



## Installation and Maintenance Manual

## IM 1125-8

Group: Applied Air Systems

Part Number: IM 1125

Date: July 2017

### Rebel® Commercial Packaged Rooftop Systems

Heating and Cooling

Models DPS003 – 028A

R-410A Refrigerant

MicroTech® III Unit Controller

Energy Recovery Wheel



3-6 tons



7-15 tons  
Shown with Energy Recovery



16-28 tons  
Shown with Energy Recovery

|   |           |   |            |
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## General Information

This manual provides general information about the “A” vintage Daikin Rebel Commercial Packaged Rooftop Unit, model DPS. 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 equipped on “A” 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 1141](#). 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  |
|---|-------------------------|
| BACnet IP Comm Module   | <a href="#">IM 916</a>  |
| BACnet® Integration   | <a href="#">IM 917</a>  |
| LONWORKS® Integration   | <a href="#">IM 918</a>  |
| DPS Unit Controller Discharge Air Control (VAV or CAV)<br>Space Comfort Control (SCC) | <a href="#">OM 1141</a> |
| Rebel Quick Start Guide   | <a href="#">OM 1164</a> |

## 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.

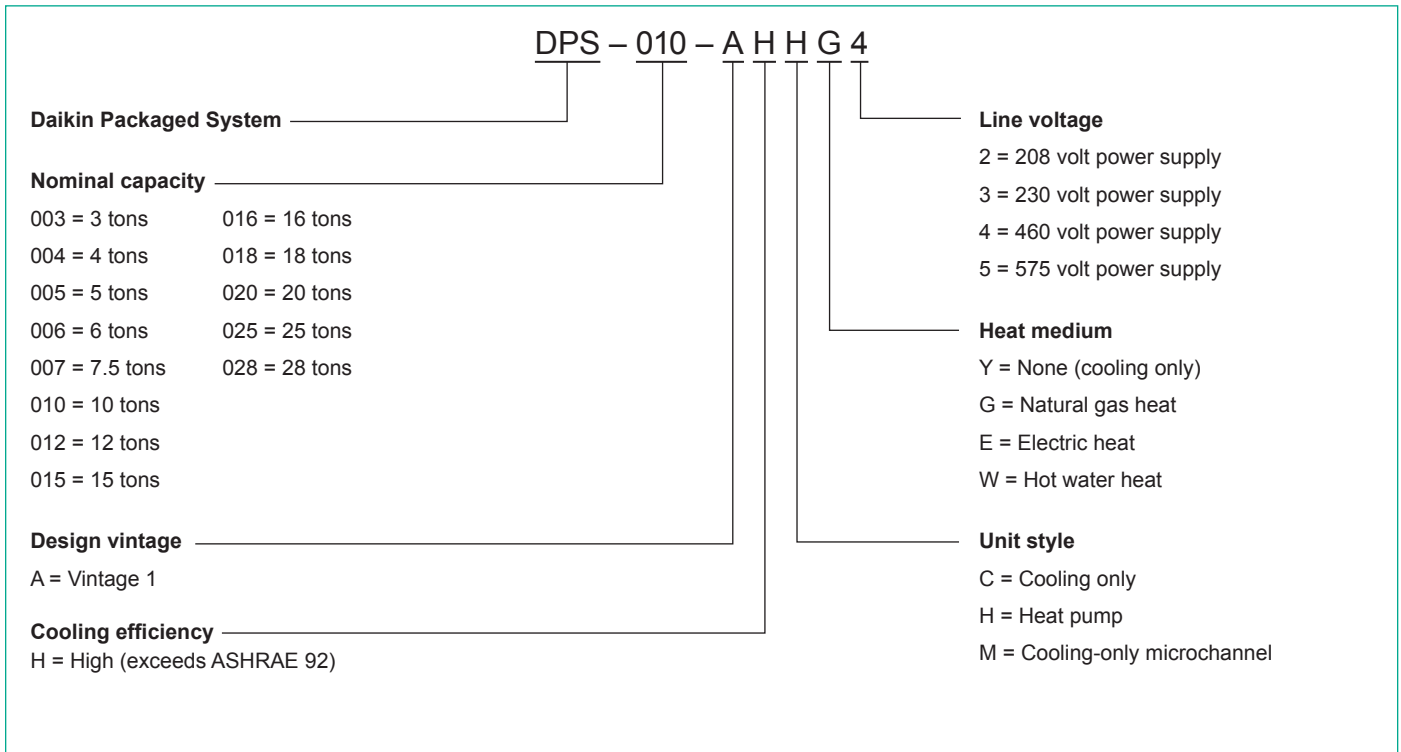
 **WARNING**

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 (DPS 003–028)



## Installer Responsibilities

**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.

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.

## 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

**CAUTION**

**Location.** Care should be taken for the installation location to minimize snow drifts on the outdoor coil.

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.

Refer to NEC and local for minimum clearances around the unit and control panel.

## 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:

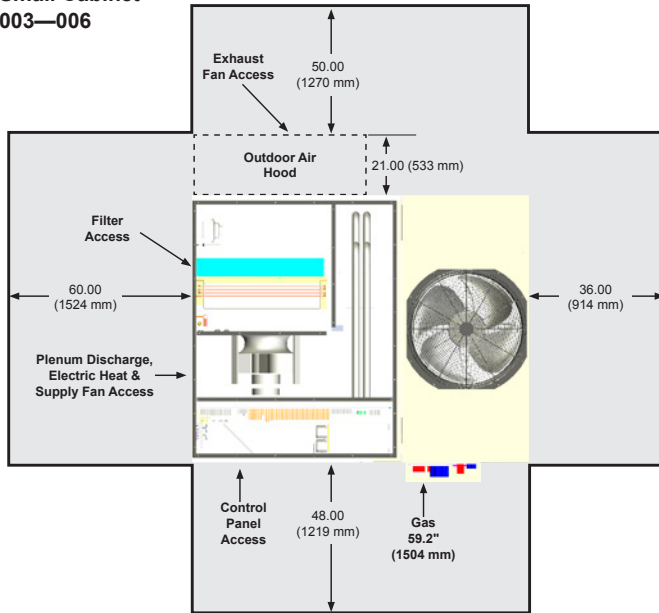
1. If there are walls on one or two adjacent sides of the unit, the walls may be any height. If there are walls on more than two adjacent sides of the unit, the walls should not be higher than the unit.
2. The distance between the unit and the wall should be at least 96" (2438 mm) on all sides of the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

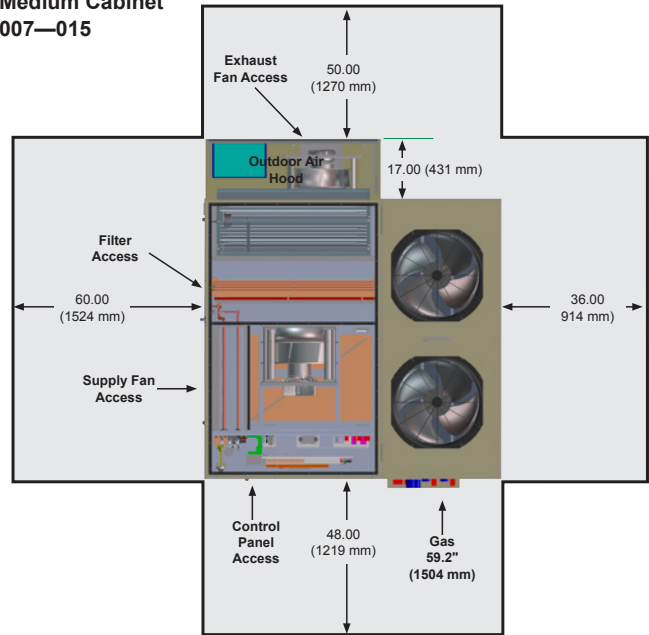
If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified (see [Figure 1](#)). This is particularly important to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

**Figure 1: Service Clearances**

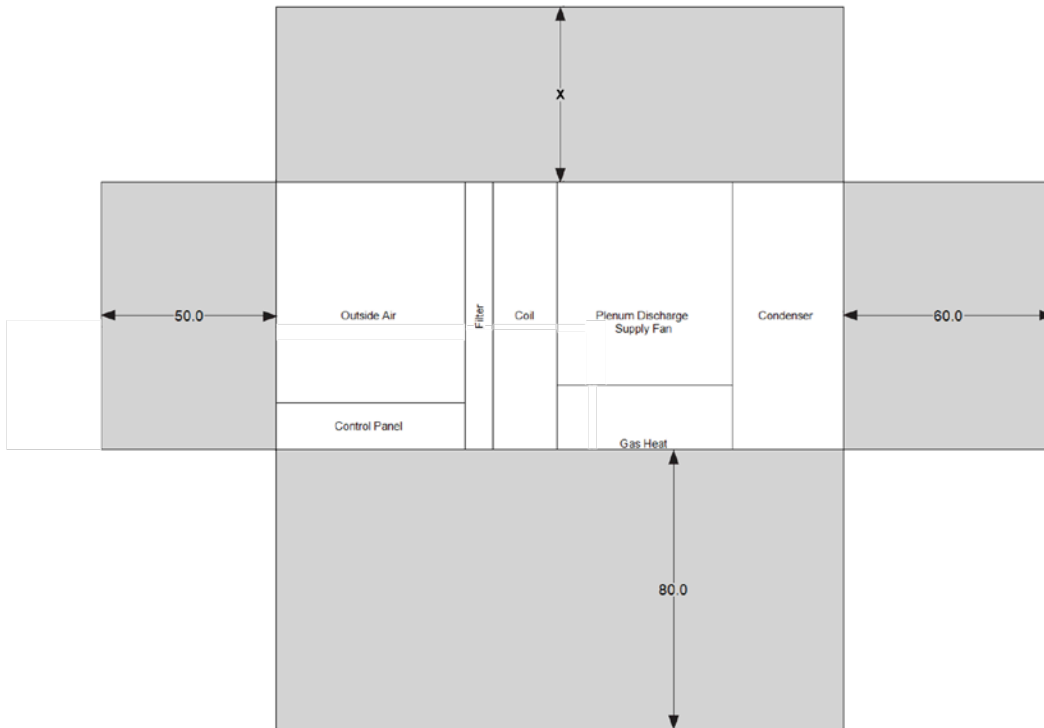
**Small Cabinet  
003—006**



**Medium Cabinet  
007—015**



**Large Cabinet  
016—028**



## Overhead Clearance

1. Unit(s) surrounded by screens or solid walls must have no overhead obstructions over any part of the unit. For heat pump models overhead obstructions could allow the formation of dangerous ice cycles.
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

### 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.

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.**

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.

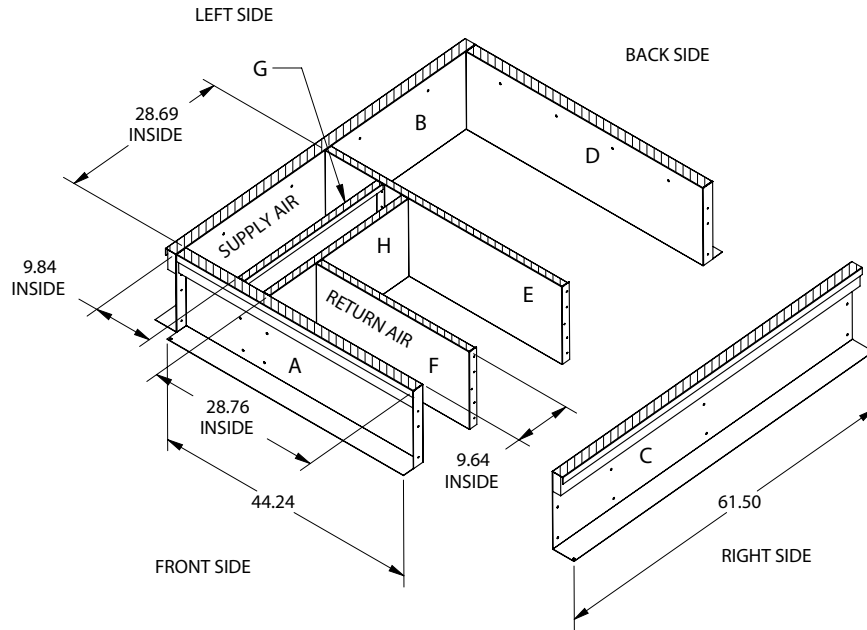
The gasketed top surface of the curb seals against the unit when it is set on the curb. These flanges must not support the total weight of the duct work. See [Installing Ductwork on page 13](#) for details on duct connections. It is critical that the condensate drain side of the unit be no higher than the opposite side.

### Assembly Instructions

Assembly of a typical roof curb is shown in [Figure 2, Figure 3 on page 8](#) and [Figure 4 on page 9](#).

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.

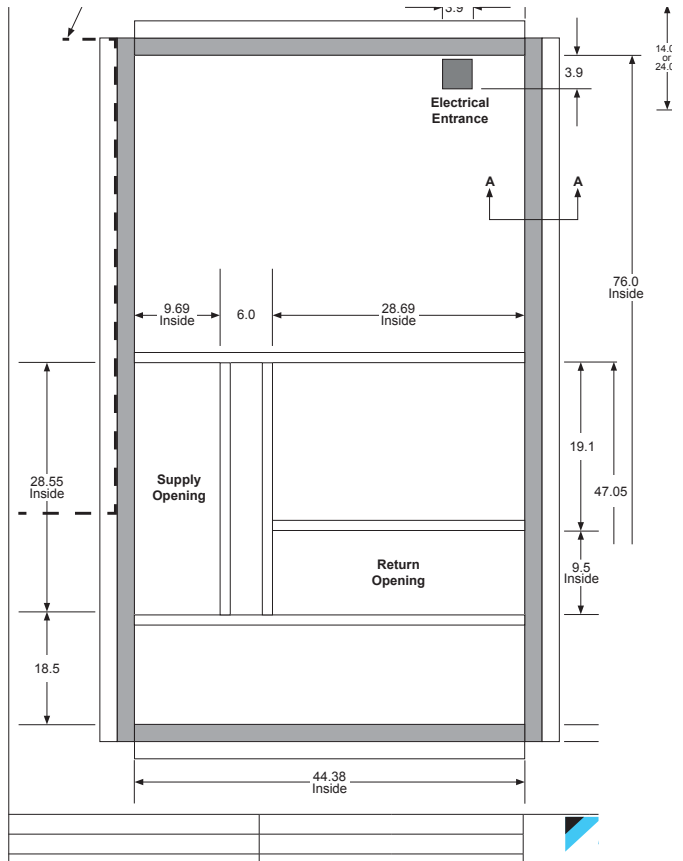
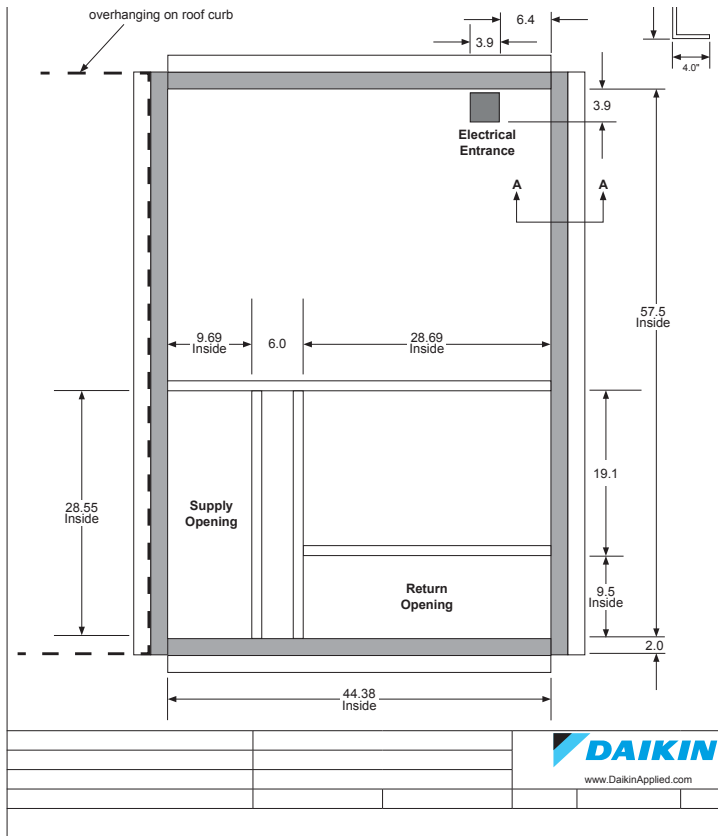
**Figure 2: Roof Curb Assembly (DPS 003—006)<sup>1</sup>**



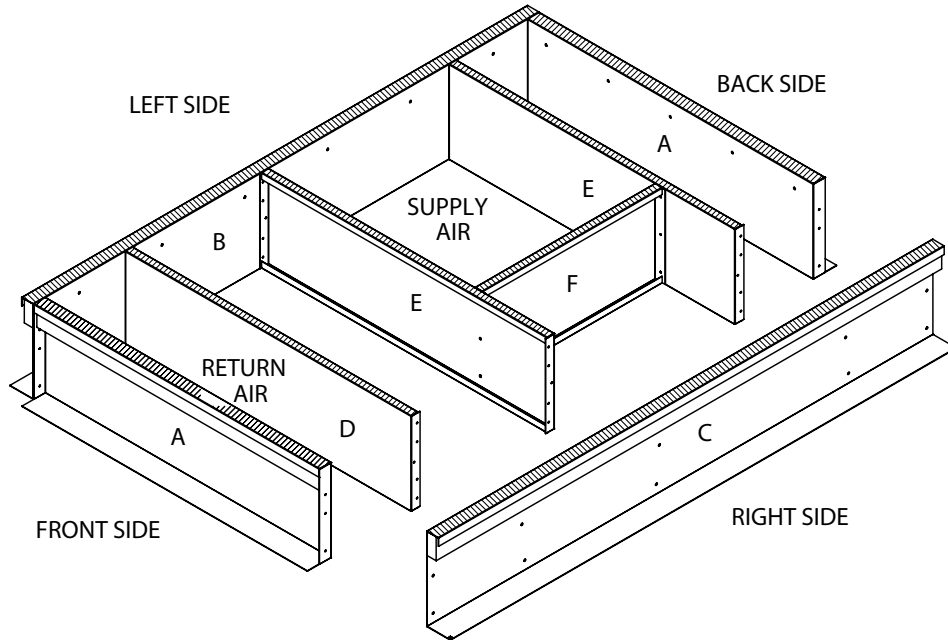
**NOTE:** 1. Check submittal drawing for gas/water/electrical/supply/return air opening  
Horizontal above the roof gas connection only

**Standard Roof Curb – Small Cabinet**

**Roof Curb for ERW – Small Cabinet**



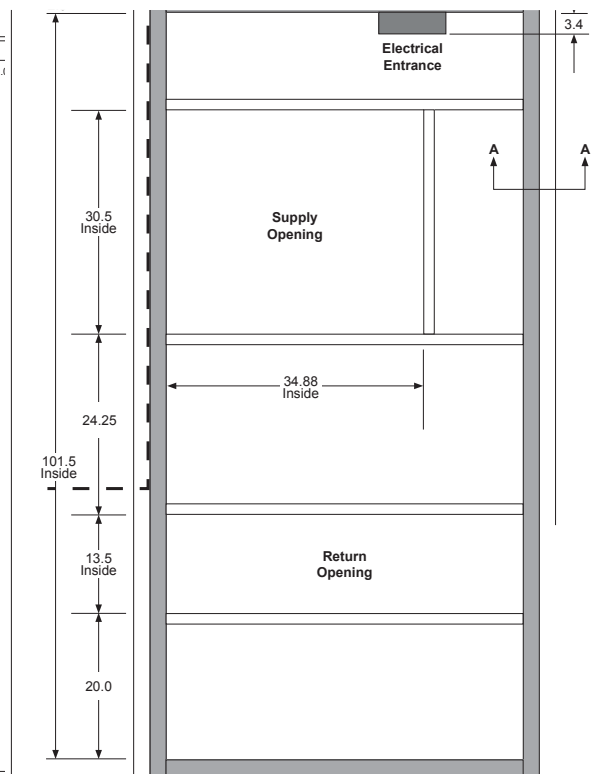
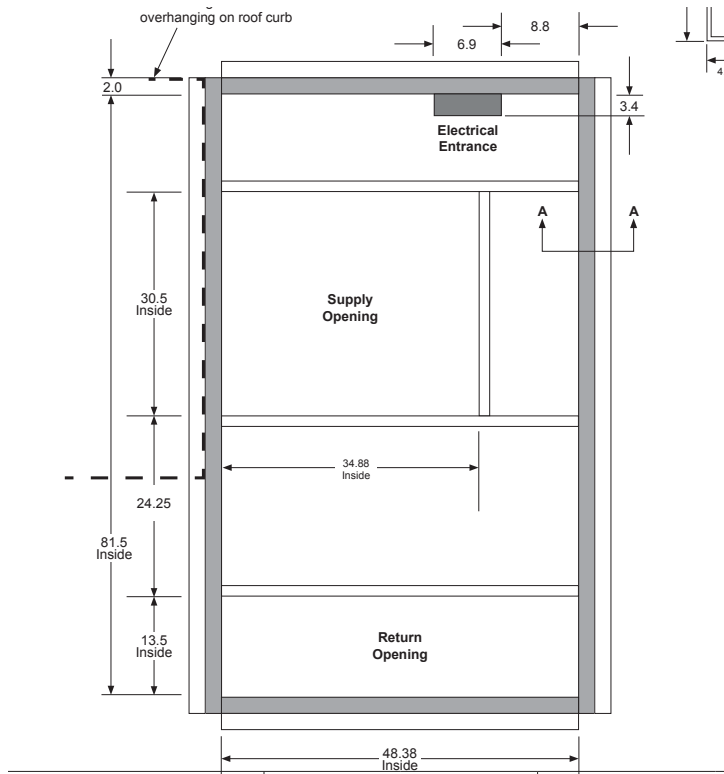
**Figure 3: Roof Curb Assembly (DPS 007-015)'**



