockage in piping/TXV).
- Use heat sink when brazing to prevent overheating the TXV valve body and bulb (avoid valve damage and erratic operation).
- Verify the TXV bulb is securely attached at 2 or 10 o'clock for 7/8″ and smaller diameter suction line piping (proper suction gas sensing and reduced hunting), see Figure 87 on page 41.

- Insulate the TXV bulb (reacts to refrigerant temperatures and not ambient), see Figure 87 on page 41.
- Insulate the suction line piping (minimum heat pickup), see Figure 86 & Figure 87.
- Evacuate and properly charge the refrigerant system, see Figure 88 on page 41.
- Charge to subcooling at the condensing unit per the condensing unit manufacturer's instructions, typically 15°F to 16°F at the unit ventilator, subcooling at 95°F outdoor ambient (results in correct refrigerant distribution at the coil to prevent low suction temperatures).
- Adjust TXV for correct superheat to eliminate/minimize hunting, see Figure 90 on page 43.
- Set superheat to 5°F to 7°F at the UV coil suction line when 95°F outdoor ambient (proper system superheat for optimum performance). Allow system to settle for 20 to 30 minutes to reach stable steady state conditions and then recheck/adjust superheat if necessary, see Table 30 on page 43.
- Compensate both subcooling and superheat for actual outdoor ambient and indoor air temperatures.
- In windy areas, add wind baffles to condensing unit or build a parapet (eliminate wind effect on condensing unit coil for proper TXV refrigerant flow at lower ambient).
- For lower ambient conditions, install variable speed condenser fan head pressure control to maintain head pressures between 180 psig and 280 psig (for proper TXV refrigerant flow at lower ambient).

Figure 86: Typical Piping and Wiring for Split System

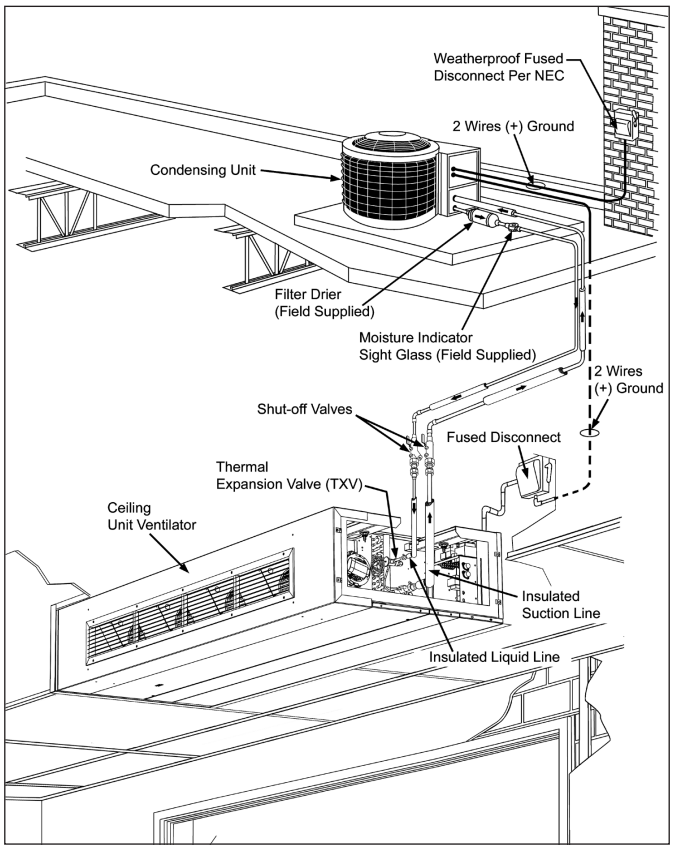


Figure 87: Insulate Bulb and Suction Line Piping

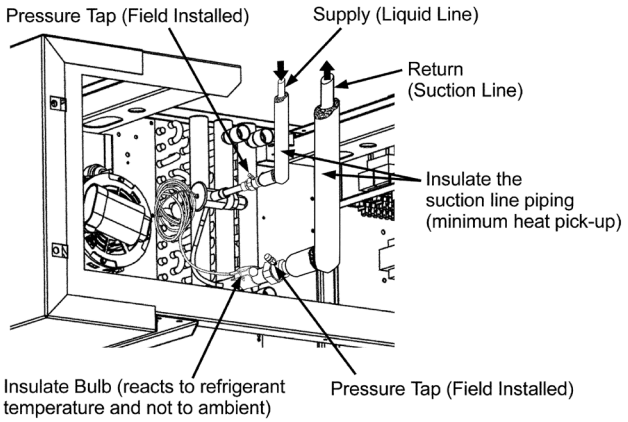
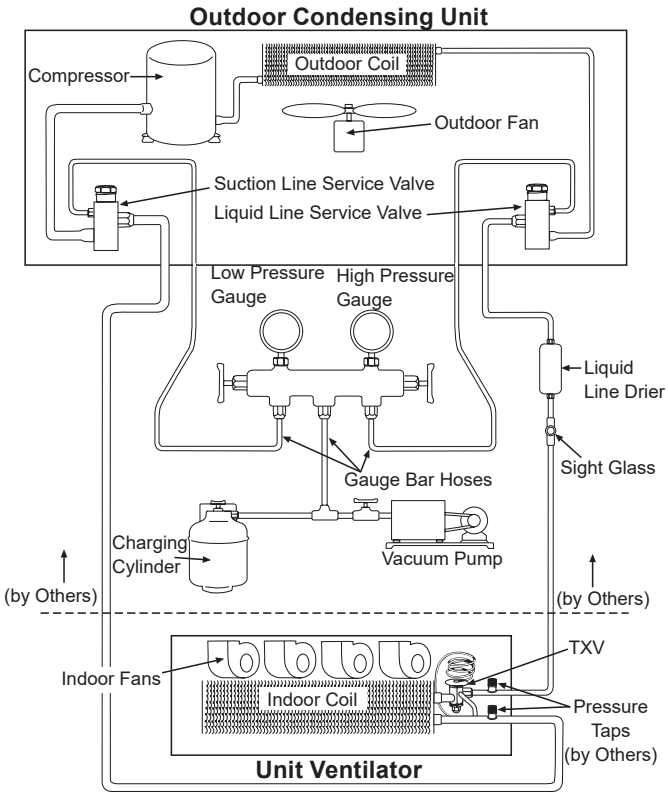


Table 28: Dimensions, DX Tubing in (mm)

Unit Series	H07, V07	H10, V10	H13, V13	H15, V15	H20, V20
Suction Line O.D. in (mm)	3/4 (19)	3/4 (19)	7/8 (22)	7/8 (22)	7/8 (22)
Liquid Line O.D. in (mm)	1/4 (6.35)	1/4 (6.35)	3/8 (10)	3/8 (10)	3/8 (10)

NOTE: Piping dimensions are for systems with up to 30 ft. (9.14 m) vertical separation and up to 100 ft (30.47 m) horizontal separation from the outdoor condensing unit.

Figure 88: Typical Split System Evacuation/Charging Set-up



Checking System Charge

The system charge should be checked under design conditions [95°F outside air, 80°F/67°F (DB/WB) indoor air]. Refer to condensing unit manufacturer's guidelines.

Before adjusting refrigerant charge, verify that the unit ventilator is operating at normal design cfm. Nominal cfm is determined with a dry coil, and cfm will be reduced during air conditioning operation with a wet coil. Filters and coil must be clean and fan speed set at high temperature to obtain subcooling.

NOTICE

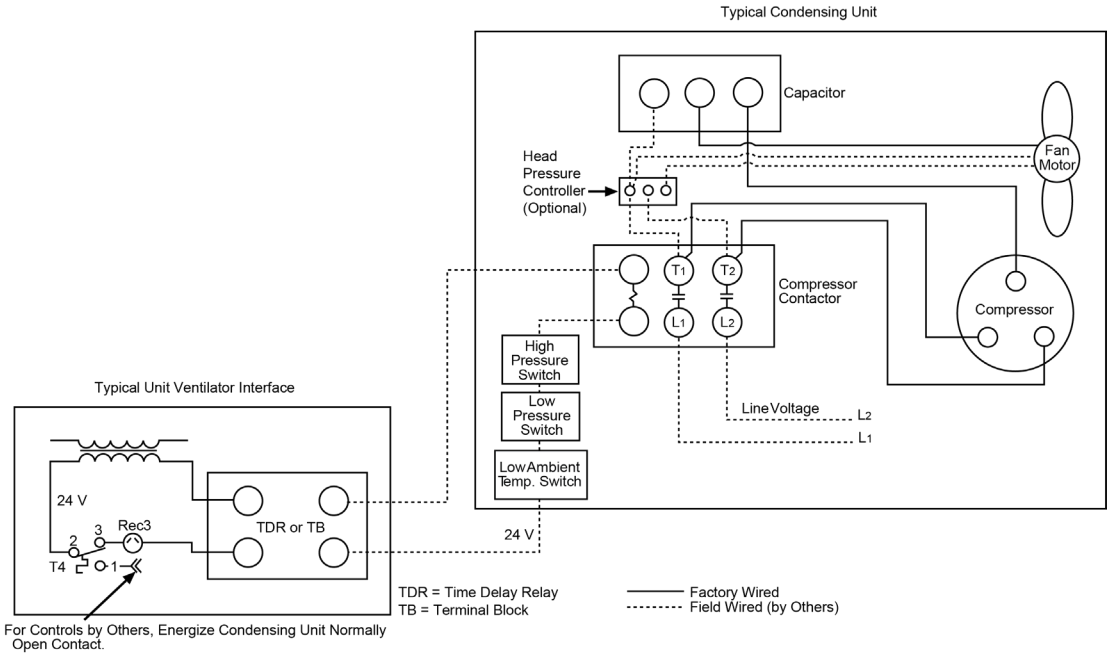
Typical conditions - 95ºF ambient, 45ºF saturated suction temperature, 105ºF saturated liquid temperature, 6-7ºF superheat, 15ºF subcooling.

Determining Subcooling

To determine correct subcooling:

1. Measure outdoor ambient. It must be between 65°F and 105°F.
2. Measure liquid line temperature 6 inches from the TXV inlet.
3. Measure liquid line pressure near the TXV.
4. Determine saturated liquid temperature from saturated temperature pressure chart (Table 29 on page 43).
5. Subtract measured liquid line temperature from saturated liquid temperature to obtain subcooling.
6. Adjust charge per condensing unit manufacturer recommendation to obtain 15 - 16°F subcooling.

Figure 89: Typical Unit Ventilator/Condensing Unit Wiring Diagram



⚠ WARNING

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

Determining System Superheat

After the subcooling has been determined, check system superheat.

1. Determine required superheat from superheat range, Table 30.
2. Measure suction line temperature 6 inches from service valve.
3. Measure suction line pressure at service valve and determine saturated suction temperature from Table 29.
4. Subtract saturated suction temperature from measured temperature to obtain superheat.
5. Refer to Table 30 and adjust charge as required for correct superheat at ambient conditions.

NOTICE

Each time that charge is added or removed from the system, allow the system to run approximately 20 - 30 minutes before pressure and temperature readings are taken and superheat calculations made.

NOTICE

If system hunting occurs or subcooling is reduced, it may be necessary to adjust TXV to obtain correct superheat.

Table 29: Saturated Temperature - Pressure Chart

(ºF)	R-32 psig	(ºF)	R-32 psig	(ºF)	R-32 psig
32	103.23	44	130.53	80	241.48
33	105.34	45	133.00	85	260.86
34	107.48	46	135.50	90	281.32
35	109.65	47	138.04	95	302.91
36	111.85	48	140.61	100	325.67
37	114.08	49	143.21	105	349.64
38	116.34	50	145.84	110	374.88
39	118.63	55	159.51	115	401.43
40	120.95	60	174.04	120	429.34
41	123.30	65	189.47	125	458.67
42	125.67	70	205.82	130	489.47
43	128.08	75	223.15	140	555.77

NOTE: The pressure values are calculated at sea level.

Table 30: Superheat Range

Outdoor Ambient	Indoor Coil Air Inlet Temp. DB/WB (50% RH)		
	75/63	80/67	85/71
105	*	*	8-10
100	*	3-5	9-11
95	*	5-7	11-13
90	*	9-11	13-15
85	5-7	10-12	15-17
80	8-10	12-14	18-20
75	10-12	15-17	21-23
70	13-15	19-21	24-26
65	15-17	21-23	26-28

NOTICE

Typical conditions - 95ºF ambient, 45ºF saturated suction temperature, 105ºF saturated liquid temperature, 6-7ºF superheat, 15ºF subcooling.

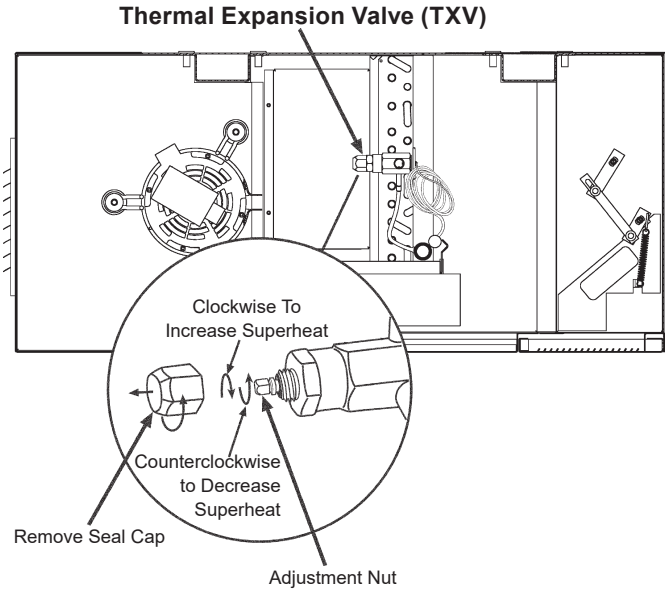
Superheat Adjustment

1. Remove the seal cap from thermal expansion valve (see Figure 90).
2. Turn the adjustment screw clockwise to increase superheat and counterclockwise to decrease superheat (Figure 90). One complete 360° turn changes the superheat approximately 3-4°F, regardless of the refrigerant type. As much as 30 minutes may be required for the system to stabilize after the adjustment is made.
3. Replace and hand-tighten seal cap.

⚠ CAUTION

Do not force adjustment stem of TXV. When adjusting superheat setting, there are a maximum of 10 turns on the stem. Turning adjustment stem after reaching stop will damage valve.

Figure 90: Superheat Adjustment of TXV

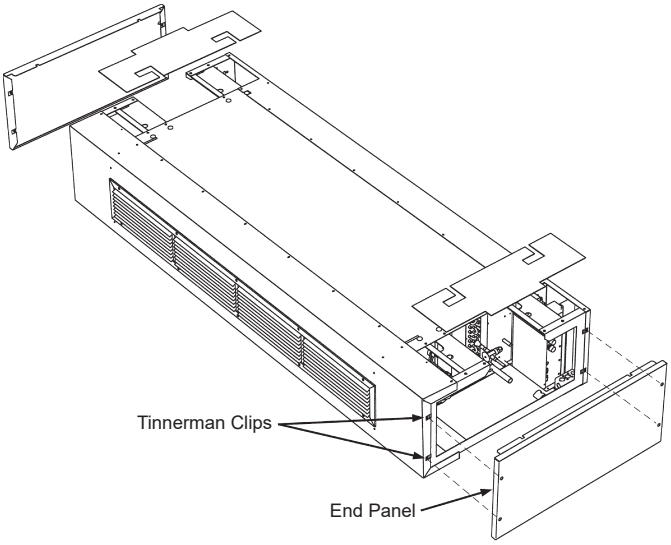


Field Installed Accessories

Install Unit Ventilator End Panels

Align each end panel with the top and front edges of the ceiling unit ventilator. Attach each end panel to the unit ventilator using the Allen wrench provided. (Figure 91)

Figure 91: Install End Panels (1" End Panel Shown)



Electrical and Controls

Electrical Heating Data

⚠ WARNING

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

Table 31: Electrical Data/Motor Data and Unit Amp Without Electric Heat

Unit Series	CFM		ESP		Motor		Unit Current				Unit MCA				Fuse or Breaker			
	Nominal	L/s	iwc	Pa	HP	Watts	115V	208V	230V	265V	115V	208V	230V	265V	115V	208V	230V	265V
H07/V07	750	354	0-.45	0-112.5	1/3	246	5.0	3.0	2.8	2.6	6.3	3.8	3.5	3.3	15	15	15	15
H10/V10	1000	472	0-.45	0-112.5	1/3	246	5.0	3.0	2.8	2.6	6.3	3.8	3.5	3.3	15	15	15	15
H13/V13	1250	590	0-.45	0-112.5	1/3	246	5.0	3.0	2.8	2.6	6.3	3.8	3.5	3.3	15	15	15	15
H15/V15	1500	708	0-.45	0-112.5	1/3	246	5.0	3.0	2.8	2.6	6.3	3.8	3.5	3.3	15	15	15	15
H20/V20	2000	944	0-.45	0-112.5	3/4	560	9.6	7.3	6.8	5.5	12.0	9.1	8.5	6.9	20	15	15	15

NOTE 1: Unit wire sizing should be determined in accordance with NEC and local codes.

NOTE 2: # Amps at unit voltage, 60 Hz, single phase

Table 32: Standard Motor Electric Heat Capacities, Amps, Wire Sizing, and Over Current Protection

	Unit Type	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR
	CFM	750			1000			1250			1500			2000		
	Indoor Fan Motor HP	0.33			0.33			0.33			0.75			0.75		
	# of Electric Heater Elements	–	3	6	–	3	6	–	3	6	–	3	6	–	3	6
115-60-1	Indoor Fan Motor Nameplate Amps	5.0	—	—	5.0	—	—	5.0	—	—	9.6	—	—	9.6	—	—
	Electric Heater Amps	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Unit MCA	6.25	—	—	6.25	—	—	6.25	—	—	12	—	—	12	—	—
	Max Fuse Size or Circuit Breaker	15	—	—	15	—	—	15	—	—	15	—	—	15	—	—
208-60-1	Indoor Fan Motor Nameplate Amps	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.3	7.3	7.3	7.3	7.3	7.3
	Electric Heat KW	—	6.0	12.0	—	8.0	16.0	—	10.0	20.0	—	12.0	24.0	—	12.0	24.0
	Electric Heater Amps	—	28.8	57.7	—	38.5	76.9	—	48.1	96.2	—	57.69	115.38	—	57.7	115.4
	Unit MCA	3.75	39.75	75.88	3.75	51.88	99.88	3.75	63.88	124.00	9.13	81.25	153.38	9.13	81.25	153.38
	Max Fuse Size or Circuit Breaker	15	40	80	15	60	100	15	70	125	15	90	175	15	90	175
230-60-1	Indoor Fan Motor Nameplate Amps	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	6.8	6.8	6.8	6.8	6.8	6.8
	Electric Heat KW	—	5.5	11.0	—	7.4	14.7	—	9.2	18.4	—	11	22.1	—	11.0	22.1
	Electric Heater Amps	—	25.0	50.0	—	33.3	66.7	—	41.7	83.3	—	50	100	—	50.0	100.0
	Unit MCA	3.5	34.75	66.00	3.50	45.13	86.88	3.50	55.59	107.63	8.5	71	133.5	8.50	71.00	133.50
	Max Fuse Size or Circuit Breaker	15	35	70	15	50	90	15	60	110	15	80	150	15	80	150
265-60-1	Indoor Fan Motor Nameplate Amps	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	5.5	5.5	5.5	5.5	5.5	5.5
	Electric Heat KW	—	5.5	11.0	—	7.4	14.7	—	9.2	18.4	—	11	22.1	—	11.0	22.1
	Electric Heater Amps	—	21.7	43.3	—	28.9	57.8	—	36.1	72.2	—	43.32	86.64	—	43.3	86.6
	Unit MCA	3.25	30.38	57.38	3.25	39.38	75.50	3.25	48.38	93.50	6.88	61	115.13	6.88	61.00	115.13
	Max Fuse Size or Circuit Breaker	15	35	60	15	40	80	15	50	100	15	70	125	15	70	125

	Unit Type	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR	AHF AHB AHV AHR	AHF AHV AHR	AHV AHR
	CFM	750			1000			1250			1500			2000		
	Indoor Fan Motor HP	0.33			0.33			0.33			0.75			0.75		
	# of Electric Heater Elements	–	3	6	–	3	6	–	3	6	–	3	6	–	3	6
208-60-3	Indoor Fan Motor Nameplate Amps	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.3	7.3	7.3	7.3	7.3	7.3
	Electric Heat KW	—	6.0	12.0	—	8.0	16.0	—	10.0	20.0	—	12	24	—	12.0	24.0
	Electric Heater Amps	—	16.7	33.3	—	22.2	44.4	—	27.8	55.5	—	33.34	66.69	—	33.3	66.7
	Unit MCA	3.75	24.63	45.38	3.75	31.50	59.25	3.75	38.50	73.13	9.13	50.75	92.5	9.13	50.75	92.50
	Max Fuse Size or Circuit Breaker	15	25	50	15	35	60	15	40	80	15	60	100	15	60	100
230-60-3	Indoor Fan Motor Nameplate Amps	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	6.8	6.8	6.8	6.8	6.8	6.8
	Electric Heat KW	—	5.5	11.0	—	7.4	14.7	—	9.2	18.4	—	11	22.1	—	11.0	22.1
	Electric Heater Amps	—	14.5	28.9	—	19.3	38.5	—	24.1	48.2	—	28.9	57.8	—	28.9	57.8
	Unit MCA	3.5	21.63	39.63	3.5	27.63	51.63	3.5	33.63	63.75	8.5	44.63	80.75	8.5	44.63	80.75
	Max Fuse Size or Circuit Breaker	15	25	40	15	30	60	15	35	70	15	45	90	15	45	90
460-60-3	Indoor Fan Motor Amps *	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	9.6	9.6	9.6	9.6	9.6	9.6
	Electric Heat KW	—	5.5	11.0	—	7.4	14.7	—	9.2	18.4	—	11	22.1	—	11.0	22.1
	Electric Heater Amps	—	7.2	14.5	—	9.6	19.3	—	12.0	24.1	—	14.45	28.9	—	14.5	28.9
	Unit MCA	6.25	10.60	19.63	6.25	13.60	25.69	6.25	16.61	31.69	12	21.06	39.13	12	21.06	39.13
	Max Fuse Size or Circuit Breaker	15	15	20	15	15	30	15	20	35	15	25	40	15	25	40

NOTE: Electric heat disconnect provided.

