Installation and Maintenance Manual IM 1058-8

Group: **Applied Air Systems**
Part Number: **IM 1058**
Date: **July 2017**

Maverick® II
Commercial Packaged Rooftop Systems

Heating and Cooling
Models MPS015F – 0050F
15 to 50 Tons
R-410A Refrigerant
MicroTech® III Unit Controller
Energy Recovery Wheel

This manual provides general information about the "F" vintage Daikin Commercial Packaged Rooftop Unit model MPS. In addition to an overall description of the unit, it includes mechanical and electrical installation procedures, commissioning procedures, sequence of operation information, and maintenance instructions.

The MicroTech® III rooftop unit controller is available on "F" vintage rooftop units. For a detailed description of the MicroTech III components, input/output configurations, field wiring options and requirements, and service procedures, see OM 920. For operation and information on using and programming the MicroTech III unit controller, refer to the appropriate operation manual (see Table 1).

For a description of operation and information on using the keypad to view data and set parameters, refer to the appropriate program-specific operation manual (see Table 1).

Table 1: Program Specific Unit Operation Literature

Rooftop unit control configuration	Manual bulletin number
VFDs	OM 844 - MD2 OM 895 - MD3 OM 1190 - MD4 OM 1191 - MD5 OM 847 - MD6
MPS Unit Controller Discharge Air Control (VAV or CAV) Space Comfort Control (SCC)	OM 920
LonWorks Integration	IM 918
BACnet Integration	IM 917
BACnet IP Comm Module	IM 916

Unit Nameplate

The unit nameplate is located on the outside of the main control box door. It includes the unit model number, serial number, electrical characteristics, and refrigerant charge.

Hazard Identification Information

⚠ DANGER

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

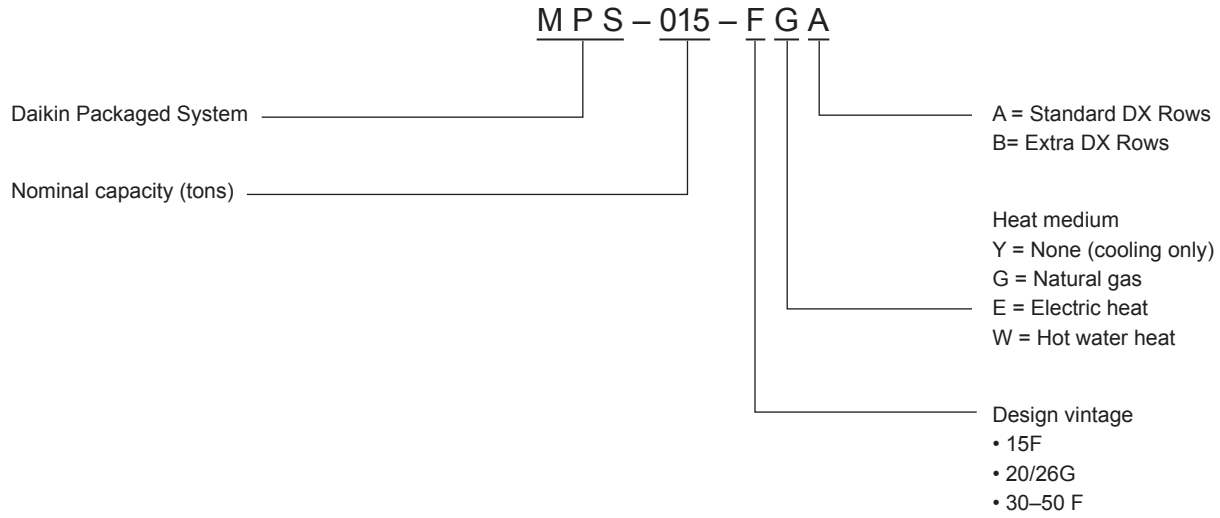
⚠ WARNING

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

⚠ CAUTION

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

Nomenclature (MPS 015–050)



Installer Responsibilities

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes.

⚠ CAUTION

Sharp edges on sheet metal and fasteners can cause personal injury. This equipment must be installed, operated, and serviced only by an experienced installation company and fully trained personnel.

Receiving Inspection

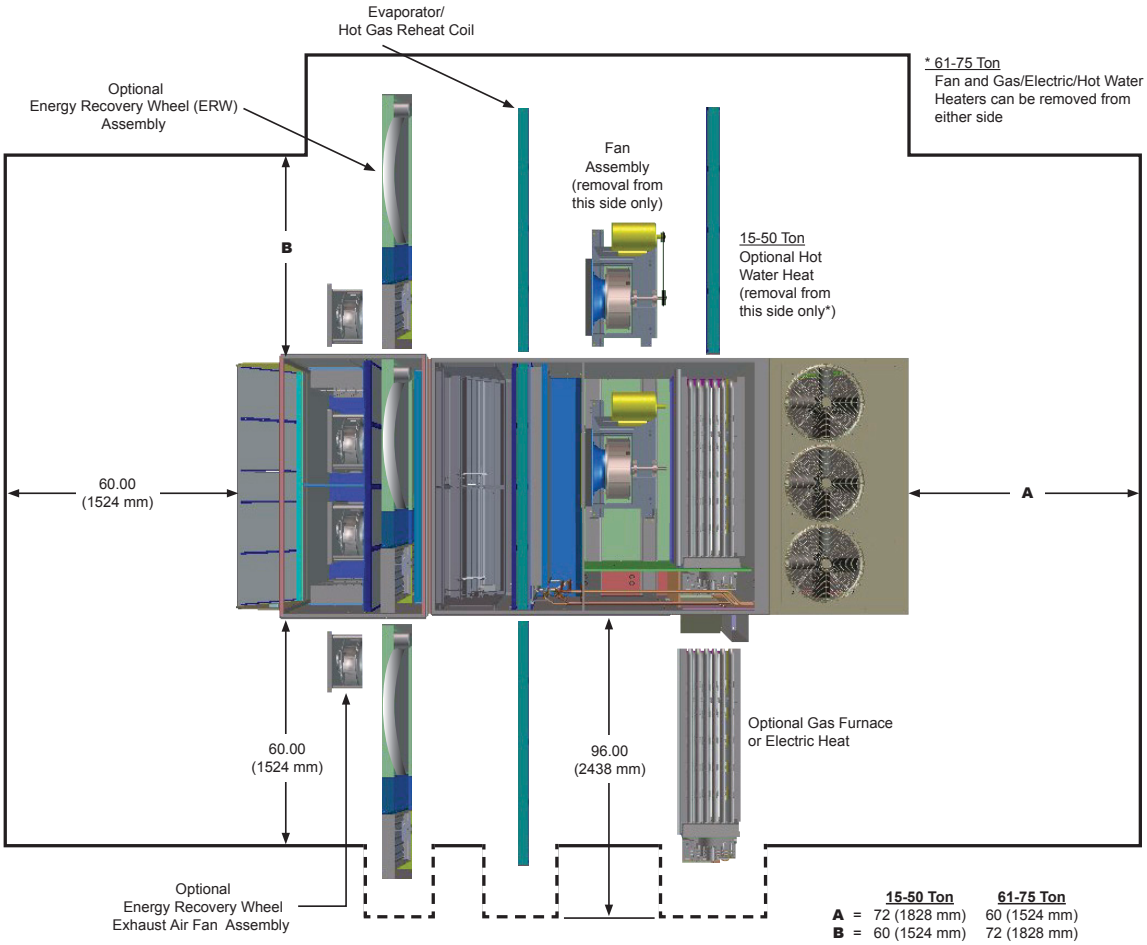
When the equipment is received, all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. **If the unit has become dirty during shipment (winter road chemicals are of particular concern), clean it when received.**

All units should be carefully inspected for damage when received. Report all shipping damage to the carrier and file a claim. In most cases, equipment is shipped F.O.B. factory and claims for freight damage should be filed by the consignee. Before unloading the unit, check the unit nameplate to make sure the voltage complies with the power supply available.

Service Clearance

Allow service clearances as approximately indicated in Figure 1. Also, Daikin recommends providing a roof walkway to the rooftop unit as well as along each side of the unit that provides access to most controls and serviceable components.

Figure 1: Service Clearances



Ventilation Clearance

Below are minimum ventilation clearance recommendations. The system designer must consider each application and provide adequate ventilation. If this is not done, the unit may not perform properly.

Unit(s) Surrounded by a Screen or a Fence:

1. The bottom of the screen or fence should be at least 1 ft. (305 mm) above the roof surface.
2. The distance between the unit and a screen or fence should be as described in Figure 1.
3. The distance between any two units within a screen or fence should be at least 120" (3048 mm).

Unit(s) Surrounded by Solid Walls:

1. If there are walls on one or two adjacent sides of the unit, the walls may be any height. If there are walls on more than two adjacent sides of the unit, the walls should not be higher than the unit.
2. The distance between the unit and the wall should be at least 96" (2438 mm) on all sides of the unit.
3. The distance between any two units within the walls should be at least 120" (3048 mm).

Do not locate outside air intakes near sources of contaminated air.

If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified (see Figure 1). This is particularly important to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

NOTE: Low head pressure may lead to poor and erratic refrigerant feed control at the thermostatic expansion valve. The unit has automatic control of the condenser fans which should provide adequate head pressure control down to 20°F provided the unit is not exposed to windy conditions. The system designer is responsible for assuring the condensing section is not exposed to excessive wind or air recirculation.

Overhead Clearance

1. Unit(s) surrounded by screens or solid walls must have no overhead obstructions over any part of the unit.
2. The area above the condenser must be unobstructed in all installations to allow vertical air discharge.
3. The following restrictions must be observed for overhead obstructions above the air handler section:
   a. There must be no overhead obstructions above the furnace flue, or within 9" (229 mm) of the flue box.
   b. Overhead obstructions must be no less than 96" (2438 mm) above the top of the unit.
   c. There must be no overhead obstructions in the areas above the outside air and exhaust dampers that are farther than 24" (610 mm) from the side of the unit.

Roof Curb Assembly and Installation

Locate the roof curb and unit on a portion of the roof that can support the weight of the unit. The unit must be supported to prevent bending or twisting of the machine.

If building construction allows sound and vibration into the occupied space, locate the unit over a non-critical area. It is the responsibility of the system designer to make adequate provisions for noise and vibration in the occupied space.

⚠ WARNING

Mold can cause personal injury. Some materials such as gypsum wall board can promote mold growth when damp. Such materials must be protected from moisture that can enter units during maintenance or normal operation.

Install the curb and unit level to allow the condensate drain to flow properly and allow service access doors to open and close without binding.

The gasketed top surface of the curb seals against the unit when it is set on the curb. These flanges must not support the total weight of the duct work. See Installing Ductwork on page 16 for details on duct connections. It is critical that the condensate drain side of the unit be no higher than the opposite side.

Assembly Instructions

Assembly of a typical roof curb is shown in Figure 2.

1. Set curbing parts A thru G per dimensions shown over roof opening or on a level surface. Note location of supply air opening. Check alignment of all mating screw holes.
2. Screw curbing parts together using fasteners provided. Leave all screws loose until curb is checked to be square.
3. Square entire curbing assembly and securely tighten all screws.
4. Position curb assembly over roof openings. Curb must be level within 0.25 inches from side to side and 1.50 inches over its length. Check that top surface of curb is flat with no bowing or sagging.
5. Weld curb assembly in place. Caulk all seams watertight. Remove backing from 0.25 × 1.50 wide gasket and apply to surfaces shown by crosshatching.
6. Check that electrical connections are coordinated.

Figure 2: Roof Curb Assembly (MPS 026G – 035F Example)

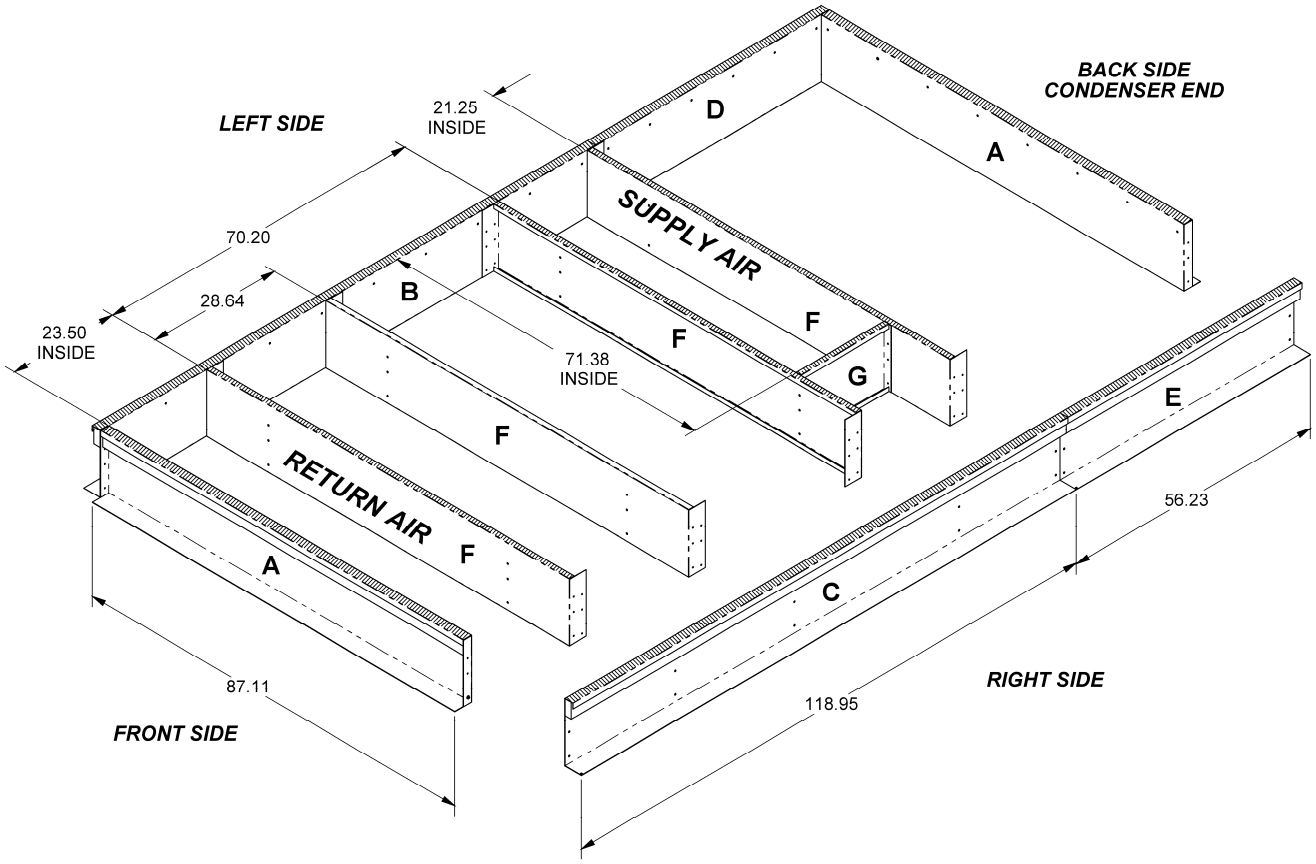
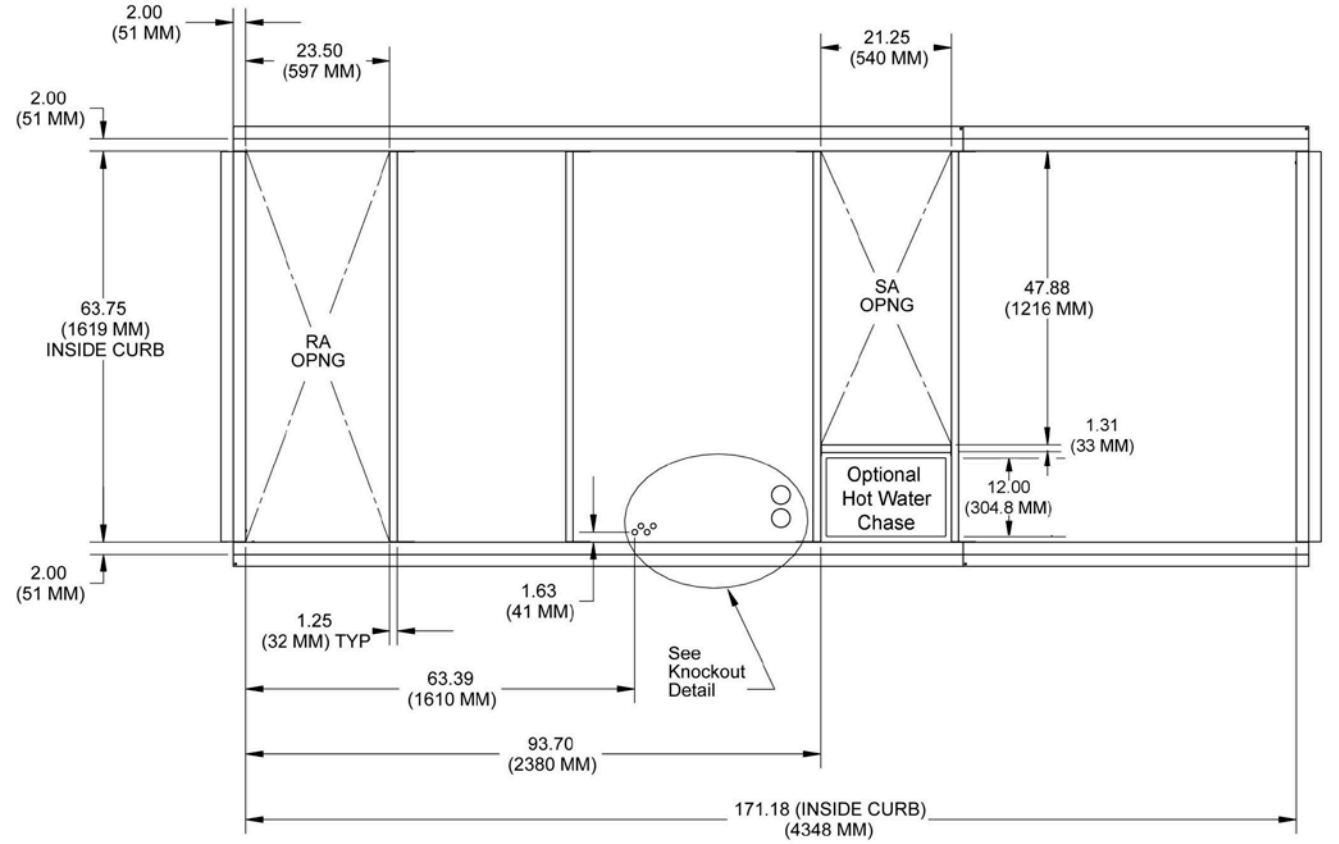
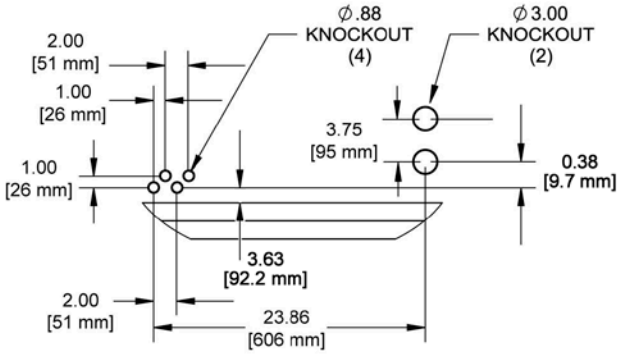


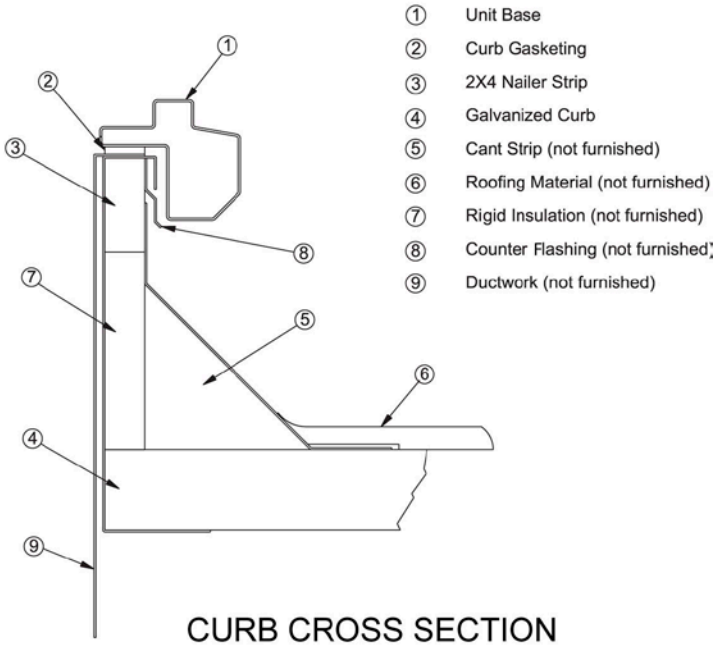
Figure 3: Roof Curb Layout—MPS 015F – 020G



PLAN VIEW

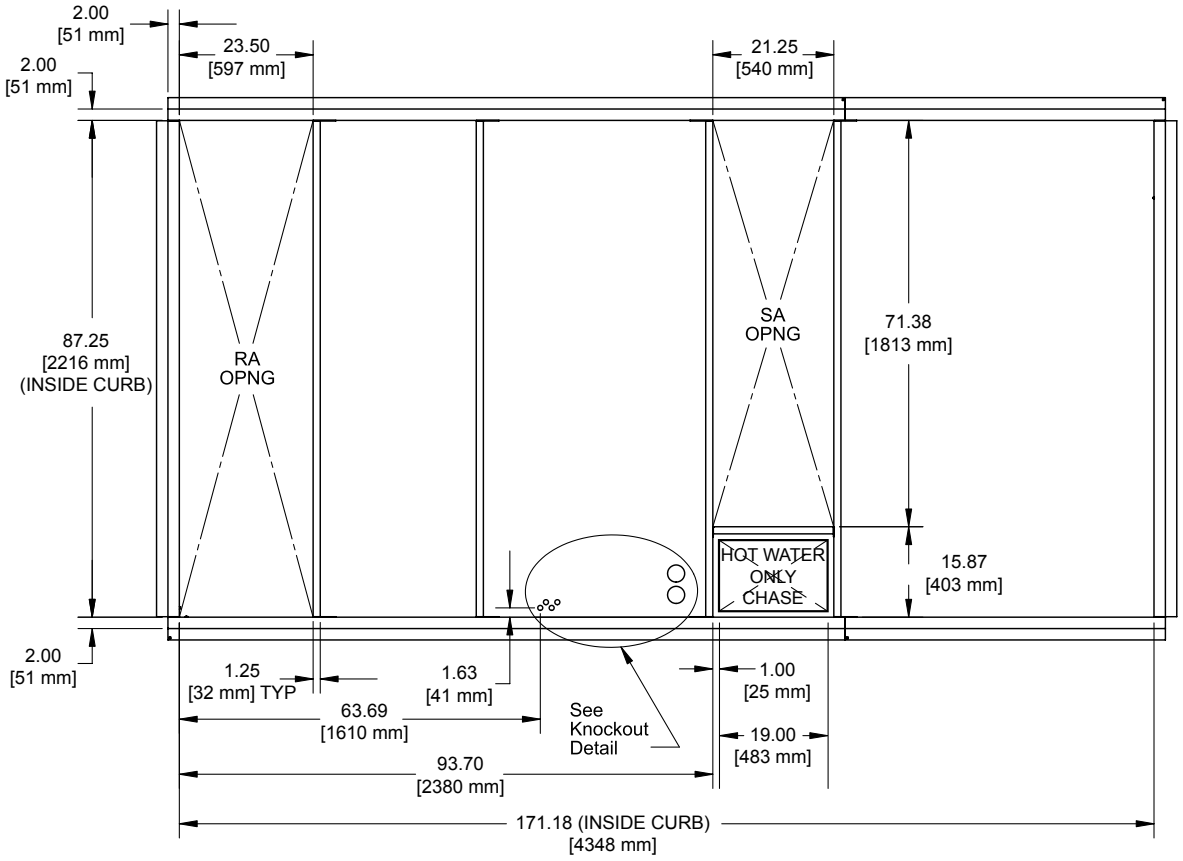


KNOCKOUT DETAIL

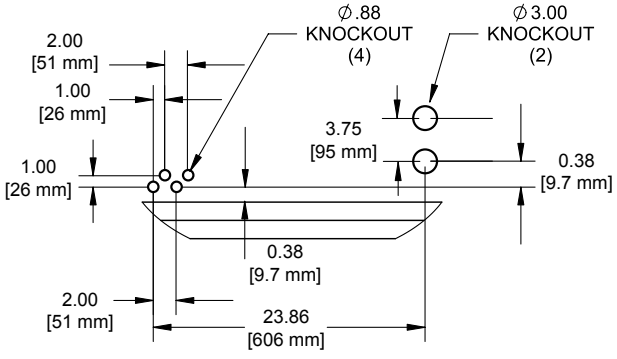


CURB CROSS SECTION

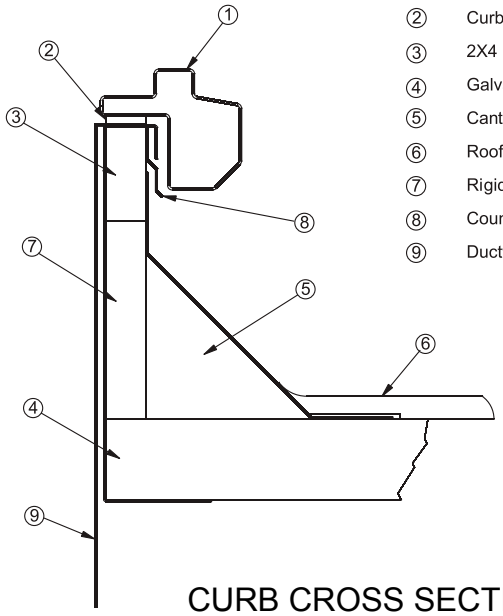
Figure 4: Roof Curb Layout—MPS 026G – 035F



PLAN VIEW



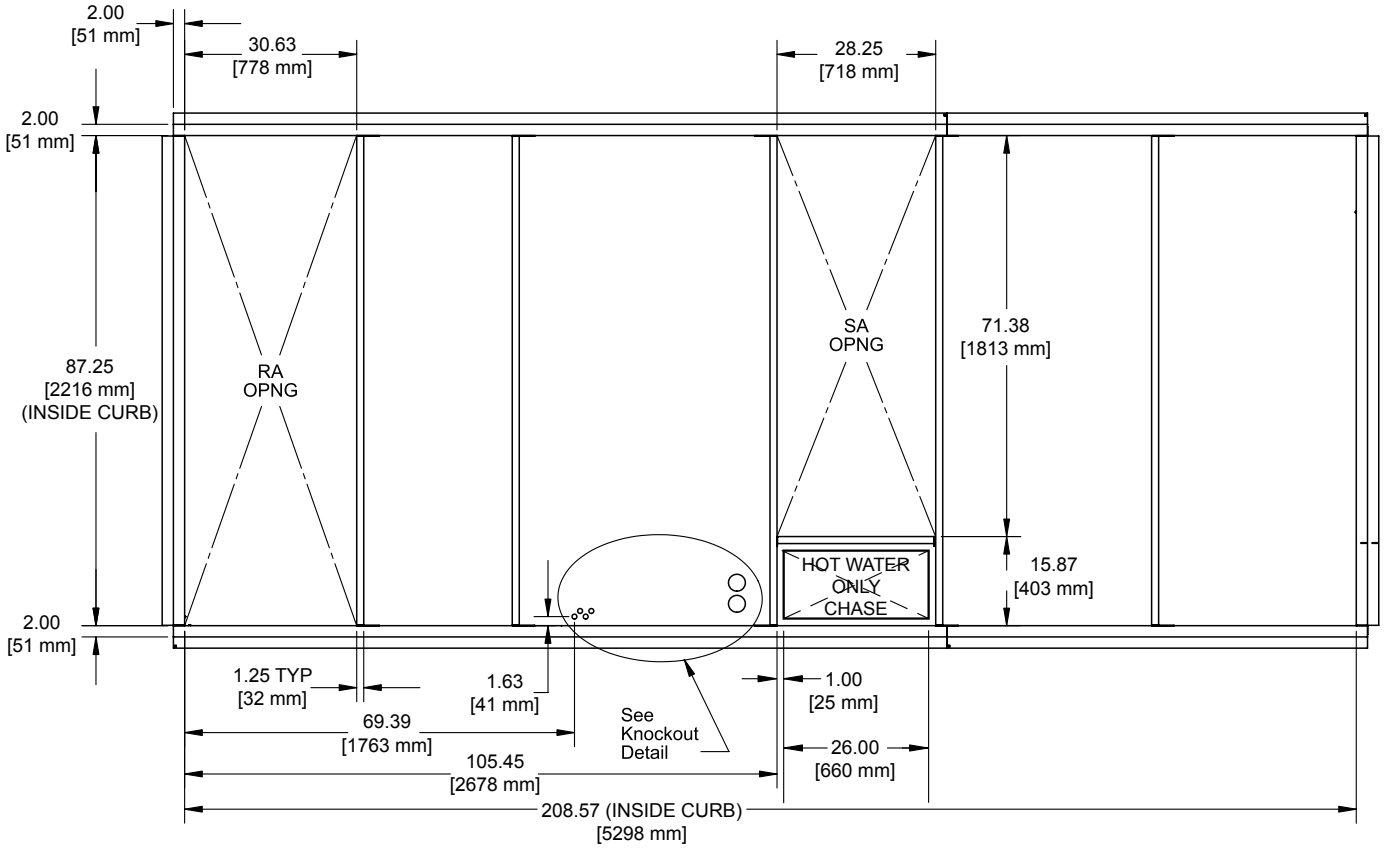
KNOCKOUT DETAIL



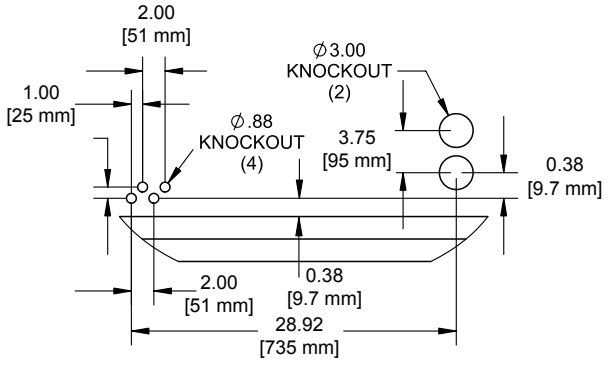
① Unit Base
② Curb Gasketing
③ 2X4 Nailer Strip
④ Galvanized Curb
⑤ Cant Strip (not furnished)
⑥ Roofing Material (not furnished)
⑦ Rigid Insulation (not furnished)
⑧ Counter Flashing (not furnished)
⑨ Ductwork (not furnished)

CURB CROSS SECTION

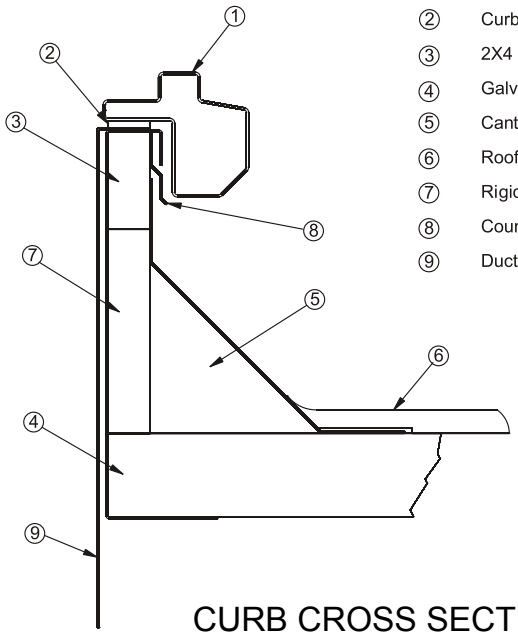
Figure 5: Roof Curb Layout—MPS 040F – 050F



PLAN VIEW



KNOCKOUT DETAIL



① Unit Base
② Curb Gasketing
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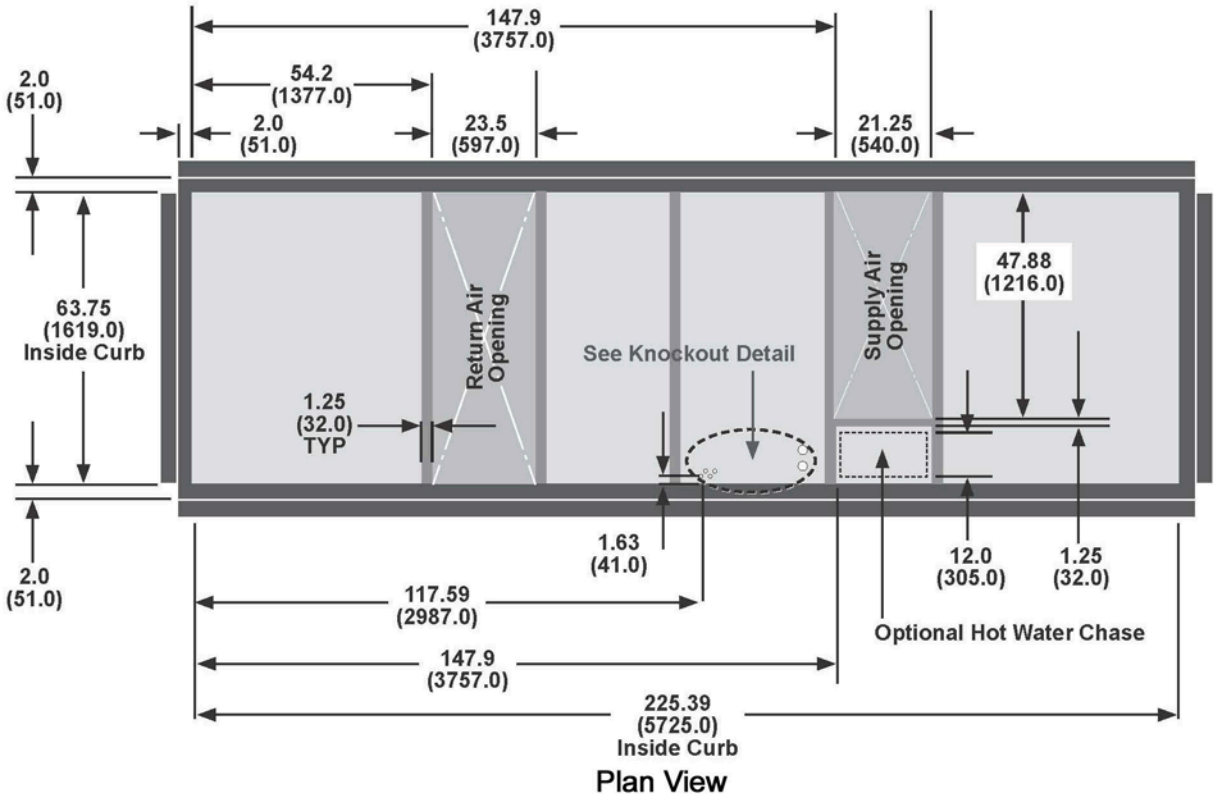
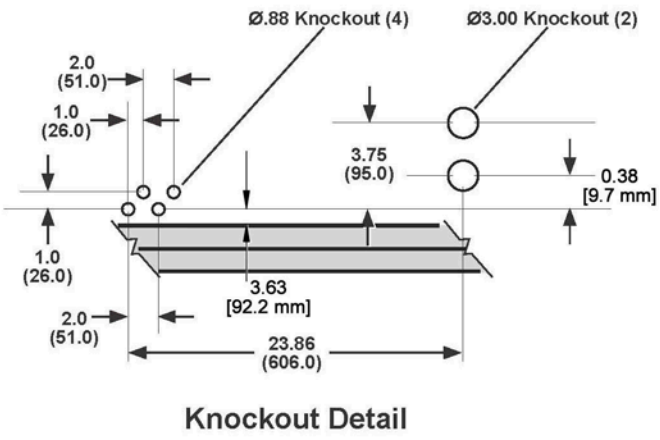
⑥ Roofing Material (not furnished)
⑦ Rigid Insulation (not furnished)
⑧ Counter Flashing (not furnished)
⑨ Ductwork (not furnished)

CURB CROSS SECTION

Figure 6: MPS 015–020 Roof Curb with Energy Recovery Wheel





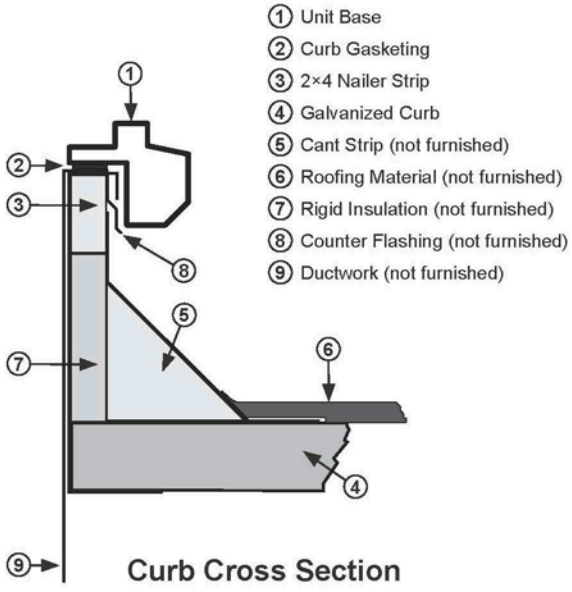
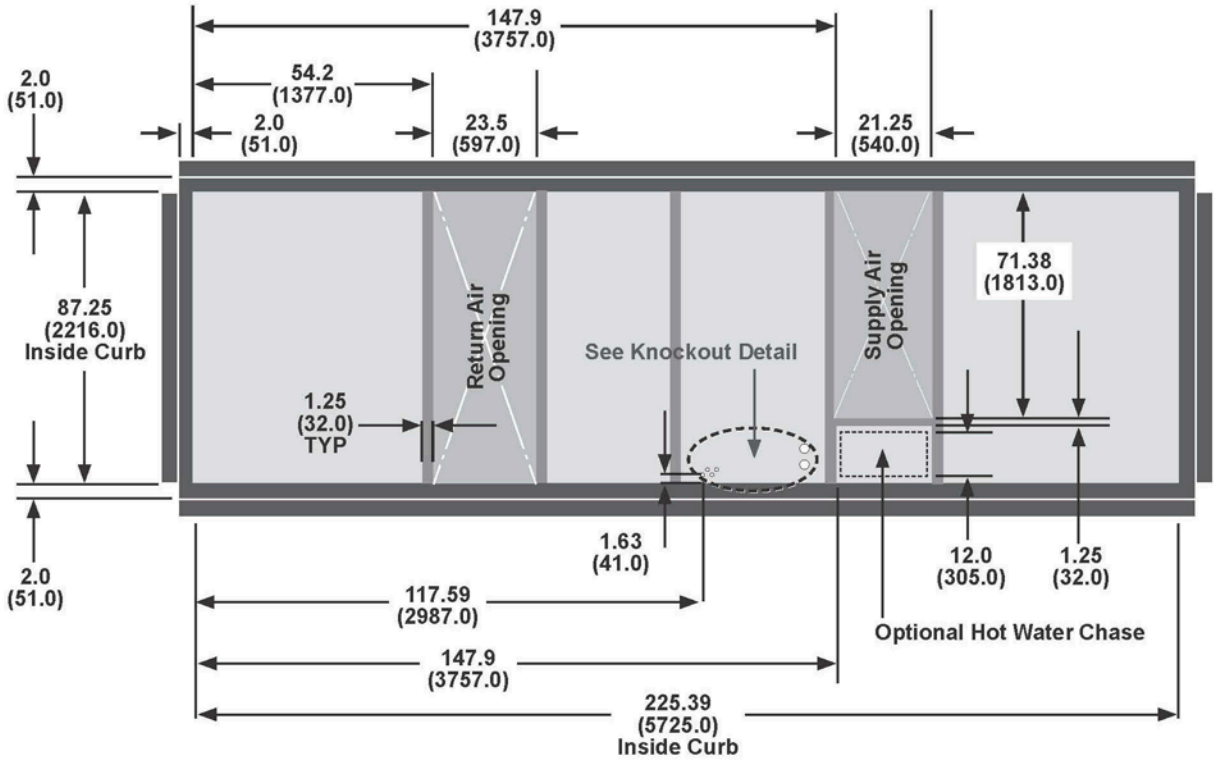
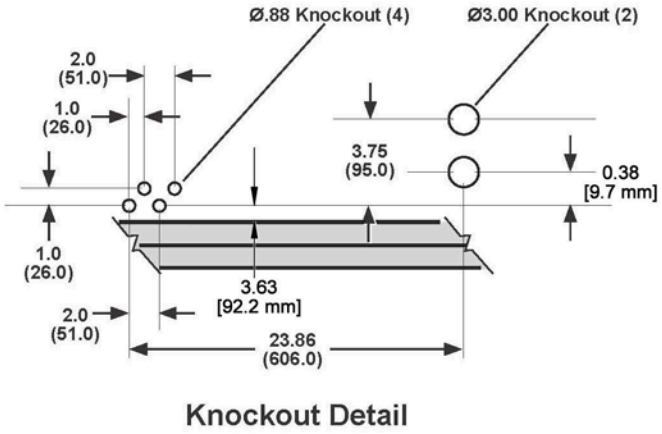


Figure 7: MPS 026–035 Roof Curb with Energy Recovery Wheel





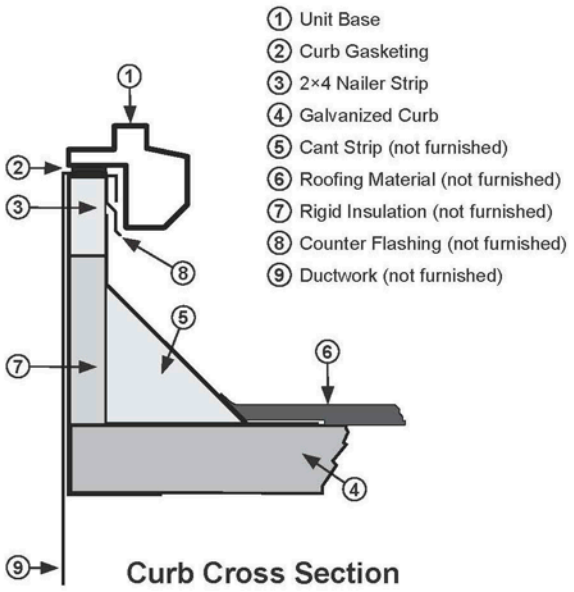
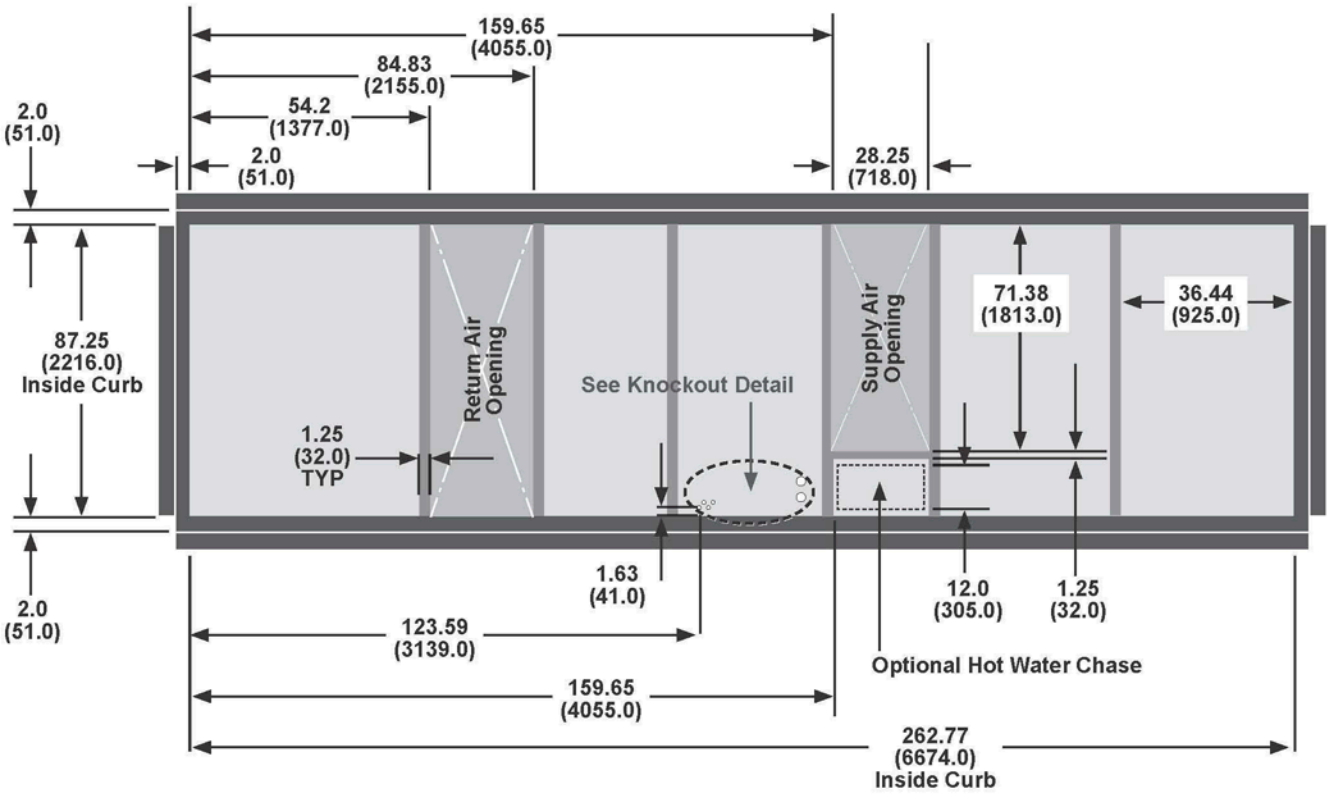
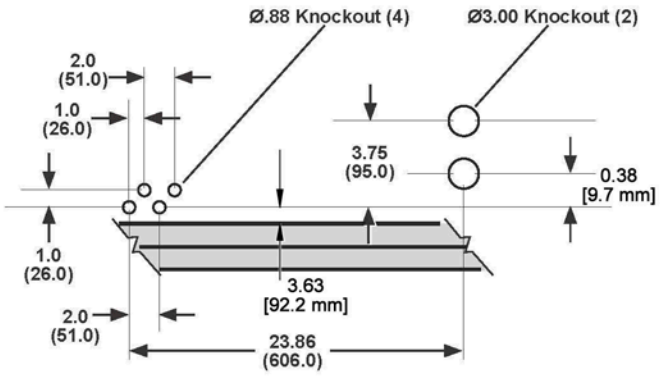


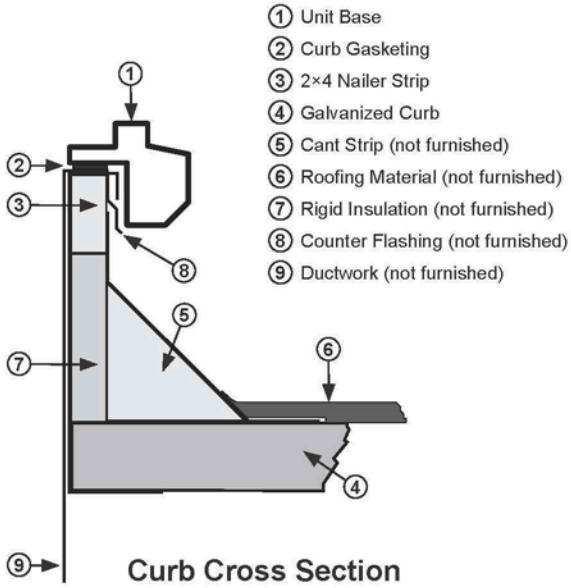
Figure 8: MPS 040–050 Roof Curb with Energy Recovery Wheel



Plan View



Knockout Detail



Curb Cross Section

Rigging and Handling

⚠ WARNING

Only trained and qualified personnel should be allowed to rig loads or operate load rated cranes and/or hoist assemblies. Do not use a forklift to lift or maneuver the unit. Failure to use a load rated crane or hoist assembly to lift or maneuver the unit can cause severe personal injury and property damage.

⚠ WARNING

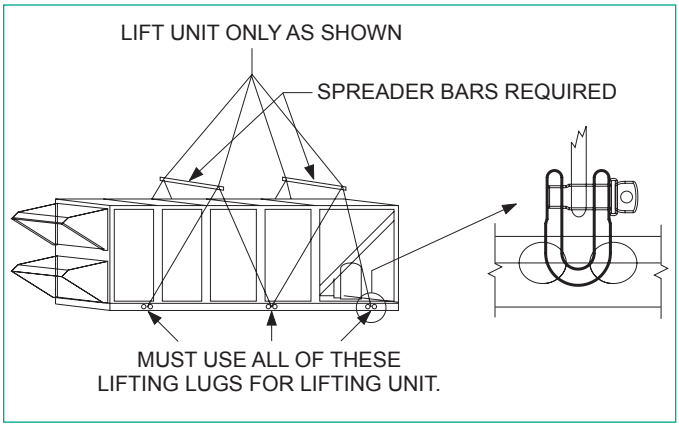
Use all lifting points. Improper lifting can cause property damage, severe pers al injury, or death.

⚠ CAUTION

Lifting points may not be symmetrical to the center of gravity of the unit. Ballast or unequal cable lengths may be required.

Rigging holes for shackles are integral on the unit base. **All six lifting points must be used for rigging the equipment. Use four independent lines, securing one end of a line to a unit base lifting point and the other end of the line to an associated spreader bar lifting point** (see Figure 10 and Figure 11). Figure 9 is an example of an instruction label shipped with each unit.

Figure 9: Rigging Label



Use spreader bars, 96" to 100" (2438 to 2540 mm) wide to prevent damage to the unit cabinet. Avoid twisting or uneven lifting of the unit. The cable length from the bracket to the hook should always be longer than the distance between the outer lifting points.

If the unit is stored at the construction site for an intermediate period, take these additional precautions:

1. Support the unit well along the length of the base rail.
2. Level the unit (no twists or uneven ground surface).
3. Provide proper drainage around the unit to prevent flooding of the equipment.
4. Provide adequate protection from vandalism, mechanical contact, etc.
5. Securely close the doors.
6. Cover the supply and return air openings.

Table 4 and Table 5 lists the weight distribution at each of the lifting points on the unit (refer to Figure 10 and Figure 11). Table 6 details lifting point locations. Table 7 through Table 12 lists the weights of unit curbs and other sections of the unit.

Table 2: Unit Base Weights

Unit (Tons)	Total Weight (lbs)
015	2655
017	2705
020	3610
026	3610
030	3610
035	3660
040	4685
050	4985

Table 3: Unit Curb Weights

Unit (tons)	Curb Height (inches)	Total Weight (lbs)
Standard Unit		
015–035	14	341
	24	504
040–050	14	461
	24	706
Unit with Energy Wheel		
015–035	14	458
	24	674
040–050	14	619
	24	908

Table 4: Weight Distribution Locations (see Figure 10)

Unit (tons)	Distance			
	L1	L2	L3	L4
040–050	42.2	66.6	58.3	60.9

Table 5: Weight Distribution Locations (see Figure 11)

Unit (tons)	Distance		
	L1	L2	L3
015–035	35.5	62.0	52.0
040–050	40.0	69.0	89.0

Table 6: Weight Distribution — Energy Wheel

Unit	Point							
	Percent of total							
	A	B	C	D	E	F	G	H
015–050 without Energy Wheel	11%	11%	20%	24%	16%	18%	N/A	N/A
015–035 with Energy Wheel	13%	12%	20%	21%	17%	17%	N/A	N/A
040–050 with Energy Wheel	12%	12%	13%	13%	12%	12%	13%	13%

Table 7: Heat Section Weights

Unit (tons)	Weights (lbs)			
	High Gas Heat	Low Gas Heat	Electric Heat	Hot Water Heat
015	200	100	120	195
017	200	100	120	195
020	200	100	120	195
026	270	135	270	291
030	270	135	270	291
035	270	135	270	291
040	350	175	350	307
050	350	175	350	307

Table 8: Curb Weights

Unit (tons)/ Curb Height (inches)	Weight (lbs)	
	without ERW	with ERW
015–035/14	341	458
015–035/24	501	674
040–050/14	481	619
040–050/24	708	908

Table 9: Energy Recovery Section Weights

Unit Size (tons)	Weight (lbs)
015–020	1200
026–035	1540
040–050	1000

Table 10: Additional Weights - Motors/Exhaust Fans (015–020)

HP	Additional Motor Weight (lbs)
1	0
1.5	9
2	9
3	32
5	43

Unit (tons)	Additional Exhaust Fan Weight (lbs)
15–20	150

Table 11: Additional Weights - Motors/Exhaust Fans (026–050)

HP	Additional Motor Weight (lbs)
7.5	0
10	25
15	125
20	175
25	225
30	275

Unit (tons)	Additional Exhaust Fan Weight (lbs)
26	150
30	150
35	150
40	200
50	200

Table 12: Additional Weights for 6-Row DX Coil and HGRH Coil

Unit Size (tons)	Weight (lbs)	
	6 Row DX	HGRH
15–20	118	70
26–35	164	82
40	187	92
50	231	92

Figure 10: Rigging the Unit (MPS 026– 035 Example)

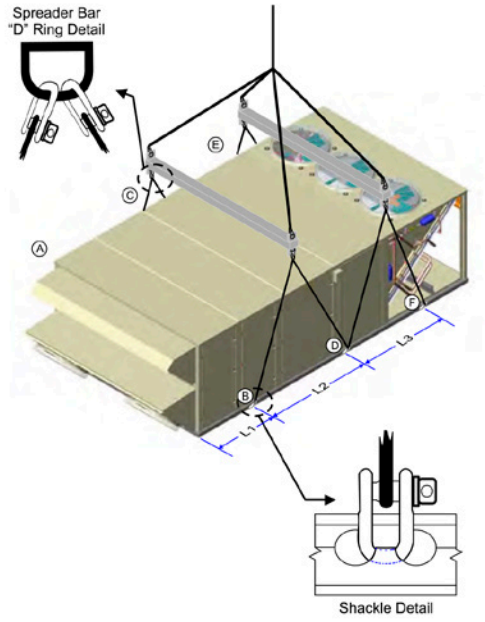
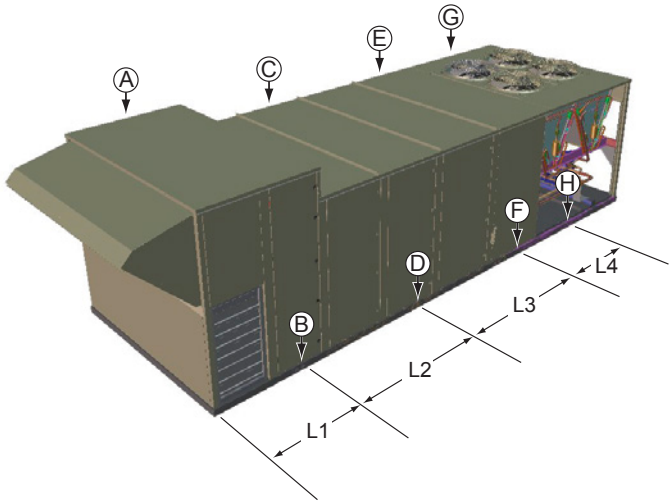


Figure 11: Rigging the Unit (MPS 040–050 Example)



Condensate Drain Pipe Connection

The unit is provided with a 1" male NPT condensate drain connection. For proper drainage, level the unit and drain pan side to side and install a P-trap.

Figure 12 shows the layout of the condensate drain connection. The distance from the drain pan outlet to the horizontal run of the P-trap should be a distance of twice the static pressure in the drain pan.

Example: If the static pressure as measured in the drain pan is 1.5", then the distance between the drain outlet and the horizontal run should be 3".

Draining condensate directly onto the roof may be acceptable; refer to local codes. Provide a small drip pad of stone, mortar, wood, or metal to protect the roof against possible damage.

If condensate is piped into the building drainage system, pitch the drain line away from the unit a minimum of 1/8" per foot. The drain line must penetrate the roof external to the unit. Refer to local codes for additional requirements. Sealed drain lines require venting to provide proper condensate flow.