**NOTE:** 1. Check submittal drawing for gas/water/electrical/supply/return air opening  
Horizontal above the roof gas connection only

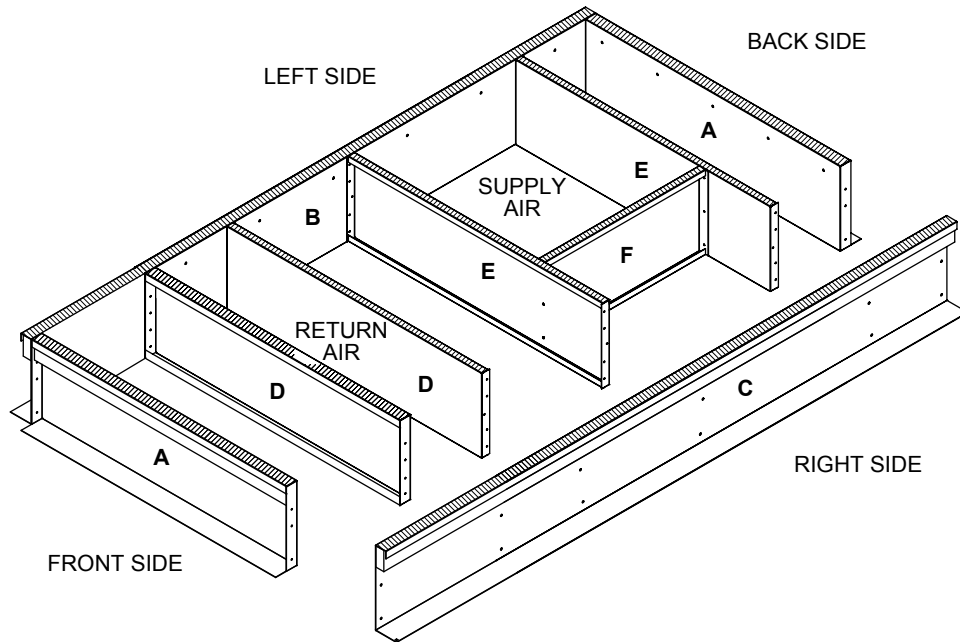
**Standard Roof Curb – Medium Cabinet**

**Roof Curb for ERW – Medium Cabinet**



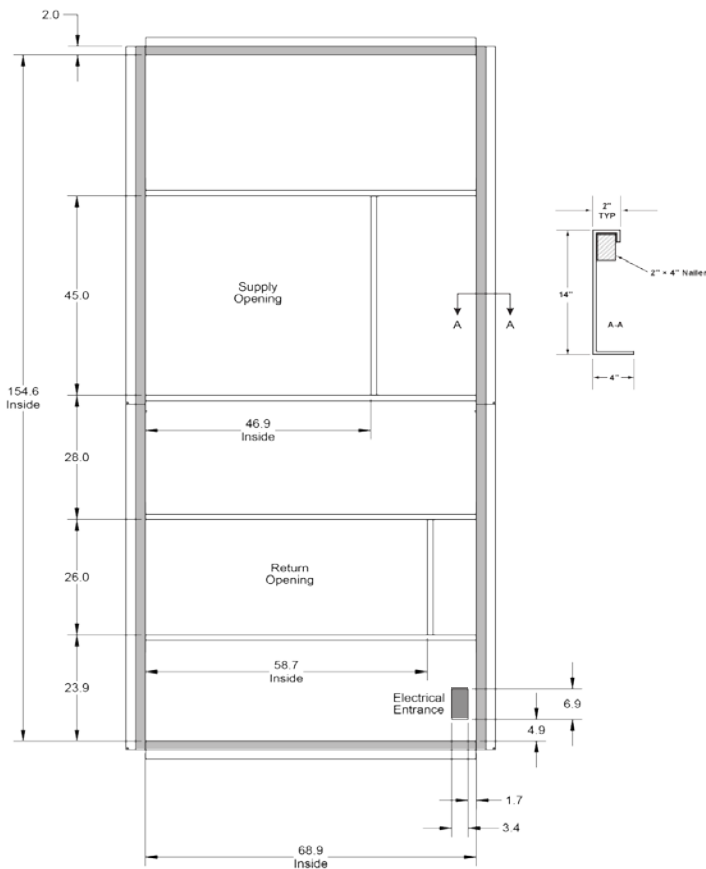


**Figure 4: Roof Curb Assembly (DPS 016-028)'**

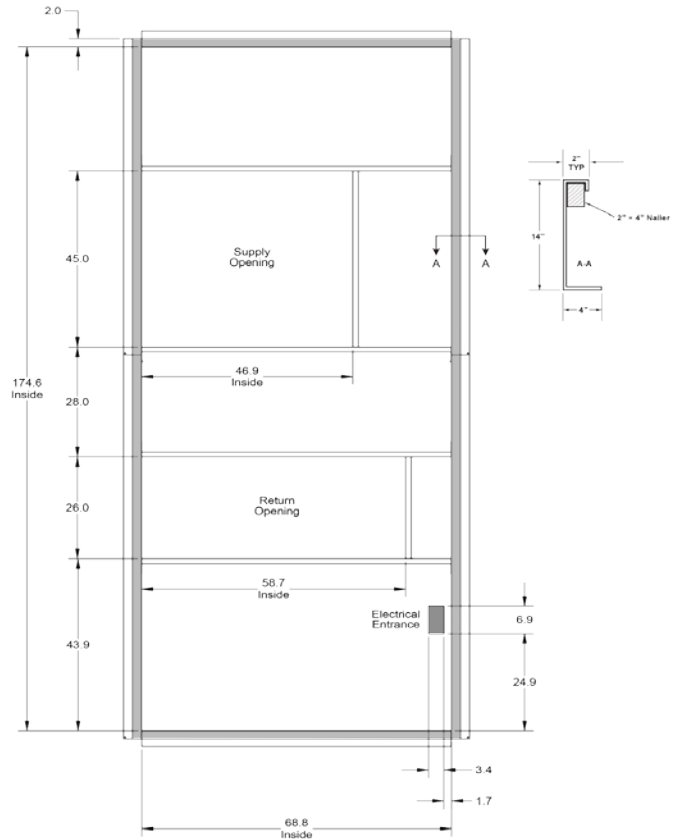


- NOTE:**
1. Check submittal drawing for gas/water/electrical/supply/return air opening
  2. Horizontal above the roof gas connection only
  3. All dimensions in inches

**Standard Roof Curb – Large Cabinet**



**Roof Curb for ERW – Large Cabinet**



## 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 personal 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.

**CAUTION**

Unit is equipped with fork slot reinforcement pieces. These need to be removed before unit is set on the curb.

Rigging holes for shackles are integral on the unit base. **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.** Figure 5 and Figure 6 are examples of instruction labels shipped with each unit.

Use spreader bars 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.

Figure 5: Rigging Label 003-015

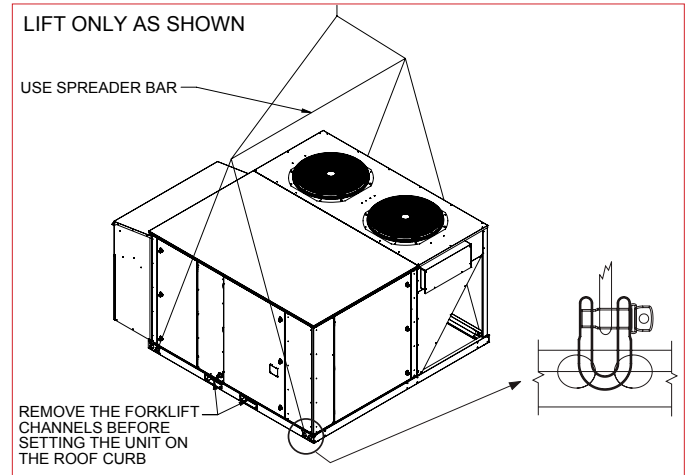
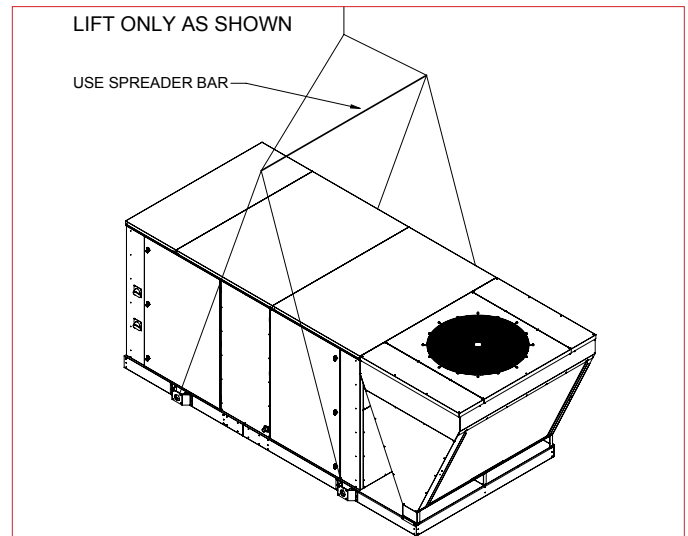


Figure 6: Rigging Label 016-028



**Table 2: Physical Data—Unit Weights DPS 003 through 028**

| Model                                  | Small Cabinet |      |      |      | Medium Cabinet |      |      |      |
|--|---------------|------|------|------|----------------|------|------|------|
|  | 003           | 004  | 005  | 006  | 007            | 010  | 012  | 015  |
| <b>Weight (lbs.)</b>                   |               |      |      |      |                |      |      |      |
| Base Weight <sup>1</sup>               | 1000          | 1000 | 1025 | 1058 | 1600           | 1600 | 1600 | 1763 |
| Heat pump                              | 1030          | 1030 | 1058 | 1058 | 1660           | 1660 | 1660 | 1823 |
| Electric Heat                          | 45            | 45   | 45   | 45   | 100            | 100  | 100  | 100  |
| Hot Water 2 Row                        | 11            | 11   | 11   | 16.5 | 30             | 30   | 30   | 30   |
| Hot Water 1 Row                        | 32            | 32   | 32   | 20   | 31             | 31   | 31   | 31   |
| Gas Heat                               | 75            | 75   | 63   | 93   | 186            | 186  | 186  | 186  |
| Hot Gas Re-heat                        | 8             | 8    | 12   | 12   | 28             | 31   | 31   | 31   |
| Economizer                             | 163           | 163  | 163  | 163  | 308            | 308  | 308  | 308  |
| High capacity coil                     | 105           | 105  | 105  | 105  | 215            | 215  | 215  | 215  |
| <b>Energy Wheel Weight Adds (lbs.)</b> |               |      |      |      |                |      |      |      |
| 100% OA                                | 160           | 160  | 160  | 160  | 300            | 300  | 300  | 300  |
| Mixed Air                              | 175           | 175  | 175  | 175  | 250            | 250  | 250  | 250  |

1. Includes standard cooling coil

| Model                 | Large Cabinet |     |       |       |     |
|-----------------------|---------------|-----|-------|-------|-----|
|                       | 016           | 018 | 020   | 025   | 028 |
| Base Weight (in lbs.) | 2,465         |     | 2,575 | 2,700 |     |
| Heat Pump             | —             | —   | —     | —     | —   |
| Electric Heat         | 228           |     |       |       |     |
| Hot Water Heat        | 1-row         | 60  |       |       |     |
|                       | 2-row         | 100 |       |       |     |
|                       | 3-row         | 140 |       |       |     |
| Gas Heat              | 300           | 175 |       |       |     |
|                       | 450           | 225 |       |       |     |
|                       | 600           | 275 |       |       |     |
| Hot Gas Reheat        | 30            |     |       |       |     |
| Economizer            | 500           |     |       |       |     |
| ERW – Small           | 350           |     |       |       |     |
| ERW – Large           | 400           |     |       |       |     |
| Indoor Fan            | 16"           | 100 |       |       |     |
|                       | 20"           | 150 |       |       |     |
|                       | 24"           | 260 |       |       |     |
| Indoor Fan Motors     | 1             | 36  |       |       |     |
|                       | 1.5           | 41  |       |       |     |
|                       | 2             | 40  |       |       |     |
|                       | 3             | 69  |       |       |     |
|                       | 5             | 84  |       |       |     |
|                       | 7.5           | 115 |       |       |     |
|                       | 10            | 128 |       |       |     |
| 15                    | 211           |     |       |       |     |
| 20                    | 225           |     |       |       |     |
| Exhaust Fan           | 250           |     |       |       |     |

| Size 3–15 Fan Weights (lbs.) |     |
|------------------------------|-----|
| 12 (in)                      | 87  |
| 14 (in)                      | 91  |
| 16 (in)                      | 115 |
| 18 (in)                      | 87  |
| 20 (in)                      | 91  |
| 22 (in)                      | 115 |

| Curb Weights (lbs.) | 14" | 24" |
|---------------------|-----|-----|
| 003—006             | 156 | 230 |
| 007—015             | 200 | 295 |
| 016—028             | 566 | 657 |

**Table 3: Refrigerant Charge**

| Unit Size | Cooling Model |                        | Heat Pump Model |                        |
|-----------|---------------|------------------------|-----------------|------------------------|
|           | Standard Unit | Standard Unit w/ MHGRH | Standard Unit   | Standard Unit w/ MHGRH |
| 3         | 10.5          | 12.9                   | 12.0            | 14.4                   |
| 4         | 11.1          | 13.5                   | 12.6            | 15.0                   |
| 5         | 15.3          | 18.2                   | 16.8            | 19.7                   |
| 6         | 15.3          | 18.2                   | 16.8            | 19.7                   |
| 7.5       | 11.0          | 17.3                   | 26.0            | 31.2                   |
| 10        | 34.0          | 39.8                   | 40.0            | 45.8                   |
| 12        | 34.0          | 39.8                   | 40.0            | 45.8                   |
| 15        | 37.0          | 43.8                   | 42.0            | 47.8                   |
| 16        | 37.0          | Consult Factory        |                 |                        |
| 18        | 37.0          |                        |                 |                        |
| 20        | 37.0          |                        |                 |                        |
| 25        | 35.5          |                        |                 |                        |
| 28        | 35.5          |                        |                 |                        |

## Unit Piping - Condensate Drain Connection

**WARNING**

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

The unit is provided with a condensate drain connection, a 3/4" male NPT for 003–015 units and a 1" male NPT for 016–028 units. For proper drainage, level the unit and drain pan side to side and install a P-trap.

Figure 7 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.

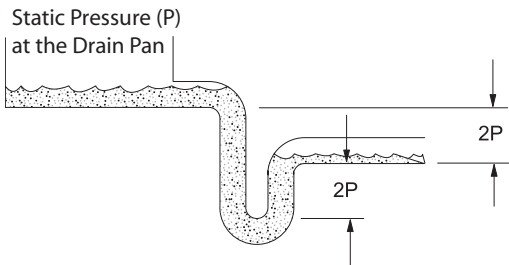
Example: If the static pressure as measured in the drain pan is 1.5", then the distance between the drain outlet and the horizontal run should be 3".

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.

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.

**Figure 7: 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 8: 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 8). The damper is set so that the crank-arm moves through a 90-degree angle to bring the economizer dampers from full open to full close. Mechanical stops are placed in the crank-arm mounting bracket. Do not remove stops. Driving the crank-arm 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 1141 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

**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.

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.

### Installing Ductwork

**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.

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.

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.

**Table 4: AHRI CFM Ratings**

| Unit Size | AHRI Rated CFM | Unit Size | AHRI Rated CFM  |
|-----------|----------------|-----------|-----------------|
| 3         | 1140           | 15        | 4690            |
| 4         | 1550           | 16        | Consult Factory |
| 5         | 1810           | 18        | Consult Factory |
| 6         | 2310           | 20        | 7315            |
| 7.5       | 2885           | 25        | 8180            |
| 10        | 3850           | 28        | 8200            |
| 12        | 4620           |           |                 |

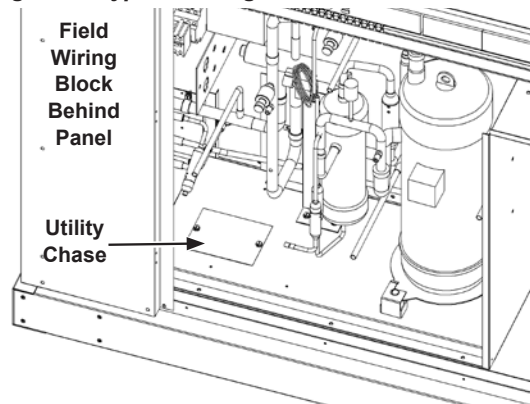
### Installing Duct Static Pressure Sensor Taps

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.

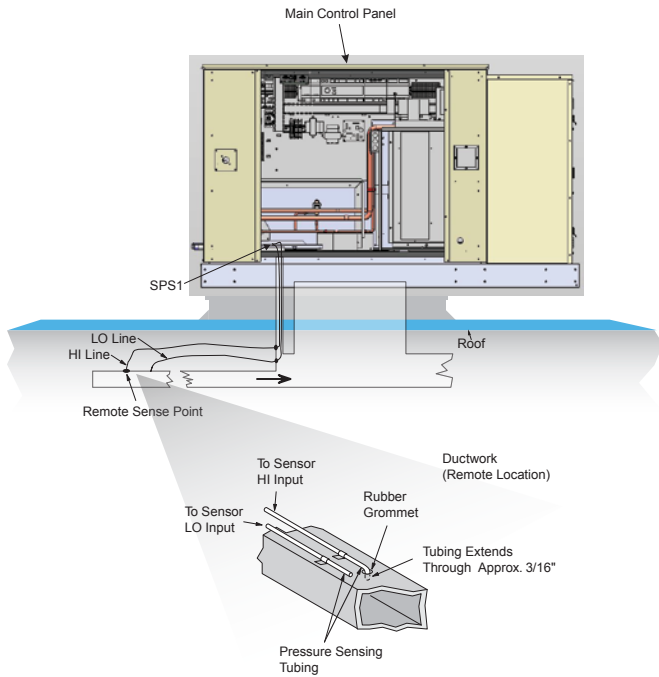
Carefully locate and install the duct static pressure sensing tap. Improperly locating or installing the sensing tap causes unsatisfactory operation of the entire variable air volume system. Below are pressure tap location and installation recommendations. The installation must comply with local code 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 10](#)).
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 9](#)). Connect the tubes to appropriate barbed fittings (on SPS1) in the control panel. (Fittings are sized to accept 3/16" ID tubing.)

**Figure 9: Typical Wiring Chase, Size 007–015 shown**



**Figure 10: Duct Static Pressure Sensing Tubing Installation**



**Installing Building Static Pressure Sensor Taps**

**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.

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.

**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.

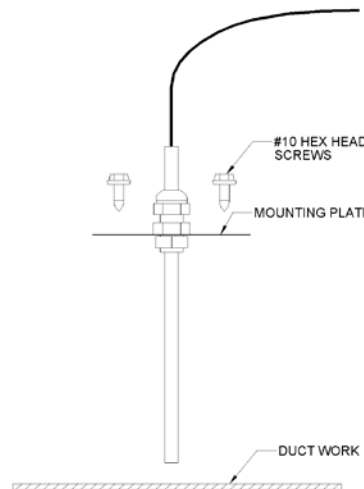
3. Locate the building tap so it is not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
4. Route the building tap tube through the curb and feed it into the unit through the knockout in the bottom of the control panel (refer to Figure 9). 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.

**Discharge Air Temperature Sensor**

The discharge air temperature sensor must be installed in the discharge air duct, downstream of the rooftop unit. Locate the sensor in a location that closely approximates the average duct temperature. To avoid the effects of radiation, the sensor should not be in the line-of-sight of a gas furnace or electric heater. Generally, locate sensor in the center of a duct wall, 5' – 10' from unit opening to allow for air mixing. Do not mount down stream of VAV boxes or other dampers.

Installation: Drill 7/8" diameter hole in duct, insert sensor probe and secure plate to duct with 2 – #10 screws. Be sure to apply gasket or silicone sealant to back of mounting plate prior to screwing plate to the duct to create an air-tight seal.

**Figure 11: Discharge Air Temperature Sensor Installation**



**DANGER**

**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.

**WARNING**

**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.

**WARNING**

**Electrical shock hazard. Can cause severe injury or death.**

Connect only low voltage NEC Class II circuits to terminal block TB2.

**DANGER**

**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.

## Pre-Construction

The Rebel unit comes equipped with a Microtech III controller and can be used for sites that are still under construction. The following conditions must be met.

1. Ductwork has to be installed. The fan proving switch and furnace might not run correctly without the specified external static pressure
2. Filters must be installed.
3. Follow furnace commissioning instructions found in the furnace section.
4. After substantial completion of the construction process the unit is to be thoroughly cleaned. Special attention should be paid to the indoor DX coil and the furnace. Filters should be changed
5. Furnace operation, rate, and temperature rise should be re-verified. See instructions found in the furnace section.

## 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.

**Electrostatic Discharge (ESD)**

**Disconnect Power to the Rebel Rooftop Unit prior to inspecting and/or repairing.**

When inspecting/repairing Rebel Rooftop units the technician or building owner must take precautions to ground themselves to the unit. This will prevent them from damaging the circuit boards mounted inside the inverter box and main control panel.