Unit Electrical and Control Connections

MicroTech Unit Mounted Direct Digital Control (DDC) Components - Models AHF, AHV, and AHR

1. **MicroTech Unit Ventilator Controller (UVC):** (Located Beneath the Local User Interface Panel). Factory mounted and run tested, microprocessor-based DDC control device capable of complete Standalone unit control, Client/Server control or incorporated into a building-wide network using an optional plug-in communication module. The UVC contains a microprocessor that is preprogrammed with the application code required to operate the unit. The UVC supports up to 16 analog inputs, 8 binary inputs, 4 analog outputs, 2 PWM outputs, and 14 binary outputs. Client/Server units have the controller factory configured and installed for a local peer-to-peer network between these units (network wiring between these units needs to be field installed). Optional network communication is provided via plug-in communication modules that connect directly to the UVC.
2. **Communication Module (optional):** Plug-in network communication module that is attached to the UVC via a 12-pin header and 4 locking standoffs. Available communication modules:

- **Building Automation and Control Network (BACnet®) Client Server/Token Passing (MS/TP) –** Allows the UVC to inter-operate with systems that use the BACnet (MS/TP) protocol with a conformance level of 3. Meets the requirements of ANSI/ASHRAE 135-2008 standard for BACnet systems
- **LonWorks® compliant Space Comfort Controller (SCC) –** Supports the LonWorks SCC profile number 8500_10

3. **Local User Interface (LUI) (optional):** (see Figure 94 on page 49). The LUI provides a unit mounted interface which indicates the current unit operating state and can be used to adjust the unit ventilator operating parameters (operating mode, temperature set points, fan speed and occupancy mode). The LUI features a 4 x 20 OLED digit display, 6 keys, and 2 individual LED indicators. In addition to the operating mode states and fan functions, the touch pad will digitally display:

- The room set point temperature
- The current room temperature
- Any fault code for quick diagnostics at the unit

4. **External Signal Connection Plugs:** Three (3) multi-pin plugs are factory provided and pre-wired with short wire whips that are capped (they must remain capped if not used). Provided for field wiring of:

- **Remote Wall Mounted Temperature Sensor (optional accessory)**
- **External Input Signals (by others) –** Unoccupied, remote shutdown, ventilation lockout, dew point/humidity (night time operation), or exhaust interlock signals
- **External Output Options (by others) –** Lights on/off, fault indication signal, exhaust fan on/off or auxiliary heat signal

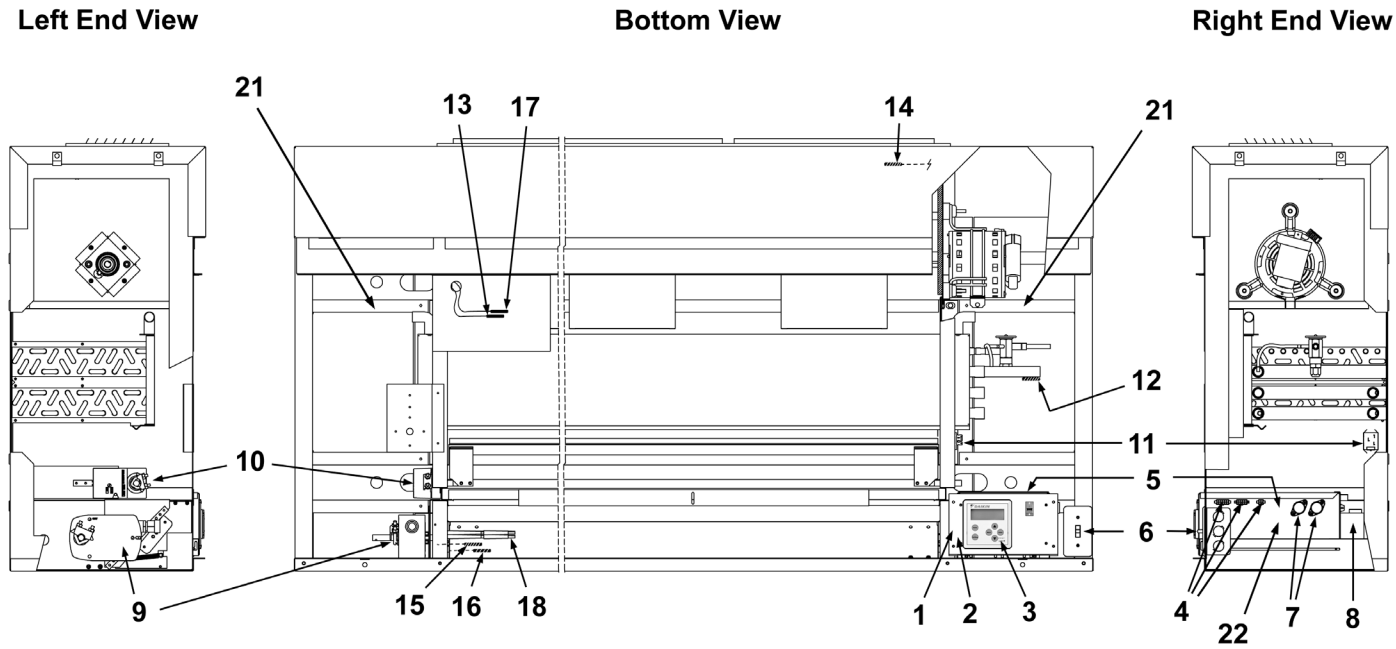
5. **Electric Connection Box:** Contains the motor speed transformer. Refer to the unit wiring diagram for specifics.
6. **Unit Main Power "On-Off" Switch:** (SW1) Disconnects the main power to the unit for servicing or when the unit is to be shut down for an extended period of time.
7. **Fuse(s):** Fan motor and controls have the hot line(s) protected by factory installed cartridge type fuse(s).
8. **Control Transformer:** 75 VA 24-volt NEC Class 2 transformer for 24 volt power supply.
9. **Outdoor Air/Return Air Damper Actuator (A1):** Proportional, direct-coupled actuator that spring returns the outdoor air damper to the closed position upon a loss of power.
10. **Face and Bypass Damper Actuator (A2):** Proportional, direct-coupled control actuator that is non-spring returned (Model AHF and AHB only).
11. **Hydronic Coil Low Air Temperature Limit (T6 Freezestat):** Factory installed on all units with hydronic (water) coils. The T6 freezestat cuts out at 38°F (+/- 2°F) and automatically resets at 45°F (+/- 2°F).
12. **Low Refrigerant Temperature Sensor (ICT):** The ICT sensor is provided on all units with a direct expansion (DX) cooling coil. It is located on the right hand side of the coil "u-bend".

NOTICE

Not all external signal options can be used simultaneously and may not be available on all software models.

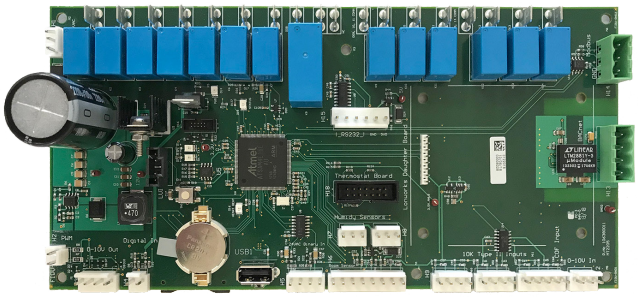
13. **Room Temperature Sensor (RAT):** The RAT is a field installed, optional accessory. The unit mounted sensor can be installed in the sampling chamber (front, center section) where room air is continuously drawn through for prompt response to temperature changes in the room. A Remote Wall Mounted Temperature Sensor is available for remote room temperature sensing.
14. **Discharge Air Temperature Sensor (DAT):** The sensor is located at the right end and inside the discharge air plenum to sense discharge air temperatures.
15. **Outdoor Air Temperature Sensor (OAT):** The sensor is located in the outdoor air section of the unit before the outdoor air damper. With network applications, the unit mounted sensor can be overridden by a remote sensor through the network.
16. **Outdoor Air Humidity Sensor (OH) (available option):** Unit mounted humidity sensor for units using expanded outdoor enthalpy economizer or leading edge indoor/outdoor, true enthalpy comparison economizer. The sensor is located in the outdoor air section of the unit before the outdoor air damper. With network applications, the unit mounted sensor can be overridden by a remote sensor through the network.

Figure 92: MicroTech Sensor and Component Locations



17. **Room Humidity Sensor (IH) (available option):** Unit mounted humidity sensor for units capable of passive or active dehumidification or with units using leading edge indoor/outdoor, true enthalpy comparison economizer. The sensor is located in the sampling chamber (front, center panel) where room air is continuously drawn through for fast response to humidity changes in the room. With network applications, the unit mounted sensor can be overridden by a remote sensor through the network.
18. **CO_2 Sensor (CO_2) (available option):** Unit mounted, single beam absorption infrared gas sensor with a sensing range of 0 – 2000 ppm and voltage output of 0 to 10 VDC (100 ohm output impedance). The Pitot Tube sensing device is located in the unit ventilator's return air stream. The optional CO_2 sensor is used with the UVC's Demand Control Ventilation feature to vary the amount of outside air based on actual room occupancy. With network applications, the unit mounted sensor can be overridden by a remote sensor through the network.
19. **Control Valve(s) (not shown):** Optional accessory valve(s) may be either 2 position End of Cycle (AHF and AHB models) or modulating (AHV and AHR models), to control the quantity of water through the coil. Available in 2-way or 3-way configurations. Spring return actuators are required for all hot water and steam heating valves. All heating valves are Normally Open (NO) and all cooling valves Normally Closed (NC). (See piping/valve section.)
20. **Water In Temperature Sensor (OCT) (not shown):** The water in temperature sensor is factory wired on 2-pipe CW/HW units only. The sensor must be field installed and insulated (by others) on the supply connection of the hydronic coil. The sensor must be located on the supply connection where there is continuous water flow. It is located on the same side as the coil connections. The sensor measures the entering water temperature to determine if the temperature is acceptable for either heating or cooling based on the unit's operating state. (See piping section.)
21. **A2L Sensor (A2L1-2):** Up to two unit mounted R32 refrigerant sensors are installed in the base of each end pocket. They are used to detect a refrigerant leak for initiating leak mitigation control.
22. **MT6210 A2L Mitigation Controller:** Factory mounted controller monitors the A2L sensors and indicates a refrigerant leak or refrigerant sensor failure should one occur.

Figure 93: MicroTech Control Board



NOTE: If Installing Communication Module, refer to the installation instructions specific to that Communication Module.

Economizer Control Capabilities

Basic – Compares the inside and outside air temperatures using item 13 (Room Temperature Sensor) and item 15 (Outdoor Air Temperature Sensor) to determine if outdoor air can be used for "free", economizer cooling operation.

Expanded – Compares the inside and outside air temperatures using item 13 (Room Temperature Sensor) and item 15 (Outdoor Air Temperature Sensor) and calculates the enthalpy of the outside air relative humidity using item 16 (Outdoor Air Humidity Sensor) to determine if outdoor air can be used for "free", economizer cooling operation.

Leading Edge – True enthalpy comparison economizer that compares the inside and outside air temperatures using item 13 (Room Temperature Sensor) and item 15 (Outdoor Air Temperature Sensor) and compares the enthalpy of the inside and outside air relative humidity using item 16 (Outdoor Air Humidity Sensor) and item 17 (Room Humidity Sensor) to determine if outdoor air can be used for "free", economizer cooling operation.

Economizer for Reheat

Basic – Uses items 13 (Room Temperature sensor, item 15 (Outdoor Air Temperature Sensor) and item 17 (Room Humidity Sensor) for active dehumidification (reheat) or to determine if outdoor air can be used for "free", economizer cooling operation.

Leading Edge – Uses items 13 (Room Temperature Sensor), item 15 (Outdoor Air Temperature Sensor), item 16 (Outdoor Air Humidity Sensor) and item 17 (Room Humidity Sensor) for active dehumidification (reheat) or to determine if outdoor air can be used for "free", economizer cooling operation.

Local User Interface (LUI)

Figure 94: Local User Interface (LUI)

The optional built-in LUI touch pad with digital OLED display is located in the right hand compartment below the top right access door. The 4 x 20 OLED display will provide a variety of information including:

Operating mode states

- Fan functions
- Room set point temperature
- Current room temperature
- Fault codes for quick diagnostics at the unit

The LUI has a built in menu structure (Password protected) with 4 keys and 2 individual LED indicators to adjust the unit ventilator operating parameters shown in the following.

Operating Mode States

- **Heat –** Heating and economizer operation only
- **Cool –** Cooling and economizer operation only
- **Fan Only –** Fan operation only
- **Auto –** Unit automatically switches between heating, cooling and economizer operation to satisfy the room load conditions. The current unit state is also displayed.

Fan States

- **High** (constant speed)
- **Medium** (constant speed)
- **Low** (constant speed)
- **Auto** (part load, variable air) – Varies the fan speed automatically to meet the room load conditions whether the unit is in heating, cooling or economizer mode. The current fan speed is also displayed. During low load or normal operation (about 60% of the time) the fans will operate at low speed. When the load increases to an intermediate demand the fans automatically shift to medium speed. At near design or design load conditions, the fans will operate on high speed. A 10-minute delay between speed changes is incorporated to minimize the awareness of these changes. The outdoor air damper will index based on the fan speed to maintain the required minimum cfm (cubic feet per minute) of ventilation air.

Occupancy Modes

- **Occupied –** Normal, daytime operation where the unit maintains the room set point.
- **Unoccupied –** Night set back operating mode in which the unit responds to a new room set point and cycles to maintain the condition. The fan comes on when heating or cooling is needed and runs until the load is satisfied. The outside air damper is closed during this mode. With direct expansion (DX) cooling units, when a cooling load is satisfied by the refrigerant system, the compressor is de-energized and the unit ventilator indoor fan continues to run for a fixed period of time to remove possible frost buildup on the evaporator coil.
- **Stand By Mode –** The unit ventilator maintains the stand by mode set point temperature with the outside air damper closed. The fan runs continuously unless it is configured to cycle in response to the room load.
- **Bypass Mode –** By depressing the Tenant Override Switch (Item 4) the unit is placed back into the Occupied Mode for a predetermined time (default of 120 minutes). This time can be set in 1-minute increments from 1 minute to 240 minutes through the Unit Ventilator Service Tool or a network.

Typical MicroTech Wiring Diagrams

Figure 95: Electromechanical Controls – A2L Leak Mitigation

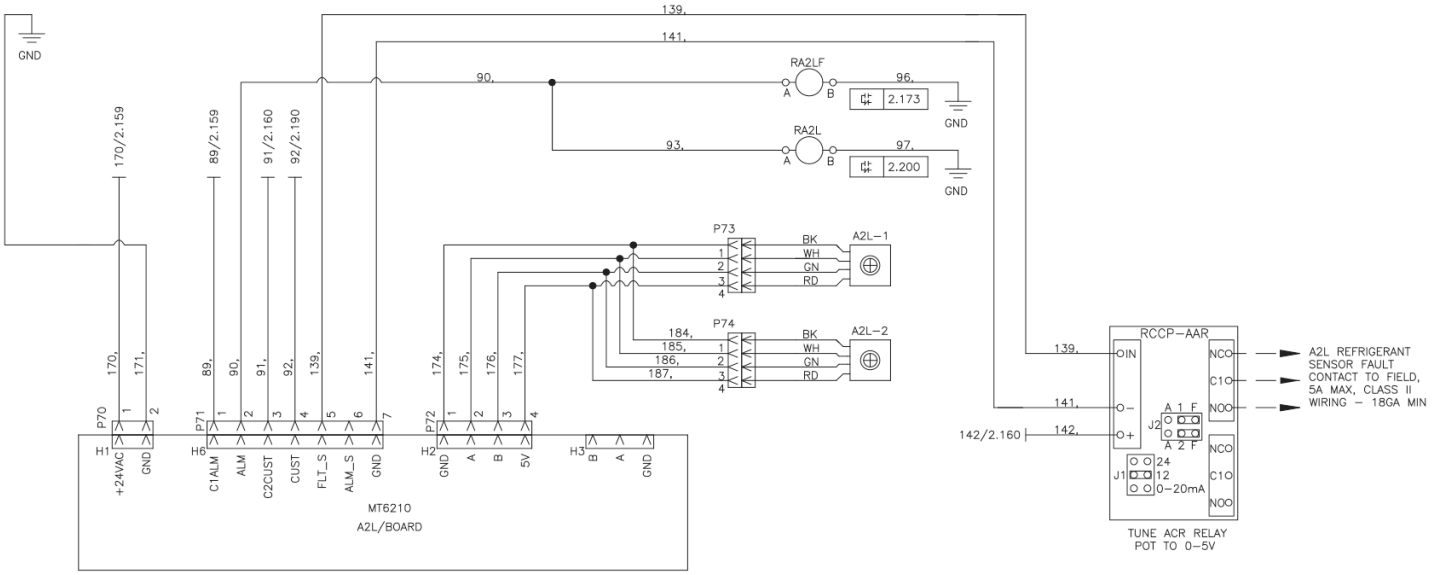


Figure 96: Typical MicroTech Wiring – 115 Volt/60 Hz /1 Ph

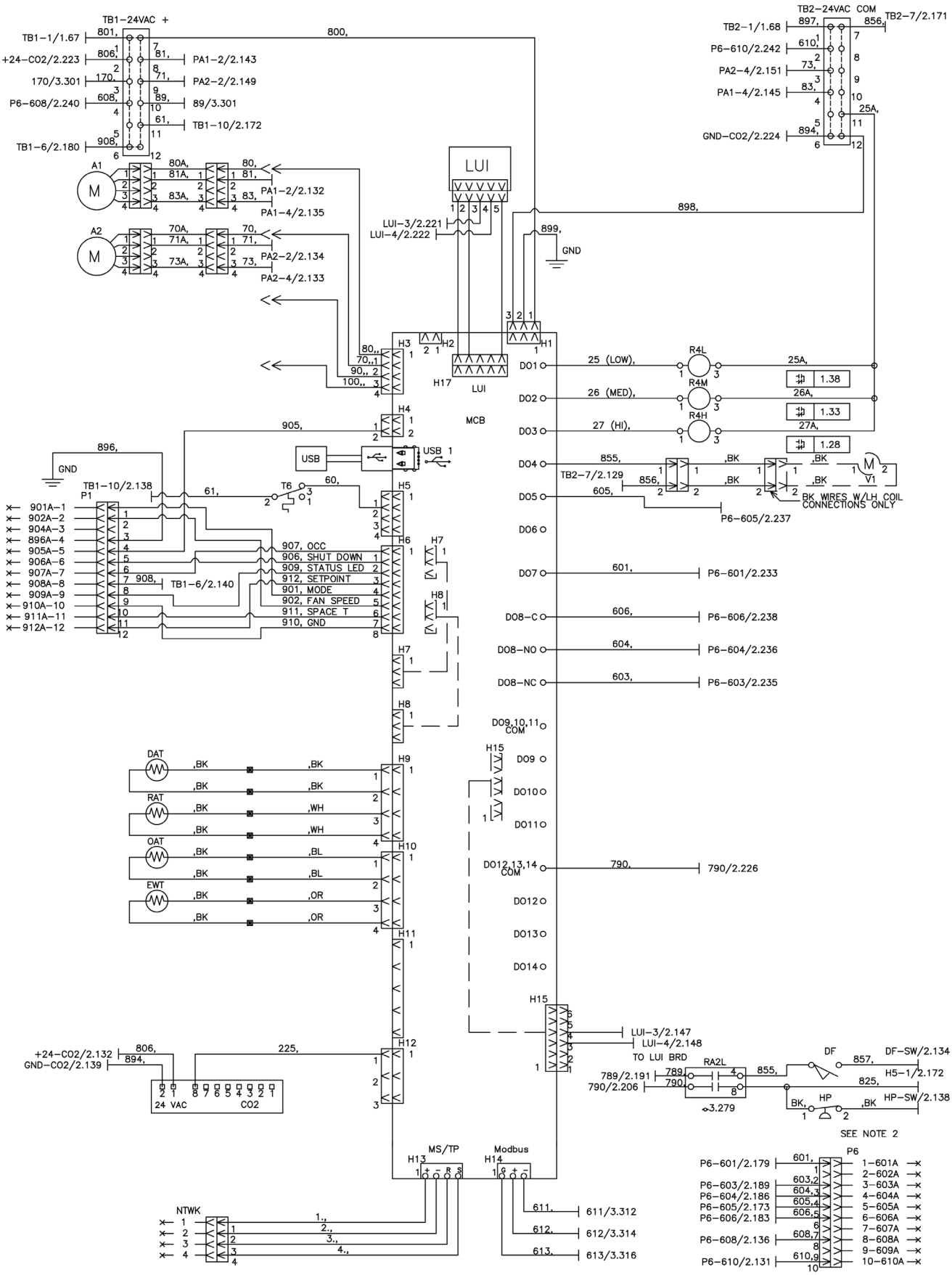
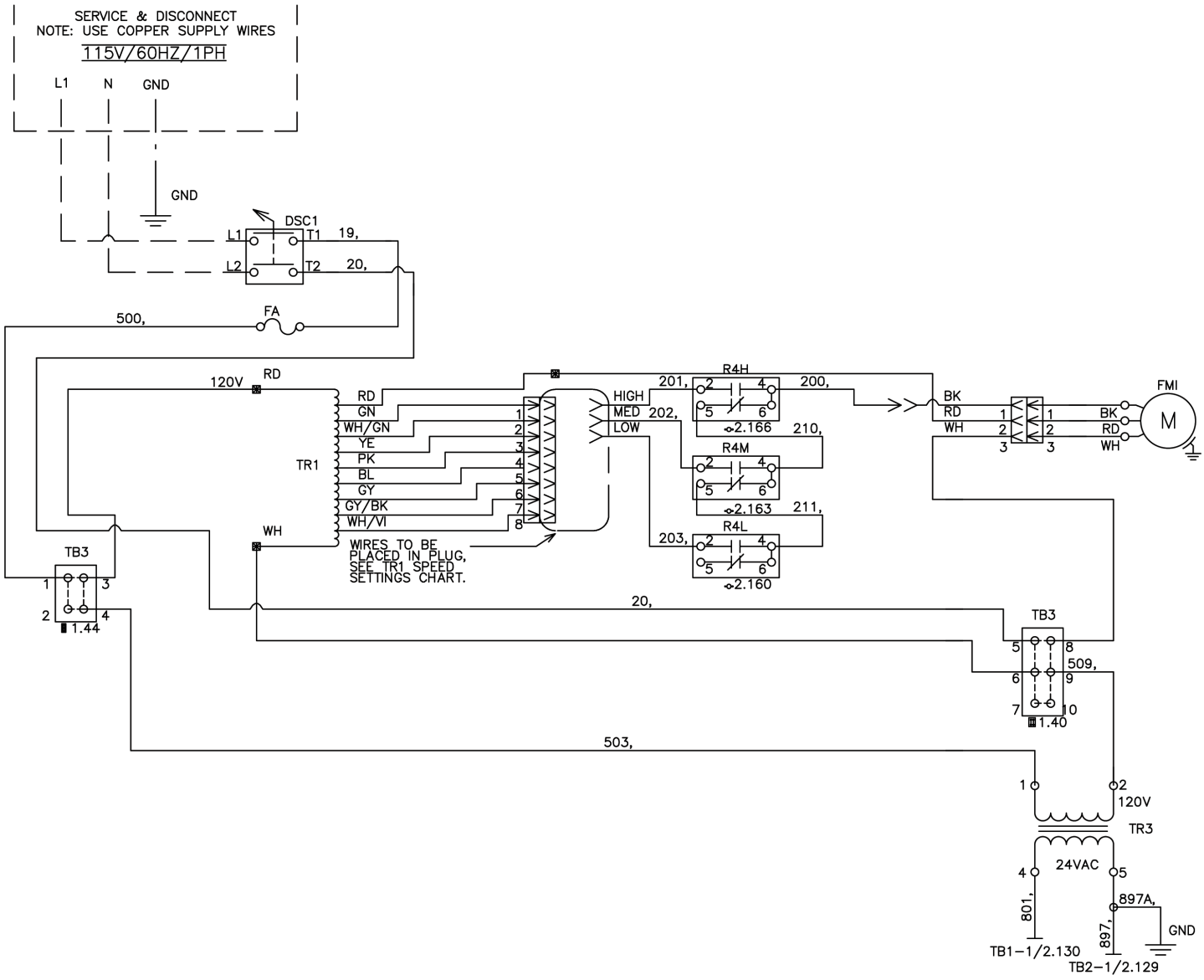


Figure 97: Typical MicroTech Wiring Diagram – Service and Disconnect, 115 Volt/60 Hz/1 Ph



Wiring Schematics Legend for "Typical MicroTech Wiring Diagrams"

Legend			
A1	Actuator- Outdoor Air	**OH1**	Thermostat - Overheat
A2	Actuator- Face & Bypass	**OH2**	Thermostat - Overheat
A2L1-2	A2L Refrigerant Sensor	**OHM**	E.H. Man Reset - Overheat Stat
CP1	Motor Compressor 2-Stage	**PL1**	LED Occupancy / Fault Status
C1	Compressor Contactor	**R1-R3**	Relay Electric Heat (Backup)
CAP1	Capacitor Run	**R10-R12**	Relay – Electric Heat
CEH1-3	Electric Heat Contactor	**R4H**	Relay – Fan High Speed
CO2	Sensor - Indoor Air CO2	**R4M**	Relay– Fan Medium Speed
DAT	Sensor - Discharge Air Temperature	**R4L**	Relay– Fan Low Speed
DCS	Switch - Unit Power	**R32**	Relay - Drain Pan Heater
DF	Dead Front Switch	**R28**	Relay - Outdoor Motor Air
EH1-6	Heater - Electric	**RA2L**	Relay A2L
EH10	Heater - Outdoor Drain Pan	**RAT**	Sensor - Room Air Temperature
F1A/F1B	Fuse - Compressor	**RV**	Reversing Valve
F2A/F3C	Fuse - Electric Heat	**T6**	Thermostat - Freeze Stat
FA/FB	Fuse– Control, Load	**TB1**	Terminal Block - 24VAC+
FC/FD	Fuse– Control, Transformer	**TB2**	Terminal Block – 24VAC Gnd
FMI	Motor - Room Fan	**TB3**	(A, B) Terminal Block – Main Power
FMO	Motor Outdoor Air	**TBE**	Terminal Block - Electric Heat
HP	High Pressure Switch	**TR1**	Transformer - Motor Speed
ICT	Sensor - Indoor DX Coil Temperature	**TR3**	Transformer - 208 / 230V-24V, 75VA
IH	Sensor - Indoor Humidity	**TR4**	Transformer - 460V–230V
MCB	Main Control Board	**TR5**	Transformer - 208 / 230V-24V
MT6210	A2L Control Board	**V1**	Valve - Heat EOC (Accessory)
NTWK	Network Connection	**V2**	Valve - Cool EOC (Accessory)
OAT	Sensor - Outdoor Air Temperature	**VH**	Valve - Heat (Accessory)
OCT	Sensor - Outdoor DX Coil Temperature	**VC**	Valve - Cool (Accessory)
OH	Sensor - Outdoor Humidity		

Legend - Symbols	
– – –	Accessory or field mounted component
⏚	Ground
⊠	Wire nut / splice
●	Overlap point - common potential wires
L1/1.20	Wire link (wire link ID / page # . line #)

TR1 Speed Settings				
	750	**1000**	**1250**	**1500**
High	PK	YE	WH/GN	GN
Med	GY	GY	PK	YE
Low	GY/BK	GY/BK	GY	PK

NOTE 1: All electrical installation must be in accordance with national and local electrical codes and job wiring schematic.