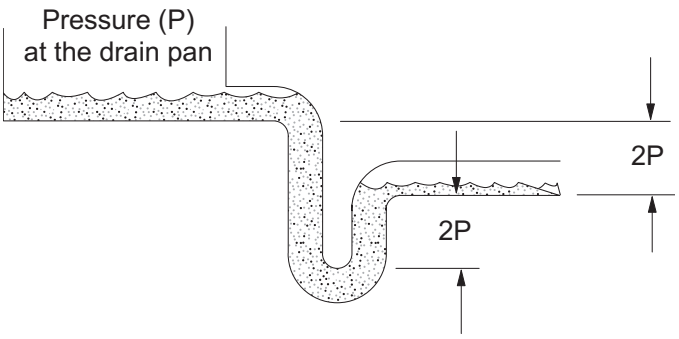
Where the cooling coils have intermediate condensate pans on the face of the evaporator coil, copper tubes near both ends of the coil supply drainage to the main drain pan. Verify the tubes are in place and open before putting the unit into operation.

Periodically clean to prevent microbial growth/algae buildup from plugging the drain and causing the drain pan to overflow. Clean drain pans to prevent the spread of disease. Cleaning should be performed by qualified personnel.

⚠ WARNING

Drain pans must be cleaned periodically. Material in uncleaned drain pans can cause disease. Cleaning should be performed by qualified personnel.

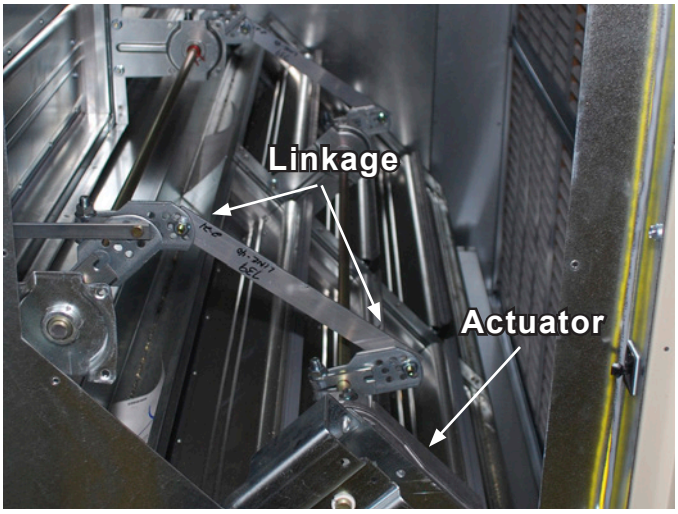
Figure 12: Condensate Drain Connection



Damper Assemblies

The optional damper assemblies described in this section are ordered with factory-installed actuators and linkages. The following sections describe the operation and linkage adjustment of the factory option.

Figure 13: Damper Assembly



Economizer Dampers

As the single actuator modulates, the outside air dampers open, the return air dampers close, and the exhaust air exits the unit through the gravity relief dampers.

The economizer comes with manually adjustable linkage (Figure 13). The damper is set so that the crankarm moves through a 90-degree angle to bring the economizer dampers from full open to full close. Mechanical stops are placed in the crankarm mounting bracket. Do not remove stops. Driving the crankarm past the stops results in damage to the linkage or damper.

Outdoor Air Dampers (0% to 30%)

These dampers are intended to remain at a fixed position during unit operation, providing fresh air quantities from 0 to 30% of the total system airflow, depending on the damper setting.

The damper position may be set at the unit controller keypad (refer to OM 920 for further detail). During unit operation, the damper is driven to the position set at the unit controller. During the off cycle, the damper is automatically closed.

Cabinet Weather Protection

This unit ships from the factory with fully gasketed access doors and cabinet caulking to provide weather resistant operation. After the unit is set in place, inspect all door gaskets for shipping damage and replace if necessary.

Protect the unit from overhead runoff from overhangs or other such structures.

⚠ CAUTION

Transportation, rigging, or maintenance can damage the unit's weather seal. Periodically inspect the unit for leakage. Standing moisture can promote microbial growth, disease, or damage to the equipment and building

Installing Ductwork

On vertical-supply/vertical-return units, if a Daikin roof curb is not used, the installing contractor should make an airtight connection by attaching field fabricated duct collars to the bottom surface of the unit's duct opening. Do not support the total weight of the duct work from the unit. See roof curb layouts in Figure 3 on page 7, Figure 4 on page 8 or Figure 5 on page 9.

Table 13: Rated Airflow

Unit Size (tons)	AHRI Rated Airflow
015	3750
017	4375
020	5000
026	6875
030	7500
035	8750
040	10000
050	12500

Use flexible connections between the unit and ductwork to avoid transmission of vibration from the unit to the structure.

To minimize losses and sound transmission, design duct work per ASHRAE and SMACNA recommendations.

Where return air ducts are not required, connect a sound absorbing T or L section to the unit return to reduce noise transmission to the occupied space.

Ductwork exposed to outdoor conditions must be built in accordance with ASHRAE and SMACNA recommendations and local building codes.

⚠ WARNING

Mold can cause personal injury. Materials such as gypsum wall board can promote mold growth when damp. Such materials must be protected from moisture that can enter units during maintenance or normal operation.

Installing Duct Static Pressure Sensor Taps

For all VAV units, duct static pressure taps must be field installed and connected to the static pressure sensor 1 (SPS1) in the unit. Sensor SPS1 is standard on VAV units and is located in the main control panel.

Carefully locate and install the duct static pressure sensing tap. Improperly locating or installing the sensing tap causes unsatisfactory operation of the entire variable air volume system. Below are pressure tap location and installation recommendations. The installation must comply with local code requirements.

1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor fitting. This facilitates connecting a manometer or pressure gauge if testing is required.
2. Use different colored tubing for the duct pressure (HI) and reference pressure (LO) taps, or tag the tubes. Daikin recommends 3/16" ID tubing.
3. Locate the duct pressure (HI) tap near the end of a long duct to ensure that all terminal box take-offs along the run have adequate static pressure.
4. Locate the duct tap in a nonturbulent flow area of the duct. Keep it several duct diameters away from take-off points, bends, neckdowns, attenuators, vanes, or other irregularities.
5. Use a static pressure tip (Dwyer A302 or equivalent) or the bare end of the plastic tubing for the duct tap. (If the duct is lined inside, use a static pressure tip device.)
6. Install the duct tap so that it senses only static pressure (not velocity pressure). If a bare tube end is used, it must be smooth, square (not cut at an angle) and perpendicular to the airstream (see Figure 15).
7. Locate the reference pressure (LO) tap near the duct pressure tap within the building. If the tap is not connected to the sensor, unsatisfactory operation will result.
8. Route the tubes through the curb and feed them into the unit through the knockout in the bottom of the control panel (see Figure 14). Connect the tubes to appropriate barbed fittings (on SPS1) in the control panel. (Fittings are sized to accept 3/16" ID tubing.)

Figure 14: Static Pressure Tubing Knockout Location

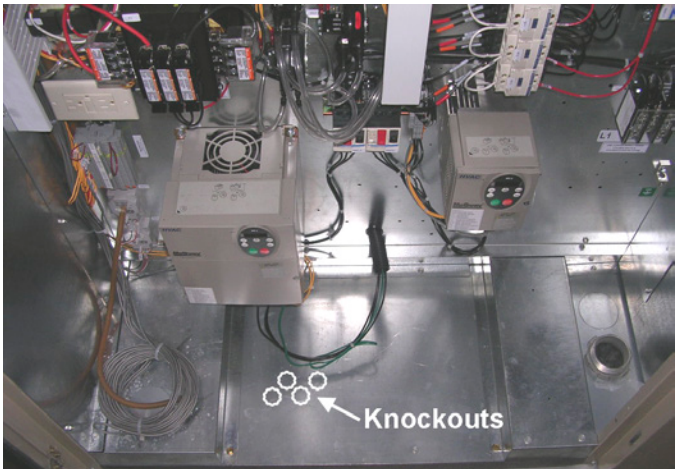
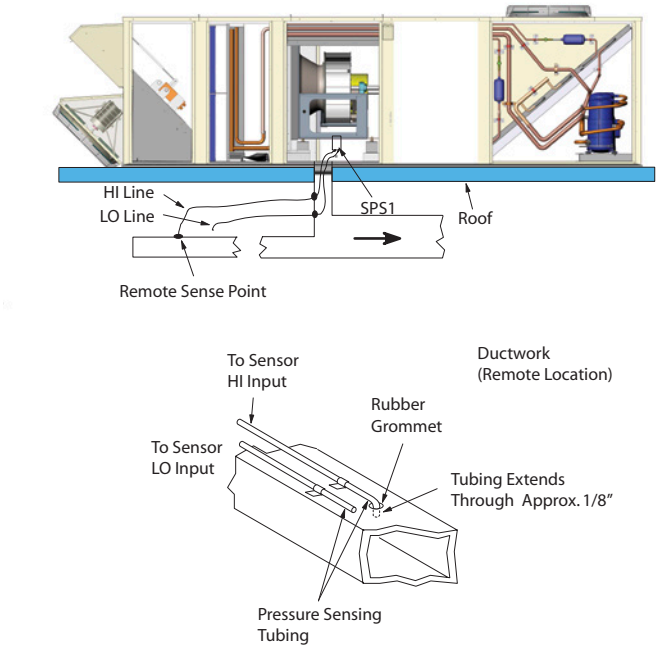


Figure 15: Duct Static Pressure Sensing Tubing Installation



Installing Building Static Pressure Sensor Taps

If a unit has building static pressure control capability, you must field install and connect static pressure taps to the static pressure sensor SPS2 in the unit. This sensor is located at the bottom of the main control panel next to SPS1.

Carefully locate and install the two static pressure sensing taps. Improper location or installation of the sensor taps causes unsatisfactory operation. Below are pressure tap location and installation recommendations for both building envelope and lab, or “space within a space” pressure control applications. The installation must comply with local code requirements.

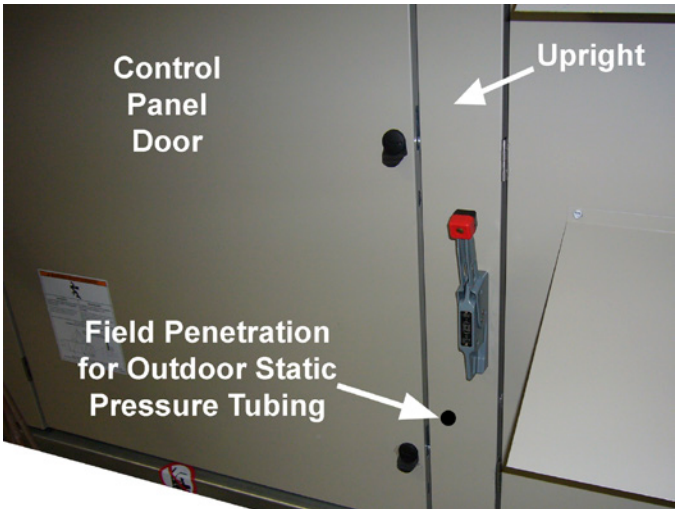
⚠ CAUTION

Fragile sensor fittings. If you must remove tubing from a pressure sensor fitting, use care. Do not use excessive force or wrench the tubing back and forth to remove or the fitting can break off and damage sensor.

Building Pressurization Applications

1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor fitting. This facilitates connecting a manometer or pressure gauge if testing is required.
2. Locate the building pressure (high) tap in the area that requires the closest control. Typically, this is a ground level floor that has doors to the outside.
3. Locate the building tap so it is not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
4. Route the building tap tube through the curb and feed it into the unit through the knockout in the bottom of the control panel (refer to Figure 14). Connect the 3/16" ID tube to the (high) fitting for sensor SPS2.
5. Locate the reference pressure (low) tap on the roof. Keep it away from the condenser fans, walls, or anything else that may cause air turbulence. Mount it high enough above the roof so it is not affected by snow. Not connecting the reference tap to the sensor results in unsatisfactory operation.
6. Use an outdoor static pressure tip (Dwyer A306 or equivalent) to minimize the adverse effects of wind. Place some type of screen over the sensor to keep out insects. Loosely packed cotton works well.
7. Route the outdoor tap tube out of the main control panel through a small field-cut opening in the upright. Seal the penetration to prevent water from entering. Connect the 3/16" ID tube to the (low) fitting for sensor SPS2.

Figure 16: Outdoor Static Pressure Tubing Installation



Lab Pressurization Applications

1. Install a “T” fitting with a leak-tight removable cap in each tube near the sensor fitting. This facilitates connecting a manometer or pressure gauge if testing is required.
2. Use different colored tubing for the controlled space pressure (high) and reference pressure (low) taps, or tag the tubes.
3. Regardless whether the controlled space is positive or negative with respect to its reference, locate the high pressure tap in the controlled space (the setpoint can be set between -0.2" and 0.2" wc).
4. Locate the reference pressure (low) tap in the area surrounding the controlled space. Not locating the reference tap to the sensor results in unsatisfactory operation.
5. Locate both taps so they are not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or doors between the high and low pressure areas.
6. Route the building tap tube between the curb and the supply duct and feed it into the unit through the knockout in the bottom of the control panel.
7. Connect the tube to the (high) fitting for sensor SPS2.

Field Power Wiring

Wiring must comply with all applicable codes and ordinances. The warranty is voided if wiring is not in accordance with these specifications.

According to the National Electrical Code, a disconnecting means shall be located within sight of and readily accessible from the air conditioning equipment. The unit can be ordered with an optional factory mounted disconnect switch. This switch is not fused. Power leads must be over-current protected at the point of distribution. The maximum rated overcurrent protection device (MROPD) value appears on the unit nameplate.

All Units

All units are provided with internal power wiring for single point power connection. The power block or an optional disconnect switch is located within the main control panel. Field power leads are brought into the unit through knockouts in the bottom of the main control panel (see Figure 17 and also Table 14). Refer to the unit nameplate to determine the number of power connections.

NOTE: To wire entry points, refer to certified drawings for dimensions.

⚠ WARNING

Hazardous voltage. Can cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

The preferred entrance for power cables is through the bottom knockouts provided on the unit. If a side entrance is the only option, a hole may be drilled in the stationary upright.

The minimum circuit ampacity (MCA) is shown on the unit nameplate. Refer to Table 14 for the recommended number of power wires.

Copper wire is required for all conductors. Size wires in accordance with the ampacity tables in Article 310 of the National Electrical Code. If long wires are required, it may be necessary to increase the wire size to prevent excessive voltage drop. Wires should be sized for a maximum of 3% voltage drop. Supply voltage must not vary by more than 10% of nameplate. Phase voltage imbalance must not exceed 2%. (Calculate the average voltage of the three legs. The leg with voltage deviating the farthest from the average value must not be more than 2% away.) Contact the local power company for correction of improper voltage or phase imbalance.

⚠ CAUTION

Provide proper line voltage and phase balance. Improper line voltage or excessive phase imbalance constitutes product abuse. It can cause severe damage to the unit's electrical components.

A ground lug is provided in the control panel. Size the grounding conductor in accordance with Table 250-95 of the National Electrical Code.

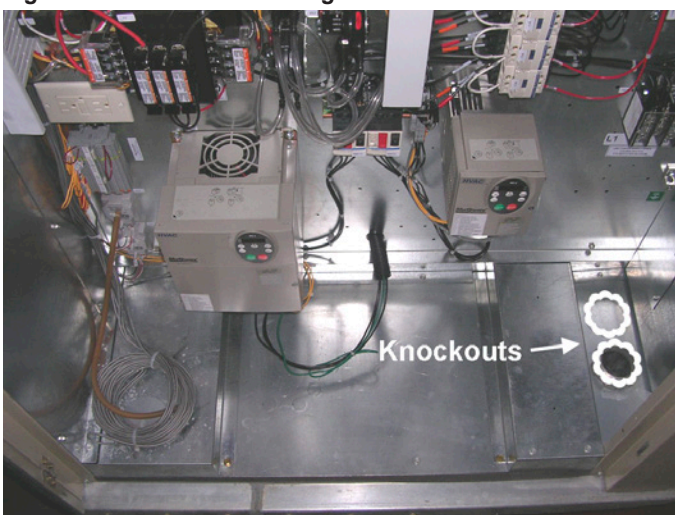
In compliance with the National Electrical Code, a 115 V factory mounted service receptacle outlet is provided. This outlet must be powered by a field connected 15 A, 115 V power supply. Leads are brought into the unit through a 7/8" knockout in the bottom of the main control panel.

Table 14: Recommended Field Power Wiring

Ampacity (MCA)	No. of Power Wires per Phase	Wire Gauge	Insulation Temperature Rating (°C)
20	1	14	75
25	1	12	75
35	1	10	75
50	1	8	75
65	1	6	75
85	1	4	75
100	1	3	75
115	1	2	75
130	1	1	75
150	1	1/0	75
175	1	2/0	75
200	1	3/0	75
230	1	4/0	75
255	1	250	75
300	2	1/0	75
350	2	2/0	75
400	2	3/0	75
460	2	4/0	75
510	2	250	75
600	3	3/0	75
690	3	4/0	75
765	3	250	75

Notes:
1. All wire sizes assume separate conduit for each set of parallel conductors.
2. All wire sizes based on NEC Table 310-16 for 75°C THW wire (copper). Canadian electrical code wire ampacities may vary.
3. All wire sizes assume no voltage drop for short power leads.

Figure 17: MPS Power Wiring Knockout Locations



Field Control Wiring

The Maverick rooftop units are available with the following field control connections:

- Space sensor.
- Space sensor with setpoint adjustment.
- Fan operation output.
- VAV box output.
- Remote alarm output.
- External discharge air temperature reset.
- Outdoor air damper minimum position adjustment.

Descriptions of these field connections are included in the MicroTech III Unit Controller manual (OM 920).

⚠ WARNING

Electrical shock hazard. Can cause severe injury or death. Connect only low voltage NEC Class II circuits to terminal block TB2.

Spring Isolated Fans

⚠ WARNING

Moving machinery hazard. Can cause severe injury ordeath. Before servicing equipment, disconnect power and lockoff. More than one disconnect may be required to de-energizeunit. Prior to operating the fans for the first time, refer to Check, Test, and Start Procedures on page 92.

Releasing Spring Mounts

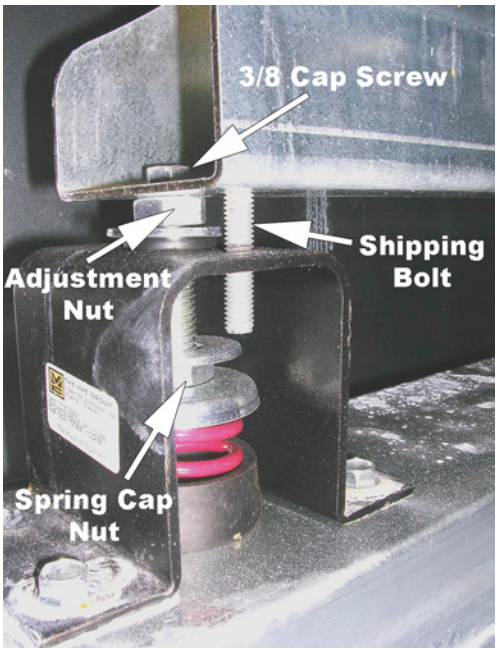
The spring-mounted supply fan is locked down with four shipping bolts for shipment. Remove each shipping bolt before operating the fans. Figure 18 shows a typical spring mount with a height adjustment nut and a shipping bolt.After removing the shipping bolts, rock the fan assembly by hand to check for freedom of movement.

Adjusting Spring Mounts

During operation all fans should ride level. Level the fan assembly by performing the following:

1. Loosen the 3/8" cap screw (do not remove).
2. Loosen the spring cap nut.
3. Rotate the 5/8" adjustment nut counter-clockwise to raise the fan assembly, or clockwise to lower the fan assembly.
4. Tighten the 3/8" cap screw.
5. Tighten the spring cap nut.

Figure 18: Spring Mounts



Daikin Applied Tubular Heater Series Package Heater Module

ANSI Z83.8-2013/CSA 2.6-2013

⚠ DANGER

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury, death or property damage.
- Be sure to read and understand the installation, operation and service instructions in this manual.
- Improper installation, adjustment alteration, service or maintenance can cause serious injury, death or property damages.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS
  - Do not try to light any appliance.
  - Do not touch any electrical switch; do not use any phone in your building.
  - Leave the building immediately.
  - Immediately call you gas supplier. Follow the gas supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

DAT heater series modules are a recognized furnace component is design certified by intertek testing services (ETL) for outdoor installation and installation downstream from refrigeration systems in cabinet applications.

This furnace must be installed in the designated non-combustible heat chamber of the cabinet. If it is removed, it is only to be replaced with an approved Original Manufacture Equipment Supplier furnace(s), installed and operated as specified by the approved Original Manufacture Equipment Supplier. It is not designed to have any portion of the heat exchanger outside the cabinet in which the furnace module is housed.

The Rating Plate/Name Plate has been permanently attached to the furnace assembly. It contains information including gas type, maximum and minimum input rating, manifold pressure, maximum and minimum inlet gas pressure, maximum and minimum airflow requirements, output capacity and electrical rating for the furnace. The plate also includes model number, serial number and scan code. This plate is to always remain attached to the furnace.

This furnace must be applied in accordance with the requirements of its listing.

Hooded and screened openings for combustion air have been provided in the furnace(s) access door. The air opening provides unrestricted combustion air to the burners and sized such that a minimum free area is maintained. The minimum free area is defined as 1 in2 (625mm2) per 4000 BTUH (2.345 kW).

The access door provides direct access to the furnace vestibule where the burners, combustion inducer fan, ignition controls and ignition safeties are housed.

The vent discharge is sized such that it is equal to or larger than the discharge area of the combustion exhaust inducer fan.

A non-adjustable High Limit Switch will shut off the gas supply to the main burners should the outlet air reach a temperature exceed 250°F (121°C).

The cabinet supply air flow delivery package has been designed to provide sufficiently well distributed air flow across the heat exchanger to limit temperature rise as follows:

- Aluminized Steel: 1030°F (575°C)
- 409 Stainless Steel: 1080°F (600°C)

Clearance from combustibles to be no less than as listed below:

- Sides and back . . . . . 6 in. (152 mm)
- Bottom . . . . . 2 in. (51 mm)
- Top . . . . . 6 in. (152 mm)
- Front. . . . . 36 in. (914 mm)
- Vent pipe to any combustible surface . . . . 6 in. (152 mm)

Do not use this package heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and any gas control which has been under water.

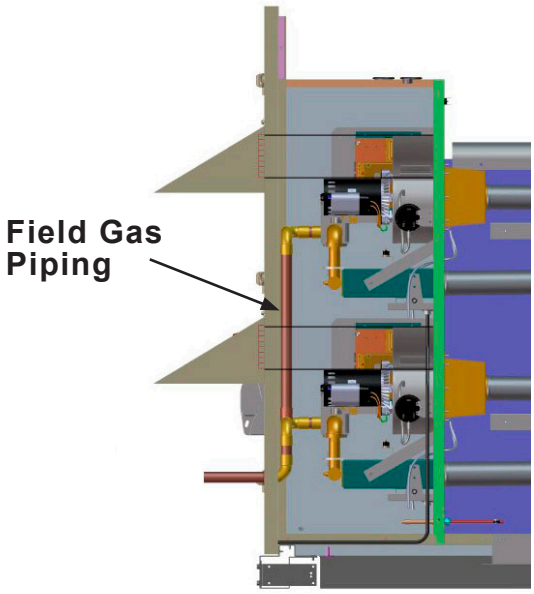
Gas Furnace Design

If the 8th digit in the model number is a “G”, the rooftop unit was furnished with a factory installed furnace (Example, MPS035FG). The Maverick commercial rooftop units are available with either the low heat input or the high heat input furnace (see capacities in Table 15). This packaged gas heat rooftop unit is designed for outdoor non-residential installations only.

The gas heat furnace design consists of a tubular heat exchanger, in-shot burner manifold with gas valve, induced combustion blower, gas heat DDC control module and all operational safeties. The tubular heat exchanger can come with the standard aluminized steel construction or the optional stainless steel construction. The safety switches include a high-limit temperature switch, an auxiliary high-limit switch, a combustion blower proof of airflow, and the flame roll-out switch (see Figure 20).

The high limit switch is an automatic reset switch and it opens up at 160°F to shut the furnace down and closes at 130°F. The auxiliary limit switch is a manual reset and opens up at 180°F to shut the furnace down.

Figure 19: Gas Heat Section



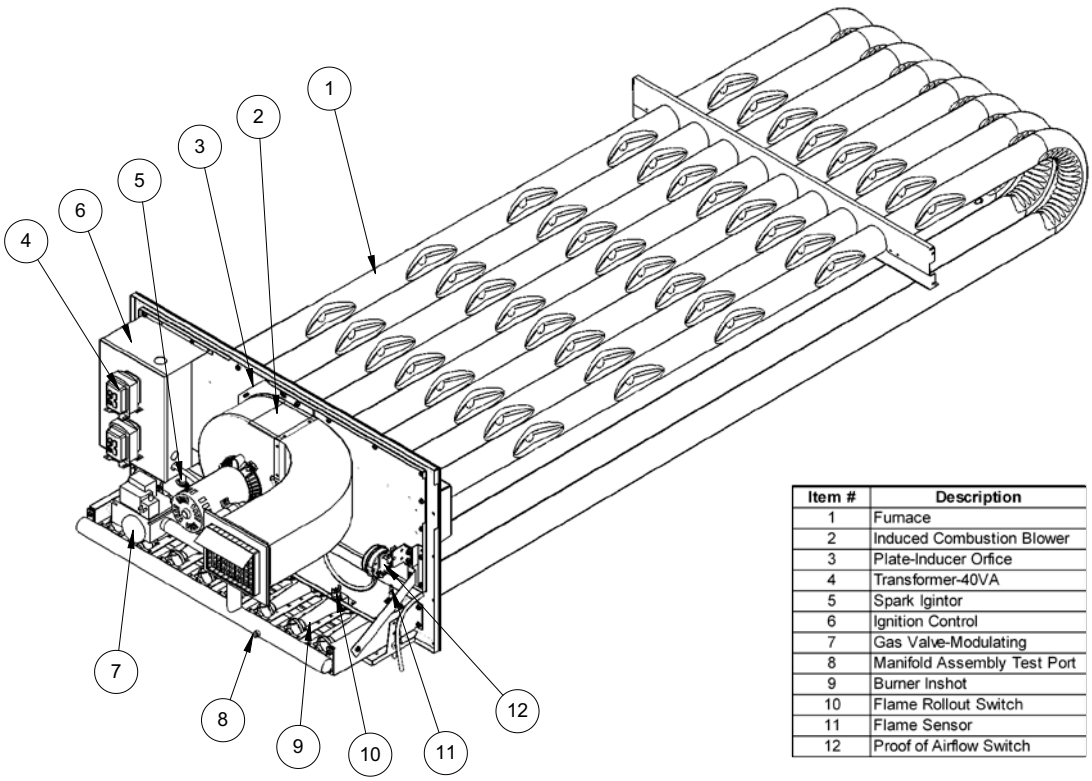
Gas Heating Capacity Data

Table 15: MPS 015F – 050F Gas Heating Capacities

Data	Unit Size					
	015–020		026–035		040–050	
	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat
Heating Input (MBh)	240	480	300	600	400	800
Heating Output (MBh)	192	384	240	480	320	640
Steady State Efficiency	80%	80%	80%	80%	80%	80%
Number of Stages	2	4	2	4	2	4
Turndown[1]	4:1	8:1	4:1	8:1	4:1	8:1
Minimum Airflow	2960	5920	3700	7400	4900	9800
Maximum Temperature Rise	60°F	100°F	60°F	85°F	60°F	85°F
Gas Main Pressure						
Natural Gas (in. wc)	7-14	7-14	7-14	7-14	7-14	7-14
Liquid Propane (in. wc)	12-14	12-14	12-14	12-14	12-14	12-14
Manifold Pressure						
Natural Gas (per gas valve)						
Stage 1 (in. wc)	1.2	1.2	1.2	1.2	1.2	1.2
Stage 2 (in. wc)	3.2	3.2	3.2	3.2	3.2	3.2
Low fire[2]	0.4	0.4	0.4	0.4	0.4	0.4
Propane						
Stage 1 (in. wc)	2.3	2.3	2.3	2.3	2.3	2.3
Stage 2 (in. wc)	10.0	10.0	10.0	10.0	10.0	10.0
Low fire[2]	N/A					

Note:
1 Modulating gas heat only.
2 Modulating gas heat not available with propane.

Figure 20: Staged Furnace Assembly



Item #	Description
1	Furnace
2	Induced Combustion Blower
3	Plate-Inducer Orfice
4	Transformer-40VA
5	Spark Igintor
6	Ignition Control
7	Gas Valve-Modulating
8	Manifold Assembly Test Port
9	Burner Inshot
10	Flame Rollout Switch
11	Flame Sensor
12	Proof of Airflow Switch

Warranty Exclusion

Warranty is void if the furnace is operated in the presence of chlorinated vapors, if the airflow through the furnace is not in accordance with rating plate, or if the wiring or controls have been modified or tampered with.

⚠ WARNING

Hot surface hazard. Can cause severe equipment damage, personal injury, or death. Allow burner assembly to cool before servicing equipment.

⚠ WARNING

Units equipped with gas heating must not be operated in an atmosphere contaminated with chemicals which will corrode the unit such as halogenated hydrocarbons, chlorine, cleaning solvents, refrigerants, swimming pool exhaust, etc. Exposure to these compounds may cause severe damage to the gas furnace and result in improper or dangerous operation. Operation of the gas furnace in such a contaminated atmosphere constitutes product abuse and will void all warranty coverage by the manufacturer. Questions regarding specific contaminants should be referred to your local gas utility.

Ventilation & Flue Pipe Requirements

The Daikin rooftop unit is equipped with an outdoor air hood to supply adequate combustion air. The unit also has a flue outlet assembly and requires no additional chimney, flue pipe, Breidert cap, draft inducer, etc.

Factory Checkout

This complete furnace was fired and tested at the factory. The unit was fired through several complete sequences of start-up through shutoff to check operation. A check was made of the air switch, gas pressure switch, high limit operation.

This checkout normally eliminates on-the-job start-up problems; however, the equipment is subject to variable job conditions and shipping shocks can change adjustments, cause damage, and loosen connections and fasteners. Therefore, it is necessary to go through the complete start-up procedure even though the unit may appear to be operating properly.

Installation

⚠ IMPORTANT

This furnace must be installed by an experienced professional installation company that employs fully trained and experienced technicians. Install the furnace in accordance with the manufacturer's instructions and local codes. In the absence of local codes, follow the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the CSA B149.1, Natural Gas and Propane Installation Code.

⚠ WARNING

Sharp edges hazard. Can cause personal injury or death. Sheet metal parts, self-tapping screws, clips, and similar itemsinherently have sharp edges, and it is necessary that theinstaller exercise caution when handling these items.

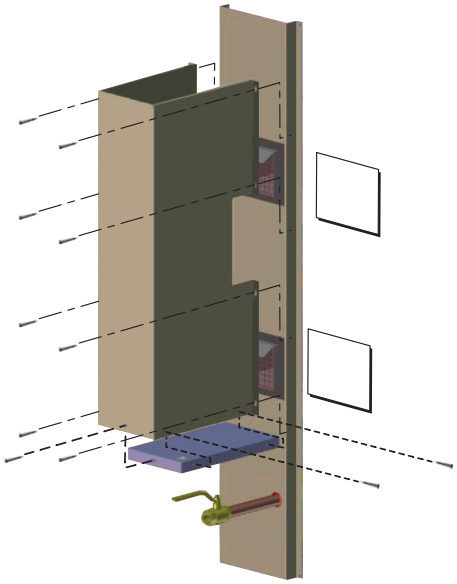
Flue Box

The flue box (Figure 21) is not installed at the factory because it would increase the width of the unit beyond the allowable shipping width.

The flue box must be installed over the combustion exhaust openings. All holes are prepunched, the fasteners are furnished and everything is shipped inside the fan section.

1. Remove and discard the shipping covers.
2. Position the flue box over the exhaust openings.
3. Line assembly holes up.
4. Install screws to fasten the flue box to the side of the unit.

Figure 21: Flue Box Installation



Outdoor Air (OA) Hood

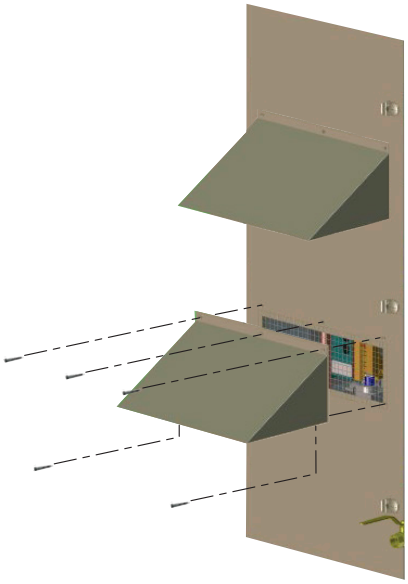
The OA hood (Figure 22) is not installed at the factory becauseit would increase the width of the unit beyond the allowableshipping width. The hood is shipped in a box in the fansection.

The OA hoods must be installed over the outdoor air openings.

1. Remove and discard the shipping covers.
2. Position the hood over the OA openings.
3. Line assembly holes up.
4. Install screws to fasten the OA hood.

The OA hoods must be installed before the furnace is operated.

Figure 22: Outdoor Air (OA) Hood Installation



Electrical

The Daikin burner receives its electrical power from the main unit control panel. No additional power wiring must be routed to the burner. The sequencing of the burner is also controlled through this panel and therefore is factory wired. No additional wiring will be required.

⚠ DANGER

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. Before operating, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

What to do if you smell gas:

- Do not try to light any appliance.
- Do not touch any electric switch, do not use any phone in your building.
- Immediately call your gas supplier from a phone in a neighboring building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

Gas Pressure Requirements

The pressure furnished to the main gas valve must not exceed 13.9" wc. When the supply pressure is above 13.9" wc, a high pressure regulator must precede the appliance gas pressure regulator. The inlet gas pressure must not exceed the maximum pressure rating of the high pressure regulator, and the outlet pressure must furnish gas to the appliance pressure regulator within the pressure range mentioned above.

Gas Piping

Gas piping must be sized to provide the minimum required pressure at the burner when the burner is operating at maximum input. Consult your local utility on any questions on gas pressure available, allowing piping pressure drops, and local piping requirements.

Install all piping in accordance with the National Fuel Gas Code (ANSI Z223.1), (NFPA 54-1999) and any applicable local codes.

The weight of the field-supplied gas pipe must be supported by field-installed brackets or hangers.

The proper size piping must be run from the meter to the gas burner without reductions. Undersized piping will result in inadequate pressure at the burner. The pressure will be at its lowest when it is needed the most, at times of maximum demand. Therefore, it can cause intermittent hard-to-find problems because the problem may have left before the service technician has arrived. Avoid the use of bushings wherever possible.

Remove all burrs and obstructions from pipe. Do not bend pipe; use elbows or other pipe fittings to properly locate pipe.

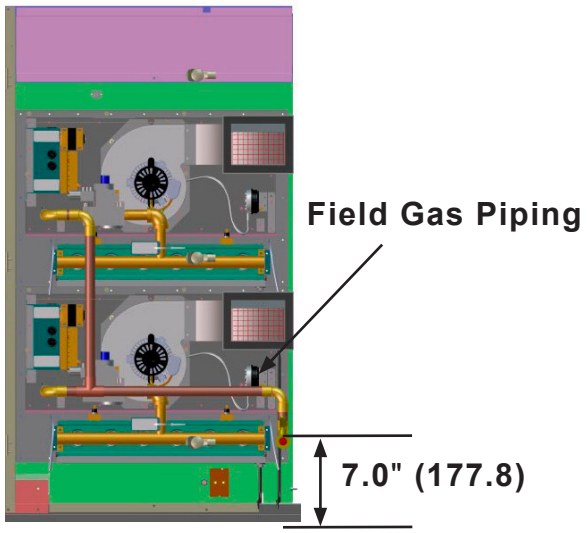
A drip leg and a manual shut-off must be installed in the vertical line before each burner such that it will not freeze. Install unions so gas train components can be removed for service. All pipe threads must have a pipe dope which is resistant to the action of LP gas. After installation, pressurize the piping as required and test all joints for tightness with a rich soap solution. Any bubbling is considered a leak and must be eliminated. Do not use a match or flame to locate leaks.

Gas Piping Routing Into Unit

On-The-Roof Piping

1. Remove knockout on upright (refer to Figure 23).
2. Route gas supply pipe through hole. Carefully plan pipe route and fitting locations to avoid interference with swinging of doors, etc.

Figure 23: Piping Schematic



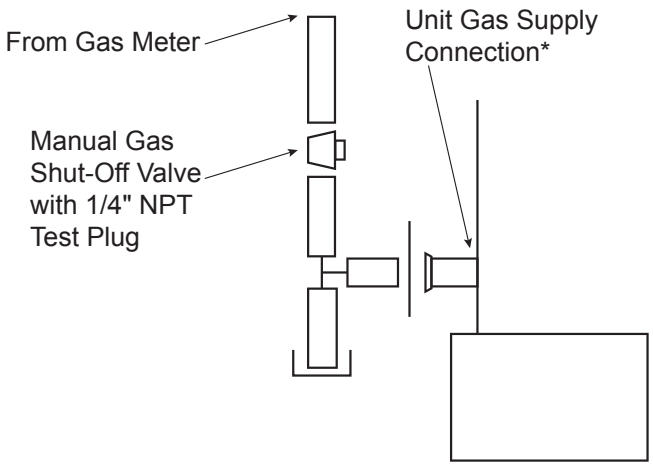
Field Gas Heat Connections

The appliance must be isolated from the gas supply system by closing off the manual shut off valve during any pressure testing less than 0.5 psi (3.5 kPa) of the gas supply piping system.

The appliance and its individual shut-off valve must be disconnected from the gas supply system during any pressure testing greater than or equal to 0.5 psi (3.5 kPa).

Regulator to be sized for the maximum total Btu input required for the heater(s).

Figure 24: Field Gas Heat Connections



* Factory-supplied grommet must be utilized

Altitude Conversion

For elevations up to 2000 feet, rating plate input ratings apply. For high altitudes (elevations over 2000 ft) contact Daikin Applied Parts. See Table 16 for part numbers. Or contact local gas supplier to confirm gas heating value has been devalued for applicable elevations.

Table 16: Furnace Identification for Altitude

Elevation (ft.)	Part Number
Natural Gas Fired Furnace with 50 MBH Burners	
2000–2999	910166410
3000–3999	910166411
4000–4999	910166412
5000–5999	910166413
6000–6999	910166415
Natural Gas Fired Furnace with 45 MBH Burners	
2000–2999	910166412
3000–3999	910166416
4000–4999	910166417
5000–5999	910166415
6000–6999	910166418
LPG Gas Fired Furnace with 50 MBH Burners	
2000–2999	910166419
3000–3999	910166420
4000–4999	910166421
5000–5999	910166422
6000–6999	910166424
LPG Gas Fired Furnace with 45 MBH Burners	
2000–2999	910166425
3000–3999	910166422
4000–4999	910166427
5000–5999	910166428
6000–6999	910166429

Gas Pipe Manifold Pressure Adjustment for Natural Gas Fuel

For Two Stage Furnace

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) and confirm pressure is at 7.0" wc. Adjust upstream pressure reducing gas regulator as required to obtain 7.0" wc gas pressure.
2. The gas pipe manifold pressure for high fire (stage #2) should be set at 3.2" wc. Adjust the High Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.
3. The gas pipe manifold pressure for low fire (stage #1) should be set at 0.8" wc. Adjust the Low Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

For Modulating Furnace:

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) and confirm pressure is at 7.0" wc. Adjust upstream pressure reducing gas regulator as required to obtain 7.0" wc gas pressure.
2. The gas pipe manifold pressure for high fire should be set at 3.2" wc. Adjust the High Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.
3. The gas pipe manifold pressure for low fire (stage #1) should be set at 0.25" wc.

   Adjust the Low Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required until pressure at the Honeywell VR8305Q Gas Safety Control Valve Outlet Pressure Tap reads 0.25" wc. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

   Adjust the Maxitrol M520B Modulating Valve (Figure 26) Low Flow Adjustment screw until the gas pipe manifold pressure reads 0.25" w.c.

Figure 25: Honeywell VR8305Q Gas Safety Control Valve

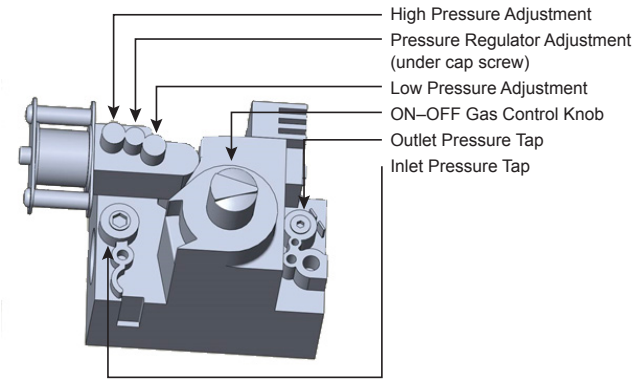
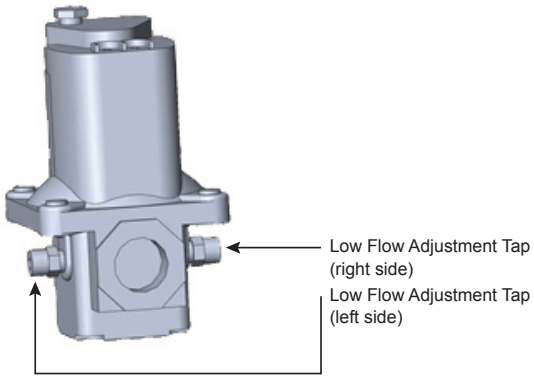


Figure 26: Maxitrol M520B Modulating Valve



Gas Pipe Manifold Pressure Adjustment for Propane Gas Fuel:

For Two Stage Furnace:

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) and confirm pressure is at 11.0" wc. Adjust upstream pressure reducing gas regulator as required to obtain 11.0" wc gas pressure.
2. The gas pipe manifold pressure for high fire (stage #2) should be set at 8.2" wc. Adjust the High Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.
3. The gas pipe manifold pressure for low fire (stage #1) should be set at 2.05" wc. Adjust the Low Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

For Modulating Furnace:

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) and confirm pressure is at 11.0" wc. Adjust upstream pressure reducing gas regulator as required to obtain 11.0" wc gas pressure.
2. The gas pipe manifold pressure for high fire should be set at 8.2" wc. Adjust the High Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.
3. The gas pipe manifold pressure for low fire (stage #1) should be set at 0.51" wc.

   Adjust the Low Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 25) as required until pressure at the Honeywell VR8305Q Gas Safety Control Valve Outlet Pressure Tap reads 0.51" wc. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

   Adjust the Maxitrol M520B Modulating Valve (Figure 26) Low Flow Adjustment screw until the gas pipe manifold pressure reads 0.51" w.c.

Figure 27: Capacity of Pipe Natural Gas (CFH)

With Pressure Drop of 0.3" W.C. & Specific Gravity of 0.60									
Pipe Length (ft)	Pipe Size-inches (Ips)								
	½	¾	1	1¼	1½	2	2½	3	4
10	132	278	520	1050	1600	2050	4800	8500	17500
20	92	190	350	730	1100	2100	3300	5900	12000
30	73	152	285	590	890	1650	2700	4700	9700
40	63	130	245	500	760	1450	2300	4100	8300
50	56	115	215	440	670	1270	2000	3600	7400
60	50	105	195	400	610	1150	1850	3250	6800
70	46	96	180	370	560	1050	1700	3000	6200
80	53	90	170	350	530	990	1600	2800	5800
90	40	84	160	320	490	930	1500	2600	5400
100	38	79	150	305	460	870	1400	2500	5100
125	34	72	130	275	410	780	1250	2200	4500
150	31	64	120	250	380	710	1130	2000	4100
175	28	59	110	225	350	650	1050	1850	3800
200	26	55	100	210	320	610	980	1700	3500

NOTE: Use multiplier below for other gravities and pressure drops.

Table 17: Specific Gravity Other Than 0.60

Specific Gravity	Multiplier
0.50	1.100
0.60	1.000
0.70	0.936
0.80	0.867
0.90	0.816
1.00	0.775
Propane-Air	
1.10	0.740
Propane	
1.55	0.622
Butane	
2.00	0.547

Table 18: Pressure Drop Other Than 0.3"

Pressure Drop	Multiplier	Pressure	Multiplier
0.1	0.577	1.0	1.83
0.2	0.815	2.0	2.58
0.3	1.000	3.0	3.16
0.4	1.16	4.0	3.65
0.6	1.42	6.0	4.47
0.8	1.64	8.0	5.15

Sequence of Operation (Staged Control)

Low Heat Option (2 Stage Control)

The following details the sequence of operation for the low heat option.

1. Unit DDC control calls for heat.
2. Furnace DDC control module receives a call for heat.
3. High limit switch is checked for safe condition.
4. Proof of airflow switch is check for combustion airflow.
5. 60 second prepurge cycle starts.
6. Spark ignitor is activated for 3 seconds.
7. Gas valve receives a command for stage 1 of heat.
8. Burner is ignited.
9. Unit DDC controller calls for stage 2 of heat.
10. Furnace DDC controller receives a stage 2 heat command.
11. Gas valve receives a command for stage 2 of heat.

High Heat Option (4 Stage Control)

For a unit with the optional high heat the above sequence is followed for the first two stages.

For the remaining 2 stages the above procedure is repeated on the second furnace module.

Sequence of Operation (Modulating Burner)

Low Heat Option with Modulation

The following details the sequence of operation for the low heat option.

1. Unit DDC controller calls for heat.
2. Furnace DDC control module receives a call for heat.
3. Furnace safety switches and DDC control are checked for safe conditions.
4. 45 second prepurge cycle starts. Proof of airflow switch is checked for combustion airflows.
5. Spark ignitor is activated.
6. Gas valve receives a signal to open fully.
7. Burner is ignited and runs for 20 seconds in high fire.

NOTE: If call for heat is interrupted during this timing, the furnace will be locked in for the 20 seconds cycle.

8. Gas valve and induction blower motor receives a signal to modulate burner output to match the unit discharge air temperature setting.

High Heat Option with Modulation

The following details the sequence of operation for the high heat option. This option includes dual burners with one being modulating and the other being 2 stage control.

1. Unit DDC controller calls for heat.
2. Top Furnace DDC control module receives a call for heat.
3. High limit switch is checked for safe condition.
4. Proof of airflow switch is checked for combustion airflow.
5. 45 second prepurge cycle starts.
6. Spark ignitor is activated.
7. Gas valve receives a signal to open fully.
8. Burner is ignited and runs for 30 seconds in high fire
9. Modulating burner gas valve and induction blower motor receives a signal to modulate burner output to match the unit discharge air temperature setting.
10. If modulating burner is unable to meet discharge temperature set point, furnace DDC control calls for third stage of heating. The top furnace is reduced to low (50%) fire. The bottom furnace is sequenced on per stage furnaces sequence of operation (steps 2 - 8).
11. Staged burner gas valve receives a signal to open to 50%.
12. Modulating burner gas valve and induction blower motor receives a signal to modulate burner output to match the unit discharge air temperature setting.
13. If stage 3 and modulating furnace is unable to meet discharge temperature setpoint, furnace DDC controller calls for stage 4 heat. The bottom furnace will stage up to high fire and the modulating furnace will reduce to 50% operation.
14. Staged burner gas valve receives a signal to open fully.
15. Modulating furnace's gas valve and induction blower motor receives a signal to modulate burner output to match the unit discharge air temperature setting.

Start-Up Procedures

Start-up and service of this equipment must be performed by trained and experienced technicians. It is highly recommended that the initial start-up and future service be performed by Daikin trained technicians who are familiar with working on live equipment. A representative of the owner or the operator of the equipment should be present during start-up to receive instructions in the operation, care and adjustment of the unit.

⚠ WARNING

Overheating or failure of the gas supply to shut off can cause equipment damage, severe personal injury or death. Turn off the manual gas valve to the appliance before shutting off the electrical supply.

⚠ DANGER

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. Before operating, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

What to do if you smell gas:

- Do not try to light any appliance.
- Do not touch any electric switch, do not use any phone in your building.
- Immediately call your gas supplier from a phone in a neighboring building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

Start-Up Responsibility

The start-up organization is responsible for determining that the furnace, as installed and as applied, will operate within the limits specified on the furnace rating plate.

1. The furnace must not operate at an airflow below the specified Minimum Airflow CFM (refer to Table 15 on page 23). On variable air volume systems it must be determined that the furnace will not be operated if or when system cfm is reduced below the specified minimum airflow cfm.
2. It must be established that the gas supply is within the proper pressure range (refer to Table 15 on page 23).

Operating Procedures

Before Start-Up

1. Notify inspectors or representatives who may be required to be present during start-up of gas fuel equipment. These could include the gas utility company, city gas inspectors, heating inspectors, etc.
2. Review the equipment and service literature and become familiar with the location and purpose of the furnace controls. Determine where the gas and power can be turned off at the unit and before the unit.
3. Determine that power is connected to the unit and available.
4. Determine that the gas piping, meter, and service regulator have been installed, tested, and meet the equipment requirements.
5. Determine that proper instruments will be available for the start-up. A proper start-up requires the following: voltmeter, manometer or gauges with ranges for both manifold pressure and inlet gas pressure.

Start-Up Preliminary

Close gas main.

1. Check the burner fan wheel for binding, rubbing, or loose setscrews.
2. Check power.
3. Purge the gas lines.
4. Leak check. Using a rich soap-water mixture and a brush, check the gas lines for leaks. Correct all leaks before starting furnace.

Start-Up

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance.
3. This appliance is equipped with an ignition device which automatically lights the burner. Do NOT try to light the pilot by hand.
4. Open the control access panel.
5. Turn the gas control clockwise to “OFF”.
6. Wait five (5) minutes to clear out any gas. Then, smell for gas, including near the floor. If you smell gas, STOP! Follow step “B” in the DANGER label on this page. If you don't smell gas, proceed to the next step.
7. Turn the gas control counter-clockwise to “ON”.
8. Close the control access panel.
9. Turn on all electric power to the appliance.
10. Set thermostat to desired setting.
11. If the furnace will not operate, refer to Turning off Gas to the Unit, and call your service technician or gas supplier.

Turning off Gas to the Unit

1. Set the thermostat to the lowest setting.
2. Turn off all electrical power to the appliance if service is to be performed.
3. Open the control access panel.
4. Turn the gas control knob clockwise to “OFF”. Do not force.
5. Close the control access panel.

Service

The furnace DDC controller has diagnostic information for troubleshooting the furnace operation. The ignition control module has a LED light that will flash when an abnormal condition occurs. See Table 19 and Table 21 for an explanation of the diagnostic information.

Maintenance

Planned maintenance is the best way to avoid unnecessary expense and inconvenience. Have this system inspected at regular intervals by a trained and experienced service technician. The following service intervals are typical for average situations but will have to be adjusted to suit your particular circumstances.

Fuel pressure settings and control settings should be made only by persons thoroughly experienced with the burner and control system, and must not be tampered with by persons without such experience.

Always replace covers on burner controls and boxes as the electrical contacts are sensitive to dust and dirt. Perform maintenance of controls, gas valves, and other components in accordance with instructions contained in the manufacturer's bulletins.

Monthly

Check air filters and replace if dirty.

Twice Yearly

Burner Air - Check burner fan wheel for dirt buildup and lint. Check combustion air intake louver and flue box for dirt buildup and accumulation of windborne debris.

Cleaning - Inspect flue tubes and combustion chamber, cleaning as required. Keep burner vestibule clean. Dirt and debris can result in burner air blockages.

Yearly

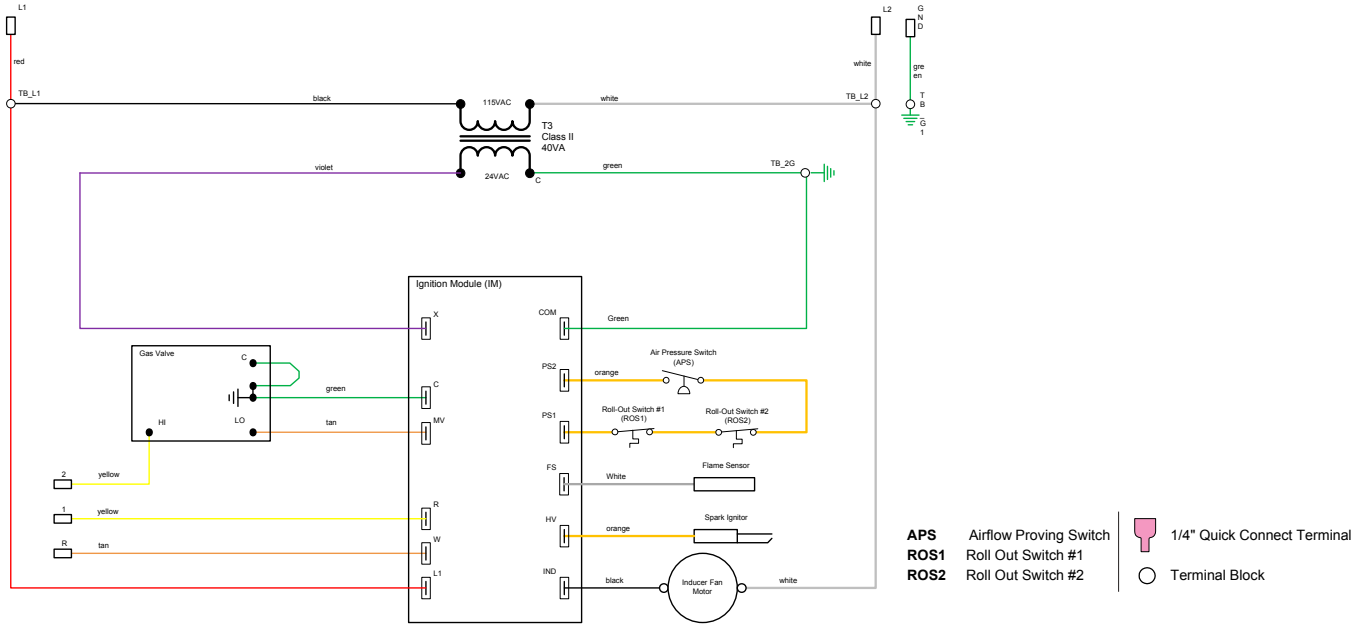
Heater and Ventilating systems - Inspected by a qualified service agency once a year.

Gas Train - Check all valves, piping and connections for leakage. Inspect and clean flame rod, ignition electrode, and burner manifold.

Condensate Pan/Drain/P-Trap - Check pan, drain, and p-trap.