Electrostatic Discharge (ESD) can damage components in a manner that is not always readily detectable. A static potential can easily be generated on a person that reaches 25 kVolts. If this potential is discharged into one of the unit’s circuit boards it can degrade part of the current carrying conductors inside. This is the conceptual equivalent of reducing 16 gage wires to 18. The component will still operate initially, but will have a much shorter life span due to overheating of the conductor.

In order to prevent ESD from the technician to the unit they must both be at the same potential. First the technician must ground themselves to the unit; this can be achieved by touching any galvanized (not painted) section of the unit. The unit’s base rail and refrigerant piping are both reliable options. The next step is to attach a grounded wrist or ankle strap to the copper tubing. This grounding strap must have direct contact with the technician’s skin. Once this has been done the technician is free to work on electrical components in side the unit.

Although ESD is partially dependent on humidity, at levels above 50% it is a greatly reduced risk, good practices should always be observed.

**All Units**

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 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 9](#) and also [Table 5](#)). Refer to the unit nameplate to determine the number of power connections.

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

**Table 5: Recommended Field Power Wiring**

| Ampacity (MCA) | Number 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                                 |

**NOTE:**

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.



**WARNING****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.

**WARNING****Electrical shock hazard. Can cause severe injury or death.**

Connect only low voltage NEC Class II circuits to terminal block TB2.

**DANGER**

**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.

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 5](#) 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.

The power source to the unit must be a balanced 3-phase power supply, meaning that the voltage and impedance to the line is matched. Under normal conditions, a balanced power supply will result in balanced current phase-to-phase. Unbalanced voltage and/or current (such as provided with an "Open Delta" configuration), is likely to result in nuisance alarms, premature failure of components and it will void equipment warranty.

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 the bottom of the main control panel.

**Field Control Wiring**

The Rebel 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 1141](#)).

**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.

**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.

**Table 6: 003–015 Electric Heat Data<sup>1</sup>**

| kW | Voltage | Amps | kW | Voltage | Amps  |
|----|---------|------|----|---------|-------|
| 6  | 208     | 16.7 | 36 | 208     | 99.9  |
|    | 230     | 15.1 |    | 230     | 90.4  |
|    | 475     | 7.3  |    | 475     | 43.8  |
|    | 575     | 6.0  |    | 575     | 36.1  |
| 12 | 208     | 33.3 | 54 | 208     | 149.9 |
|    | 230     | 30.1 |    | 230     | 135.6 |
|    | 475     | 14.6 |    | 475     | 65.6  |
|    | 575     | 12.0 |    | 575     | 54.2  |
| 18 | 208     | 50.0 | 72 | 208     | N/A   |
|    | 230     | 45.2 |    | 230     | N/A   |
|    | 475     | 21.9 |    | 475     | 87.5  |
|    | 575     | 18.1 |    | 575     | 72.3  |
| 30 | 208     | 83.3 |    |         |       |
|    | 230     | 75.3 |    |         |       |
|    | 475     | 36.5 |    |         |       |
|    | 575     | 30.1 |    |         |       |

**Table 7: DPS 016–028 Electric Heat Data**

| KW | Voltage | Amps  | KW  | Voltage | Amps  |
|----|---------|-------|-----|---------|-------|
| 30 | 208     | 83.4  | 90  | 208     | 250.1 |
|    | 230     | 75.4  |     | 230     | 226.2 |
|    | 460     | 37.7  |     | 460     | 113.1 |
|    | 575     | 30.2  |     | 575     | 90.5  |
|    |         |       |     |         |       |
| 45 | 208     | 125.1 | 120 | 208     | 333.5 |
|    | 230     | 113.1 |     | 230     | 301.6 |
|    | 460     | 56.5  |     | 460     | 150.8 |
|    | 575     | 45.2  |     | 575     | 120.6 |
| 60 | 208     | 166.7 | 150 | 208     | 416.9 |
|    | 230     | 150.8 |     | 230     | 377.0 |
|    | 460     | 75.4  |     | 460     | 188.5 |
|    | 575     | 60.3  |     | 575     | 150.8 |

NOTE: 1. Maximum temperature rise equals 60°F

**Table 8: Amp Draw Data**

| Unit Size (Tons) | Compressor RLA          |      |      |      |      |                      |      |      |      |          | Compressor LRA |      |      |     |              |     |     |     | Condenser Fan FLA Each |     |     |     |
|------------------|-------------------------|------|------|------|------|----------------------|------|------|------|----------|----------------|------|------|-----|--------------|-----|-----|-----|------------------------|-----|-----|-----|
|                  | Compressor 1 - Variable |      |      |      |      | Compressor 2 - Fixed |      |      |      |          | Compressor 1   |      |      |     | Compressor 2 |     |     |     | Qty                    | 208 | 230 | 460 |
|                  | Voltage                 |      |      |      |      | Voltage              |      |      |      |          | Voltage        |      |      |     | Voltage      |     |     |     |                        |     |     |     |
|                  | 208                     | 230  | 460  | 575  | [%]  | 208                  | 230  | 460  | 575  | 208      | 230            | 460  | 575  | 208 | 230          | 460 | 575 |     |                        |     |     |     |
| 3                | 7.7                     | 7.0  | 3.5  | —    | 45%  | 0.0                  | 0.0  | 0.0  | —    | See Note | 0.0            | 0.0  | 0.0  | —   | 1            | 0.9 | 0.8 | 0.4 |                        |     |     |     |
| 4                | 10.0                    | 9.0  | 4.5  | —    | 55%  | 0.0                  | 0.0  | 0.0  | —    |          | 0.0            | 0.0  | 0.0  | —   | 1            | 0.9 | 0.8 | 0.4 |                        |     |     |     |
| 5                | 11.9                    | 10.8 | 5.4  | —    | 68%  | 0.0                  | 0.0  | 0.0  | —    |          | 0.0            | 0.0  | 0.0  | —   | 1            | 2.0 | 1.8 | 0.9 |                        |     |     |     |
| 6                | 15.0                    | 13.6 | 6.8  | —    | 89%  | 0.0                  | 0.0  | 0.0  | —    |          | 0.0            | 0.0  | 0.0  | —   | 1            | 2.0 | 1.8 | 0.9 |                        |     |     |     |
| 7.5              | 11.9                    | 10.8 | 5.4  | —    | 68%  | 8.6                  | 7.8  | 3.9  | —    |          | 67.5           | 73.7 | 37.1 | —   | 2            | 2.0 | 1.8 | 0.9 |                        |     |     |     |
| 10               | 10.0                    | 9.0  | 4.5  | —    | 59%  | 17.5                 | 15.8 | 7.9  | —    |          | 93.1           | 84.2 | 42.1 | —   | 2            | 2.0 | 1.8 | 0.9 |                        |     |     |     |
| 12               | 15.0                    | 13.6 | 6.8  | —    | 89%  | 17.5                 | 15.8 | 7.9  | —    |          | 93.1           | 84.2 | 42.1 | —   | 2            | 2.0 | 1.8 | 0.9 |                        |     |     |     |
| 15               | 28.3                    | 25.6 | 12.8 | —    | 100% | 17.5                 | 15.8 | 7.9  | —    |          | 93.1           | 84.2 | 42.1 | —   | 2            | 2.0 | 1.8 | 0.9 |                        |     |     |     |
| 16               | 47.0                    | 42.5 | 22.9 | 20.5 | —    | 0                    | 0    | 0    | 0    |          | See Note       |      |      |     |              | 1   | 8.0 | 8.0 | 4.0                    |     |     |     |
| 18               | 47.0                    | 42.5 | 22.9 | 20.5 | —    | 0                    | 0    | 0    | 0    |          |                |      |      |     |              | 1   | 8.0 | 8.0 | 4.0                    |     |     |     |
| 20               | 47.0                    | 42.5 | 22.9 | 20.5 | —    | 0                    | 0    | 0    | 0    |          |                |      |      |     |              | 1   | 8.0 | 8.0 | 4.0                    |     |     |     |
| 25               | 47.0                    | 42.5 | 22.9 | 20.5 | —    | 39.1                 | 35.4 | 18.6 | 15.4 |          |                |      |      |     |              | 1   | 8.0 | 8.0 | 4.0                    |     |     |     |
| 28               | 47.0                    | 42.5 | 22.9 | 20.5 | —    | 39.1                 | 35.4 | 18.6 | 15.4 |          |                |      |      |     |              | 1   | 8.0 | 8.0 | 4.0                    |     |     |     |

NOTE: The inverter compressor is controlled to have a soft start and an LRA <1.0

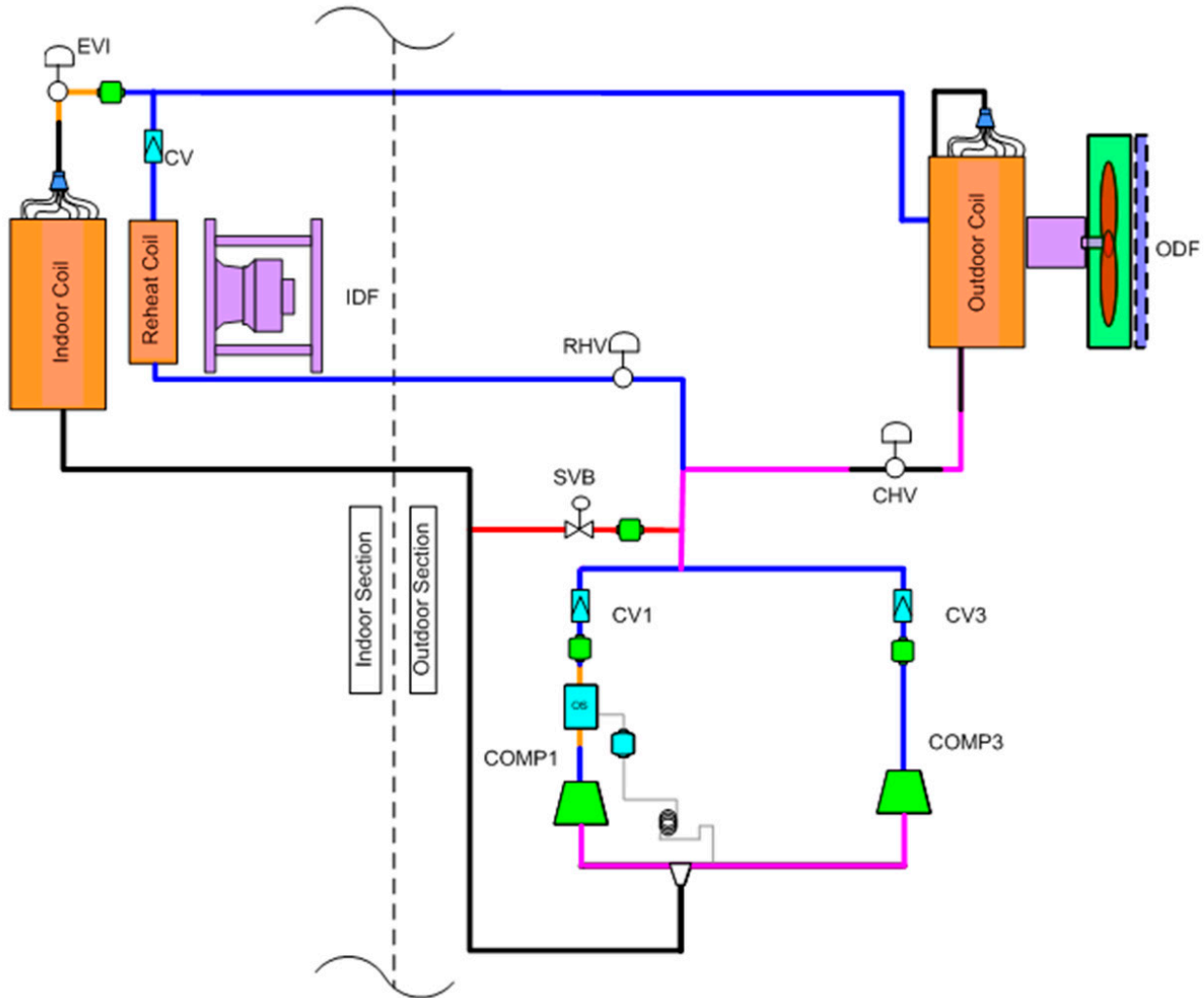
| Horse Power | Supply Fan FLA (DPS 003–015) |      |     |     | Exhaust Fan FLA (DPS 003–028) |     |     |     | Supply Fan FLA (016–028) |      |      |      |
|-------------|------------------------------|------|-----|-----|-------------------------------|-----|-----|-----|--------------------------|------|------|------|
|             | Voltage                      |      |     |     | Voltage                       |     |     |     | Voltage                  |      |      |      |
|             | 208                          | 230  | 460 | kW  | 208                           | 230 | 460 | kW  | 208                      | 230  | 460  | 575  |
| 1.3         | 3.1                          | 2.8  | 1.4 | 1.0 | 3.1                           | 2.8 | 1.4 | 1.0 | —                        | —    | —    | —    |
| 2.3         | 5                            | 4.6  | 2.3 | 1.7 | 5                             | 4.6 | 2.3 | 1.7 | —                        | —    | —    | —    |
| 3           | —                            | —    | —   | —   | —                             | —   | —   | —   | 9.9                      | 9.0  | 4.5  | 3.4  |
| 4           | 8.8                          | 7.4  | 4.0 | 3.0 | 8.8                           | 7.4 | 4.0 | 3.0 | —                        | —    | —    | —    |
| 5           | —                            | —    | —   | —   | —                             | —   | —   | —   | 16.1                     | 14.0 | 7.0  | 5.3  |
| 7.5         | —                            | —    | —   | —   | —                             | —   | —   | —   | 25.0                     | 21.6 | 10.8 | 8.2  |
| 8           | 13.5                         | 12.2 | 6.1 | 6.0 | —                             | —   | —   | —   | —                        | —    | —    | —    |
| 10          | —                            | —    | —   | —   | —                             | —   | —   | —   | 33.0                     | 28.0 | 14.0 | 11.0 |
| 15          | —                            | —    | —   | —   | —                             | —   | —   | —   | 44.8                     | 40.6 | 20.3 | 16.2 |
| 20          | —                            | —    | —   | —   | —                             | —   | —   | —   | 61.0                     | 50.0 | 25.0 | 20.0 |

NOTE: DPS 007–015 575V Amp Draws: Compressors and motors will be run off a 575 to 460V transformer. Motors will be nameplated at 460V. EAF FLA are per motor. Some DPS 016–028 units have (2) EAFs and motors.

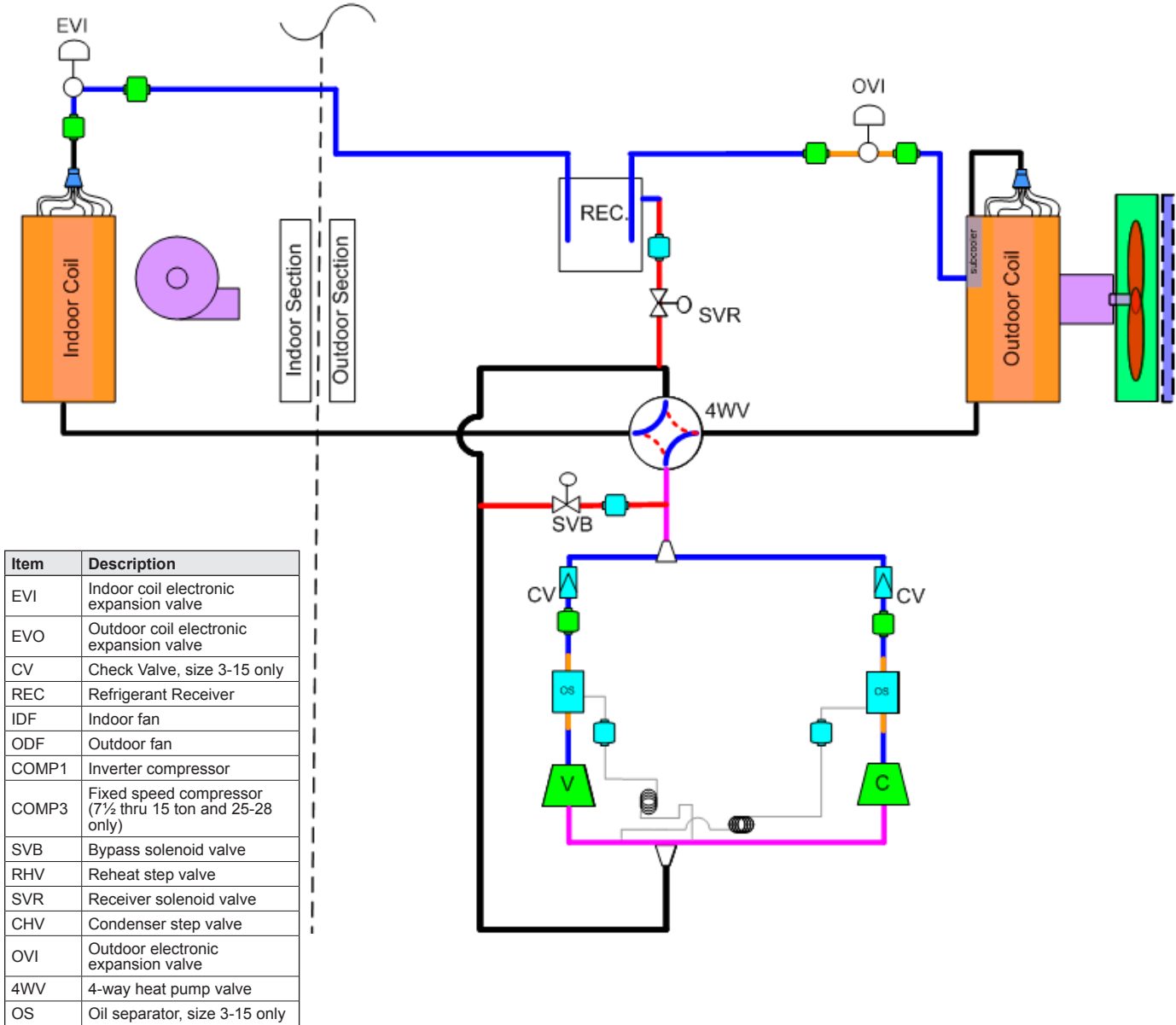
### Piping System

The Rebel piping system varies significantly between the multiple possible configurations; heat pump, cooling only, and modulating hot gas reheat. In spite of this multiplicity there are some consistent characteristics. All units have a single circuit with a single or tandem compressor. All units use an electronic expansion valve (EVI) and a start-up by pass solenoid valve (SVB).

**Figure 12: Typical Refrigeration Circuit for Cooling Only Unit with Modulating Hot Gas Reheat (DPS 007-015 shown)**



**Figure 13: Typical Refrigeration Circuit for Heat Pump Unit with Modulating Hot Gas Reheat (DPS 007–015 shown)**



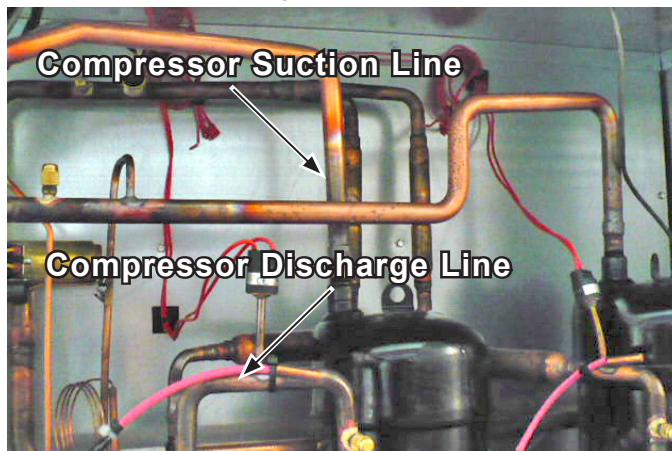
## DPS 003–015 Component Description

### Variable Speed Compressor

A variable speed compressor (COMP1) is used on all DPS(H) 003–015. On small cabinet units (3–6 Tons) the variable speed compressor will be the only one present. On medium cabinet units (7–15 Tons) the variable speed compressor will be on the left. The discharge of the variable speed compressor is located on the side and the suction is located on the top.

These pipes can also be identified by recalling that suction lines will always be larger than discharge lines. The side discharge design is used to create a positively pressurized crank case that returns oil to the scroll set even during low turn down conditions.

**Figure 14: Compressor Suction and Discharge on Medium Cabinet (7.5T) Heat Pump (DPH)**



### Fixed Speed Compressor (7–15 Only)

The fixed speed compressor (COMP3) is used on all medium cabinet (7–15 Ton), DPS, units. This compressor will always be located on the right and like the variable speed has the suction line on the top of the dome entering the scrolls and a discharge exiting from the side of the shell.