NOTE 2: External wiring options - see IM for the different configured options, wiring to be minimum 18 gauge, 90°C.

NOTE 3: EC Motors are factory programmed for specified airflow. Contact Daikin Applied for replacement.

NOTE 4: Cap extra wire. Switch wire 42A to red wire for 208V operation.

NOTE 5: Devices in legend may or may not be on unit.

MicroTech Unit Electrical Connections

⚠ DANGER

Do not force adjustment stem of TXV. When adjusting superheat To avoid electrical shock, personal injury, or death, be sure that field wiring complies with local and national fire, safety, and electrical codes, and voltage to the system is within the limits shown in the job-specific drawings and unit electrical data plate(s)

⚠ WARNING

Power supply to unit must be disconnected before making field connections. To avoid electrical shock, personal injury, or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

See Table 31, Figure 95 through Figure 99 and the job-specific electrical drawings before proceeding with field power and control wiring. See also the wiring diagram provided on the unit ventilator right front access panel.

Unit ventilators equipped with an optional electric heating coil have electric heating coil power connections at right end only.

Procedure

1. Provide power supply to right end compartment to match unit nameplate.

⚠ CAUTION

Use copper conductors only. Use of aluminum conductors may result in equipment failure and overheating hazards. All wiring in right hand compartment must be class 1.

2. Wire leads provided from unit ventilator electric connection box to load side of unit power switch (switch provided by Daikin Applied).

   The junction box has 1″ (25 mm) and 2″ (51 mm) knockouts, located 10-1/2″ (267 mm) from right end of unit.
3. Provide ground wire from grounding screw in switch junction box to switch ground terminal.
4. Wire field power supply to line side of unit power switch. Wire ground conductor to switch ground terminal.
5. Mount unit power switch in switch junction box and install switch cover plate (provided).
6. On units with electric heat, the 2 pole unit power switch is replaced by a 3 pole switch and is mounted in the locations as shown in Figure 98. (A) shows switch location for valve control units and (B), and (C) show location for Face & Bypass control units. (B) is for 208, 230 and 265 volt units. (C) shows location for 460 volt units.

A2L Leak Mitigation Connections

Terminal A2LCUST is intended to be used to provide notification of a refrigerant leak. This normally de-energized output will energize providing 24 VAC when the MT6210 Mitigation Controller detects a refrigerant leak as indicated by one of the A2L sensors. In the event of an A2L leak, the compressor and any electric heat outputs will be de-energized and the fan will be forced to run at high speed for at least 5 minutes after refrigerant centrifugation is no longer detected. See Figure 95.

Upon indication of a refrigerant leak by the MT6210 Mitigation Controller, the field installed controller should disable compressor and electric heat signals immediately and also command the fan speed so that sufficient airflow is delivered within 10 seconds of leak indication. The MT6210 Mitigation Controller will continue to deliver the airflow until the leak indication signal is re-energized.

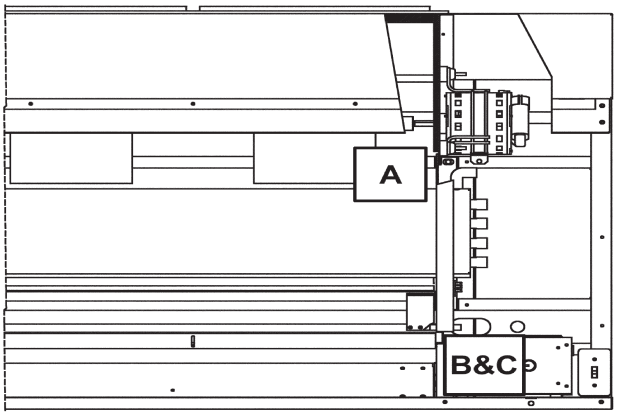
The Adjustable Analog Relay (AAR) board is intended to provide notification of a refrigerant sensor failure. Relay 1 on the AAR will be energized under normal operating conditions (closed circuit between C1 and N.O., open circuit between C1 and N.C.) and energized when the MT6210 Mitigation Controller detects that any of the sensors are reporting a failure, or if they are not communicating with the MT6210 Mitigation Controller or when a refrigerant leak is detected.

Upon indication of a sensor failure by the MT6210 Mitigation Controller, the field installed controller should command the fan speed so that sufficient airflow is delivered within 10 seconds of sensor failure indication. The MT6210 Mitigation Controller will continue to deliver the airflow until the sensor failure indication signal is re-energized.

⚠ CAUTION

The Adjustable Analog Relay (AAR) is factory calibrated to provide an indication of a R-32 sensor failure or communication problem. Consult the factory before making any adjustments to the settings on the AAR.

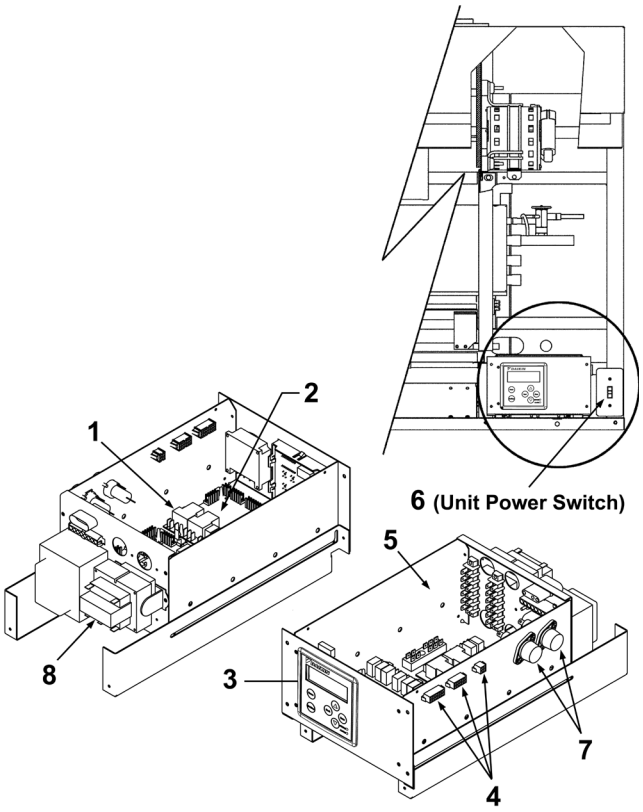
Figure 98: Electric Heat Unit Power Switch Locations



NOTICE

See "Electrical Data/Motor Data and Unit Amp Without Electric Heat" and "Standard Motor Electric Heat Capacities, Amps, Wire Sizing, and Over Current Protection" on page 45.

Figure 99: MicroTech Control DDC Electric Connection Box Located in Right End Compartment



NOTE: See page 46 for detailed number descriptions.

Legend for Figure 99	
1	MicroTech Unit Ventilator Controller (UVC)
2	Plug-in Communication Module Location
3	Local User Interface (LUI)
4	External Signal Connection Plugs
5	Electric Connection Box
6	Unit Power Switch
7	Fuse(s)
8	Control Transformer

MicroTech Wall Mounted Sensor

⚠ WARNING

Rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

⚠ WARNING

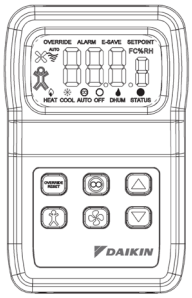
To avoid electrical shock, personal injury, or death:

1. Installer must be a qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and damage to equipment.
3. Make all connections in accordance with electrical wiring diagrams, and in compliance with national and local codes. Use copper conductors only.
4. Do not exceed ratings of the device. This is a low voltage device. Never apply more than 12VAC/VDC to any lead or damage will result.
5. Avoid locations where excessive moisture, corrosive fumes, or vibrations are present.

NOTICE

Avoid placing wall sensor near drafty areas such as doors or windows. Avoid external walls, or dead spots near exposed columns. Avoid direct sunlight on wall sensor.

Figure 100: Wall Mounted Temperature Sensor



When Using a Remote Temperature Sensor

If a decision is made to use a Wall Mounted Temperature Sensor instead of the unit mounted room air sensor then placement of the Remote Wall Mounted Temperature Sensor is critical for proper room temperature sensing (see Figure 101 and Figure 102). The UVC is capable of using one of four remote wall mounted temperature sensors. It is recommended that additional wires be pulled to compensate for potential wire breakage or future options.

- 6-Button Digital Adjustable Sensor (PN 910247458) 8 total wires (power and ground wires should be bundled separately)
- 4-Button Digital Adjustable Sensor (PN 910247448) 6-wires (power and ground wires should be bundled separately)
- The Basic Sensor with setpoint adjustment (PN 910247453) 4-wires
- The Basic Sensor (PN 910247450) 3-wires

NOTICE

For sensor terminal wiring details see the installation manual specific to the sensor being used.

Figure 101: Correct Wall Sensor Locations

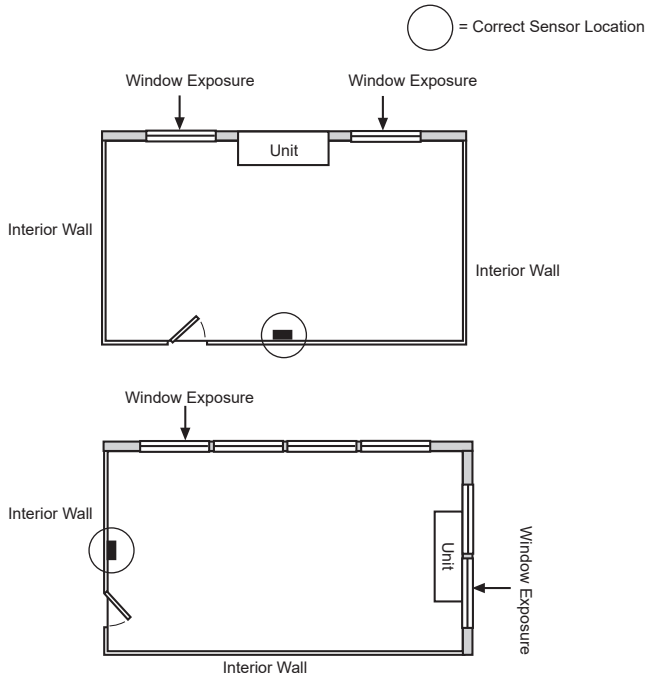


Figure 102: Incorrect Unit and Wall Sensor Locations

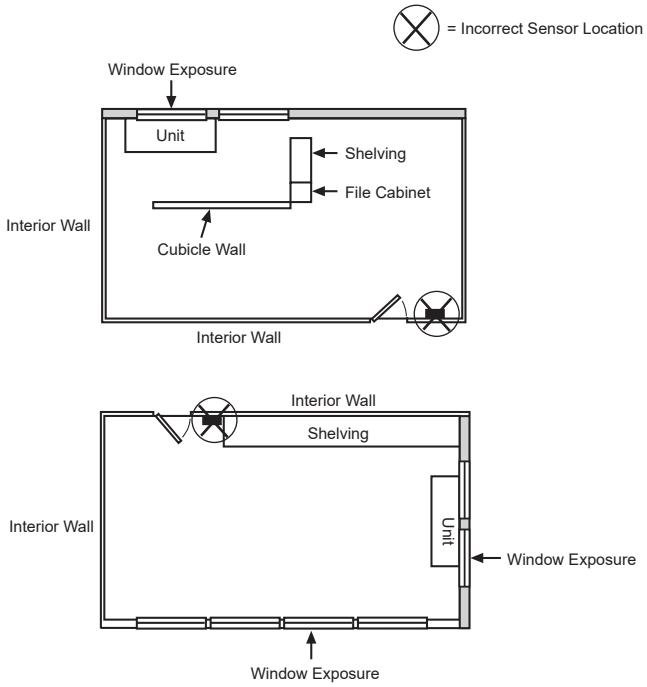


Table 33: Max Sensor Wire Length and Gauge

Maximum sensor wire length for less than 1°F error	
Gauge	**Length**
14 AWG	800 ft (244 m)
16 AWG	500 ft (152 m)
18 AWG	310 ft (94 m)
20 AWG	200 ft (61 m)
22 AWG	125 ft (38 m)

⚠ 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 main control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, relay modules, or power plugs while power is applied to the panel.

Typical Connections For Temperature Sensor Applications

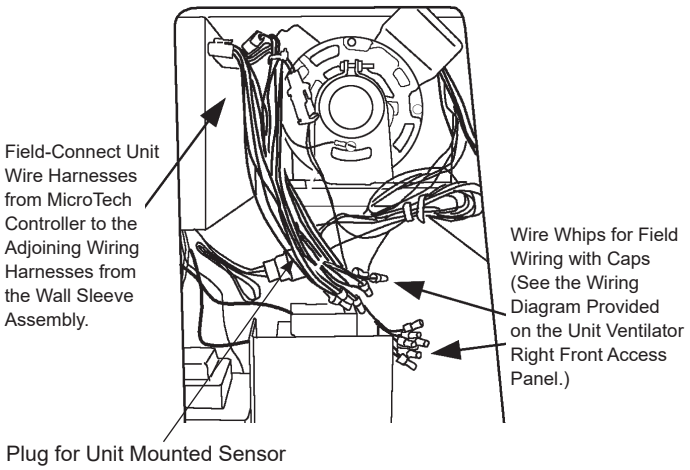
The low voltage field wiring connections have all been centrally located within the unit ventilator and are easily accessible.

To simplify field connections, multi-pin plugs are factory provided and pre-wired with short wire whips (Figure 103). Each of the wires in these wire whips is capped and should remain capped if not used. See Table 34 on page 58 for wiring the remote mounted temperature sensor to the unit control wiring.

All low voltage field wiring connections must be run in shielded cable with the shield drain wires connected as shown in the field wiring diagrams.

For sensor terminal wiring details see the installation manual specific to the sensor being used.

Figure 103: Field Wiring Whips with Caps Viewed from Right End Compartment



Sensor Functions

- Display sensor to show room temperature, fan speed (AUTO/HIGH/MEDIUM/LOW), system mode (HEAT/COOL AUTO/OFF), ALARM, override and occupancy.

Mounting

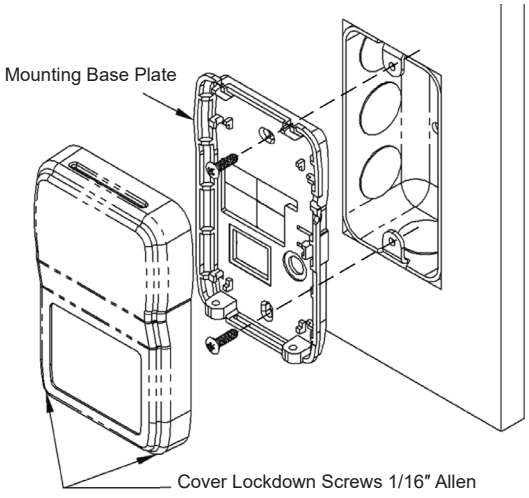
Location

Avoid mounting on outside walls or in direct sunlight.

Junction Box, (J-Box)

1. Pull the wire through the wall and out of the junction box, leaving about six inches free.
2. Pull the wire through the hole in the base plate.
3. Secure the back plate to the box using the #6-32 × 1/2 inch mounting screws provided.
4. Screw the plate firmly to the wall so the foam plate backing is compressed about 50%.
5. Terminate the unit according to the guidelines in the Termination section.
6. Attach cover by latching it to the top of the base, rotating it down and snapping into place.
7. Secure the cover by backing out the lock-down screws using a 1/16″ Allen wrench until it is flush with the bottom of the cover.

Figure 104: Junction box mounting



NOTE: Hardware is provided for both junction box and drywall installation.

Drywall Mounting

1. Place the base plate against the wall where you want to mount the sensor.
2. Mark out the two mounting holes where the unit will be attached to the wall. Drill a 3/16″ hole in the center of each mounting hole and insert a drywall anchor into the holes.
3. Drill one 1/2″ hole in the middle of the marked wiring through hole area.
4. Pull the wire through the wall and out the 1/2″ hole, leaving about six inches free.
5. Pull the wire through the hole in the base plate.
6. Secure the base to the drywall anchors using the #6 × 1″ mounting screws provided.
7. Screw the plate firmly to the wall so the foam plate backing is compressed about 50%.
8. Terminate the unit according to the guidelines in the Termination section.
9. Attach cover by latching it to the top of the base, rotating it down and snapping it into place.
10. Secure the cover by backing out the lock-down screws using a 1/16″ Allen wrench until it is flush with the sides of the cover.

NOTICE
In any wall-mount application, the wall temperature and the temperature of the air within the wall cavity can cause erroneous readings. The mixing of room air and air from within the wall cavity can lead to condensation, erroneous readings and sensor failure. To prevent these conditions, Daikin Applied recommends sealing the conduit leading to the junction box with fiberglass.

Maintenance

Wipe the display as needed with a damp water only cotton cloth. Do not use any type of cleaner as it may damage the buttons or scratch the display. Do not paint.

Terminations

⚠ CAUTION

The AC power wiring at terminals [R] & [5] should be run in a separate twisted shielded pair to avoid fluctuating and inaccurate signal levels induced into the other sensor signal wires. This sensor AC power can be run in the same conduit with the sensor signal wire as long as it's run in twisted, shielded pair and terminated properly.

Daikin Applied recommends using shielded 22AWG for all connections and a separate twisted pair for the power wire connections. The shield should be earth grounded only at the power source. Larger gauge wire may be required for runs greater than 250′.

All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run any of this device's wiring in the same conduit as other AC power wiring. Tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. If you are experiencing any of these difficulties, please contact your Daikin Applied representative.

Figure 105: Sensor Circuit Board

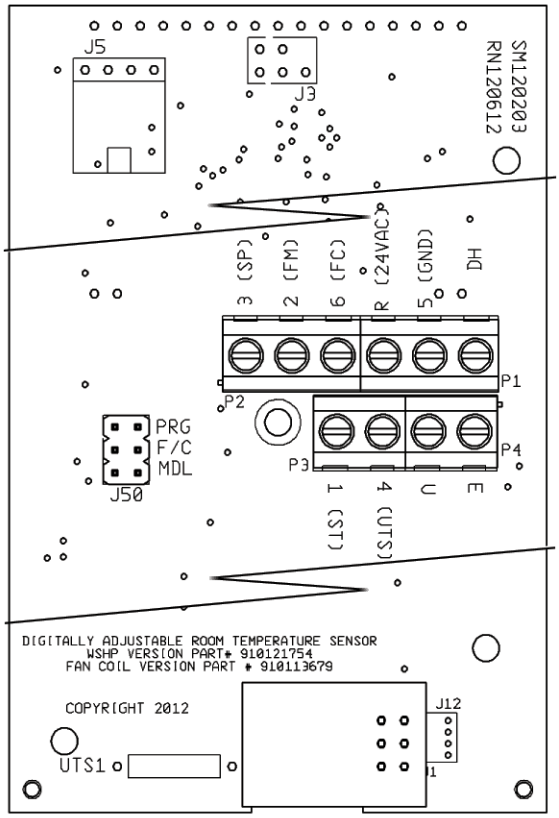


Table 34: Unit Ventilator MicroTech Board to Room Temperature Sensor Wiring

MicroTech Base Board									
Terminal Block Label	**TB1**	**H6-1**	**H6-2**	**H6-3**	**H6-4**	**H6-5**	**H6-6**	**H6-7**	**H6-8**
Sensor 910247458	●	●	○	●	●	●	●	●	●
Sensor 910247448	●	●	○	●	●	○	○	●	●
Sensor 910247453	○	○	○	●	●	○	○	●	●
Sensor 910247450	○	○	○	●	○	○	○	●	●
Description	24VAC	Occupancy	Shutdown (Not Used)	Status LED	Setpoint	Unit Mode	Fan Speed	10K RTD	Ground
Wire	**908**	**907**	**906**	**909**	**912**	**901**	**902**	**911**	**910**

Typical Wiring

Terminal Label	**R**	**U**	**1 (ST)**	**3 (SP)**	**2 (FM)**	**6 (FC)**	**4 (UTS)**	**5 (GND)**
Description	24VAC	Unoccupied	Unit Status Output	Setpoint Adjust	Unit Mode	Fan Speed	Room Temp Sensor & Tenant Override	Ground
Room Temperature Sensor								

Terminal Designations

● = Active Terminal ○ = Not Used

Making Control Connections

Digital Ready™ – Face & Bypass Control Components Model AHF

Digital Ready is a factory installed pre-wired package of selected Direct Digital Control (DDC) components. It facilitates the field hook up of a DDC Unit Ventilator Controller (UVC) that is compatible with these factory installed, pre-wired components, and capable of providing the standard ASHRAE II cycle.

⚠ CAUTION

It is the responsibility of the Automatic Temperature Control supplier to ensure the controls operate correctly and protect the unit.

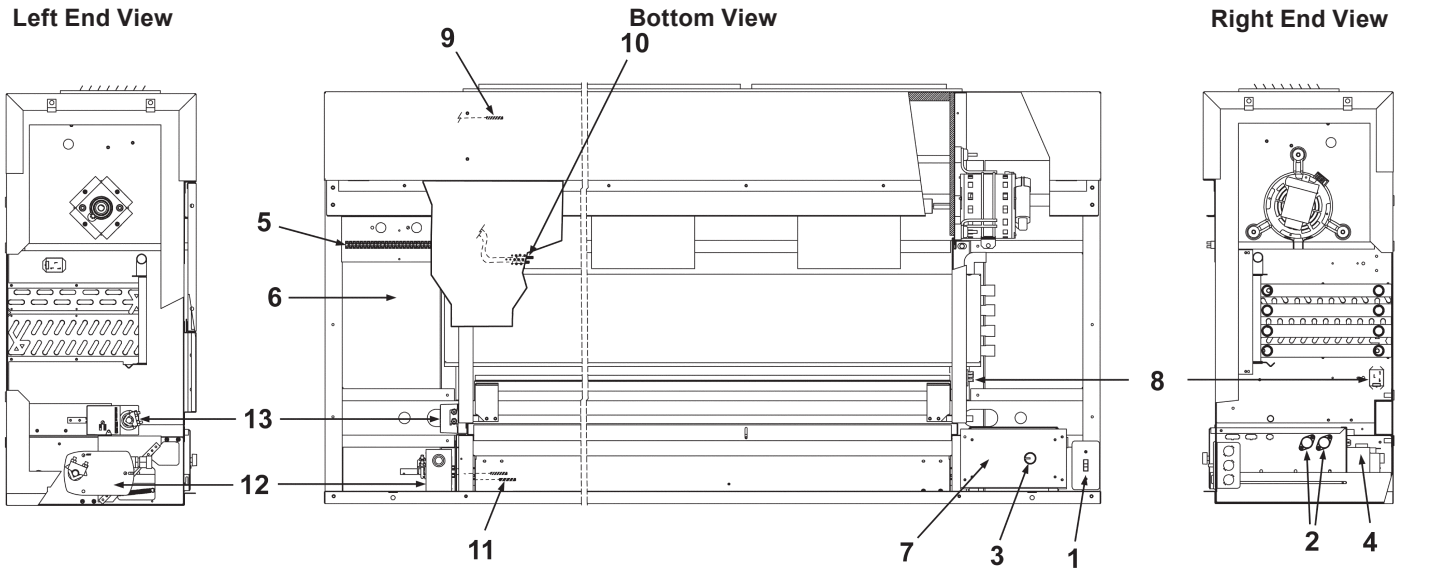
Digital Ready consists of the following components which are factory wired and powered:

1. **Unit Main Power "On-Off" Switch:** disconnects main power to the unit for service. Non-fused power interrupt switch.
2. **Fuse(s):** fan motor, auto transformer and control transformer have the hot line(s) protected by factory installed cartridge type fuse(s).
3. **Three (3) Speed HIGH-MEDIUM-LOW-OFF Motor Fan Speed Switch** (on units with 3-speed EC Motors). Units with variable EC motor will not have a speed switch.
4. **75 VA 24 V NEC Class 2 Transformer:** for 24 V power supply.
5. **Three 10-Pole Europa Type 16 awg Terminal Strips:** rated for 10 amps at 300 volts with nickel plated connectors and zinc plated clamping screws (TB1, TB2, TB3).
6. **Space** available in left end compartment, approximately 8″ x 21″ (203 mm x 533 mm) for UVC mounting (by others).