Ignition Control Module for Staged Gas Furnace

Figure 28: Typical Staged Gas Furnace Electrical Schematic with Sensor



Ignition Control Module LED Diagnostics

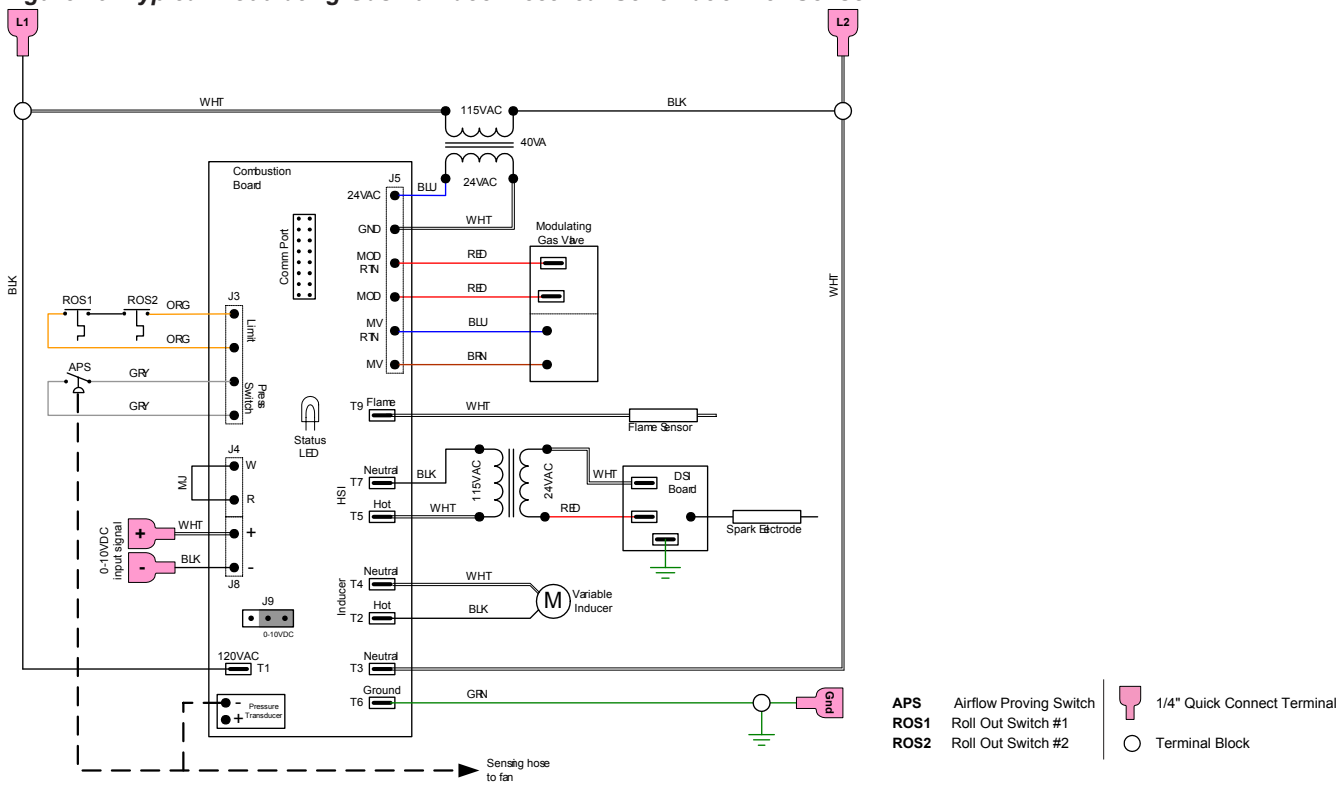
The LED indicators (Table 19) can be used to diagnose faults associated with the staged gas furnace.

Table 19: Staged Ignition Control Troubleshooting Guide (UTEC 1016 Ignition Board)

LED Indicator	System Status	Fault Description	Possible Causes and Corrective Action
Steady ON	System Normal	N/A	**Power applied, control OK**
LED OFF	Lockout	LED is OFF	**No power or control hardware fault** 1. Check 120V is being supplied to heater transformer. 2. Check that 24 VAC is being supplied by transformer. Replace transformer if not being supplied 24 VAC.
1 Flashes	Lockout	Combustion air pressure switch contact is open with inducer fan running.	**Combustion fan motor energized, pressure switch open** 1. Check air pressure switch hose and hose connection between switch and fan. 2. Check reset switch is not tripped for rollout switch(s). 3. Check high limit switch is not open. 4. Replace pressure switch if contact does not close when fan is running.
2 Flashes	Lockout	Combustion air pressure switch contact is closed when inducer fan is not running.	**Combustion fan motor OFF, pressure switch closed** 1. Check wiring between PS1 and PS2 on ignition control board for correct connection and proper wiring. 2. Check pressure switch functions correctly with and without pressure. 3. Replace pressure switch if fails to function correctly.
3 Flashes	Lockout	Ignition locked out from too many ignition attempts	**Ignition lockout from too many trials** 1. Verify gas supply is present. 2. Verify gas safety valve is working correctly. 3. Verify gas manifold pressure is adequate and correct. 4. Check spark igniter is not cracked or dirty. Check spark igniter wire is not covered with oil and debris or cracked. Check wire is connected correctly. 5. Check flame sensor wiring. Check to see if flame sensor is grounded.
4 Flashes	Lockout	Ignition lockout from too many flame losses within a single heat.	**Ignition lockout from too many flame losses within single call for heat** 1. Check pressure switch hose for leaks or poor connection 2. Check for condensate in pressure switch hose. 3. Check pressure tap on combustion blower and combustion pressure switch for blockage. 4. Check functionality of combustion inducer fan.
5 Flashes	Lockout	Control hardware fault detected	**Control hardware fault detected** 1. Change ignition board.

Ignition Control Module for Modulating Gas Furnace (240 MBH Furnace Only)

Figure 29: Typical Modulating Gas Furnace Electrical Schematic with Sensor



Variable Furnace Controller

Daikin's furnace controller is an electronic device that delivers full control of the modulating furnace. Control includes sequencing, ignition, safety, modulation of the control valve, and the induced draft motor. Inputs to the furnace control board are an a 0-10V signal. The analog signal will modulate the burner down to 25% of full load. Safety inputs include pressure line and electrical connection from the airflow proofing switch and electrical connection from the rollout switches. Control board outputs are to the igniter board, modulating gas valve, and to the induce draft motor.

Ignition Control Module LED Diagnostics

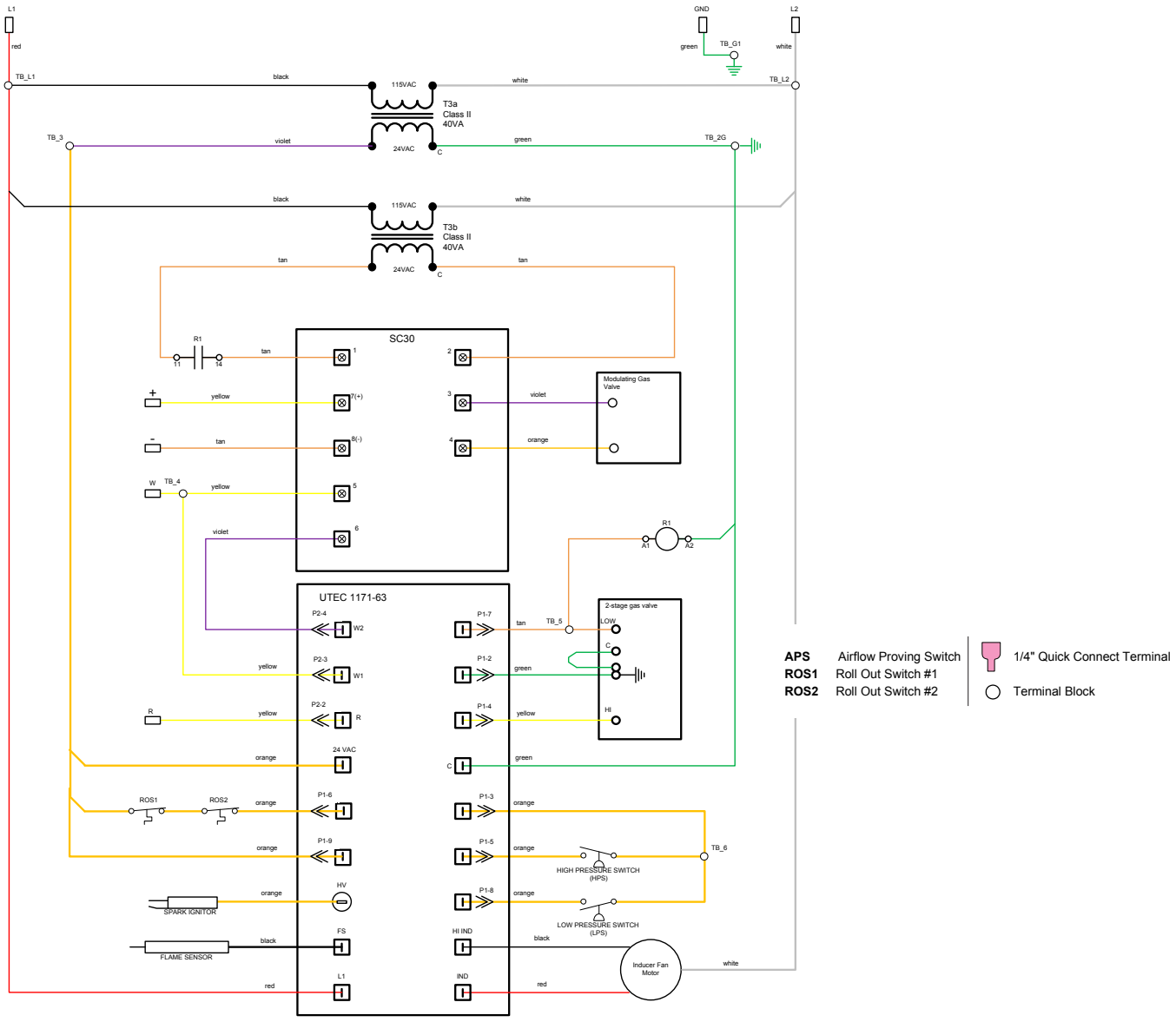
The LED indicators (Table 20) can be used to diagnose faults associated with the modulating gas furnace.

Table 20: LED Indicator and Fault Conditions

Indicator	Fault Condition
Steady Off	No power or control hardware fault Indicator Fault Condition
Steady On	Control fault detected or no 24 VAC power
1 Flash	Combustion fan motor energized, pressure switch open
2 Flashes	Inducer air pressure reads above zero level when the inducer is off
3 Flashes	Flame is on when is should be off or flame is off when it should be on
4 Flashes	Gas valve is on when is should be off or gas valve is off when it should be on
5 Flashes	Safety relay is on when it should be off or safety relay is off when it should be on
6 Flashes	Excessive plenum temperature
7 Flashes	High limit switch is open or fuse is open
8 Flashes	Pressure switch failed to operate or modulation current is incorrect
Slow Flash	Normal operation - no call for heat
1 Slow	Flash Call for heat
2 Slow	Flashes Gas on - call for heat
3 Slow	Flashes Gas on - no call for heat
Rapid Flash	Retry

Ignition Control Module for Modulating Gas Furnace (300 & 400 MBH Furnace Only)

Figure 30: Typical Modulating Gas Furnace Electrical Schematic with Sensor



Variable Furnace Controller

Daikin's furnace controller is an electronic device that delivers full control of the modulating furnace. Control includes sequencing, ignition, safety, modulation of the control valve, and the induced draft motor. Inputs to the furnace control board are an a 0-10V signal. The analog signal will modulate the burner down to 25% of full load. Safety inputs include pressure line and electrical connection from the airflow proofing switch and electrical connection from the rollout switches. Control board outputs are to the igniter board, modulating gas valve, and to the induce draft motor.

Ignition Control Module LED Diagnostics

The LED indicators (Table 21) can be used to diagnose faults associated with the modulating gas furnace.

Table 21: Modulating Ignition Control Troubleshooting Guide (UTEC 1171 Ignition Board)

LED Indicator	System Status	Fault Description	Possible Causes and Corrective Action
Heartbeat	System Normal	N/A	**All conditions are normal**
2 Flashes	Inducer ON No gas	Combustion air flow pressure switch contact is open; combustion inducer fan is running	**Pressure switch open with inducer ON** 1. Combustion air flow pressure switch hose leaking; repair and/or replace 2. Combustion air flow pressure switch hose plugged; repair and/or replace 3. Combustion air flow pressure switch hose fittings plugged or damaged; repair and/or replace 4 Combustion air pressure hose and/or switch has condensate accumulation; repair and/or replace 5. Combustion air pressure switch not functioning; replace 6. Combustion inducer fan not working; repair or replace
3 Flashes	No Flame	Combustion air pressure switch contact is closed when fan is not running.	**Pressure switch close with inducer ON** 1. Check wiring to the combustion air flow pressure switch. 2. Check combustion air flow pressure switch continuity with OHM meter; if not open replace
4 Flashes	Lockout	Failed to ignite after too many failed attempts	**Lockout from too many failed ignition tries** 1. Confirm gas supply available; verify manifold gas pressure is correct. 2. Verify manual gas shut-off valve is open. 3. Verify Gas Safety Control valve is in On position. 4. Confirm that spark is present. If not, check spark igniter for debris between electrodes, cracked ceramic and damaged or disconnected wire connection. Check ignition wire for cracks, coated with oil and debris. 5. Check for air leaks at inducer fan assembly and flue 6. Check for recirculation of exhaust flue gases. 7. If all above condition are OK, replace ignition board
5 Flashes	Lockout	Burners light and then drop out resulting in too many flame failures	**Lockout from too many flame losses** 1. Check flame sensor ceramic is not cracked; check flame rod for being coated with debris and oil. 2. Check flame sensor wire is connected correctly; not cracked, no abrasions and not covered with debris. 3. Check for recirculation of exhaust gases. 4. Check flame stability and proper location from sensor. 5. Check that pressure switch is not dripping due to loss of pressure.
6 Flashes	No Flame	Inducer fan is running on high speed, burners are OFF, high limit is open.	**High temperature switch open** 1. Check temperature rise and air flow over furnace heat exchanger 2. If high limit does not reset, change high limit switch
7 Flashes	No Flame	Rollout switch has tripped open	**Rollout switch open** 1. Check for blockages in exhaust vent assembly 2. Check for air leaks inside the burner compartment 3. Reset the Rollout switch and observe flame for any signs of rollout.
8 Flashes	Lockout	Flame is present without any call for heat	**Flame present with gas OFF** 1. Verify there is no voltage to the gas valve 2. Check gas line pressure making sure it is not higher than allowed by gas valve manufacturer 3. If valve is not energized, check for gas flow. If gas is flowing, replace gas valve; verify line and manifold gas pressure are correct.
9 Flashes	Lockout	Exceeded max limit trips in one call for heat	**Exceeded maximum limit trips in on call for heat (5)**

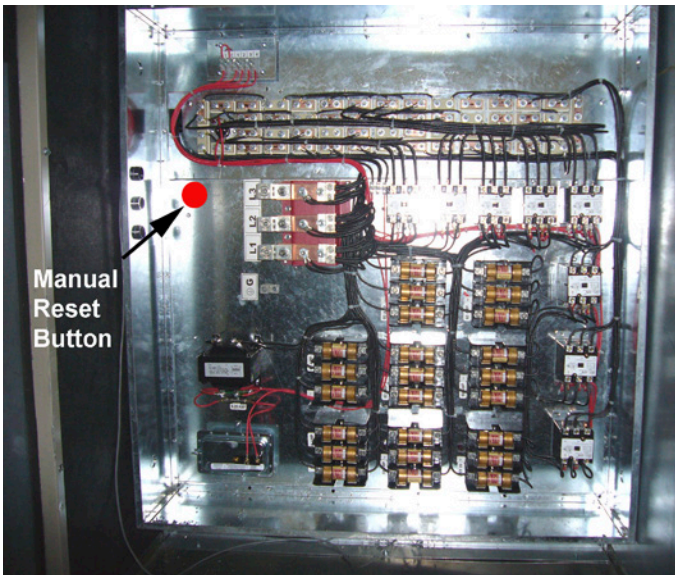
Electric Heater Design

If the 8th digit in the model number is an “E”, the rooftop unit was furnished with a factory installed electric furnace (Example, MPS035FE). The Maverick commercial rooftop units are available with low, medium, or high heat output (see capacities in Table 22). This packaged electric heat rooftop unit is designed for outdoor non-residential installations only.

The electric heat design consists of a heating coil, DDC staging control, and all operational safeties. The safety switches include high-limit temperature switches and individual coil fusing.

The high limit switch is an automatic reset switch. It opens the control circuit and shuts the heater down when the temperature reaches 160°F. The high limit switch closes again allows the heater to run when the temperature gets to 130°F. There is a second level of protection with an auxiliary high limit switch. This switch opens up and shuts the heater down when the temperature reaches 250°F. The auxiliary switch automatically resets again at 220°F. The third level of protection is the secondary auxiliary high limit switch which shut the heater down at 285°F. This switch requires a manual reset.

Figure 31: Electric Heat Section



Electric Heating Capacity Data

Table 22: MPS 015 – 050 Electric Heating Capacities

Tons	Nom cfm	Stages	Low				Medium				High			
			kW	Min cfm	MBh	Delta T*	kW	Min cfm	MBh	Delta T*	kW	Min cfm	MBh	Delta T*
15	6000	4	18	950	61	9.5	36	1900	123	19.0	72	3800	246	38.0
17	6800	4	18	950	61	8.4	36	1900	123	16.7	72	3800	246	33.5
20	8000	4	36	1900	123	14.2	72	3800	246	28.5	90	4740	307	35.5
26	10,000	4	54	2900	184	16.9	72	3800	246	25.5	90	4800	307	31.4
30	12,000	4	54	2900	184	14.2	72	3800	246	19.0	90	4800	307	23.7
35	14,000	4	54	2900	184	12.2	72	3800	246	16.3	90	4800	307	20.3
40	16,000	4	72	3800	246	14.2	90	4800	307	17.8	108	5700	369	21.3
50	20,000	4	72	3800	246	11.4	90	4800	307	14.2	108	5700	369	17.1

* Temperature rise is calculated at nominal cfm

Electric Heater Data

Table 23: MPS 015 – 050 Electric Heater Data (Maximum Temp. 60°F)

kW	Voltage	Amps
18	208	50
	230	45
	460	23
	575	18
36	208	100
	230	90
	460	45
	575	36
54	208	150
	230	136
	460	68
	575	54

kW	Voltage	Amps
72	208	200
	230	181
	460	90
	575	72
90	208	250
	230	226
	460	113
	575	90
108	460	136
	575	108

Modulating Hot Gas Reheat

The reheat coil option comes complete with an aluminum micro channel coil and modulating hot gas valves for leaving air temperature control.

On a call for dehumidification, the unit will enable the supply to be over-cooled by the DX coil. Hot gas from the unit condenser will be routed to an indoor coil downstream of the DX coil to reheat the air. Hot gas reheat valves will control how much hot gas is routed to the indoor coil to maintain a discharge air setpoint (Figure 33).

Figure 32: Ideal for Neutral Air Ventilation Control

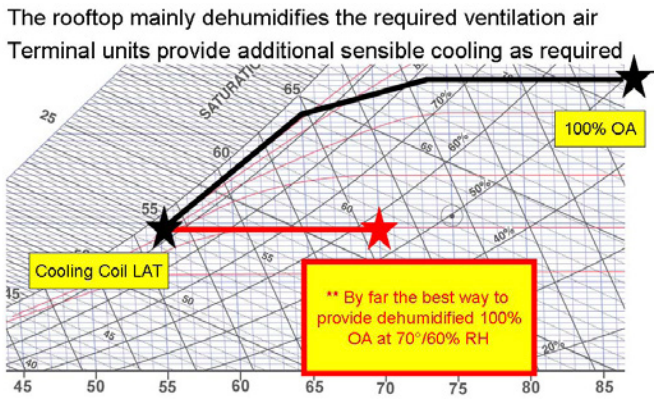
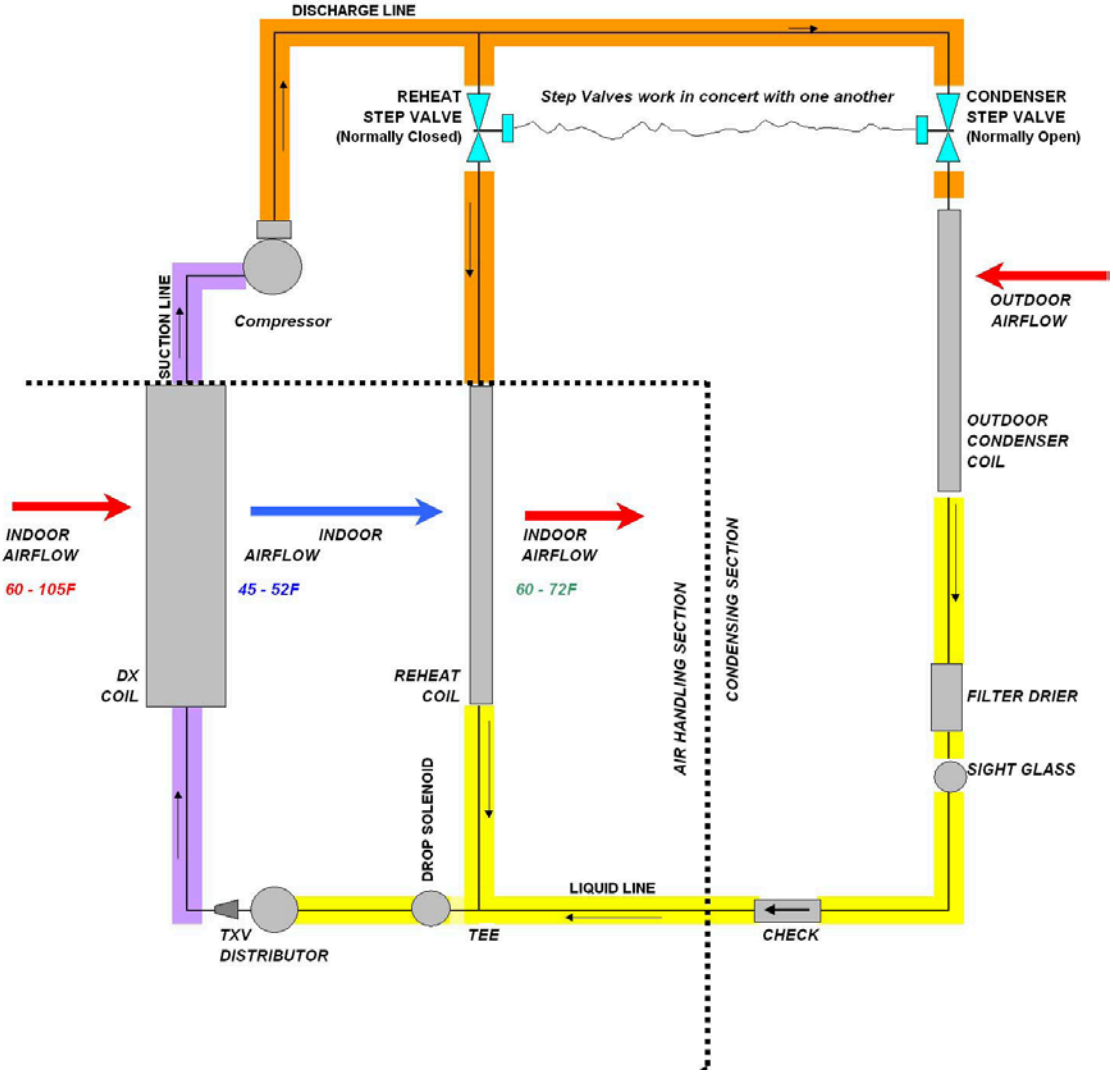


Figure 33: Dual 2-Way Valve Refrigeration Schematic



Dehumidification Initiation

An analog sensor is mounted in the return duct, the space, or outdoors to sense Relative Humidity. The location is selected by setting the Sensor Location value on the keypad to Return, Space, or OAT. OAT can only be selected for units with DAT control. Dehumidification is disabled when the unit is in either the Heating or Minimum DAT state. When Dehumidification is enabled, Dehumidification operation is initiated when Humidity Control is set to either Relative Humidity or Dew Point and that value rises above the appropriate setpoint by more than half its deadband. Economizer operation is disabled in the Dehumidification mode so the unit immediately transitions to Cooling if Dehumidification is initiated in Economizer state.

Dehumidification Termination

Dehumidification is terminated if the selected variable, Relative Humidity or Dew Point, drops below the appropriate humidity setpoint by more than half its deadband. Dehumidification is also terminated if cooling is disabled for any reason or the unit enters either the Heating or Minimum DAT state. For units with compressors, the number of cooling stages is reduced by one and control reverts to normal control when dehumidification is terminated in the Cooling state. Another compressor stage change could then occur after one Cooling Stage Time has elapsed.

Control & Arrangement

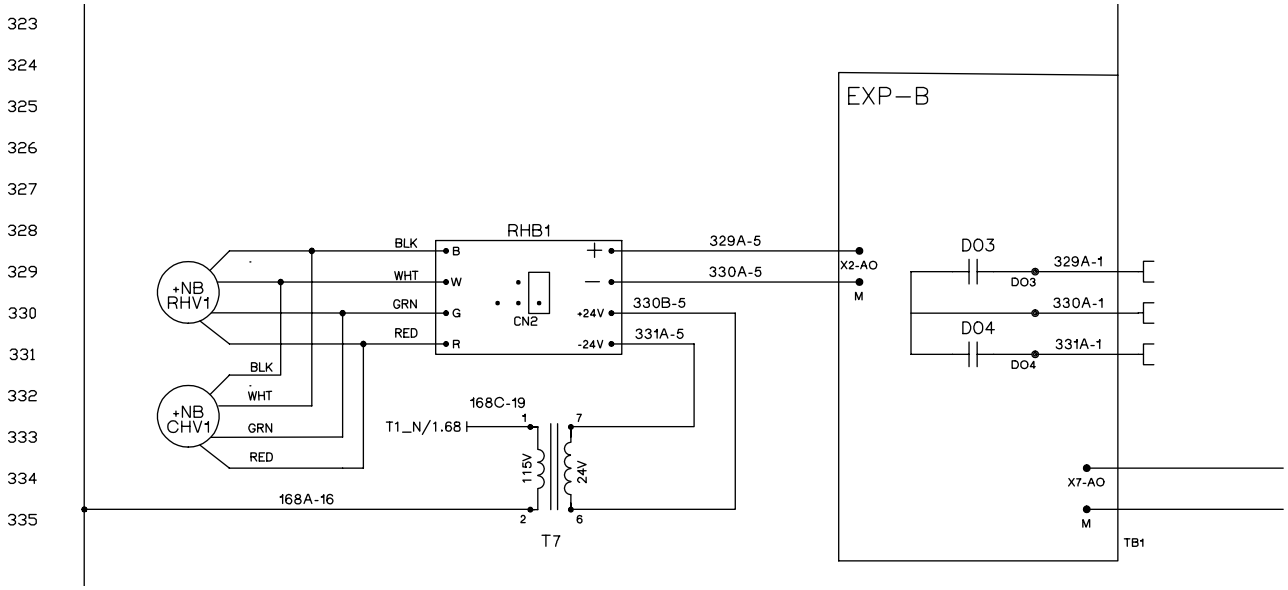
In conjunction with dehumidification, MHGRH is used to raise the temperature of the cooled air to a desirable value. MHGRH is comprised of a parallel coil arrangement, with both the condenser and reheat coils of the micro channel type, dual reheat valves (which operate in concert with one another) and a check valve. MHGRH components will always be installed in circuit #2.

During Dehumidification control w/ modulating Hot Gas Reheat (MHGRH) an analog signal (0-10Vdc) is controlled as described below.

- A PI Loop is used to control the HGRH valves to maintain the Discharge Air Temperature from the reheat coil.
- Compressor staging during reheat (or dehumidification) will be controlled by the Leaving DX Coil Temperature. For increased dehumidification during reheat, the standard default compressor staging range is 45 - 52°F.
- When dehumidification is active in the Cooling state, the reheat set point equals the DAT Cooling Setpoint. For DAT units, this is the normal DAT set point resulting from any reset. For Zone Control units, this set point is the result of a PI Loop based on the Control Temperature.
- Communication with the reheat control valves is accomplished by providing a 0-10Vdc signal to a pair of interface boards which in turn supply the control signal to the reheat valves (step type).
- In the Fan Only state, no sensible cooling is required, but dehumidification mode will still be enabled if the dew point or humidity sensor is not satisfied. Reheat set point varies from a maximum value (default 65°F) when the Control Temperature is at or below the heating changeover setpoint to a minimum value (default 55°F) when the Control Temperature is at or above the cooling changeover setpoint.

- Lead/Lag Arrangement w/ MHGRH (when applicable)
  - — Alternate staging with circuit #1 as lead will be the standard default arrangement.
  - — During cooling mode, circuit #1 will lead and load up before starting circuit #2.
  - — During reheat mode, circuit #2 will lead and load up before starting circuit #1.
  - — For reheat operation, compressor(s) in circuit #2 must be active. If the unit is operating in the cooling mode when a call for dehumidification/reheat arises,circuit #2 will become the lead and the controller will bring on an additional stage of coolingfor dehumidification. If any compressors in circuit #1 are operating at this moment they will be switched over to compressors in circuit #2. Dehumidification operation is disabled if circuit #2 is disabled for any reason.
- In the reheat mode, the minimum position for the reheat valves is 10% (1.0 Vdc). The controller will modulate the reheat valves from this starting position.
- Reheat valve(s) must be at 0% (0 Vdc) position before starting the first compressor in the reheat circuit to prevent pressure spikes.
- Upon termination of dehumidification (reheat), the maximum ramp down or decay rate of the reheat control valves shall be 1% per sec (or 0.1V per sec).
- Upon termination of dehumidification (reheat), staging of compressor(s) is delayed for 1 minute after reheat capacity = 0% (0 Vdc).
- Every 24 hours, the reheat control valves will be driven to their maximum position (10Vdc) and then returned to their normal operating position (0Vdc). If unit is operating in cooling or dehumidification (reheat) at the prescribed time it will be deferred to the next time.
- Dehumidification status can now be found under the MTIII main system menu. Reheat capacity (valve position) can also be found under the main system menu, display based on percentage (0-100%).

Figure 34: Modulating Hot Gas Reheat Schematic



Hot Water Heater Design

If the 8th digit of the model number is a “W”, the rooftop unit was furnished with a factory installed hot water coil (Example: MPS035FW). The hot water coil comes with a piping vestibule for field supplied and installed control valve and piping. The coil is furnished with ODM copper connections. The Maverick commercial rooftop units are available with a low heat (one row coil) or a high heat (two row coil) configuration.

See certified drawings for the recommended piping entrance locations. Seal all piping penetrations to prevent air and water leakage.

NOTE: Factory installed piping is copper. Dissimilar metal within the plumbing system can cause galvanic corrosion. To avoid corrosion, provide proper di-electric fittings as well as appropriate water treatment.

⚠ CAUTION

Coil freeze possible. Can damage equipment. Follow instructions for mixing antifreeze solution. Some products have higher freeze points in natural state than when mixed with water. The freezing of coils is not the responsibility of Daikin.

Figure 35: Hot Water Heating Schematic

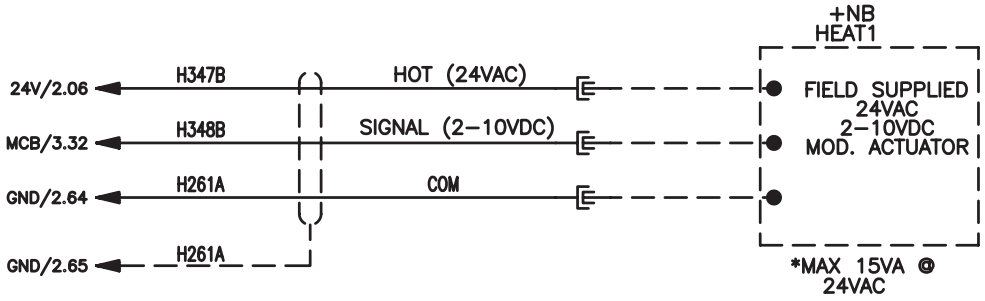
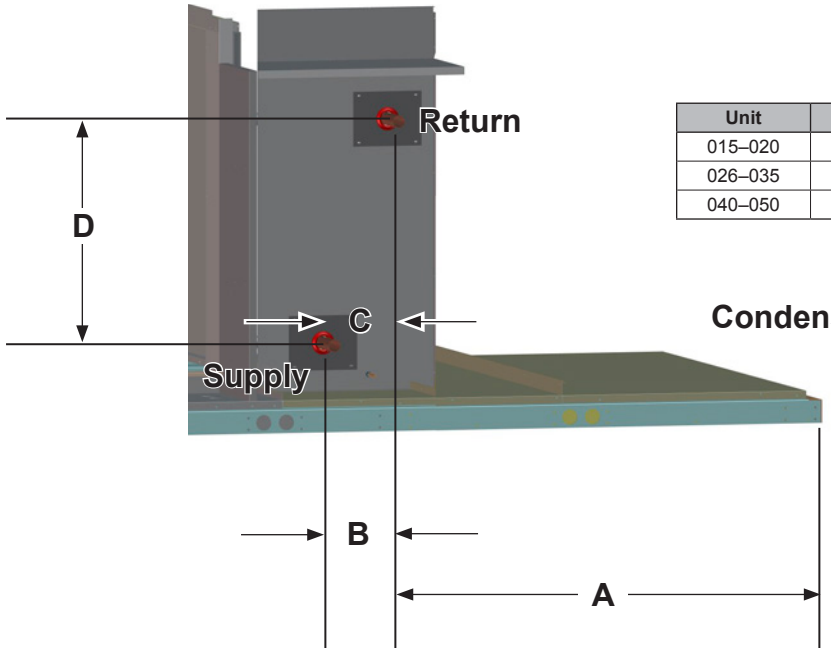


Figure 36: Hot Water Heat Vestibule



Unit	A	B	C	D
015–020	64.5	8.5	8.5	28.5
026–035	64.5	8.5	8.5	28.5
040–050	90.2	8.5	8.5	28.5

Hot Water Pressure Drop Data

Figure 37: MPS 015 – 017 Low and High Heat

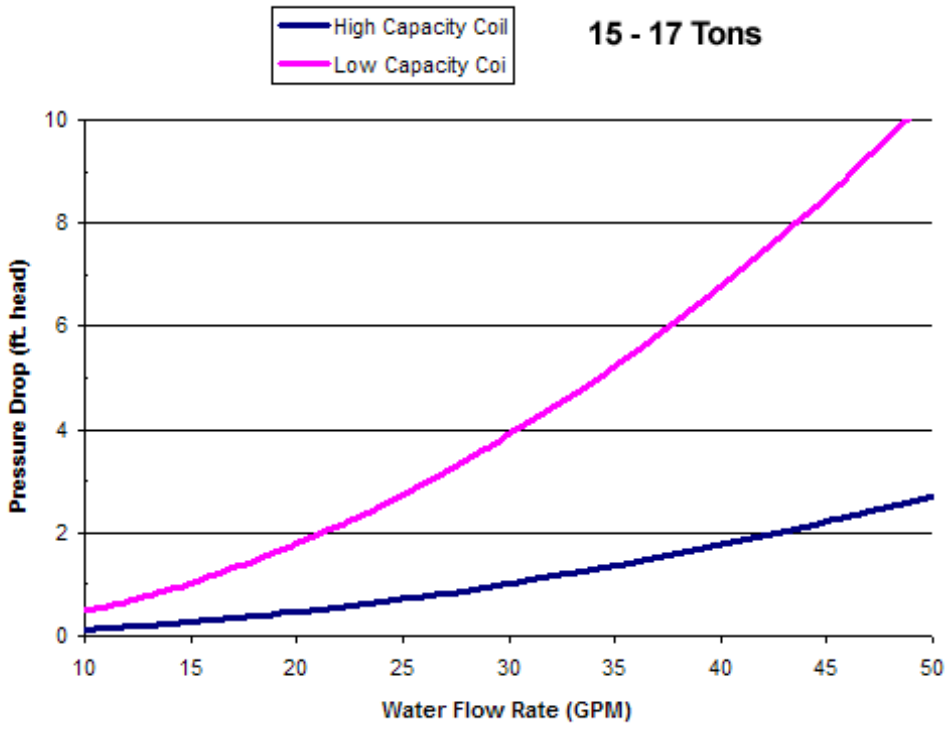


Figure 38: MPS 020 Low and High Heat

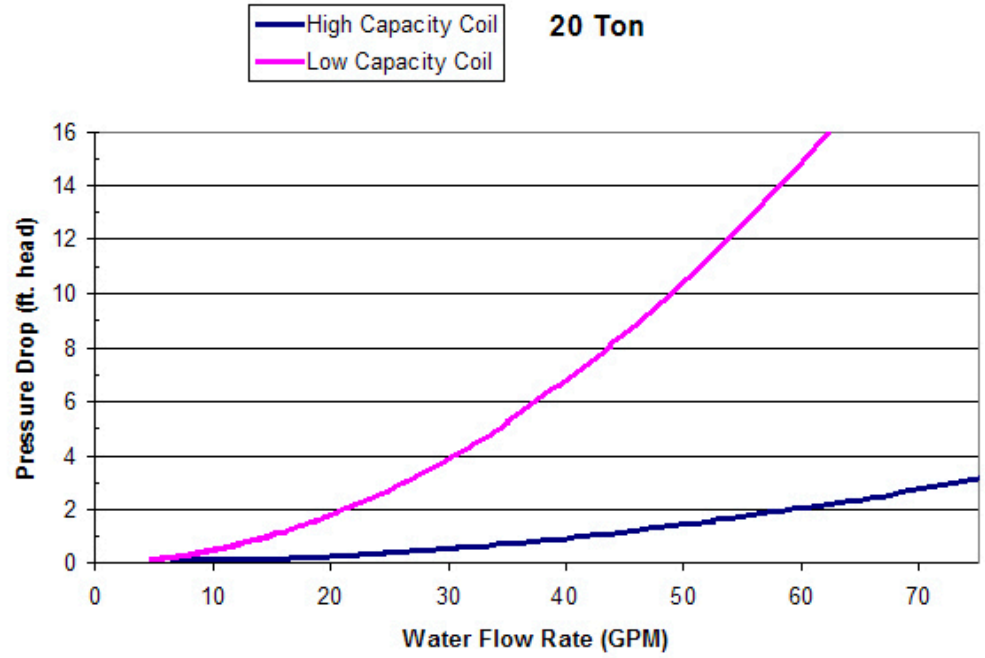


Figure 39: MPS 026 – 035 Low and High Heat

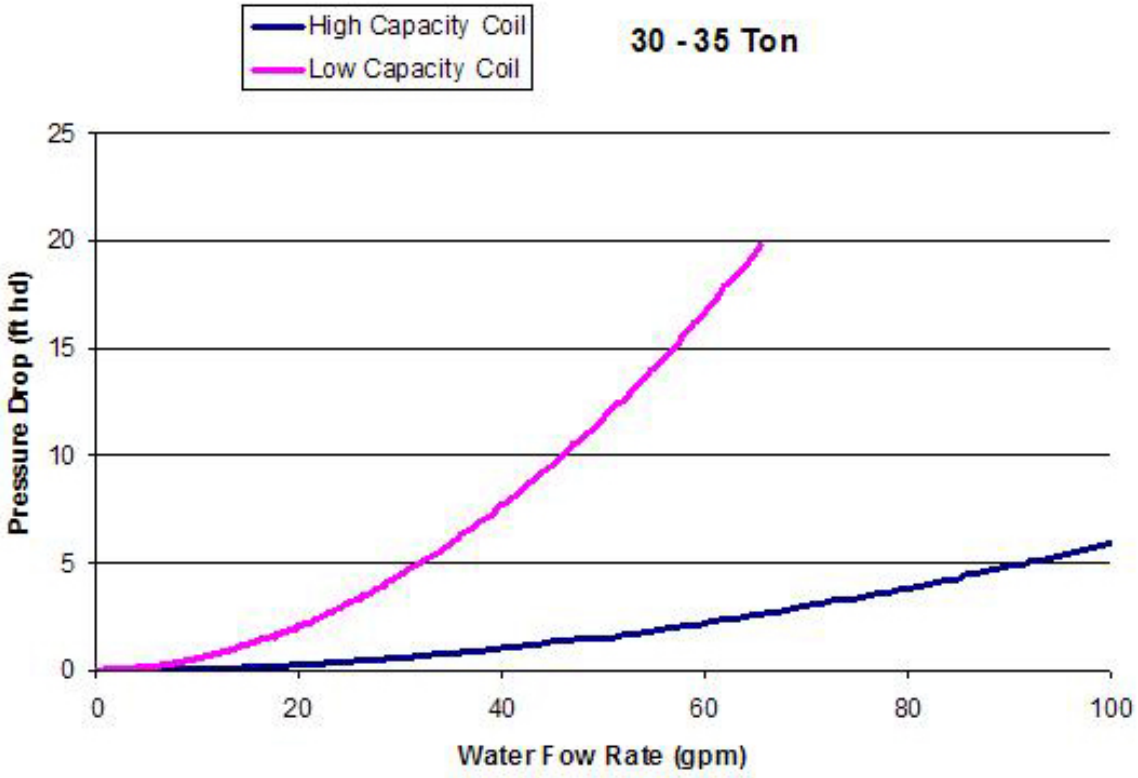
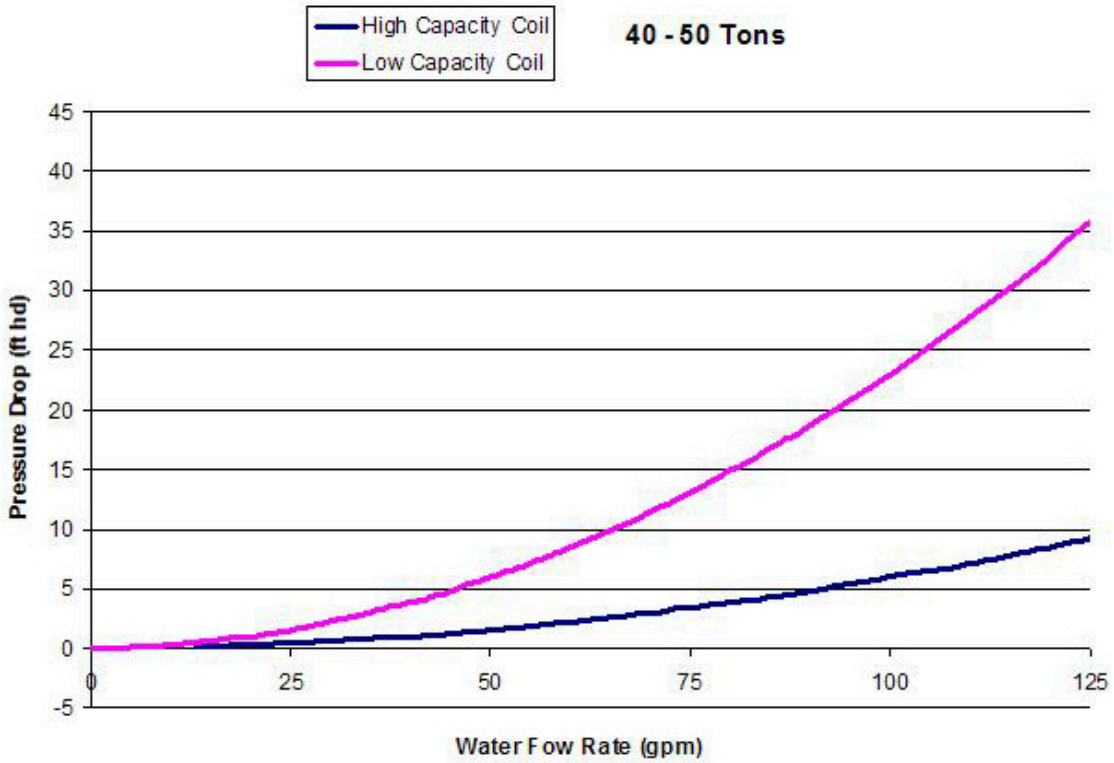


Figure 40: MPS 040 – 050 Low and High Heat



Energy Recovery Wheel Design

When a unit is equipped with an optional enthalpy wheel, energy recovery is provided by drawing outside air across half of the enthalpy wheel and drawing exhaust air across the other half. Latent heat and sensible heat are transferred from the hotter and moist exhaust air to the colder and dry outside air during winter conditions. Latent heat and sensible heat are transferred from the hotter and moist outside air to the cooler and dry exhaust air during summer conditions. Energy recovery control consists of starting and stopping an exhaust fan, modulating the speed of the exhaust fan, starting and stopping an enthalpy wheel, optionally controlling the speed of the enthalpy wheel and opening and closing a set of bypass dampers. The outdoor dampers are controlled in the normal manner.

Arrangements

Three arrangements are offered for the enthalpy wheel:

1. Single enthalpy wheel with economizer and bypass (see Figure 41). This arrangement is available for all units.
2. Single enthalpy wheel without economizer (100% outdoor air unit) for airflow up to about 7000 CFM. This arrangement is available on sizes 015 - 040C and 800 - 802C only.

Wheel Construction

Your Daikin enthalpy wheel is delivered completely assembled and ready to run. The wheel is built to provide many years of trouble free service following proper installation and performance of the minimal maintenance requirements.

Definitions

The following are descriptions of various components related to the enthalpy wheel construction (see Figure 41):

Bearing, external – The wheel and bearing rotate on the shaft, no field lubrication is required.

Brush seal – The seal used for both the circumferential seal and the inner seal in the cassettes. They are constructed of nylon brush and configured to seal against the enthalpy wheel band in the case of the circumferential seal, and against the wheel face in the case of the inner seal. These seals are full contact seals, have an integral clip, and they are clipped to the cassette face panel cutout (concumferential) or to the (inner) post.

Cassette – The steel structure that houses the rotor. Cassettes are of punched sheet metal panelized construction.

Enthalpy wheel – A generic name for an energy conservation wheel. The term “enthalpy” refers to an air stream’s total energy (temperature and humidity level).

Exhaust air – The air stream that is exhausted to the outside. Exhaust air is building return air that has been run through the enthalpy wheel.

Heat wheel – Synonymous with an enthalpy wheel, energy conservation wheel, or total energy recovery wheel. Some heat wheels are sensible only wheels and should not be confused with Daikin total energy recovery wheels.

Hub – The center support of an enthalpy wheel.

Latent energy – Latent energy, in the context of enthalpy wheel discussions, is the work done by the wheel to transfer moisture from one air stream to another. Latent work is accompanied by humidity changes in the air streams.

Media – The chemical composite part of the enthalpy wheel which actually performs the latent and sensible exchange.

Outdoor air – The air stream that is brought in from the outside. Outdoor air becomes supply air after going through the enthalpy wheel.

Purge – A small segment of supply air defined by the gap between the inner seal on the outdoor air edge of the center post and the supply air edge of the center post. The purge angle is adjustable. The purge captures the small amount of supply air captive in the enthalpy wheel when the wheel moves from return to supply and routes it to return to minimize cross contamination.

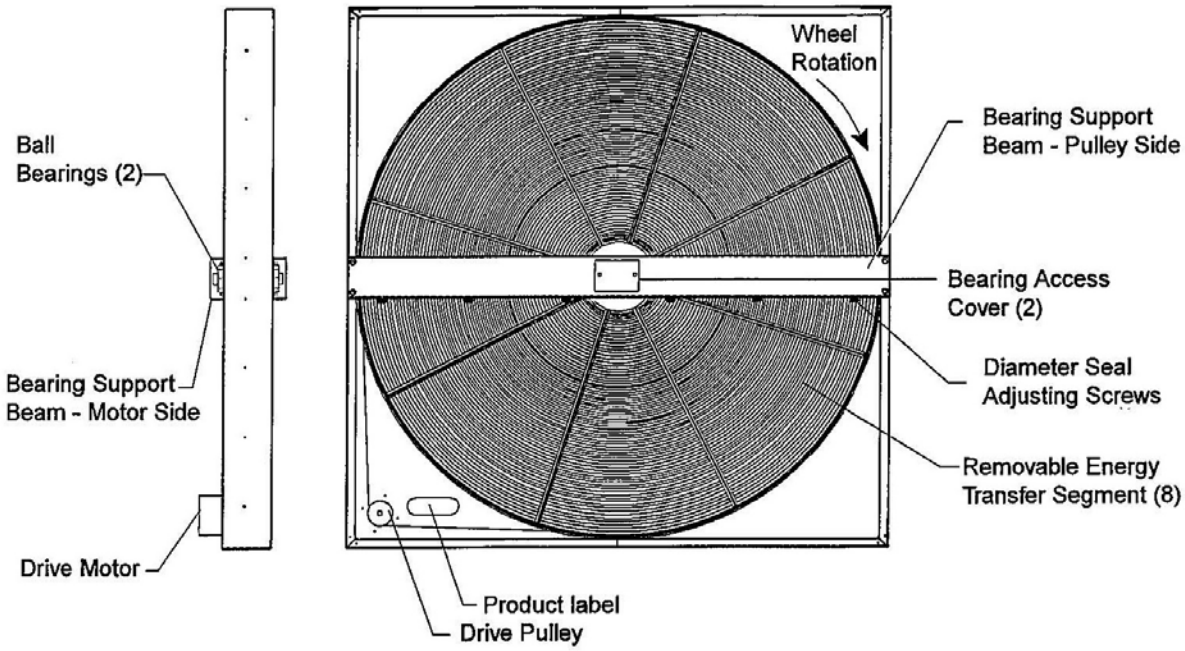
Return air – The air stream that is returned from the building. Return air becomes exhaust air after going through the enthalpy wheel.

Rotor – The part of an enthalpy wheel that performs the energy exchange and consists of the wheel media, hub, spokes and band.

Sensible heat – Sensible energy, in the context of enthalpy wheel discussion, is the work done by the enthalpy wheel to transfer heat from one air stream to another. Sensible work is accompanied by temperature changes in the air stream.

Supply air – The air stream that is supplied to the building space. Supply air is outdoor air that has been run through the enthalpy wheel.

Figure 41: Wheel Construction (Side-by-Side)

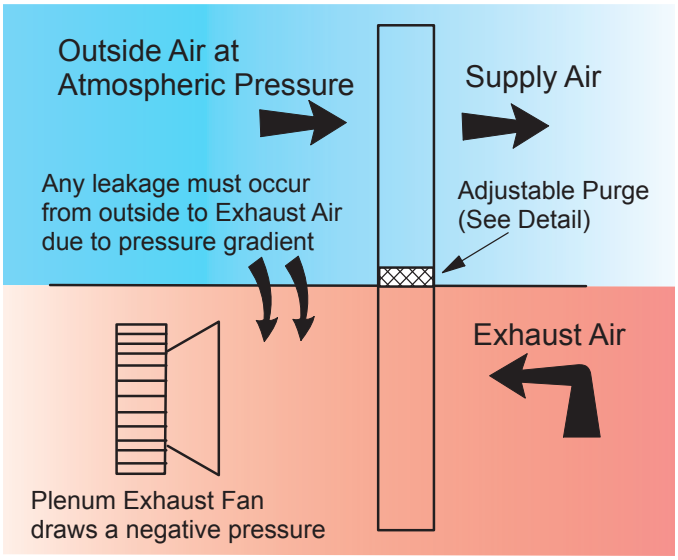


(1) Currently, only the Over-Under configuration is offered on Daikin roof-top systems and air handlers.

Purge and Pressurization

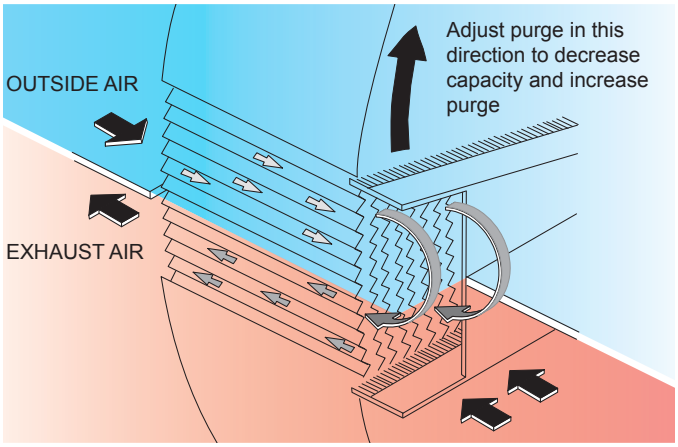
Pressurization is critical to minimize crossover from exhaust to Figure 42: Purge Detail supply and to allow the purge to operate.

Figure 42: Purge and Pressurization



NOTE:
Maintain the pressure gradient to prevent cross contamination from the Exhaust to Outside Supply Air

Figure 43: Purge Detail



Drive Motor

The enthalpy wheel comes standard with a constant speed drive motor which is prewired to turn in the proper direction.

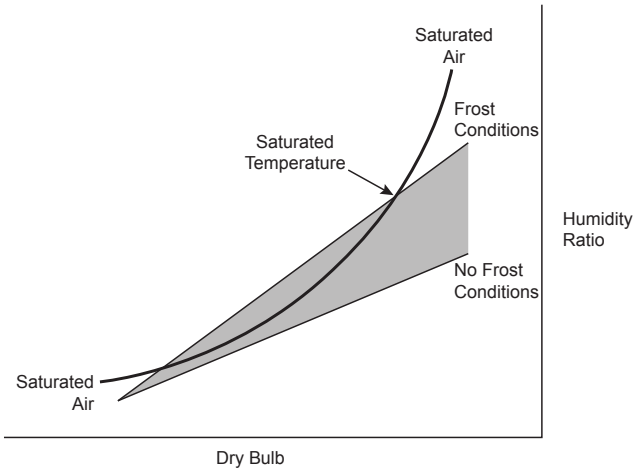
Frost Protection Option

During extremely cold winter conditions, exhaust air stream To circumvent this possiblity, Daikin offers three factory installed frost protection options with the MicroTech III system.

Defrost ON/OFF Control (Standard)

With this method the enthalpy wheel is stopped periodically for a defrost time duration when the outdoor air temperature is below an outdoor frost temperature threshold setpoint.

Figure 44: Frost Prevention Psychrometric Chart



Constant Speed Frost Prevention

When there is a threat of frost on the enthalpy wheel, the wheel is jogged so that less enthalpy transfer occurs and frosting of the wheel is avoided. Frosting can occur on the enthalpy wheel when the exhaust air leaving the wheel is saturated. This condition occurs when two lines intersect on a psychrometric chart, and it does not occur when these two lines do not intersect (see Figure 39).

Varible Speed Frost Prevention

When there is a threat of frost on the enthalpy wheel, the wheel is slowed down so that less enthalpy transfer occurs and frosting of the wheel is avoided. Frosting can occur on the enthalpy wheel when the exhaust air leaving the wheel is saturated. This condition occurs when two lines intersect on a psychrometric chart, and it does not occur when these two lines do not intersect (see Figure 44).

Energy Recovery Exhaust Hoods

Units with the optional energy recovery section have one or two (depending on model) exhaust hoods. Each hood is shipped in three pieces, consisting of one top and tow sides. Install exhaust hood over the barometric relief dampers by installing tow sides first and then install the top.

Variable Speed Frequency Control

A variable frequency drive is included with the frost protection option and it controls the speed of the enthalpy wheel. The unit has also been programmed for the recommended range of wheel speed operation. Typical wheel speed is 45 RPM, but the programming can allow for wheel speeds above or below 45 RPM. Check all factory settings to make sure they are consistent with the application.

Enthalpy wheel speed will be controlled by exhaust temperature measurement.

Thermal Dispersion Airflow Measurement Technology

Thermal dispersion technology relates the velocity of the air to the power and rise in temperature of a heated element in a moving airstream. A precise bead-in glass thermistor probes the airflow rate and air temperature. Multiple sensing points are used to produce an average velocity for true volumetric airflow (CFM/LPS). Each individual sensor node is calibrated to NIST traceable airflow standards at 16 points, resulting in a accuracy of 2% of the reading.

Figure 45: Bead-in-Glass Thermistor

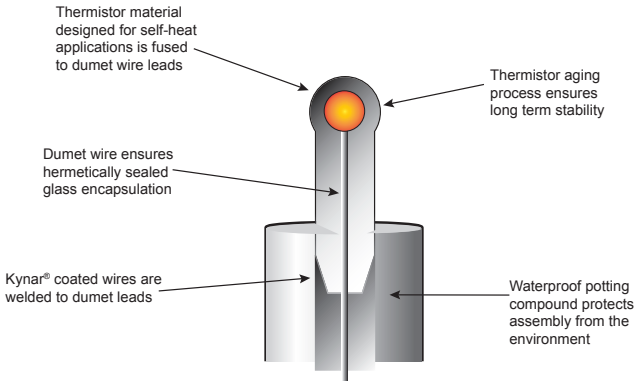
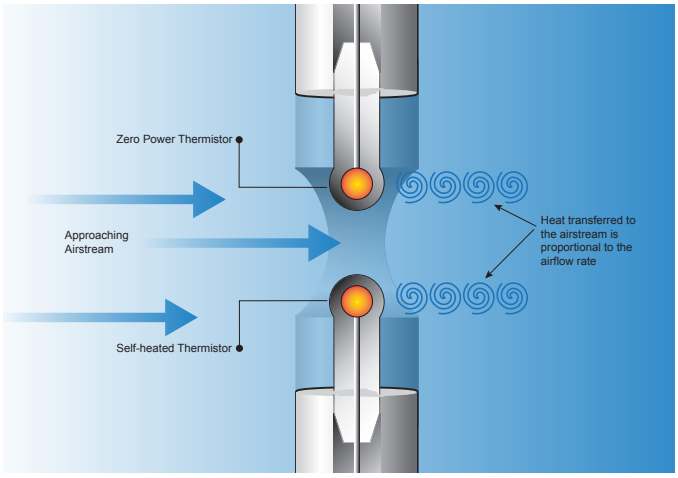


Figure 46: Bead-in-Glass Thermistor Probe



Connecting to MicroTech III Controllers

Wiring

1. Connect analog control wires from the MicroTech III Controller to the outdoor air monitor controller.
   a. MicroTech III controller (X1 on the MCB or X11 on the EXP_D) to the controller's analog output terminal 1.
   b. MicroTech III controller (M on the MCB or M on the EXP_D) to the controller's analog output terminal COM.
2. Power Wires (24 VAC) to the outdoor air monitor controller.
   a. 24VAC from the unit control panel to the controller terminals L1 and L2.