**Figure 15: Compressor Tandem on Medium Cabinet**



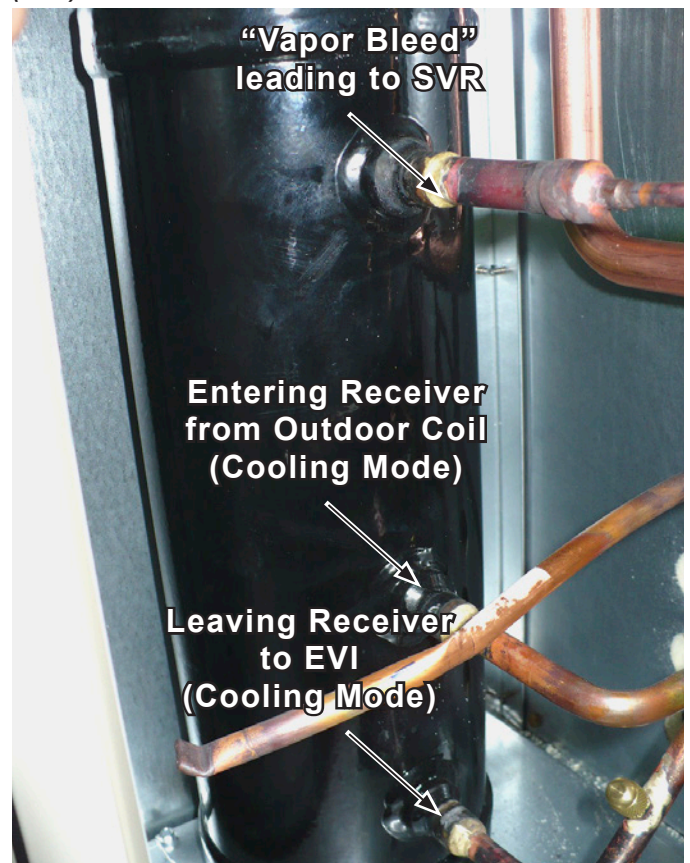
### Receiver

Only Rebel Heat Pump units will have a receiver. Different volumes of refrigerant are required inside the system during Mechanical Cooling (or defrost) and Mechanical Heating. This is the results of the charge in operating temperatures in Cooling and Heating Mode. The receiver stores the excess refrigerant upstream, in Cooling Mode, of the Indoor Expansion Valve (EVI). Three refrigerant lines connect to the receiver.

In cooling mode the refrigerant leaves (Cooling Mode) the receiver from the bottom connection on its way to the Indoor Expansion Valve (EVI). The refrigerant enters the receiver by the middle connection from the Outdoor Expansion Valve (EVO). The top connection is linked to the Receiver Solenoid Valve (SVR) and is used to bleed refrigerant vapor out of the top of the vessel during the change over from Mechanical Heating to Cooling Mode (or defrost).

In heating mode the refrigerant flow path will be reversed and will enter the receiver at the bottom connection on its way from EVI. The refrigerant will leave the receiver from the middle connection towards EVO. The top connection will always be a vapor bleed connected to SVR regardless of the units operating mode.

**Figure 16: Receiver on Medium Cabinet (7.5T) Heat Pump (DPH)**



**Oil Separator**

All DPS(H) 003–015 units will have an oil separator on the discharge line of the compressor. This device will remove oil from the compressor discharge gas and return it to the compressor suction line. The oil separator has three lines entering it. The connection on the side of the compressor is where the discharge gas enters. The hot gas continues on to the Outdoor Coil from the connection on the top of the separator. On the bottom is a small drain through which the oil returns after separation to the compressor suction. The refrigerant and oil path through the separator will not change depending on Heating or Cooling Mode.

**Figure 17: Oil Separator**



**Figure 18: Secondary Oil Separator**



**Check Valve**

All DPS 003–015 will have check valves on each of the compressor discharge lines. On medium cabinet units (7–15 Tons), two valves, one on each compressor, prevent recirculation of refrigerant during part load conditions. On small cabinet units (3–6 Tons) a single check valve prevents migration of refrigerant into the scrolls during off cycles.

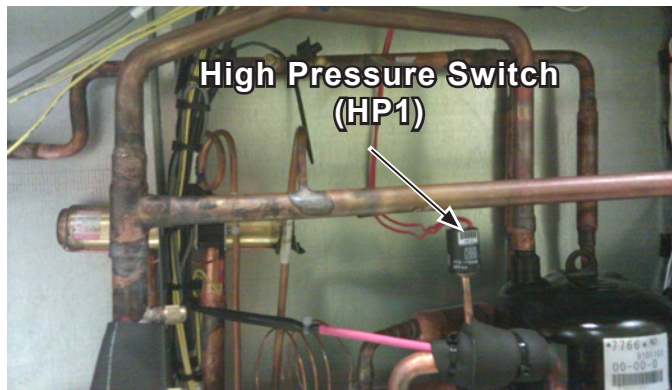
**Figure 19: Discharge Line Check Valves on Large Cabinet (7.5T) Heat Pump (DPH)**



**High Pressure Switch**

All Rebel Units will have a high pressure switch on each compressor. Medium cabinet units (7–15 Tons) will have an HP1 switch on the variable speed compressor (COMP1) and a HP3 on the fixed speed compressor (COMP3). These switches are normally closed devices that are brazed directly to the refrigerant piping. When the pressure at the switch exceeds 580 PSIG the switch will open. This opening will interrupt the control signal to the variable compressor drive or de-energize the contactor coil on the fixed speed compressor, both acts will shut down the compressors and generate an alarm at the MicroTech III keypad.

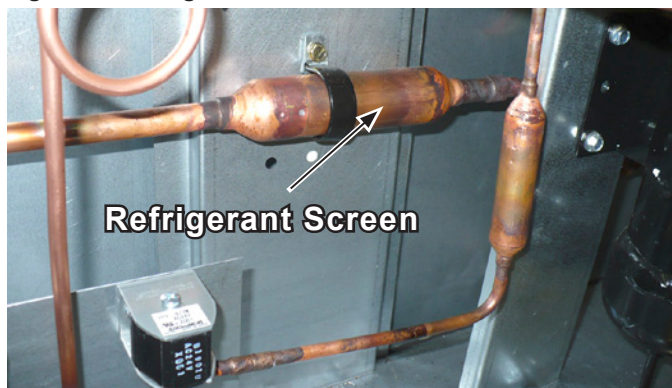
**Figure 20: High Pressure Switch**



**Refrigerant Screen**

During manufacturing, service, and repair there is always the potential for debris to accidentally enter the sealed refrigeration system. Filter screens are positioned around the refrigerant circuit to prevent any possible debris from entering critical components; expansion valves, compressors, etc. These screens are not bi-direction and must be installed in a specific direction if replaced. Please be aware that these screens are not desiccant filters and provide no moisture protection for compromised systems.

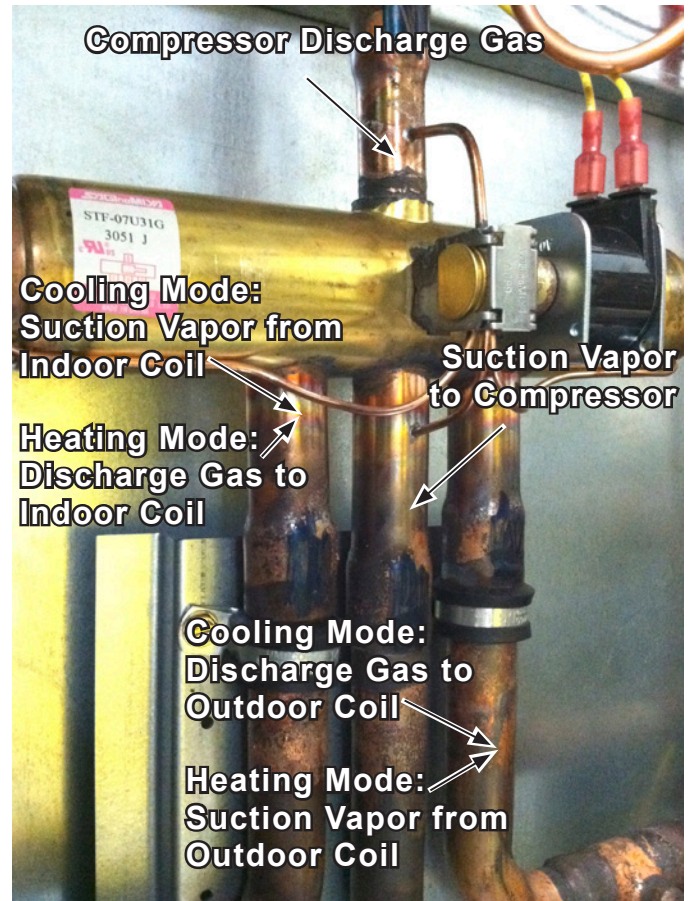
**Figure 21: Refrigerant Screen**



**Four-Way Valve**

The Four-Way Valve (4WV) also known as a Reversing Valve is a component only used on Heat Pumps. This device is used to direct the discharge gas from the compressor into the outdoor coil (Heating Mode) or indoor coil (Cooling Mode). This device is defaulted to cooling and when un-energized will direct the discharge gas into the outdoor coil.

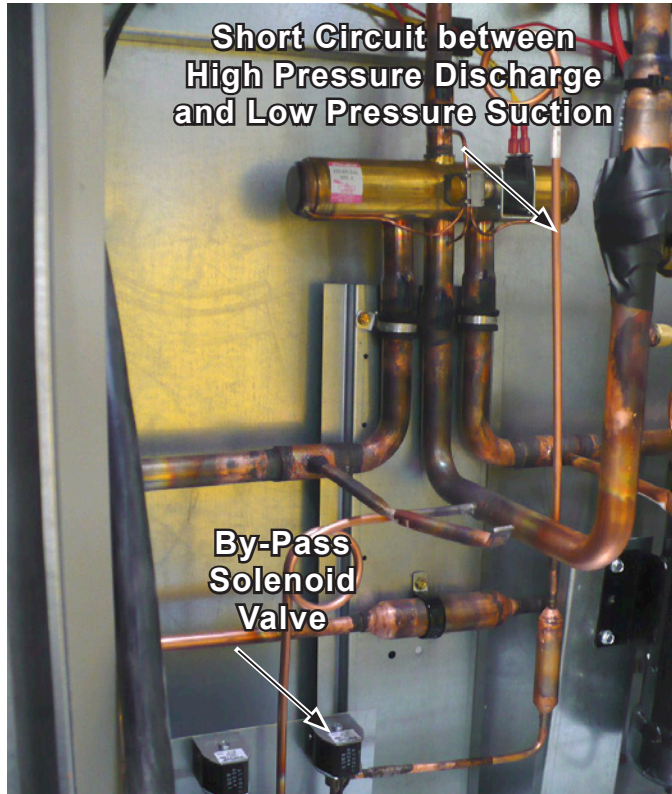
**Figure 22: Four-Way Valve**



**By-Pass Solenoid Valve**

The By-Pass Solenoid Valve (SVB) is used to “short-circuit” the high pressure compressor discharge to the low pressure suction side during start-up. This increases compressor longevity by minimizing starting torque and inrush current.

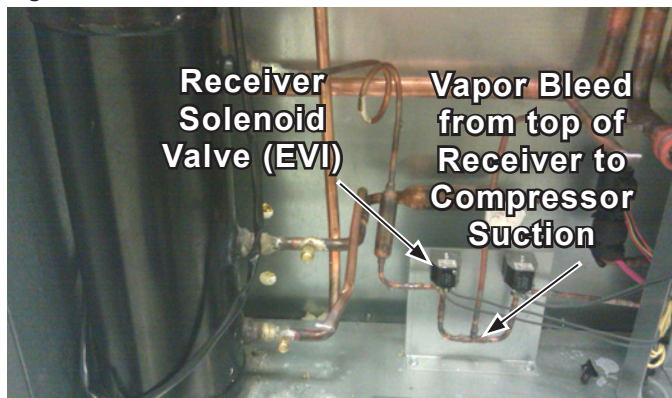
**Figure 23: By-pass Solenoid Valve**



**Receiver Solenoid Valve**

The Receiver Solenoid Valve (SVR) is used to “bleed off” refrigerant vapor from the top of the Receiver during pump down or the transition between mechanical heating and defrost. Cooling only units will not have this component, only Heat Pumps .

**Figure 24: Receiver Solenoid Valve**

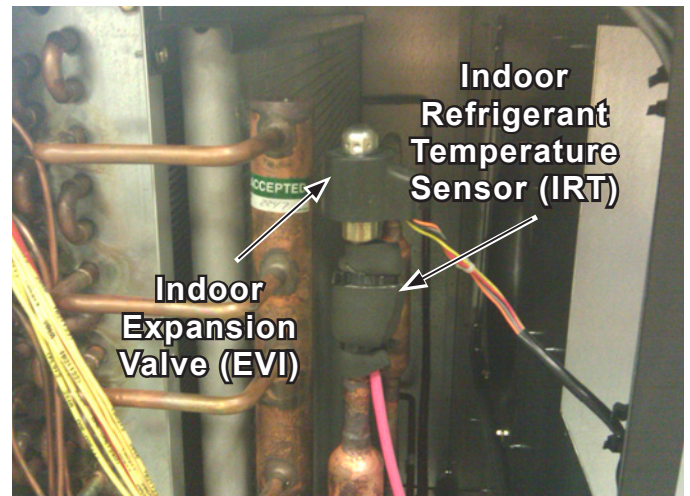


**Indoor Expansion Valve**

The Indoor Expansion Valve (EVI) is a 12 VDC stepper motor driven valve, used in heating and cooling mode. In cooling mode EVI is used to expand the refrigerant entering the Indoor Coil, operating as an evaporator, in much the same way as a TXV on a conventional air conditioner. In heating mode the EVI can operate in two different modes, configurable at the keypad.

When configured for Standard during heating mode the EVI will modulate to fully open and remain in this position. When configured for heating mode the EVI will modulate to maintain the Subcooling Set-Point.

**Figure 25: Indoor Expansion Valve**



**Outdoor Expansion Valve**

The Outdoor Expansion Valve (EVO) is a 12 VDC stepper motor driven valve, used in heating and cooling mode. Cooling only units will not have this component, only Heat Pumps. In heating mode the EVO is used to expand the refrigerant entering the Outdoor Coil, which is now and evaporator, in much the same way as a TXV on a conventional air conditioner. In Cooling Mode the EVO can operate in two different modes, configurable at the keypad. When configured for Standard during Cooling Mode the EVO will modulate to fully open and remain in this position. When configured for Cooling Mode the EVO will modulate to maintain the Subcooling Set-Point.



**Suction Pressure Transducer**

The Suction Pressure Transducer (PTS) is a refrigerant pressure sensor that screws onto a Schrader fitting on the suction line of the compressor deck. On single compressor units (3–6T) this sensor is located on the suction line. On tandem, two compressor units (7–15T), the PTS is located upstream of the joint suction.

This sensor is used to ensure that the compressor does not leave the operating envelope and is used to regulate the super heat leaving the indoor coil and entering the compressor.

**Discharge Pressure Transducer**

The Discharge Pressure Transducer (PTD) is a refrigerant pressure sensor that screws onto a Schrader fitting on the discharge line of the compressor system. On single compressor units (3–6T) this sensor is located on the discharge line. On tandem, two compressor units (7–15T), the PTD is located down stream of the joint discharge.

This sensor is used to ensure that the compressor does not leave the operating envelope and is used to regulate the outdoor fan speed and maintain head pressure.

**Discharge Refrigerant Temperature**

All Rebel units will have a Discharge Refrigerant Temperature Sensor (DRT1 / DRT3) on the discharge line of each compressor. This sensor is attached the piping with a metal clip and wrapped in insulation. The purpose of this device is to increase compressor life by preventing it from running outside of the operating envelope.

**Suction Refrigerant Temperature**

All Rebel units will have a Suction Refrigerant Temperature Sensor (SRT). This sensor is located on the suction line. Unlike DRT1 or 3 there is only one SRT for tandem compressor units. This sensor is used to determine the suction super heat entering the compressor and is the control input for the EVI in cooling mode (EVO in heating mode).

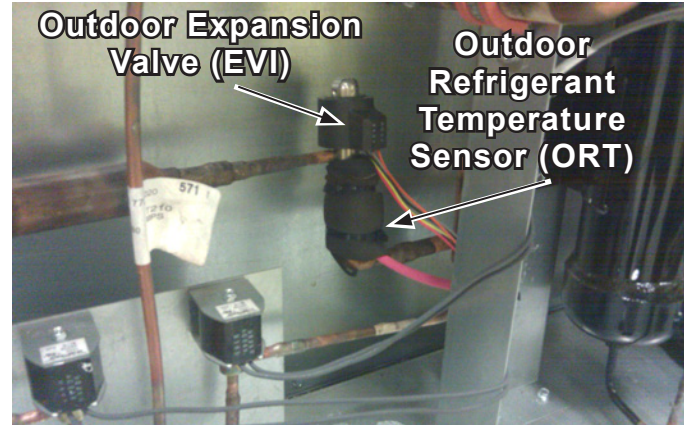
**Indoor Refrigerant Temperature**

Only Rebel Heat Pump units will have an Indoor Refrigerant Temperature Sensor (IRT). This sensor is used in Heating Mode when htgEVImethod is set to control subcooling. This sensor is attached to the refrigerant piping downstream (Cooling Mode) of the Indoor Expansion Valve (EVI).

**Outdoor Refrigerant Temperature**

Only Rebel Heat Pumps units will have an Outdoor Refrigerant Temperature Sensor (ORT). This sensor is used in Cooling Mode when ClgEVOMethod is set to control subcooling. This sensor is attached to the refrigerant piping upstream (Cooling Mode) of the Outdoor Expansion Valve (EVO).

*Figure 26: Outdoor Expansion Valve*



**Defrost Temperature Sensor**

Only Rebel Heat Pump, DPH, units will have a Defrost Temperature Sensor (DFT). This sensor is used in Heating Mode and Defrost Mode to determine the amount of frost accumulated on the Outdoor Coil.

**Heating**

The unit's heating mode of operation is determined by the control temperature and the heating setpoint temperature. The unit enters the heating mode of operation by comparing the control temperature to the heating setpoint.

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.

For example, a standard air conditioning unit with supplemental gas, electric, or hot water heat with a heating setpoint of 68.0°F and a deadband of 1.0°F would enter heating mode if the control temperature reached 67.4°F. When this takes place, the heating mode of operation will begin and the 1st Stage of heating operation will start.

**Heat Pump**

*(DPS 003–015 ton)*

The heating mode of operations will be slightly different for heat pump units. It is the manufacturer's recommendation that all Rebel heat pump units be purchased with supplemental gas, electric, or hot water heat. When the control temperature drops below the heating setpoint by half the deadband the unit will energize the four way valve and initiate mechanical heating.

On heat pumps mechanical heating is the primary source of heat and will always be the unit's first attempt to meet the application's load. After start-up the variable compressor will ramp up to meet the DAT Setpoint. If the mechanical heating capacity at the ambient conditions is capable of meeting the building load the variable speed compressor will stabilize at some value below its maximum speed. If the heat pump's capacity is insufficient at the ambient conditions the supplemental (gas, electric, hot water) heat will be enabled and gradually ramp/stage on to make up the capacity shortage. If the combined capacity of the heat pump's mechanical and supplemental heating is greater than the building load the supplemental supply will ramp/stage down. The unit will always seek to operate with mechanical heating as much as possible.

Periodically during heating operations the unit will need to enter defrost to remove frost build up from the outdoor coil. During defrost mechanical heating will be unavailable and the supplemental heat will ramp/stage up to meet the DAT set-point.

**Defrost**

*(DPS 003–015 ton)*

Defrost is a temporary and infrequent period during normal heating operations on Rebel heat pumps. The purpose of defrost is to remove frost that has built up on the outdoor coil during mechanical heating. In heating mode the outdoor coil acts as an evaporator to "pull" heat out of the ambient air. As a result the surface temperature of the outdoor coil is below the ambient temperature and depending on conditions maybe below freezing. During prolonged mechanical heating while the surface temperature of the outdoor coil is below 32°F frost will form.

The defrost operation is similar to mechanical cooling. In defrost the four way valve will de-energize and the hot gas from the compressor will be forced into the outdoor coil, rejecting heating to the ambient, and melting any frost formed on the coil. To speed up the melting process during a defrost cycle the OA damper will close and the outdoor fan will de-energize. During this period the supplemental (gas, electric, hot water) heat will ramp/stage up to maintain the unit's DAT Setpoint.

Rebel heat pump unit's have demand based defrost control and will operate in defrost only as long as necessary to remove frost from the outdoor coil.

**Charging**

Rebel units have advanced charge management systems that obsolete many common techniques for determining over or under charged conditions. The charge management system means that super heat and subcooling values will float to achieve the peak real time energy efficiency possible at current operating conditions (building load and ambient temperature). Rebel units also use electronic expansion valves that can not be adjusted manually. Refrigerant should never be added or removed from the system based on the desire to achieve an arbitrary subcooling value. It will always be Daikin's recommendation that unit's suspected of being over/under charged have all of their refrigerant removed, leak tested with nitrogen, and then re-charged based on the unit name plate.

**Table 9: Refrigerant Charge**

| Unit Size | Cooling Model |                        | Heat Pump Model |                        |
|-----------|---------------|------------------------|-----------------|------------------------|
|           | Standard Unit | Standard Unit w/ MHGRH | Standard Unit   | Standard Unit w/ MHGRH |
| 3C        | 10.5          | 12.9                   | 12.0            | 14.4                   |
| 3M        | 6.6           | 11.3                   |                 |                        |
| 4C        | 11.1          | 13.5                   | 12.6            | 15.0                   |
| 4M        | 6.5           | 11.3                   |                 |                        |
| 5         | 15.3          | 18.2                   | 16.8            | 19.7                   |
| 6         | 15.3          | 18.2                   | 16.8            | 19.7                   |
| 7.5       | 11.1          | 17.8                   | 26.0            | 31.2                   |
| 10        | 20.0          | 25.8                   | 40.0            | 45.8                   |
| 12        | 20.0          | 25.8                   | 40.0            | 45.8                   |
| 15        | 24.4          | 30.2                   | 46.0            | 51.8                   |

3C & 4C with fin tube outdoor coils  
3M & 4M with micro-channel outdoor coils

## DPS 016–028 Ton Component Description

### Variable Speed Compressor

A variable speed compressor (COMP1) is used on all DPS 016-028. On DPS 16–20 ton units, the variable speed compressor will be the only one present, and be on the right. The discharge of the variable speed compressor is located on the top and the suction is located on the side.