Wired to the Terminal Strips:

7. **Interface with the Fan Motor Start/Stop Relay (R4):** in electric connection box.
8. **Low Air Temperature Limit (T6 - Freezestat):** cuts out below 38°F±2 °F and automatically resets above 45°F±2 °F. Responds when any 15% of the capillary length senses these temperatures. Wired so that upon (T6) cut out, the outside air damper (A1) closes, the hot water valve opens and the 24 volt power supply to the terminal strip (T6 Sig) is interrupted.
9. **Discharge Air Temperature Sensors (S2):** 10 K ohm NTC (Negative Temperature Coefficient) and 1 K ohm PTC (Positive Temperature Coefficient). Located on the second fan housing from the right to sense discharge air temperatures.
10. **Room Temperature Sensors (S1):** 10K ohm (NTC) and 1 K ohm (PTC). The unit mounted sensors are located in the unit sampling chamber (bottom panel with perforations), where room air is constantly drawn through for prompt response to temperature changes in the room.
11. **Outdoor Air Temperature Sensors (S3):** 10K ohm (NTC) and 1 K ohm (PTC). The sensors are located in the outdoor air section of the unit before the outdoor air damper.
12. **Outdoor Air/Return Air Damper Actuator (A1):** spring returned, direct coupled, proportional control (2 to 10 VDC or 4 to 20 mA).
13. **Face and Bypass Damper Actuator (A3):** non-spring returned, proportional control (2 to 10 VDC or 4 to 20 mA).
14. **End of Cycle DDC Valves (not shown):** spring return actuators (by others). Interface from the terminal board with one or two providing 24-volt power. Open/shut signal from UVC (by others).
15. **24 V Power Wiring Harness:** from the right to left-hand end compartment through the built-in metal wire raceway terminating at three terminal blocks.
16. **Low Refrigerant Temperature Sensor (T4) (not shown):** capillary sensor, helps protect against abnormally low evaporator coil temperatures. Direct Expansion (DX) units only.

Figure 106: Component Locations (Horizontal Ceiling Unit Shown)



Digital Ready Face and Bypass Control Wiring Diagrams

Figure 107: Digital Ready Face and Bypass Control - 208-230 V/60 Hz/1 Ph

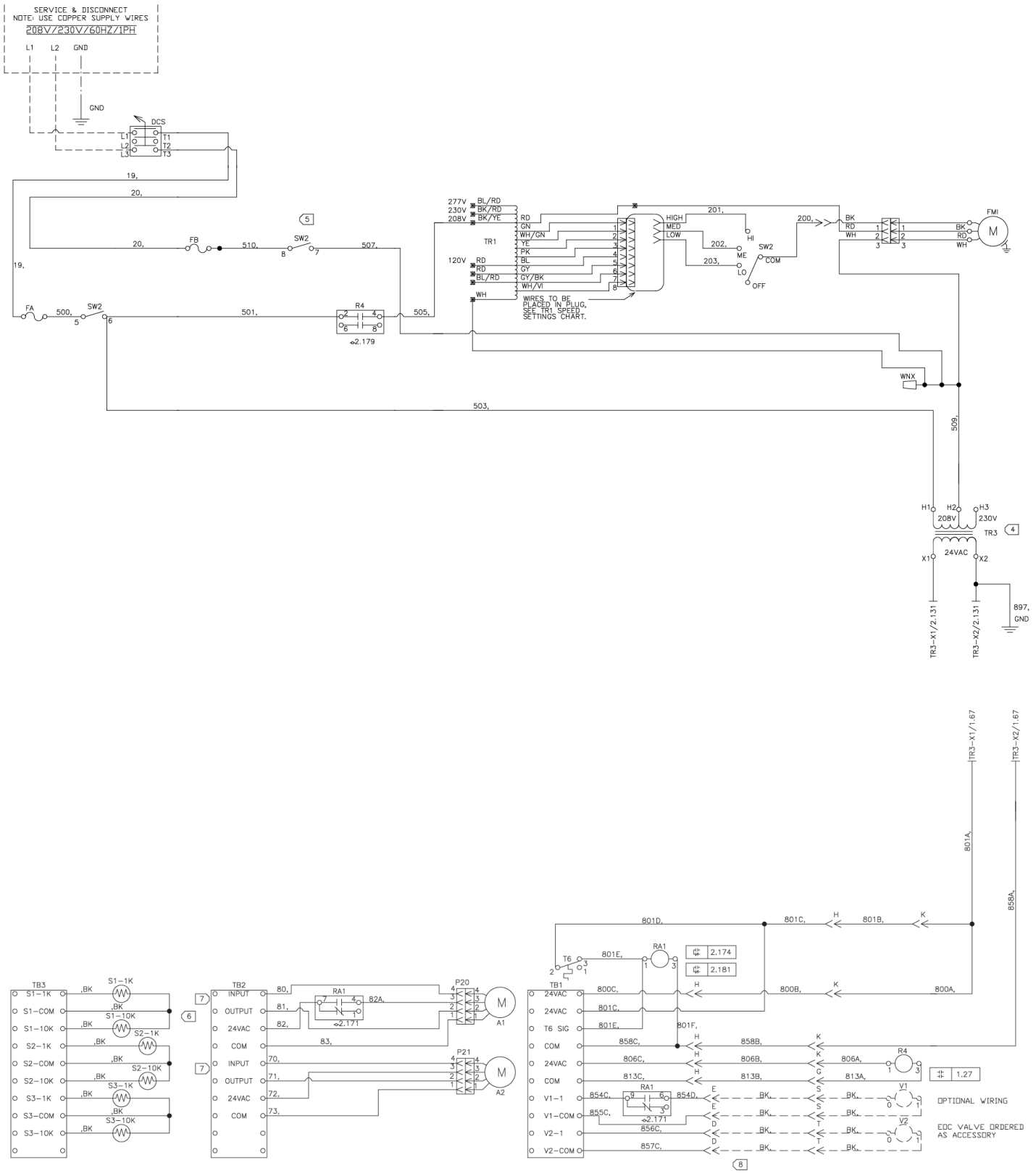


Figure 108: Digital Ready Face and Bypass Control - 120 V/60 Hz/1 Ph

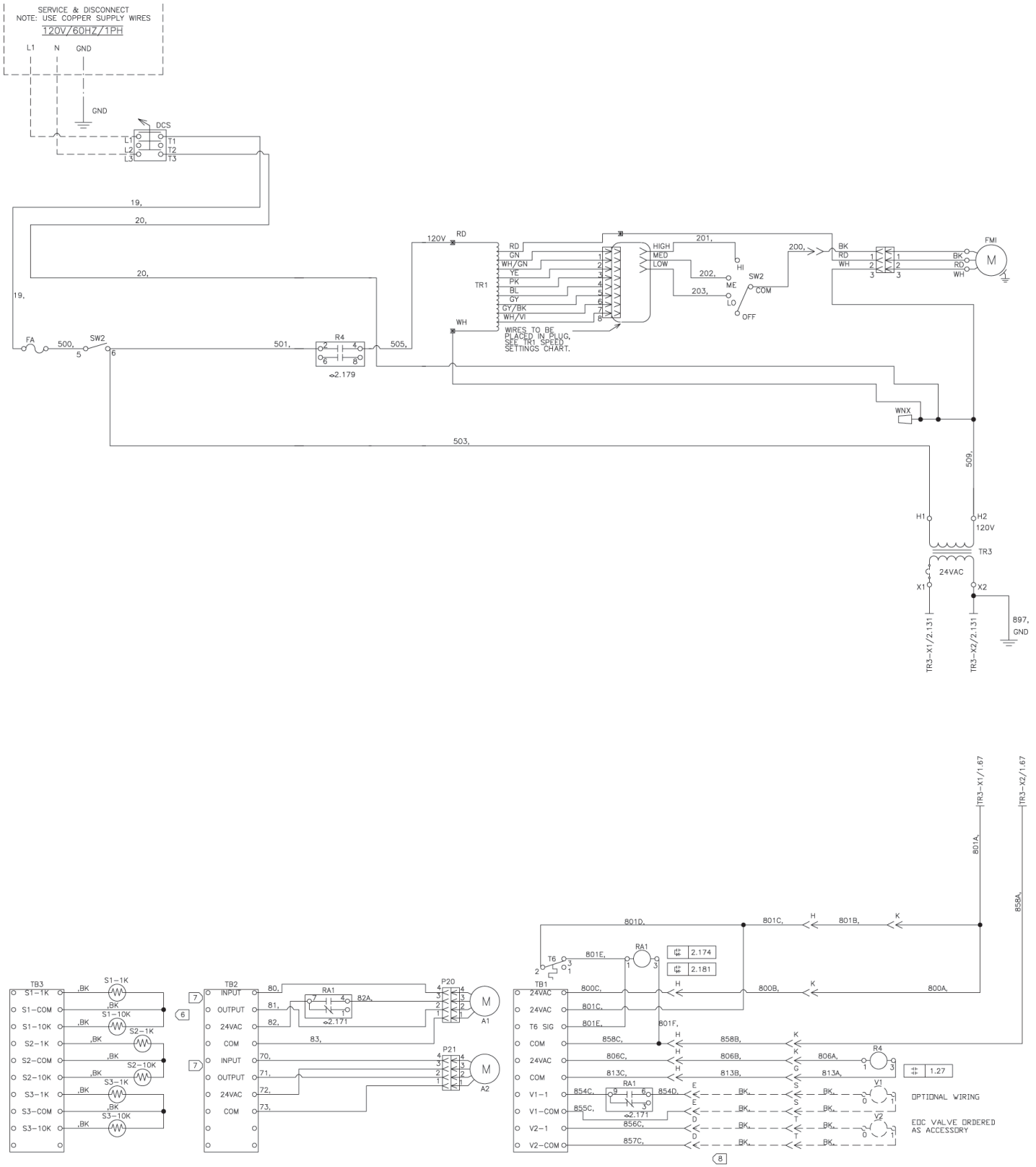
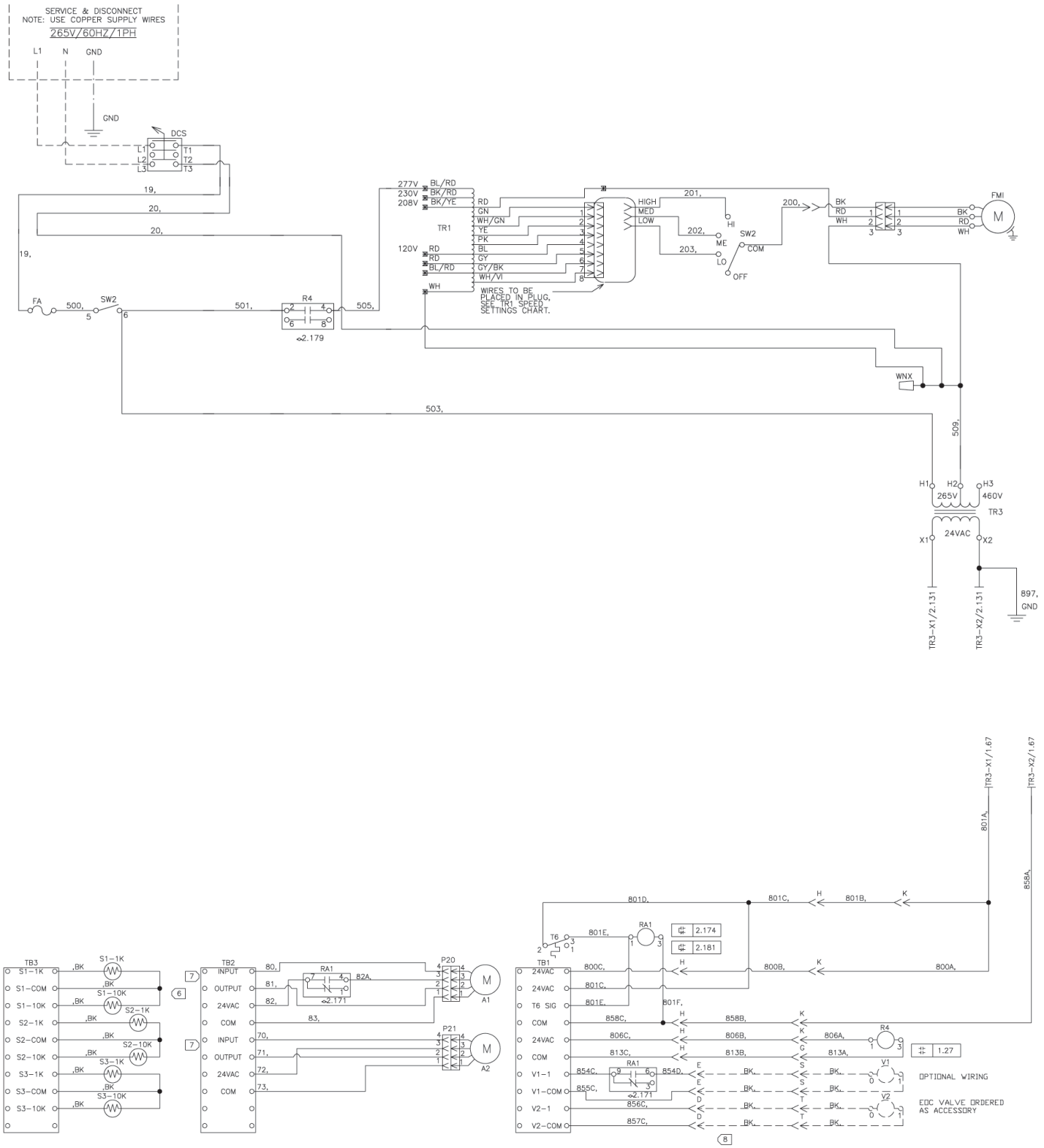


Figure 109: Digital Ready Face and Bypass Control - 265 V/60 Hz/1 Ph



Wiring Schematics Legend for "Digital Ready Face and Bypass Control Wiring Diagrams"

Legend			
A1	Actuator- Outdoor Air	**SW1**	Switch Disconnect
A2	Actuator- Face & Bypass	**SW2**	Switch - On, Off, and Fan Speed
DCS	Switch - Unit Power	**T6**	Thermostat - Freeze Stat
FA/FB	Fuse– Control, Load	**TB1**	Terminal Board Control
FMI	Motor - Room Fan	**TB2**	Terminal Board Control
R2A	Relay – Actuator/Valve	**TB3**	Terminal Board Control
R4	Relay – Fan Coil (24VAC)	**TR1**	Transformer - Motor Speed
S1	Sensor - Room Air	**TR3**	Transformer - 24V, 75VA
S2	Sensor - Discharge Air	**V1**	Valve - Heating N.O. Spring Return
S3	Sensor - Outdoor Air	**V2**	Valve - Cooling N.O. Spring Return

Legend - Symbols	
– – –	Accessory or field mounted component
⏚	Ground
⊠	Wire nut / splice
●	Overlap point - common potential wires
L1/1.20	Wire link (wire link ID / page # . line #)

Motor Size	SW2 Term	TR1 Speed Settings			
		750	1000	1250	1500
1/4 HP 0.00-0.20 ESP	High	PK	YE	WH/GN	GN
	Med	GY	GY	PK	YE
	Low	GY/BK	GY/BK	GY	PK

NOTE 1: All electrical installation must be in accordance with national and local electrical codes and job wiring schematic.

NOTE 2: Automatic temperature control supplier is responsible to ensure controls operate correctly and protect the unit.

NOTE 3: Cap all unused transformer leads.

NOTE 4: For 230V operation, switch wire 509 to 240V terminal in the transformer.

NOTE 5: Fuse FB, wire 510, and wire 507 furnished on 208/230 volt units only.

NOTE 6: 1K thermistor is positive temperature coefficient. 10K thermistor is negative temperature coefficient.

NOTE 7: Actuators, 24VAC for 2 to 10 VCD control input. For A 4 to 10 mA input control signal, add a 500 Ohm resistor across WHT and BLK. Output signal of 2 to 10 VDC for position feedback.

NOTE 8: Cord furnished on right hand connections.

NOTE 9: Devices in legend may or may not be on unit.

Digital Ready Unit Mounted Temperature Sensor Specifications

A 10 kΩ Negative Temperature Coefficient (NTC) sensor and a 1 kΩ Positive Temperature Coefficient sensor is provided for the discharge air, outdoor air and room air temperature measurement. They are located next to each other in the air stream as shown in Figure 106. Each is wired to the terminal strip separately so that the Automatic Temperature Control contractor may select the appropriate sensor for the application.

10 kΩ NTC Sensor

The 10 kΩ NTC sensor is constructed from stainless steel with an epoxy seal and twisted wire leads.

Type: 10 kΩ @ 25°C

Accuracy: ±0.2°F, 40°F - 80°F

±0.36°F, 32°F - 158°F

1 kΩ PTC Sensor

The 1 kΩ sensor is a shrink-wrap encapsulated, PTC silicon sensing element with stranded, tinned copper wire leads (#22 AWG).

Type: 1035 Ω @ 25°C

Accuracy: ±0.9°F, 5°F - 167°F

Table 35: Temperature Sensors Resistance Values

10 kΩ (NTC)	**Temperature (°C)**	**-40**	**-20**	**0**	**20**	**25**	**30**	**40**	**50**	**60**
	Resistance (Ω)	337200	97130	32660	12490	10000	8056	5326	3602	2489
1 kΩ (PTC)	**Temperature (°C)**	-40	-20	0	20	25	30	40	50	60
	Resistance (Ω)	613	727	855	997	1035	1074	1153	1237	1323

Digital Ready – Damper Actuator Specifications

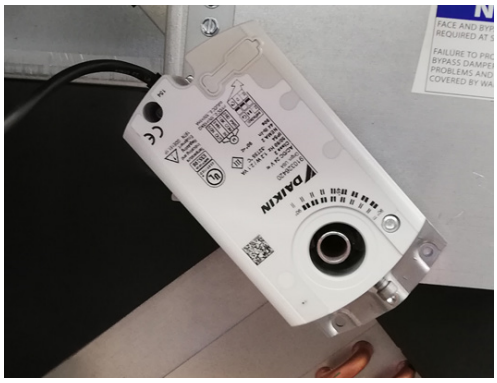
Outdoor Air/Return Air Damper (OAD) Actuator

The outdoor air/return air damper actuator is a unit mounted, direct coupled, proportional control actuator that spring returns the outdoor air damper shut upon a loss of power. The actuator provides proportional damper control based on a 2 to 10 VDC input from the DDC Unit Ventilator Controller (UVC).

Outdoor Air Damper Actuator

The Face & Bypass damper actuator is a unit mounted, direct coupled, non-spring returned actuator used for the modulation of the face and bypass damper. The actuator provides proportional damper control based on a 2 to 10 VDC input from the DDC Unit Ventilator Controller (UVC). Refer to the wiring diagram for proper installation of the resistor. The gears can be manually disengaged with a button on the actuator cover. Rotation is counterclockwise to bypass air around coil.

Figure 110: Face & Bypass Actuator



Face & Bypass Damper Actuator

Table 36: Actuators Technical Data

Actuator Type	Power Supply	Power Consumption	Transformer Sizing	Torque	Running Time	Direction of Rotation
Face & Bypass Damper Actuator	24 VAC ±20% 50/60 HZ	1.2 Watts 2.1 VA	3 VA (class 2 power source)	44 in-lb	90 sec	Reversible with built in switch.
Outdoor Air / Return Air Damper Actuator	24 VAC ±20% 50/60 HZ	Running: 4 Watt 6 VA Holding: 2 Watt 3.6 VA	8 VA (class 2 power source)	35 in-lb	90° with motor 30s 90° with spring return 15s	Spring: reversible with CW/CCW mounting. Motor: reversible with built in switch.

Digital Ready Unit Electrical Connections

⚠ WARNING

Rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

⚠ WARNING

To avoid electrical shock, personal injury, or death:

1. Installer must be a qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and damage to equipment.
3. Make all connections in accordance with electrical wiring diagrams, and in compliance with national and local codes. Use copper conductors only.
4. Do not exceed ratings of the device. This is a low voltage device: Never apply more than 12VAC/VDC to any lead or damage will result.
5. Avoid locations where excessive moisture, corrosive fumes, or vibrations are present.

See Table 31 on page 45 and refer to Digital Ready component details on page 59 and the job-specific electrical drawings before proceeding with field power and control wiring. See also the wiring diagram provided on the unit ventilator right front access panel.

In addition, those unit ventilators equipped with optional electric heating coil have electric heating coil power connections at right end only.

Procedure

1. Provide power supply to right end compartment to match unit nameplate.

⚠ CAUTION

Use copper conductors only. Use of aluminum conductors may result in equipment failure and overheating hazards. All wiring in right hand compartment must be class 1.

2. Wire leads provided from unit ventilator electric connection box to load side of unit power switch (switch provided by Daikin Applied).

   The junction box has 1″ (25 mm) and 2″ (51 mm) knockouts, located 10-1/2″ (267 mm) from right end of unit.
3. Provide ground wire from grounding screw in switch junction box to switch ground terminal.
4. Wire field power supply to line side of unit power switch. Wire ground conductor to switch ground terminal.
5. Mount unit power switch in switch junction box and install switch cover plate (provided).
6. Figure 126 on page 81 (A) shows power switch location for valve control units and (B), and (C) show location for Face & Bypass control units. (B) is for 208, 230 and 265 volt units.
7. See Figure 112 for terminal strip designations.

NOTICE

See "Electrical Data/Motor Data and Unit Amp Without Electric Heat" and "Standard Motor Electric Heat Capacities, Amps, Wire Sizing, and Over Current Protection" on page 45.

Figure 111: Unit Left End Compartment Terminal Strip Location

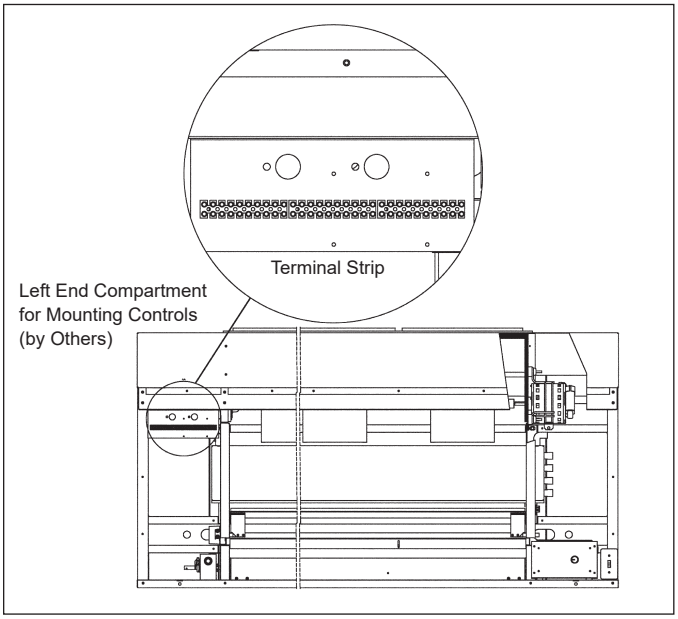
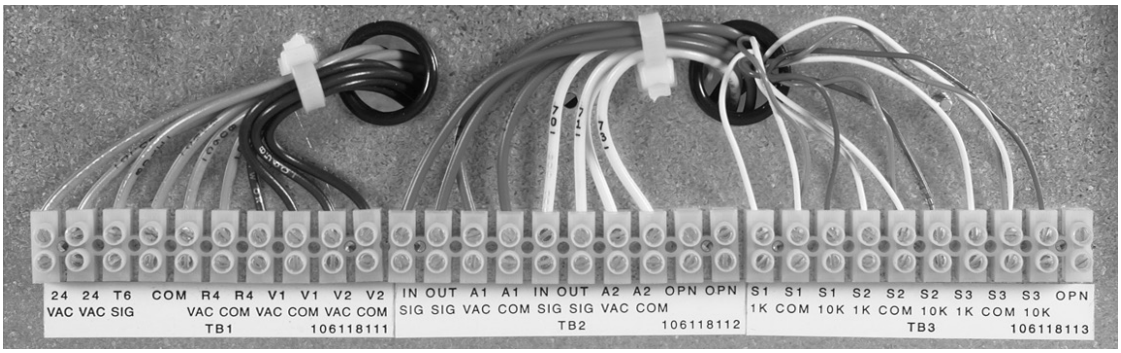


Figure 112: Terminal Strip



Controls by Others Components

Daikin Applied unit ventilators come with factory installed components and wiring. It facilitates the field hookup of controls by others, capable of providing the standard ASHRAE II cycle that are compatible with these factory installed and pre-wired components.