Outdoor Air Monitor Controller Settings

1. Set Controller SW1 switch to Vdc.
2. Set power switch to ON.

Outdoor Air Monitor Controller Configuration/ Set Up

(see Appendix, Figure 102 on page 129 for navigating the Controller keypad)

1. Set LCD1 U/M to "CFM"
2. Set AR1 (see Table 24)
3. Set OUT1 U/M =CFM
4. Set OUT1 =0–10V
5. Set FSI (see Table 24)

Table 24: Settings by Cabinet Size

Unit size	Economizer and 0–100%	0–30% Area sq.ft. (AR1)	Full scale output CFM (FS1)
Small cabinet	7.3	4.75	10,000
Medium cabinet	10.0	9.5	10,000
Large cabinet	14.5	10.0	10,000

Figure 47: MicroTech III Controller

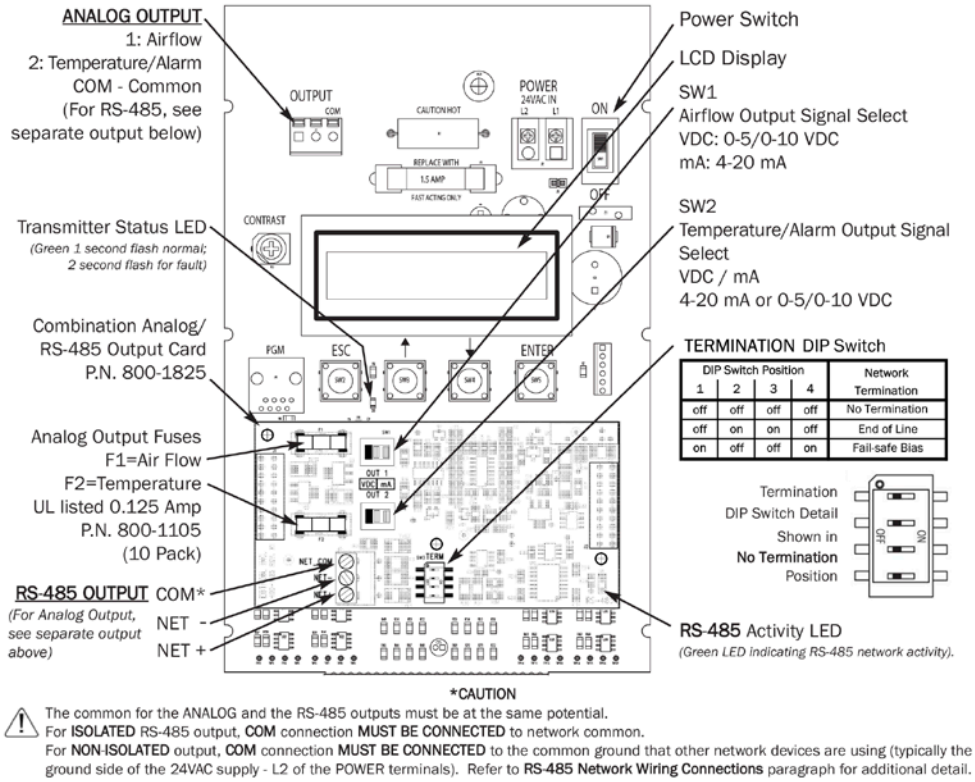
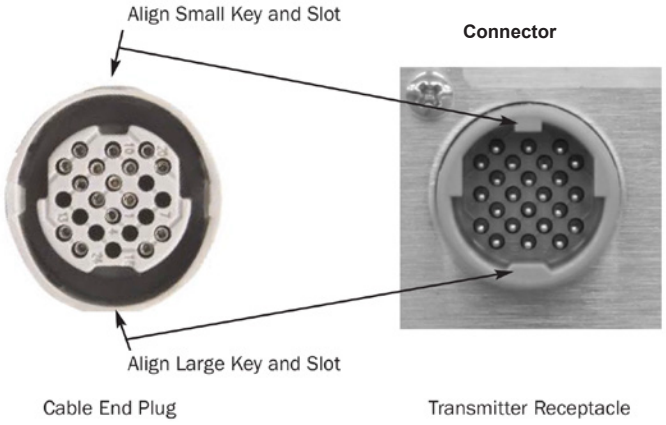
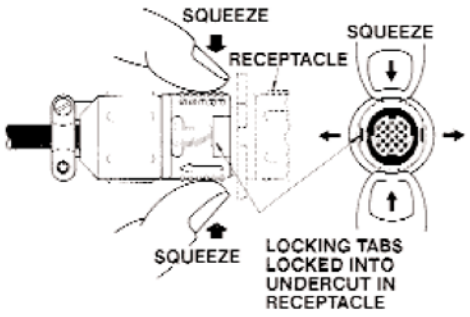


Figure 48: Transmitter and Connector Detail

Transmitter

Accepts 1 or 2 probes up to 8 sensors each.





Squeeze and Pull to Remove
DO NOT TWIST!

Changing the System of Units

The transmitter is provided with the system of units set to I-P. To change to S.I., simultaneously press and release the “UP” and “DOWN” arrow buttons during normal operation. “IP/SI UNITS” will be indicated on the LCD display. Press “ENTER” three times and use the “UP” and “DOWN” arrow buttons until the system of units desired is indicated. Press the “ENTER” button to select changes then press “ESC” twice to return to the normal operating mode. See Appendix, Figure 102 on page 129.

LCD Display Notifications

Following a brief initialization at power up, the LCD display automatically displays airflow and temperature as all upper case (caps) characters. The display provides additional information on system status and alarm conditions as follows:

Last LCD Character Shown in Lower Case (Probe Malfunction)

If the last character of the flow rate units on the LCD display is lower case (for example FPm or CFm), this indicates that an improper/malfunctioning probe is connected to the transmitter.

All LCD Characters Shown in Lower Case

When all characters of the flow rate units are displayed in lower case (for example cfm) the transmitter is operating in the Field Calibration Wizard mode. Daikin users do not need to use this function.

*LCD Blinks ** LOW ALARM **, ** HIGH ALARM ** or ** TRBL ALARM***

The LCD will alternately flash to indicate an active alarm condition for the type of alarm that has been set. The LCD displays airflow/temperature readings between the alarm notifications. Alarm will cease when the alarm is cleared.

Converting the Analog Output Signal from FPM to CFM (MPS to LPS for SI units scaling)

The transmitter is shipped from the factory with analog output “OUTPUT 1” set to indicate velocity in FPM. To automatically convert this analog velocity output to volumetric flow (CFM or LPS), simply set the *OUT1 U/M from FPM (default) to CFM in the Setup Menu (See Appendix, Figure 103 on page 130). If you wish to manually convert the velocity output to volumetric flow (CFM or LPS), simply multiply the indicated output velocity (in FPM or MPS) by the free area of the air flow probe installation location (free area x 1000 for SI units when area is calculated in square meters). For -P sensors, the total free area is programmed into the probe at the factory and is printed on the probe hang-tag. For -F and -B sensor probes, determine the free area following installation in accordance with the installation guidelines. Refer also to Tables 4 and 9 for a complete listing of conversions for each of the analog outputs of the transmitter.

NOTE: The full scale analog output (OUTPUT1) value is determined by the FS1 setting within the SETUP MENU.

Altitude Correction Adjustment

The Altitude Correction Adjustment allows for correction of airflow readings at the installed site altitude and more precise readings regardless on installed altitude. Refer to the SETUP MENUS of Figure 102 for the *ALT= menu item, and set this vale to the installation altitude.

Adjusting The Digital Output Filter

The digital output filter is useful for dampening signal fluctuations resulting from transient wind gusts on outdoor air intakes or excessive turbulence generated from duct disturbances. The digital output filter range can be set between 0 (OFF) and 99%. Increasing the filter percentage limits the allowable change of the output signal. To change the amount of filtering, enter the Setup menu and set “*FILTER1={desired value}” as shown in Figure 102.

IMPORTANT

Fluctuations in the airflow output signal are normal. Laboratory research indicates that dampening true fluctuations will result in poor control and a larger dead-band of operation. Therefore, the use of the dampening filters in control devices is not recommended. Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

Table 25: General Troubleshooting

Problem	Possible Cause	Remedy
No LCD display indication and the green Transmitter Status LED (D3) on the main circuit board is not illuminated.	Power switch not in the "ON" position.	Move the power switch to the "ON" position.
	Improper supply voltage to the power input terminal block.	Ensure that 24VAC power is connected to L1 and L2 of the POWER terminal block and that the voltage with the power switch in the "ON" position is between 22.8 and 26.4 VAC.
	Blown fuse.	Check power wiring. Ensure that multiple devices wired on a single transformer are wired "in-phase". Replace fuse only with a 1.5 amp, fast-acting fuse after the problem has been identified and corrected.
No LCD display indication and the green Transmitter Status LED (D3) on the main circuit board is flashing.	LCD contrast too low.	Turn “Contrast” potentiometer on the main circuit board "clockwise".
The LCD display is scrambled or there is no LCD display indication after touching the switches, LCD display or circuit board.	Static electricity.	Touch an earth-grounded object, such as a duct, to discharge static electricity then reset the power. Avoid direct contact with the LCD display or circuit board.
The LCD display indicates "No Probes".	The power switch on the transmitter was moved to the "ON" position before the sensor probes were connected.	Reset 24VAC power by moving the power switch from the "ON" to "OFF" position and then back to the "ON" position.
The LCD display indicates "DiffSensor Type".	Sensor probes have been mismatched.	Transmitters must have the same sensor type connected (GP1, GF1 or GB1 sensor probes).
The LCD display indicates "Too Many Sensors".	A probe with 5 or more sensors has been connected to a 'Type B' transmitter with 4 receptacles.	Probes with 5 or more sensors are shipped with and require a 'Type A' transmitter with 2 receptacles.
The last digit of the flow rate unit is displayed as a lower case letter. (When the Field Calibration Wizard is engaged, the last character of the flow rate units is displayed as an upper case letter.	The sensor detection system has detected one or more malfunctioning or missing sensors.	Check sensor probe cable connections. If sensor probe connections look OK and match the number of sensor probes indicated on each probe’s hang tag.
	A probe with 5 or more sensors has been connected to a 'Type B' transmitter with 4 receptacles.	Probes with 5 or more sensors are shipped with and require a 'Type A' transmitter with 2 receptacles.
The green Transmitter Status LED (D3) on the main circuit board is "ON" but not flashing.	The microprocessor is not running.	Reset 24VAC power by moving the power switch from the "ON" to "OFF" position and then back to the "ON" position.
The green Transmitter Status LED (D3) on the main circuit board is flashing at 1-second intervals.	No problem, normal operation.	No remedy required.
The green Transmitter Status LED (D3) on the main circuit board is flashing at 2-second intervals.	The sensor detection system has detected one or more malfunctioning or missing sensors.	Check sensor probe cable connections. If sensor probe connections look OK and match the number of sensor probes indicated on each probe's hang tag.
	A probe with 5 or more sensors has been connected to a 'Type B' transmitter with 4 receptacles.	Probes with 5 or more sensors are shipped with and require a 'Type A' transmitter with 2 receptacles.
The transmitter indicates airflow when the HVAC system is not operating.	Sensors are sensitive and can measure very low air velocities. If a reading is indicated, there is airflow present where the airflow measuring station is located.	Do not attempt to adjust zero ("offset"). Doing so will result in an error in airflow measurement. The Low Limit airflow cutoff value can be set to force the output signal to zero.
No output signal can be measured at the OUTPUT terminal block of the transmitter.	Output card is not securely mounted on main circuit board.	Turn the transmitter power "OFF", and then press the output card firmly onto main circuit board. Turn the transmitter power back "ON".
	Blown output fuse (output 1 and output 2 are fused and protected independently on the transmitter).	Make sure that power has not been connected to the output terminal block. Correct the problem and replace with 0.125 amp, fast acting fuse only.
		Make sure that the host control system is not configured for a 2-wire device (no excitation voltage should be present on the signals from the host controls). Correct the problem and replace with 0.125 amp, fast acting fuse only.
	The Low Limit airflow cutoff value is above the actual airflow reading.	Decrease the Low Limit airflow cutoff value in the Setup menu until it is below the actual airflow reading.
The output signal on the transmitter fluctuates while the flow and/or temperature readings on the LCD are steady.	Electrical interference from other devices is creating noise in the signal wires to the host control system.	The output signal wiring must be shielded. Individually ground one or more of the following points: the signal wire shield at host controls; signal wire shield at the transmitter, or L2 of the power terminal block of the transmitter.
The LCD display does not match the readings indicated by the host control system.	The scaling in the host control system is incorrect.	Compare the current configuration of the transmitter with that of the host control system. Compare the minimum and full scale settings for each output by navigating through the Setup menu.

Table 26: Transmitter Troubleshooting

Problem	Possible Cause	Remedy
The host control system is unable to communicate with the transmitter.	Output card is not securely mounted on main circuit board.	Turn the transmitter power "OFF" and press the output card firmly onto main circuit board. Turn the transmitter power back "ON".
	Network signal wiring is not properly connected to the transmitter or the host controls.	Verify that the network signal wires from the host controls are connected to the proper terminals of the OUTPUT block. On the transmitter OUTPUT terminal block, NET+ is for A, NET- is for B and COM for common.
	Network protocol is not properly set on the transmitter.	Set network protocol based on the network requirements and reset transmitter power.
	Network address is not properly set on the transmitter.	Set address based on network requirements and reset transmitter power. The address must be unique for the network.
	Network termination is not properly set on the transmitter.	Set transmitter termination based on network requirements and reset the transmitter power.
The LCD display does not match the readings indicated by the host control system.	The Area or K factor of the transmitter does not match that of the host controls.	Compare the value of the Area or K factor of the transmitter with that of the host control system and make adjustments to ensure a match.
The returned value for airflow is zero when airflow is indicated on the LCD display of the transmitter.	The Low Limit airflow cutoff value is above the actual airflow reading.	Decrease the Low Limit airflow cutoff value in the Setup menu until it is below the actual airflow reading.
The status point from the transmitter has a Trouble value.	The sensor detection system has detected one or more malfunctioning or missing sensors.	Check sensor probe cable connections. If sensor probe connections look OK and match the number of sensor probes indicated on each probe's hang tag.
	A probe with 5 or more sensors has been connected to a 'Type B' transmitter with 4 receptacles.	Probes with 5 or more sensors are shipped with and require a 'Type A' transmitter with 2 receptacles.
There is no value for the differential pressure point	Differential pressure is only available from transmitters that have a Bi-directional Bleed Airflow Sensors connected.	If a differential pressure measurement is required, contact your local Daikin Representative about a Bi-directional Bleed Airflow Sensor.

Economizer Enthalpy Control

The economizer can be ordered with the optional differential enthalpy control. With this option a solid-state humidity and temperature sensing device is located in the return and outdoor airstreams. These devices are labeled RAE and OAE respectively. When the outdoor enthalpy is lower than the return air enthalpy, the economizer operation will be initiated. If the outdoor air enthalpy is higher than the return air, the outdoor air damper position will be at the minimum setpoint. See OM 920 for further information on the economizer operation.

External Time Clock

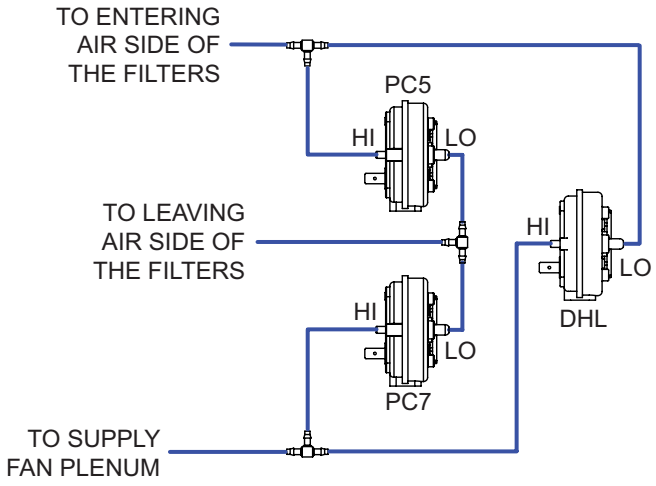
You can use an external time clock as an alternative to (or in addition to) the MicroTech III controller's internal scheduling function. The external timing mechanism is set up to open and close the circuit between field terminals 101 and 102. When the circuit is open, power is not supplied to binary input ID1. This is the normal condition where the controller follows the programmable internal schedule. When the circuit is closed, power is fed to ID1. The MicroTech III controller responds by placing the unit in the occupied mode, overriding any set internal schedule.

Exhaust Fan Option

Economizer units may include exhaust fan options. For units with CAV applications, the exhaust fans can be ordered as staged control or they may be ordered with building pressure control. The building pressure control option has a VFD that runs the exhaust fan motors and is controlled by the static pressure sensor number 2 (SPS2). Refer to OM 920 for setting up the unit controller with these two options. The units are only available with building pressure control on VAV units.

The exhaust fan motors are permanently lubricated and do not require any additional periodic lubrication.

Figure 49: Pressure Tubing Diagram



Proof-of-Airflow and Dirty Filter Switch

The proof-of-airflow switch (PC7) and the dirty filter switch (PC5) are supplied on all CAV units. The tubing is installed to the switches per Figure 49. The proof of airflow switches senses the pressure difference between the positive pressure in the supply air fan compartment and the suction pressure on the leaving air side of the filters. The differential pressure is factory set at 0.25" for this switch. The dirty filter switch senses the pressure difference across the filter; from the entering air side of the filter to the leaving air side of the filters. The switch is factory set at 1.0". When the pressure difference across the filters is sensed at this value, the dirty filter alarm will appear on the DDC controller.

All VAV units also have the PC7 and PC5 switches as standard (see Figure 40). These switches are tied into the Duct High Limit switch (DHL) as shown in Figure 49.

The DHL is factory set at 4.0". When this differential pressure is sensed the normally closed contacts will open on the switch giving the DHL alarm at the unit controller.

Duct High Pressure Limit

The duct high pressure limit control (DHL) is provided on all VAV units. The DHL protects the duct work, terminal boxes, and the unit from over pressurization, which could be caused by, for example, tripped fire dampers or control failure.

The DHL control opens when the discharge plenum pressure rises to 3.5" wc (872 Pa). This setting should be correct for most applications and should not be adjusted.

If the DHL switch opens, digital input ID9 on the Unit Control Board will be de-energized. The MicroTech III controller then shuts down the unit and enters the Off-Alarm state. The alarm must be manually cleared before the unit can start again. Refer to the operation manual supplied with your unit for more information on clearing alarms (refer to OM 920).

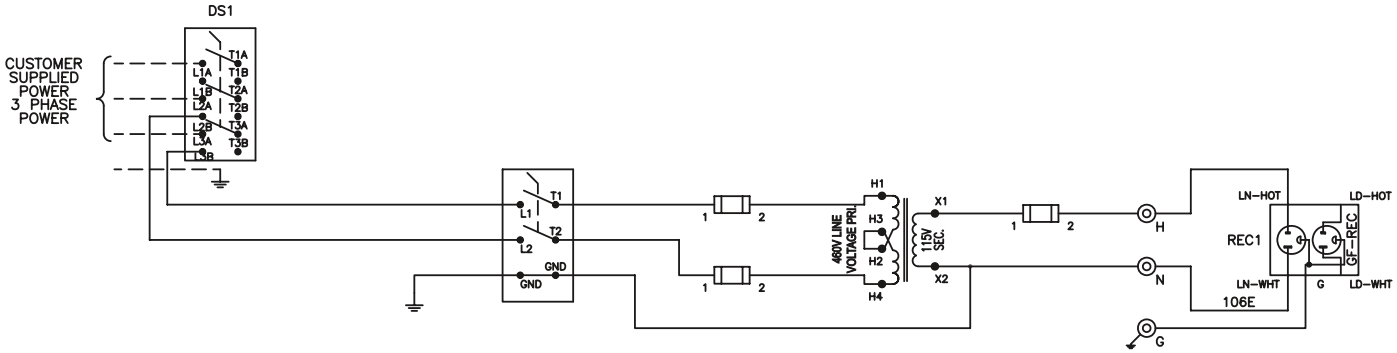
Convenience Receptacle (Field Powered)

A Ground Fault Circuit Interrupter (GFCI) convenience receptacle is provided in the main control box on all units. To use this receptacle, connect a separate field-supplied 115 V power wiring circuit to the outlet.

Convenience Receptacle (Unit Powered)

A Ground Fault Circuit Interrupter (GFCI) convenience receptacle is provided in the main control box on all units. The receptacle shall be powered by a factory installed and wired 120V, 20 amp power supply. The power supply shall be wired to the line side of the unit's main disconnect, so the receptacle is powered when the main unit disconnect is off. This option shall include a GFI receptacle, transformer, and a branch circuit disconnect. The electrical circuit shall be complete with primary and secondary overload protection. See Figure 50 for a branch circuit diagram.

Figure 50: Unit Powered GFCI Receptacle Schematic



Condenser Fan Operation for Variable Speed Compressor Low Ambient Option

(MPS 040 and 050 Only)

Daikin's head pressure control operates by modulating the motor speed of one condenser fan on the VFD compressor refrigeration circuit in response to the condenser pressure. VFD compressor refrigerant circuit contains a solenoid valve that blocks refrigerant flow to half of the condenser coil, which effectively removes 50% of the condenser surface from the circuit for low load/low ambient conditions.

This option allows for mechanical cooling operation down to 0F (-18C). The VFD option senses refrigerant head pressure and varies the fan speed accordingly. When the pressure rises, the SpeedTrol increases the speed of the fan, when the pressure falls. SpeedTrol decreases the speed of the fan.

The VFD throttling range is 250 to 400 psig, fixed, with a corresponding fan speed range of 10Hz to 60Hz. The fan motor is a three-phase motor, identical to the unit voltage (208V to 575V) and is controlled by a variable frequency drive. The variable frequency drive receives a signal from a pressure transducer and varies the speed of the condenser fan accordingly.

The SpeedTrol arrangement for VFD compressors is also employing "Start-Stop control by Speed reference Level" in which the VFD will stop the condenser fan motor under certain conditions. If the head pressure were to fall below 250 PSIG with the condenser fan operating at minimum speed of 10Hz (possibly due to a low ambient or high wind condition) the VFD will shut down the condenser fan. The VFD will restart the condenser fan at 20 Hz if head pressure rises to a level above 250 PSIG. In addition to modulating fan speed, a refrigerant solenoid valve is included in circuit #1. Operation of the solenoid valve is based on head pressure. If the average condensing pressure falls below 250 PSIG (83F sat) for 60 seconds, the condenser solenoid valve closes, effectively removing 50% of the condensing surface. If the averaging condensing pressure rises above 350 PSIG (105F sat) for 60 seconds, the condenser solenoid valve is opened, activating the entire condenser surface. The solenoid valve is disabled above an outdoor ambient of 80F. The solenoid valve is in a normally open configuration.

Refer to Figure 51 for wiring schematics of SpeedTrol. Refer to Figure 52 and Figure 53 for SpeedTrol operating characteristics.

Figure 51: R-410A Speedtrol

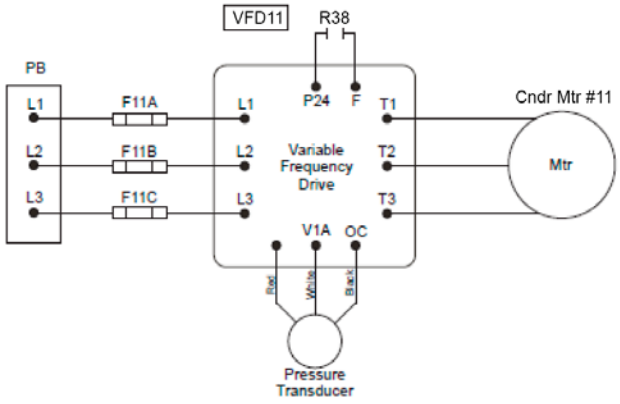


Figure 52: Speedtrol Operating Characteristics (for Variable Speed Inverter Compressor Units)

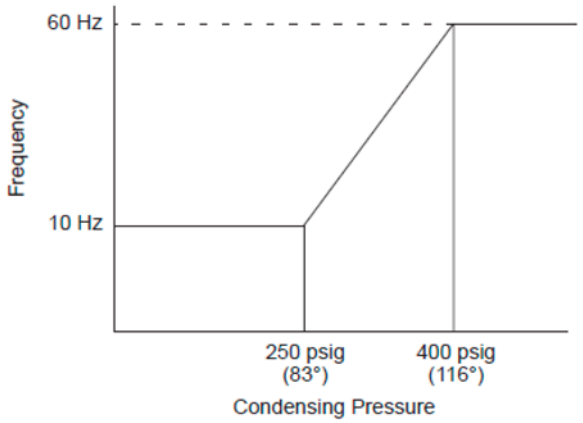
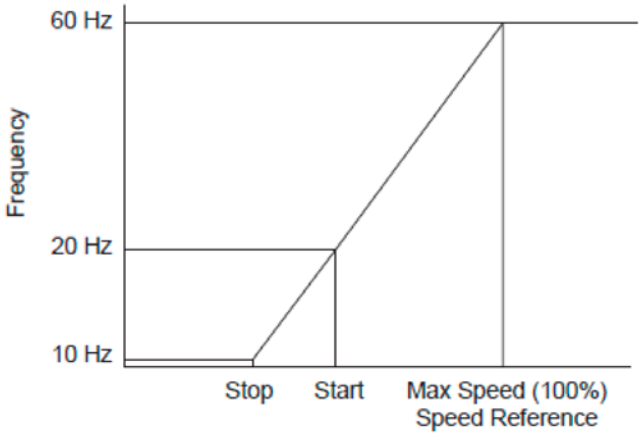


Figure 53: Speedtrol Operating Characteristics (for Variable Speed Inverter Compressor Units with Start-Stop Control)



VFD Compressor Operation

When a MPS is equipped with the VFD compressor option there are two refrigeration circuits, one VFD controlled compressor with up to 3 fixed speed compressors depending on unit model. The VFD compressor must always be the “lead” circuit or first one on and last one off.

VFD compressor modulation is controlled by an analog signal (0 – 10 Vdc) from the unit controller. Refer to Figure 101. The minimum VFD compressor speed is 25 rps (1500 rpm) and the maximum VFD compressor speed is 100 rps (6000 rpm), but the minimum and maximum limits per unit may vary depending on operating conditions and unit model size.

The VFD compressor is a 4 pole motor design that operates off a frequency signal from the VFD between 50Hz and 200Hz.

At Start-up the VFD compressor will automatically ramp up to 50 rps for first 10 seconds for lubrication requirements.

Crankcase heating for VFD Compressor model VZH-088 is performed by the VFD via DC-holding current through the motor windings.

VFD compressor modulation is additionally monitored and adjusted in order to maintain operation within the approved compressor operating envelope.

If the VFD compressor were to become inoperative, any other compressors on the VFD circuit will be disabled. The unit can continue to operate on the remaining fixed speed compressors of the non-VFD circuit until the unit can be serviced.

When the VFD compressor is at its maximum speed and more capacity is required, a fixed speed compressor is started while the VFD compressor is reduced to minimum speed at which point it resumes modulating to maintain the discharge temperature. When the VFD compressor is at its minimum speed and less capacity is required, a fixed speed compressor is turned off while the VFD compressor is increased to maximum speed at which point it resumes modulating to maintain discharge temperature.

Figure 54: VFD Compressor Modulation Signal

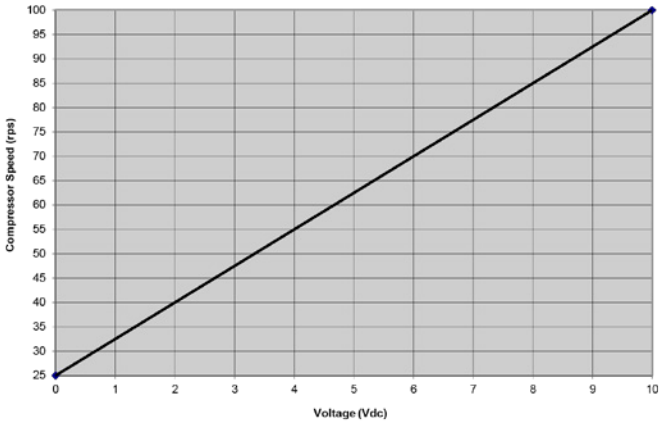


Table 27: VFD Compressor Modulation Ranges

MPS Unit Model	VFD Modulation Range					OilBoostrps/ OilBoostV*
	VFD Min rps/ VFD Min V	VFD Max rps				
		VFD and Fixed Comp(s) On			VFD Comp Only VFDMax rps/ VFDMaxV	
		1 Fixed On	2 Fixed On	3 Fixed On		
		VFD1Max rps/ VFD1MaxV	VFD2Max rps/ VFD2MaxV	VFD3Max rps/ VFD3MaxV		
026	39 rps / 0 Vdc	60 rps / 4.0 V	55 rps / 4.0 V	NA	70 rps / 6.0 V	70 rps / 4.0 V
030	39 rps / 0 Vdc	100 rps / 8.7 V	80 rps / 7.3 V	NA	100 rps / 10.0 V	100 rps / 7.3 V
035	39 rps / 0 Vdc	100 rps / 8.7 V	80 rps / 7.3 V	NA	100 rps / 10.0 V	100 rps / 7.3 V
040	39 rps / 0 Vdc	85 rps / 8.0 V	85 rps / 8.0 V	80 rps/ 7.3 V	100 rps / 10.0 V	100 rps / 7.3 V
050	39 rps / 0 Vdc	85 rps / 8.0 V	85 rps / 8.0 V	80 rps/ 7.3 V	100 rps / 10.0 V	100 rps / 7.3 V

* High and Low Oil Boost are explained on page 57

VFD Compressor Control

Control of the VFD compressor is accomplished with a digital output enable signal and a 0-10VDC analog modulating control signal.

General VFD Compressor Start Sequence

On a call for VFD compressor operation the VFD enable output is energized (on) and the 0-10VDC analog control signal is set to 3.33VDC (50 rps) for 10 seconds. During this 10 second initial period the VFD compressor's internal logic ramps the compressor to 50 rps to insure compressor startup oil lubrication. After 10 seconds the VFD compressor control signal begins modulation to maintain the cooling discharge set point.

NOTE: In addition to enabling VFD compressor operation the VFD enable output is used to energize the liquid line drop solenoid on the VFD circuit. (Only for Low Ambient Option)

Compressor Stage Up Transition

When the VFD compressor has been operating at maximum capacity for the cooling stage time period and there is a call for more cooling capacity the following transition sequence is followed when staging up.

During each fixed compressor stage UP sequence, the VFD compressor speed is reduced to its minimum, as a fixed speed compressor is turned on. Note that the VFD compressor speed range is extended for these staging points to assure smooth transition and to minimize capacity gaps. Typically, the VFD compressor is overdriven (higher speed than normal full load rating speed) before staging up a fixed compressor. The VFD is held at minimum speed for 30 seconds before normal modulation resumes.

Compressor Stage Down Transition

When the VFD compressor has been operating at minimum capacity for the cooling stage time period and there is a call for less capacity the following transition sequence is followed when staging down.

During each fixed speed compressor stage DOWN sequence, the VFD compressor speed is increased to maximum speed (which varies with unit size and number of operating fixed compressors) as a fixed speed compressor is turned off. Note that the VFD compressor speed range has been extended for these staging points to assure smooth transition and to minimize capacity gaps. Typically, the VFD compressor will be overdriven (higher speed than normal full load rating speed) when staging down a fixed compressor.

Dehumidification Transition During Cooling State

When dehumidification operation becomes active while the unit is in the Cooling operating state, The VFD compressor is ramped to its maximum capacity. If the VFD capacity at this point is already above 75% of its full modulation a fixed compressor is also turned on. The compressors are held at this capacity for 1 minute before normal modulation resumes, to maintain leaving coil temperature (LCT).

- VFD compressor will load up completely before starting any fixed speed compressors to achieve LCT of 45F (default) with the VFD compressor option. LCT may be set between 45F to 52F.
- If reheat signal is at 100% for 10 minutes and the unit is unable to raise the DAT to desired point, the controller will stage off 1 fixed compressor and modulate the VFD compressor speed to achieve the DAT set point.

Oil Balance/Boost Operational Sequence

When a low oil level is indicated in the VFD compressor sump, the unit switches to either an oil balance or oil boost state. The VFD compressor speed is increased during these modes to promote the return of refrigerant oil to the VFD compressor.

To avoid short cycling of the oil balance/boost sequence, no action is taken until a low oil indication has been present for 5 consecutive run minutes.

The unit determines whether to enter the oil balance or oil boost mode based on the running conditions when a low oil indication is experienced. The balance mode is only used when a VFD compressor is part of a tandem compressor set. The balance mode is usually entered first, and is utilized to move oil from the fixed speed compressor to the VFD compressor. If this mode fails to resolve the low oil indication issue, the unit will then go into the boost mode. The boost mode is utilized to return oil from the refrigerant system to the compressors. VFD compressors that are not part of a tandem compressor arrangement will skip the balance mode and only utilize the boost mode.

The balance mode will be entered if the VFD compressor is part of a tandem compressor arrangement and the fixed speed compressor is running, and there is a low oil indication. Upon entering the oil balance mode the fixed speed compressor is turned off and the VFD compressor speed is increased to the oil boost value shown in Table 20. The VFD compressor runs at this condition until the optical oil sensor verifies that oil is present for 3 continuous minutes. Unit Controller default is set for a 10 minute max balance.

If the oil balance mode fails to resolve the low oil condition, or the fixed speed compressor was not running when the low oil indication occurred, or the VFD compressor was not part of a tandemized compressor set, when the low oil indication occurred, the unit will enter boost mode

Upon entering oil boost mode, the VFD compressor speed is increased to the oil boost value shown in Table 20. If the VFD compressor is part of a tandem arrangement, the fixed speed compressor is started as well. The VFD compressor runs at this condition until the optical oil sensor verifies that oil is present for 3 continuous minutes. Unit Controller default is set for a 10 minute max boost.

During the oil balance/boost sequence the DAT temperature is overridden to allow the VFD compressor to continue operating until oil balance/boost sequence termination.

If one or more fixed speed compressors on the non VFD compressor circuit is operating, and the fixed speed compressor on the VFD compressor circuit was not already running when entering the oil boost mode, one fixed speed compressor on the non VFD compressor circuit will be turned off to minimize the disturbance to the DAT.

Oil balance/boost sequences and durations are logged in the unit controller.

If low oil indication does not clear, the VFD compressor will be shut down and oil level will be monitored for an additional 15 minutes. If low oil indication still does not clear within these 15 minutes, the VFD compressor will be locked out on alarm.

The low oil problem is also generated and the VFD compressor circuit is disabled if the oil boost sequence is initiated more than 4 times in a 24 hour period. If the oil balance/boost sequence successfully restores the VFD compressor oil level the fixed compressor stage is returned to its pre-oil balance/ boost condition and normal compressor sequencing and modulation resumes

VFD Compressor Protection Unloading Control

There are several modulating control functions that adjust the speed control range of the VFD compressor to protect it from damage under abnormal operating conditions. The following functions are provided by the unit controller

- High Pressure Unloading Control
- High Discharge Line Temperature Unloading Control
- High/Low Discharge Superheat Control
- Condenser Coil Splitter Valve Control (For Low Ambient Option)

High Pressure Unloading Control

The VFD compressor has an upper operating sat discharge pressure limit of 575 PSIG. If the discharge pressure exceeds 575 PSIG, the compressor speed is reduced 1 rps every 10 seconds until the discharge pressure is at or below 575 psig.

If the discharge pressure does not drop below 575 PSIG with the VFD compressor operating at minimum speed (30 rps), the compressor is locked out on alarm.

In addition, when the VFD compressor is operating above a sat discharge pressure of 525 PSIG, the VFD compressor maximum speed is limited to 90 rps and the minimum speed is limited to 30 rps.

A high side pressure transducer is standard on the VFD circuit allowing the discharge pressure of the refrigerant circuit to be viewed at the unit controller display.

If the unit controller needs to reduce the compressor speed in order to limit discharge pressure, the action is recorded in unit controller event log section.

High Discharge Line Temperature Unloading Control

A compressor discharge temperature sensor (Thermistor) is installed on the VFD compressor as standard. The temperature is used to measure discharge temperature and superheat levels at the VFD compressor discharge.

If the compressor discharge temp reaches 250F, the VFD compressor speed is reduced by 10 rps and monitored for 3 additional minutes. The unit controller will continue to reduce VFD compressor speed by 10-rps increments until the discharge temp drops below 250F. If the VFD compressor discharge temp reaches 250F a warning will be logged in the controller. If reduced compressor speed does not resolve the issue, the VFD compressor is shut down and allowed to cool for 30 minutes. The VFD compressor is then re-started and if the discharge temperature cannot be held under 250F, the VFD compressor is locked out. The root cause may be connected to a number of issues (low charge, blocked condenser coil, condenser fan failure, malfunctioning TEV, etc.) and service is needed.

The VFD compressor discharge Temp has an upper limit of 275F. The VFD compressor will be shut down if discharge temp reaches 275F.

NOTE: The fixed speed compressor circuit does not contain this feature.

Low/High Discharge Superheat

With the high side pressure transducer and discharge thermistor, the unit controller is capable of monitoring the variable speed compressor discharge superheat. This feature protects the VFD compressor against flood back, undercharged conditions, overcharged conditions, malfunctioning TEV, etc. Typical compressor superheat range is 20F to 75F. The discharge temperature of the VFD compressor can be viewed at the unit controller display.

Low Superheat

If the compressor discharge superheat falls below 20F for 15 consecutive run minutes, the VFD compressor speed is increased by 5 rps increments up to a 60 rps operating speed. Superheat is monitored at each speed for 10 minutes and if superheat remains below 20F, the VFD compressor speed is increased an additional 5 rps. When compressor discharge superheat level is at 20F or above, the compressor speed is no longer increased. If speed correction resolves problem, the unit controller will have logged that a speed correction was needed for superheat in the event log. If increasing speed does not correct issue, the VFD compressor is locked out and an alarm is logged in the unit controller.

High Superheat

If the VFD compressor discharge superheat rises to 75F for 10 consecutive minutes, the VFD compressor speed is reduced by 10 rps increments down to a 40 rps operating speed. Superheat is monitored at each speed for 10 minutes and if superheat remains above 75F, the VFD compressor speed is decreased an additional 10 rps. When compressor discharge superheat level is at 75F or below, the compressor speed is no longer decreased. If speed correction resolves problem,

the unit controller will have logged that a speed correction was needed for superheat in the event log. If decreasing speed does not correct issue, the VFD compressor is locked out and an alarm is logged in the unit controller.

Manual Control (with VFD Compressor)

For service and troubleshooting the unit controller has capability to allow the VFD compressor to be operated manually. Refer to the controller OM-920 for more detail.

The basic manual operations include the following:

- Start or Stop the VFD compressor
- Modulate VFD compressor from 0 – 100% speed
- Ability to energize condenser coil splitter solenoids (Only for low ambient option)
- Ability to initiate or terminate oil boost sequence

If an electrical issue with the VFD compressor is suspected, the winding resistance can be checked at the motor terminals.

Table 28: VFD Compressor Winding Resistance

Compressor Model	Voltage	Winding Resistance (Ohms)
VZH-088B-X	208-230V	0.03
VZH-088B-X	460V	0.10
VZH-088B-X	575V	0.10

Condenser Coil Splitter Solenoid Valve Control (MPS 040 and 050 Only)

Condenser coil splitting is avaialble only on VFD compressor circuit of a unit with low ambinet option. This feature assists in maintaining head pressure during low ambient/low modulating operation. A solenoid valve on each circuit is controlled by a digital output from the MicroTech III controller.

The coil splitter solenoid valve is controlled based on the average discharge line pressure equivalent saturation temperature determined from the corresponding discharge pressure transducer monitored via an analog input to the MicroTech III controller.

The splitter solenoid valve on each circuit is normally open (digital output de-energized). The splitter valve on a circuit is closed (energized) when that circuit's saturation temperature remains below 83.0°F (250 psig) continuously for 60 seconds and the OAT is less than or equal to 80.0°F. The solenoid valve is re-opened when the saturation temperature rises above 105.0°F (350 psig) continuously for 60 seconds and the OAT rises above 80°F or when all the compressors on the circuit are OFF.

If the average saturated discharge temp falls below 250 PSIG (83F) for 60 seconds and condenser coil splitter solenoid coil is energized (closed), the VFD compressor modulation rate is increased until an average saturated discharge temp of 250 PSIG (83F) is achieved. This operation will raise the lower modulation limit of the VFD compressor, but is needed to keep the VFD compressor inside its operating envelope and maintain head pressure for TEV control.

When the condenser coil splitter is energized (closed) and the VFD compressor discharge pressure is below 250 PSIG, the VFD compressor speed is increased by 5rps increments every 30 seconds until the discharge pressure exceeds 250 PSIG. When the VFD compressor reaches 250 PSIG, this speed becomes the new minimum speed of the VFD compressor. As the discharge pressure rises above 250 PSIG, the minimum allowable compressor speed is decreased in 5 rps increments every 30 seconds.

If the condenser coil splitter valve is closed and the VFD compressor discharge remains below 250 PSIG for 15 minutes the circuit is locked out and an alarm is logged in the unit controller.

If a speed correction was performed to increase the compressor discharge pressure, there will be a record of the action in the unit controller under the event log.

VFD Compressor Emergency Stop Control

If the VFD compressor enable output signal has been ON for 30 seconds and the controller fails to receive the VFD run verification input, VFD Compressor Emergency Stop Control is activated. When this function is active, VFD compressor enable output will be turned OFF for 5 seconds and then turned ON and ramp VFD compressor speed to 60Hz. If controller receives a VFD run verification input, a log event is set on VFD Emergency Stop Control. If controller fails to receive the VFD run verification input after 3 attempts in 30 minutes, the VFD compressor is locked out and the problem is logged.

Once active the VFD Compressor Emergency Stop Control function remains active until one of the conditions are met.

- VFD compressor enable output signal has been ON for 30 seconds and VFD compressor status Input is ON
- VFD compressor is OFF

If the controller fails to receive the VFD run verification input after the VFD compressor enable output signal has been ON for 30 seconds, the circuit is shut OFF on VFD Compressor Emergency Stop Control alarm.

Whenever this protection function becomes active a VFD Compressor Emergency Stop Control event is recorded in the Event Log with date and time stamp. Whenever this protection function returns to normal a VFD Compressor Emergency Stop Control return to normal event is recorded in the Event Log with date and time stamp.

Variable Speed Scroll Compressor

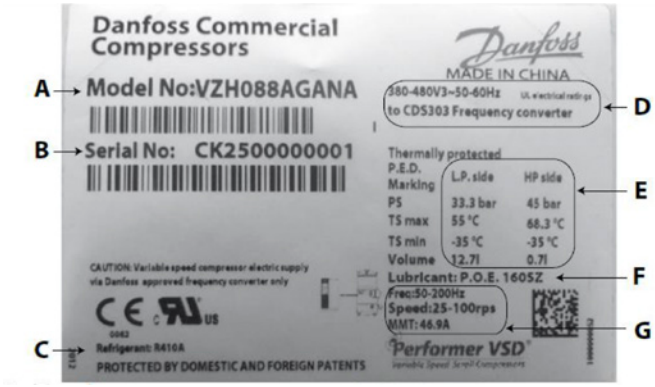
⚠ WARNING

The compressor must only be used for its designed purpose(s) and within its scope of application (refer to the Operating Limits). Consult the Application Guidelines. Under all circumstances, the EN378 (or other applicable local safety regulations) requirements must be fulfilled.

Daikin units with variable speed inverter compressor are engineered with fixed speed compressor(s) in such a way that the unit delivers only the required energy to satisfy space conditions and provides you with exceptional energy savings. It improves comfort through precise temperature and humidity control. Variable speed compressor enhances energy efficiency and capable of providing unit capacity modulation down to 20% and reduces compressor cycling and wear on compressor.

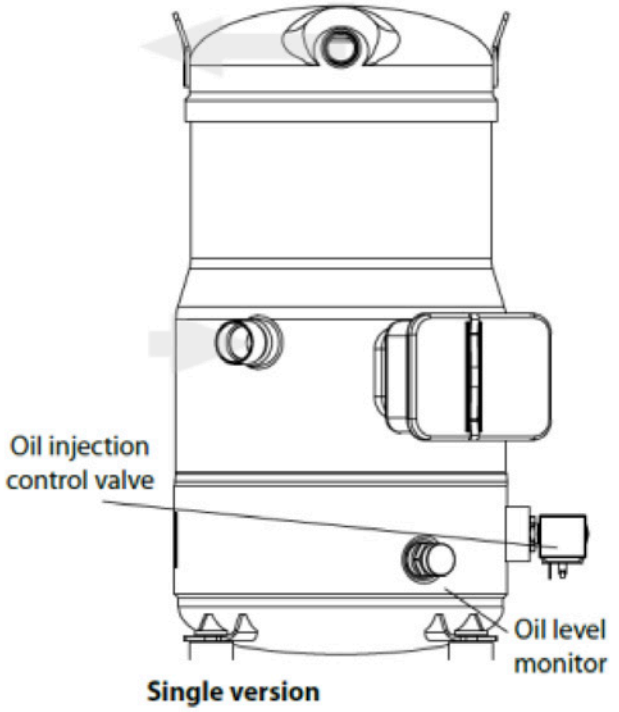
Daikin rooftop units with variable speed Inverter compressors are provided with Internal Permanent Magnet (IPM) motors. Compressors are designed to vary capacity by modulating the speed of the scroll set. The speed ratio for the IPM motor compressor is 4:1 (25 rps to 100 rps). Condenser fans staging and an oil management/monitoring system are provided for reliable operation. The VFD compressor will always be on the “lead” circuit and will be the first one ON and last one OFF.

Figure 55: Compressor Nameplate Information



A.	Model number
B.	Serial number
C.	Refrigerant
D.	Supply voltage to CDS303 frequency converter
E.	Housing service pressure
F.	Factory charged lubrication
G.	Compressor frequency and MaxMust trip current

Figure 56: Compressor Components



Oil Injection Control

The VFD compressor contains an oil injection valve and solenoid (SV11) as standard. The oil injection valve provides lubrication to the scroll set under low speed/low refrigerant velocity situations. The oil injection valve is a normally closed valve. Below 50 rps (100 Hz) the valve is closed and directs oil to the scroll set suction port. Above 50 rps (100 Hz) the solenoid is bypassed and sends oil into sump. The oil injection valve/ solenoid is mounted directly on the compressor and is controlled by the Compressor VFD (relay 1 output, terminals NO & Com). The coil voltage for the oil injection solenoid is 24 Vac.

The coil can be removed if required by carefully prying off the valve stem. The wiring connector is attached to the coil by a screw in the center of the housing. Refer to Figure 57 and Figure 58.

Figure 57: Assembly Components

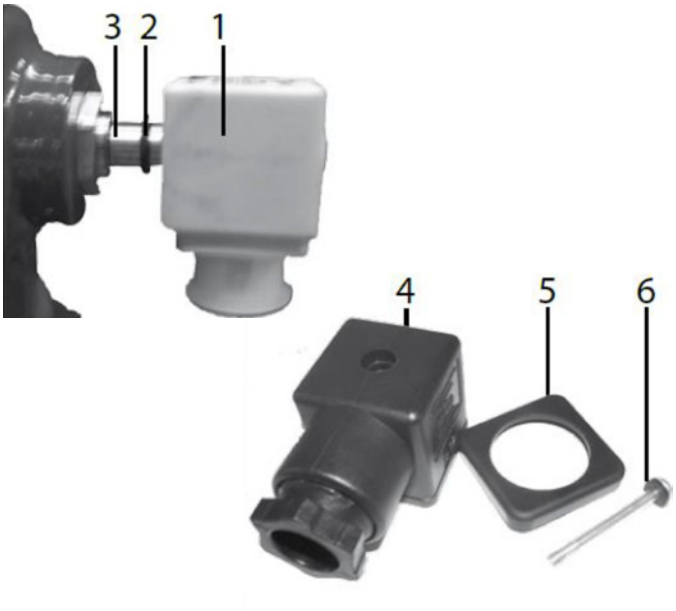
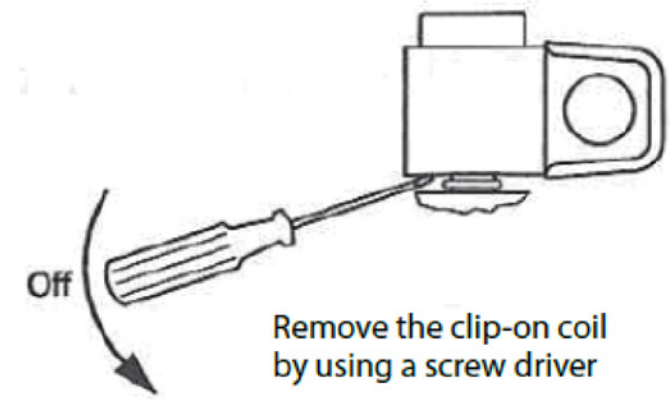


Figure 58: Oil Injection Control Dismanteling



Optical Oil Level Sensor

An optical oil sensor is used to monitor oil level in VFD compressor sump. The sensor is mounted directly to a fitting on the VFD compressor shell and can be removed without having to depressurize/reclaim the refrigeration system. Optical oil indication signal is sent to MTIII Expansion Module 'C' (terminals X3 & M). Normal oil indication will provide a contact closure from relay R40. Relay R40 will de-energize during low oil indication, removing signal to terminal X3 and will start the unit in an oil boost sequence. Refer to Figure 59 and Figure 60

Figure 59: Sightglass for Optical Oil Sensor/Switch

Figure 60: Optical Oil Level Sensor/Switch

Electrical Connections and Wiring

Basic Connections

Depending on the frequency converter version, the physical position of individual connectors may differ. Always make sure that the compressor terminals, U, V and W are connected to the frequency converter terminals, 96, 97 and 98 respectively.

The compressor motor cable is shielded and the armoured part of the cable is connected to a ground on both cable ends; at the side of the compressor and at the side of the frequency converter.

Variable Frequency Drive for VFD Compressor

⚠ WARNING

Never bypass the compressor drive or directly connect the VFD compressor to the main power supply.

⚠ WARNING

The compressor drive is preset to run the compressor clockwise.

⚠ WARNING

Variable Speed Inverter Compressor

The VFD is factory-programmed and should not be modified in the field. Any modifications will void the warranty. Compressors are compatible with the manufacturer's VFD only.

The compressor drive used for this option is a special series (CDS 303) that is intended for use with an IPM compressor motor and cannot be replaced with any off the shelf VFD.

The compressor drive is mounted in the main control box.

The compressor drive and the LCP (local control panel) are preset with parameters from the factory and should not need to be changed in the field. The LCP is removable and is interchangeable with any of the compressor drives used by any of the VFD compressors. If the need arises to replace the compressor drive, the parameters can be downloaded from the LCP to the new compressor drive.

The compressor drive is preset to run the compressor clockwise and must be connected as shown in the unit schematic.

The compressor drive is preset for an open loop configuration with 0-10Vdc reference corresponding to 1500-6000 Rpm.

The compressor drive generates a soft start with an initial ramp of 2 seconds. In-rush current (or LRA) to the VFD compressor is typically not more than a few percent more than rated nominal Current.

Compressor Speed, modulation signal %, frequency signal, compressor amperage are all displayed in real time on the compressor drive screen. Alarms and descriptions will also be visible on the compressor drive screen.

Basic Operation of Compressor Drive:

Start= Connect terminals 12 & 18 for minimum of 5 secs, connect terminals 12 &27 and terminals 13 &37

Stop= Disconnect terminals 12 & 27

Emergency Stop= Disconnect terminals 13 & 37

Control/Modulation= 0 to 10Vdc signal to terminals 53 & 55

Run Verification= A contact closure from relay 02 (terminals 04 & 05) is provided when drive is running

Oil Injection= A contact closure from relay 01 (terminals 01 & 02) is provided when compressor speed is greater than 50 rps (3000 rpm) which energizes the oil solenoid coil.

The compressor drive contains protection for the compressor against short circuits at the compressor terminals, overload protection , phase loss and earth faults. The compressor drive is protected against short-circuits.

Table 29: Compressor Drive Model & Frame Size

Compressor Model	Drive Model	Frame Size	
		208-230V	460V
VZH-088B	CDS303-15kW	B4	B3
VZH-117B	CDS303-18kW	C3	B4
VZH-170B	CDS303-22kW	C3	B4

Refer to the VFD operational manual for more information.