These pipes can also be identified by recalling that suction lines will always be larger than discharge lines. The side suction design is used to cool the motor with cold refrigerant.

**Figure 27: Compressor Suction and Discharge on DPS 025–028 units**



### Fixed Speed Compressor (DPS 025–028 Only)

This compressor will always be located on the left and like the variable speed has the suction line on the side of the dome entering the scrolls and a discharge exiting from the top of the shell.

### High Pressure Switch

All Rebel Units will have a high pressure switch on each compressor. HP1 switch is on the variable speed compressor (COMP1) and HP3 is on the fixed speed compressor (COMP3). These switches are normally closed devices that are brazed directly to the refrigerant piping. When the pressure at the switch exceeds 580 PSIG the switch will open. This opening will interrupt the control signal to the variable compressor drive or de-energize the contactor coil on the fixed speed compressor, Both acts will shut down the compressors and generate an alarm at the MicroTech III keypad.

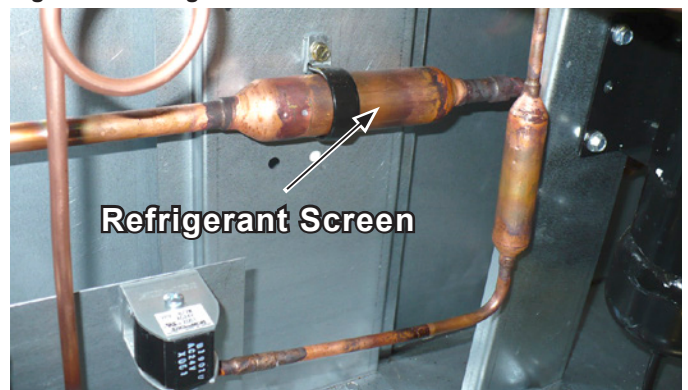
**Figure 28: High Pressure Switch**



### Refrigerant Screen

During manufacturing, service, and repair there is always the potential for debris to accidentally enter the sealed refrigeration system. Filter screens are positioned around the refrigerant circuit to prevent any possible debris from entering critical components; expansion valves, compressors, etc. These screens are not bi-direction and must be installed in a specific direction if replaced. Please be aware that these screens are not desiccant filters and provide no moisture protection for compromised systems.

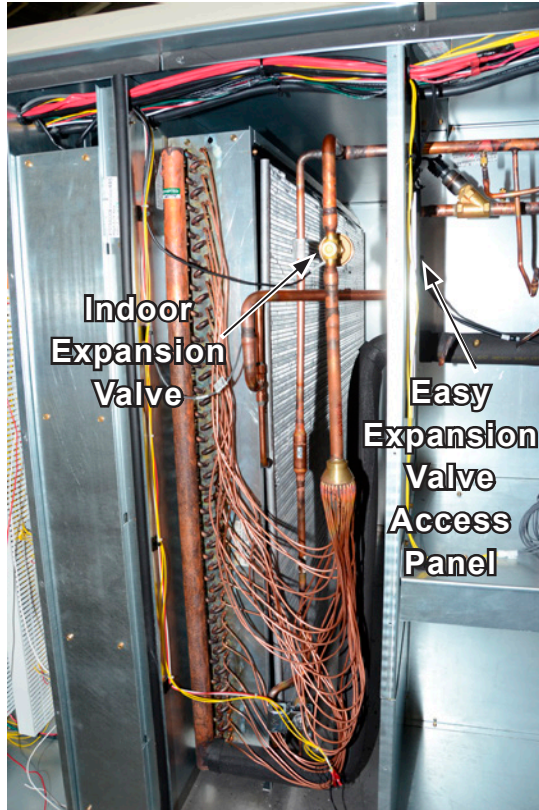
**Figure 29: Refrigerant Screen**



**Indoor Expansion Valve**

The Indoor Expansion Valve (EVI) is a 12 VDC stepper motor driven valve. In cooling mode EVI is used to control the superheat and expand the refrigerant entering the Indoor Coil, operating as an evaporator, in much the same way as a TXV on a conventional air conditioner.

**Figure 30: Indoor Expansion Valve**



**Suction Pressure Transducer**

The Suction Pressure Transducer (PTS) is a refrigerant pressure sensor that screws onto a Schrader fitting on the suction line of the compressor deck. On single compressor units (DPS 016–020) this sensor is located on the suction line. On tandem, two compressor units (DPS 025–028), the PTS is located upstream of the joint suction.

This sensor is used to ensure that the compressor does not leave the operating envelope and is used to regulate the super heat leaving the indoor coil and entering the compressor.

**Discharge Pressure Transducer**

The Discharge Pressure Transducer (PTD) is a refrigerant pressure sensor that screws onto a Schrader fitting on the discharge line of the compressor system. On single compressor units (DPS 016–020) this sensor is located on the discharge line. On tandem, two compressor units (DPS 025–028), the PTD is located downstream of the joint discharge.

This sensor is used to ensure that the compressor does not leave the operating envelope and is used to regulate the outdoor fan speed and maintain head pressure.

**Discharge Refrigerant Temperature**

All Rebel units will have a Discharge Refrigerant Temperature Sensor (DRT1/DRT3) on the discharge line of each compressor. This sensor is attached the piping with a metal clip and wrapped in insulation. The purpose of this device is to increase compressor life by preventing it from running outside of the operating envelope.

**Suction Refrigerant Temperature**

All Rebel units will have a Suction Refrigerant Temperature Sensor (SRT). This sensor is located on the suction line. Unlike DRT1 or 3 there is only one SRT for tandem compressor units. This sensor is used to determine the suction super heat entering the compressor and is the control input for the EVI in cooling mode.

**Bypass Solenoid**

The bypass solenoid (SVB) is used to “short circuit” the high pressure compressor discharge to the low pressure suction side during startup. This increases compressor life by reducing the startup torque and inrush current.

## VFD Compressor Operation – DPS 016–028

VFD compressor modulation is controlled by a Mobus® signal from the unit controller. 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 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.

## DPS Size 025 & 028, Two Compressor Units

If the VFD compressor were to become inoperative, the unit can continue to operate on the remaining fixed speed compressor 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.

**Table 10: VFD Compressor Modulation Ranges**

| DPS Unit Model | VFD Modulation Range      |                          |   |
|----------------|---------------------------|--------------------------|---|
|                | VFD Min rps/<br>VFD Min V | VFD Max rps              |   |
|                |                           | VFD and Fixed Comp(s) ON | VFD Comp Only<br>VFDMax rps/<br>VFDMaxV |
|                |                           | 1 Fixed ON               |   |
|                | VFD1Max rps/<br>VFD1MaxV  |                          |   |
| 016            | 25 rps/0 Vdc              | 60 rps/4.0 V             | 90 rps/6.0 V                            |
| 018            | 25 rps/0 Vdc              | 100 rps/8.7 V            | 100 rps/10.0 V                          |
| 020            | 25 rps/0 Vdc              | 100 rps/8.7 V            | 100 rps/10.0 V                          |
| 025            | 25 rps/0 Vdc              | 85 rps/8.0 V             | 100 rps/10.0 V                          |
| 028            | 25 rps/0 Vdc              | 85 rps/8.0 V             | 100 rps/10.0 V                          |

\* High and Low Oil Boost are explained on [page 30](#)

## 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.

### Compressor Stage Up Transition (DPS 025 & 028 Only)

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 the 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 the fixed compressor. The VFD is held at minimum speed for 30 seconds before normal modulation resumes.

### Compressor Stage Down Transition (DPS 025 & 028 Only)

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 the 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 the 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 the 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 the 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 9 on page 26](#). 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.

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.

**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 11: VFD Compressor Winding Resistance**

| Compressor Model | Voltage  | Winding Resistance (Ohms) |
|------------------|----------|---------------------------|
| VZH-088B-X       | 208-230V | 0.03                      |
|                  | 460V     | 0.10                      |
|                  | 575V     | 0.10                      |
| VZH-117*         | 208-230V | 0.02                      |
|                  | 460V     | 0.08                      |
|                  | 575V     | 0.08                      |

\* Size 020 only



**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**

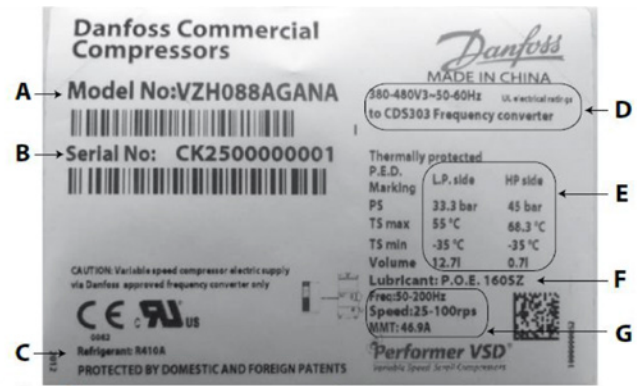
**WARNING**

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 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.

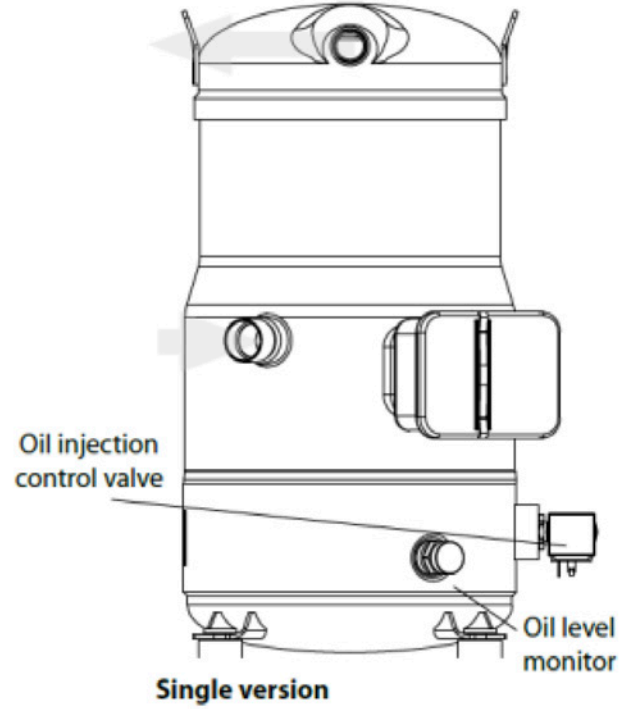
Daikin rooftop units with variable speed Inverter compressors are provided with Internal Permanent Magnet (IPM) motors. Compressors are designed to vary capacity by modulating the speed of the scroll set. The speed ratio for the IPM motor compressor is 4:1 (25 rps to 100 rps). Condenser fan modulation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

**Figure 31: 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 32: Compressor Components**



**Oil Injection Control**

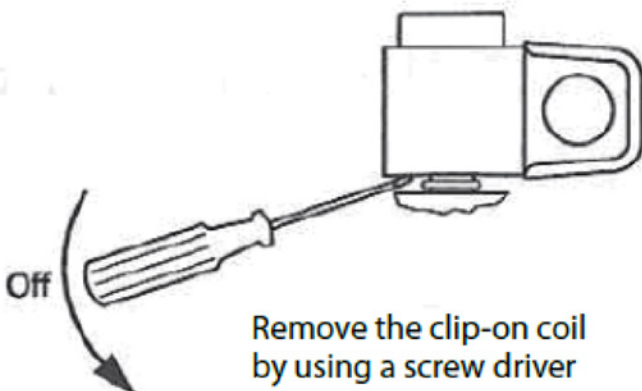
The VFD compressor contains an oil injection valve and solenoid (SV11) as standard. The oil injection valve provides lubrication to the scroll set under low speed/low refrigerant velocity situations. The oil injection valve is a normally closed valve. Below 50 rps (100 Hz) the valve is closed and directs 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 33](#) and [Figure 34](#).

**Figure 33: Assembly Components**



**Figure 34: 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 35](#) and [Figure 36](#)

**Figure 35: Sightglass for Optical Oil Sensor/Switch**



**Figure 36: 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 12: 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   |

\* Size 020 only

Refer to the VFD operational manual for more information.

### 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 (Figure 37) will control how much hot gas is routed to the indoor coil to maintain a discharge air setpoint.

Figure 37: Dual 2-Way Valve Refrigeration Schematic (Cooling Model Shown)

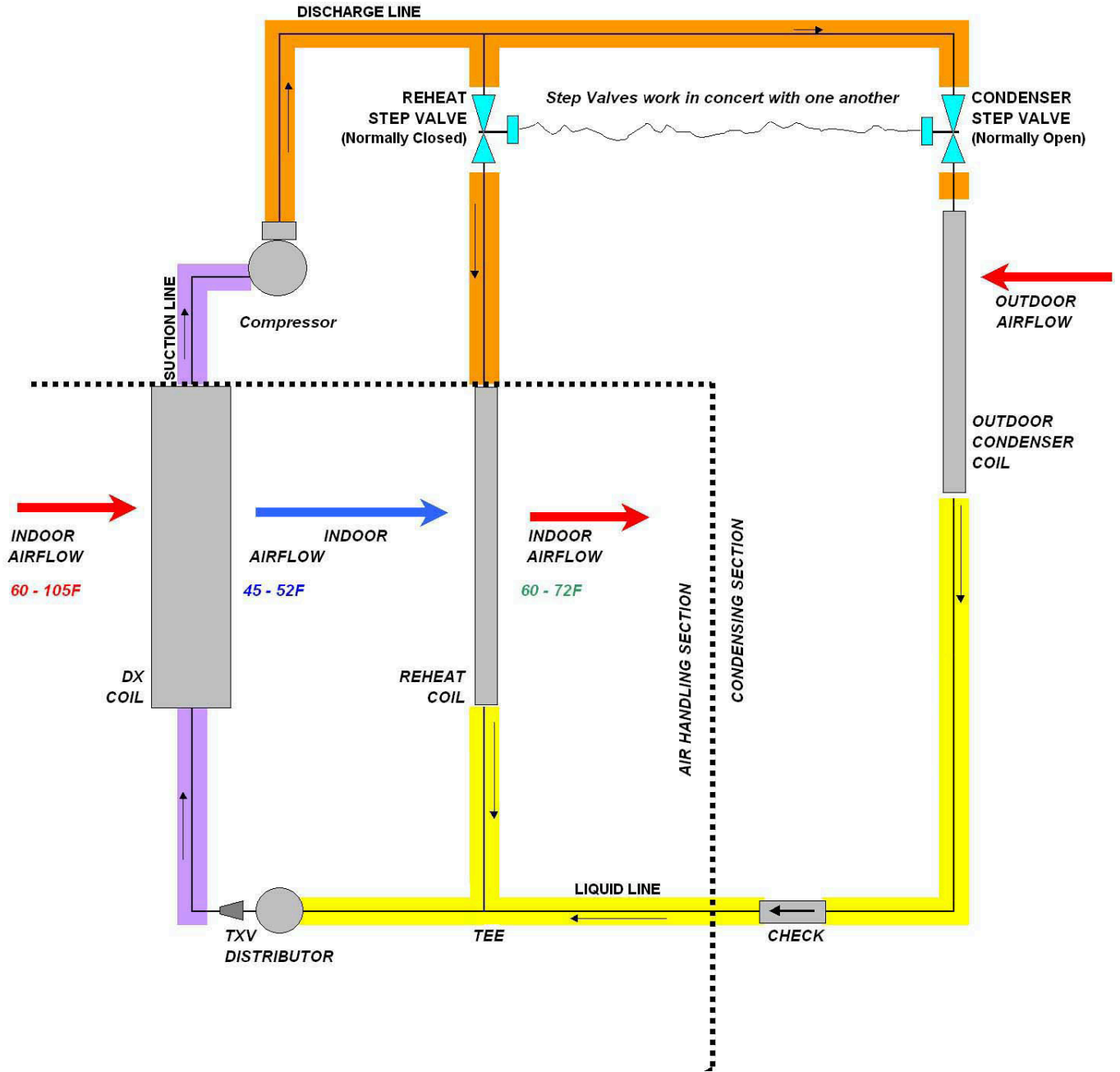
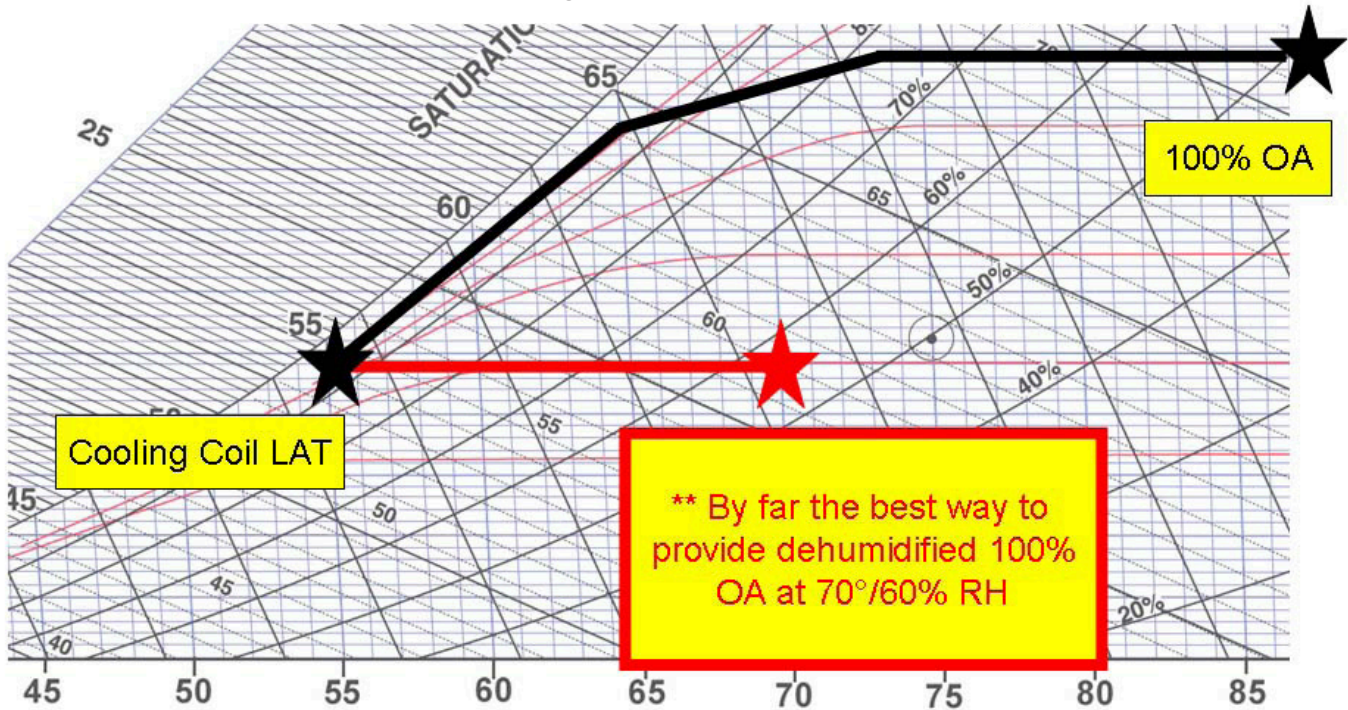


Figure 38: Ideal for Neutral Air Ventilation Control

- The rooftop mainly dehumidifies the required ventilation air
- Terminal units provide additional sensible cooling as required



**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 dual reheat valves (which operate in concert with one another) and a check valve.

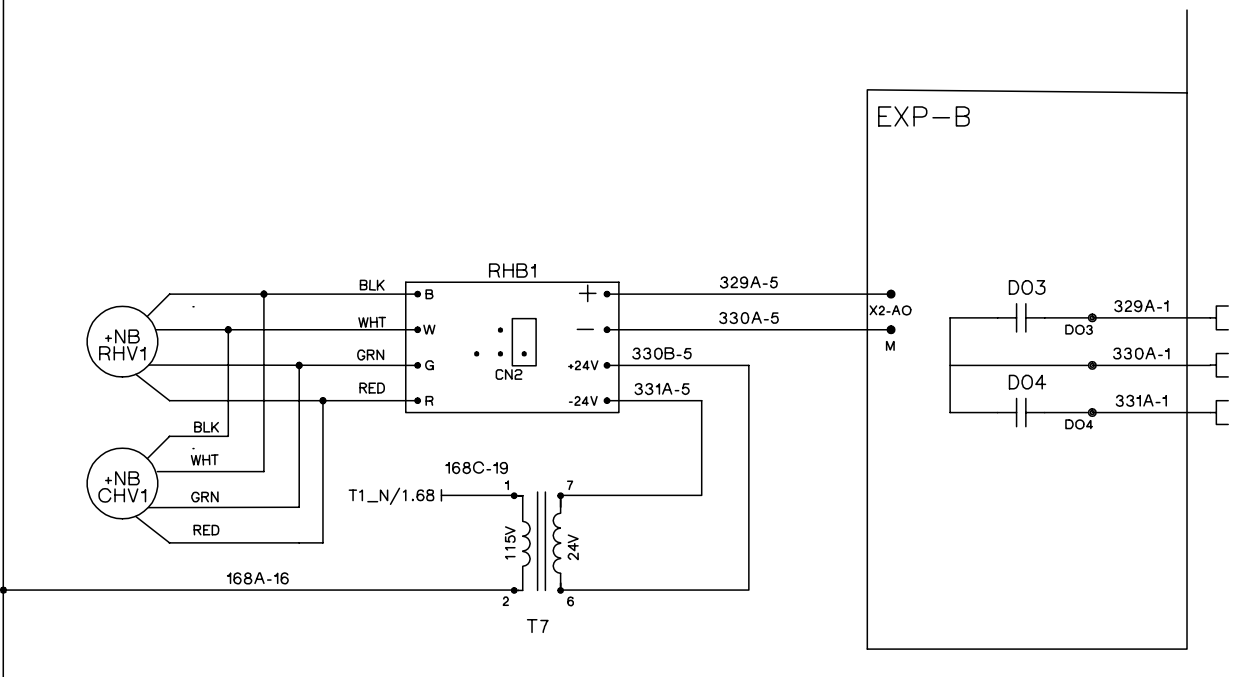
During Dehumidification control with modulating Hot Gas Reheat (MHGRH) an analog signal (0-10Vdc) is controlled as described below.