⚠ CAUTION

It is the responsibility of the Automatic Temperature Control supplier to ensure the controls operates correctly and protect the unit.

Controls by others option consists of the following components which are factory provided and wired where indicated:

1. **Unit Main Power "On-Off" Switch:** disconnects main power to the unit. Non-fused power interrupt switch (S1).
2. **Fuse(s):** fan motor, auto transformer and control transformer have the hot line(s) protected by factory installed fuse(s).
3. **Three (3) Speed HIGH-MEDIUM-LOW-OFF Motor Fan Speed Switch:** (on units with 3-speed EC motor) Units with Variable EC motor will not have a speed switch.
4. **Factory Installed Low Air Temperature (Limit T6 - Freezestat):** across leaving air side of hydronic heating coil. Cuts out below 38°F ± 2°F and automatically resets above 45°F ± 2°F. Responds when any 15% of the capillary length senses these temperatures.

⚠ CAUTION

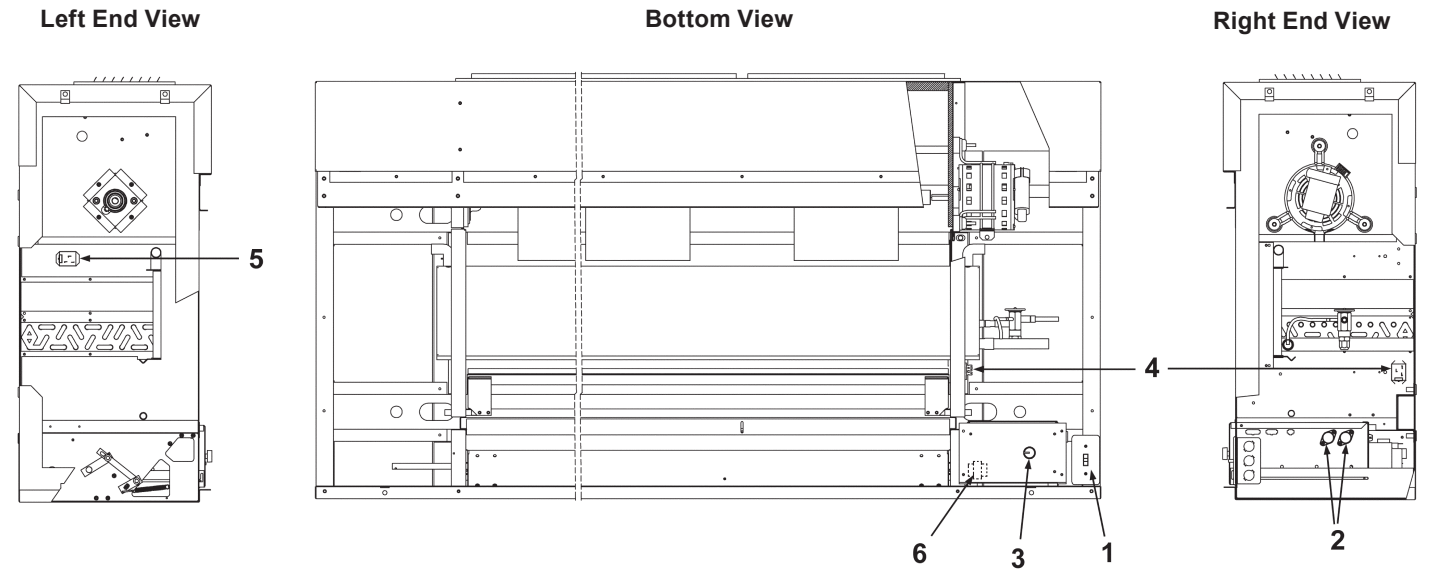
It is the responsibility of the Automatic Temperature Control supplier to ensure the T6 freezestat is incorporated properly to protect the unit.

5. **Low Refrigerant Temperature Sensor (T4 - Capillary Sensor):** for Direct Expansion (DE) coils the unit is supplied with a (T4) sensor, located on the entering air side of the direct expansion coil. T4 cuts out below 34°F ± 2°F and automatically resets above 38°F ± 2°F. Responds when any 15% of the capillary length senses these temperatures.
6. **40 VA, 24 V, NEC Class 2 Transformer:** for Direct Expansion (DE) coils, the unit is supplied with 24 volt power (X2), with a factory installed 5 minute timer delay relay (TDR) (located inside Unit Power Box).

⚠ CAUTION

It is the responsibility of the Automatic Temperature Control supplier to ensure that T4 and R4 are incorporated properly to protect the unit.

Figure 113: Controls by Others Unit Component Locations



Controls by Others - Variable Airflow

An optional EC motor with “variable fan speed control” allows a field provided DDC controller to modulate the unit airflow between 50% and 100% of nominal unit airflow in a single zone variable air volume sequence. In continuous fan mode, the benefits of Single Zone VAV include sound reduction, energy savings, and consistent and precise temperature control for improved comfort with better air mixing and less stratification. In humid climates, the ability to deliver a wide range of fan speeds is particularly effective for de-humidification.

NOTICE

This option is not available with MicroTech controls.

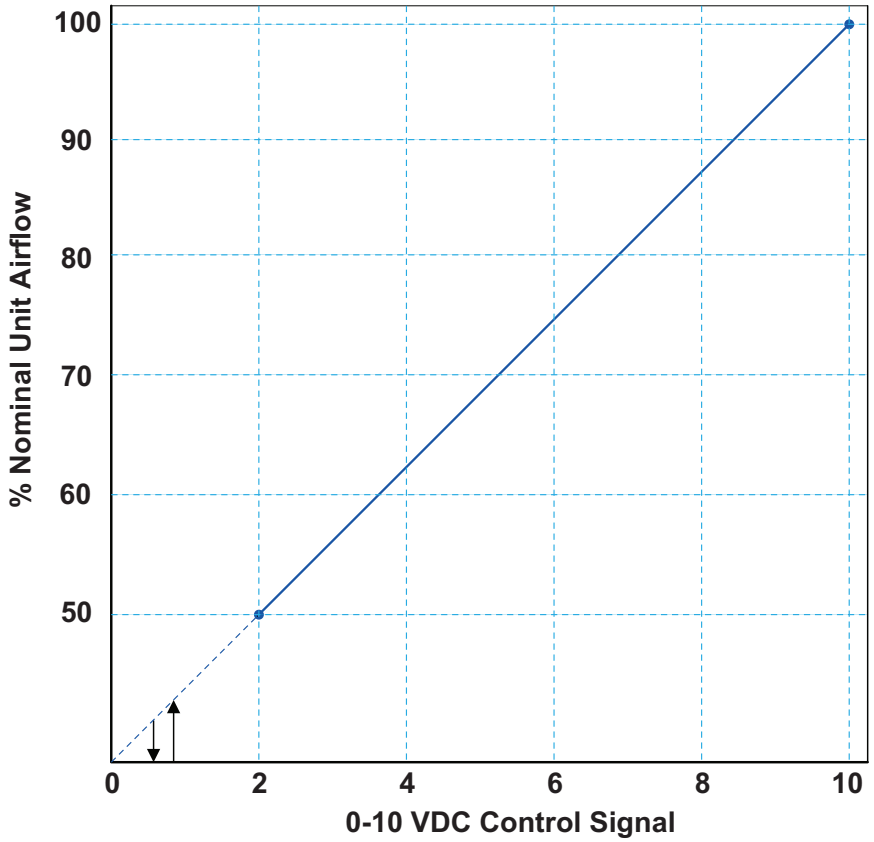
Making Control Connections

For field provided control wiring connections refer to the appropriate control wiring schematic, Figure 115 through Figure 120.

Connect the field supplied controller to the harness provided. A 0-10VDC fan control signal must be provided between ground and wire 33. For RPM/data out signal, connect controller to wire 34.

The variable fan speed scale is linear between a minimum 50% airflow at 2VDC and a maximum 100% airflow at 10vdc as shown in Figure 114. Reducing the input signal to 0VDC will cause the motor to turn off. Care should be taken when using variable airflow on units with DX cooling as lower airflow may increase the risk of coil freeze-up. Variable airflow control should not be used on units with electric heat.

Figure 114: 0-10VDC Variable Fan Speed Control



Typical Controls by Others Wiring Diagram – Units with Optional EC Motor with Variable Airflow

Figure 115: Variable Airflow 208-230V /60 Hz/1 Ph – Motor Switchbox, Non-Electric Heat Units

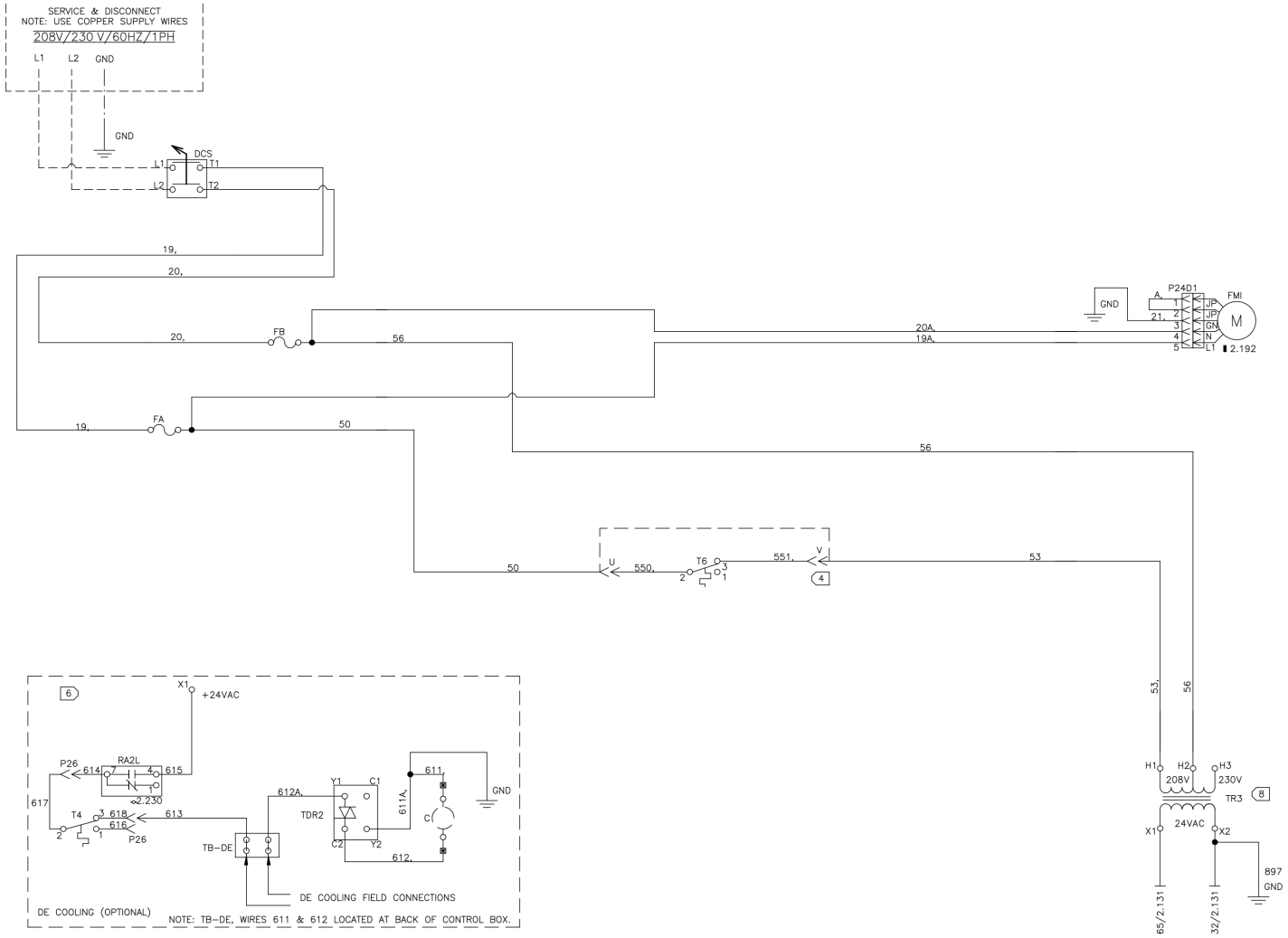


Figure 116: Variable Airflow 208-230V /60 Hz/1 Ph – Motor Switchbox, Non-Electric Heat Units

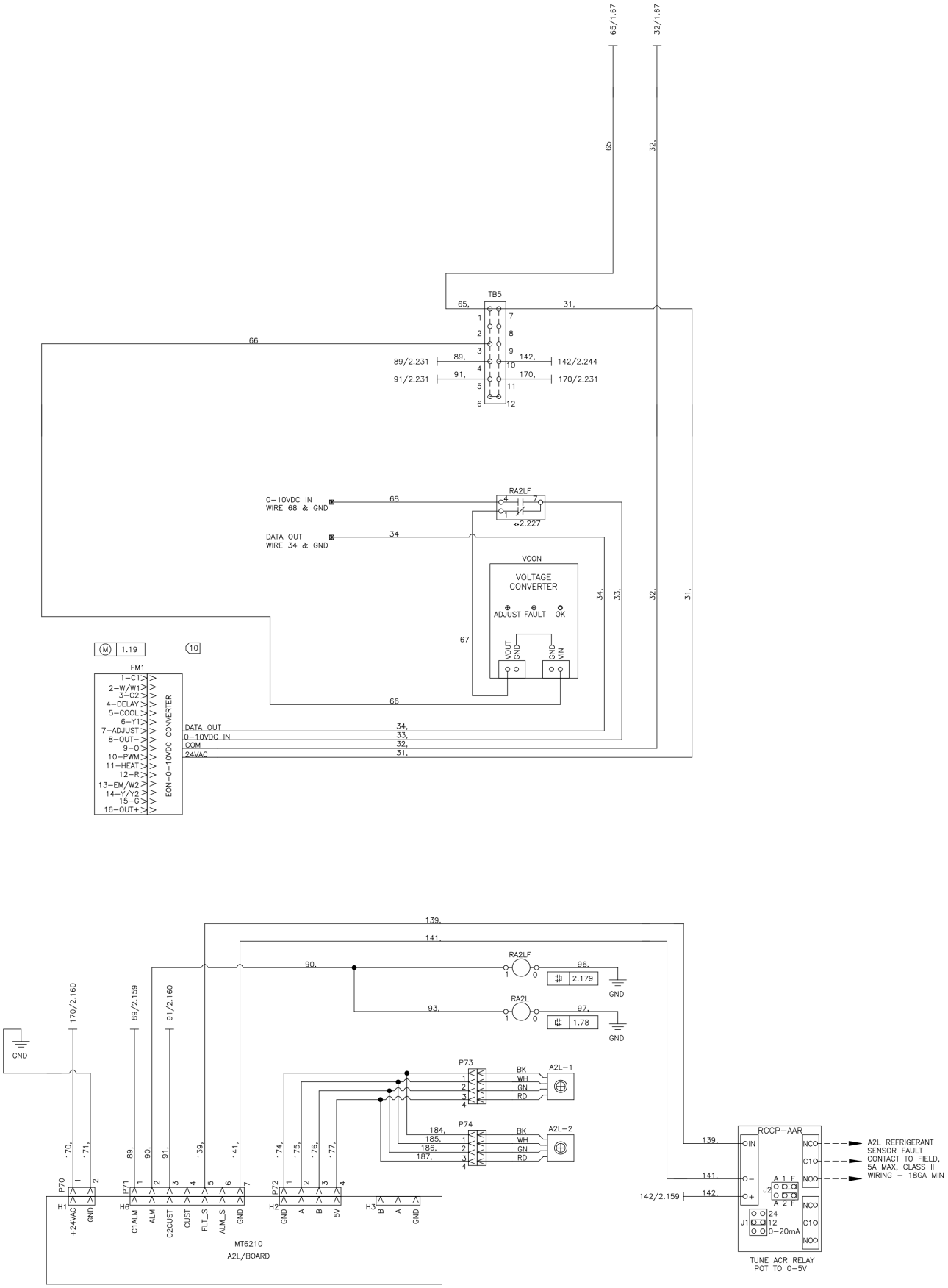


Figure 117: Variable Airflow 115 V/60 Hz/1 Ph – Motor Switchbox, Non-Electric Heat Units

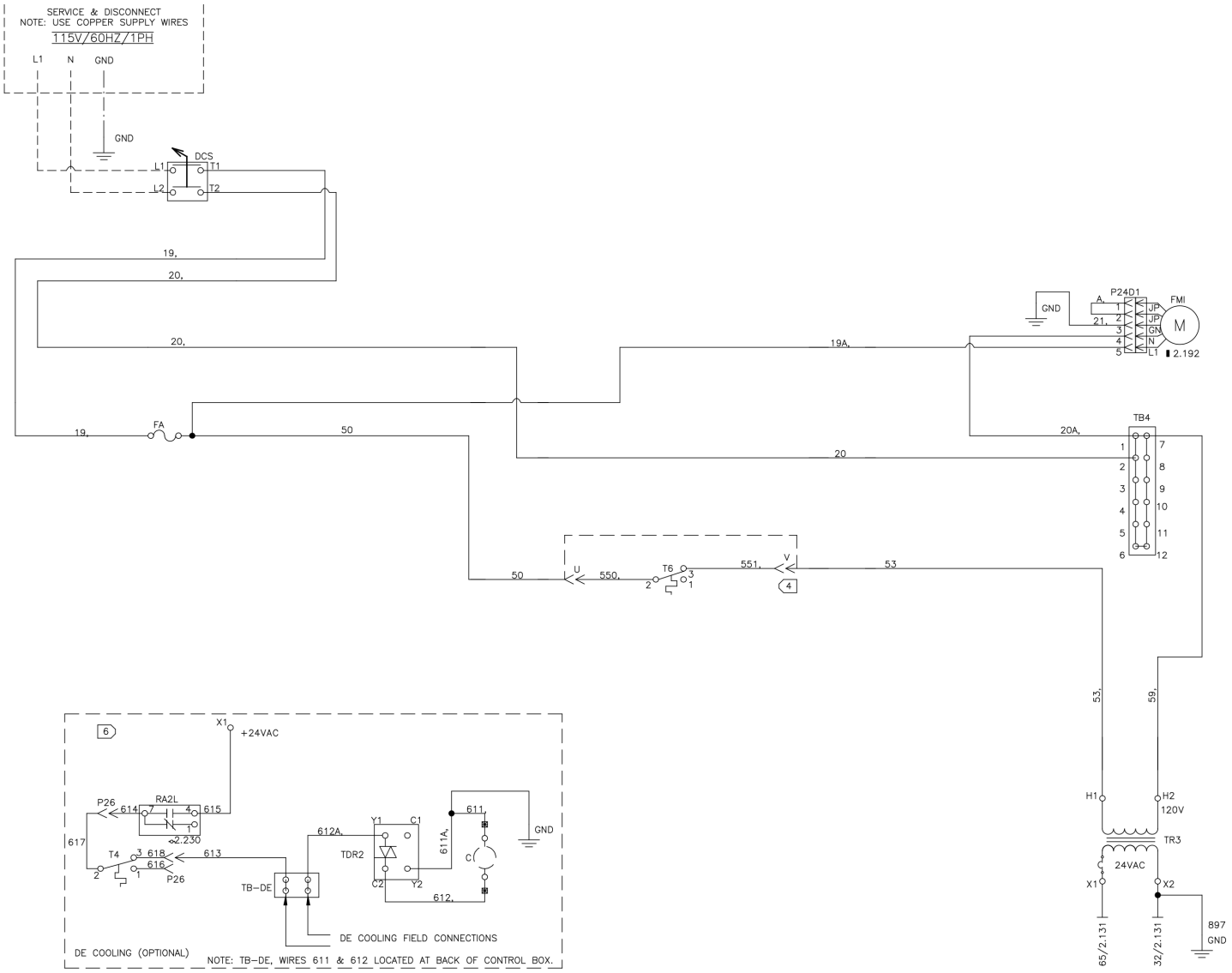


Figure 118: Variable Airflow 115 V/60 Hz/1 Ph – Motor Switchbox, Non-Electric Heat Units

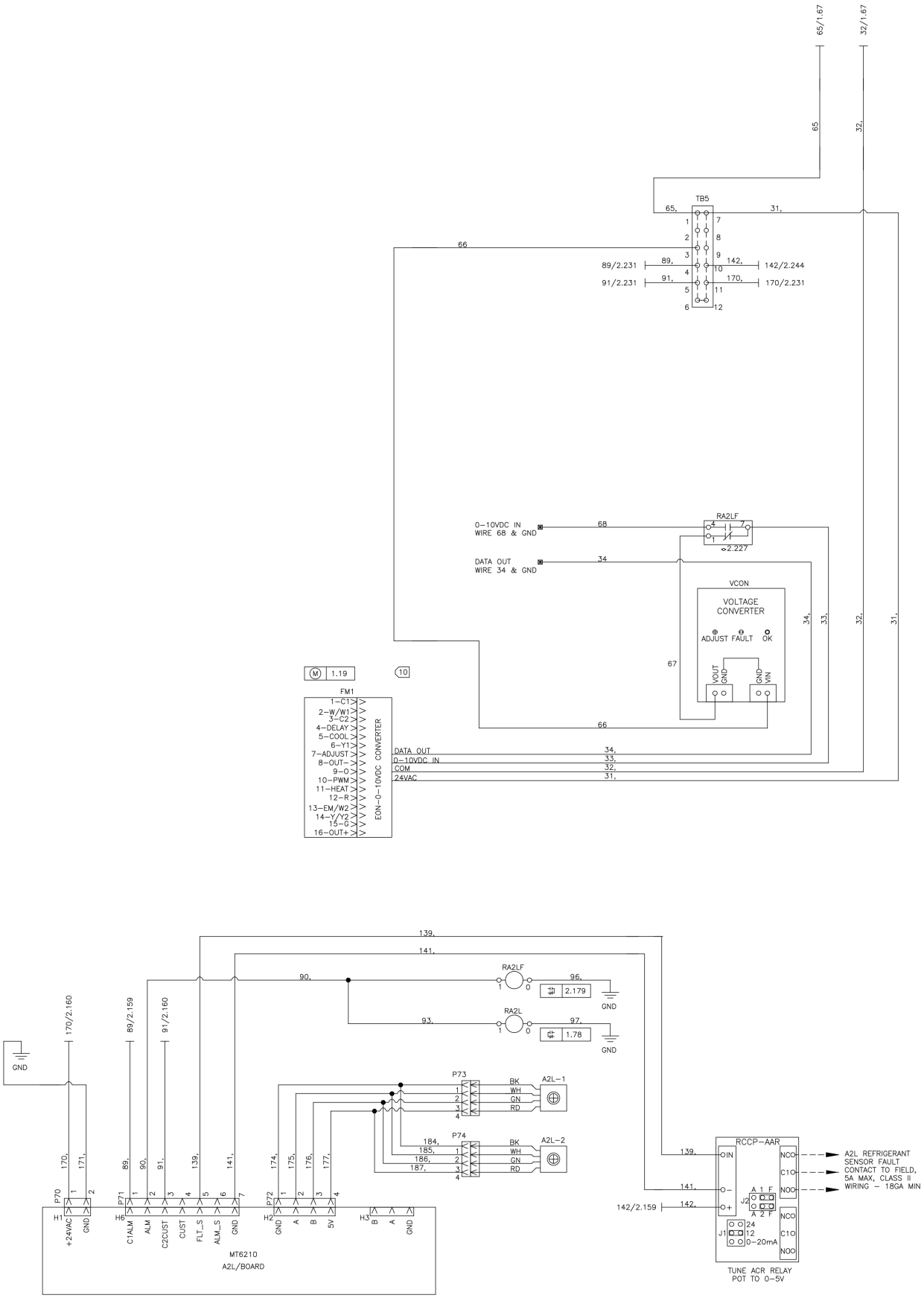


Figure 119: Variable Airflow 265 V/60 Hz/1 Ph – Motor Switchbox, Non-Electric Heat Units