Figure 61: VAV Power – Fixed Speed Scroll Compressor

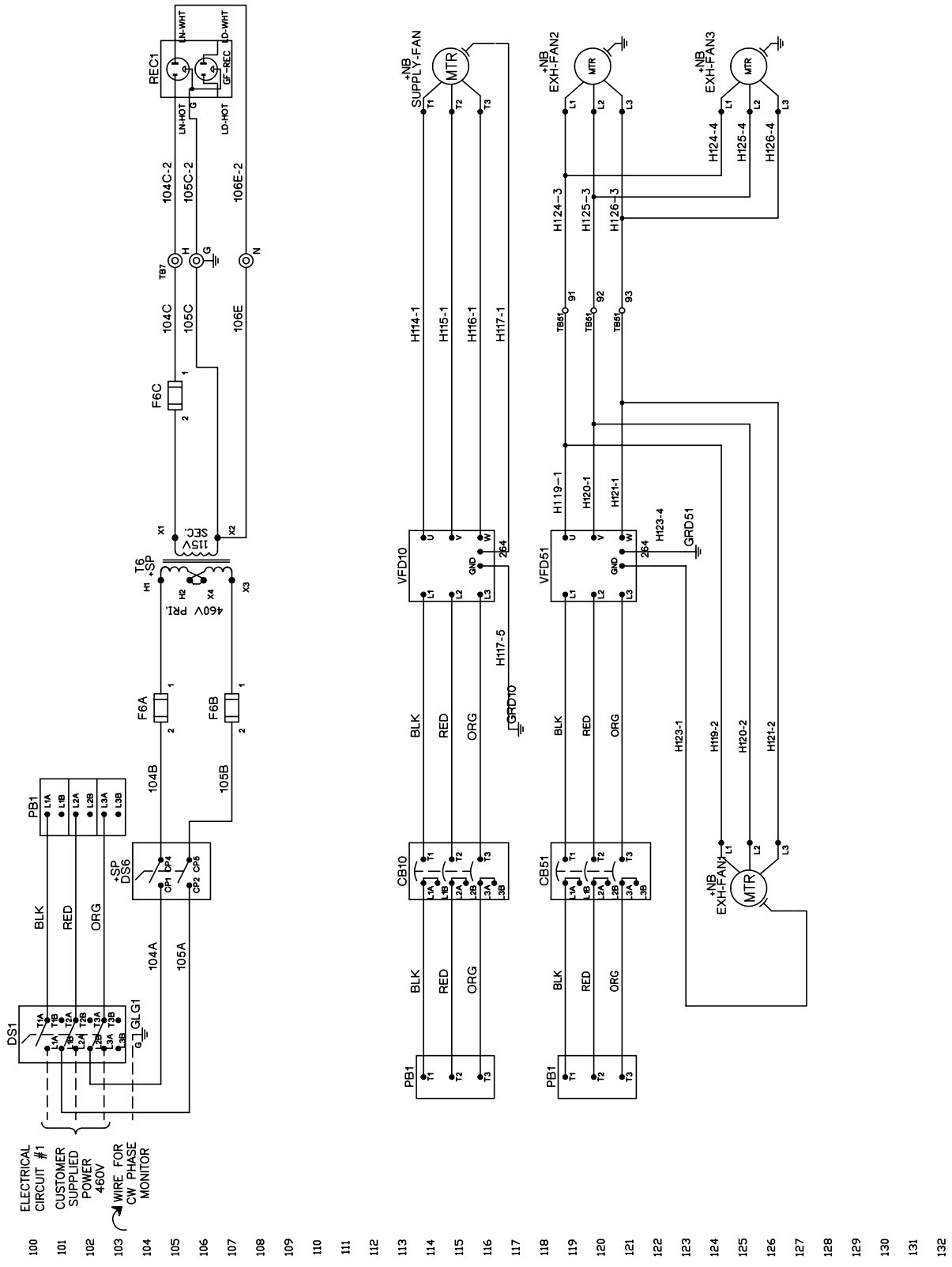


Figure 61 continued: VAV Power – Fixed Speed Scroll Compressor

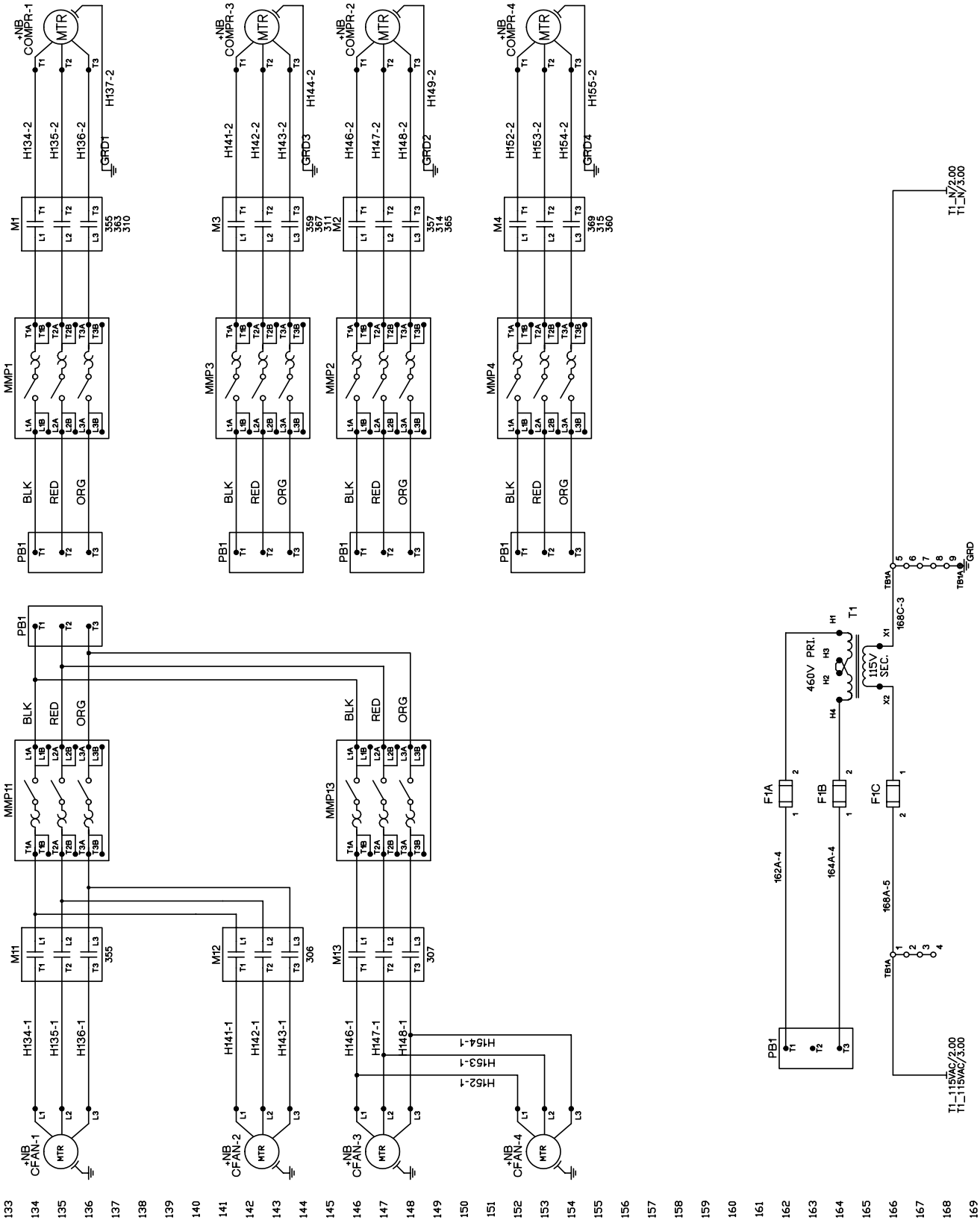


Figure 62: MPS 026 VAV Power with Variable Speed Inverter Compressor

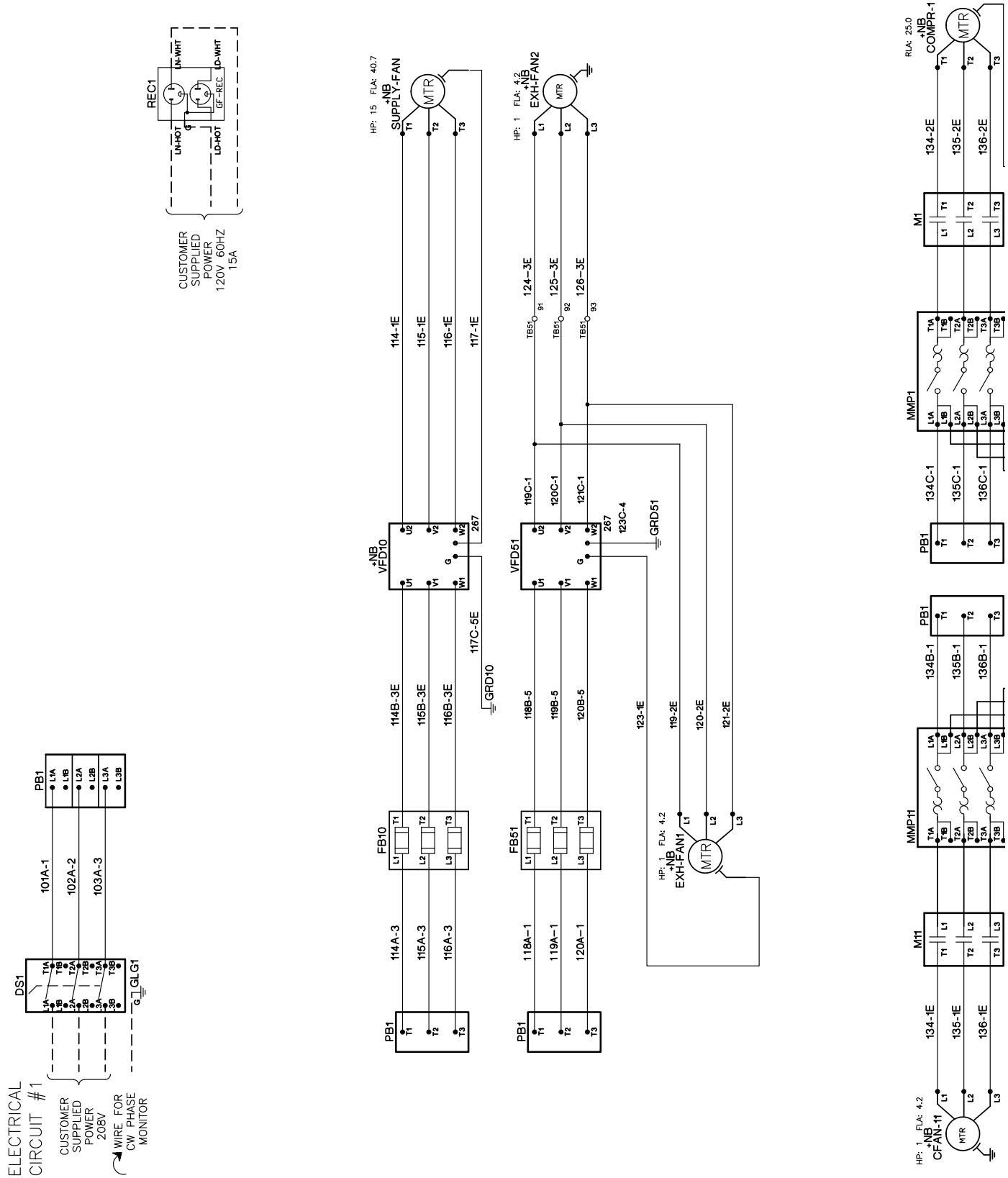


Figure 62 continued: MPS 026 VAV Power with Variable Speed Inverter Compressor

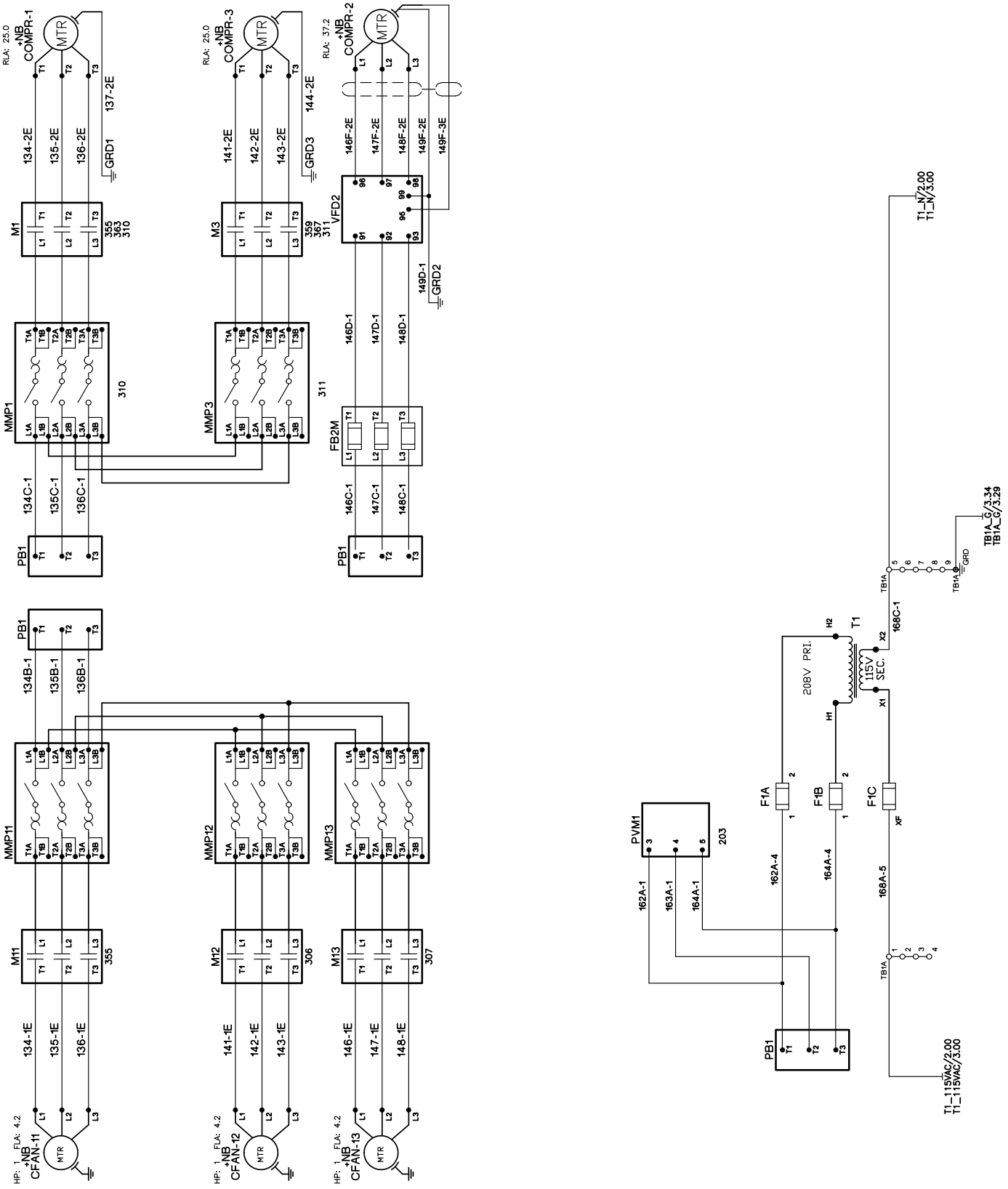


Figure 63: MPS 030–050 VAV Power with Variable Speed Inverter Compressor

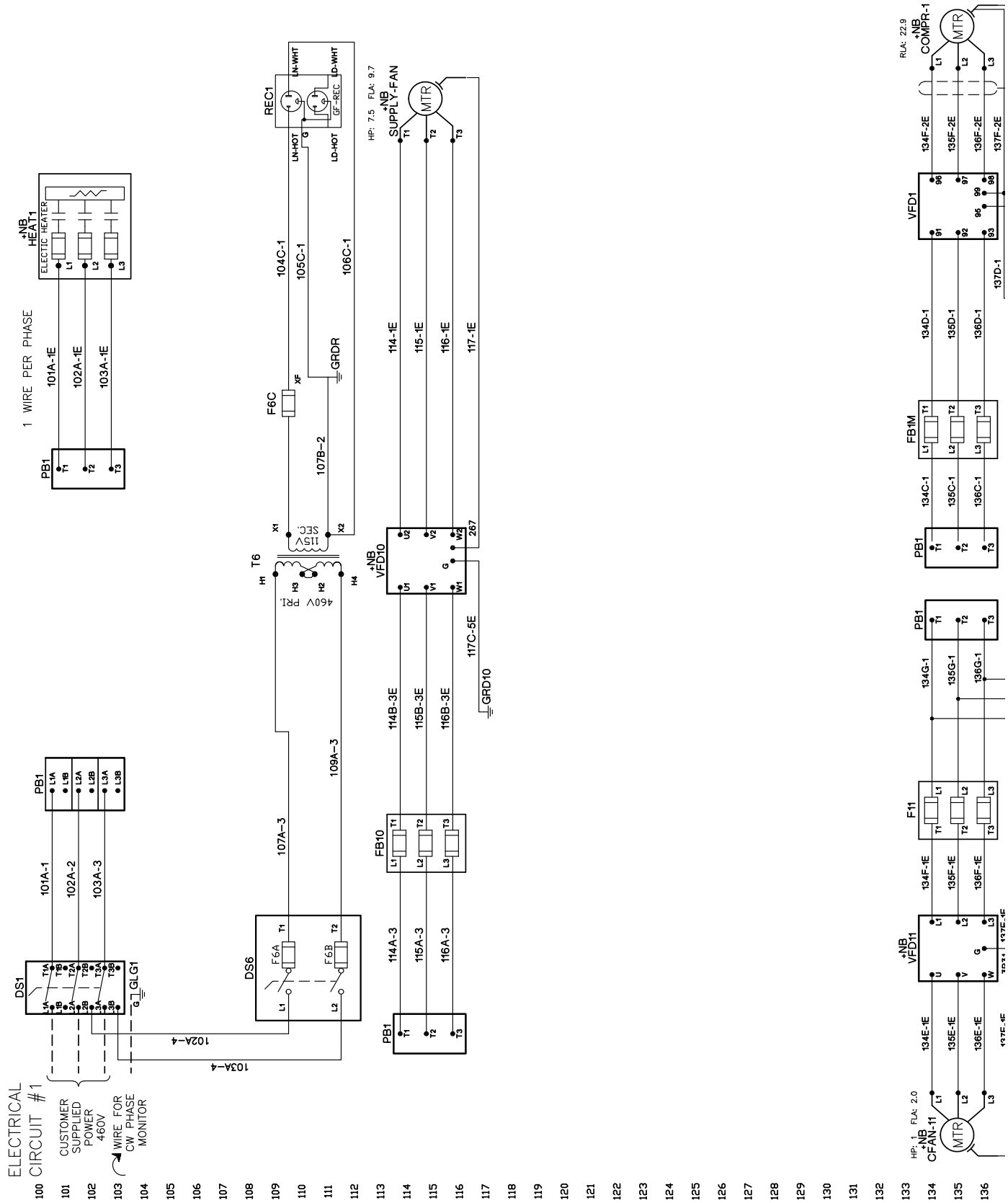


Figure 63 continued: MPS 030–050 VAV Power with Variable Speed Inverter Compressor

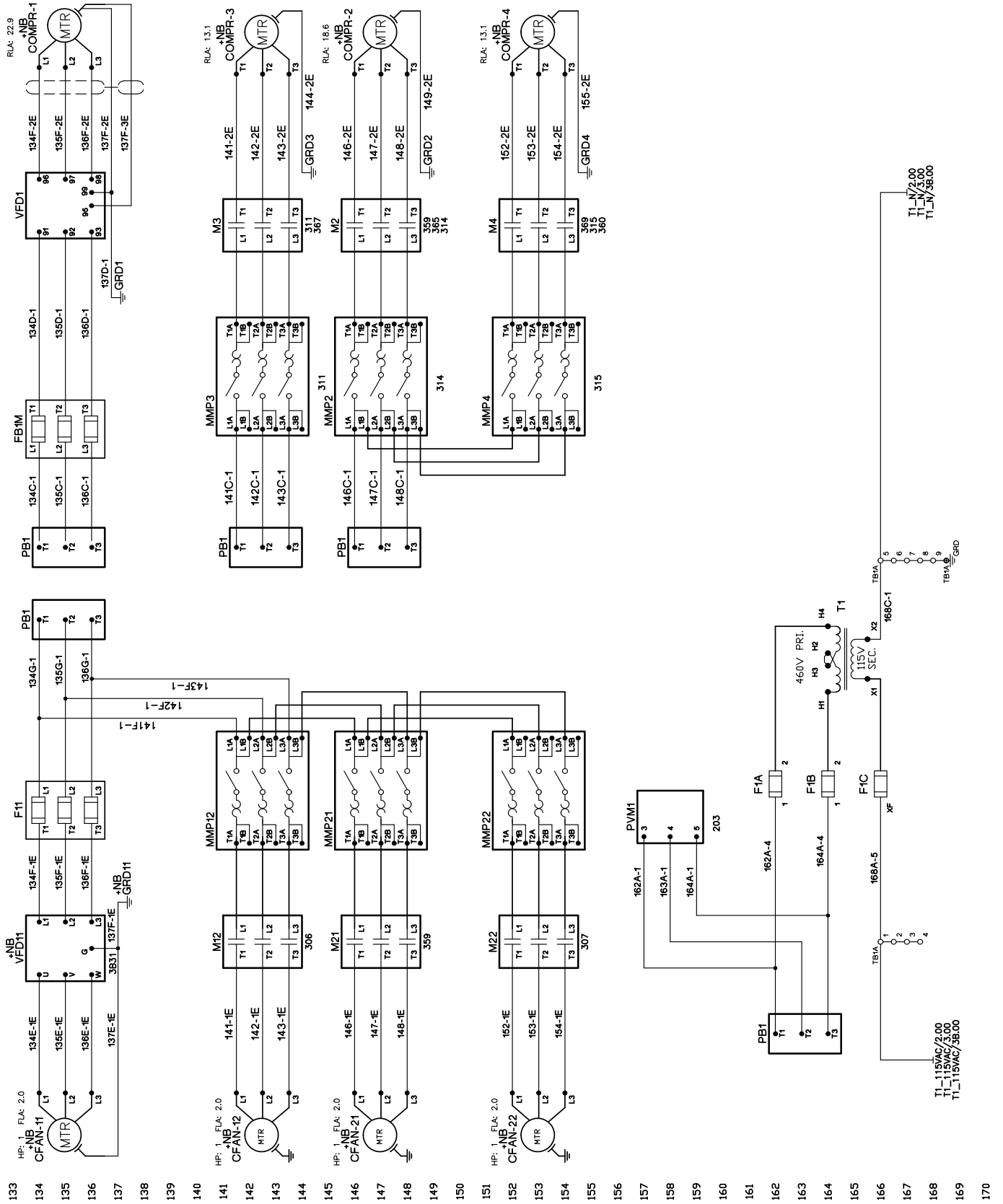


Figure 64: VAV Control – Inputs

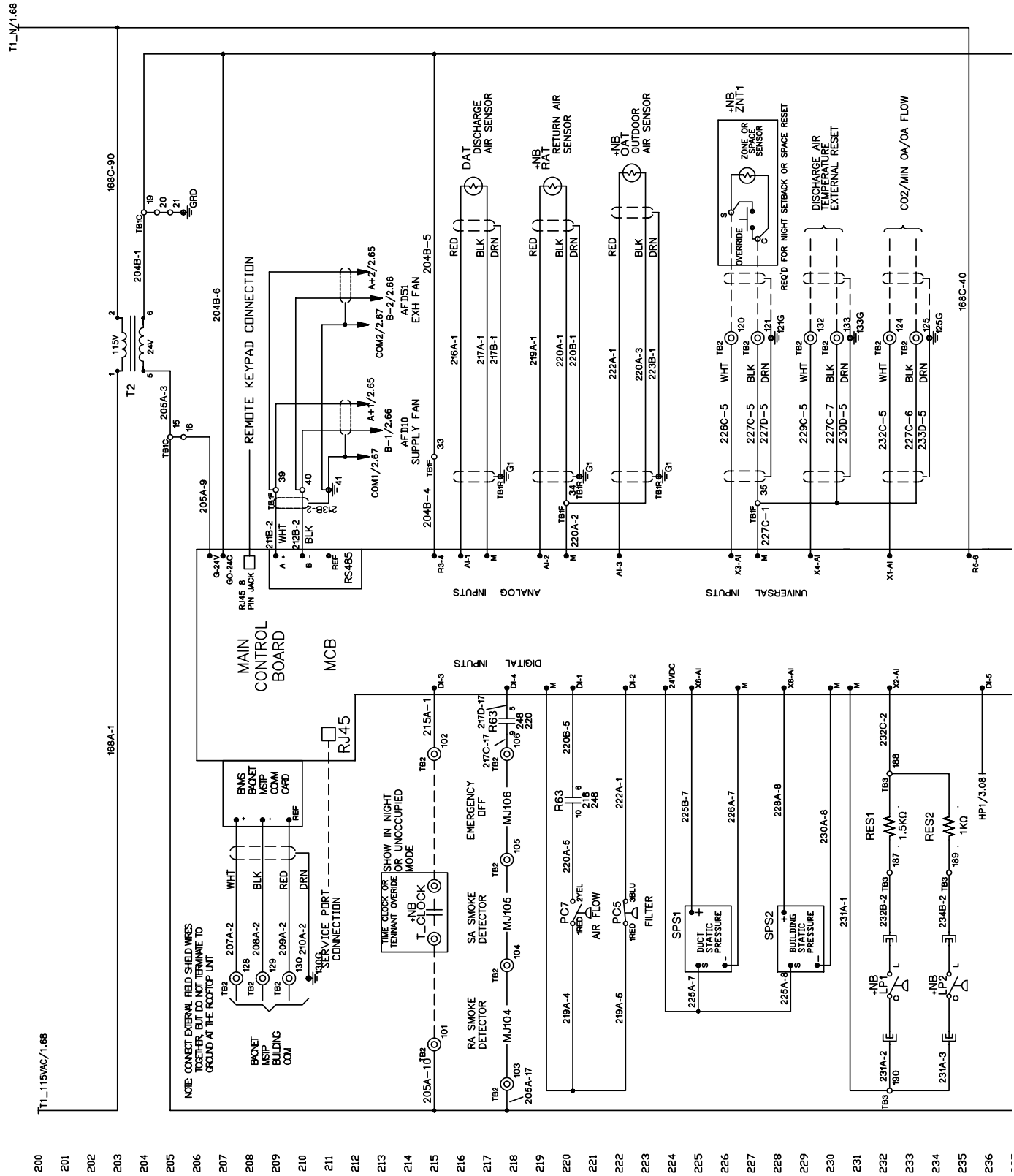


Figure 64 continued: VAV Control – Inputs

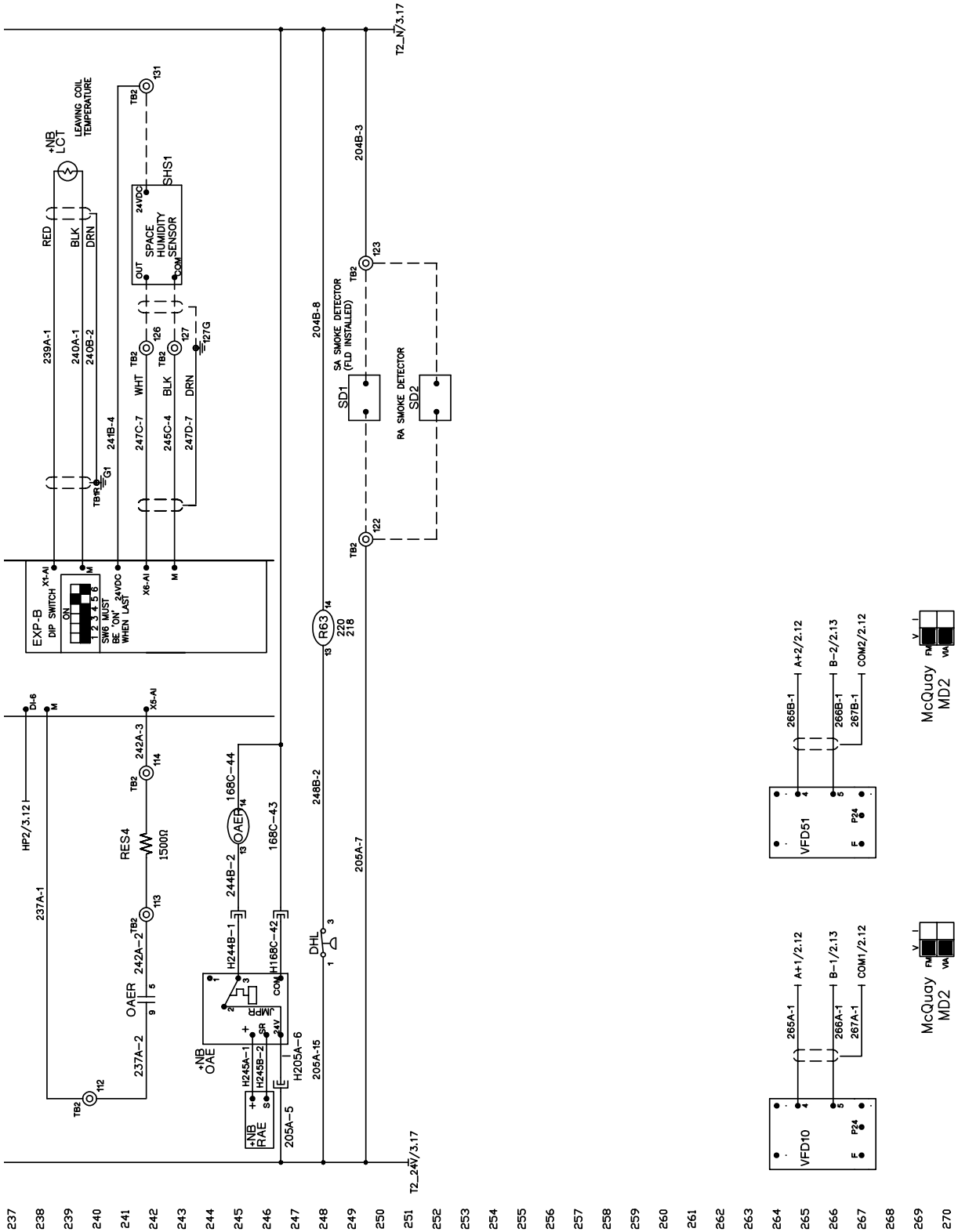


Figure 65: MPS 026 VAV Control with Variable Speed Inverter Compressor

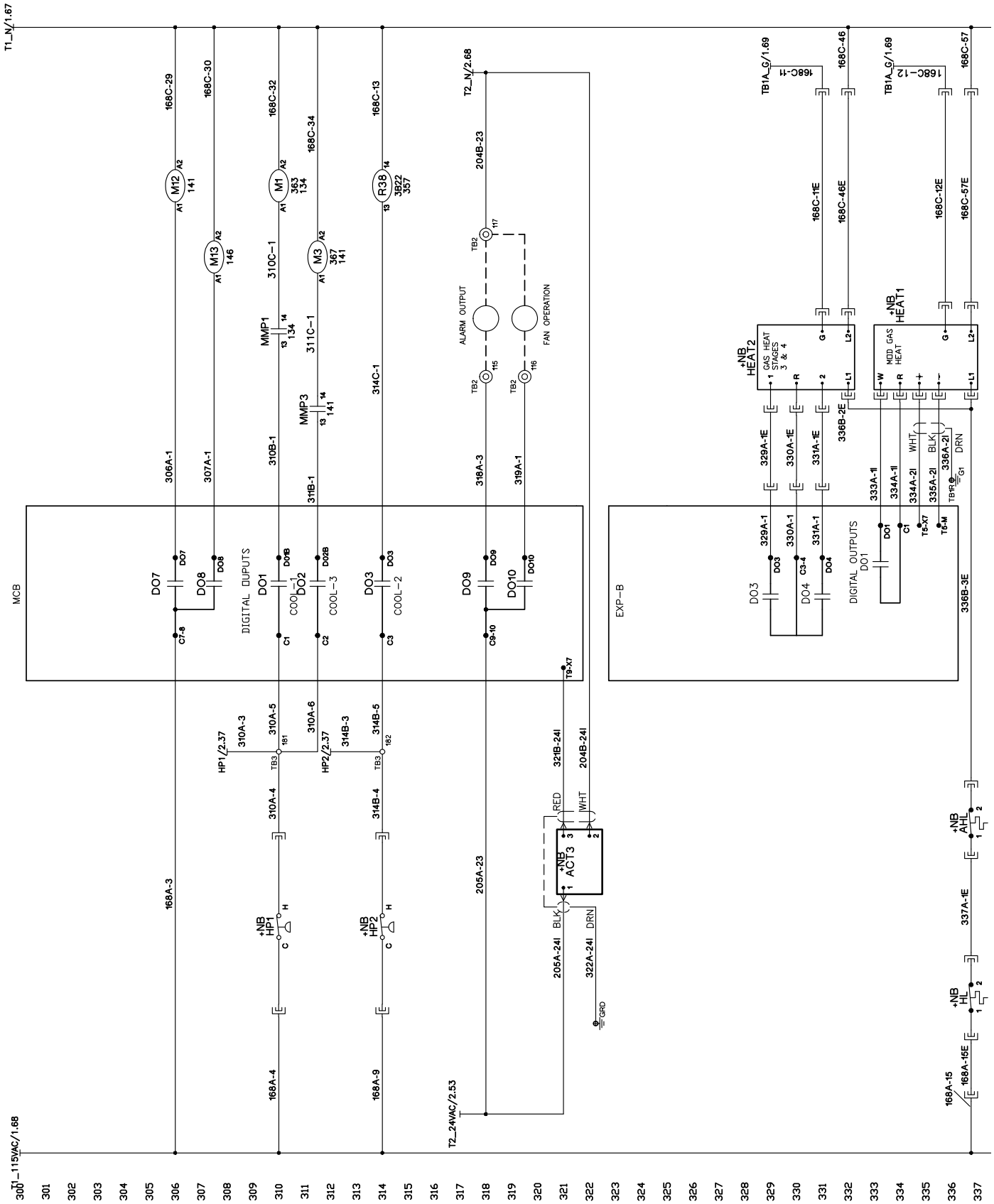


Figure 65 continued: MPS 026 VAV Control with Variable Speed Inverter Compressor

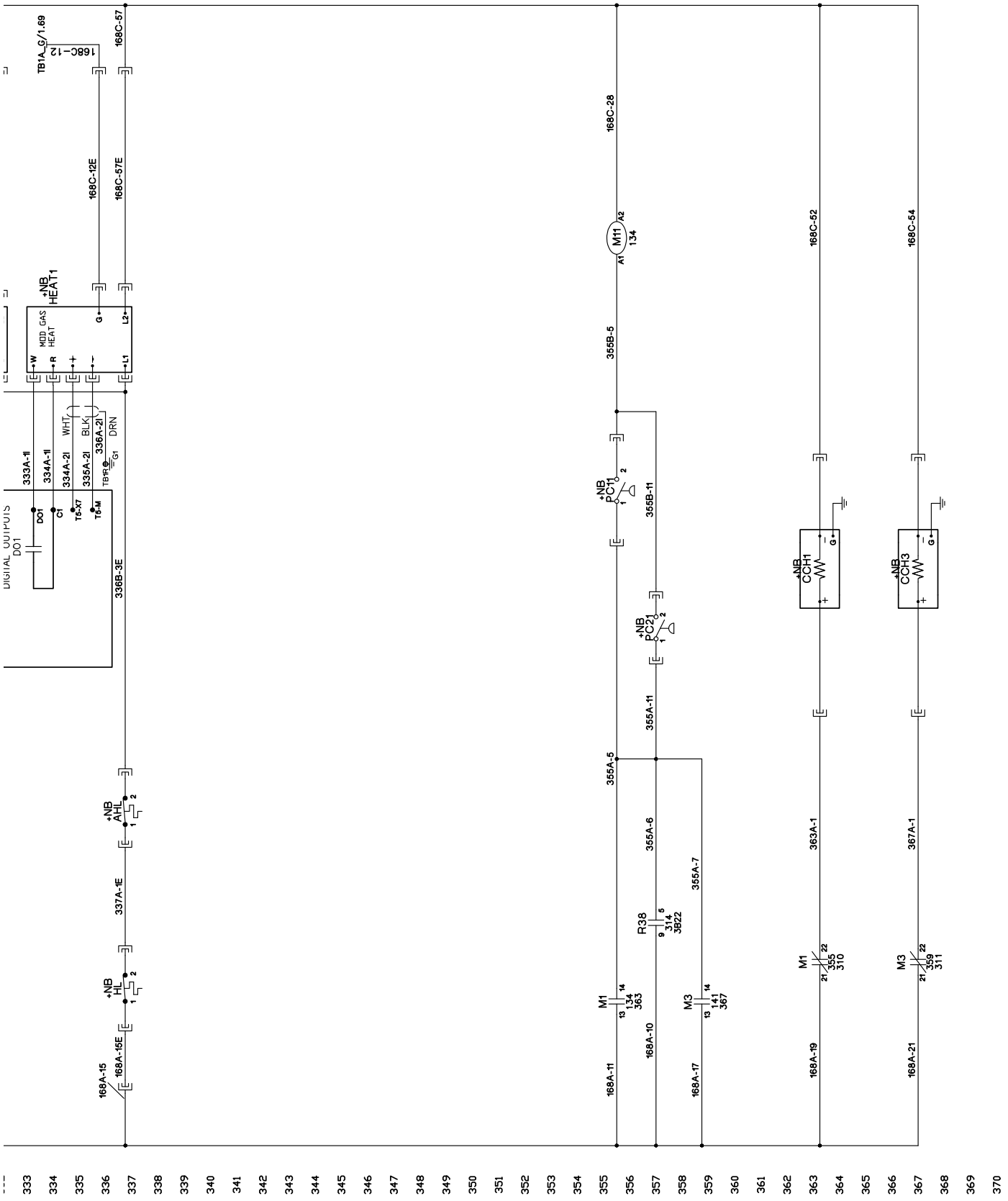


Figure 66: MPS 026 with Variable Speed Inverter Compressor – without Low Ambient Option

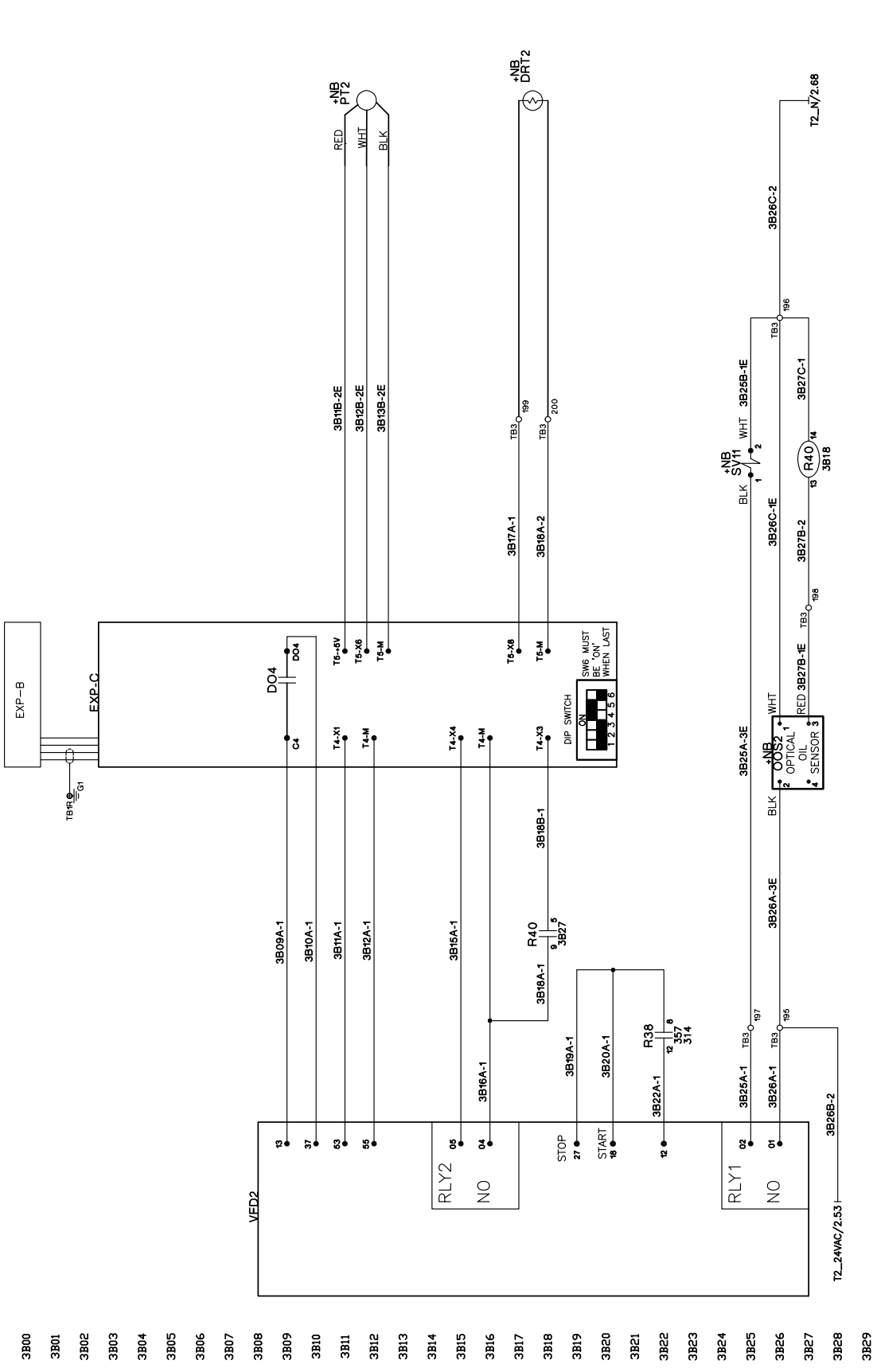


Figure 67: MPS 030 – 050 VAV Control with Variable Speed Inverter Compressor

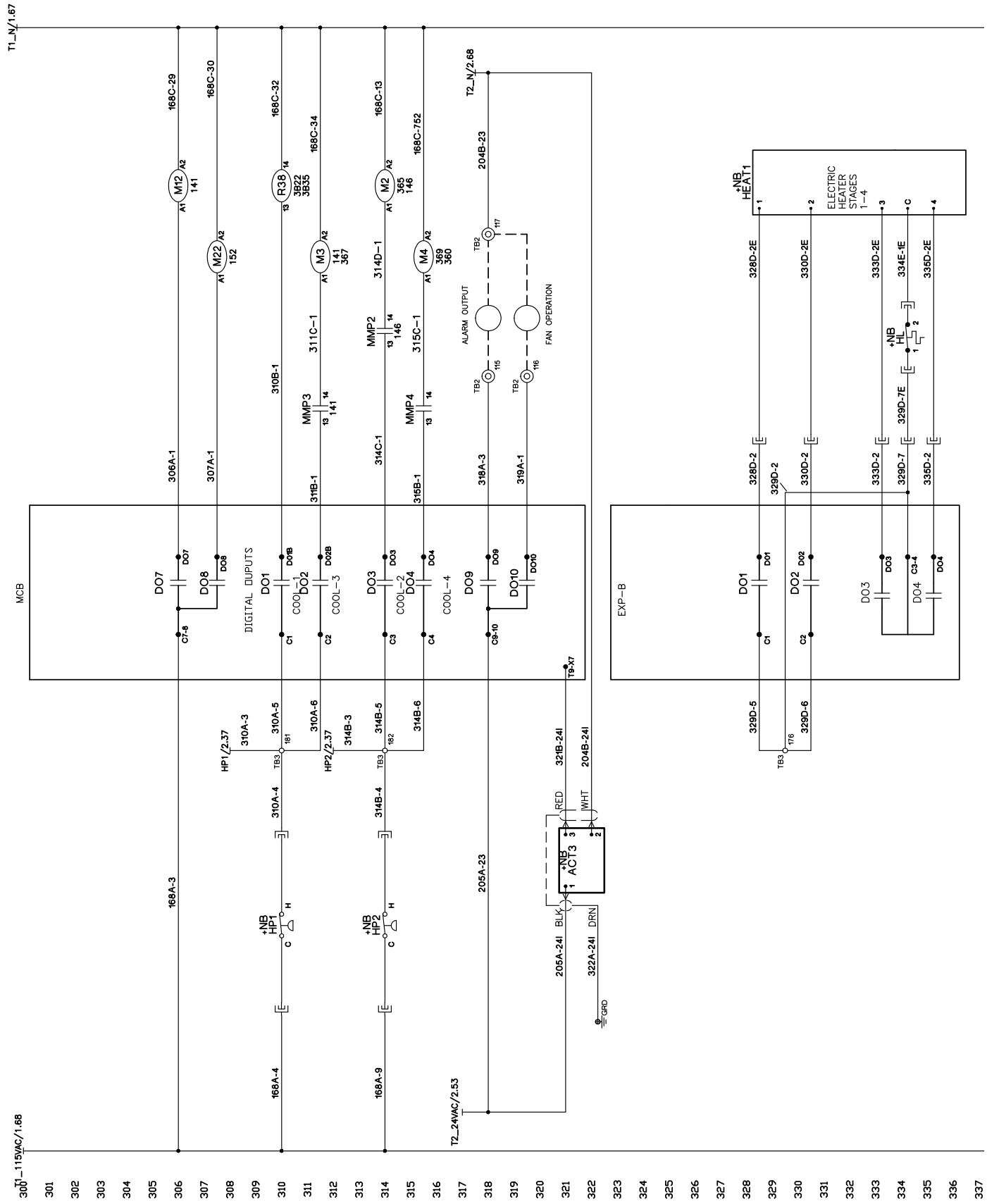


Figure 67 continued: MPS 030 – 050 VAV Control with Variable Speed Inverter Compressor

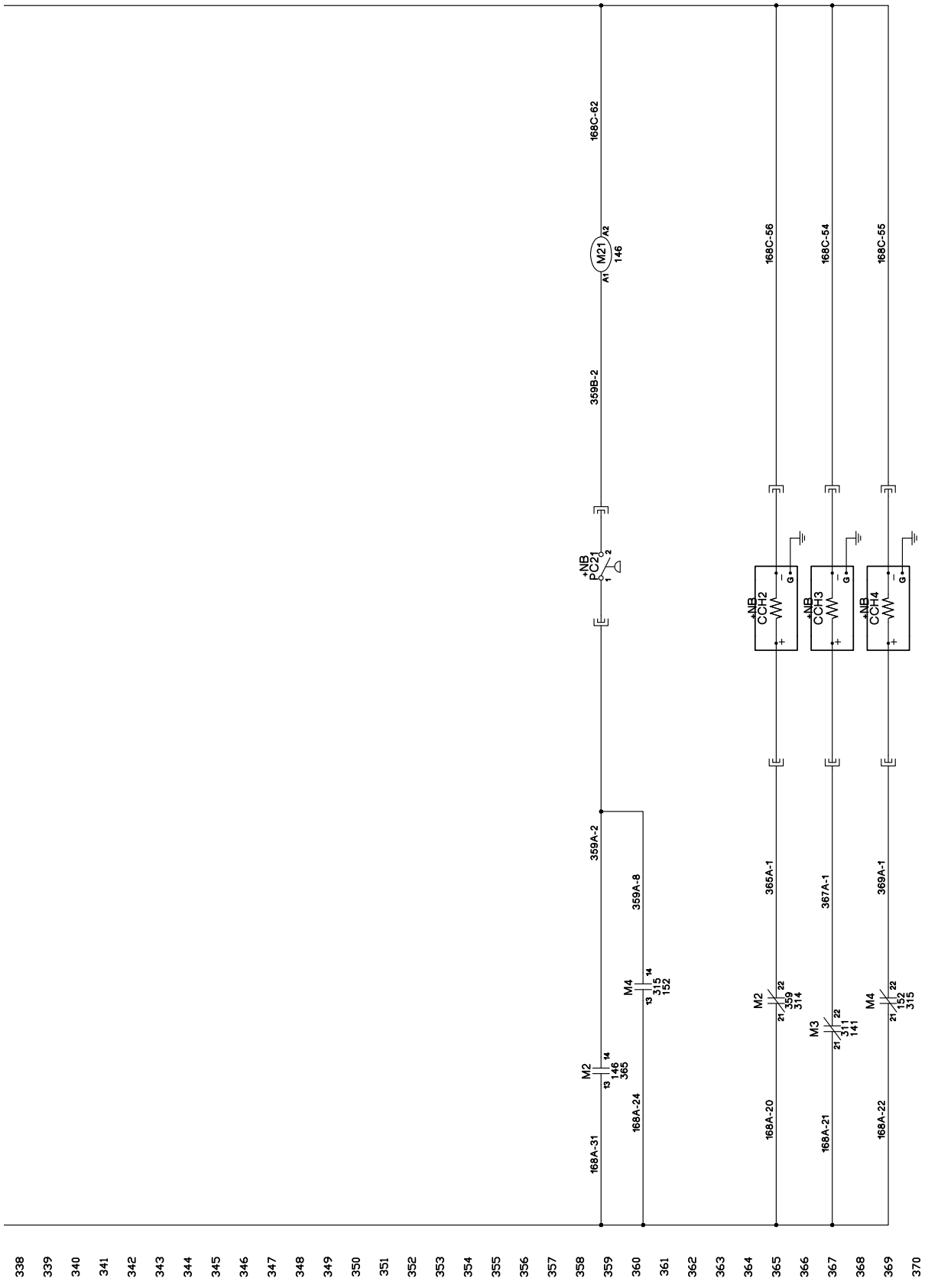


Figure 68: MPS 040 – 050 with Variable Speed Inverter Compressor – with Low Ambient Option

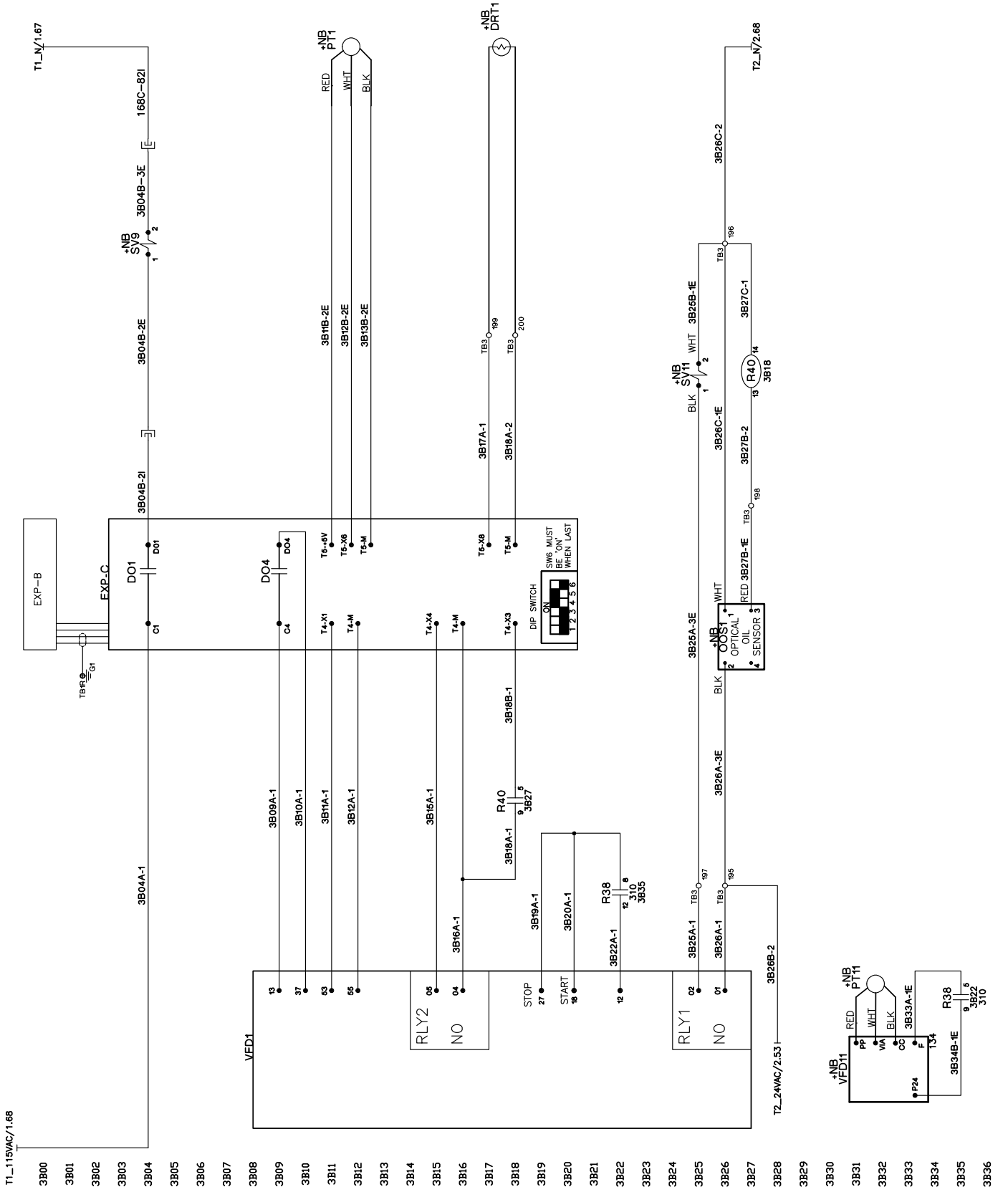


Figure 69: VAV Control – Outputs (Staged Gas Heat)

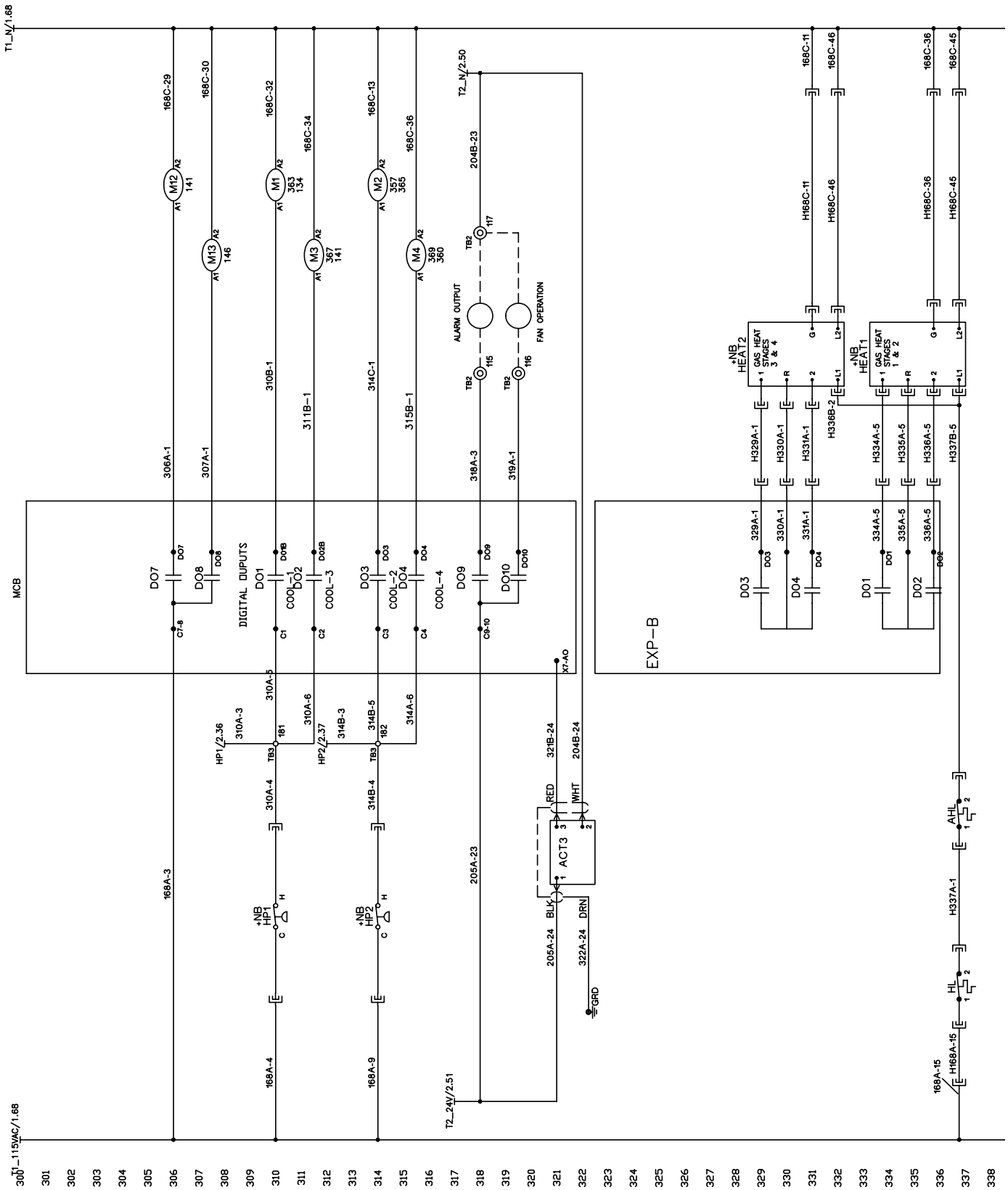


Figure 69 continued: VAV Control – Outputs (Staged Gas Heat)