- 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.

- In the reheat mode, the minimum position for the reheat valves is 1% (1.0 Vdc). The controller will modulate the reheat valves from this starting position.
- 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 MicroTech III main system menu. Reheat capacity (valve position) can also be found under the main system menu, display based on percentage (0-100%).

**Figure 39: Modulating Hot Gas Reheat Schematic**

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## Electric Heater Design

If the 10th digit in the model number is an “E”, the rooftop unit was furnished with a factory installed electric furnace (Example, DPS010AHCE). The Rebel rooftop units are available with 4-stage heat output (see capacities in [Table 23](#)). 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 the high limit switch closes again allows the heater to run when the temperature gets below dead band. 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 exceeds the set point. This switch requires a manual reset.

## Electric Heating Capacity Data

**Table 13: Heating Capacity – Electric Heaters**

| Unit | Stages | Option # 1 |      |                      |           | Option # 2 |       |                      |           | Option # 3 |       |                      |           | Option # 4        |       |                      |           | Option # 5 |      |                      |           | Option # 6 |      |                      |           |
|------|--------|------------|------|----------------------|-----------|------------|-------|----------------------|-----------|------------|-------|----------------------|-----------|-------------------|-------|----------------------|-----------|------------|------|----------------------|-----------|------------|------|----------------------|-----------|
|      |        | KW         | MBH  | Delta T <sup>1</sup> | Min (cfm) | KW         | MBH   | Delta T <sup>1</sup> | Min (cfm) | KW         | MBH   | Delta T <sup>1</sup> | Min (cfm) | KW                | MBH   | Delta T <sup>1</sup> | Min (cfm) | KW         | MBH  | Delta T <sup>1</sup> | Min (cfm) | KW         | MBH  | Delta T <sup>1</sup> | Min (cfm) |
| 003  | 2, SCR | 6          | 20.5 | 15.8                 | 316       | 12         | 40.9  | 31.6                 | 632       | 18         | 61.4  | 47.4                 | 948       | 30                | 102.4 | 60.0 <sup>3</sup>    | 1580      | —          | —    | —                    | —         | —          | —    | —                    | —         |
| 004  |        |            |      | 11.9                 |           |            |       | 23.7                 |           |            |       | 35.6                 |           |                   |       | 59.3                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 005  |        |            |      | 9.5                  |           |            |       | 19.0                 |           |            |       | 28.4                 |           |                   |       | 47.4                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 006  |        |            |      | 7.9                  |           |            |       | 15.8                 |           |            |       | 23.7                 |           |                   |       | 39.5                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 007  | 4, SCR | 18         | 61.4 | 19.0                 | 948       | 36         | 122.9 | 37.9                 | 1896      | 54         | 184.3 | 56.9                 | 2844      | 72.0 <sup>2</sup> | 245.8 | 60.0 <sup>3</sup>    | 3793      | —          | —    | —                    | —         | —          | —    | —                    | —         |
| 010  |        |            |      | 14.2                 |           |            |       | 28.4                 |           |            |       | 42.7                 |           |                   |       | 56.9                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 012  |        |            |      | 11.9                 |           |            |       | 23.7                 |           |            |       | 35.6                 |           |                   |       | 47.4                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 015  |        |            |      | 9.5                  |           |            |       | 19.0                 |           |            |       | 28.4                 |           |                   |       | 37.9                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 016  |        |            |      | 17.5                 |           |            |       | 26.2                 |           |            |       | 34.9                 |           |                   |       | 52.4                 |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 018  |        |            |      | —                    |           |            |       | —                    |           |            |       | —                    |           |                   |       | —                    |           | —          | —    | —                    | —         | —          | —    | —                    |           |
| 020  | 30     | 102        | 13.5 | 1580                 | 45        | 154        | 20.3  | 2369                 | 60        | 205        | 27.1  | 3159                 | 90        | 307               | 40.6  | 4739                 | —         | —          | —    | —                    | —         | —          | —    | —                    |           |
| 025  |        |            | 10.8 |                      |           |            | 16.2  |                      |           |            | 21.7  |                      |           |                   | 32.5  |                      | —         | —          | —    | —                    | —         | —          | —    |                      |           |
| 028  |        |            | 9.8  |                      |           |            | 14.8  |                      |           |            | 19.7  |                      |           |                   | 29.5  |                      | 120       | 409        | 54.2 | 6319                 | 150       | 512        | 49.2 | 7898                 |           |

**NOTE:** 1. Temperature is calculated at nominal air flow

**NOTE:** 2. Not available in 208 & 230 Volt

**NOTE:** 3. 60 degree max rise

## Daikin Tubular Heater Series

### Package Heater Module

ANSI Z83.8-2013/CSA 2.6-2013

**WARNING**

**Fire or explosion hazard.**

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

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 damage.

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

What to do if you smell gas:

- Do not try to light an appliance
- Do not touch any electrical switch
- Do not use any telephone in the building
- Leave the building immediately
- Call the gas supplier immediately and follow the gas supplier's instructions
- If you cannot reach the gas supplier, call the fire department

**NOTICE**

DAT heater series modules are a recognized furnace component 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 Manufacturer Equipment Supplier furnace(s), installed and operated as specified by the approved Original Manufacturer 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 in<sup>2</sup> (625 mm<sup>2</sup>) 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)

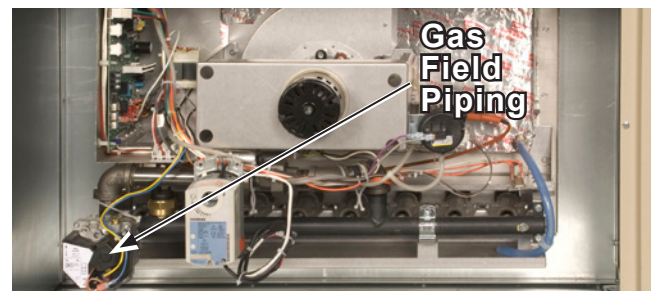
Do not use this package heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and any gas control which has been under water.

### Gas Furnace Design

If the 10th digit in the model number is a "G", the rooftop unit was furnished with a factory installed furnace (Example, DPS010AHCG). The Rebel commercial rooftop units are available with either the low, medium and high heat input furnace (see capacities in Table 14). This packaged gas heat rooftop unit is designed for outdoor non-residential installations only. Furnace to be supplied with natural gas or LP 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 41).

Figure 40: Typical Gas Heat Section (Size 000 shown)





## Gas Heating Capacity Data

**Table 14: DPS 003-015 Gas Heating Capacities**

| Data   | Unit Size |          |           |           |          |           |
|--|-----------|----------|-----------|-----------|----------|-----------|
|  | 003 - 006 |          |           | 007 - 015 |          |           |
|  | Low Heat  | Med Heat | High Heat | Low Heat  | Med Heat | High Heat |
| Heating Input (MBh)                                  | 80        | 120      | 160       | 200       | 300      | 400       |
| Heating Output (MBh)                                 | 64        | 96       | 128       | 160       | 240      | 320       |
| Steady State Efficiency                              | 80%       |          |           |           |          |           |
| Number of Stages                                     | 2         |          |           |           |          |           |
| Turndown <sup>1</sup>                                | 5:1       |          |           | 10:1      |          |           |
| Maximum Temperature Rise <sup>3</sup>                | 60/100    |          |           |           |          |           |
| Gas Connection Size                                  | 1/2"      |          |           | 3/4"      |          |           |
| Min/Max External Static Pressure                     | 0.5"/2.5" |          |           |           |          |           |
| <b>Gas Main Pressure</b>                             |           |          |           |           |          |           |
| Natural Gas (in. wc)                                 | 7-14      | 7-14     | 7-14      | 7-14      | 7-14     | 7-14      |
| Propane (in. wc)                                     | 12-14     | 12-14    | 12-14     | 12-14     | 12-14    | 12-14     |
| <b>Manifold Pressure Natural Gas (per gas valve)</b> |           |          |           |           |          |           |
| 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 <sup>2</sup>                                | 0.4       | 0.4      | 0.4       | 0.4       | 0.4      | 0.4       |
| <b>Manifold Pressure Propane Gas (per gas valve)</b> |           |          |           |           |          |           |
| 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 <sup>2</sup>                                | N/A       | N/A      | N/A       | N/A       | N/A      | N/A       |

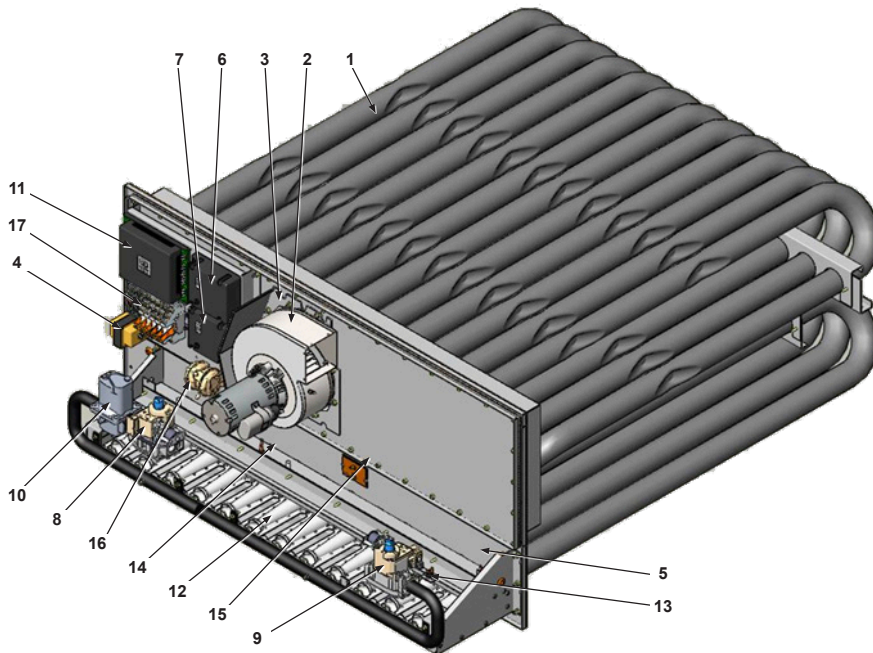
**NOTE:**

1. Modulating heat only.
2. Modulating heat not available with propane.
3. Aluminized steel 60°, Stainless steel 100°

**Table 15: DPS 016–028 Gas Heating Capacities**

| Data   | Unit Size    |       |             |       |       |           |       |       |
|--|--------------|-------|-------------|-------|-------|-----------|-------|-------|
|  | 016 - 028    |       |             |       |       |           |       |       |
|  | Low Heat     |       | Medium Heat |       |       | High Heat |       |       |
| Heating Input (MBh)                                  | 300          | 300   | 450         | 450   | 450   | 600       | 600   | 600   |
| Heating Output (MBh)                                 | 240          | 240   | 360         | 360   | 360   | 480       | 480   | 480   |
| Steady State Efficiency                              | 80%          |       |             |       |       |           |       |       |
| Control (stage/modulating)                           | 2            | Mod   | 2           | 4     | Mod   | 2         | 4     | Mod   |
| Turndown   | 2:1          | 5:1   | 2:1         | 4:1   | 10:1  | 2:1       | 4:1   | 10:1  |
| Maximum Temperature Rise                             | 100          |       |             |       |       |           |       |       |
| Gas Connection Size                                  | ¾"Ø          |       |             |       |       |           |       |       |
| Min/Max External Static Pressure                     | 0.5"/2.5" wc |       |             |       |       |           |       |       |
| <b>Gas Main Pressure</b>                             |              |       |             |       |       |           |       |       |
| Natural Gas (in wc)                                  | 7-14         | 7-14  | 7-14        | 7-14  | 7-14  | 7-14      | 7-14  | 7-14  |
| Propane Gas (in wc)                                  | 12-14        | 12-14 | 12-14       | 12-14 | 12-14 | 12-14     | 12-14 | 12-14 |
| <b>Manifold Pressure Natural Gas (per gas valve)</b> |              |       |             |       |       |           |       |       |
| Stage 1 (in wc)                                      | 0.88         | 0.88  | 0.88        | 0.88  | 0.88  | 0.88      | 0.88  | 0.88  |
| Stage 2 (in wc)                                      | 3.5          | 3.5   | 3.5         | 3.5   | 3.5   | 3.5       | 3.5   | 3.5   |
| Low Fire   | 0.88         | 0.26  | 0.88        | 0.88  | 0.26  | 0.88      | 0.88  | 0.26  |
| <b>Manifold Pressure Propane Gas (per gas valve)</b> |              |       |             |       |       |           |       |       |
| Stage 1 (in wc)                                      | 2.5          | 2.5   | 2.5         | 2.5   | 2.5   | 2.5       | 2.5   | 2.5   |
| Stage 2 (in wc)                                      | 10.0         | 10.0  | 10.0        | 10.0  | 10.0  | 10.0      | 10.0  | 10.0  |
| Low Fire   | 2.5          | 0.74  | 2.5         | 2.5   | 0.74  | 2.5       | 2.5   | 0.74  |

Figure 41: Typical Modulating Furnace Assembly (016-028 shown)



| Item | Description                   |
|------|-------------------------------|
| 1    | Furnace                       |
| 2    | Inducer Combustion Blower     |
| 3    | Plate-Inducer Orifice         |
| 4    | Transformer – 40 VA           |
| 5    | Spark Igniter (2)             |
| 6    | Ignition Control #1           |
| 7    | Ignition Control #2           |
| 8    | Gas Safety Valve #1           |
| 9    | Gas Safety Valve #2           |
| 10   | Gas Modulating Valve          |
| 11   | Gas Modulating Control        |
| 12   | Burner In-Shot (Typ)          |
| 13   | Flame Roll-Out Switch (2)     |
| 14   | Flame Sensor (2)              |
| 15   | High Limit Temperature Switch |
| 16   | Proof of Airflow Switch       |
| 17   | Control Relay (Typ)           |

**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 Rebel 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.

**CAUTION**

Snow levels must be controlled to prevent moisture and air flow blockage to the furnace enclosure and combustion air stream.

**Installation**

**IMPORTANT**

Connect this unit only to gas supplied by a commercial utility. This furnace must be installed by an experienced professional installation company that employs fully trained and experienced technicians. Install the gas piping in accordance local codes and regulations of the local utility company. 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 – latest editions. Note: The use of flexible gas connectors is not permitted.

**WARNING**

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

**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 neighbor's phone. 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.

** DANGER**

The spark ignitor and ignition control are high voltage. Keep hands and tools away to prevent electrical shock. Shut off electrical power before servicing any of the controls. Failure to adhere to this warning can result in personal injury or death.

**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. The weight of field supplied gas piping must be supported by field supplied 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 Propane 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.

**Auxiliary Limit Switch Function**

The auxiliary limit switch is a manually resettable switch and is designed to trip in the event of a supply fan failure. It should not trip during any other conditions. In the event of a blockage to the return or discharge air, the primary limit, which is an automatic-reset type, is designed to trip.

Should there be a fan failure which results in the tripping of the auxiliary limit, the limit must be manually reset to resume function of the unit.

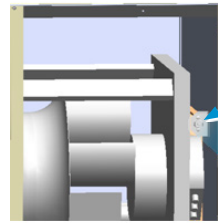
On the Rebel A cabinet (3-6 ton), the auxiliary limit resides in the fan compartment between the furnace heat exchanger and the fan. To access the switch, the fan compartment door must be opened. Be sure all power to the unit is disconnected before opening the fan compartment door.

Once the fan compartment door is opened the auxiliary limit switch can be found behind the supply fan on a bracket mounted to the cabinet wall.

Depressing the red button on the auxiliary limit will reset the limit and allow the furnace to be powered. The furnace should now respond to a call for heat.

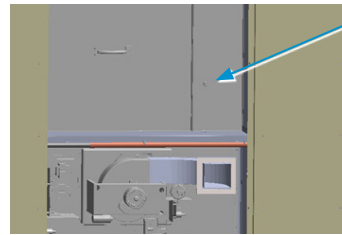
Again, the red button must be depressed in order to reset the limit and allow the furnace to be powered.

**Figure 42: 3–6 Ton—Auxiliary Limit Switch**



View of supply fan with aux limit behind, mounted on a bracket off the cabinet wall

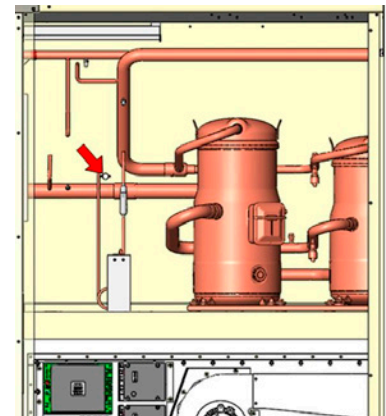
**Figure 43: 7–15 Ton—Auxiliary Limit Switch**



The auxiliary limit on the B cabinet (7-15 ton) is in the furnace compartment (vestibule) above the furnace

**Figure 44: 016–028 Auxiliary Switch**

The auxiliary limit on the C cabinet (17-28 ton) is in the compressor compartment above the furnace vestibule. The red button of auxiliary limit switch must be depressed in order to reset the limit and allow the furnace to be powered.



**Figure 45: Capacity of Pipe Natural Gas (CFH)**

| Pipe Length (ft.) | With Pressure Drop of 0.3" Wc & Specific Gravity Of 0.60 |     |     |      |      |      |      |      |       |
|-------------------|--|-----|-----|------|------|------|------|------|-------|
|                   | 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 16: 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      |
| <b>PROPANE-AIR</b> |            |
| 1.10               | 0.740      |
| <b>PROPANE</b>     |            |
| 1.55               | 0.622      |
| <b>BUTANE</b>      |            |
| 2.00               | 0.547      |

**Table 17: 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       |

**Gas Piping Routing Into Unit**

**On-The-Roof Piping**

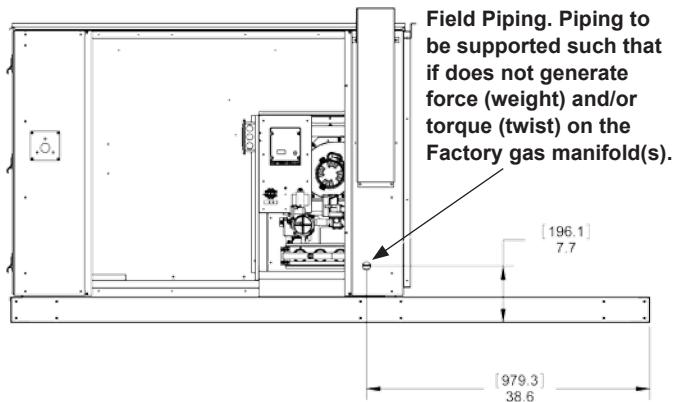
1. Remove knockout on upright (refer to Figure 46, Figure 47 or Figure 48).
2. Route gas supply pipe through hole. Carefully plan pipe route and fitting locations to avoid interference with swinging of doors, etc.
3. The Rebel unit does not have an option for gas piping through the curb.
4. Field piping to be supported such that it does not generate a force (weight) and/or torque (twist) on the Factory gas manifold(s).

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.

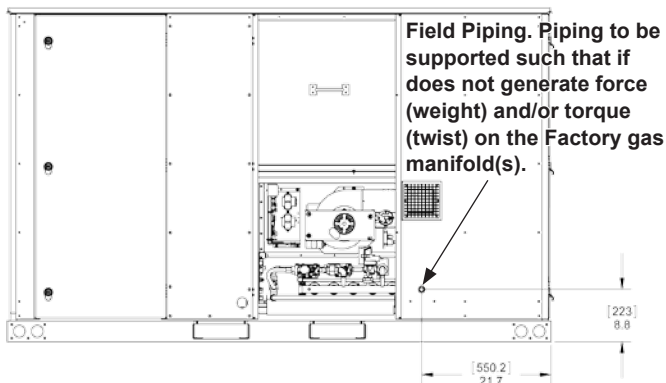
The appliance and its individual shut-off valve must be disconnected from the gas supply system during any pressure testing greater than or equal to 0.5 psi (3.5 kPa).