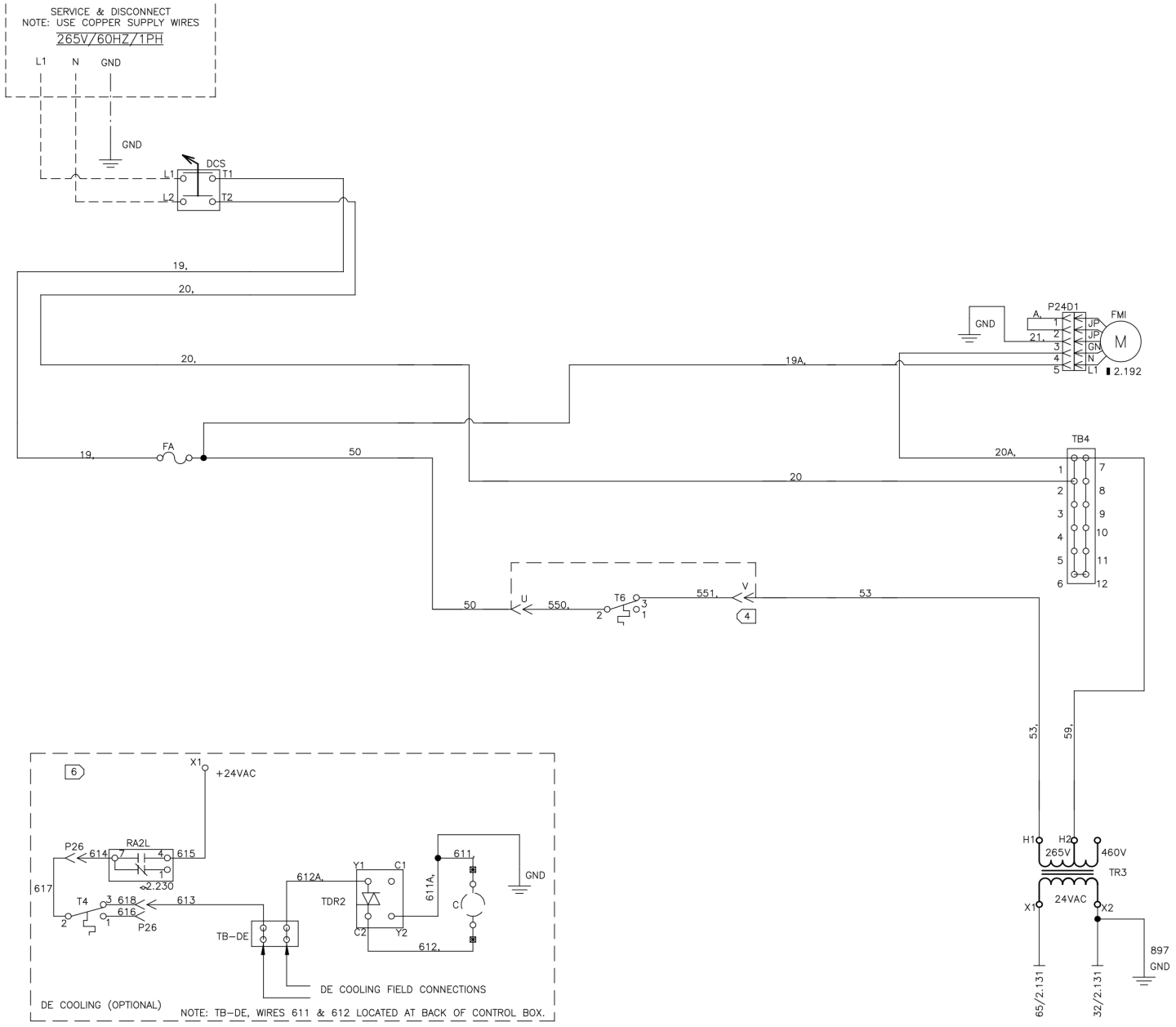
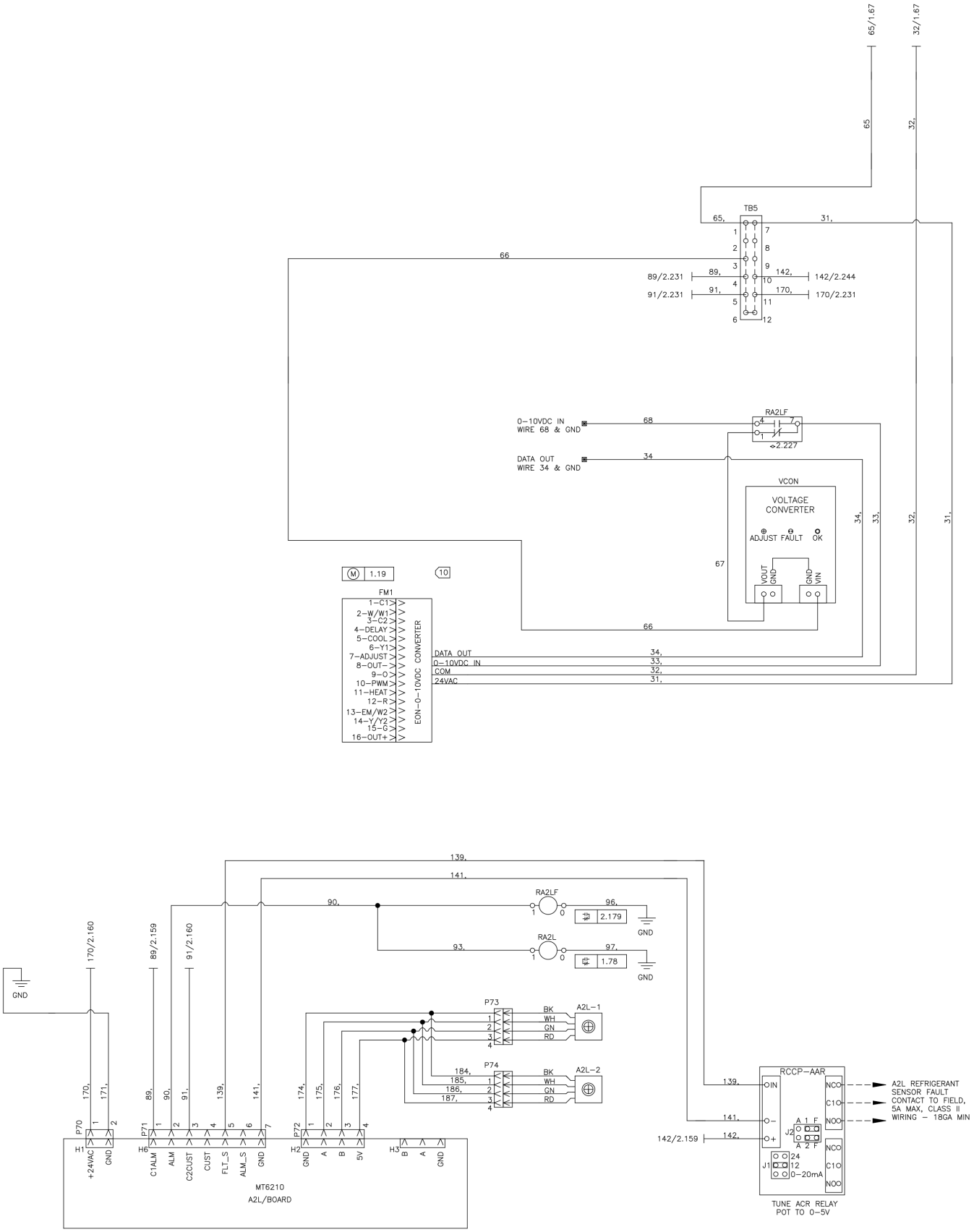


Figure 120: Variable Airflow 265 V/60 Hz/1 Ph – Motor Switchbox, Non-Electric Heat Units



Wiring Schematics Legend for "Typical Controls by Others Wiring Diagram – Units with Optional EC Motor with Variable Airflow"

Legend					
A1	Actuator (Optional)	**R3B**	Relay – Defrost/EH Coil (24 VAC)	**T5**	Thermostat Defrost
A2LB	A2L Mitigation Board	**R4**	Relay – Fan Coil (24 VAC)	**T6**	Thermostat - Freeze Stat
A2L-1	A2L Sensor	**R7**	Relay – Compressor Lockout	**T7**	Thermostat- Changeover 60°
C1	Compressor Contactor	**R8-9**	Relay – Emergency Heat	**T8**	Thermostat - Cooling Lockout 59C F
CAP1	Capacitor Run	**R10-12**	Relay – Electric Heat	**TB1**	Terminal Board Control
CEH1-3	Electric Heat Contactor	**R11A**	Relay - Defrost	**TB2**	Terminal Board Control
CO2	Sensor – Indoor Air CO_2	**RA1**	Relay - Actuator/Valve	**TB3**	Terminal Board Control
CP1	Motor Compressor 2-Stage	**RA2L**	A2L Actuator	**TB4**	Terminal Board
CS	Current Sensor (Hawkeye 800)	**RA2LF**	A2L Actuator	**TB5**	Terminal Board
DCS	Switch – Unit Power	**RAT**	Sensor - Room Air Temperature	**TB-DE**	Terminal Board for DE Contactor
DF	Dead Front Switch	**RCCP**	Transducer AAR	**TBE**	Terminal Block - Electric Heat
EH1-6	Heater – Electric	**REH**	Relay – H1 Fan 3rd STG EH	**TDR1**	Time Delay Low Voltage 5 Min
EH10	Heater – Outdoor Drain Pan	**RT6**	Relay – Freeze Stat	**TDR2**	Protector Low Voltage 5 Min
F1A/F1B	Fuse – Compressor	**RV**	Reversing Valve	**TR1**	Transformer - Motor Speed
F2A/F3B	Fuse – Electric Heat	**S2**	Sensor - DA (TAC 01-2085-001)	**TR3**	Transformer - 24 V, 75 VA
FA/FB	Fuse – Control, Load	**SW1**	Switch – Disconnect	**TR4**	Transformer - 460 V–230 V
FC/FD	Fuse – Control, Transformer	**SW2**	Switch – On - Off and Fan Speed	**TR5**	Transformer - 24 V
FMI	Motor – Room Fan	**SW5**	Switch – Emergency Heat	**TS**	Terminal Strip for EH
FMO	Motor Outdoor Air	**SW6**	Switch Rocker SPDT	**V1**	Valve - Heat EOC (Accessory)
R1-R3	Relay Electric Heat (Back Up)	**T2**	Thermostat EH Relay - 0A Temp>20°	**V2**	Valve - Cool EOC (Accessory)
R2S	Relay – High (2nd) Stage Compr	**T4**	Thermostat Low Temp 28°	**VCON**	Converter Cable 0-10 VDC

Legend - Symbols	
– – –	Accessory or field mounted component
⏚	Ground
⊠	Wire nut / splice
●	Overlap point - common potential wires
L1/1.20	Wire link (wire link ID / page # . line #)

Motor Size	SW2 Term	TR1 Speed Settings			
		750	1000	1250	1500
1/4 HP 0.00-0.20 ESP	High	PK	YE	WH/GN	GN
	Med	GY	GY	PK	YE
	Low	GY/BK	GY/BK	GY	PK

NOTE 1: Make electrical installation in accordance with job wiring schematic complying with national and local electrical codes.

NOTE 2: Cap all unused transformer leads.

NOTE 3: Fuse FB, SW2, and wire 56 furnished on 208/230 volt units only. Fuse FB, SW2, wire 510 and 507 furnished on 208/230 volt units only.

NOTE 4: T6 and wires 550 and wire 551 furnished only on units with hot water or chilled water. All others connect transformer wire to wire 50.

NOTE 5: SW2 contacts 5, 6 and 7, 8 open only when SW2 is in OFF position.

NOTE 6: Automatic temperature control can be wired to TB-DE for de-cooling operation. Typical operation is to wire from the TB-DE to a Normally Open relay, with the relay closing on control call for cooling. For additional information, contact Daikin Applied.

NOTE 7: Motors are factory programmed for specified airflow. Contact Daikin Applied for replacement.

NOTE 8: For 230V operation, switch wire 56 to 240V terminal in the transformer.

NOTE 9: Devices in legend may or may not be on unit.