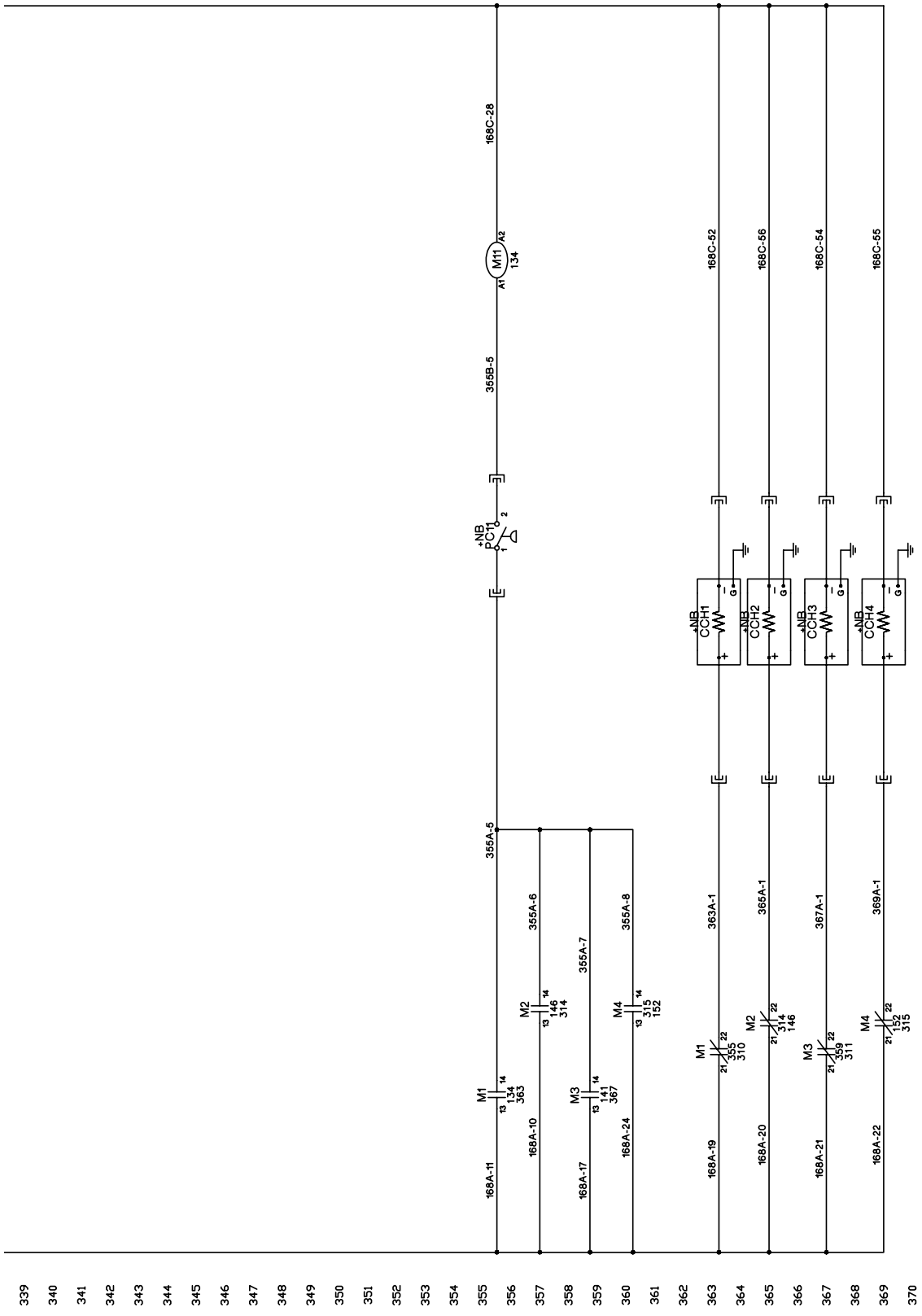


Figure 70: CAV Power

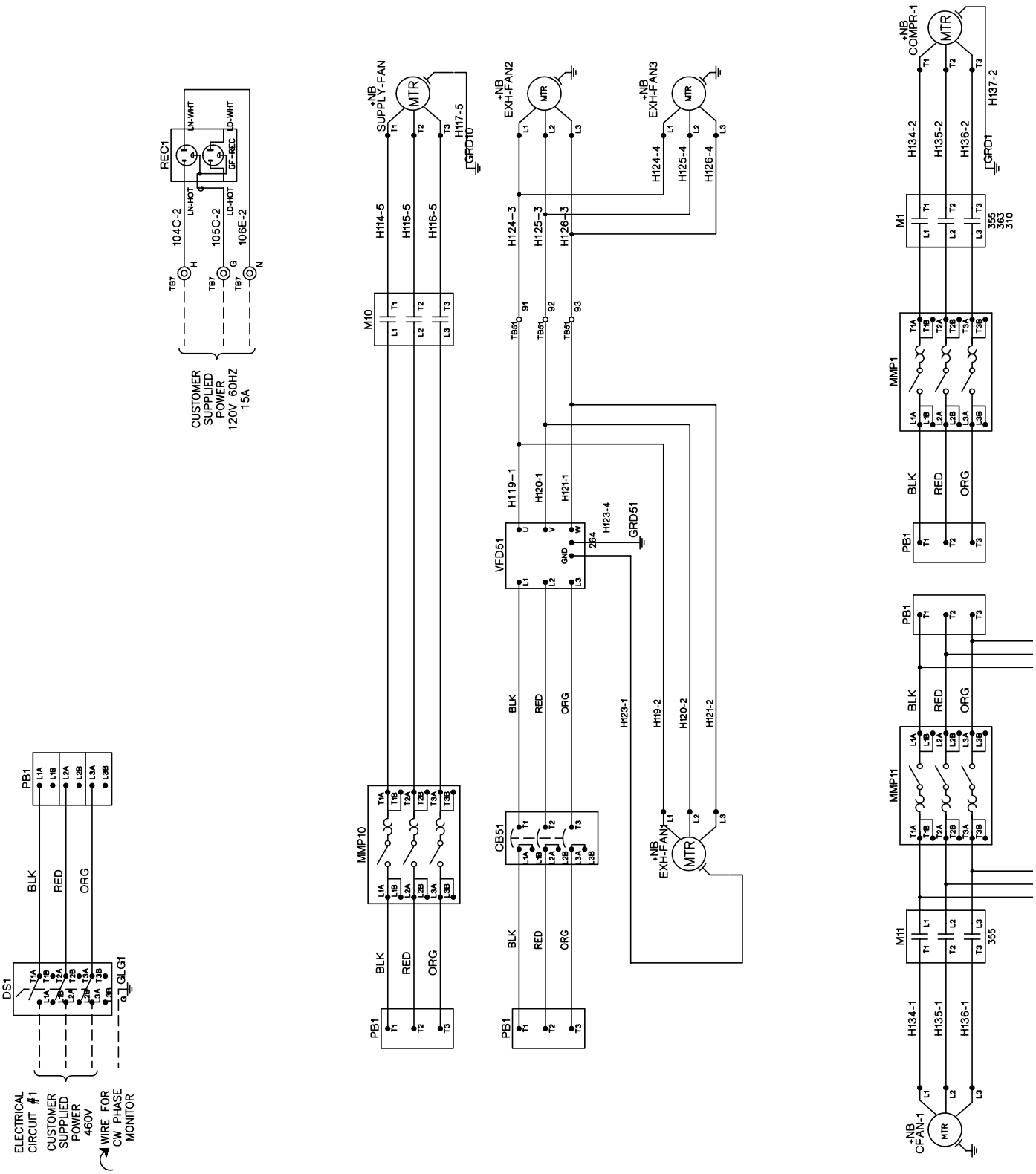


Figure 70 continued: CAV Power

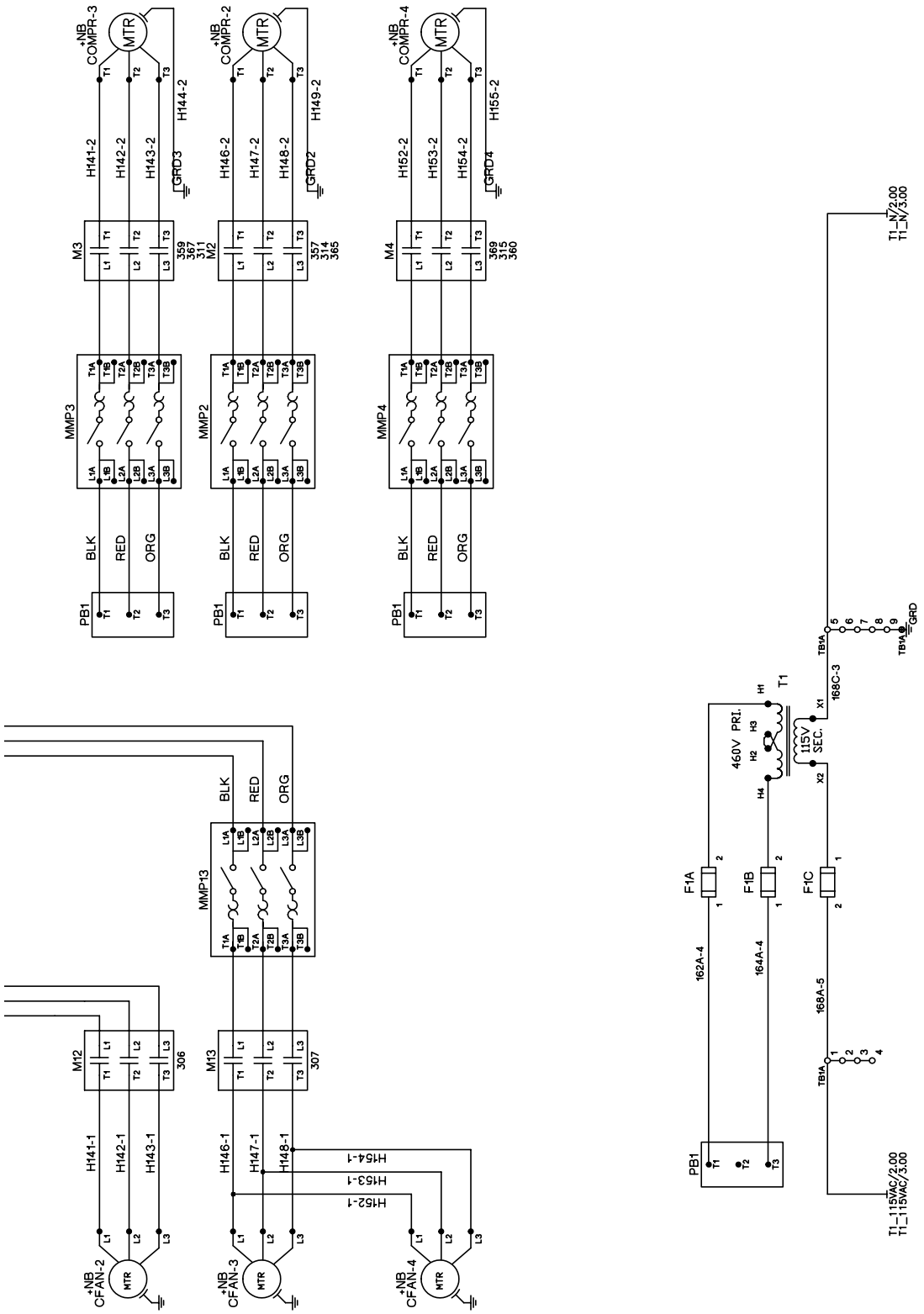


Figure 71: CAV Control – Inputs

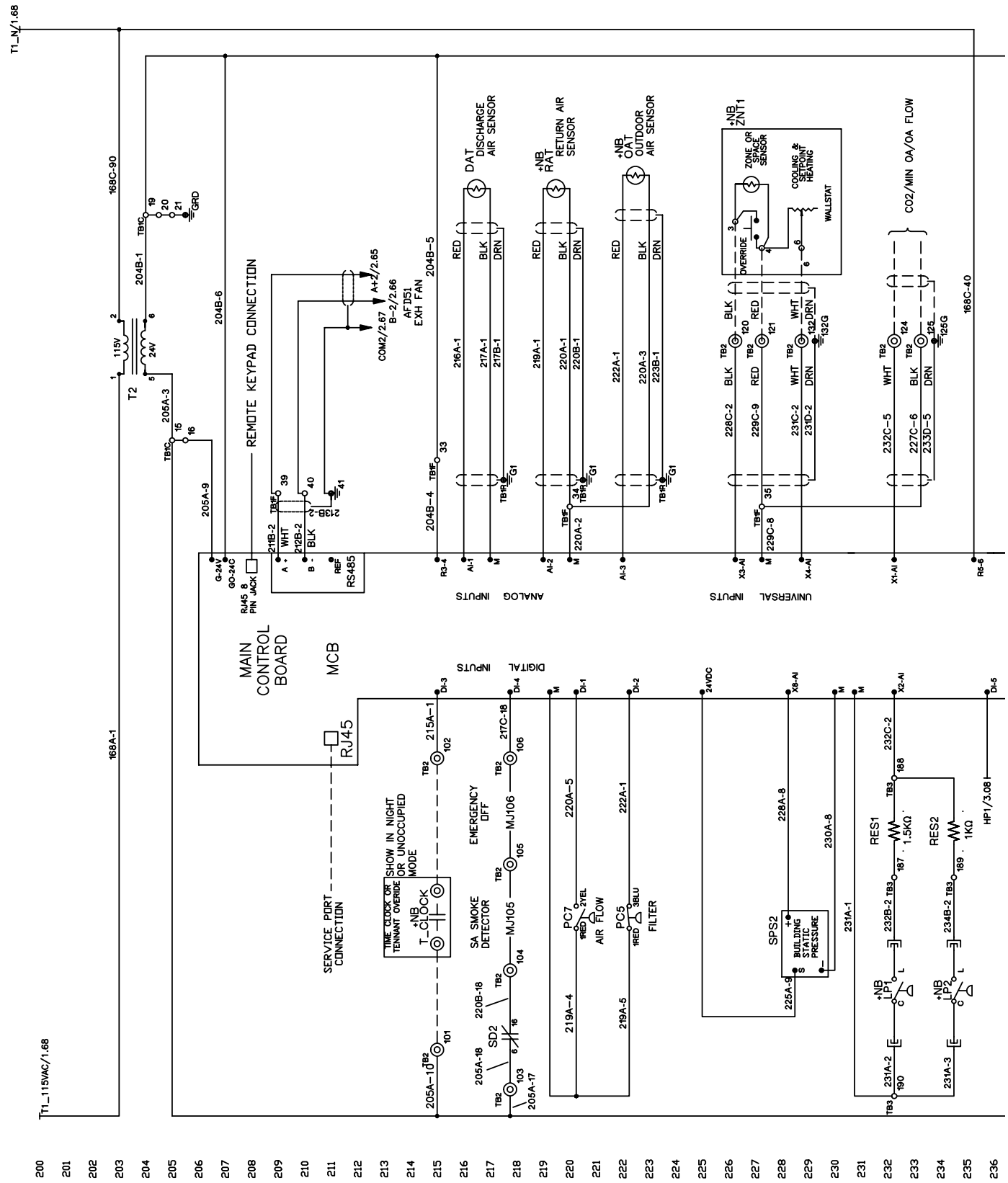


Figure 71 continued: CAV Control – Inputs

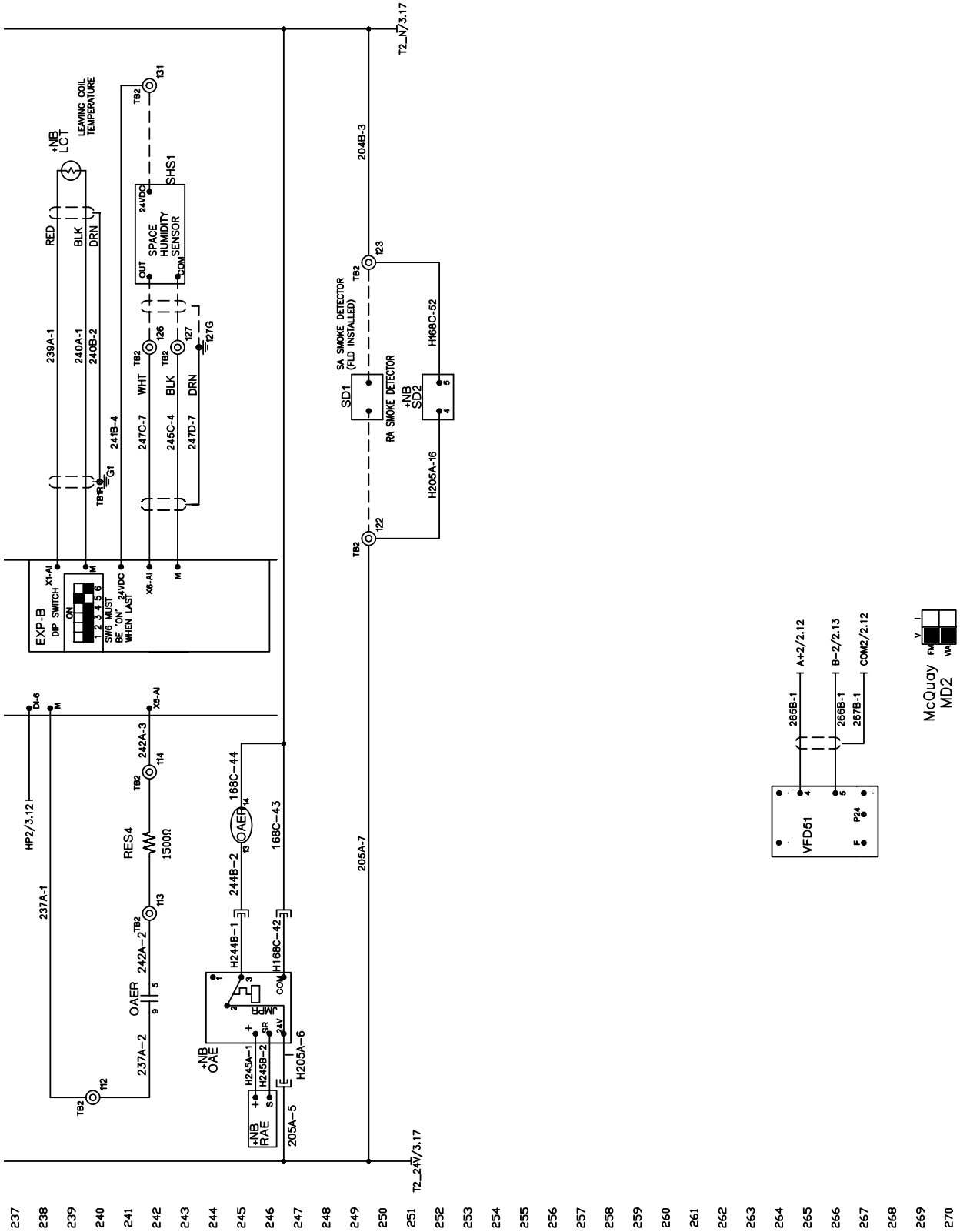


Figure 72: CAV Control – Outputs (Staged Gas Heat)

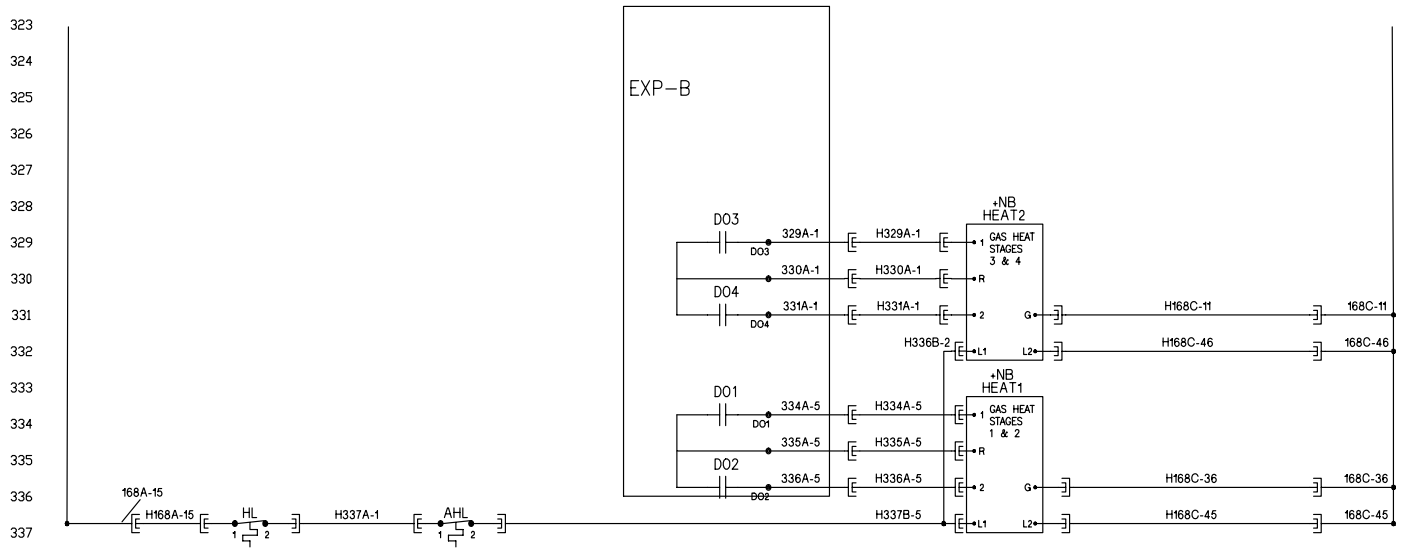


Figure 73: VAV/CAV Control – Outputs (Modulating Gas Heat)

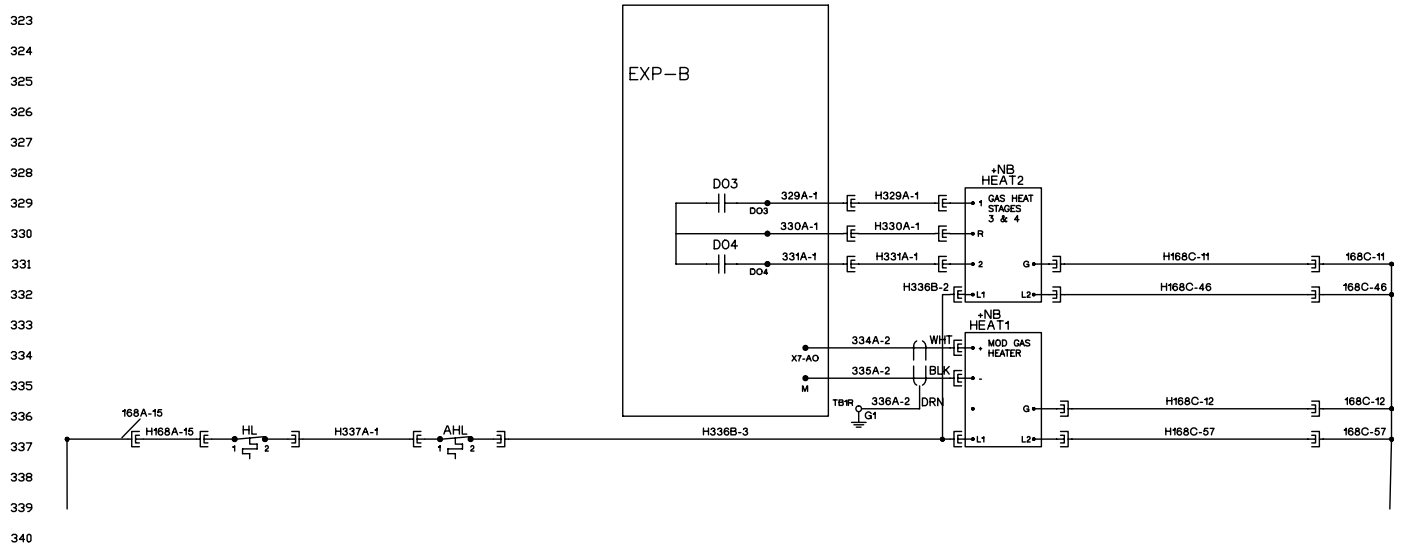


Figure 74: Electric Heat Option Power

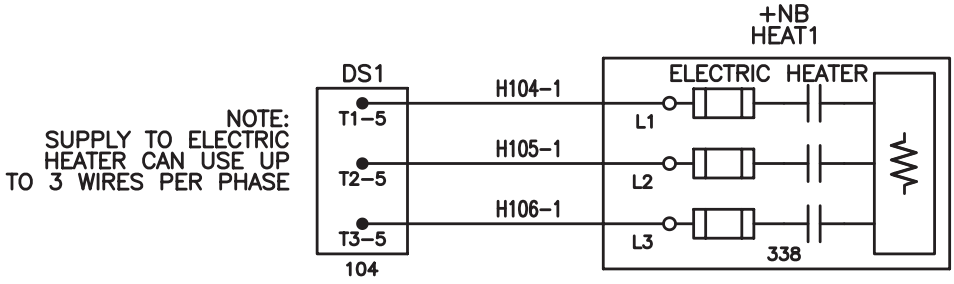


Figure 75: Electric Heat Option – Outputs

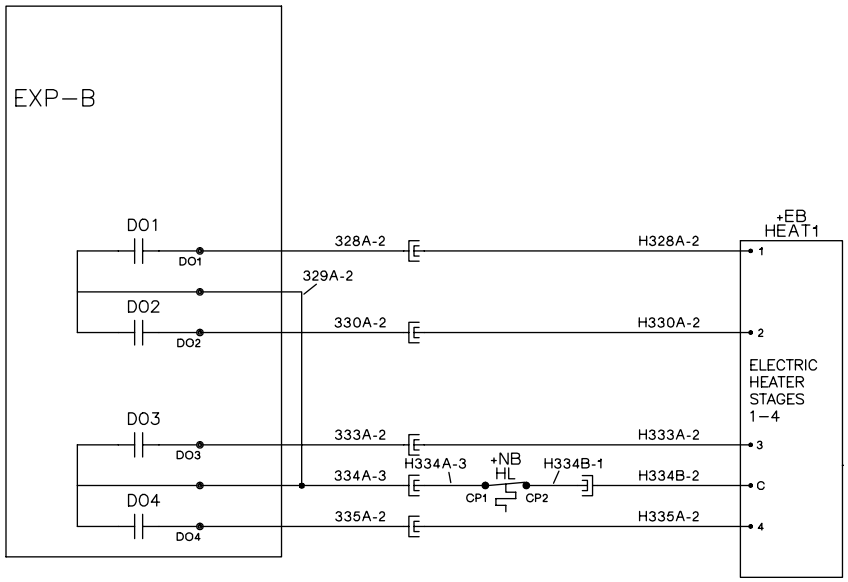


Figure 76: Energy Recovery

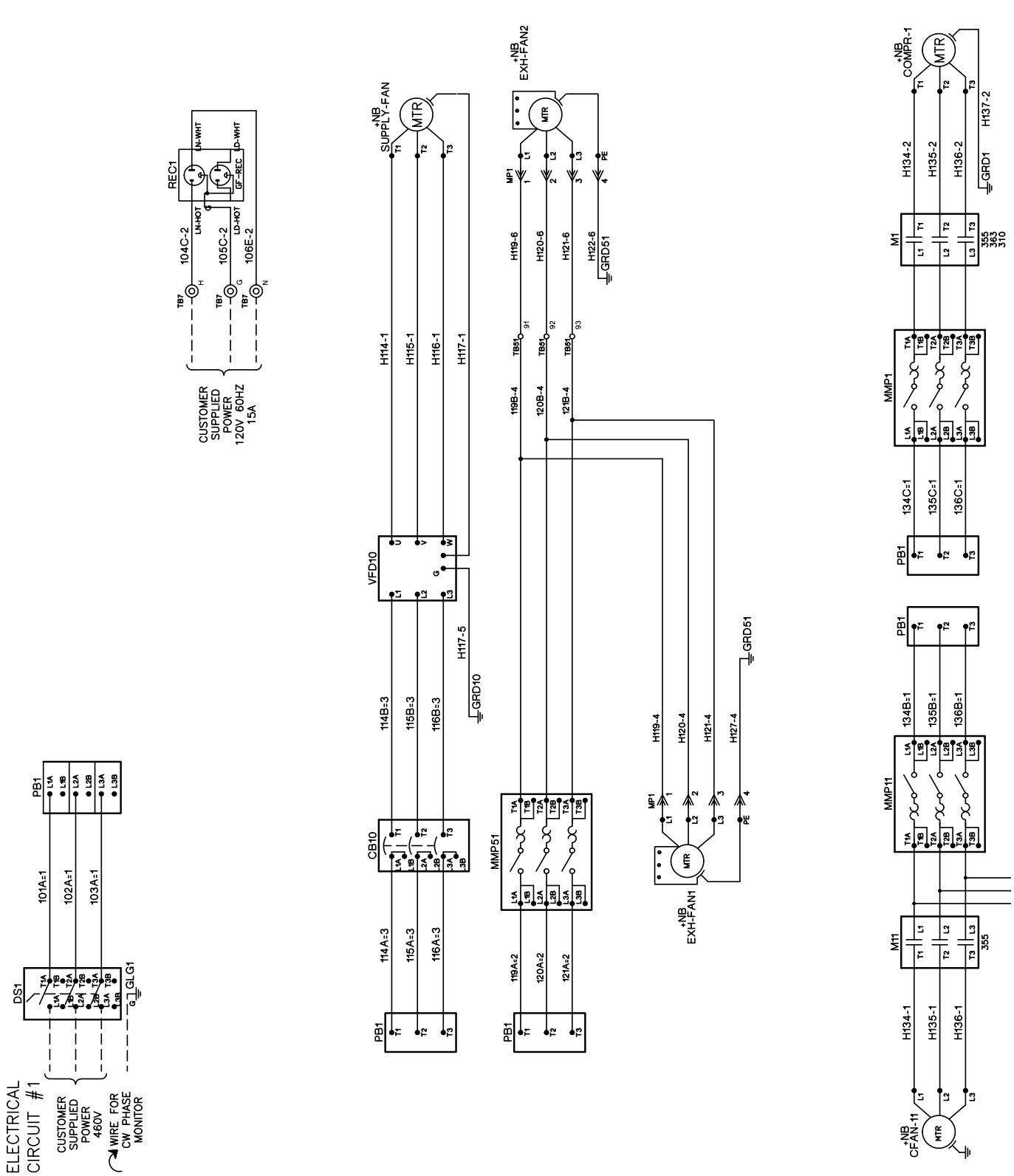


Figure 76 continued: Energy Recovery

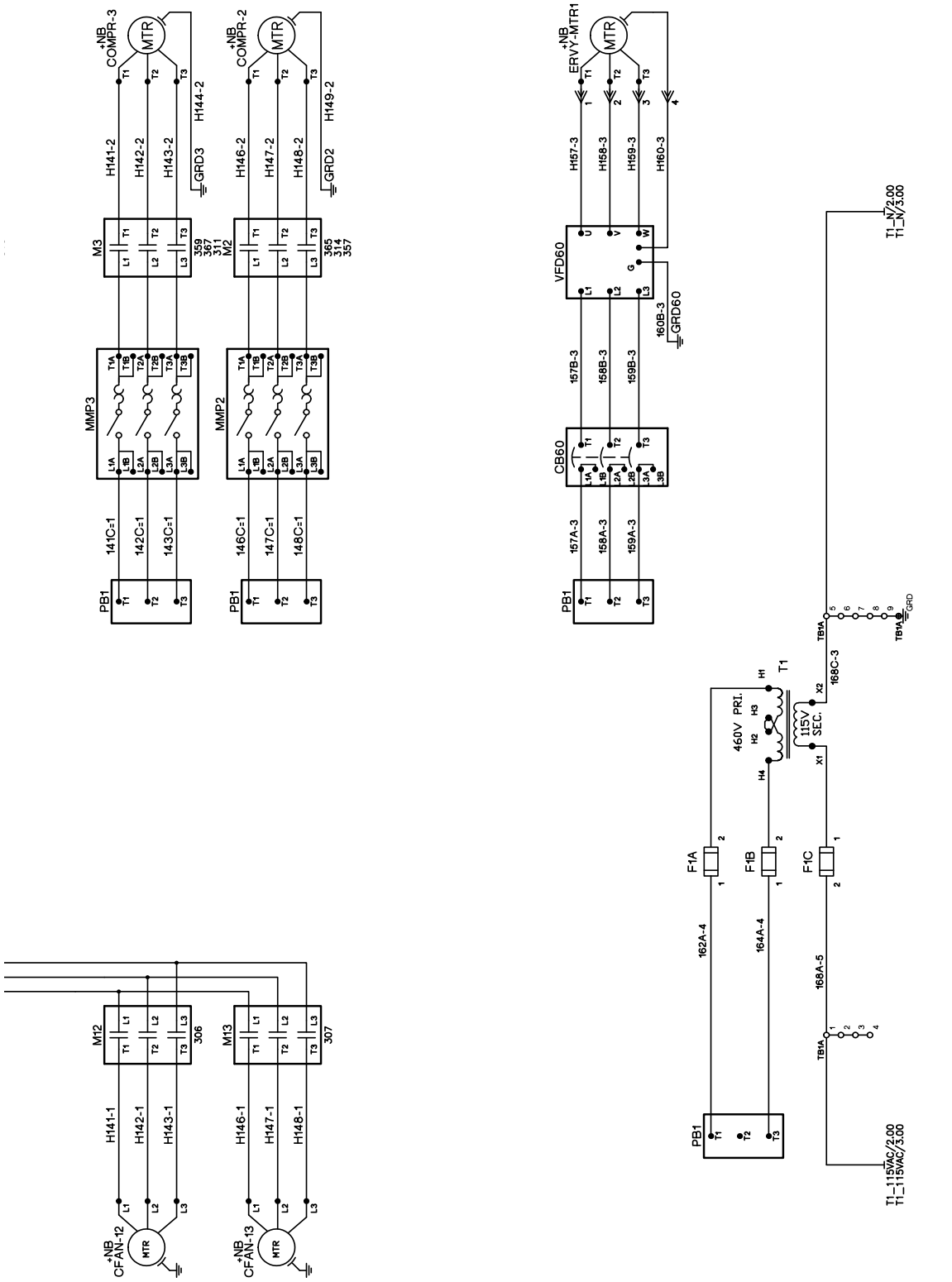


Figure 77: Energy Recovery Main Control Board

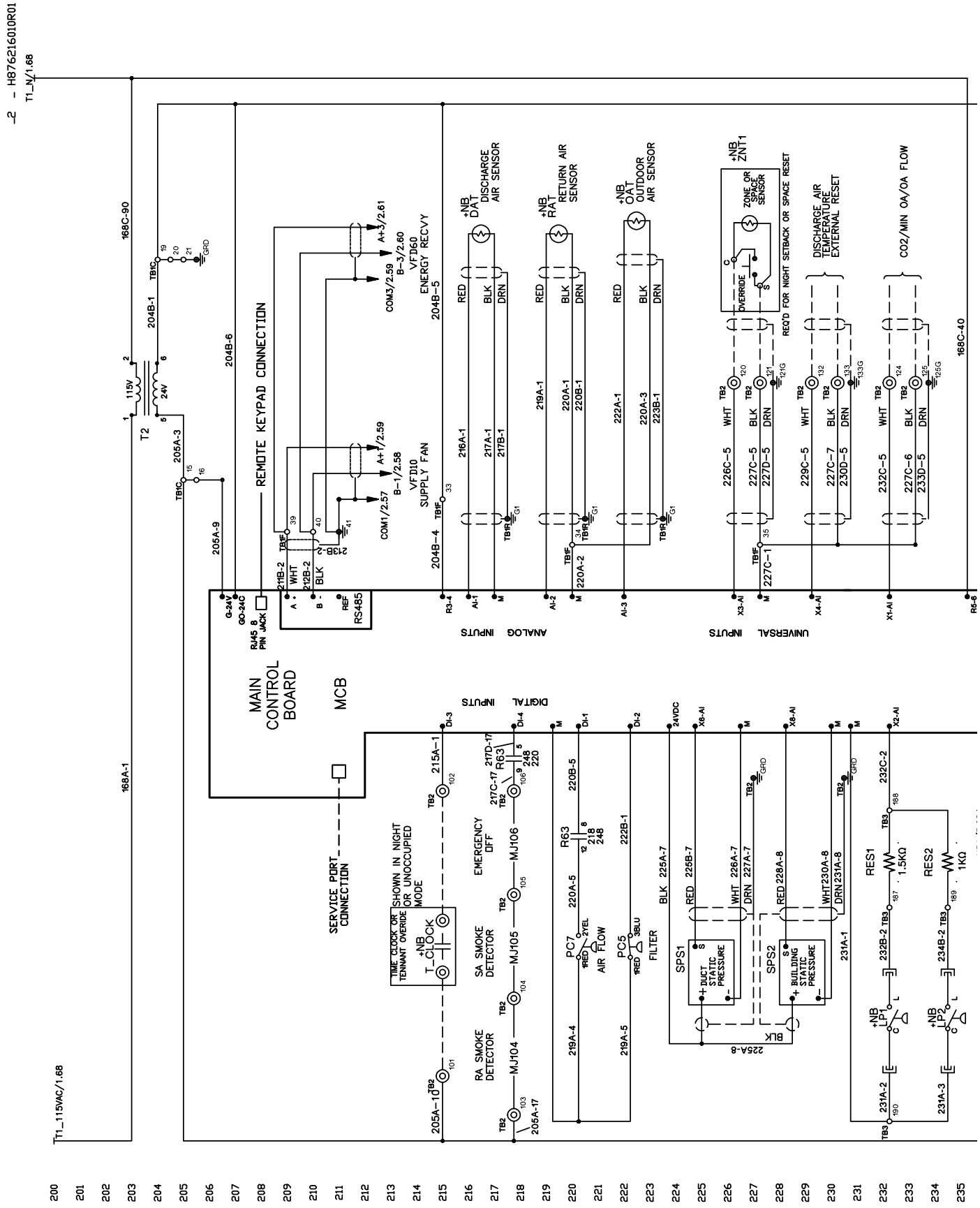
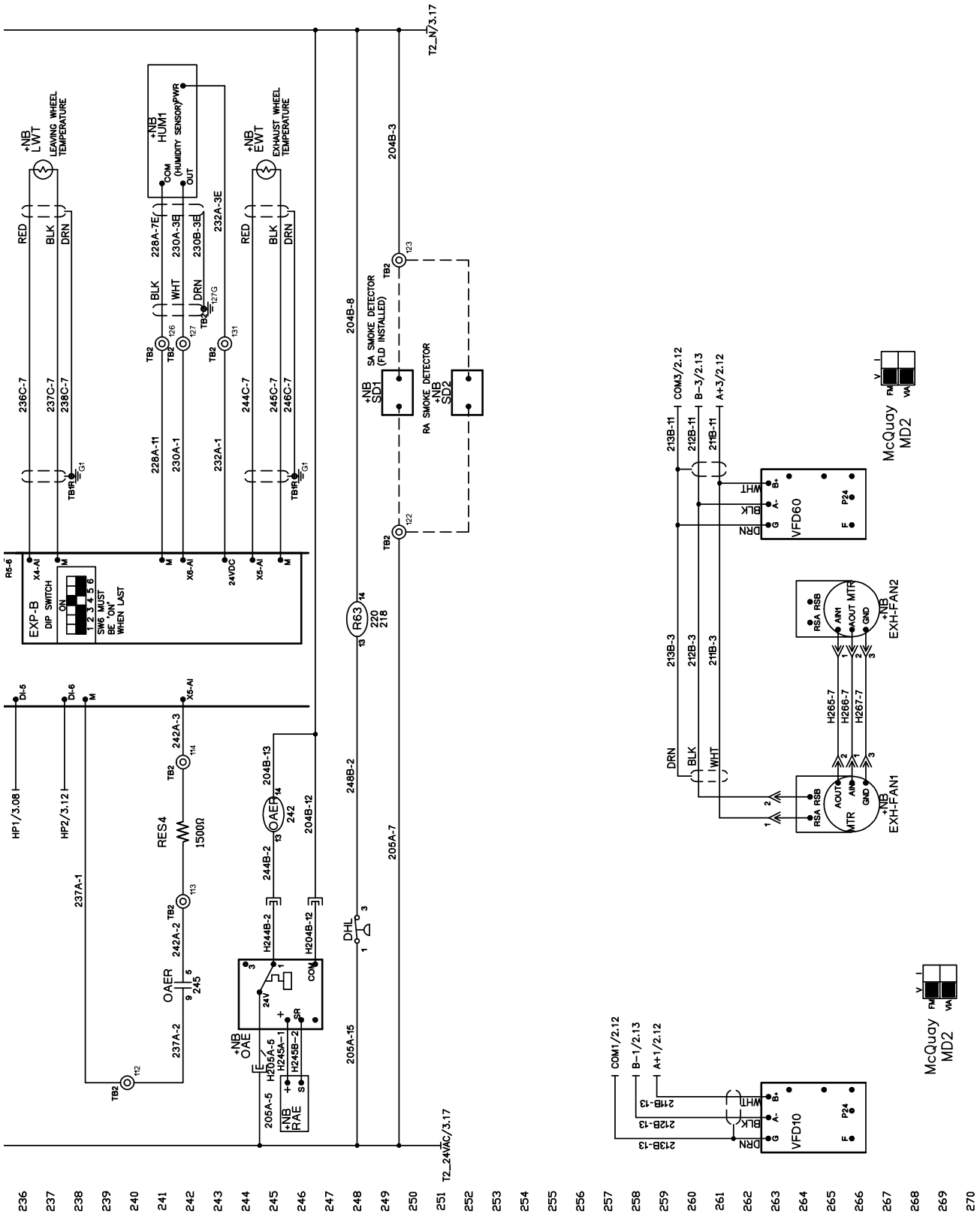


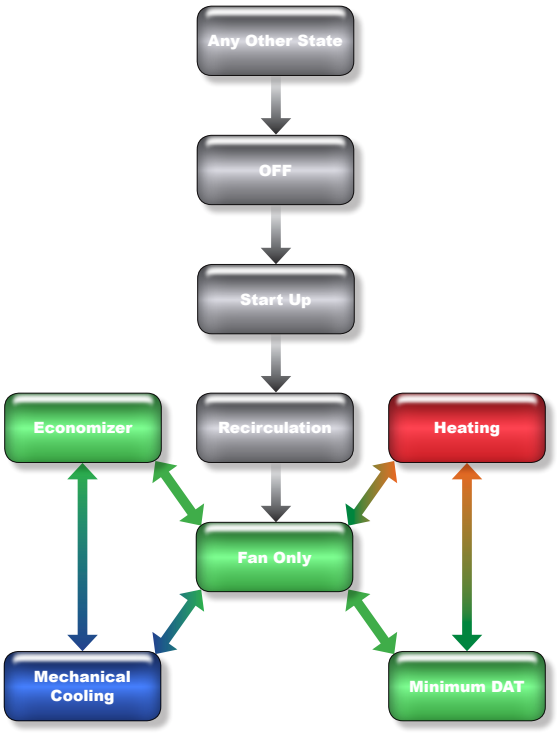
Figure 77 continued: Energy Recovery Main Control Board



Operating States

The transition from any operating state to another is graphically represented in Figure 78.

Figure 78: State Diagram



Start Up

With a “start up” command from the “Off” State the unit will default into the “Start Up” state of operation for 3 minutes. During this time, the fan is off.

Recirculation

Next, the unit will transition into the “Recirculation” state of operation for another 3 minutes. During this time, the outside air damper will close and the fan will turn on, thereby mixing the air in the ductwork and the space.

Fan Only

The outside air damper will modulate to the minimum position and based upon the sensor inputs, the unit will go into one of the four running states - “Heating,” “Cooling,” “Economizing,” or “Minimum DAT.” If the control temperature is between its setpoint and its dead band, the unit will remain in the “Fan Only” state.

Heating

The unit's heating mode of operation is controlled by the control temperature and the heating setpoint temperature. The unit goes into the heating mode of operation by analyzing the control temperature.

The control temperature can be either the return temperature or the space temperature.

The return temperature is typically used for VAV units and the space temperature is typically used for CAV units.

The unit goes into the heating mode of operation when the control temperature (return or space temperature) is below the heating setpoint by more than ½ the deadband.

Example – If the heating setpoint is 68.0°F and the deadband is 1.0°F, the unit will not go into the heating mode of operation until the control temperature reaches 67.4°F.

When this takes place, the heating mode of operation will begin and the 1st stage of heating operation will start. The next stage, up or down, will take place after 4 minutes. This “4 minutes” is called the stage timer. The gas or electric heat module will continue to stage up as long as the control temperature is below the heating setpoint by more than ½ the heating setpoint deadband. The unit will stage down if the maximum discharge air temperature of 120°F is reached. Gas units with one gas valve have 2 stages of heating and units with two gas valves have 4 stages of heating.

Minimum DAT

This control mode is designed to temper the air in the ductwork when in heating mode. When the unit is in the “Fan Only” state and the Discharge Air Temperature is less than the minimum discharge air temperature limit, “Minimum DAT” control is initiated. The unit will turn on minimum heat until the discharge air temperature exceeds the limit.

Mechanical Cooling

Constant Volume (Space Comfort Controller)

The control temperature for a CAV unit is typically the space temperature. A space temperature sensor must be field installed into the occupied space and connected to the unit controller.

The unit goes into the cooling mode of operation when the control temperature (space temperature) is above the cooling setpoint by more than ½ the deadband.

Example – the cooling setpoint is set to 70.0°F and the deadband is 1.0°F, the unit will not go into the cooling mode of operation until the space sensor reaches 70.6°F.

When this takes place, the cooling mode of operation will begin and the 1st stage of compressor operation will start.

The unit controller will turn on the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the cooling setpoint temperature within the deadband. When a compressor stage turns on, the next compressor stage, up or down, will not take place for the next 4 minutes. This “4 minutes” is called the stage time. Reference the “Cooling Setup” menu for the adjustable stage time value.

When a cooling stage is initiated no further operation will take place within the stage timer limit. In the above example, the unit will stage down or turn off the cooling mode of operation when the cooling setpoint reaches 69.4°F.

Variable Air Volume (Discharge Air Controller)

The unit's cooling mode of operation is controlled by the control temperature, the change-over temperature, and the discharge air temperature. The unit goes into the cooling mode of operation by analyzing the control temperature. The control temperature for a VAV system is the return temperature.

The unit goes into the cooling mode of operation when the control temperature (return temperature) is above the changeover setpoint by more than ½ the deadband.

Example – If the change over temperature is 70.0°F and the deadband is 1.0°F, the unit will not go into the cooling mode of operation until the return temperature reaches 70.6°F.

When this takes place, the cooling mode of operation will begin and the 1st stage of compressor operation will start.

The unit controller will turn on the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the discharge air temperature setpoint within the deadband. When a compressor stage turns on, the next compressor stage up or down will not take place for the next 4 minutes. This “4 minutes” is called the stage timer.

When a cooling stage is initiated no further operation will take place within the stage timer limit. Reference the Cooling Setup menu for the adjustable stage time value. In the above example, the unit will stage down or turn off the cooling mode of operation when the return temperature reaches 69.4°F.

Economizer

When the economizer is enabled, the outside air temperature is below the changeover setpoint, and the differential enthalpy switch (if installed) is made, the economizer becomes the first stage of cooling. It will modulate to control to either the discharge air temperature (VAV) or space temperature (CV).

Every 4 minutes, the unit can then either add mechanical cooling if the economizer is at 100% open, continue economizing, or if the control temperature is satisfied, return to minimum position and transition back to “Fan Only” mode.

If the enthalpy switch breaks or the outside air warms, the unit will exit economizing and continue to mechanically cool while returning to the minimum position for ventilation.

⚠ WARNING

Electric shock and moving machinery hazard. Can cause severe equipment damage, personal injury, or death.

Disconnect and tag out all electrical power before servicing this equipment.

All start-up and service work must be performed only by trained, experienced technicians familiar with the hazards of working on this type of equipment

Read and follow this manual: “MicroTech III Unit Controller” (OM 920) before operating or servicing.

Bond the equipment frame to the building electrical ground through grounding terminal or other approved means.

⚠ WARNING

Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment.

Pre-Start of Unit

All units are completely run tested at the factory to promote proper operation in the field. However, to ensure proper operation once the unit is installed, the following check, test, and start procedures must be performed to properly start the unit. To obtain full warranty coverage, complete and sign the check, test, and start form supplied with the unit and return it to Daikin.

A representative of the owner or the operator of the equipment should be present during start-up to receive instructions in the operation, care, and ma enance of the unit.

Servicing Control Panel Components

Before Start-Up

1. Remove shipping bolt form fan spring.
2. Verify that the unit is completely and properly installed with ductwork connected.
3. Verify that all construction debris is removed, and that the filters are clean.
4. Verify that all electrical work is complete and properly terminated.
5. Verify that all electrical connections in the unit control panel are tight, and that the proper voltage is connected.
6. Verify all nameplate electrical data is compatible with the power supply.
7. Verify the phase voltage imbalance is no greater than 2%.
8. Verify that gas piping is complete and leak tight.
9. Verify that the shutoff cock is installed ahead of the furnace, and that all air has been bled from the gas lines.
10. Verify installation of gas flue and outside air vents.
11. Manually rotate all fans and verify that they rotate freely.
12. Verify that the belts are tight and the sheaves are aligned.
13. Verify that all setscrews and fasteners on the fan assemblies are still tight. See Setscrews on page 111.
14. Verify that the evaporator condensate drain is trapped and that the drain pan is level.
15. If unit is curb mounted, verify that the curb is properly flashed to prevent water leakage.
16. Review the equipment and service literature, the sequences of operation, and the wiring diagrams to become familiar with the functions and purposes of the controls and devices.
17. Determine which optional controls are included with the unit.
18. Inspect the outside and inside of the unit for any signs of damage or rough handling. Excessive air leakage would be one possible, unacceptable consequence. If any problems are found, contact the local Daikin representative for instructions.

Power-Up

1. Close the unit disconnect switch.
2. Power should now be supplied to the control panel.

Fan Start-Up

1. Remove shipping bolt from fan spring if this has not already been done.
2. Verify fan spring adjustment and that the fan assembly is level. Adjust as necessary.
3. Verify all duct isolation dampers are open.
4. Place the unit into the “Fan Only” mode through the keypad.
5. The controller should enter the “Startup Initial” operating state. If the fan does not run, check the manual motor protectors or that the circuit breakers have not tripped.
6. Verify the rotation is correct.

Economizer Start-Up

1. Check whether the outdoor air is suitable for free cooling.
2. At the keypad, set the cooling setpoint low enough so the controller calls for cooling.
3. Place the unit into cooling mode through the keypad menu.
4. Observe the outdoor air dampers:
    a. If the outdoor enthalpy is low, the control algorithm should start to modulate the dampers open to maintain the discharge air setpoint.
    b. If the outdoor enthalpy is high, the dampers should maintain their minimum position.

NOTE: It may not be possible to check the economizer operation in both low and high enthalpy states on the same day. If this is the case, repeat this procedure on another day when the opposite outdoor air enthalpy conditions exist.

Compressor Start-Up

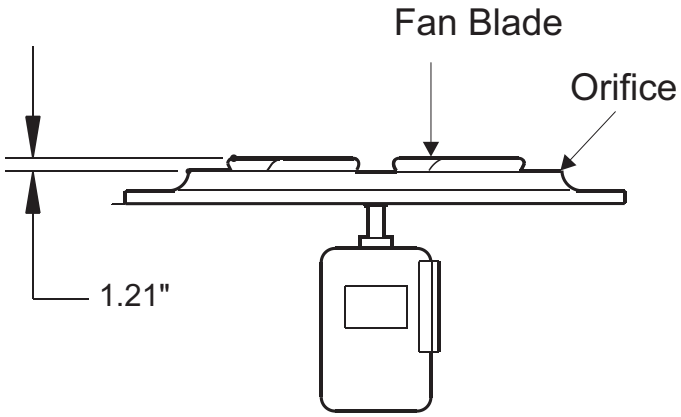
⚠ CAUTION

Low ambient temperature hazard. Can cause compressor damage. Do not attempt to start up and check out the refrigeration system when the outdoor air temperature is below 20°F.

With the supply fan operational, prepare for compressor operation.

1. Inspect all refrigerant piping and look for leaks by looking for refrigerant oil residue. If any problem is found, reclaim any remaining refrigerant, fix the problem and then add the circuit's nameplate charge by weight before proceeding.
2. Connect service gauges and verify that the unit has not lost its refrigerant charge.
3. Verify that the crankcase heaters are operating. These should operate for at least 24 hours before starting the compressors.
4. Verify that the condenser fan blades are positioned properly (see Figure 79) and that the screws are tight. The fan blade must be correctly positioned within its orifice for proper airflow across the condenser coils.
5. Check the fan rotation.

Figure 79: Condenser Fan Blade Positioning



Scroll Compressor Rotational Direction

Scroll compressors only compress in one rotational direction. Three-phase compressors rotate in either direction depending upon phasing of the power to L1, L2, and L3. Since there is a 50/50 chance of connecting power to cause rotation in the reverse direction, verify that the compressor rotates in the proper direction after the system is installed. If the compressor is rotating properly, suction pressure drops and discharge pressure rises when the compressor is energized. If the compressor is rotating in reverse, the sound level is louder and current draw is reduced substantially. After several minutes of operation, the compressor's internal protector trips.

All three-phase compressors are wired the same internally. Therefore, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same terminals should maintain proper rotation direction.

Perform the Following Procedure:

1. At the keypad, set the cooling setpoint low enough so that the controller will call for cooling.
2. Verify that compressor #1 starts. If the compressor motor hums but does not run, verify that it is getting three-phase power.
3. The compressor should operate continuously while there is a call for cooling. If the compressor cycles on and off on its low pressure switch, perform the following:
    a. Verify that the circuit is not short of refrigerant.
    b. Check for low airflow across the evaporator coil.
    c. Check for clogged filters.
    d. Check for restricted ductwork.
    e. Check for very low temperature return air entering the unit.
    f. Verify that the liquid line components, expansion valve, and distributor tubes are feeding the evaporator coil.
    g. Verify that all air handling section panels are closed.
4. Verify that the condenser fans are cycling and rotating properly (blowing air upward). When the compressor starts, at least one condenser fan should also start.
5. Check the oil level in the compressor sightglass. If low oil is observed, it is possible that liquid refrigerant is returning to the compressor. Check the suction superheat, see "Expansion Valve Superheat Adjustment" below. It should be between 10°F (5.5°C) and 13°F (7.2°C). See "Expansion Valve Superheat Adjustment" below.
6. Verify that the condenser refrigerant subcooling at full capacity is between 13°F and 20°F.

Checking Subcooling

Following are recommendations for checking subcooling:

1. Run unit until it reaches steady state. Close the unit section doors. Running the unit with its doors open will affect system operation.
2. Measure the discharge gas pressure at the compressor discharge gauge port with an accurate gauge. Use this pressure to determine the saturation temperature of the refrigerant.
3. Measure liquid temperature accurately by attaching a thermocouple to the liquid line tube leaving the condenser coil. Insulate the tube and thermocouple for more accurate results.
4. Subtract the measured liquid temperature from the saturation temperature to determine the subcooling.
5. As a general rule, high subcooling indicates that the circuit is low on charge. Low subcooling generally indicates that the circuit has too much charge.

⚠ NOTICE

Venting refrigerant to atmosphere is not allowed per most local laws and/or codes.

Expansion Valve Superheat Adjustment

It is very important that the expansion valve superheat setting be adjusted to be between 10°F (5.5°C) and 13°F (7.2°C). Insufficient superheat will cause liquid floodback to the compressor which may result in slugging. Excessive superheat will reduce system capacity and shorten compressor life.

Turn the adjustment stem clockwise to increase superheat. Not exceeding one turn, adjust the stem and then observe the superheat. Allow up to 30 minutes for the system to rebalance at the final superheat setting.

Checking Superheat

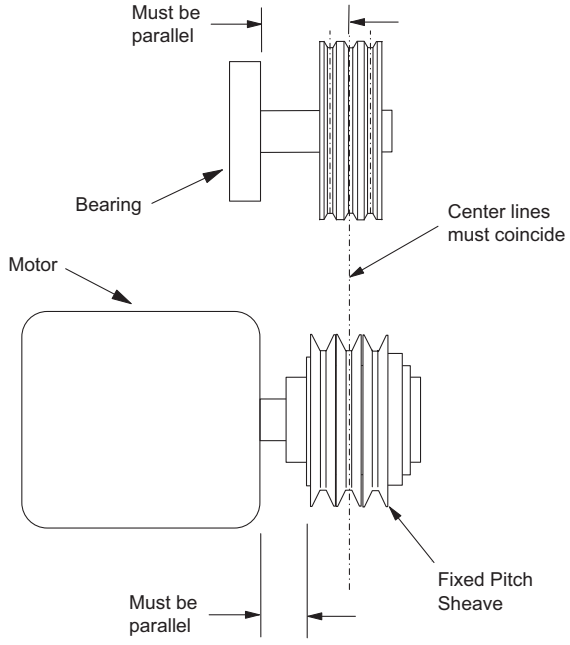
Following are recommendations for checking superheat:

1. Close the unit section doors. Running the unit with its doors open will affect expansion valve and system operation considerably.
2. Check the pressure and temperature at the suction gauge port.

Sheave Alignment

1. Verify both motor and fan sheaves are in alignment and the shafts are parallel. The center line of the motor sheave must be in line with the center line of the fan sheave. See Figure 80.
2. Verify that all setscrews are torqued to the values shown in Table 35 on page 111 before starting drive. Check setscrew torque and belt tension after 24 hours of service.