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

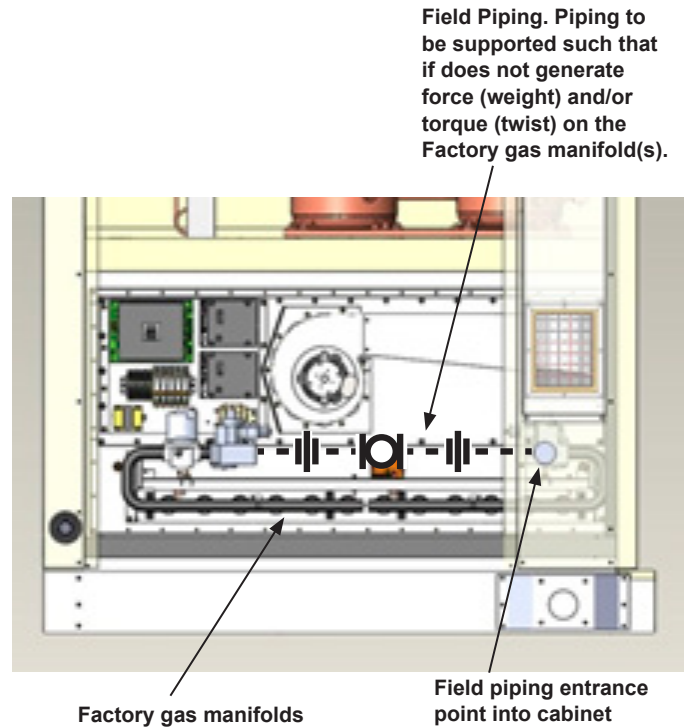
**Figure 46: Rebel A Cabinet 003–006 Gas Piping**



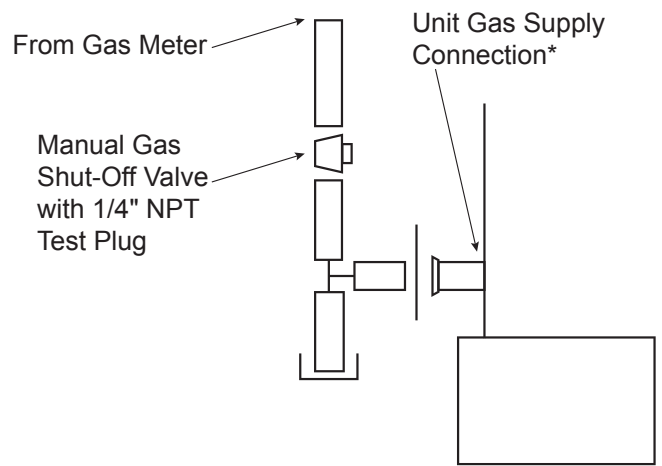
**Figure 47: Rebel B Cabinet 007–015 Gas Piping**



**Figure 48: Rebel C Cabinet 016–028 Gas Piping**



**Figure 49: Field Gas Heat Connections**



\* Factory-supplied grommet must be utilized

**DPS 016–028 Gas Pipe Manifold Pressure Adjustment**

**For Two Stage Furnace**

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 50) and confirm pressure is at 7.0" wc for natural gas or 11.0" for propane. Adjust upstream pressure reducing gas regulator as required to obtain 7.0" wc gas pressure for natural gas or 11.0" for propane.
2. The gas pipe manifold pressure for high fire (stage #2) should be set at 3.5" wc for natural gas or 10.0" for propane. Adjust the High Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 50) 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 0.88" wc for natural gas or 2.5" for propane. Adjust the Low Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 50) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

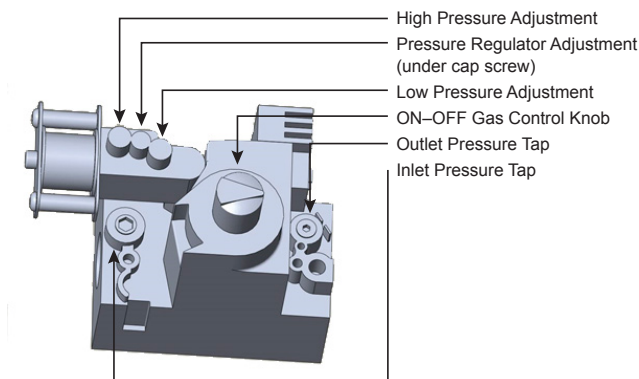
**For Modulating Furnace:**

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 50) and confirm pressure is at 7.0" wc for natural gas or 10.0" for propane. Adjust upstream pressure reducing gas regulator as required to obtain 7.0" wc natural gas pressure or 10.0 for propane.
2. The gas pipe manifold pressure for high fire should be set at 3.5" wc for natural gas or 8.2" for propane. Adjust the High Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 50) 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 0.26" wc for natural gas or 0.74" for propane.

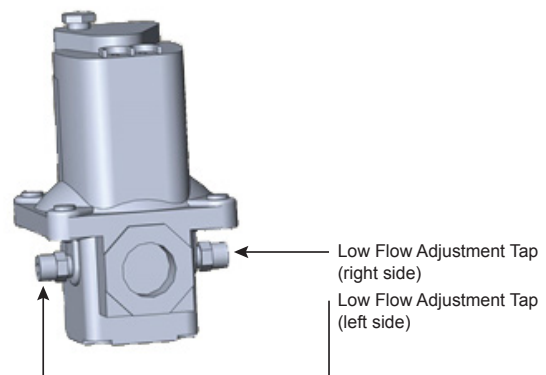
Adjust the Low Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 50) as required until pressure at the Honeywell VR8305Q Gas Safety Control Valve Outlet Pressure Tap reads 0.26" wc for natural gas or 0.74" for propane. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

Adjust the Maxitrol M520B Modulating Valve (Figure 51) Low Flow Adjustment screw until the gas pipe manifold pressure reads 0.26" w.c. for natural gas or 0.74" for propane.

**Figure 50: Honeywell VR8305Q Gas Safety Control Valve Used for Both Staged and Modulating Furnaces**



**Figure 51: Maxitrol M520B Modulating Valve**



White Rogers is also used — functionally the same but different in appearance.

## DPS 003–015 Sequence of Operation

**DANGER**

**Never test for gas leaks with an open flame.** It can cause an explosion or fire resulting in property damage, personal injury, or death. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.

**WARNING**

This unit is equipped at the factory for use with natural gas only. Conversion to LP gas requires a special kit supplies by Daikin Parts. Failure to use the proper conversion kit can cause fire, carbon monoxide poisoning, explosion, personal injury, property damage, or death.

### Staged 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.

### Modulating Control

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.

### LP Conversion (Staged Furnace Only)

**For Rebel A and B Cabinets Only**

Convert the furnace in this unit using the liquefied petroleum (LP) gas valve spring and burner nozzles supplied in the conversion kit. See [Table 18](#) for part numbers.

The LP gas valve maintains the proper manifold pressure for LP gas. See [Table 18](#). The correct burner orifices are included in the kit.

**Table 18: Furnace Identification for LP Conversion**

| Unit Size       | Staged Furnace |
|-----------------|----------------|
| 3 – 6 Ton Unit  | 300049725      |
| 7 – 15 Ton Unit | 300049583      |

### Altitude Conversion

For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), contact Daikin Parts. See [Table 19](#) for part numbers.

**Table 19: Furnace Identifications for Altitude (DPS 003–015)**

| Elevation               | Part Number |
|-------------------------|-------------|
| <b>Staged Operation</b> |             |
| 2000–2999               | 300049578   |
| 3000–3999               | 300049579   |
| 4000–4999               | 300049580   |
| 5000–5999               | 300049581   |
| 6000–6999               | 300049582   |



## DPS 016–028 Sequence of Operation

### DANGER

**Never test for gas leaks with an open flame.** It can cause an explosion or fire resulting in property damage, personal injury, or death. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.

### WARNING

This unit is equipped at the factory for use with natural gas only. Conversion to LP gas requires a special kit supplies by Daikin Parts. Failure to use the proper conversion kit can cause fire, carbon monoxide poisoning, explosion, personal injury, property damage, or death.

### Staged 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 limits switch(s) are checked for safe conditions.
4. Proof of air flow switch is checked for combustion induced draft airflow.
5. 30 second pre-purge cycle starts.
6. Spark ignitor is activated for 3 seconds.
7. Gas valve receives a command for stage 1 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.

### Modulating 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 limits switch(s) are checked for safe conditions.
4. Proof of air flow switch is checked for combustion induced draft airflow. Combustion draft inducer fan will be operating at high speed.
5. 30 second pre-purge cycle starts.
6. Spark ignitor is activated for 3 seconds.
7. Gas safety shut-off valve is opened.
8. Gas modulating valve is run to 66% open.
9. Burner is ignited.
10. Gas modulating valve remains at 66% open for 30 seconds.
11. After 30 seconds have elapsed, modulating controller opens and closes gas control valves as required based on heat input requirement from Unit DDC control.
12. Unit DDC control input for 8–30% of span will result in heat input up to 30% of full heating capacity. The gas train with the modulating valve will be used to achieve the heating during this phase. Combustion draft inducer fan will be operating at low speed.
13. Unit DDC control input for 30–55% of span will result in heat input up to 50% of full heating capacity. The gas train with the modulating valve will be used to achieve the heating during this phase. Combustion draft inducer fan will be operating at high speed.
14. Unit DDC control input for 55–75% of span will result in heat input up to 75% of full heating capacity. The gas train with the modulating valve will be used to achieve the heating during this phase. The gas train with the two stage gas safety valve will be used to achieve the heating during this phase. Stage 1 coil of the two stage gas safety will be energized. Combustion draft inducer fan will be operating at high speed.
15. Unit DDC control input for 75–100% of span will result in heat input up to 100% of full heating capacity. The gas train with the modulating valve will be used to achieve the heating during this phase. The gas train with the 2 stage gas safety valve will be used to achieve the heating during this phase. Stage 1 coil and Stage 2 coil of the two stage gas safety will be energized. Combustion draft inducer fan will be operating at high speed.

**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 20](#) for part numbers. Or contact local gas supplier to confirm gas heating value has been devalued for applicable elevations.

**Table 20: Furnace Identification for Altitude (DPS 016–028)**

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

**Start-Up Procedures**

**Start-Up Responsibility**

**DANGER**

**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.

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 insufficient airflow or temperature rise greater than specified (refer to [Table 14 on page 41](#)). 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 14 on page 41](#)).

**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.

**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.

## Operating Procedures

### 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 neighbor's phone. 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.

1. Set the controller 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 controller to full heat.
11. Verify manifold pressure and rate.
12. If the appliance will not operate, refer to "Turning Off Gas to the Appliance", and call a qualified service technician.

### Turning OFF Gas to the Appliance

1. Set the controller 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 21 on page 52](#) & [Table 14 on page 41](#) 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

1. **Burner Air** - Check burner fan wheel for dirt buildup and lint. Check combustion air intake louver and flue box/vent for dirt buildup and accumulation of wind borne debris.
2. **Cleaning** - Inspect flue tubes and combustion chamber, clean as required. Keep burner vestibule clean. Dirt and debris can result in burner air blockages.

#### Yearly

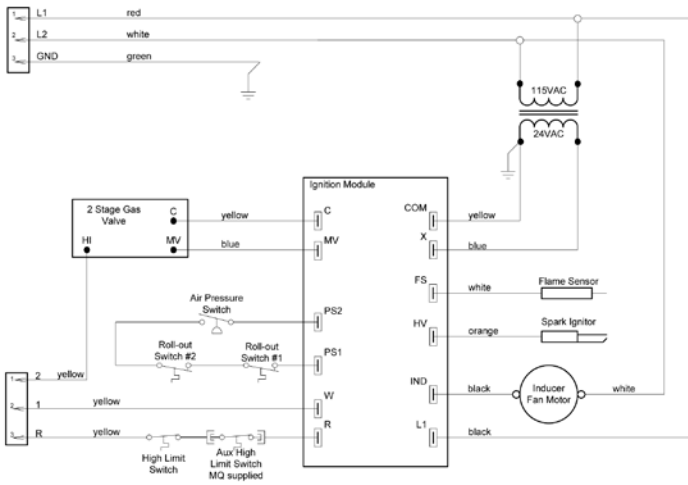
The heater and the venting system shall be inspected once a year by a qualified service agency

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

**Condensate Pan/Drain** - Check pan and drain for accumulation of debris.

## DPS 003–015 (only) Ignition Control Module for Staged Gas Furnace

Figure 52: Typical Staged Gas Furnace Electrical Schematic with Sensor



### LED Diagnostic Information

- Steady Off: No power or Control hardware fault
- Steady On: Power applied, Control OK
- 1 Flash: Combustion fan motor energized, Pressure switch open
- 2 Flashes: Combustion fan motor off, Pressure switch closed
- 3 Flashes: Ignition lockout from too many trials
- 4 Flashes: Ignition lockout from too many flame losses within single call for heat
- 5 Flashes: Control hardware fault detected

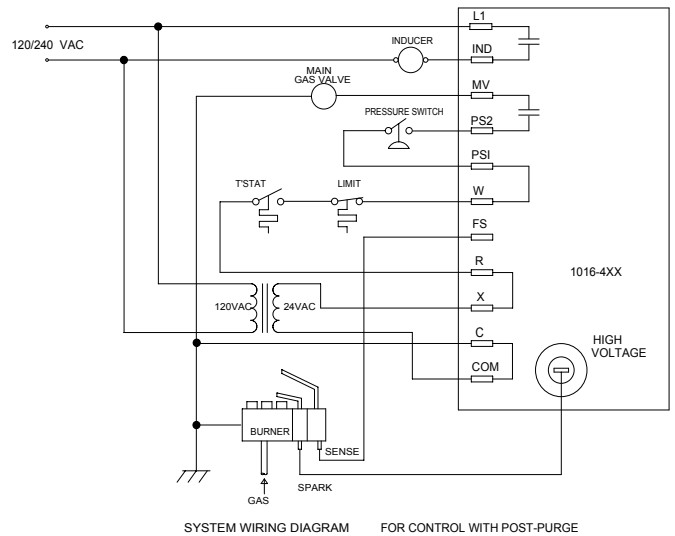
### Ignition Control Module LED Diagnostics

The following LED indicators can be used to diagnose faults associated with the staged gas furnace.

Table 21: LED Indicator and Fault Conditions

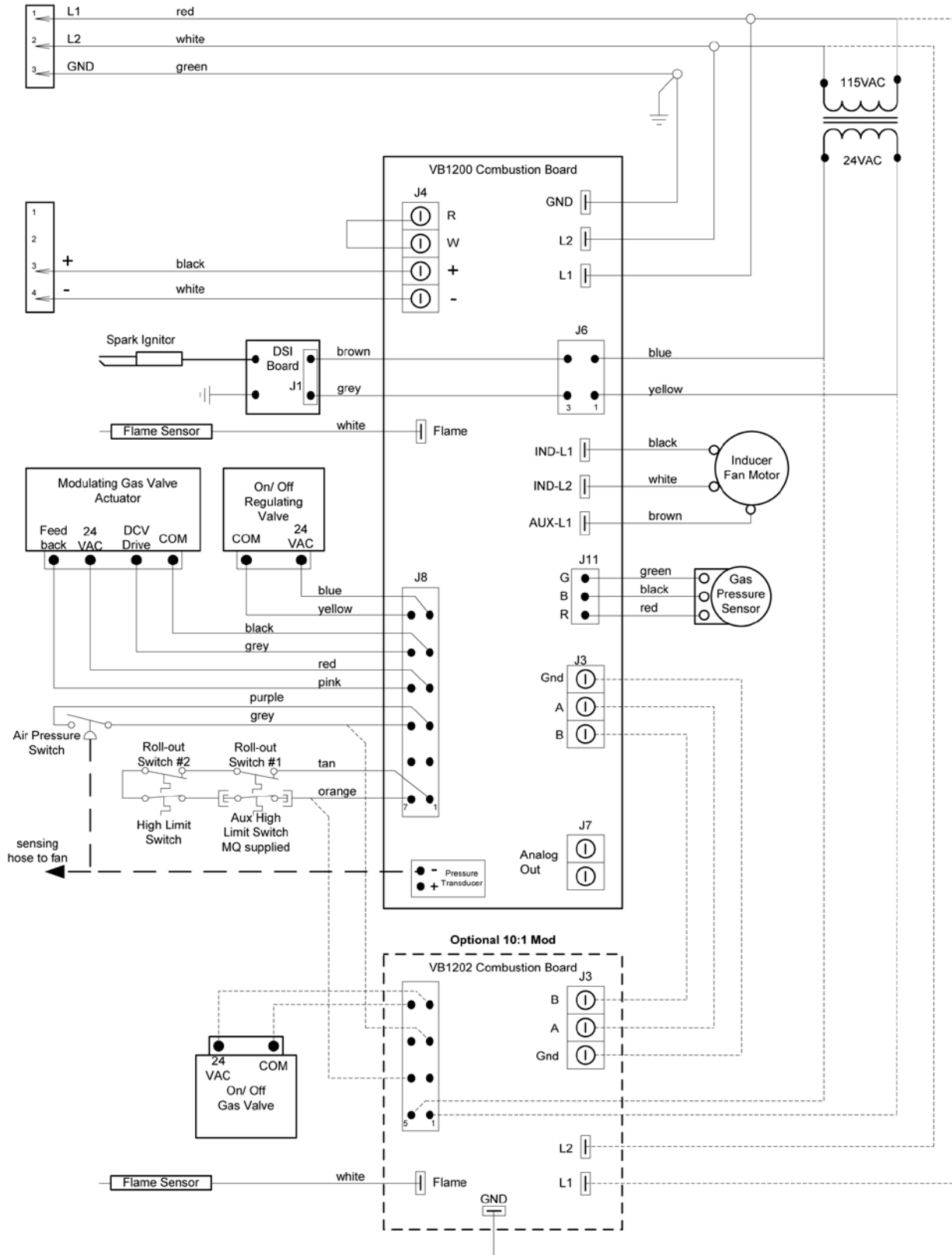
| Indicator  | Fault Condition   |
|------------|---|
| Steady Off | No power or control hardware fault                                      |
| Steady On  | Power applied, control OK   |
| 1 Flash    | Combustion fan motor energized, pressure switch open                    |
| 2 Flashes  | Combustion fan motor off, pressure switch closed                        |
| 3 Flashes  | Ignition lockout from too many trials                                   |
| 4 Flashes  | Ignition lockout from too many flame losses within single call for heat |
| 5 Flashes  | Control hardware fault detected   |

Figure 53: Ignition Control Wiring



DPS 003-015 (only) Ignition Control Module for Modulating Gas Furnace

Figure 54: Typical Modulating Gas Furnace Electrical Schematic with Sensor



## DPS 003–015 (only) Gas Furnace Ignition and Control Troubleshooting

### 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 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.

### Modulating Furnace Diagnostics

The Rebel furnace control that operates the furnace has built-in, self-diagnostic capability. The control continuously monitors its own operation and the operation of the system. The LED on the control indicates the current system state, warnings, failures and test modes.

## VB-1200 Trouble Shooting Guide

**Table 22: Furnace I.D. Plug Information (Displayed on Power-up)**

| Display Information (example) | Description  |
|-------------------------------|--|
| C.                            | Furnace series or model name, for example, C cabinet series. |
| C.A.b                         |  |
| 400                           | Furnace size in 1000's of BTU, for example, 400 kBTU.        |
| n.A.t Or L.P.                 | Burner fuel type, for example, natural gas or LP.            |
| G.A.S. Or L.P.                |  |
| 1.0 1                         | Software version, for example, v1.01                         |

**Table 23: Normal Furnace Operation**

| Display Information | Mode           | Description   |
|---------------------|----------------|---|
| 0.F.F               | OFF Mode       | System Idle - Control board has power, no faults found, no call for heat.   |
| P.u.r               | PURGE Mode     | System is purging the heat exchanger – No gas on, no flame, inducer runs for the specified purge timings. Purge cycles occur immediately before and after each burner operation.                            |
| 1.9 n               | IGNITION Mode  | System is initiating burner operation – Igniter energized, modulating valve moved to ignition setting, gas on. Maintained for the trial-for-ignition period and the five second flame stabilization period. |
| H.E.A.              | WARM-UP Mode   | Period between Ignition and Run – System checks completed before modulation control begins.   |
| r u.n               | RUN Mode       | Normal modulating operation.  |
| r E.t               | Ignition Retry | System has had a failed ignition attempt or has lost flame during burner operation and is beginning another ignition cycle.   |

**Table 24: Functional Alerts — DPS 003–015 only**

| Display Information | Alert   | Description  | Possible Cause   | Solution   |
|---------------------|---|--|--|--|
| <b>A.O. 1</b>       | Failed ignition attempt<br><i>Maximum number of allowed retries not met</i> | The flame could not be established during the trial for ignition period. This alert indicates the maximum number of retries has not been exceeded and furnace operation will continue with another ignition attempt. | See “E0 1” in the LOCKOUT ERRORS section.  | See “E0 1” in the LOCKOUT ERRORS section.  |
| <b>A.O. 2</b>       | Lost Flame  | The flame sensor signal has been lost after flame is established during a call for heating. This alert is displayed during the ignition RECYCLE period prior to the next ignition attempt.                           | A. Flame sensor coated   | 1. Clean flame rod sensor.   |
|                     |   |  | B. Flame sensor improperly mounted or grounded   | 1. Check flame sensor wiring integrity and ceramic for cracks.<br>2. Re-install / replace flame sensor.  |
|                     |   |  | C. Unstable flame pattern  | 1. Check that all burner assembly components are properly installed.<br>2. Check that all seals between the vestibule area and the heat exchanger area are tight.<br>3. Insure that the combustion door gasket is in place and the door is properly installed. |
|                     |   |  | D. Insufficient intermediate gas manifold pressure through main gas safety valve       | 1. Check for faulty gas valve wiring.<br>2. Check 24 VAC to gas valve assembly.<br>3. Check inlet pressure to safety gas valve.<br>4. Check outlet pressure from the safety gas valve.<br>5. Replace safety gas valve if faulty.                               |
|                     |   |  | E. Insufficient gas manifold pressure to burner through modulating ball valve assembly | 1. Check voltage to gas valve actuator. (2 – 10 VDC depending on model)<br>2. Check alignment and set screw connection between ball valve and actuator.  |
| <b>A.O. 3</b>       | Insufficient Combustion Air<br><i>Furnace Functional</i>                    | Furnace cannot achieve desired combustion air flow due to blockage or high altitude operation resulting in a de-rate of the furnace.   | A. High altitude operation   | 1. Normal operation. Furnace automatically de-rates for high altitude conditions   |
|                     |   |  | B. Partially blocked vent  | 1. Check air inlet and outlet for blockage.<br>2. Check venting configuration for excessive venting length, improper sizing, etc..   |
|                     |   |  | C. Leak in sensing hose  | 1. Check sensing hose for cracks, crimps or loose connections.   |
|                     |   |  | D. Low Line Voltage  | 1. Check sensing hose for cracks, crimps or loose connections.   |
|                     |   |  | E. Faulty inducer assembly   | 1. Insure correct inducer assembly installed and functioning properly.   |