Typical Controls by Others Wiring Diagram – Field Installed

Figure 121: Controls by Others – Field Installed - 208-230 V/60 Hz/1 Ph

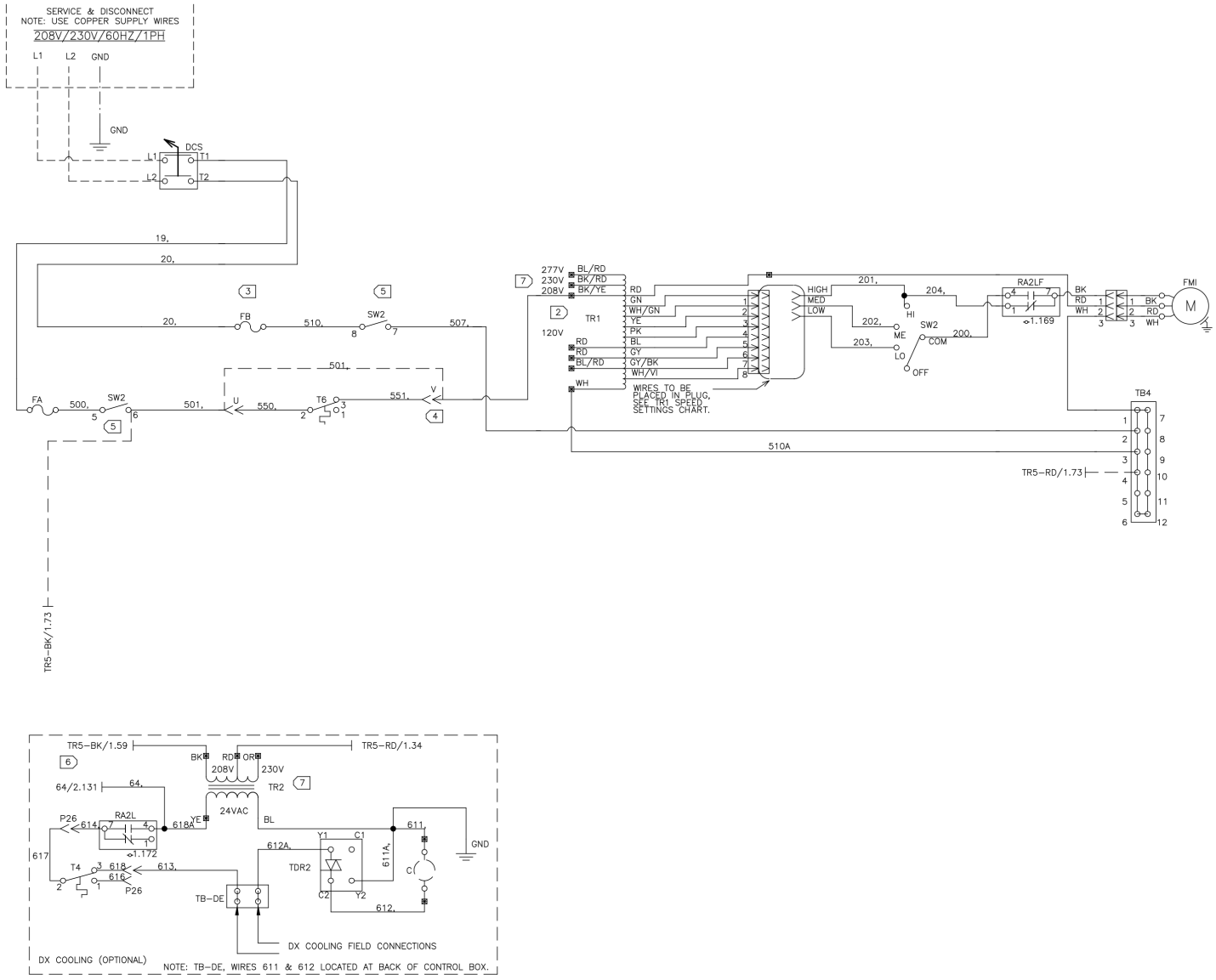


Figure 122: Controls by Others – Field Installed - 120 V/60 Hz/1 Ph

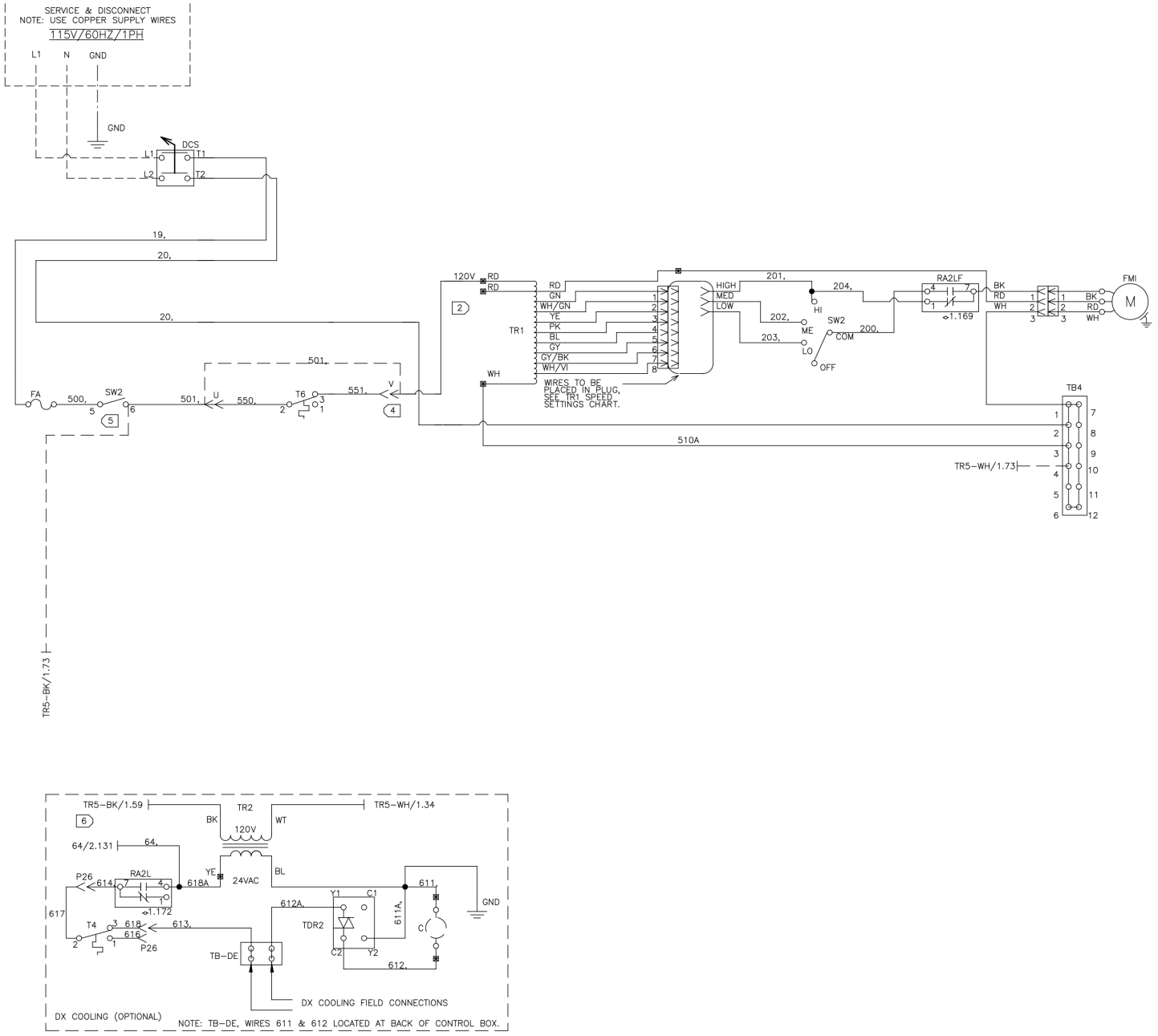


Figure 123: Controls by Others – Field Installed - 120 V/60 Hz/1 Ph

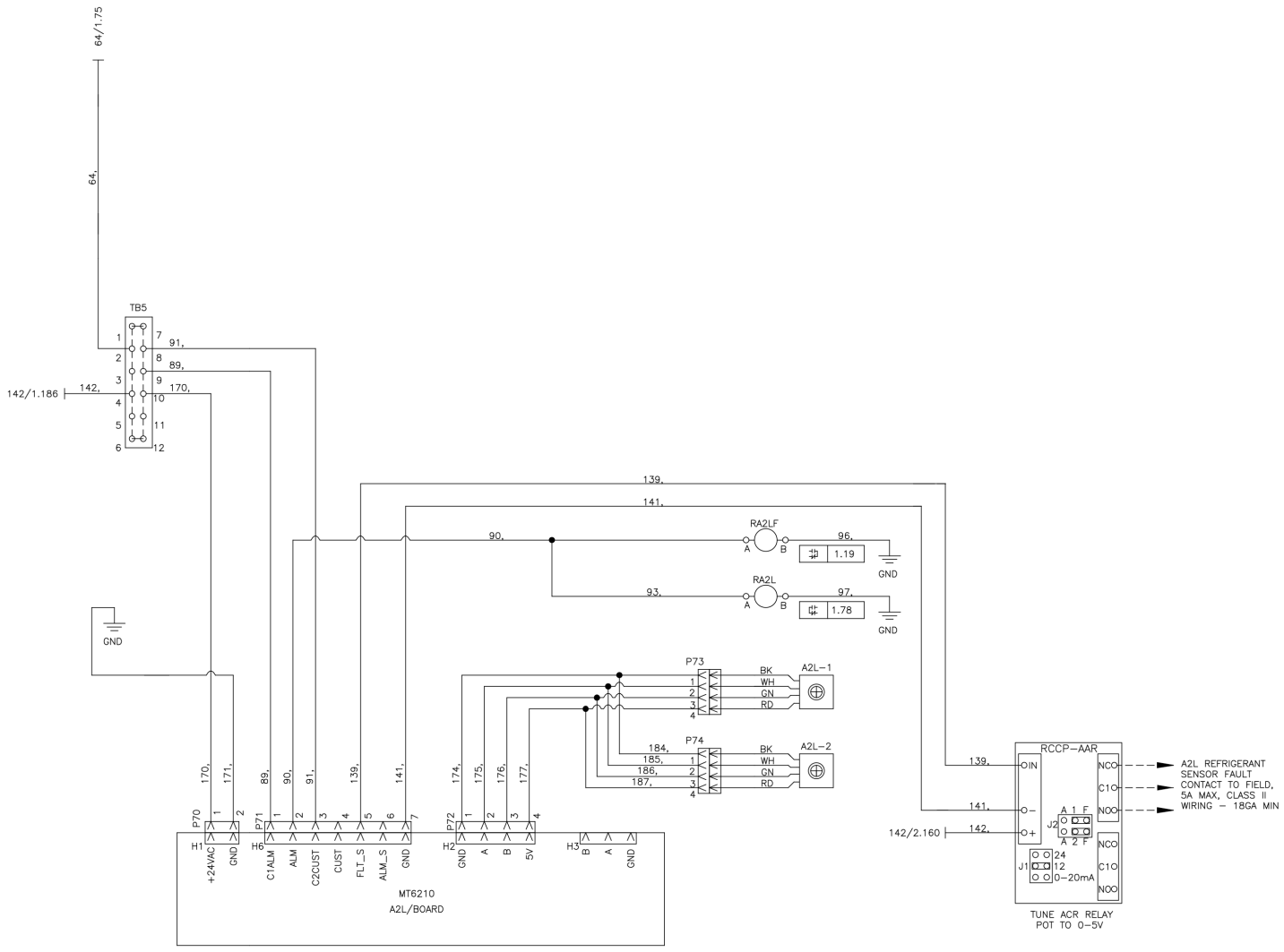


Figure 124: Controls by Others – Field Installed - 265 V/60 Hz/1 Ph

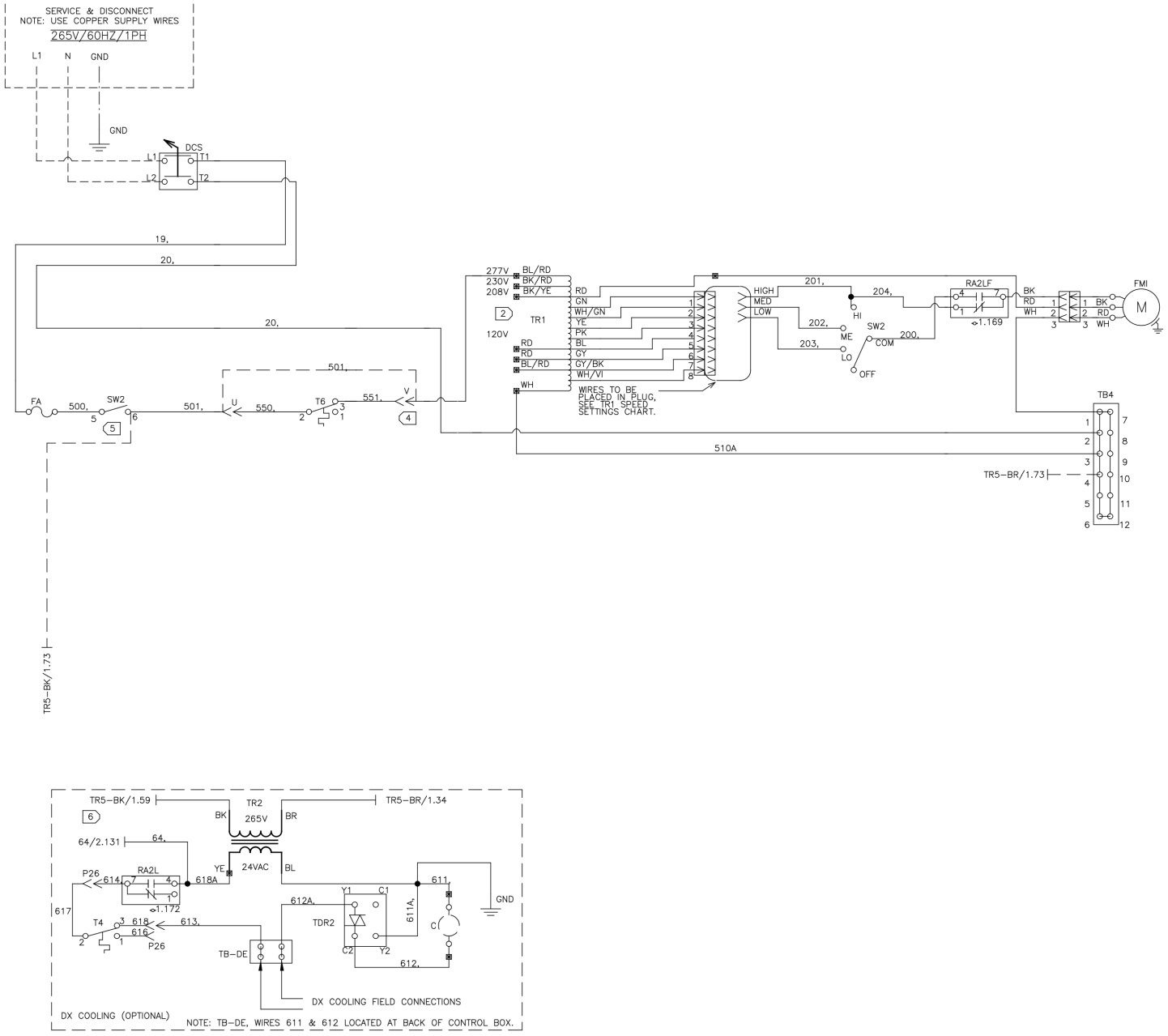
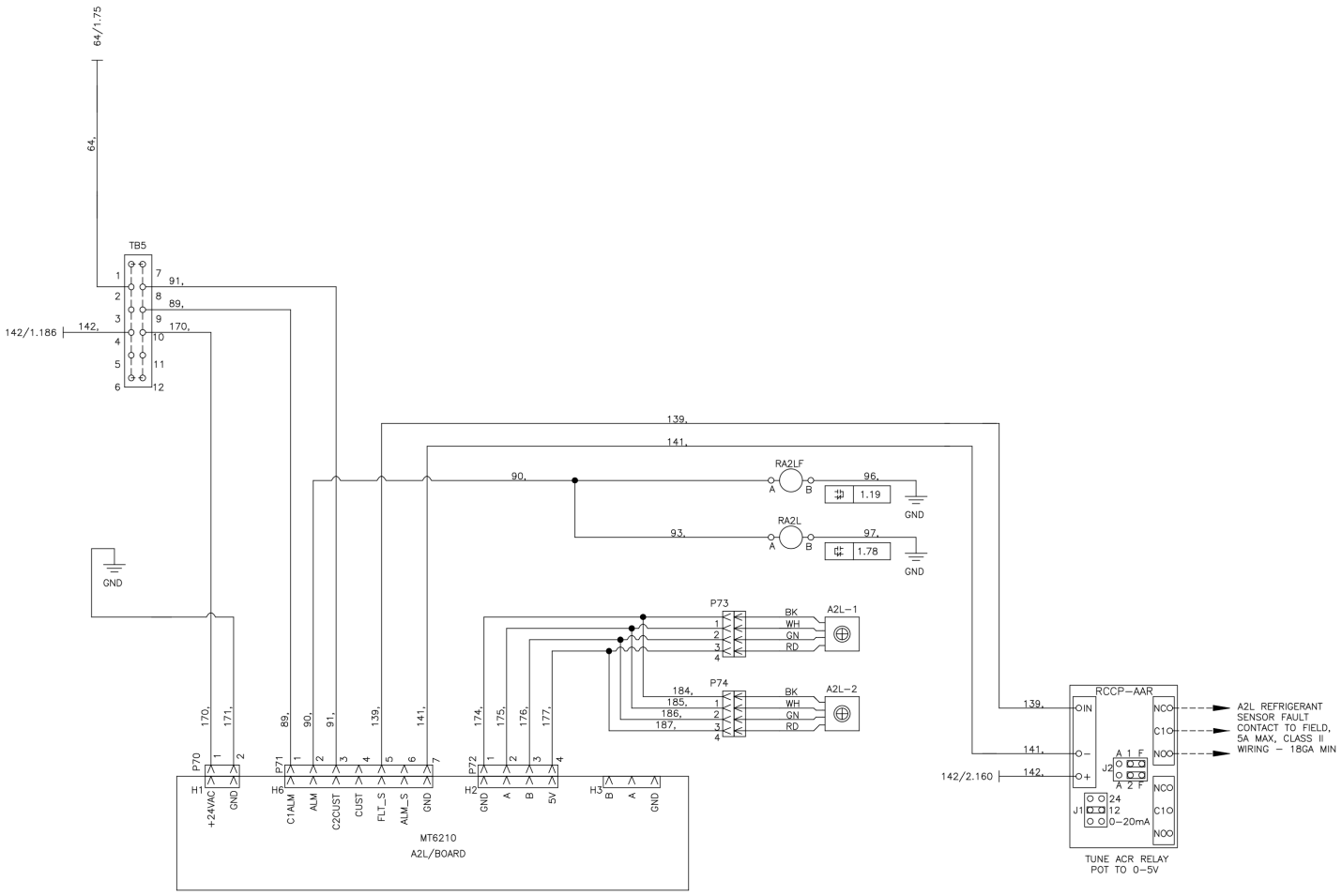


Figure 125: Controls by Others – Field Installed - 265 V/60 Hz/1 Ph



Wiring Schematics Legend for "Typical Controls by Others Wiring Diagram – Field Installed"

Legend					
A1	Actuator (Optional)	**R1-R3**	Relay Electric Heat (Back Up)	**T2**	Thermostat EH Relay - 0A Temp>20°
A2LB	A2L Mitigation Board	**R2S**	Relay – High (2nd) Stage Compr	**T4**	Thermostat Low Temp 28°
A2L-1	A2L Sensor	**R3B**	Relay – Defrost/EH Coil (24 VAC)	**T5**	Thermostat Defrost
C1	Compressor Contactor	**R4**	Relay – Fan Coil (24 VAC)	**T6**	Thermostat - Freeze Stat
CAP1	Capacitor Run	**R7**	Relay – Compressor Lockout	**T7**	Thermostat- Changeover 60°
CEH1-3	Electric Heat Contactor	**R8-9**	Relay – Emergency Heat	**T8**	Thermostat - Cooling Lockout 59C F
CO2	Sensor – Indoor Air CO_2	**R10-12**	Relay – Electric Heat	**TB1**	Terminal Board Control
CP1	Motor Compressor 2-Stage	**R11A**	Relay - Defrost	**TB2**	Terminal Board Control
CS	Current Sensor (Hawkeye 800)	**RA1**	Relay - Actuator/Valve	**TB3**	Terminal Board Control
DCS	Switch – Unit Power	**RA2L**	A2L Actuator	**TB4**	Terminal Board
DF	Dead Front Switch	**RA2LF**	A2L Actuator	**TB5**	Terminal Board
EH1-6	Heater – Electric	**RAT**	Sensor - Room Air Temperature	**TB-DE**	Terminal Board for DE Contactor
EH10	Heater – Outdoor Drain Pan	**RCCP**	Transducer AAR	**TBE**	Terminal Block - Electric Heat
F1A/F1B	Fuse – Compressor	**REH**	Relay – H1 Fan 3rd STG EH	**TDR1**	Time Delay Low Voltage 5 Min
F2A/F3B	Fuse – Electric Heat	**RT4**	Relay - 24 VAC	**TDR2**	Protector Low Voltage 5 Min
FA/FB	Fuse – Control, Load	**RT6**	Relay – Freeze Stat	**TR1**	Transformer - Motor Speed
FC/FD	Fuse – Control, Transformer	**RV**	Reversing Valve	**TR3**	Transformer - 24 V, 75 VA
FMI	Motor – Room Fan	**S2**	Sensor - DA (TAC 01-2085-001)	**TR4**	Transformer - 460 V–230 V
FMO	Motor Outdoor Air	**SW1**	Switch – Disconnect	**TR5**	Transformer - 24 V
OH1	Thermostat - Overheat	**SW2**	Switch – On - Off and Fan Speed	**TS**	Terminal Strip for EH
OH2	Thermostat - Overheat	**SW5**	Switch – Emergency Heat	**V1**	Valve - Heat EOC (Accessory)
OHM	EH Man Reset Overheat Stat	**SW6**	Switch Rocker SPDT	**V2**	Valve - Cool EOC (Accessory)

Legend - Symbols	
– – –	Accessory or field mounted component
⏚	Ground
⊠	Wire nut / splice
●	Overlap point - common potential wires
L1/1.20	Wire link (wire link ID / page # . line #)

Motor Size	SW2 Term	TR1 Speed Settings			
		750	1000	1250	1500
1/4 HP 0.00-0.20 ESP	High	PK	YE	WH/GN	GN
	Med	GY	GY	PK	YE
	Low	GY/BK	GY/BK	GY	PK

NOTE 1: Make electrical installation in accordance with job wiring schematic complying with national and local electrical codes.

NOTE 2: Cap all unused transformer leads.

NOTE 3: Fuse FB, SW2, wire 510, and wire 507 furnished on 208/230 volt units only.

NOTE 4: T6 and wires 550 & 551 furnished only on units with hot water or chilled water. All others connect transformer wire to wire 501.

NOTE 5: SW2 Contacts 5, 6 and 7, 8 open only when SW2 is in OFF position.

NOTE 6: Automatic temperature control can be wired to TB-DE for de-cooling operation. Typical operation is to wire from the TB-DB to a Normally Open relay, with the relay closing on control call for cooling. For additional information, contact Daikin Applied.

NOTE 7: For 230V operation, switch wire 501 to "240V" terminal in the transformer.

NOTE 8: Devices in legend may or may not be on unit.

Controls by Others – Electrical Connections

⚠ WARNING

Rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

⚠ WARNING

To avoid electrical shock, personal injury, or death:

1. Installer must be a qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and damage to equipment.
3. Make all connections in accordance with electrical wiring diagrams, and in compliance with national and local codes. Use copper conductors only.
4. Do not exceed ratings of the device. This is a low voltage device: Never apply more than 12VAC/VDC to any lead or damage will result.
5. Avoid locations where excessive moisture, corrosive fumes, or vibrations are present.

See Table 31 on page 45, Figure 126 through Figure 129 and the job-specific electrical drawings before proceeding with field power and control wiring. See also the wiring diagram provided on the unit ventilator right front access panel.

Unit ventilators equipped with an optional electric heating coil have electric heating coil power connections at right end only, see Table 31 and Table 32 on page 45.

Procedure

1. Provide power supply to right end compartment to match unit nameplate.

⚠ CAUTION

Use copper conductors only. Use of aluminum conductors may result in equipment failure and overheating hazards. All wiring in right hand compartment must be class 1.

2. Wire leads provided from unit ventilator electric connection box to load side of unit power switch (switch provided by Daikin Applied).

   The junction box has 1″ (25 mm) and 2″ (51 mm) knockouts, located 10-1/2″ (267 mm) from right end of unit.
3. Provide ground wire from grounding screw in switch junction box to switch ground terminal.
4. Wire field power supply to line side of unit power switch. Wire ground conductor to switch ground terminal.
5. Mount unit power switch in switch junction box and install switch cover plate (provided).
6. On units with electric heat, the 2 pole unit power switch is replaced by a 3 pole switch and is mounted in the locations as shown in Figure 126. (A) shows switch location for valve control units and (B), and (C) show location for Face & Bypass control units. (B) is for 208, 230 and 265 volt units. (C) shows location for 460 volt units.

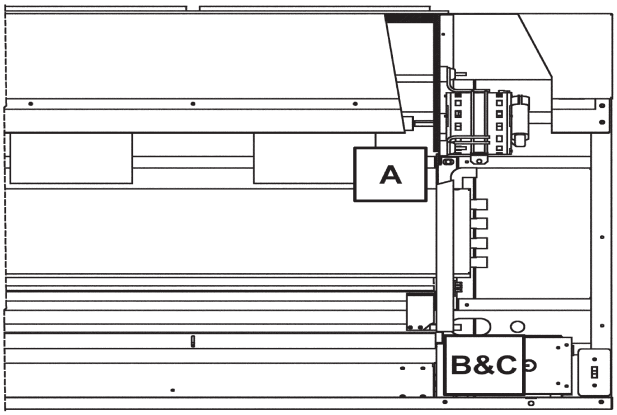
   Also, on electric heat units with controls by others, wiring to the field mounted controller is done in the left end compartment. See specific wiring diagram for details.

   The unit comes with wiring that requires relay controls by others.

⚠ CAUTION

It is the responsibility of the Automatic Temperature Control supplier to ensure that the proper electric heat control components are installed, and operate correctly to protect the unit.

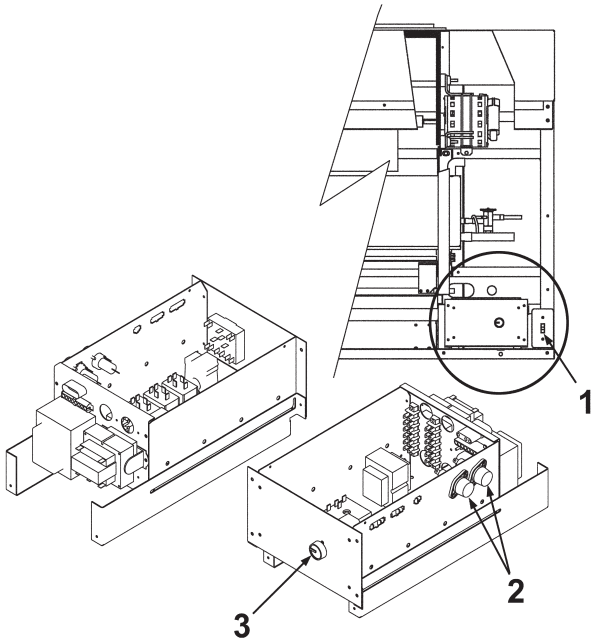
Figure 126: Electric Heat Unit Power Switch Locations



NOTICE

See "Electrical Data/Motor Data and Unit Amp Without Electric Heat" and "Standard Motor Electric Heat Capacities, Amps, Wire Sizing, and Over Current Protection" on page 45.

Figure 127: Controls by Others Unit Power and Junction Box Connection Location



Legend for Figure 127	
1	Unit Main Power "On-Off" Switch
2	Factory-installed Fuse(s)
3	Three (3) Speed, HIGH-MEDIUM-LOW-OFF, Motor Fan Speed Switch

Typical Electric Heat Wiring Diagram

Figure 128: Electric Heat Wiring Diagram – Typical 460 V/60 Hz/3 Ph

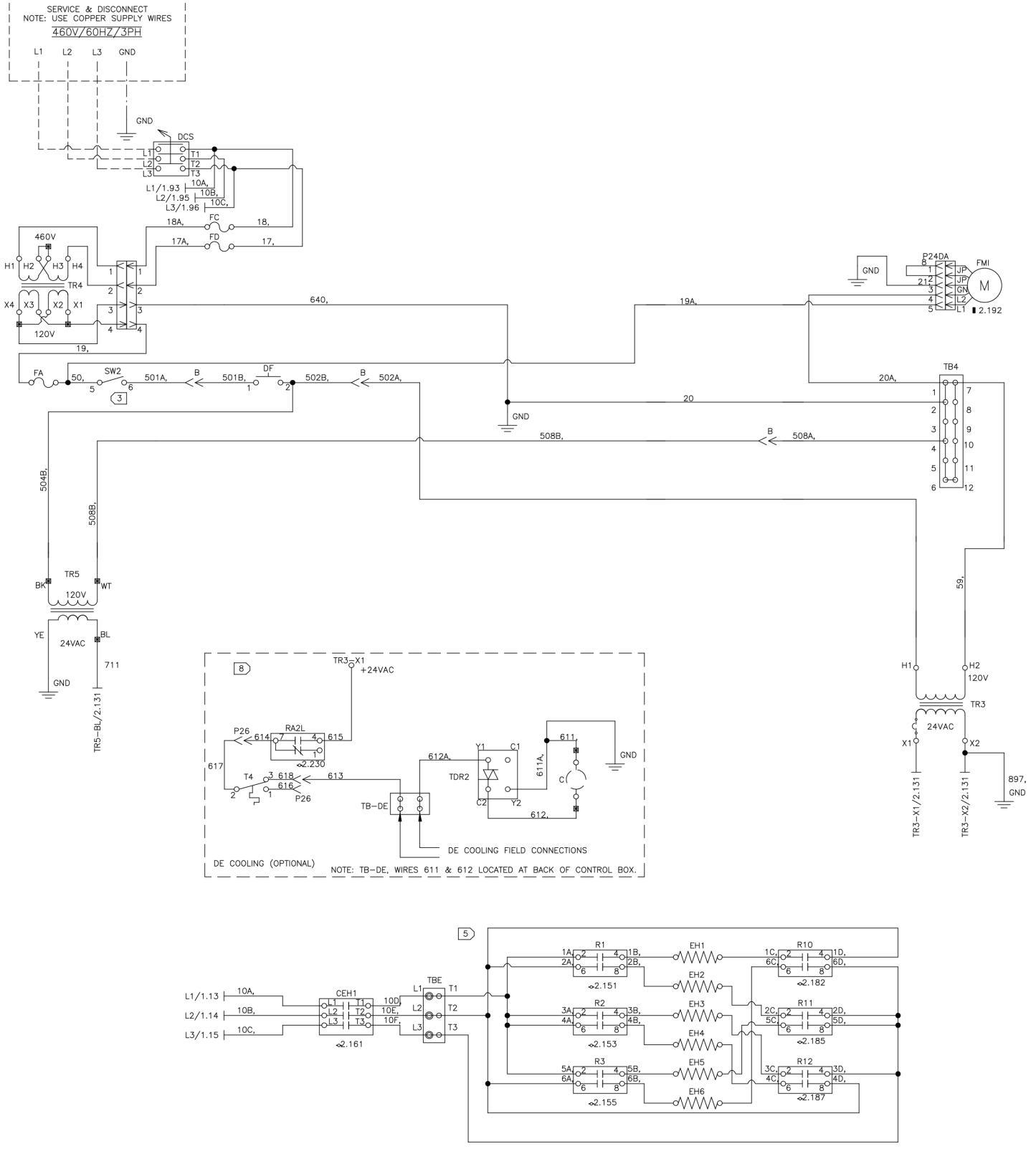
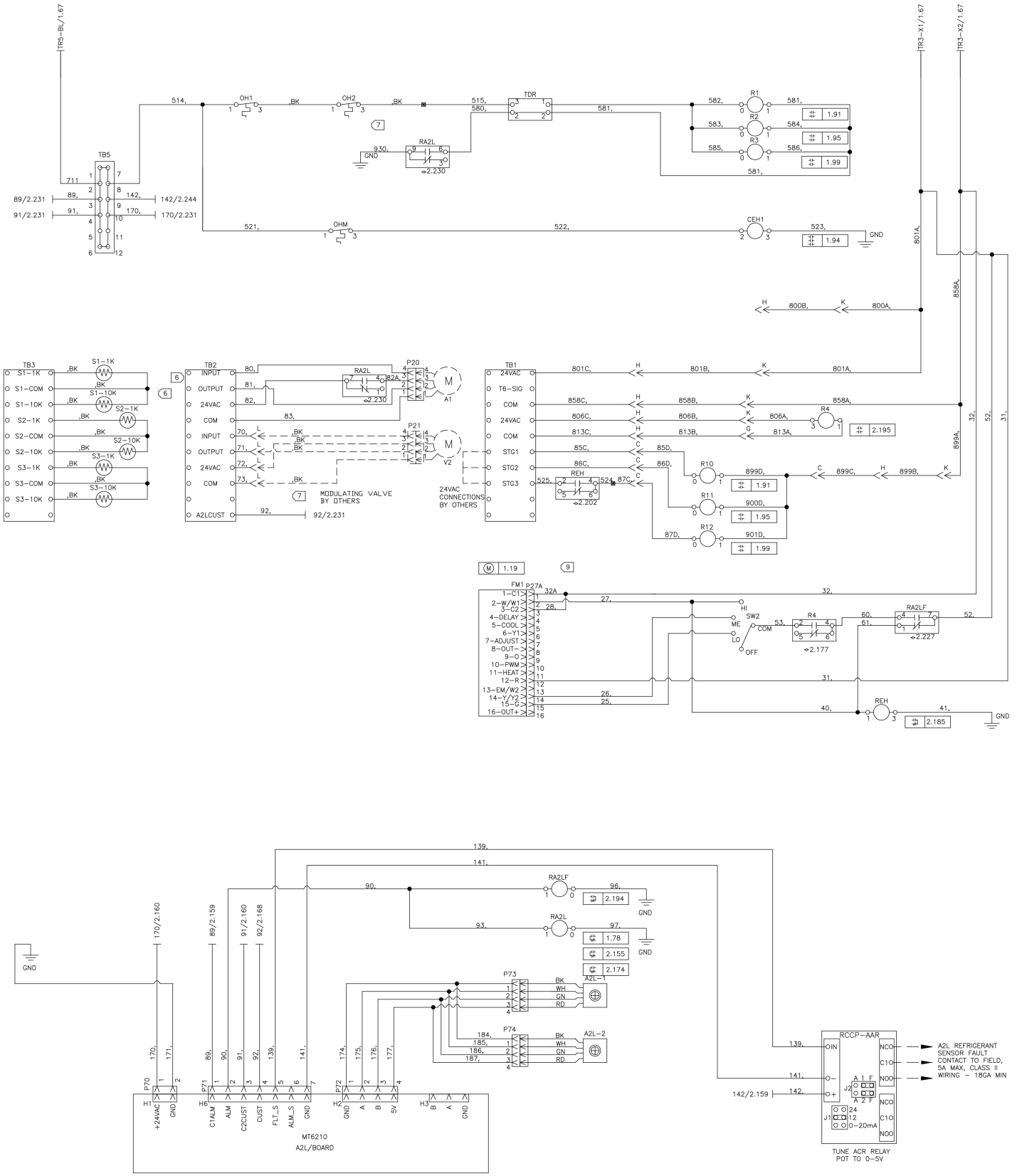


Figure 129: Electric Heat Wiring Diagram – Typical 460 V/60 Hz/3 Ph



Wiring Schematics Legend for "Typical Electric Heat Wiring Diagram"

Legend					
A1	Actuator (Optional)	**OH2**	Thermostat - Overheat	**SW2**	Switch – On - Off and Fan Speed
A2LB	A2L Mitigation Board	**OHM**	EH Man Reset Overheat Stat	**SW5**	Switch – Emergency Heat
A2L-1	A2L Sensor	**R1-R3**	Relay Electric Heat (Back Up)	**SW6**	Switch Rocker SPDT
BPT	Sensor - Braze Plate DX Coil Refrigerant Temperature	**R2S**	Relay – High (2nd) Stage Compr	**T2**	Thermostat EH Relay - 0A Temp>20°
		R4	Relay – Fan Coil (24 VAC)	**T4**	Thermostat Low Temp 28°
CAP1	Capacitor Run	**R4H**	Relay – Hi Fan Speed Coil (24 VAC)	**T5**	Thermostat Defrost
CEH1-3	Electric Heat Contactor	**R4L**	Relay – Low Fan Speed Coil (24 VAC)	**T6**	Thermostat - Freeze Stat
CO2	Sensor – Indoor Air CO_2	**R4M**	Relay – Med Fan Speed Coil (24 VAC)	**T7**	Thermostat- Changeover 60°
CP1	Motor Compressor 2-Stage	**R7**	Relay – Compressor Lockout	**T8**	Thermostat - Cooling Lockout 59C F
CS	Current Sensor (Hawkeye 800)	**R8-9**	Relay – Emergency Heat	**TB1**	Terminal Board Control
DCS	Switch – Unit Power	**R10-12**	Relay – Electric Heat	**TB3 (A,B)**	Terminal Block - Main Power
DF	Dead Front Switch	**R11A**	Relay - Defrost	**TB4**	Terminal Block 24 VAC
EH1-6	Heater – Electric	**RA1**	Relay - Actuator/Valve	**TB-DE**	Terminal Board for DE Contactor
EH10	Heater – Outdoor Drain Pan	**RA2L**	A2L Actuator	**TBE**	Terminal Block - Electric Heat
F1A/F1B	Fuse – Compressor	**RA2LF**	A2L Actuator	**TDR**	Time Delay Low Voltage 5 Min
F2A/F3B	Fuse – Electric Heat	**RAT**	Sensor - Room Air Temperature	**TDR2**	Protector Low Voltage 5 Min
FA/FB	Fuse – Control, Load	**RCCP**	Transducer AAR	**TR1**	Transformer - Motor Speed
FC/FD	Fuse – Control, Transformer	**REH**	Relay – H1 Fan 3rd STG EH	**TR3**	Transformer - 24 V, 75 VA
FMI	Motor – Room Fan	**RT4**	Relay - 24 VAC	**TR4**	Transformer - 460 V–230 V
FMO	Motor Outdoor Air	**RT6**	Relay – Freeze Stat	**TR5**	Transformer - 24 V
M	Motor (ECM) - Fan ⅓ HP (750/1500)	**S2**	Sensor - DA (TAC 01-2085-001)	**V1**	Valve - Heat EOC (Accessory)
OH1	Thermostat - Overheat	**SW1**	Switch – Disconnect	**V2**	Valve - Cool EOC (Accessory)

Legend - Symbols	
– – –	Accessory or field mounted component
⏚	Ground
⊠	Wire nut / splice
●	Overlap point - common potential wires
L1/1.20	Wire link (wire link ID / page # . line #)

Motor Size	SW2 Term	TR1 Speed Settings			
		750	1000	1250	1500
1/4 HP 0.00-0.20 ESP	High	PK	YE	WH/GN	GN
	Med	GY	GY	PK	YE
	Low	GY/BK	GY/BK	GY	PK

Electric Heat Sequence:

NOTE 1: Backup relays R1, R2, and R3 are energized when power is applied.