Figure 80: Sheave Alignment (Adjustable Shown)



Drive Belt Tension Adjustment

1. The ideal tension is the lowest tension at which the belt will not slip under peak load conditions. Over tensioning shortens belt and bearing life.
2. Check tension frequently during the first 24–48 hours of operation.
3. Keep belts free from foreign material which may cause slippage.
4. Make V-drive inspection on a periodic basis. Adjust tension if the belt is slipping. Do not apply belt dressing. This may damage the belt and cause early failure.

Air Balancing

The following should be performed by a qualified air balancing technician:

1. Check the operating balance with the economizer dampers positioned for both full outdoor air and minimum outdoor air.
2. Verify that the total rflow will never be less than that required for operation of the electric heaters or gas furnace.
3. When the final drive adjustments or changes are complete, check the current draw of the supply fan motors. The amperage must not exceed the service factor stamped on the motor nameplate.

⚠ WARNING

Moving machinery hazard. Can cause severe personal injury or death. Do not use a mechanically driven tachometer to measure the speed return fans on this fan arrangement. Use a strobe tachometer.

Rotating parts can cause severe personal injury or death. Replace all belt/fan guards that are removed for service.

Energy Recovery Wheel

Prestartup Checks

1. By hand, turn wheel clockwise (as viewed from the pulley side) to verify wheel turns freely through 360° rotation.
2. During rotation confirm wheel segments are fully engaged in the wheel frame and segment retainers are completely fastened
3. With hands and objects away from moving parts, apply power and confirm wheel rotation. Wheel rotates clockwise as viewed from the pulley side.
4. If wheel has difficulty starting, disconnect power and inspect for excessive interference between the wheel surface and each of the (4) diameter seals.

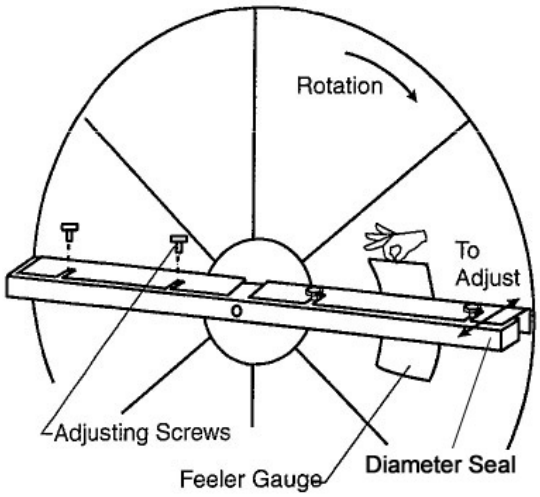
Diameter Seal Adjustment

1. Loosen diameter seal adjusting screws. See Figure 81.
2. Move adjustable diameter seals away from wheel.
3. Using a ¼ inch feeler gauge, adjust the diameter against the wheel. See Figure 81.
4. Tighten diameter seal adjusting screws.
5. Apply power per the start up procedure.

⚠ WARNING

Keep hands away from rotating wheel! Contact with rotating wheel can cause physical injury.

Figure 81: Energy Recovery Wheel



Controller Settings for Normal Operation

When all start-up procedures are completed, set the controls and program the MicroTech III controller for normal operation. Use the following list as a guide; some items may not apply to your unit.

1. Set the heating and cooling parameters as required for normal unit operation:
    a. Temperature \ Zone Cooling \
    b. Temperature \ Zone Heating \
    c. Temperature \ Discharge Cooling \
2. Set the low ambient compressor lockout setpoint as required. Do not set it below 20°F.
3. Set the high ambient heat lockout temperature setpoint.
4. Set the alarm limits as required.
5. Set the duct static pressure control parameters as required.
6. Set the building static pressure control parameters as required.
7. Set the economizer control parameters as required.
8. Set the date and time in keypad menu.
9. Set the operating schedule as required using keypad menus.

NOTE: Unit operation may also be controlled by the building automation system.

Maintaining Control Parameter Records

Daikin recommends that the MicroTech III controller's setpoints and parameters be recorded and saved for future reference. If the microprocessor control board requires replacement, this record facilitates entering the unit's proper

Performing Service Maintenance

Installation and maintenance must be performed only by qualified personnel who are experienced with this type of equipment and familiar with local codes and regulations.

⚠ WARNING

Moving machinery and electrical power hazards. May cause severe personal injury or death. Disconnect and lock off all power before servi ng equipment.

⚠ CAUTION

Sharp edges are inh rent to sheet metal parts, screws, clips, and similar items. May cause personal injury. Exercise caution when servicing equipment.

⚠ IMPORTANT

Chilled Water Piping: A qualified Architect or Systems HVAC Design Engineer familiar with piping design, local codes and regulations, must provide piping design. The following manufacturer recommendations serve as a general guide and should not replace a qualified professional's piping system design.

⚠ IMPORTANT

Refrigerant Piping: A qualified Architect or Systems HVAC Design Engineer familiar with refrigerant piping design, as well as local codes and regulations, must provide refrigerant piping design. The following manufacturer recommendations serve as a general guide and should not replace a qualified professional's refrigerant piping system design.

⚠ WARNING

Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

Servicing Control Panel Components

Disconnect all electric power to the unit when servicing control panel components. Before servicing, always inspect units for multiple disconnects to ensure all power is removed from the control panel and its components.

Planned Maintenance

Preventive maintenance is the best way to avoid unnecessary expense and inconvenience. Have this system inspected at regular intervals by a qualified service technician. The required frequency of inspections depends upon the total operating time and the indoor and outdoor environmental conditions. Routine maintenance should cover the following items:

- Tighten all belts, wire connections, and setscrews.
- Clean the evaporator and condenser coils mechanically or with cold water, if necessary. Usually any fouling is only matted on the entering air face of the coil and can be removed by brushing or vacuuming.
- Lubricate the motor and fan shaft bearings.
- Align or replace the belts as required.
- Clean or replace the filters as required.

NOTE: A partially full sight glass is not uncommon at part load conditions. A varying amount of bubbles may be noticeable in the sightglass, which is normal.

- Check for proper superheat.
- Check for blockage of the condensate drain. Clean the condensate pan as needed.
- Check the power and control voltages.
- Check the running amperage of all motors.
- Check all operating temperatures and pressures.
- Check and adjust all temperature and pressure controls as needed.
- Check and adjust all damper linkages as needed.
- Check the operation of all safety controls.
- Check the condenser fans and tighten their setscrews.

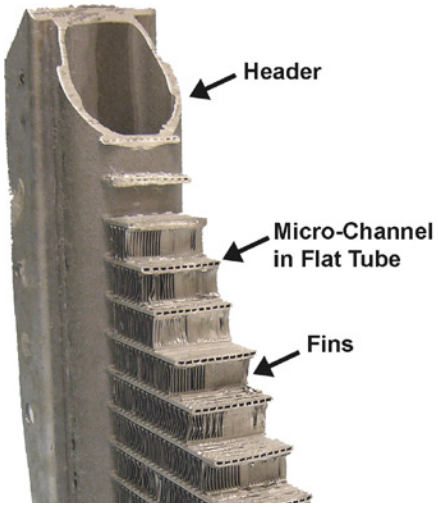
All-Aluminum Condenser Coils

The condenser coils are an all-aluminum design including the connections, micro-channels, fins (an oven brazing process brazes the fins to the micro-channel flat tube), and headers (Figure 82), which eliminates the possibility of corrosion normally found between dissimilar metals of standard coils.

During the condensing process, refrigerant in the coil passes through the micro-channel flat tubes, resulting in higher efficiency heat transfer from the refrigerant to the airstream.

In the unlikely occurence of a coil leak, contact Daikin to receive a replacement coil module.

Figure 82: Micro-Channel Coil Cross-Section



Connecting the Condenser Coil to Copper Tubing

Figure 83 shows the aluminum condenser coil connection to the copper tubing in the unit. Because of the low melting point of aluminum (1220°F compared to 1984°F for copper), this brazed joint is performed with a low temperature brazing process.

⚠ CAUTION

Potential equipment damage. If a standard copper brazing process is performed at this joint, the process will damage the aluminum connection. If a condenser coil ever needs to be replaced, the copper aluminum joint repair should be done with a ProBraze™ repair kit manufactured by OmniTechnologies Corporation. A non-corrosive flux must also be used. The brazing temperature should be between 850°F–900°F. If a coil needs replacing, contact Daikin for a coil and copper connection assembly.

Figure 83: Aluminum/Copper Connection

Cleaning Option E Coated Coils

The following cleaning procedures are recommended as part of the routine maintenance activities for Option E Coated Coils. Documented routine cleaning of Option E Coated Coils is required to maintain warranty coverage.

⚠ WARNING

Prior to cleaning the unit, turn off and lock out the main power switch to the unit and open all access panels.

Remove Surface Loaded Fibers

Surface loaded fibers or dirt should be removed prior to water rinse to prevent further restriction of airflow. If unable to back wash the side of the coil opposite that of the coils entering air side, then surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse

A monthly clean water rinse is recommended for coils that are applied in coastal or industrial environments to help to remove chlorides, dirt and debris. An elevated water temperature (not to exceed 130ºF) will reduce surface tension, increasing the ability to remove chlorides and dirt. Pressure washer PSI must not exceed 900 psig and the nozzel should remain at leat 1 foot from the coil to avoid damaging fin edges.

Routine Quarterly Cleaning of Option E Coated Coil Surfaces

Quarterly cleaning is essential to extend the life of an Option E Coated Coil and is required to maintain warranty coverage. Coil cleaning shall be part of the unit's regularly scheduled maintenance procedures. Failure to clean an Option E Coated Coil will void the warranty and may result in reduced efficiency and durability in the environment.

For routine quarterly cleaning, first clean the coil with the below approved coil cleaner (see approved products list under Recommended Coil Cleaners section, Table 30). After cleaning the coils with the approved cleaning agent, use the approved chloride remover (under the Recommended Chloride Remover section) to remove soluble salts and revitalize the unit.

Recommended Coil Cleaner

The following cleaning agent, assuming it is used in accordance with the manufacturer's directions on the container for proper mixing and cleaning, has been approved for use on Option E Coated Coils to remove mold, mildew, dust, soot, greasy residue, lint and other particulate:

Table 30: Option E Coated Coil Recommended Cleaning Agents

Cleaning Agent	Reseller	Part Number
Enviro-Coil Concentrate	Hydro-Balance Corp P.O. Box 730 Prosper, TX 75078 800-527-5166	H-EC01
Enviro-Coil Concentrate	Home Depot	H-EC01
Chloride Remover	Chlor*Rid Int'l, Inc. P.O. Box 908 Chandler AZ 85244 800-422-3217	Chlor*Rid DTS

CHLOR*RID DTS™ should be used to remove soluble salts from the Option E Coated Coil, but the directions must be followed closely. This product is not intended for use as a degreaser. Any grease or oil film should first be removed with the approved cleaning agent.

1. Remove Barrier - Soluble salts adhere themselves to the substrate. For the effective use of this product, the product must be able to come in contact with the salts. These salts may be beneath any soils, grease or dirt; therefore, these barriers must be removed prior to application of this product. As in all surface preparation, the best work yields the best results.
2. Apply CHLOR*RID DTS - Apply CHLOR*RID DTS directly onto the substrate. Sufficient product must be applied uniformly across the substrate to thoroughly wet out surface, with no areas missed. This may be accomplished by use of a pump-up sprayer or conventional spray gun. The method does not matter, as long as the entire area to be cleaned is wetted. After the substrate has been thoroughly wetted, the salts will be soluble and is now only necessary to rinse them off.
3. Rinse - It is highly recommended that a hose be used, as a pressure washer will damage the fins. The water to be used for the rinse is recommended to be of potable quality, though a lesser quality of water may be used if a small amount of CHLOR*RID DTS is added. Check with CHLOR*RID International, Inc. for recommendations on lesser quality rinse water.

Cautions

Harsh Chemical and Acid Cleaners

Harsh chemicals, household bleach or acid cleaners should not be used to clean outdoor or indoor Option E Coated Coils. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion and attack the Option E coating. If there is dirt below the surface of the coil, use the recommended coil cleaners as described above.

High Velocity Water or Compressed Air

High velocity water from a pressure washer or compressed air should only be used at a very low pressure to prevent fin and/or coil damages. The force of the water or air jet may bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdowns may occur.

Coil Cleaning for Non-Coated Coils

- Clean as needed
- No chemicals or pressure washer use
- Vaccuum and spray with water

Control Panel Components

The following individual motor protection is provided.

Table 31: Maverick Individual Motor Control and Protection

Motor Type	Short Circuit	Overload	ON-OFF
Compressor < 100 Amps	MMP	Internal	Contactor
Condenser Fans	MMP	Internal	Contactor
EAF, no VFD, 208-460V	MMP	MMP	Contactor
EAF, no VFD, 575V	CB	OL	Contactor
EAF with VFD	CB*	VFD	VFD
SAF with VFD	CB*	VFD	VFD
SAF, no VFD	CB	OL	Contactor

MMP = manual motor protector
Internal = vendor motor protector with internal sensors
CB = circuit breaker [* FB with MD4 VFD]
OL = over load relay

Manual Motor Protector (MMP)

The manual motor protector (MMP) provides coordinated branch circuit, short circuit protection, a disconnecting means, a motor controller, and coordinated motor overload protection. A short circuit indicator with manual reset is mounted along side of each MMP as a means to differentiate between a short circuit and overload trip conditions.

The MMP trip points are factory set. Do not change unless the motor ampacity changes or the MMP is replaced with a new device with incorrect setpoint adjustment. Any other non-authorized trip point or setpoint adjustment voids all or portions of the unit's warranty. Authorized setpoint adjustment is accomplished as follows

1. For motors with a 1.15 service factor, rotate the arrow on the dial to correspond to the motor FLA.
2. For motors with a 1.0 service factor, multiply the motor FLA by 0.9; then rotate the arrow on the dial to correspond to that value.

To reset a tripped MMP, clear the trip by rotating the knob counterclockwise to the OFF (O) position; then rotate knob clockwise to the ON (I) position. See Figure 84.

⚠ WARNING

If an overload or a fault current interruption occurs, check circuits to determine the cause of the interruption. If a fault condition exits, examine the controller. If damaged, replace it to reduce the risk of fire or electrical shock.

Other MMP Features:

- Three-position rotary operator: OFF (O)-TRIP-ON (I) (Figure 84).
- Lockout—tagoutable rotary operator: turn the rotary operator to OFF (O), slide out the extension arm, and insert a lockout pin.
- Ambient compensated –20°C to +40°C.
- Single-phase sensitivity: if one phase exceeds setpoint, all three phases open.
- Trip test: insert a 9/64" screw driver in the test slot to simulate a trip.

Figure 84: Manual Motor Protector

Thermal Overload Relay

Designed to provide current-dependent protection for loads with normal starting against impermissibility high temperature rises due to overload, phase asymmetry or phase failure. Increase in motor current beyond set point as a result to overload or phase failure will trip the overload and disconnect the motor.

The Relay trip points are factory set. Do not change unless the motor ampacity changes or the Relay is replaced with a new device with incorrect set point adjustment. Any other non-authorized trip points or set points adjustment voids all or portions of the unit's warranty. Authorized set point adjustment is accomplishment as follows:

1. For motors with 1.15 service factor, rotate the arrow on the dial to correspond to the motor FLA (See Figure 85).
2. For motors with a 1.0 service factor, multiply the motor FLA with 0.9; then rotate the arrow on the dial to correspond to that value.

To reset a tripped Relay, push the blue RESET button. To disconnect, push the Red stop Button.

Other Relay features:

- Three connection systems options, Screw type, spring loaded and ring cable lug connection.
- Switch position indicator to indicate a trip and TEST function for wiring.
- Large rotary button to adjust current to Motor RLA.
- Selector switch for manual/and automatic RESET.

Figure 85: Overload Relay

Circuit Breaker

Circuit breakers are installed upstream of all VFDs to provide short circuit protection. These breakers are not adjustable.

To reset a tripped circuit breaker: Clear the trip by rotating the lever down to the OFF position. Then rotate lever up to the ON position (see Figure 86).

Breakers, like MMPs, have three distinct modes of operation which are clearly indicated by the handle position. The positions are ON (usually up, OFF (usually down), and TRIPPED (midway). Some circuit breakers may have a push-to-test button.

⚠ CAUTION

If a circuit breaker has tripped due to an overload or a fault current (short circuit), prior to resetting, the connected wiring circuits must be checked to determine the cause of the interruption.

Reset After Tripping Information

If a breaker is tripped, the handle/lever will be halfway between the OFF and ON positions. To reset a tripped circuit breaker:

1. Press the handle or rotate the lever to the OFF position.
2. Press the handle or rotate the lever the opposite direction to the ON position.

⚠ WARNING

In certain applications the circuit breaker may be mounted upside down. Therefore, when the handle is in the DOWN position it may not be turned OFF. The handle position corresponds to ON and OFF text clearly printed on the face of the unit. Be sure the mounting orientation and desired handle position is verified prior to performing service on the equipment. Only qualified service personnel should work on this equipment. **Improper position of the breaker handle during service may result in electric shock or death.**

Figure 86: Circuit Breaker

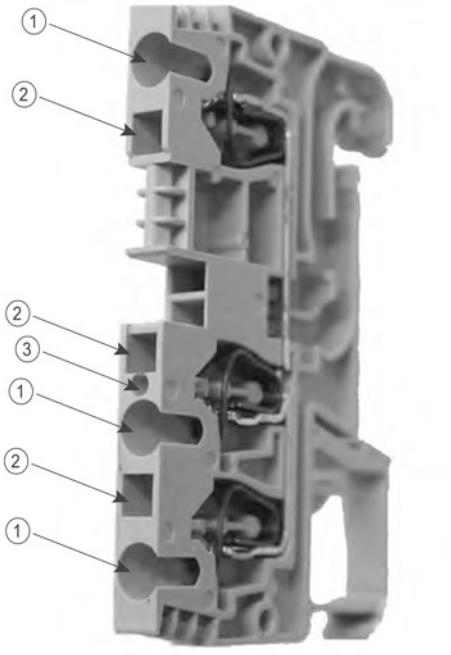
Field Wiring Terminals

All field wiring terminals are spring clamp type, which offer several advantages over traditional screw-type terminals:

- Spring connections do not require torquing
- Spring connections resist failure due to vibration
- Easily identifiable terminal markers
- Combination spring release and square test ports

Wire connections require inserting (“1” in Figure 87) a stripped wire a round port and clamping the stripped wire by inserting a flat-bladed screw driver in the adjacent square port (“2”).

Figure 87: Terminal Connectors



Phase Voltage Monitor (PVM)

The phase voltage monitor (Figure 88) is designed to protect three-phase loads from damaging power conditions. A microprocessor-based voltage and phase sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, its output relay is deactivated after a specified trip delay (Trip Delay). The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (Restart Delay). The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

There are two LEDs on the face of the PVM (“1” in Figure 88) to indicate the following items in Table 32.

Figure 88: Phase Voltage Monitor

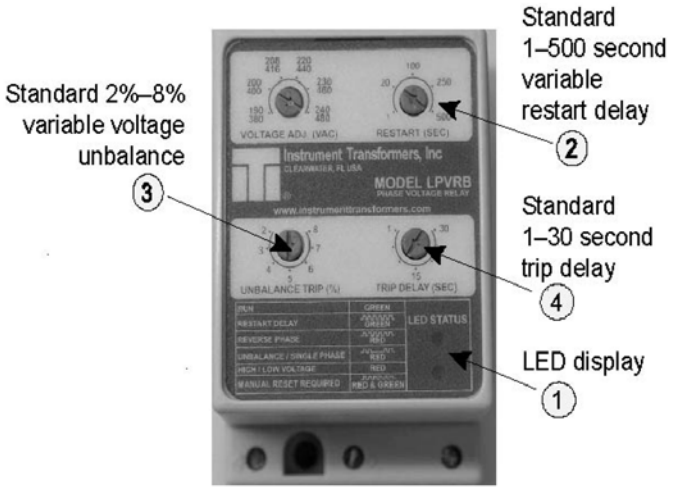


Table 32: LED Indication

Status	LED Indicator
Normal operation, no faults, relay energized	Green LED - steady on
Loss of input phase (relay deenergized)	Red LED - flash twice, off, flash twice, off, etc.
Voltage unbalance (relay deenergized)	Red LED - flash twice, off, flash twice, off, etc.
High or low voltage (relay de-energized)	Red LED - steady on
Phase reversal (relay deenergized)	Red LED - pulse on, off, on, off, etc.
Restart delay (fault cleared, PVM pending restart, relay de-energized)	Green LED - pulse on, off, on, off, etc.

Other features:

- Standard 2% to 8% variable voltage unbalance (“3” in Figure 88).
- Standard 1 to 500 second variable restart delay (“2”).
- Standard 1 to 30 second trip delay (“4”) (except loss of phase, which trips at 1 second non-adjustable).

Through-the-Door Disconnect

Opening the through-the-door disconnect without performing a proper machine shut-down is not recommended except in emergencies.

The optional disconnect provides for locking out power to the unit. To lock out power to the unit, rotate the habdle to the “Reset/Lock” position and insert a padlock or locking device through the base of the handle. **Do not lockout the handle with the Interlock in bypass mode.**

⚠ DANGER

Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

⚠ CAUTION

Molded case switches do not provide over-current protection. This device may automatically open the circuit at levels above the ampere rating of the switch.

Figure 89: Through-the-Door Handle Disconnect

Unit Storage

Location

The Maverick II is an outdoor unit. However, the construction schedule may dictate storage either on the ground or in its final position at the site. If the unit is stored on the ground, additional precautions should be taken as follows:

- Make sure that the unit is well supported along the length of the base rail.
- Make sure that the unit is level (no twists or uneven ground surface).
- Provide proper drainage around the unit to prevent flooding of the equipment.
- Provide adequate protection from vandalism, mechanical contact, etc.
- Make sure all doors are securely closed and all latches closed.
- Units should be fitted with covers over the supply and return air openings.

Preparation for Storage

Supply Fans

1. Remove the drive belts, tag them with the fan name and unit serial number, and store them in a conditioned space out of direct sunlight.
2. Once every two weeks, rotate the fan and motor shafts. Mark the shaft positions first to make sure they stop in a different position.
3. Depending on local climate conditions, condensate may collect on components inside the units. To prevent surface rust and discoloration, spray all bare metal parts with a rust preventive compound. Pay close attention to fan shafts, sheaves, bearings, and bearing supports.

Cabinet Sections

Once a month, open a door on each section and verify that no moisture or debris is accumulating in the unit.

Control Compartment

1. Daikin recommends that the electronic control equipment in the unit be stored in a 5% to 95% RH (non-condensing) environment.
2. It may be necessary to put a heat source (light bulb) in the main control panel to prevent the accumulation of atmospheric condensate within the panel. The location and wattage of the heat source is dependent on local environmental conditions.
3. Check the control compartment every two weeks to confirm that the heat source is functional and is adequatefor current conditions.

Restart

After extended storage, perform a complete start up. Inevitable accumulations of dirt, insect nests, etc. can contribute to problems if not cleaned out thoroughly prior to start up. In addition, thermal cycling tends to loosen mechanical and electrical connections. Following the startup procedure helps discover these and other issues that may have developed during the storage interval.

Bearing Lubrication

⚠ CAUTION

Bearing overheating potential can damage the equipment. Do not overlubricate bearings. Use only a high grade mineral grease with a 200°F safe operating temperature.

Motor Bearings

Supply Fans

Supply fan motors should have grease added after every 2000 hours of operation. Use one of the greases shown in Table 33. Using the following procedure, relubricate the bearings while the motor is warm, but not running.

1. Remove and clean upper and lower grease plugs.
2. Insert a grease fitting into the upper hole and add a small amount of clean grease with a low pressure gun.
3. Install the lower grease plug.
4. Run the motor for five minutes before installing the upper grease plug.

Condenser Fan and Exhaust Fan

The condenser fan and exhaust fan motors are permanently lubricated and require no periodic lubrication.

Fan Shaft Bearings

Relubricate fan shaft bearings periodically. Relubricate according to the schedule on the fan housing. If the bearings are exposed to wet conditions, wide temperature variations, or other severe atmospheric conditions, relubricate more frequently. Use one of the greases shown in Table 33.

While the bearing is at normal operating temperatures, rotate the fan by hand and add only enough grease to purge the seals. The seals bleed slightly when this occurs. Do not overlubricate.

Table 33: Recommended Greases

Manufacture	Product Name	Temp. Range (°F)
Texaco Lubricants Co.	Premium RB	-30 to 300
Mobil Oil Corporation	Mobilith AW2	-40 to 325
Shell Oil Company	Alvania No. 2	-20 to 240

Vibration Levels

Each unit as shipped is trim balanced to operate smoothly. To provide satisfactory operation after shipping and installation, use accepted industry guidelines for field balancing fans.

NOTE: Excessive vibration from any cause contributes to premature fan and motor bearing failure. Monitor overall vibration levels every six months of operation. An increase in levels is an indication of potential trouble.

Vibration Causes

1. Wheel imbalance.
   a. Dirt or debris on wheel blades.
   b. Loose setscrews in wheel hub or bearing-to-shaft.
   c. Wheel distorted from overspeed.
2. Bent shaft.
3. Faulty drive.
   a. Bad V-belts; lumpy, or mismatched.
   b. Belt tension too tight or too loose.
4. Bad bearings or loose bearing hold-down bolts.
5. Motor imbalance.
6. Fan section not supported evenly on foundation.

Periodic Service and Maintenance

1. Check all moving parts for wear every six months.
2. Check bearing collar, sheave, and wheel hub setscrews, sheave capscrews, and bearing hold-down bolts for tightness every six months.

Energy Recovery Wheel

⚠ CAUTION

Installation and maintenance must be performed only by qualified personnel who are experienced with this type of equipment and familiar w th local codes and regulations.

⚠ WARNING

Moving machinery and electrical power hazards. Can cause severe personal injury or death. Disconnect and lock off all power before servicing equipment.

⚠ CAUTION

Sharp edges are inherent to sheet metal parts, screws, clips, and similar items. Contact with these edges may cause personal injury. Exercise caution when servicing equipment.

⚠ DANGER

Hazardous voltage. Will cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

Servicing Control Panel Components

Disconnect all electric power to the unit when servicingcontrol panel components. Before servicing, always inspectunits for multiple disconnects to ensure all power is removedfrom the control panel and its components.

Bearings

Enthalpy wheels are provided with "no maintenance" inboard bearings, requiring no maintenance during the life of the equipment.

Drive Motor

The drive motor should require no maintenance. The wheel drive motor bearings are pre-lubricated and no further lubrication is necessary. The wheel drive pulley is secured to the drive motor shaft by a combination of either a key or D slot or setscrew. The set screw is secured with removable locktite to prevent loosening. Annually confirm set screw is secure.

Drive Belts

The wheel drive belt is a urethane stretch belt designed to provide constant tension through the life of the belt. No adjustment is required. Inspect the drive belt annually for proper tracking and tension. A properly tensioned belt will turn the wheel immediately after power is applied with no visible slippage during start-up.

Belts are multilink with individual links constructed of a high performance polyurethane elastomer, reinforced with multiple plies of polyester fabric. This belt provides a strong, yet flexible belting. The multilink feature provides easy servicing or replacement.

Seals

The seals are designed to be durable and require no maintenance other than adjustment. If seals become worn or damaged they may easily be replaced. The seals are made to clip onto the cassette or metal post easily.

Variable Frequency Controller

No maintenance should be required on the VFD. Should problems with the VFD develop, consult the VFD service manual that accompanied your order.

Wheel

The enthalpy wheel is designed to last the life of the equipment. It is protected by an ASHRAE 30% filter to keep dust and dirt from the heat transfer surface. The wheel is somewhat self cleaning through its normal action of rotating in and out of countercurrent air flow streams. If the wheel becomes dirty, it may be cleaned by blowing out the unit with compressed air (20 psig maximum). In cases of severe dirt, the wheel may be removed from the cassette and washed with water following wheel removable procedures outlined below.

Routine Maintenance

Cleaning

The need for periodic cleaning of the energy recovery wheel will be a function of operating schedule, climate and contaminants in the indoor air being exhausted and the outdoor air being supplied to the building.

The Daikin wheel is “self-cleaning” with respect tiny particles due to its laminar flow characteristics. Smaller particles pass through; larger particles land on the surface and are blown clear as the flow direction is reversed. Any material that builds up on the face of the wheel can be removed with a brush or vacuum.

The primary need for cleaning is to remove oil based aerosols that have condensed on energy transfer surfaces. A characteristic of all dry desiccants, such films can close off micron sized pores at the surface of the desiccant material, reducing the efficiency by which the desiccant can adsorb and desorbs moisture and also build up so as to reduce airflow.

In a reasonably clean indoor environment such as school or office building, measurable reductions of airflow or loss of sensible (temperature) effectiveness may not occur for several years. Measurable changes in latent energy (water vapor) transfer can occur in shorter periods of time in applications such as moderate occupant smoking or cooking facilities.

In applications experiencing unusually high levels of occupant smoking or oil based aerosols such as industrial applications involving the ventilation of machine shop areas for example, annual washing of energy transfer may be necessary to maintain latent transfer efficiency. Proper cleaning of the energy recovery wheel will restore latent effectiveness to near original performance.

To clean, gain access to the energy recovery wheel and remove segments. Brush foreign material from the face of the wheel. Wash the segments or small wheels in a 5% solution of non-acid based coil cleaner (such as Acti-Klean, available through Daikin, Stock # AK1) or alkaline detergent and warm water. Soak in the solution until grease and tar deposits are loosened (Note: some staining of the desiccant may remain and is not harmful to performance).

Before removing, rapidly run finger across surface of segment to separate polymer strips for better cleaning action. Rinse dirty solution from segment and remove excess water before reinstalling in wheel.

⚠ CAUTION

Do not use acid based cleaners, aromatic solvents, steam or temperatures in excess of 170ºF; damage to the wheel may occur!

Air Seals

Four adjustable diameter seals are provided on each cassette to minimize transfer of air between the counter flowing airstreams.

To adjust diameter seals, loosen diameter seal adjusting screws and back seals away from wheel surface (Figure 90). Rotate wheel clockwise until two opposing spokes are hidden behind the bearing support beam. Using a folded piece of paper as a feeler gauge, position paper between the wheel surface and diameter seals. Adjust seals towards wheel surface until a slight friction on the feeler gauge (paper) is detected when gauge is moved along the length of the spoke. Retighten adjusting screws and recheck clearance with “feeler” gauge.

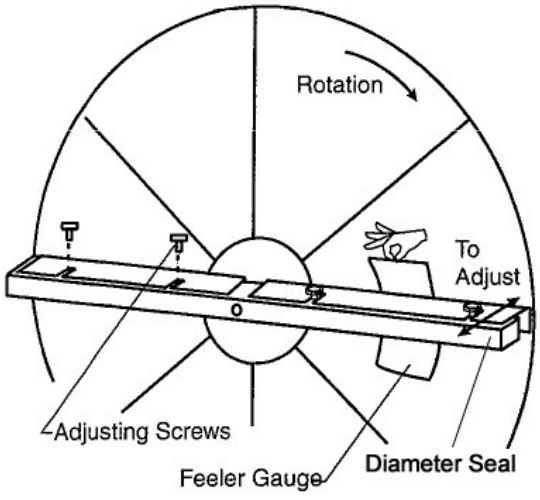
Wheel Drive Components

The wheel drive motor bearings are prelubricated and no further lubrication is necessary.

The wheel drive pulley is secured to the drive motor shaft by a combination of either a key or D slot or setscrew. The set screw is secured with removable locktite to prevent loosening. Annually confirm set screw is secure.

The wheel drive belt is a urethane stretch belt designed to provide constant tension through the life of the belt. No adjustment is required. Inspect the drive belt annually for proper tracking and tension. A properly tensioned belt will turn the wheel immediately after power is applied with no visible slippage during start-up.

Figure 90: Adjusting Diameter Seals



Segment Installation & Replacement

Wheel segments are secured to the wheel frame by a Segment Retainer which pivots on the wheel rim and is held in place by a Segment Retaining Catch (Figure 91).

To install wheel segments follow steps 1 through 5 (Figure 92). Reverse the procedure for segment removal.

1. Disconnect power to the drive motor.
2. Unlock two segment retainers. There is one on each side of the selected segment opening.
3. With the embedded stiffener facing he motor side, insert the node of the segment between hub plates.
4. Holding the segment by the two outer corners, press the segment towards the center of the wheel and inwards against the spoke flanges. If hand pressure does not fully seat the segment, insert the flat tip of a screwdriver between the wheel rim and outer corners of the segment and apply downward force while guiding the segment into place.
5. Close and latch each Segment Retainer under the Segment Retaining Catch.
6. Slowly rotate the wheel 180°. Install the second segment opposite the first for counter balance. Rotate the two installed segments 90° to balance the wheel while the third segment is installed. Rotate the wheel 180° again to install the fourth segment opposite the third. Repeat this sequence with the remaining four segments.

Figure 91: Segment Retaining Clip

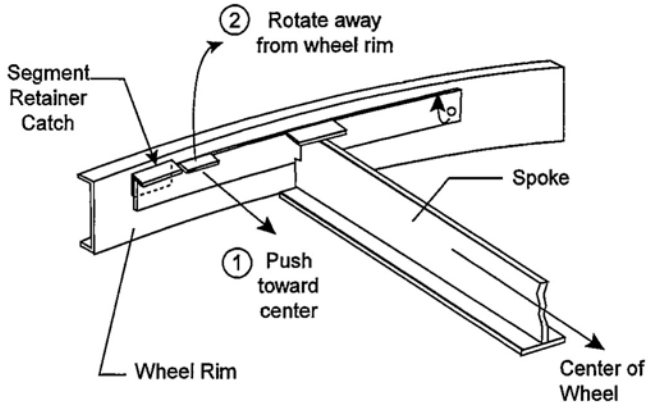
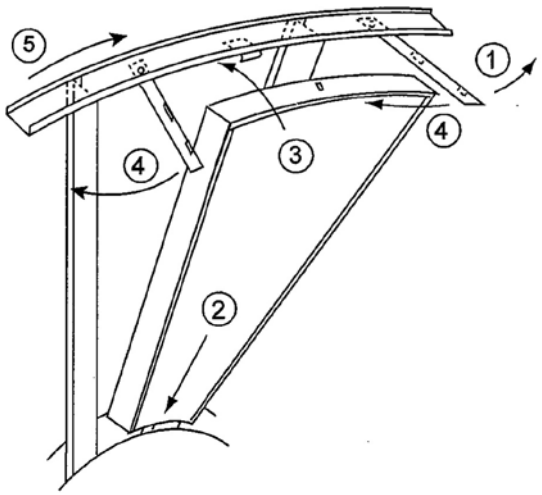


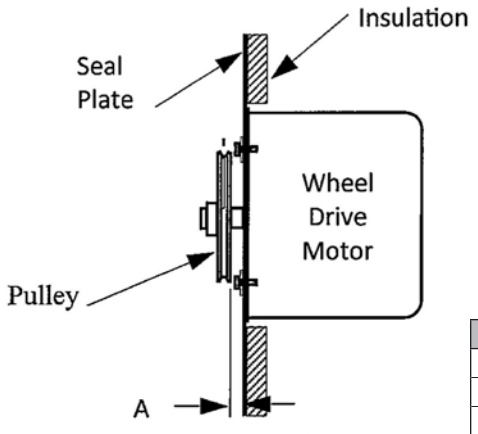
Figure 92: Installing Wheel Segments



Wheel Drive Motor & Pulley Replacement

1. Disconnect power to the drive motor.
2. Remove belt from the pulley and positions temporarily around the wheel rim.
3. Loosen the set screw in wheel drive pulley using Allen wrench and remove pulley from the motor drive shaft.
4. While supporting the weight of the drive motor in one hand, loosen and remove (4) mounting bolts
5. Install the replacement motor with hardware kit supplied.
6. Install the pulley per the dimensions in Figure 93 and secure the set screw to the drive shaft
7. Stretch belt over pulley and engage grove.
8. Follow start up procedure on page 96 (procedure needs to be confirmed).

Figure 93: Pulley Installation

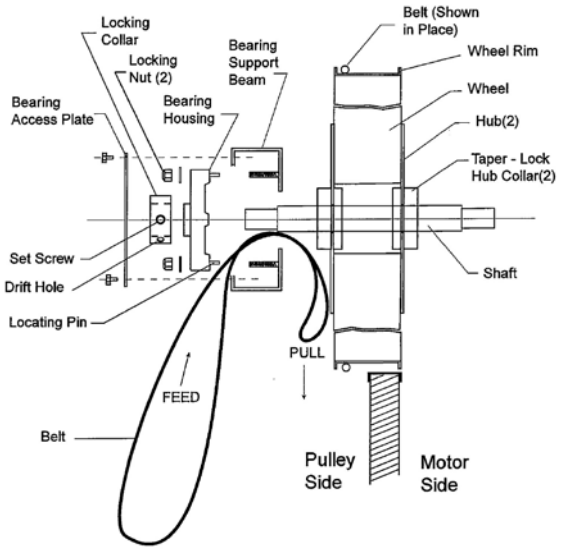


Series	DIM–A
36	1/4"
52	1/4"
64	7/16"
74	7/16"
86	7/16"

Belt Replacement

1. Obtain access to the pulley side bearing access plate and remove two retaining screws.
2. Using a hexagonal wrench, loosen the screw in the bearing lock collar.
3. Using a light hammer and drift, tap collar in the direction of wheel rotation to unlock collar. Remover collar.
4. Using a socket wrench with extension, remove two nuts which secure bearing housing to the bearing support beam.
5. Slide bearing from shaft.
6. Using a wrench, remove the diameter seal retaining screws. Remove diameter seals from bearing beam.
7. Form a small loop on the belt and pass it through the hole in the bearing support beam. Grasp the belt at the wheel hub and pull the entire belt down. Loop the trailing edge of the belt over the shaft.
8. Install the new belt around the wheel and pulley.
9. Reinstall the bearing onto the wheel shaft, being careful to engage the two locating pins into the holes in the bearing support beam. Secure the bearing with two self locking nuts.
10. Reinstall the diameter seals and tighten retaining screws. See Diameter Seal Adjustment on page 96.
11. Reinstall bearing locking collar. Rotate collar by hand in the direction the wheel rotates according to label on wheel casset. Lock in position by tapping pin hole with hammer and drift. Secure in position with set screw
12. Reinstall bearing access cover with two screws
13. Apply power and ensure wheel rotated freely.

Figure 94: Belt Replacement



Troubleshooting

The following table may be used as a quick-reference for identifying common symptoms and possible causes related to the recovery wheel.

Table 34: Energy Recovery Wheel Troubleshooting

Symptom	Cause
Inadequate Wheel Performance	Check wheel rotation speed (see Variable Speed Frequency Control on page 47).
	Check for wheel integrity and adjust seals or replace worn seals (see Energy Recovery Wheel Design on page 45 and Seals on page 107).
	Check entering air conditions and compare to design (see “Energy Recovery Wheel” on page 67).
	Check ducting for leakage and fix any leaks.
	Check media for dirt and clean per cleaning instructions (seeCleaning on page 108 and Segment Installation & Replacement on page 109).
Improper Wheel Rotation	Check drive belts for engagement with sheave.
	Check drive motor.
	Check drive motor wiring for proper voltage.
	Check VFD programming (provided with optional frost protection).
High Pressure Drop	Check air flow and compare to design.
	Check filters and clean/replace as necessary.
	Check media for plugging and clean per cleaning instructions (see Segment Installation & Replacement).
Noise	Check seals and adjust as necessary.
	Check the bearings for source of noise.
	Check the belt for slippage (see Drive Belt Tension Adjustment on page 95).
Wheel Will Not Operate	Check all electrical connections. If MicroTech II controls are provided, make sure the building pressure is above setpoint such that the EAF turns on. The wheel does not operate unless the EAF is on (see Exhaust Fan Option on page 53).

Supply Fan

Setscrews

Setscrews are used to lock bearings, sheaves, locking collars, and fan wheels to their shafts. They must be checked periodically to see that they have not loosened. If this is not done, severe equipment damage could occur.

Refer to the values in Table 35 and check the tightness of all setscrews with a torque wrench.

Table 35: Setscrew Minimum Torque Specifications

Setscrew Diameter (in.)	Minimum Torque (ft.lb)
1/4	5.5
5/16	10.5
3/8	19.0
7/16	29.0
1/2	42.0
5/8	92.0

Supply Fan Wheel-to-Funnel Alignment

The fan wheel-to-funnel alignment must be as shown in Figure 95 to obtain proper air delivery and operating clearance. If necessary, adjustments are made as follows:

1. Verify that the fan shaft has not moved in its bearings.
2. Loosen the fan hub setscrews and move the wheel(s) along the shaft as necessary to obtain the correct dimension shown in Table 36.
3. Retighten the setscrews to the torque specification given in Table 35. Tighten the setscrews over the keyway first; tighten those at 90 degrees to the keyway last.
4. Verify that the radial clearance around the fan is uniform.

Figure 95: SWSI Airfoil Wheel-to-Funnel Alignment

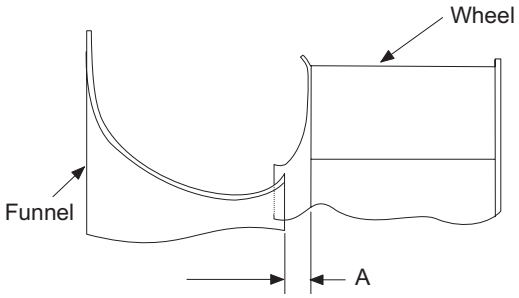


Table 36: SWSI Airfoil Wheel-to-Funnel Relationship

Wheel-to-Funnel Relationship (in inches)	
Wheel Diameter	**A**
15	0.44
18	0.44
20	0.44
22	0.44
24	0.44
30	0.56

Refrigerant Charge

The unit nameplate references proper charge for each refrigerant circuit in case a full charge must be added to the unit.

⚠ CAUTION

Severe loss of charge may occur if the high refrigerant pressure switch is replaced before reclaiming the refrigerant. Replace pressure switch after reclaiming refrigerant. Venting refrigerant to atmosphere is not allowed per most local laws and/or codes.

Servicing Refrigerant Sensors or Switches

The Maverick II includes the following refrigerant sensors or switches.

1. Low refrigerant pressure sensing, operating switch, automatic reset.
    a. Disables associated compressors on a drop in suction pressure to approximately 35 psig.
    b. Enables associated compressors on a rise in suction pressure to approximately 60 psig.
2. High refrigerant pressure, protective switch, manual reset at keypad.

The low pressure switch senses refrigerant pressure through shrader fittings that contain cores. The cores are stop valves that do not allow refrigerant to flow through the Shrader unless the device is in place. Therefore, the low pressure switch can be replaced without reclaiming the refrigerant.

The Shrader that serves the high pressure switch does not contain a core in order to maximize the functionality of the safety. Therefore it cannot be replaced unless the refrigerant has already been reclaimed.

Servicing Optional Electric Heater

⚠ WARNING

Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

If the electric heater is not operating properly, a qualified electrician should perform the following to check if the heater is damaged:

1. Measure continuity through all fuses.
2. Check that all electrical connections are tight. Look for signs of arcing.
3. Check the resistance to ground for each circuit. It should be infinite.
4. Check the resistance phase to phase for each circuit.
5. Check all contactors.

Replacement Parts

Replacement parts can be obtained by contacting Daikin at 1-800-37-PARTS or at www.DaikinMcQuay.com. When contacting Daikin for service or replacement parts, refer to the model number and serial number of the unit as stamped on the nameplate attached to the unit.

When contacting Daikin for service or replacement parts, provide the model number, serial number, and unit part number of the unit as stamped on the serial plate attached to the unit. For questions regarding wiring diagrams, provide the number on the specific diagram. If replacement parts are required, include the date of unit installation, the date of failure, an explanation of the malfunction, and a description of the replacement parts required.

Compressors

Scroll Compressor

All Daikin Rooftop products include a first-year parts only warranty. The warranty period extends 12 months from startup or 18 months from date of shipment, whichever comes first. Labor to install these parts is not included with this warranty. Compressors are considered a part and are included in this standard warranty.

All Compressors

Replacement compressors for Daikin Rooftop Units can be obtained from the Daikin Service Parts department.

The decision to replace the failed portion of the compressor tandem, as opposed to replacing the entire tandem, must be decided based on the following.

1. In warranty: Warranty only covers replacement of the failed portion of the tandem.
2. Out of warranty: The customer decides whether to replace the entire tandem or just a portion.
3. Some equipment may include the extended 2nd - 5th year compressor warranty option.

Order the replacement compressor through the Daikin Parts Department (Minneapolis).

1. Contact the Daikin Parts Department for compressor availability.
2. Send a completed parts order form to the Daikin Parts Department.
3. The Parts Department processes the order and the compressors are shipped from our Dayton, OH warehouse via ground transportation. If next-day air is required, indicate this on the parts order form and a freight charge will be billed to your account. Air freight costs are not covered under the Daikin warranty.
4. After the failed compressor is replaced, return it to Daikin with a Return Goods Tag attached, which you will receive in the mail. It must be attached to the compressor. The Return Goods Tag has instructions on where to send the compressor. If the compressor is not returned, you will be billed for the replacement compressor.
5. Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.

In-Warranty Return Material Procedure

Material other than compressors may not be returned except by permission of authorized factory service personnel of Daikin at Minneapolis, Minnesota.

A “return goods” tag will be sent to be included with the returned material. Enter the information as called for on the tag in order to expedite handling at out factories and issuance of credits. All parts shall be returned to the factory designated on the return goods tag, transportation charges prepaid.

The return of the part does not constitute an order for replacement. A purchase order for the replacement part must be entered through your nearest Daikin representative. The order should include the component's part number and description and the model and serial numbers of the unit involved.

If it is determined that the failure of the returned part is due to faulty material or workmanship within the standard warranty period, credit will be issued on the customer's purchase order.

Rooftop
Equipment Warranty Registration Form

To comply with the terms of Daikin Applied Warranty, complete and return this form within 10 days to the Warranty Department of Daikin Applied.

Check, test, and start procedure for Rooftop roof mounted air conditioners with or without heat recovery and roof mounted air handlers.

GENERAL INFORMATION

Job Name: _____ **Unit No.:** _____

SOI No.: _____

Installation address: _____

City: _____ **State:** _____

Purchasing contractor: _____

City: _____ **State:** _____

Name of person doing start-up: _____

Company name: _____

Address: _____

City/State/Zip: _____

UNIT INFORMATION

Unit model number: _____ **Unit serial number:** _____

Compressor 1 model number: _____ **Serial number:** _____

Compressor 2 model number: _____ **Serial number:** _____

Compressor 3 model number: _____ **Serial number:** _____

Compressor 4 model number: _____ **Serial number:** _____

Compressor 5 model number: _____ **Serial number:** _____

Compressor 6 model number: _____ **Serial number:** _____

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DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

Select Yes or No. If not applicable to the type of unit, select N/A.

I. INITIAL CHECK

A. Is any shipping damage visible? . . . . . Yes No N/A

B. Are fan drives properly aligned and belts properly adjusted? . . . . . Yes No N/A

C. Tightened all setscrews on pulleys, bearings and fans? . . . . . Yes No N/A

D. Have the hold-down bolts been backed off on spring mounted fan isolators? . . . . . Yes No N/A

E. Do fans turn freely? . . . . . Yes No N/A

F. Has the discharge static pressure reference line been properly located within the building? . . . . . Yes No N/A

G. Electrical service corresponds to unit nameplate? . . . . . Yes No N/A

G1. Voltage at Terminal Block | Disconnect 1–2_____ V 2–3 _____ V 1–3 _____ V

H. Is the main disconnect adequately fused and are fuses installed? . . . . . Yes No N/A

I. Are crankcase heaters operating, and have they been operating 24 hours prior to start-up? . . . . . Yes No N/A

J. Are all electrical power connections tight? (Check compressorelectrical box.) . . . . . Yes No N/A

K. Is the condensate drain trapped? . . . . . Yes No N/A

II. FAN DATA

A. Check rotation of supply fan? . . . . . Yes No N/A

B. Voltage at supply fan motor: . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V

C. Supply fan motor amp draw per phase: . . . . . L1 _____ L2 _____ L3 _____

D. Fuse sizes: . . . . . _____

E. What is the supply fan rpm? . . . . . _____

F. Check rotation of return fan? . . . . . Yes No N/A

G. Voltage at return fan motor: . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V

H. Return fan motor amp draw per phase: . . . . . L1 _____ L2 _____ L3 _____

I. Fuse sizes: . . . . . _____

J. What is the return fan rpm? . . . . . _____

K. Record supply static pressure at unit in inches of H_20: . . . . . _____

L. Record return static pressure at unit (with outside air dampers closed) in inches of H_20: . . . . . _____

DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

Select Yes or No. If not applicable to the type of unit, select N/A.

III. START-UP COMPRESSOR OPERATION

A. Do compressors have holding charges?

Circuit #1 . . . . . Yes No N/A

Circuit #2 . . . . . Yes No N/A

B. Are compressors rotating in the right direction? . . . . . Yes No N/A

C. Do condenser fans rotate in the right direction? . . . . . Yes No N/A

D. Ambient temperature (°F): . . . . . _____

E. Does unit start up and perform per sequence of operation? . . . . . Yes No N/A

IV. PERFORMANCE DATA

A. Compressor voltage across each phase: . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V

B. Compressor amperage of fully loaded compressor: Compressor #1 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #2 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #3 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #4 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #5 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #6 — Phase 1_____ Phase 2 _____ Phase 3 _____

C. Low pressure cut-out: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

D. Low pressure cut-in: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

E. High pressure cut-out: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

F. Discharge pressure, one compressor: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

G. Discharge pressure, fully loaded, 2–3 compressors: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

H. Suction pressure, one compressor: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

I. Suction pressure, fully loaded, 2–3 compressors: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

J. Liquid press, fully loaded, 2–3 compressors (at liquid line shutoff valve): . . . Circuit 1 _____ psig Circuit 2 _____ psig

K. Liquid temperature, fully loaded, 2–3 compressors: . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

L. Suction line temperature: . . . . . _____ °F _____ °F

M. Superheat: . . . . . _____ °F _____ °F

N. Subcooling:. . . . . _____ °F _____ °F

O. Is the liquid in the line sightglass clear and dry? . . . . . Yes No N/A

P. Does the hot gas bypass valve function properly? . . . . . Yes No N/A

DAIKIN **Rooftop Equipment Warranty Registration Form (continued)**

Select Yes or No. If not applicable to the type of unit, select N/A.

Q. At what suction pressure does the hot gas bypass valve open? . . . . . Circuit 1 _____ psig Circuit 2 _____ psig

R. Record discharge air temperature at discharge of unit: _____ °F

S. Are all control lines secure to prevent excessive vibration and wear? . . . . . Yes No N/A

T. Are all gauges shut off and valve caps and packings tight after start-up? . . . . . Yes No N/A

V. ELECTRIC HEAT CHECK, TEST & START

A. Electrical heat service corresponds to unit nameplate? . . . . . Yes No N/A

Volts _____ Hertz _____ Phase _____

B. Are there any signs of physical damage to the electric heat coils? . . . . . Yes No N/A

C. Have all electrical terminals been tightened? . . . . . Yes No N/A

D. Does sequence controller stage contactors properly? . . . . . Yes No N/A

E. Electric heater voltage across each phase: . . . . . _____ L1 _____ L2 _____ L3

F. Amp draw across each phase at each heating stage:

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Phase L1:	_____	_____	_____	_____	_____	_____
Phase L2:	_____	_____	_____	_____	_____	_____
Phase L3	_____	_____	_____	_____	_____	_____

G. FLA: . . . . . L1 _____ L2_____ L3 _____

H. Operate electric heat with fans off. Electric heat must cycle on high limit control . . . . . Yes No N/A

VI. GAS BURNER CHECK, TEST, & START

Specifications:
For gas, see Forced Draft Gas Burner Installation and Maintenance Bulletin. (IM 684 and IM 685)

A. Gas Furnace: . . . . . Model no. _____

B. Gas Burner: . . . . . .Model no._____ Serial no. _____

C. Gas Rated firing rate (MBH input): . . . . . ._____

D. Gas Altitude (ft. above sea level): . . . . . ._____

E. Input (CFH): . . . . . _____

F. Gas pressure at burner (inches w.c.): . . . . . _____

G. CO_2 (%) . . . . . _____

H. CO_2 (%): . . . . . _____

I. Pilot flame only in microamps (steady at low fire): . . . . . _____

J. Pilot Tap-gas pressure (inches w.c.): . . . . . _____

K. Motor only/burner FLA running amps: . . . . . _____

L. High limit control OK? . . . . . Yes No N/A

M. Flame safeguard (microamps): . . . . . _____

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DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

Select Yes or No. If not applicable to the type of unit, select N/A.

N. Flame failure shutoff (seconds): _____

O. Airswitch OK? . . . Yes No N/A

P. High Gas Pressure Switch OK? . . . Yes No N/A

Q. Low Gas Pressure Switch OK? . . . Yes No N/A

R. Main Gas Valve Close-off OK? . . . Yes No N/A

S. Modulation Gas Heat Performance

Gas Pressure Mod. Valve	Reg. Valve
25% _____ in Wc.	25% _____ in Wc.
50% _____ in Wc.	50% _____ in Wc.
75% _____ in Wc.	75% _____ in Wc.
100% _____ in Wc.	100% _____ in Wc.

VII. Hot Water Coil

A. Pressure test OK? . . . Yes No N/A

VIII. Heat Recovery

A. Heat wheel rotates freely? . . . Yes No N/A

B. Heat wheel VFD operates properly? . . . Yes No N/A

C. Heat wheel VFD . . . Model No. _____ Serial No. _____

D. Check for air bypass around heat wheel . . . Yes No N/A

IX. Design Flow Calibration

A. Verify power is supplied to the MicroTech III unit controller . . . Yes No N/A

B. Verify that the shipping screws have been removed from the measuring station vane . . . Yes No N/A

C. Examine station for damage . . . Yes No N/A

D. Record Level Position after calibration

- LH Level Position . . . _____
- RH Level Position . . . _____

NOTE: This is viewed in the MicroTech III controller, in the Min OA setup menu.

DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

Select Yes or No. If not applicable to the type of unit, select N/A.

X. Have all electronic or electrical controls been checked, adjusted, and tested for proper operation per the installation and maintenance bulletins?

. . . . . Yes No N/A

XI. MAINTAINING MICROTECH CONTROL PARAMETER RECORDS

After the unit is checked, tested, and started and the final control parameters are set, record the final settings. Keep these records on file and update whenever changes to the control parameters are made. Keeping a record facilitates any required analysis and troubleshooting of the system operation and facilitates restoration after a controller replacement.

Thank you for completing this form. Please sign and date below.

Signature _____ **Startup date:** _____

Return completed form by mail to:

Daikin Warranty Department, 13600 Industrial Park Boulevard, Minneapolis, MN 55441

or by email to: AAH.Wty_WAR_forms@daikinapplied.com

Please fill out the Daikin Applied "Quality Assurance Survey Report" and list any additional comments that could affect the operation of this unit; e.g., shipping damage, failed components, adverse installation applications, etc. If additional comment space is needed, write the comment(s) on a separate sheet, attach it to the Survey Report and return it to the Warranty Department of Daikin Applied with the completed Equipment Warranty Registration form.

DAIKIN

Quality Assurance Survey Report

To whom it may concern:
Please review the items below upon receiving and installing our product. Select N/A on any item that does not apply to the product.