NOTE 2: Main relays R10, R11, and R12 are energized when a 24 VAC source is connected to STG1, STG2, and STG3 on terminal strip. Stage 3 energized only when fans are in high.

NOTE 3: Electric heat can be staged by applying the 24 VAC to the stages (1, 2, and 3) at different time intervals.

Control Wiring Notes:

NOTE 1: Make electrical installation in accordance with job wiring schematic complying with national and local electrical codes.

NOTE 2: Automatic temperature control supplier is responsible to ensure controls operate correctly and protect the unit.

NOTE 3: SW2 contacts 5, 6 and 7, 8 open only when SW2 is in OFF position.

NOTE 4: T6 only on units with chilled water.

NOTE 5: TYP 6 ELM on 750 & 1000 CFM units only terminal block furnished when total heating load is less than 48 amps.

NOTE 6: 1K thermistor is positive temperature coefficient. 10K thermistor is negative temperature coefficient.

NOTE 7: OH2 supplied on ceiling units, connect wire 515 to OH1 on AV (floor) units.

NOTE 8: Automatic temperature control can be wired to TB-DE for the de-cooling operation. Typical operation is to wire from the TB-DE to a normally open relay with the relay closing on the control call for cooling. For additional information, contact Daikin Applied.

NOTE 9: Motors are factory programmed for specified airflow. Contact Daikin Applied for replacement.

NOTE 10: Devices in legend may or may not be on unit.

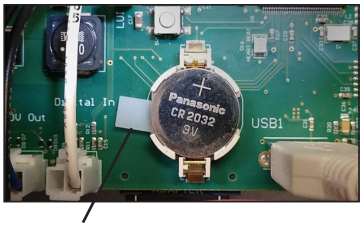
Operation

Start-Up

Remove Battery Shipping Tab

The controller battery protects the time clock schedule in the event of a power loss. Remove the board backup battery shipping tab by grasping the tab and pulling gently. The battery should be replaced every 3 years with a new CR2032 or equivalent.

Figure 130: Battery Shipping Tab



Remove Battery Shipping Tab

Complete Check, Test and Start Procedure

Provide completed Check, Test and Start form to your local Daikin Applied representative and specifying engineer for verification that proper start-up was completed. See page 94.

⚠ CAUTION

Remove debris, dust, dirt and any obstruction from the outside air ducting, return air ducting (if applicable) and discharge air outlet (if applicable) as this will affect unit performance.

1. Before proceeding, inspect the fan system, to verify that all parts are aligned properly and move freely. Inspect fans and fan discharge area for obstructions. Verify that power has been disconnected. Rotate the fan assembly manually. Check that a clean filter is installed and the ductwork to and from ventilator is free of debris. All panels should be in place and properly fastened. Check for outdoor air leaks and condensation. Verify that the coil section is properly sealed using the insulating foam donuts supplied.
2. After the unit ventilator has been properly installed, activate unit electrical power and applicable chilled water/hot water/steam/refrigerant systems.
3. Using the applicable control, activate the unit ventilator. Depending on the operating mode selected, the dampers, fans, and other components should operate as needed.
4. Run the unit ventilator for ten minutes, listening and observing. Fans should be operating correctly and rotating in the proper direction, without unusual noise. Likewise, the unit should be free of sheet metal rattles and / or unusual noises. All panels should be in place and properly fastened. Check for air leaks and condensation.
5. Test Refrigerant Detection System (RDS). See "A2L Leak Detection Sensor and Board Troubleshooting and Diagnostics" on page 90. For full details on the mitigation modes and sequence of operation please refer to the literature for the unit controller and A2L mitigation control board.

Post Installation Checklist

- ☐ Unit is securely fastened to ceiling.
- ☐ Electrical hook-up is complete; power, control, wall thermostat (if applicable) in accordance with unit wiring diagram(s).
- ☐ Air filter is clean and in place.
- ☐ All access and end panels are in place and protective covering has been removed.
- ☐ No debris, dust, dirt, or obstructions exist around outside air ducting, return air ducting (if applicable), and discharge air outlet (if applicable).
- ☐ All installation work has been completed in accordance with applicable local, state and national codes.
- ☐ Unit is square and level and is running smoothly and quietly.
- ☐ Refrigerant Detection System for refrigerant leak mitigation has been tested.
- ☐ No air infiltration has been detected.
- ☐ Paint nicks and scratches have been touched up (as required).
- ☐ Access space is provided for maintenance, service and unit removal.
- ☐ Owner or maintenance personnel provided with a copy of this manual and other manuals/documents shipped with the unit.
- ☐ Owner or maintenance personnel instructed on proper unit operation and maintenance.

Maintenance

General Maintenance

1. Normal maintenance on all units is generally limited to filter changes. Units are provided with a permanently lubricated motor 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. 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.

Oiling (Not Required)

No oiling required. The indoor motor and fan shaft bearings are permanently lubricated.

NOTICE

Motor manufacturer recommends not oiling the room fan motor.

Filter(s)

⚠ CAUTION

Turn off unit before servicing to avoid danger of injury from rotating fans.

⚠ CAUTION

Electric heat units should ONLY use permanent wire mesh filters. Filters other than wire mesh are not intended for electric heat units, and can cause unit damage, property damage, or personal injury.

⚠ CAUTION

Units must have a filter installed when operating. Operation without a filter can compromise unit performance due to build up of dust and dirt on components.

⚠ CAUTION

Dirty or clogged filters can impact unit performance, resulting in damage to the unit.

1. Turn off the unit, (fan speed switch or unit on/off switch is located behind the bottom access panel, located in the right end compartment).
2. The filter is removed by fully opening the bottom, louvered hinged access panel (Figure 131 and Figure 132).
3. Release the ends of the safety chains (2) attached at the unit frame to allow full swing of the louvered panel (Figure 131).
4. Loosen (do not remove) the two (2) hex head screws on the slotted filter bracket, and slide the –filter bracket away to provide adequate clearance for filter removal (Figure 132).

Filters should be replaced during the first week of placing into service to prevent dirt carry-over into the internals of the unit and back into the classroom. A periodic filter changeout program should be established. Filters should be checked monthly or more often if conditions indicate. Filters are included in all units. Daikin Applied single-use filters are standard on all but electric heat units, which come with permanent wire mesh filters. Permanent wire mesh and renewable media filters are available for non-electric heat units, in lieu of single-use filters.

- Single-use filters feature Amerglas media. They are designed to be used once and discarded.
- Permanent filters are metal filters that may be removed for cleaning and reused numerous times.
- Renewable media filters (Figure 133) consist of a heavy painted metal structural frame and renewable Amerglas media.

Figure 131: Filter Access

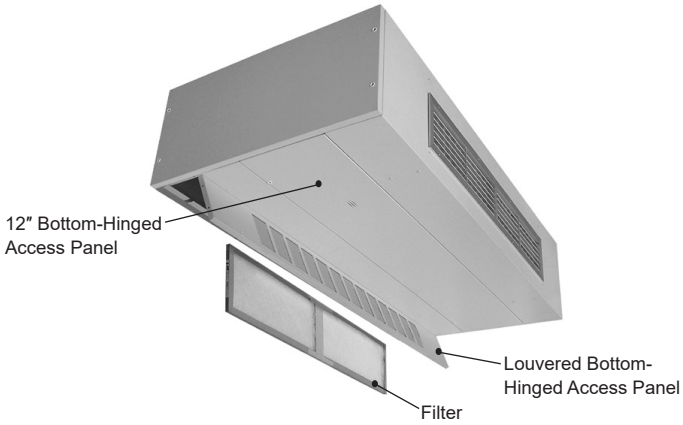


Figure 132: Removing Filter

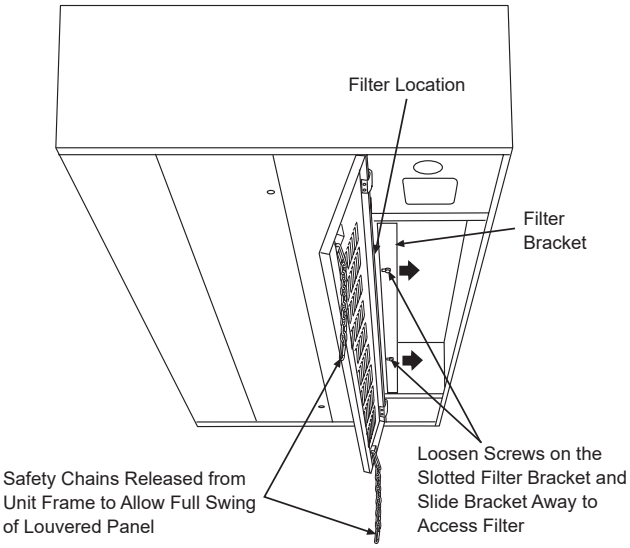
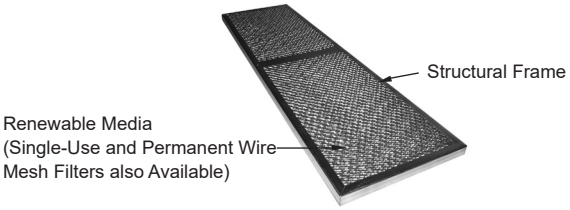


Figure 133: Renewable Media Filter



Refrigerant Information

Refrigerant Guidelines

⚠ 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 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.

⚠ WARNING

The appliance is designed to activate leak mitigation airflow in the event a refrigerant leak is detected. This is required to ensure dilution and prevent stagnation of any leaked refrigerant. Always ensure the supply fans are able to operate freely. Always maintain proper airflow and do not allow filters, air inlets, or air outlets to become blocked. Refer to Table 38.

⚠ WARNING

The appliance shall be installed, operated, and stored in a room with a floor area not less than the minimum room area.

≥ 225.36 ft² (20.94 m²)
Minimum Room Area*

*See the required minimum room area for your specific unit size in Table 38.

NOTICE

Refer to Table 37 for the altitude adjusted room area calculation referenced later in this manual.

The indoor equipment mitigation requirements are calculated at sea level. For higher altitudes, adjust the minimum room area specified on or near the serial plate by the corresponding altitude adjustment factor shown in Table 37. This table is provided as a reference. Adjusted room area (Amin adj) is the product of the minimum room area specified in the serial plate and the minimum room area multiplier, as shown in formula below.

Amin adj = Amin (serial plate) * (minimum room area multiplier)

The minimum room area can also be found in Table 38.

Table 37: Minimum Room Area Multipliers by Altitude

Altitude (Meters)	Minimum Room Area Multiplier
0	1.000
305	1.047
500	1.078
750	1.117
1000	1.156
1250	1.195
1500	1.234
1750	1.273
2000	1.312
2250	1.351
2500	1.390
2750	1.429
3000	1.468
3250	1.507
3500	1.546

Table 38: Minimum Airflow and Room Area Requirements

Unit Series	Tonnage	Voltage	Estimated Recommended Charge for Condensing Unit oz (kg)	Maximum R-32 Refrigerant Charge with Field Piping oz (kg)	Minimum Airflow Qmin ft³/min (m³/min)	Minimum Room Area Amin ft² (m²)
H07, V07	1-1/2	208/230-1	53 (1.50)	194.75 (5.52)	318 (9.00)	175.98 (16.35)
H10, V10	2-1/2	208/230-1	63 (1.79)	204.75 (5.80)	334 (9.46)	185.02 (17.19)
H13, V13	3	208/230-1	69 (1.96)	216.3 (6.13)	353 (1.00)	195.45 (18.16)
	3	208/230-3	60 (1.70)	201.75 (5.72)	329 (9.32)	182.31 (16.94)
	3	460-3	60 (1.70)	207.3 (5.88)	338 (9.57)	187.32 (17.40)
H15, V15	3-1/2	208/230-1	83 (2.35)	230.3 (6.53)	376 (10.65)	208.10 (19.33)
	3	208/230-3	60 (1.70)	201.75 (5.72)	329 (9.32)	182.31 (16.94)
	3	460-3	60 (1.70)	207.3 (5.88)	338 (9.57)	187.32 (17.40)
	4	208/230-3	84 (2.38)	225.75 (6.40)	368 (10.42)	203.99 (18.95)
	4	460-3	84 (2.38)	242.4 (6.87)	395 (11.19)	219.04 (20.35)
H20, H20	4	208/230-1	91 (2.58)	249.4 (7.07)	407 (11.53)	225.36 (20.94)
	4	208/230-3	84 (2.38)	225.75 (6.40)	368 (10.42)	203.99 (18.95)
	4	460-3	84 (2.38)	242.4 (6.87)	395 (11.19)	219.04 (20.35)

Refrigerant Detection System (RDS) Operation

The Refrigerant Detection System (RDS) is controlled by refrigerant sensors, which are secured to designated locations for active monitoring. If the sensors detect the presence of R-32 refrigerant above 15% LFL mitigation actions are initiated. Compressor and electric heat operation is disabled and the supply fan is activated, providing airflow at or above the minimum required airflow to evacuate excess concentration. Once refrigerant concentration reaches below a safe threshold, the unit will resume normal operation. If the sensors detect another refrigerant concentration excess, the unit will go back into mitigation mode and will repeat the same process.

High speed airflow must be maintained above minimum airflow levels for proper operation of the RDS. See Table 38 for specific airflow requirements.

Refrigerant Detection System and Sensors

For additional instructions on how to operate the RDS including how to activate a manual test of the RDS, refer to the unit controller manual.

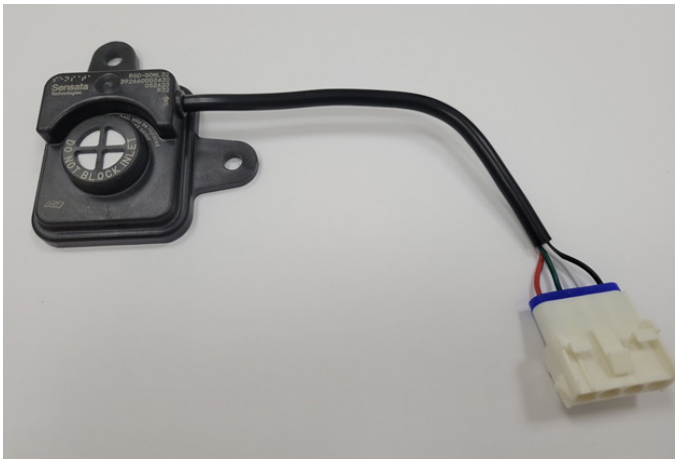
⚠ WARNING

This unit is equipped with a Refrigerant Detection System (RDS). Only components and refrigerant detection sensors specified by Daikin Applied may be used for replacement and maintenance.

⚠ WARNING

Always ensure the refrigerant detection sensors installed in the equipment are free of debris and the inlet is not blocked. If replacing a refrigerant detection sensor, always install in the identical orientation as the original sensor.

Figure 134: Sample Refrigerant Detection Sensor



NOTE: Identify the sensor inlet marked “Do Not Block Inlet,” and ensure it is free of debris.

⚠ WARNING

Auxiliary devices which may be a Potential Ignition Source shall not be installed in the duct work. Examples of such Potential Ignition Sources are hot surfaces with a temperature exceeding 700°C (1292°F) and electric switching devices.

⚠ WARNING

The unit must be stored and/or located to prevent mechanical damage of the refrigeration system. Do not store the unit near sources of open flame, electrical switching devices, or hot surfaces above 700°C (1292°F). If the unit is stored indoors, the storage area should be larger than the Minimum Room Area specified in this manual. The storage space should be well ventilated and not allow for the stagnation of leaked refrigerant. Failure to do so may result in a fire or explosion hazard.

⚠ WARNING

Only auxiliary devices approved by Daikin Applied or declared suitable for installation with R-32 shall be installed in the connecting ductwork.

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.

A2L Leak Detection Sensor and Board Troubleshooting and Diagnostics

At power up, the Refrigerant Detection System RDS control board display shows what sensors are detected and what sensors are not detected.

- Where X is the sensor number (1 to 8):
  - SX = 1 , sensor X is active and communicating
  - SX = 0, sensor X is not communicating or inactive

By pressing and holding the push button for:

- Less than 2 seconds:

  The RDS control board display shows the last 10 sensor faults (can be loss of communication or faulted state reported by a specific sensor). General configuration fault (Flt CFG) is also shown when the expected number of sensors does not match the number of sensors detected online.

- More than 2 seconds and less than 5 seconds:

  The display shows sensor(s) status info:

  — The current LFL level.

  — Loss of communication or faulted state reported by a specific sensor.

- More than 5 seconds and less than 10 seconds:

  The RDS control board starts a mitigation test. The board will go into alarm mode and the MT6210 controller will begin the mitigation sequence. The mitigation test will last approximately 5 minutes.

  As part of the test, the following will occur:

  — Compressor outputs will be de-energized.

  — Electric heat outputs will be de-energized.

  — Supply fan circulation will be energized to provide airflow above minimum required levels.

- More than 10 seconds:

  The display shows all the GID values supported by the sensor board.

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)
- 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 de-commissioned 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.

Appendix

Warranty Registration Form

Warranty - Check, Test and Start	Form: 5F-4240
	Group: **ATS**
	Date: **June 2024**
	Supercedes: **573882Y**

Unit Ventilator Warranty Registration Form

Check, test & start procedure for Daikin Applied Unit Ventilators

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.

Sales Office: _____ S.O.#: _____ Date Started: _____

Job Name: _____ G.O. # _____

Job Location: _____

Unit Location: _____ Unit Tagging: _____

Model No: _____ Serial No.: _____

Supply Voltage: L1/L2 _____ L2/L3 _____ L3/L1 _____ Rated: _____

Room Fan Motor Amps: T1: _____ RPM _____ Nameplate Rating: _____

I. Initial check

A. Does electrical service correspond to unit nameplate? ..... Yes ☐ No ☐
B. Are all electrical power connections tight? ..... Yes ☐ No ☐
C. Does all field wiring conform to unit electrical schematic? ..... Yes ☐ No ☐
D. Is unit installed per IM bulletin? ..... Yes ☐ No ☐
E. Cabinet paint O.K.? ..... Yes ☐ No ☐
F. Cabinet bent? ..... Yes ☐ No ☐
G. Do outdoor (AEQ, AZU, AZQ & AZR) and indoor fans turn freely? ..... Yes ☐ No ☐
H. Are all setscrews on outdoor and indoor fan couplings tight? ..... Yes ☐ No ☐
I. Is the fan coupler aligned between the shaft and motor? ..... Yes ☐ No ☐
J. Are end bearing bolts on outdoor and indoor fan shaft tight? ..... Yes ☐ No ☐
K. Have the fan shaft end bearing and room fan motor been oiled (if applicable)? ..... Yes ☐ No ☐
L. Are outdoor air and return air dampers operating properly? ..... Yes ☐ No ☐
M. Is the filter clean? ..... Yes ☐ No ☐
N. Is there excessive noise or vibration? ..... Yes ☐ No ☐

If Yes, corrective action (if any) _____

II. Controls check

A. Does the unit have Daikin Applied controls (MicroTech)? ..... Yes ☐ No ☐

If No, control company _____
If controls are not by Daikin Applied, skip to Section III.

B. Condensate disposal system operating O.K.? ..... Yes ☐ No ☐
C. Does unit start and perform per sequence of operation as stated in OM? ..... Yes ☐ No ☐
D. If the unit has a unit mounted sensor, has the insulation been removed from the sampling chamber inlet? ..... Yes ☐ No ☐
E. Are all sensors installed and insulated properly? ..... Yes ☐ No ☐
F. If the unit has MicroTech controls, room setpoint: _____°F Deadband 6° or _____°F

III. Refrigeration system

A. Has all field piping been leak tested to 100 psig (AVS, AVV, AVR, AHF, AHV, & AHR)? ..... Yes ☐ No ☐
B. Is expansion valve bulb properly installed and insulated? ..... Yes ☐ No ☐
C. High pressure control cutout (if applicable) _____ psig
D. Crankcase heater operating O.K.? ..... Yes ☐ No ☐
E. Reversing valve operating O.K.? ..... Yes ☐ No ☐
F. Emergency heat operating O.K.? ..... Yes ☐ No ☐
G. Piping correct (AVS, AVV, AVR, AHF, AHV, & AHR to remote condensing unit)? ..... Yes ☐ No ☐
H. Checked for refrigerant leaks? ..... Yes ☐ No ☐

IV. Hydronic piping check

A. Is unit piping correct (the remainder of this section applies only to units with Daikin Applied controls)? ..... Yes ☐ No ☐
B. Is the modulating control valve(s) piped correctly (valve controlled units)? ..... Yes ☐ No ☐
C. Is the modulating control valve(s) placed in the upright position (valve controlled units)? ..... Yes ☐ No ☐
D. Is 2 - position control valve(s) piped correctly (face and bypass)? ..... Yes ☐ No ☐

Warranty Registration Form

V. Start-up (Readings must be taken at full load conditions)

A. Outdoor Fan Motor Amps: T1 _____ Nameplate Rating: _____

B. Compressor Amps (Cig): T1 _____ T2 _____ T3 _____ Nameplate Rating: _____

C. Compressor Amps (Htg): T1_____ T2 _____ T3 _____ Nameplate Rating: _____

D. Refrigerant Pressures Htg./Clg.: Suction:_____ /_____ Discharge:_____ / _____

E. Refrigerant Temperature Htg./Clg.: Suction_____°F/_____°F Discharge:_____°F/_____°F

F. O.A.Temp.: _____°F Super Heat: _____°F Subcooling:_____°F

G. R.A. Temp. Htg./Clg.: _____°F/_____°F Discharge Air Temp.:_____°F/_____°F

H. Electric Htg. Amp: L1 _____ L2 _____ L3 _____ Total Amp: _____

I. Water Temperature Htg./Clg.: In _____°F/_____°F Out _____°F/_____°F

VI. Performed by:

Company: _____

Name: _____

Title: _____

Signature: _____ Date: _____

Comments: _____

_____

_____

_____

_____

_____

Service Technician: _____

Contractor Representative: _____

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

Notes / Comments

COMPLETE HVAC SYSTEM SOLUTIONS

SELF-CONTAINED | ROOFTOPS | COILS | CONDENSING UNITS
AIR HANDLERS | WATER-COOLED CHILLERS | AIR-COOLED CHILLERS
MODULAR CENTRAL PLANTS | SITELINE BUILDING CONTROLS
UNIT HEATERS | FAN COILS | AIR PURIFIERS | WATER SOURCE HEAT PUMPS
VARIABLE AIR VOLUME UNITS | UNIT VENTILATORS

13600 INDUSTRIAL PARK BLVD. | MINNEAPOLIS, MN 55441
1-800-432-1342 | 763-553-5330

LEARN MORE AT
DAIKINAPPLIED.COM

PART NUMBER: IM1399