Job Name: _____ **Daikin Applied S.O. No.**_____

Installation address:_____

City: _____ State: _____

Purchasing contractor:_____

City: _____ State: _____

Name of person doing start-up (print): _____

Company name:_____

Address:_____

City/State/Zip: _____

Unit model number: _____ **Unit serial number:** _____

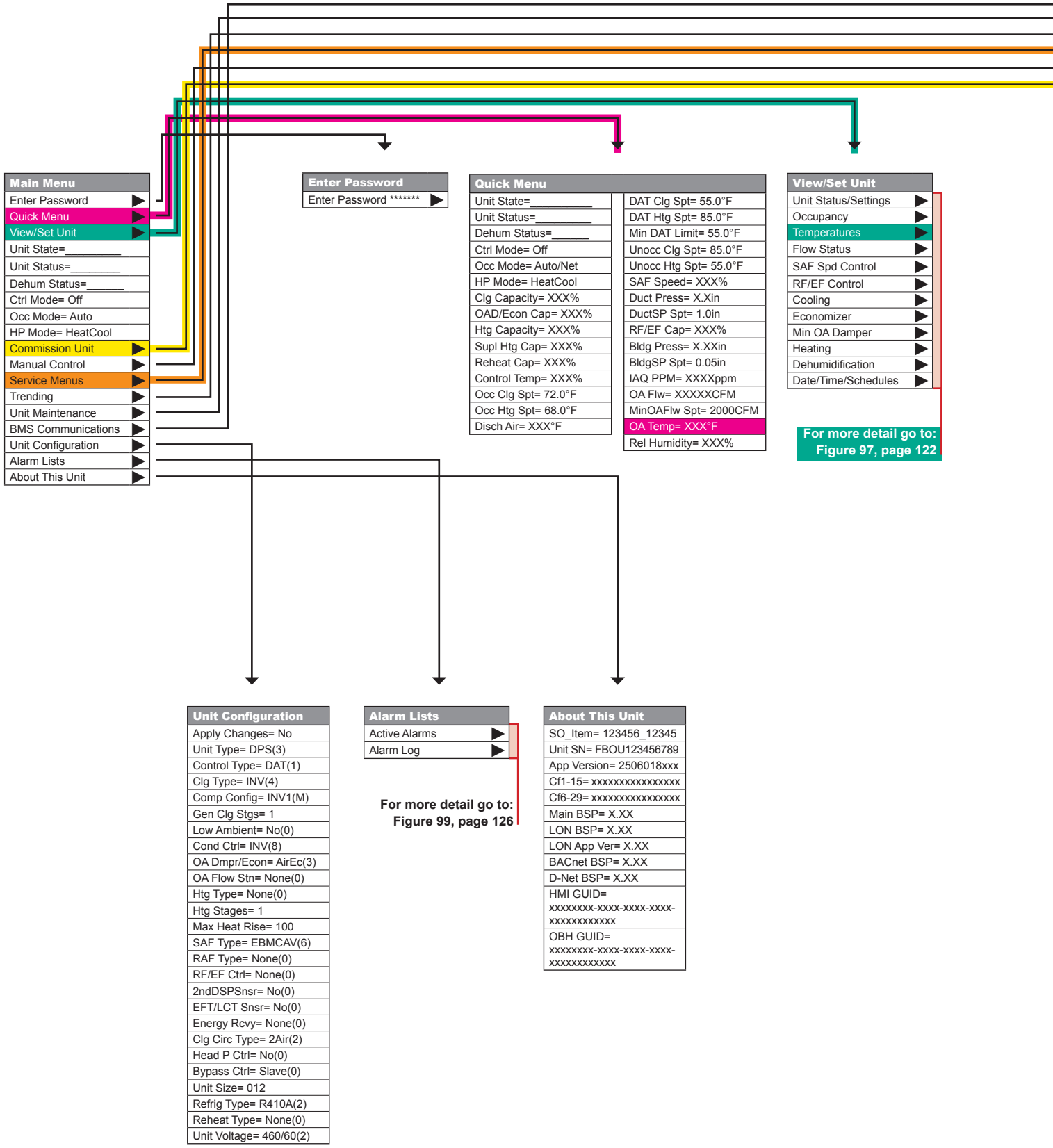
1. Is there any shipping damage visible? . . . . . Yes No N/A
   Location on unit _____
2. How would you rate the overall appearance of the product; i.e., paint, fin damage, etc.?
   Excellent Good Fair Poor
3. Did all sections of the unit fit together properly? . . . . . Yes No N/A
4. Did the cabinet have any air leakage? . . . . . Yes No N/A
   Location on unit _____
5. Were there any refrigerant leaks? . . . . . Yes No N/A
   From where did it occur? . . . . . Shipping Workmanship Design
6. Does the refrigerant piping have excessive vibration? . . . . . Yes No N/A
   Location on unit _____
7. Did all of the electrical controls function at start-up? . . . . . Yes No N/A
   Comments _____
8. Did the labeling and schematics provide adequate information? . . . . . Yes No N/A
9. How would you rate the serviceability of the product?
   Excellent Good Fair Poor
10. How would you rate the overall quality of the product?
    Excellent Good Fair Poor
11. How does the quality of Daikin Applied products rank in relation to competitive products?
    Excellent Good Fair Poor
    Comments _____

Please list any additional comments which could affect the operation of this unit; i.e., shipping damage, failed components, adverse installation applications, etc. If additional comment space is needed, write the comment(s) on a separate sheet, attach the sheet to this completed Quality Assurance Survey Report, and return it to the Warranty Department with the completed preceding “Equipment Warranty Registration Form”.

13F-4160 (02/16)

The following is a description of the MicroTech III menu structure. These menus and items can all be displayed with the keypad/display. Menu items displayed will change based on the selected unit configuration.

***Figure 96: Main Menu** – Keypad/Display Menu Structure*



Commission Unit
Unit Set-Up ▶
Timer Settings ▶
SAF Set-Up ▶
RF/EF Set-Up ▶
Htg/Clg ChgOvr Set-Up ▶
Cooling Set-Up ▶
INV Cmp Set-Up ▶
Econo Set-Up ▶
Min OA Set-Up ▶
Heating Set-Up ▶
OA Fan Set-Up ▶
Exp Valve Set-Up ▶
Defrost Set-Up ▶
Dehum Set-Up ▶
Energy Rec Set-Up ▶
D3 Set-Up ▶
Alarm Configuration ▶

For more detail go to: Figure 98, page 124

Manual Control
Manual Control= Normal
Supply Fan= Off
SAF Spd Cmd= 0%
INV/OF Ena= Off
INV Comp= Off
INV Spd Cmd= 0%
Comp 3= Off
OA Fan= Off
OA Fan Cmd= 0%
4 Way Valve= Cool
RcvrSol Valve= Closed
BP Sol Valve= Closed
EVI Cmd= 0%
EVO Cmd= 0%
RF/EF VFD= Off
RF/EF Spd Cmd= 0%
OAD/Econo= 0%
Gas Htg On/Off
Htg Valve= 0%
SCR Out= 0%
Htg Stg 1= Off
SCR Ena 1= Off
Htg Stg 2= Off
Htg Stg 3= Off
Htg Stg 4= Off
Reheat Valve= 0%
ERec Wheel= Off
ER Whl Cmd= 0%
ER BP Dmpr Cl= Off
ER BP Dmpr Op= Off
Alm Output= Off
Fan Op Out= Off

Service Menus
Timer Settings ▶
Operating Hours ▶
Save/Restore Settings ▶
Active Alarms ▶
Alarm Log ▶
Alarm Configuration ▶
Analog Input Status ▶
Universal I/O Status ▶
Digital Input Status ▶
Digital Output Status ▶
Network Input Status ▶
Modbus Status ▶
D3 Status ▶
Sensor Offsets ▶
Reset Counte= XXXX

For more detail go to: Figure 99, page 126

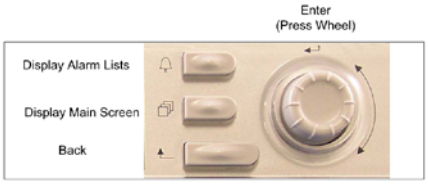
Trending
Trending Ena= No
Apply Chgs= No
Sample Time= 300s
TrendOnOff= Off
Export Data= No
Clear Trend= Done
Points 1–8 (Fixed) ▶
Points 9–24 (from List) ▶
Points 25–27 (with IDs) ▶
Points 28–30 (with IDs) ▶

For more detail go to: Figure 101, page 128

Unit Maintenance
Operating Hours

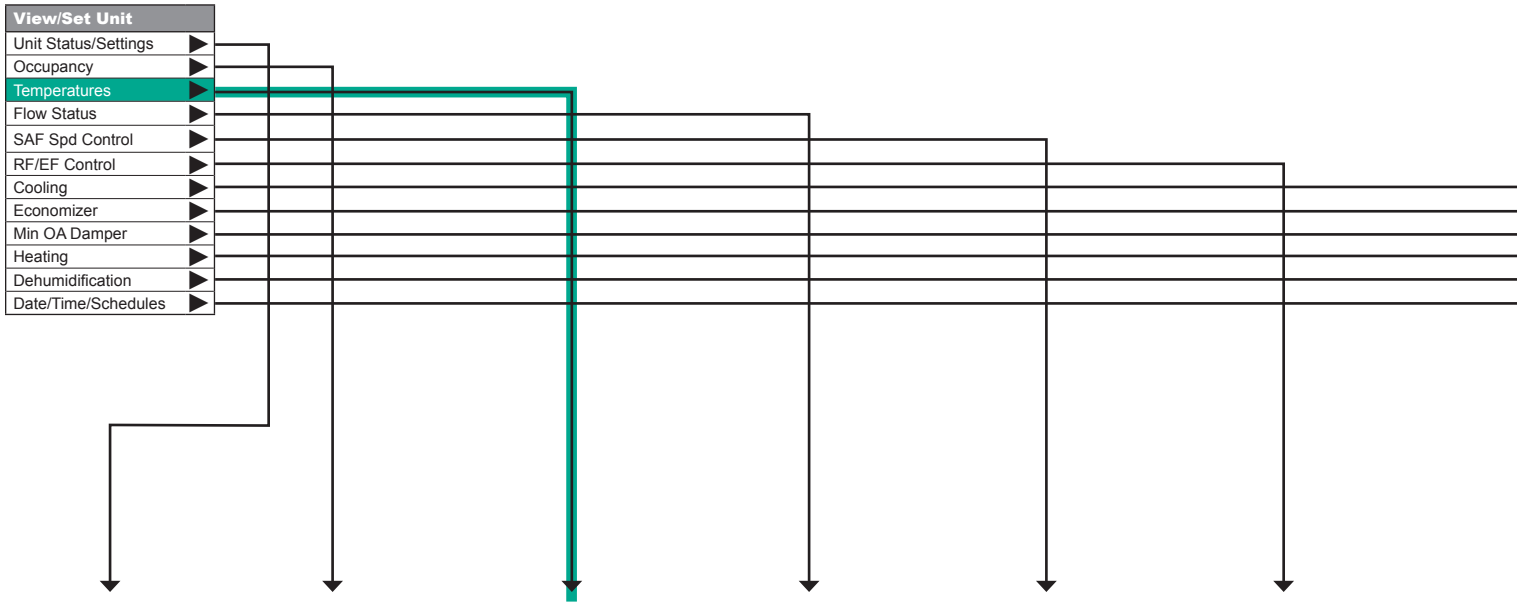
BMS Communications
LON Set-Up ▶
BACnet MSTP Set-Up ▶
BACnet IP Set-Up ▶
D-Net Set-Up ▶
Network Unit Set-Up ▶

For more detail go to: Figure 100, page 128



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 97: View/Set Unit** – Keypad/Display Menu Structure*



Unit Status/Settings
Unit State= _____
Unit Status= _____
Dehum Status= _____
Ctrl Mode= Off
Clg Status= _____
Htg Status= _____
Sup/Htg Status= _____
Econo Status= _____
Clg Capacity= XXX%
Htg Capacity= XXX%
Supl Htg Cap= XXX%
Reheat Cap= XXX%
SAF Speed= XXX%
RF/EF Cap= XXX%
OAD/Econo Cap=XXX%
Rel Humidiy= XXX%
Net Emrg Ovrd= Normal
Net App Mode= Auto

Occupancy
Occupancy= _____
Occ Mode= Auto/Net
OccSrc= _____
UnoccSrc= _____
Tnt Ovrde Tm= 0 min

Temperatures
Control Temp= XXX°F
Disch Temp= XXX°F
Return Air= XXX°F
Space Temp= XXX°F
OA Temp= XXX°F
EF/LC Temp= XXX°F
ER LAT= XXX°F
ER EAT= XXX°F
DRT1= XXX°F
DRT3= XXX°F
SRT= XXX°F
DFT= XXX°F
IRT= XXX°F
ORT= XXX°F

Flow Status
Airflow= _____
Supply Fan= _____
Ret/Exh Fan= _____

SAF Speed Control
SAF Speed= XXX%
Speed Cmd= XXX%
Duct Press= X.Xin
DuctSP Spt= 1.0in
IAQ PPM= XXXXPPM
OA Flw= XXXXXCFM
MinOAFlw Spt= 2000CFM
Bldg Press= X.XXin
BldgSP Spt= 0.05in

RF/EF Control
RF/EF Cap= XXX%
Speed Cmd= XXX%
Bldg Press- X.XXin
BldgSP Spt= 0.050in

Cooling
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F
DAT Clg Spt= 55.0°F

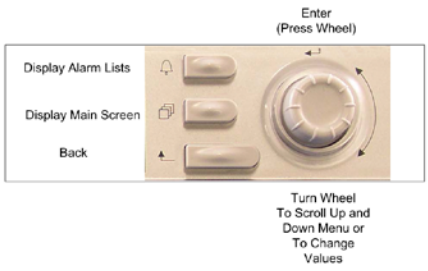
Economizer
OAD/Econo Pos= XXX%
DAT Clg Spt= 55.0°F
Min OA Pos= XXX%
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F

Min OA Damper
Min OA Pos= XXX%
Vent Limit= 20%
LoFlo V Lmt= 30%
DCV Limit= 10%
Min OA Src= _____

Heating
Occ Htg Spt= 68.0°F
Unocc Htg Spt= 55.0°F
MWU Spt= 70.0°F
DAT Htg Spt= 85.0°F

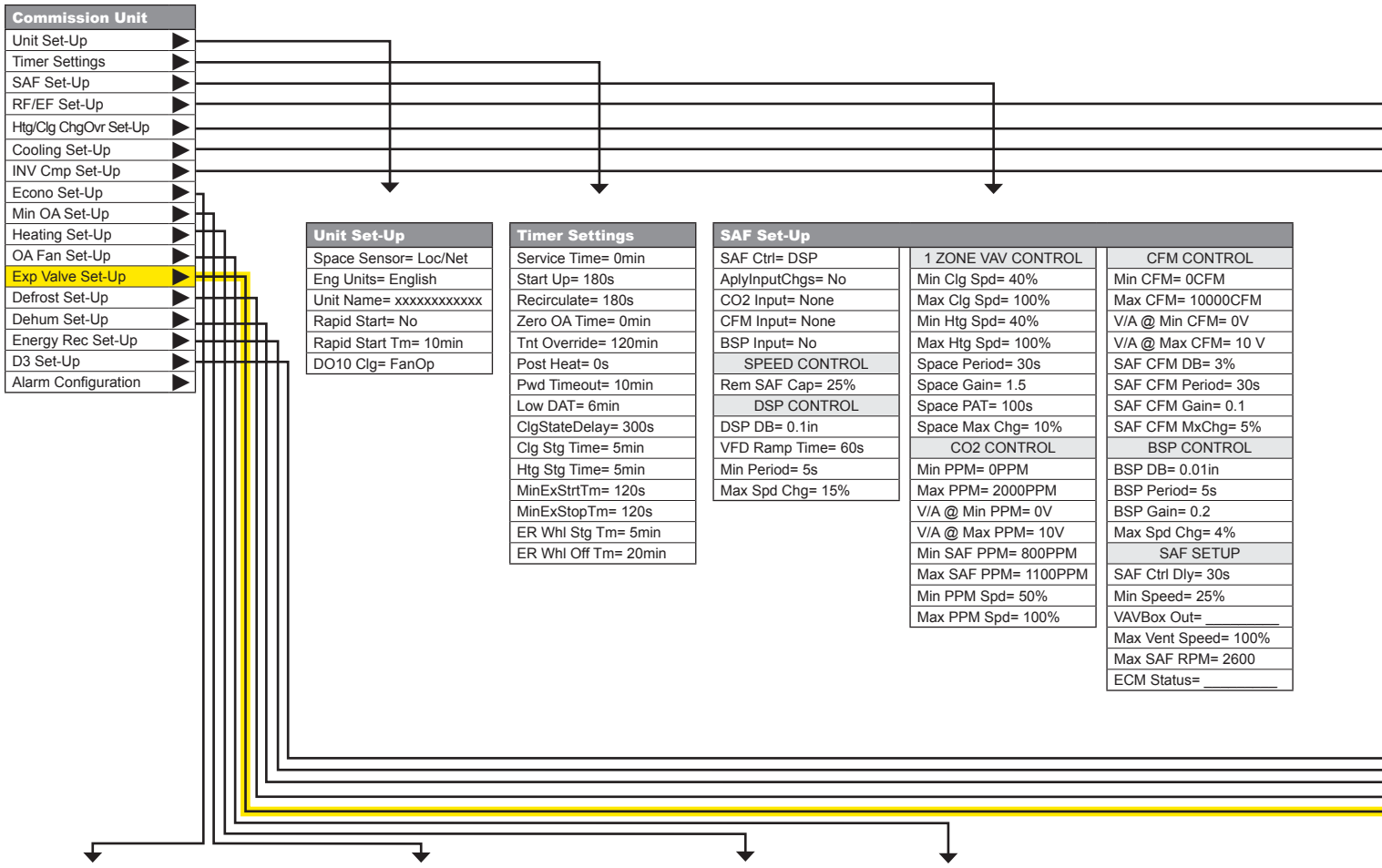
Dehumidification
Dehum Status= _____
Rel Humidity= XXX%
Dewpoint= XXX°F
Dehum Method= None
RH Setpoint= 50%
Dewpoint Spt= 50°F
Reheat Spt= XXX°F
Reheat Cap= XXX%

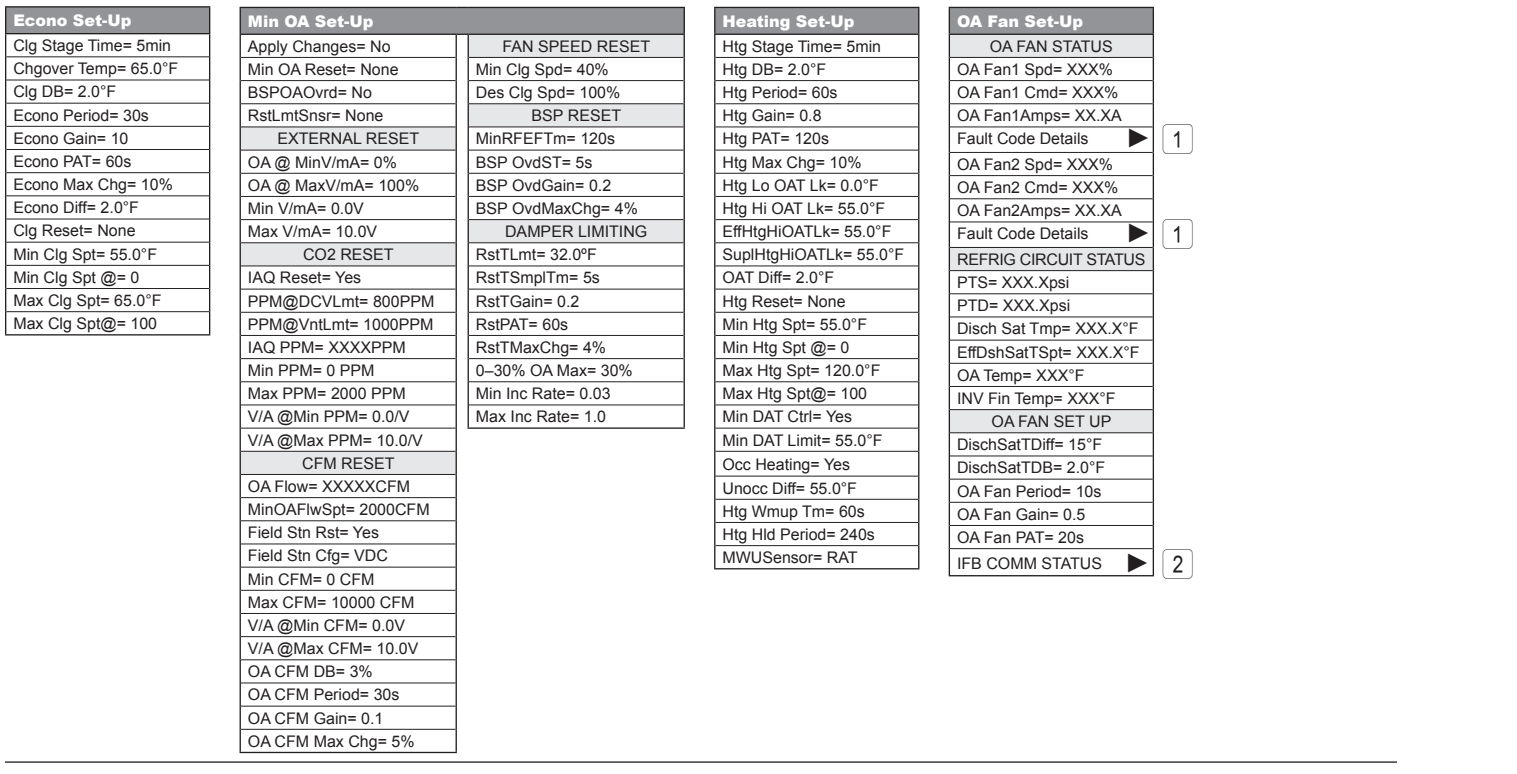
Date/Time/Schedules
Time= hh:mm:ss
Date= MM/DD/YY
UTC Diff= -60min
DAILY SCHEDULE
Mon= HH:MM-HH:MM
Tue= HH:MM-HH:MM
Wed= HH:MM-HH:MM
Thu= HH:MM-HH:MM
Fri= HH:MM-HH:MM
Sat= HH:MM-HH:MM
Sun= HH:MM-HH:MM
Hol= HH:MM-HH:MM
HOLIDAY DATES
Hol 1=MMMDD/YY-MMMDD/YY
Hol 2=MMMDD/YY-MMMDD/YY
Hol 3=MMMDD/YY-MMMDD/YY
Hol 4=MMMDD/YY-MMMDD/YY
Hol 5=MMMDD/YY-MMMDD/YY
Hol 6=MMMDD/YY-MMMDD/YY
Hol 7=MMMDD/YY-MMMDD/YY
Hol 8=MMMDD/YY-MMMDD/YY
Hol 9=MMMDD/YY-MMMDD/YY
Hol 10=MMMDD/YY-MMMDD/YY
ONE EVENT SCHEDULE
Beg= MMMDD/YY@HH:MM
End= MMMDD/YY@HH:MM
OPTIMAL START
Enable= No
Htg Range= 0.4 °F/min
Htg OAT= 35 °F
Des Htg OAT= 0 °F
Clg Rate= 0.4 °F/min
Clg OAT= 85 °F
Des Clg OAT= 95 °F
DAYLIGHT SAVINGS
DLS Strt Mon= Mar
DLS Strt Wk= 2nd Week
DLS End Mon= Nov
DLS End Wk= 1st Week
DLS Active= Yes



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 98: Commission Unit** – Keypad/Display Menu Structure*





[1], [2] See Figure 99, page 127 for the expansion information

RF/EF Set-Up
RF/EF Ctrl= None
Rem ExhF Cap= 5%
BSP DB= 0.010in
BSP Period= 5s
BSP Gain= 0.2s
Max Spd Chg= 4%
RFEF Ctrl Dly= 30s
Min Speed= 5%
MinExStrtTm= 120s
MinExStopTm= 120s
MinExOAPos= 5%
MinExSAFCap= 10%
ExhOnOAPos= 40%
ExhMxOAPos= 100%
Max Vent Spd= 100%
Max RFEF RPM= 2600
ECM Status= _____

Htg/Clg ChgOvr Set-Up
Ctlr Temp Src= RAT
Use Tstat Spt= No
Occ Clg DB= 2.0°F
Clg Period= 60s
Clg Gain= 0.1
Clg PAT= 600s
Max Clg Chg= 5.0°F
Occ Htg DB= 2.0°F
Htg Period= 60s
Htg Gain= 0.1
Htg PAT= 600s
Max Htg Chg= 5.0°F

Cooling Set-Up
Clg Stage Time= 5min
Clg DB= 2.0°F
Clg Lo OAT Lk= 55ºF
OAT Diff= 2.0°F
Clg Reset= None
Min Clg Spt= 55.0°F
Min Clg Spt @= 0
Max Clg Spt= 65.0°F
Max Clg Spt@= 100
Unocc Diff= 3°F

INV Cmp Set-Up
COMPRESSOR STATUS
Clg State= _____
Htg State= _____
INV Cmp Spd= XXX.X%
INV Spd Cmd= XXX.X%
Comp 3=_____
Prev Standby=_____ ▶
Compressor Limiting ▶
Fault Code Details ▶ [1]
INV Port Temp= XXX.XºF
INV Fin Temp= XXX.XºF
INV Cmp Amps= XX.XA
REFRIG CIRCUIT STATUS
PTS= XXX.Xpsi
PTD= XXX.Xpsi
4 Way Valve=_____
RcvrSol Valve=_____
BP Sol Valve=_____

COMPRESSOR SETUP
Clg Lo OAT Lk= 55°F
Htg Lo OAT Lk= 0.0ºF
Htg Hi OAT Lk= 55.0ºF
EffHtgOATLk= 55.0ºF
OAT Diff= 2ºF
INV Period= 20s
INV Gain= 2.5
INV PAT= 10s
INV Max Chg= 15%
IFB COMM STATUS ▶ [2]

Date/Time
MM/DD/YYYY HH:MM:SS

Compressor Limiting
Clg Press Lmtg=_____
Htg Press Lmtg=_____
C Ratio Lmtg=_____
Ref DLT Lmtg=_____
INV Brd Lmtg=_____
INV Man Dsbl= Enable
Comp3 ManDsbl= Enable

Exp Valve Set-Up
EXP VALVE STATUS
EVI Pos= XXX%
EVO Pos= XXX%
EVStatus=_____
REFRIG CIRCUIT STATUS
PTS= XXX.Xpsi
PTD= XXX.Xpsi
Suction SH= XX.XºF
Discharge SH= XX.XºF
Subcooling= XX.X°F
Eff SSH Spt= XX.X°F
EffSH Base= XX.X°F
Eff SC Spt= XX.X°F
Eff SC Lo Lmt= XXX%
SRT= XXX°F
Disch Sat Tmp= XXX.X°F
Sucn Sat Tmp= XXX.X°F
IRT= XXX°F
ORT= XXX°F

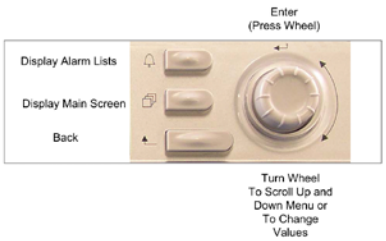
EXP VALVE SETUP
SSH DB= 2.0ºF
SH Lo Base= 5.0ºF
SH Hi Base= 9.0ºF
Htg EVI Meth= SbC
IC SC Spt= 9.0ºF
IC SC DB= 2.0ºF
HtgSC EVI Min= 0%
Clg EVO Meth= SbC
OC SC Spt= 9.0ºF
OC SC DB= 2.0ºF
ClgSC EVO Min= 0%
ManCtrl EV Op= Auto

Defrost Set-Up
Defrost State= _____
Manual DF= No
MinCmpOpTm= 10min
MinAccCmpTm= 40min
MaxFrostTm= 120min
Defrost Temp= XXºF
Tdef Adj= 0.0ºF
CmpOpTime= XXXmin
AccCmpOpTm= XXXmin
LoFrstAccTm= XXXmin
HiFrstAccTm= XXXmin

Dehum Set-Up
Dehum Method= None
RH DB= 2%
Dewpoint DB= 2°F
RH Period= 30s
RH Gain= 1
RH PAT= 30s
RH Max Chg= 10%
Dehum Ctrl= Occupied
Sensor Loc= Return
Mn Lvg Coil T= 45.0°F
Mx Lvg Coil T= 52.0°F
Min Rheat Spt= 55.0°F
Max Rheat Spt= 65.0°F
RH Sens Type= VDC
RH Min Sig= 0V
RH Max Sig= 10V
Min Dehum Spd= 33%
Max Dehum Spd= 100%
RH Min Pos= 15%
RH Dec Rate= 1.0%/s

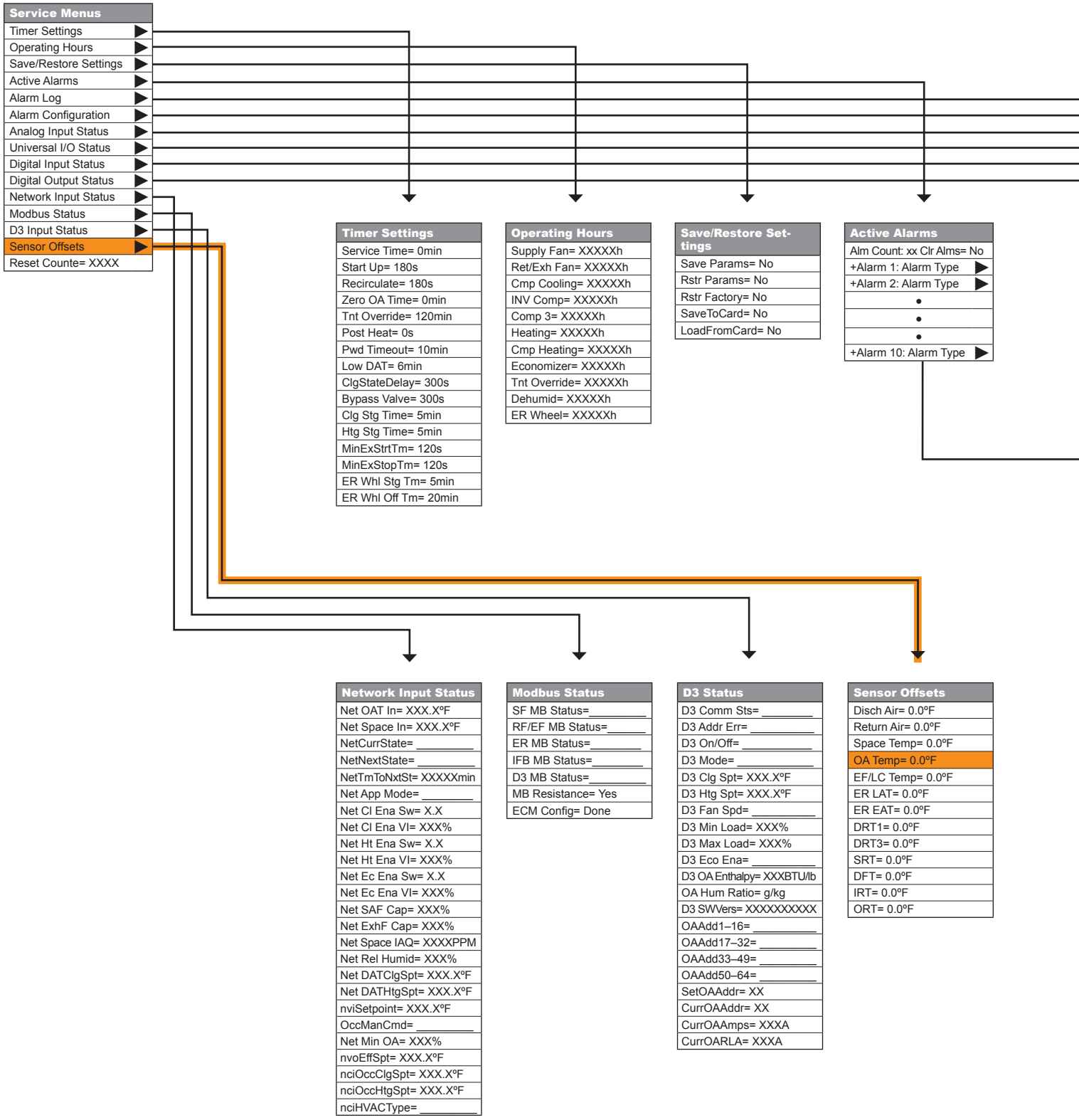
Energy Rec Set-Up
Energy Rcvy= Yes
ER Wheel= _____
Wheel Speed= XXX%
Whl Spd Cmd= XXX%
ER LAT= XXX°F
ER EAT= XXX°F
Min ExhT Diff= 2.0°F
Max ExhT Diff= 6.0°F
ER Whl Stg Tm= 5min
ER Whl Off Tm= 20min
Rel Humidity= XXX%
Min Whl Spd= 5%
Intersect Pt= XXX.XºF
Fst Mgnt Meth= Timed
OA Frst Temp= -5.0°F
Defrost Time= 5min
Defrost Period= 60min
Defrst On Tm= 1s
Defrst Off Tm= 24s
ER Whl Period= 30s
ER Whl Gain= 1.0
ER Whl PAT= 30s
ER Whl Chg= 10%

D3 Set-Up
Itouch Vers= _____
Unit D3 Addr= 1–00
Set D3 Addr= No
OA Unit Num= 0
OA Unit Amps= 0
OA Unit Addr= 0
Set OA Unit= No
Rst All OA= No
Min Load= 20%
Max Load= 50%
HiCapReset= No
DATLoDiff= 10.0ºF
Eco Method= None
DATHiDiff= 10.0ºF
OA Enth Max= 25.5 BTU/lb
OA Hum Max= 0.0107lb/lb
OAT Max= 84ºF
Temp Display= DAT
Low Speed= 33%
Med Speed= 66%
Hi Speed= 100%



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Figure 99: Service Menu *– Keypad/Display Menu Structure*



Alarm Log
Log Count: xx Clr Log= No ▶
+/-Alarm 1: Alarm Type ▶
+/-Alarm 2: Alarm Type ▶
•
•
•
+/-Alarm 10: Alarm Type ▶

Alarm Configuration
ALARM LIMITS
Hi Disch Temp= 170°F
Lo Disch Temp= 40°F
Hi Return Temp= 120°F
ALARM OUT CONFIG
Faults= Fast
Problems= Slow
Warnings= Off
ALARM DELAYS
Frz Delay Time= 30s
Air Flw Ing=120s
Sens Alm Dly= 30s
Temp AlmDly= 30s
ALARM CONFIG
Emerg Stop= ManClr

Analog Input Status
MCB AI1= XXXXXXXX
MCB AI2= XXXXXXXX
MCB AI3= XXXXXXXX

Universal I/O Status
MCB X1= XXXXXXXX
MCB X2= XXXXXXXX
MCB X3= XXXXXXXX
MCB X4= XXXXXXXX
MCB X5= XXXXXXXX
MCB X6= XXXXXXXX
MCB X7= XXXXXXXX
MCB X8= XXXXXXXX
EMB X1= XXXXXXXX
EMB X2= XXXXXXXX
EMB X3= XXXXXXXX
EMB X4= XXXXXXXX
EMB X5= XXXXXXXX
EMB X6= XXXXXXXX
EMB X7= XXXXXXXX
EMB X8= XXXXXXXX
EMD X1= XXXXXXXX
EMD X2= XXXXXXXX
EMD X3= XXXXXXXX
EMD X4= XXXXXXXX
EMD X5= XXXXXXXX
EMD X6= XXXXXXXX
EMD X7= XXXXXXXX
EMD X8= XXXXXXXX

Digital Input Status
MCB DI1= _____
MCB DI2= _____
MCB DI3= _____
MCB DI4= _____
MCB DI5= _____
MCB DI6= _____
EMD DI1= _____

Digital Output Status
MCB DO1= _____
MCB DO2= _____
MCB DO3= _____
MCB DO4= _____
MCB DO5= _____
MCB DO6= _____
MCB DO7= _____
MCB DO8= _____
MCB DO9= _____
MCB DO10= _____
EMB DO1= _____
EMB DO2= _____
EMB DO3= _____
EMB DO4= _____
EMB DO5= _____
EMB DO6= _____
EMD DO1= _____
EMD DO2= _____
EMD DO3= _____
EMD DO4= _____
EMD DO5= _____
EMD DO6= _____

Alarm Lists
Active Alarms ▶
Alarm Log ▶

Active Alarms
Alm Count: xx Clr Alms= No
+Alarm 1: Alarm Type ▶
+Alarm 2: Alarm Type ▶
•
•
•
+Alarm 10: Alarm Type ▶

Alarm Log
Log Count: xx Clr Log= No ▶
+/-Alarm 1: Alarm Type ▶
+/-Alarm 2: Alarm Type ▶
•
•
•
+/-Alarm 10: Alarm Type ▶

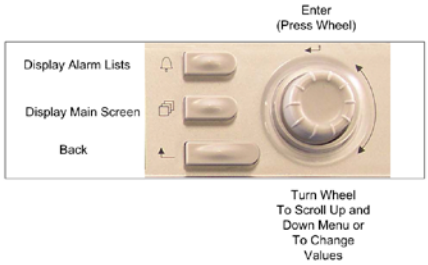
Alarm Details
+/-Alarm 1: Alarm Type
MM/DD/YYYY HH:MM:SS
INV/OF Flt Code Details ▶
IFB Comm Status ▶

1

2

IFB Comm Status
IFB SW Vers= VP0329008
IFBCommStatus=____
PrvCommStatus=_____
MM/DD/YYYY HH:MM:SS
ACS1 DataRcvd=_____
ACS3 DataRcvd=_____

Fault Code Details
ACTIVE FAULT CODES
INVAlarmCode=_____
Code Text
OF1AlarmCode=_____
Code Text
OF2AlarmCode=_____
Code Text
PREVIOUS FAULT CODES
PrvINVAlmCode=_____
Code Text
MM/DD/YYYY HH:MM:SS
PrvOF1AlmCode=_____
Code Text
MM/DD/YYYY HH:MM:SS
PrvOF2AlmCode=_____
Code Text
MM/DD/YYYY HH:MM:SS



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Figure 100: BMS Communications *– Keypad/Display Menu Structure*

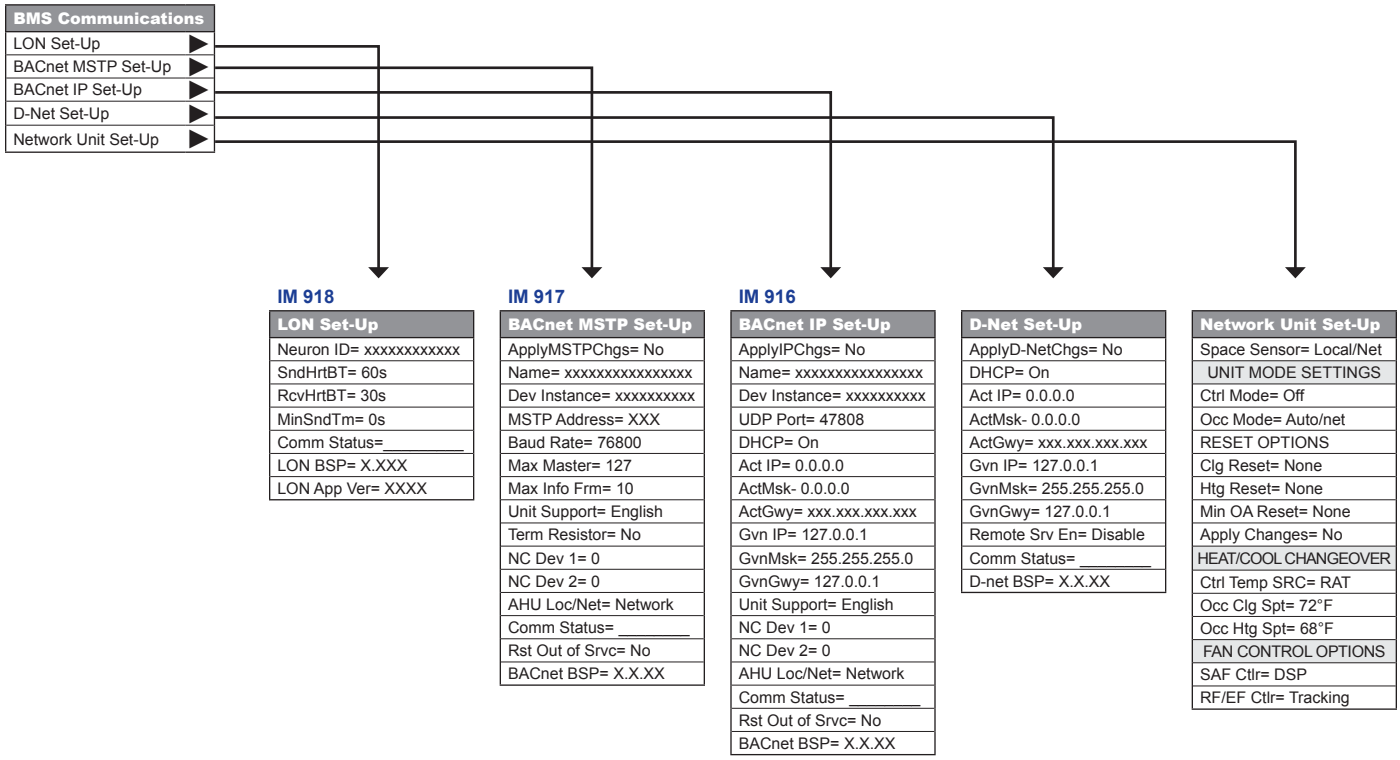


Figure 101: Trending *– Keypad/Display Menu Structure*

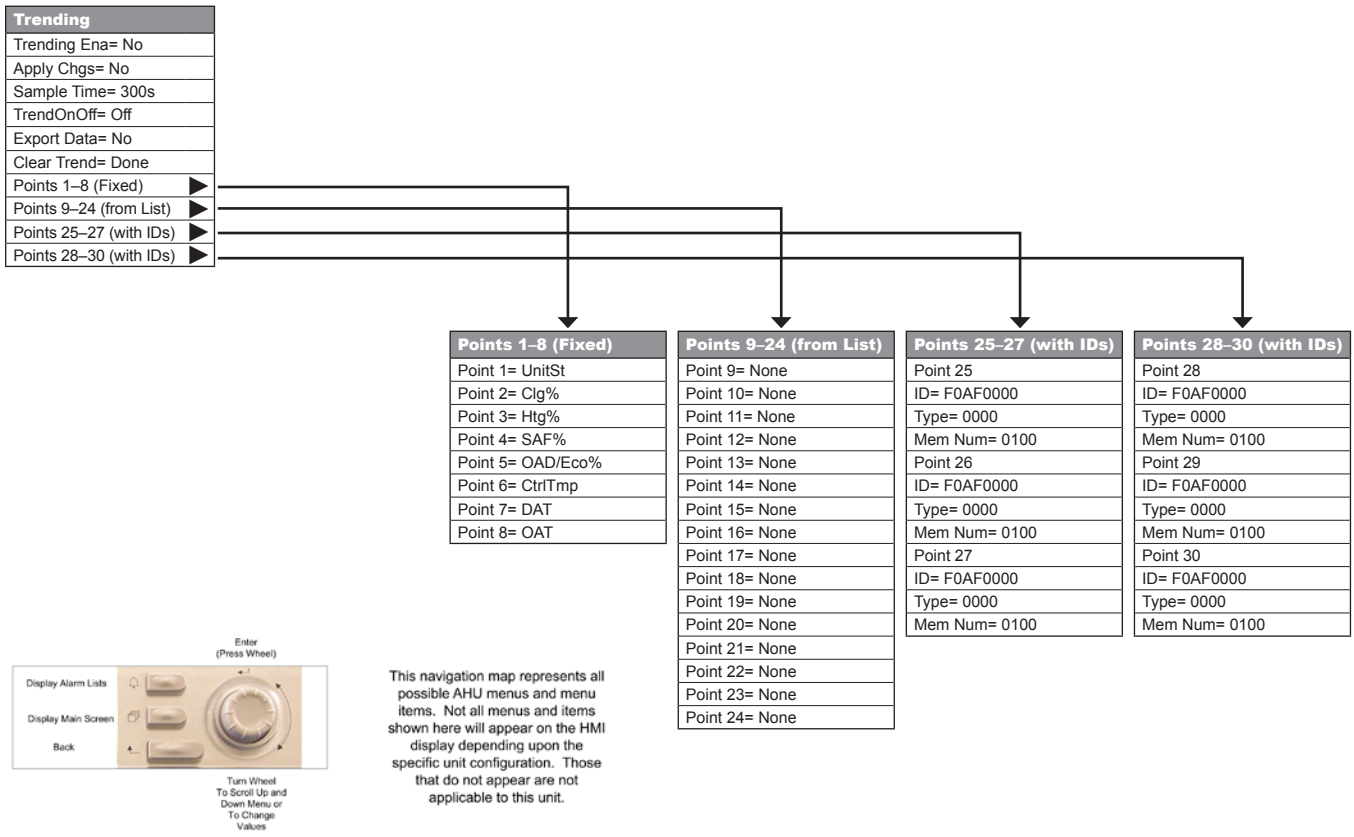
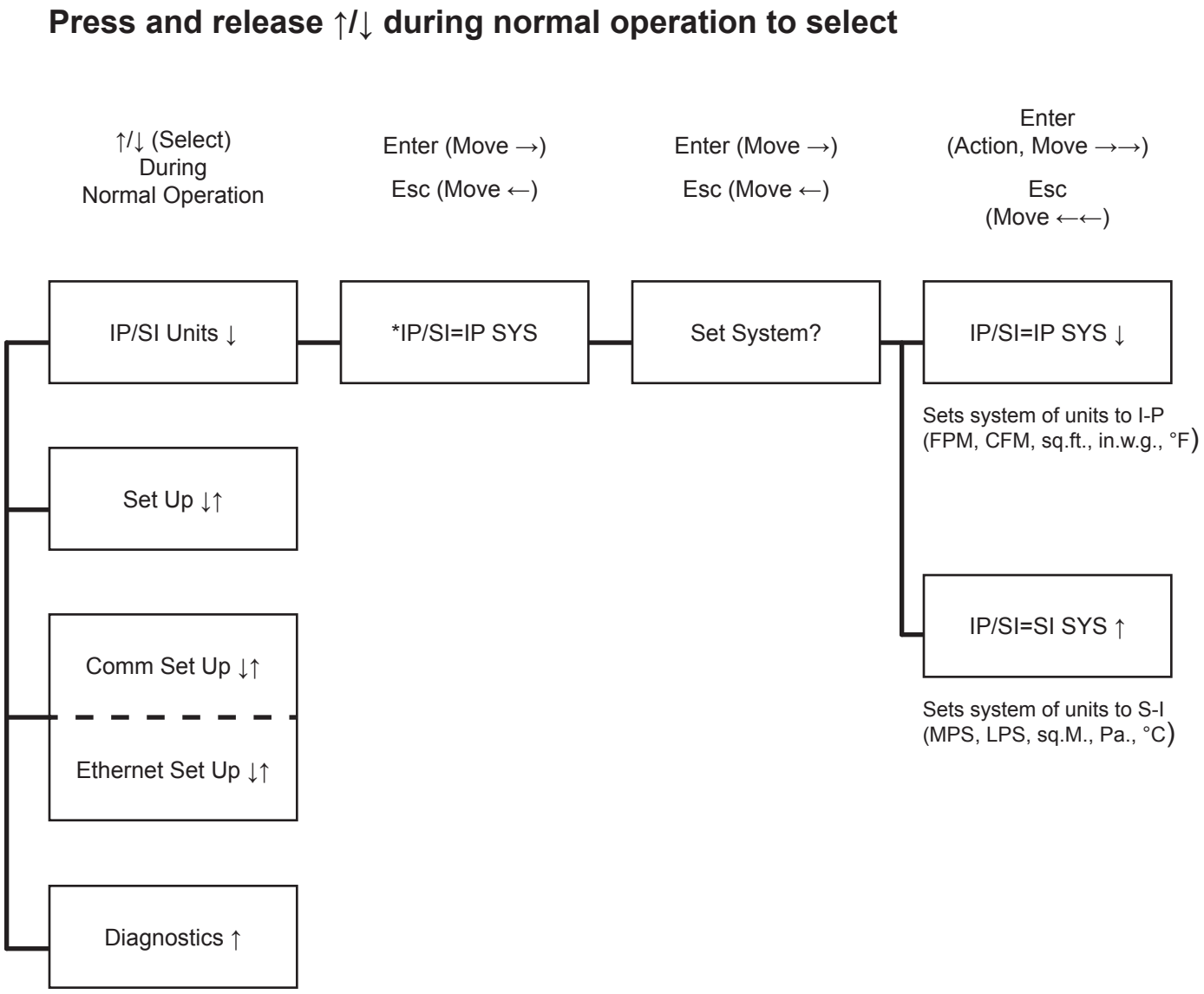


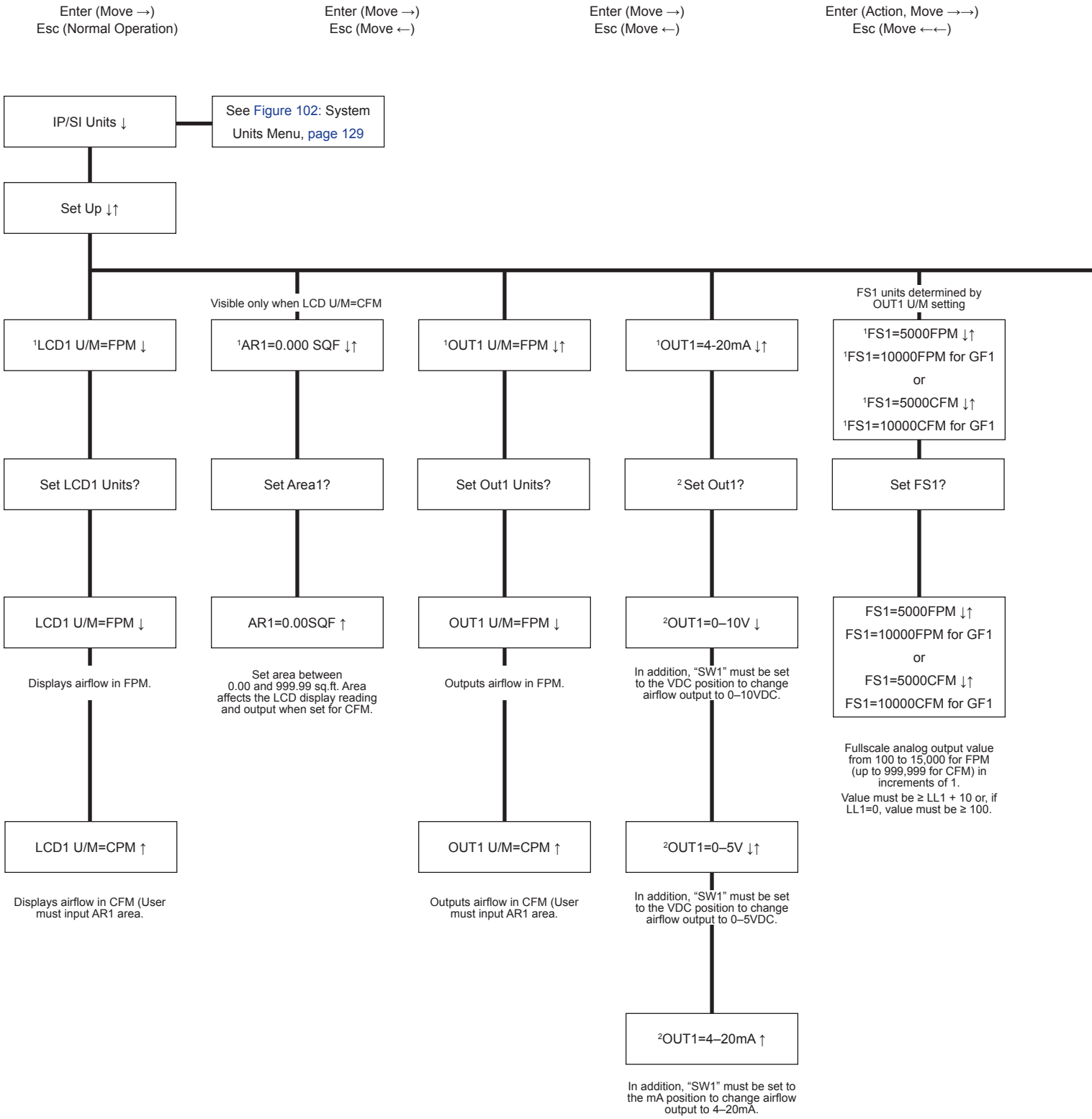
Figure 102: Optional Outdoor Air Monitor *– Changing the System of Units*



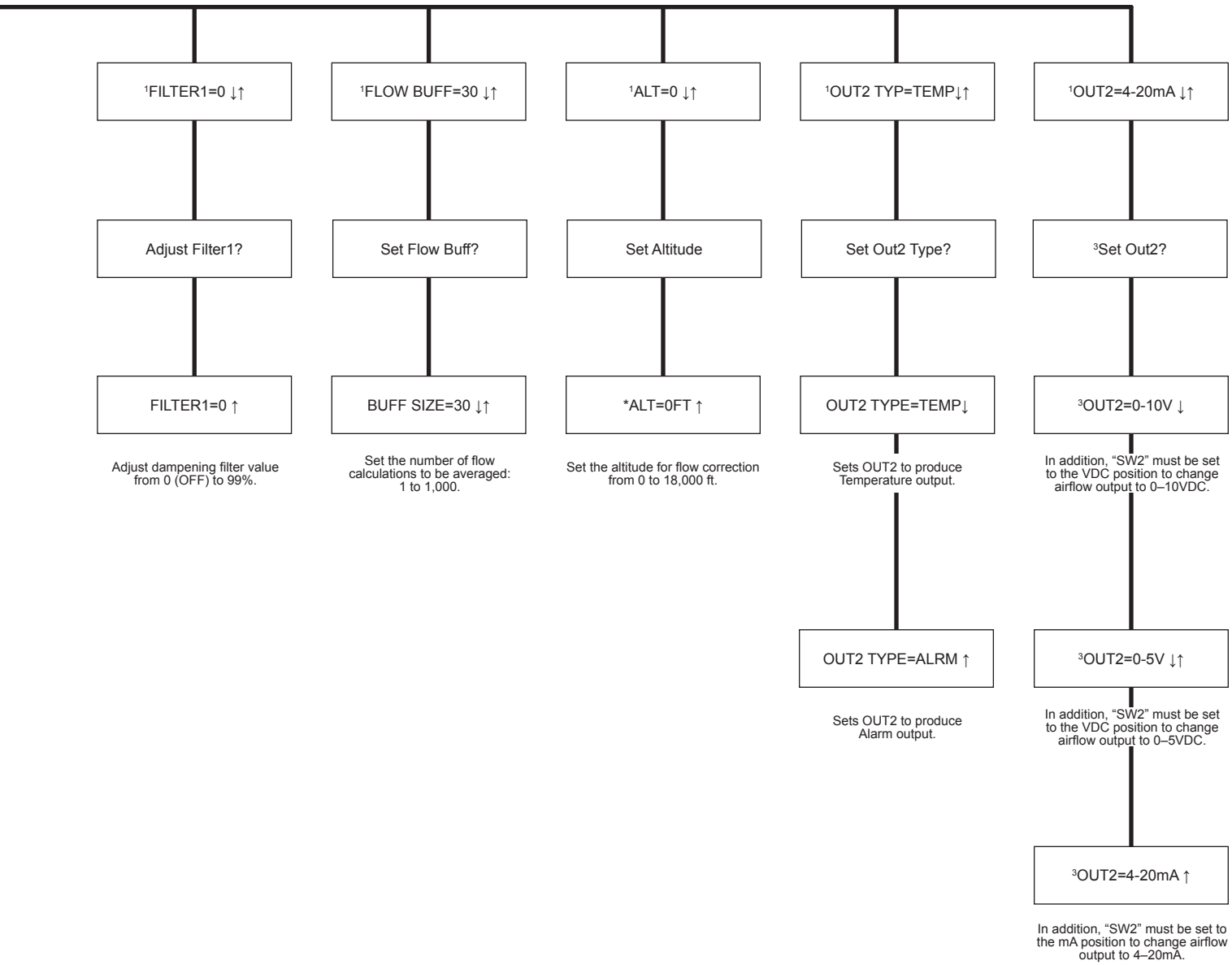
* Factory Default/Current Setting

Figure 103: Optional Outdoor Air Monitor *– Set Up Menu*

Press and release ↑/↓ during normal operation to select



1. Factory default/current setting
2. If a selection is made that requires SW1 to be set, the LCD displays “Set SW1 on Board”.
3. If a selection is made that requires SW2 to be set, the LCD displays “Set SW2 on Board”.



Daikin Applied Training and Development

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

Warranty

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

Aftermarket Services

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

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

Products manufactured in an ISO Certified Facility.