**Table 24 continued: Functional Alerts**

| Display Information | Alert                    | Description   | Possible Cause  | Solution   |
|---------------------|--------------------------|---|---|--|
| <p><b>A.O.4</b></p> | <p>Limited Low Fire</p>  | <p>Automatic adaptive program is currently limiting the lower range of modulation at avoid flame loss at minimum fire conditions. The alert is displayed during the run cycle once a flame-out condition has triggered the Limited Low Fire function. This function is reset by cycling power to the board.</p> | A. Low gas line pressure  | <ol style="list-style-type: none"> <li>1. Insure gas supply is connected to furnace and check for proper line pressure.</li> </ol>   |
|                     |                          |   | B. Insufficient intermediate gas manifold pressure through gas safety valve | <ol style="list-style-type: none"> <li>1. Check for faulty gas valve wiring.</li> <li>2. Check 24 VAC to gas valve assembly.</li> <li>3. Check inlet pressure to safety gas valve.</li> <li>4. Check outlet pressure from the safety gas valve – adjust as needed.</li> <li>5. Replace safety gas valve if faulty.</li> </ol>                          |
|                     |                          |   | C. Faulty burner operation  | <ol style="list-style-type: none"> <li>1. Check for proper mounting of the burner assembly.</li> <li>2. Check burner orifice for proper size and blockage.</li> </ol>  |
|                     |                          |   | D. Faulty flame sensor  | <ol style="list-style-type: none"> <li>1. Check flame rod wiring and connections.</li> <li>2. Check for proper alignment of flame rod.</li> <li>3. Clean flame rod sensor.</li> </ol>  |
|                     |                          |   | E. Improper alignment of the modulating actuator and the gas ball valve     | <ol style="list-style-type: none"> <li>1. Check that the alignment of the actuator to the ball valve is correct. The ball valve must be in the fully open position when the actuator is fully energized (“ACTUATOR DRIVE” = 9.6 VDC or greater).</li> <li>2. Insure that the set screw on the actuator is tightened to the ball valve stem.</li> </ol> |
|                     |                          |   | F. Blocked or improper venting  | <ol style="list-style-type: none"> <li>1. Check air inlet and outlet for blockage.</li> <li>2. Check venting configuration for excessive venting length, improper sizing, etc.</li> </ol>  |
| <p><b>A.O.5</b></p> | <p>Weak Flame Signal</p> | <p>The flame signal level is less than optimal for this furnace. Maintenance of the flame sensing components is advised.</p>  | A. Flame sensor coated  | <ol style="list-style-type: none"> <li>1. Clean flame rod sensor.</li> </ol>   |
|                     |                          |   | B. Flame sensor improperly mounted or grounded                              | <ol style="list-style-type: none"> <li>1. Check flame sensor wiring integrity and ceramic for cracks.</li> <li>2. Re-install / replace flame sensor.</li> </ol>  |
|                     |                          |   | C. Unstable flame pattern   | <ol style="list-style-type: none"> <li>1. Check that all burner assembly components are properly installed.</li> <li>2. Check that all seals between the vestibule area and the heat exchanger area are tight.</li> <li>3. Insure that the combustion door gasket is in place and the door is properly installed.</li> </ol>                           |



**Table 25: Lockout Errors — DPS 003–015 only**

| Display Information | Alert  | Description  | Possible Cause   | Solution  |
|---------------------|--|--|--|---|
| 888                 | Ignition Board Failure                         | Ignition board start-up checks have detected an error.   | A. Faulty transformer  | <ol style="list-style-type: none"> <li>1. Check 24-volt transformer for correct output.</li> <li>2. Check connections and wiring to control board and other components connected to the 24 volt source.</li> <li>3. Replace if necessary.</li> </ol>  |
|                     |  |  | B. Faulty control board  | <ol style="list-style-type: none"> <li>1. Turn off power to the furnace, wait 30 seconds and turn power back on. Re-try ignition sequence and see if the system responds.</li> <li>2. Replace control board if necessary.</li> </ol>  |
| E.O. 1              | Failed Ignition<br>Maximum Retries<br>Exceeded | The flame could not be established during multiple trial-for-ignition periods. The maximum number of retries has been exceeded and the furnace is in a lock-out condition. | A. Insufficient gas line pressure  | <ol style="list-style-type: none"> <li>1. Insure gas supply is connected to furnace and check for proper line pressure.</li> </ol>  |
|                     |  |  | B. Gas valve control turned "OFF"  | <ol style="list-style-type: none"> <li>1. Turn gas valve to the "ON" position.</li> </ol>   |
|                     |  |  | C. No spark from direct spark ignition   | <ol style="list-style-type: none"> <li>1. Check ignition voltage (115 VAC from board to transformer) and wiring.</li> <li>2. Check 24 VAC transformer for DSI board.</li> </ol>   |
|                     |  |  | D. Insufficient intermediate gas manifold pressure through gas safety valve            | <ol style="list-style-type: none"> <li>1. Check for faulty gas valve wiring.</li> <li>2. Check 24 VAC to gas valve assembly.</li> <li>3. Check inlet pressure to safety gas valve.</li> <li>4. Check outlet pressure from the safety gas valve – adjust as needed.</li> <li>5. Replace safety gas valve if faulty.</li> </ol> |
|                     |  |  | E. Insufficient gas manifold pressure to burner through modulating ball valve assembly | <ol style="list-style-type: none"> <li>1. Check voltage to gas valve actuator. (7 – 10 VDC depending on model)</li> <li>2. Check alignment and set screw connection between ball valve and actuator (See Modulating Gas Valve Alignment procedure).</li> </ol>  |
|                     |  |  | F. Burners do not light  | <ol style="list-style-type: none"> <li>1. Check spark rod assembly for proper location, spark gap, etc.</li> <li>2. Check for proper mounting of the burner assembly.</li> <li>3. Check burner orifice for proper size and blockage.</li> </ol>   |
|                     |  |  | G. Burners light and remain lit for about 5 seconds                                    | <ol style="list-style-type: none"> <li>1. Check flame rod wiring and connections.</li> <li>2. Check for proper alignment of flame rod.</li> <li>3. Clean flame rod sensor.</li> </ol>   |

**Table 25 continued: Lockout Errors**

| Display Information       | Alert   | Description  | Possible Cause                                  | Solution   |
|---------------------------|---|--|---|--|
| E.O.2                     | Primary Limit / Fuse Failure  | The control board safety fuse has blown or the primary temperature limit has opened indicating safe operating temperatures for this furnace have been exceeded.  | A. Improper circulating airflow                 | <ol style="list-style-type: none"> <li>1. Check filter / replace if dirty.</li> <li>2. Check for improperly sized duct system.</li> <li>3. Check for faulty blower motor.</li> <li>4. Check for faulty blower motor wiring.</li> </ol> |
|                           |   |  | B. Primary limit switch failure                 | <ol style="list-style-type: none"> <li>1. Check for an open primary limit switch at ambient temperature.</li> </ol>  |
|                           |   |  | C. Fuse is blown                                | <ol style="list-style-type: none"> <li>1. Check and replace fuse on the board.</li> <li>2. Make sure fuse socket is tight, crimp fuse terminals if necessary.</li> </ol>   |
|                           |   |  | D. Faulty primary limit switch wiring           | <ol style="list-style-type: none"> <li>1. Check primary limit wiring continuity from the switch to the control board.</li> </ol>   |
| E.O.3                     | Modulation Valve Failure  | The control lost the position feedback from the modulating gas valve actuator.   | A. Faulty modulation valve actuator wiring      | <ol style="list-style-type: none"> <li>1. Insure wiring is connected per unit wiring diagram.</li> <li>2. Check for loose pins or bad connections.</li> <li>3. Check for frayed wiring or shorts to ground.</li> </ol>                 |
|                           |   |  | B. Modulation valve actuator failure            | <ol style="list-style-type: none"> <li>1. Insure actuator has 24 V power.</li> </ol>   |
|                           |   |  |   | <ol style="list-style-type: none"> <li>2. Insure actuator is receiving valid drive signal from the control board (2 – 10 VDC).</li> </ol>  |
|                           |   |  |   | <ol style="list-style-type: none"> <li>3. Check for actuator feedback to the control board (2 – 10 VDC).</li> </ol>  |
| E.O.4                     | Air Sensor Failure<br>Pressure Sensor Reading Low                             | The air sensor reading is too low for operating conditions or the air pressure switch closed when the sensor indicates low flow.<br><i>The pressure switch MUST be open prior to inducer activation.</i>   | A. Faulty wiring or connections                 | <ol style="list-style-type: none"> <li>1. Check pressure switch wiring.</li> <li>2. Check inducer wiring.</li> <li>3. Check for plugged or disconnected vacuum hoses.</li> </ol>   |
|                           |   |  | B. Faulty pressure switch                       | <ol style="list-style-type: none"> <li>1. Replace pressure switch.</li> </ol>  |
|                           |   |  | C. Faulty pressure sensor, located on the board | <ol style="list-style-type: none"> <li>1. Replace board.</li> </ol>  |
| E.O.5                     | Air Sensor Failure<br>Pressure Sensor Reading High                            | The air sensor reading is too high when the inducer is off or the air pressure switch open when the sensor indicates high flow.<br><i>The pressure switch MUST close to initiate an ignition sequence.</i> | A. Faulty wiring or hose connections            | <ol style="list-style-type: none"> <li>1. Check pressure switch wiring.</li> <li>2. Check inducer wiring.</li> <li>3. Check for broken or disconnected vacuum hoses.</li> </ol>  |
|                           |   |  | B. Blocked or improper venting                  | <ol style="list-style-type: none"> <li>1. Check air inlet and outlet for blockage.</li> </ol>  |
|                           |   |  |   | <ol style="list-style-type: none"> <li>2. Check venting configuration for excessive venting length, improper sizing, etc.</li> </ol>   |
| C. Faulty pressure switch | <ol style="list-style-type: none"> <li>1. Replace pressure switch.</li> </ol> |  |   |  |

**Table 25 continued: Lockout Errors**

| Display Information | Alert  | Description  | Possible Cause  | Solution  |
|---------------------|--|--|---|---|
| E.0.6               | Gas Sensor Failure<br>Pressure Sensor Reading Low  | The gas sensor reading is too low compared to the expected value for the modulating gas valve actuator position.<br><i>When the furnace is operating at 75% or higher – greater than 8 VDC analog input voltage – the manifold pressure sensor must read 1.4" w.c. or higher</i> | A. Modulating actuator / ball valve not properly aligned      | 1. Perform Modulating System Gas Valve Alignment procedure as defined in the service manual.  |
|                     |  |  | B. Line pressure too low                                      | 1. Insure line pressure is properly adjusted for the gas and application. Correct as necessary.   |
|                     |  |  | C. Intermediate regulated pressure too low                    | 1. Insure the safety gas valve(s) are properly adjusted to the specified outlet pressure. Adjust per the installation instructions as necessary.  |
|                     |  |  | D. Wrong gas pressure sensor installed                        | 1. Insure the proper gas sensor – either Natural Gas or LP – is installed. Replace as needed.   |
|                     |  |  | E. Gas pressure sensor faulty                                 | 1. Insure gas sensor is installed properly and wired per the unit wiring diagram. Replace as necessary.   |
| E.0.7               | Gas Sensor Failure<br>Pressure Sensor Reading High | The gas sensor reading is too high compared to the expected value for the modulating gas valve actuator position.<br><i>When the furnace is operating at 75% or lower – less than 8 VDC analog input voltage – the manifold pressure sensor must read 2.8" w.c. or lower</i>     | A. Modulating actuator / ball valve not properly aligned      | 1. Perform Modulating System Gas Valve Alignment procedure as defined in the service manual.  |
|                     |  |  | B. Line pressure too high                                     | 1. Insure line pressure is properly adjusted for the gas and application. Correct as necessary.   |
|                     |  |  | C. Intermediate regulated pressure too high                   | 1. Insure the safety gas valve(s) are properly adjusted to the specified outlet pressure. Adjust per the installation instructions as necessary.  |
|                     |  |  | D. Wrong gas pressure sensor installed                        | 1. Insure the proper gas sensor – either Natural Gas or LP – is installed. Replace as needed.   |
|                     |  |  | E. Gas pressure sensor faulty                                 | 1. Insure gas sensor is installed properly and wired per the unit wiring diagram. Replace as necessary.   |
| E.0.8               | Improper Flame Signal                              | Control senses flame present when the gas valve is commanded off.  | A. Flame remains lit in "Off" cycle                           | 1. Gas valve leaks - check wiring to remove continuous 24V to gas valve.<br>2. Gas valve is stuck open – remove, repair or replace gas valve.   |
| E.0.9               | No Firing Rate Input                               | Call for heat is sensed (R & W closed) but firing rate is below defined voltage threshold for furnace operation.   | A. Faulty wiring into the "Analog +" and "Analog -" terminals | 1. Insure wiring is connected per unit wiring diagram.<br>2. Check for loose pins or bad connections.<br>3. Check for frayed wiring or shorts to ground.  |
|                     |  |  | B. No signal from source.                                     | 1. Check firing rate input voltage – must be greater than 1.5 VDC.<br>2. Troubleshoot controller providing firing rate input to the VB-1200 control board.  |
| E.1d                | Invalid I.D. Plug                                  | The installed I.D. plug is not valid for this control board.   | A. Incorrect I.D. plug installed                              | 1. Insure I.D. plug is correct for the furnace – check label.<br>2. Insure I.D. plug is properly inserted into the mating connector on the control board.<br>3. With the I.D. plug installed, cycle power to the furnace. The board will display the I.D. plug identity upon power-up.<br>4. Install correct I.D. plug as needed. |

## DPS 016–028 Gas Furnace Ignition Troubleshooting

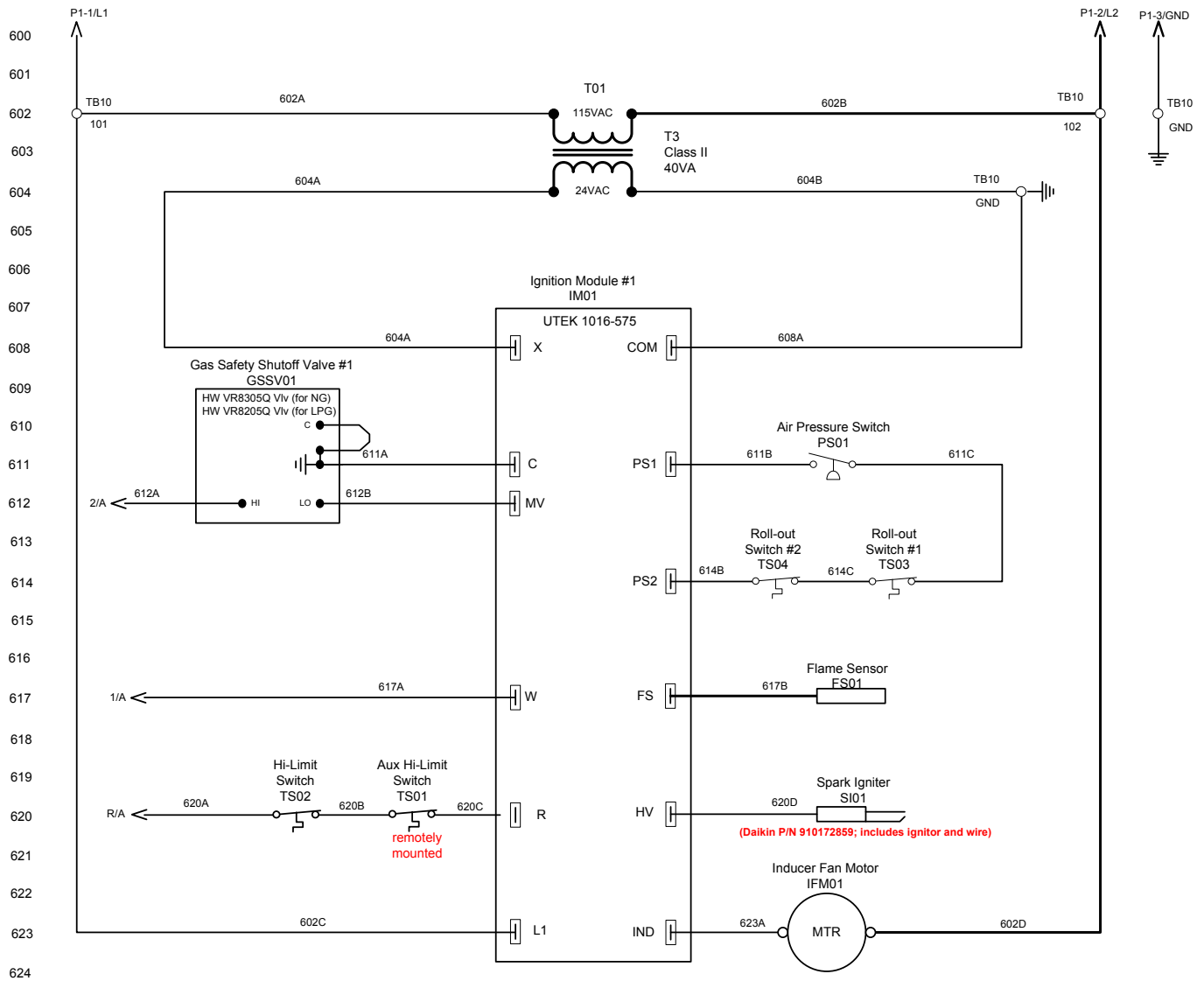
**Table 26: 300/450/600 MBH Staged Ignition Control Troubleshooting Guide (UTEK 1016 Ignition Board)**

| LED Indicator | System Status | Fault Description   | Possible Causes and Corrective Action   |
|---------------|---------------|---|---|
| Steady ON     | System Normal | N/A   | N/A   |
| LED OFF       | Lockout       | LED is OFF  | <ol style="list-style-type: none"> <li>1. Check 120V is being supplied to heater transformer.</li> <li>2. Check that 24 VAC is being supplied by transformer. Replace transformer if not being supplied 24 VAC.</li> </ol>  |
| 1 Flashes     | Lockout       | Combustion air pressure switch contact is open with inducer fan running.          | <ol style="list-style-type: none"> <li>1. Check air pressure switch hose and hose connection between switch and fan.</li> <li>2. Check reset switch is not tripped for rollout switch(s).</li> <li>3. Check high limit switch is not open</li> <li>4. Replace pressure switch if contact does not close when fan is running.</li> </ol>   |
| 2 Flashes     | Lockout       | Combustion air pressure switch contact is closed when inducer fan is not running. | <ol style="list-style-type: none"> <li>1. Check wiring between PS1 and PS2 on ignition control board for correct connection and proper wiring.</li> <li>2. Check pressure switch functions correctly with and without pressure.</li> <li>3. Replace pressure switch if fails to function correctly.</li> </ol>  |
| 3 Flashes     | Lockout       | Ignition locked out from too many ignition attempts                               | <ol style="list-style-type: none"> <li>1. Verify gas supply is present.</li> <li>2. Verify gas safety valve is working correctly.</li> <li>3. Verify gas manifold pressure is adequate and correct.</li> <li>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.</li> <li>5. Check flame sensor wiring. Check to see if flame sensor is grounded.</li> </ol> |
| 4 Flashes     | Lockout       | Ignition lockout from too many flame losses within a single heat.                 | <ol style="list-style-type: none"> <li>1. Check pressure switch hose for leaks or poor connection</li> <li>2. Check for condensate in pressure switch hose.</li> <li>3. Check pressure tap on combustion blower and combustion pressure switch for blockage.</li> <li>4. Check functionality of combustion inducer fan.</li> </ol>  |
| 5 Flashes     | Lockout       | Control hardware fault detected   | <ol style="list-style-type: none"> <li>1. Change ignition board.</li> </ol>   |

**Table 27: Modulating Control LED Status Indicator**

| LED Indicator       | PCB Label | Color  | Functionality Description  |
|---------------------|-----------|--------|--|
| Main Power          | PWR       | Blue   | Light ON: Controller has received a call for heat and is powered.  |
| AFS                 | AFS       | Green  | Light ON: Combustion Inducer Blower is running   |
| Start Up            | SU        | Yellow | Light ON: Controller has received signal that ignition has commenced and gas modulating valve has moved to 66% open position. Valve will be held at this position for 30 seconds to insure burner ignition is stable.        |
| Modulation          | MOD       | Green  | Modulating section is operational and modulating   |
| Relay 1 (energized) | R1        | Red    | Relay 1 is energized and combustion inducer blower is operating at low speed.<br><b>NOTE:</b> When Relay 1 is not energized combustion inducer fan has permissive to operate at high speed.                                  |
| Relay 2 (energized) | R2        | Red    | Relay 2 is energized and Non-modulating (Staged) gas train is operational. 1st coil of two stage gas safety valve is energized.<br><b>NOTE:</b> When R2 LED is on the two stage gas safety valve is at low fire.             |
| Relay 3 (energized) | R2        | Red    | Relay 3 is energized and Non-modulating (Staged) gas train is operational. 2nd coil of two stage gas safety valve is energized.<br><b>NOTE:</b> When both R2 & R3 LED are on the two stage gas safety valve is at high fire. |

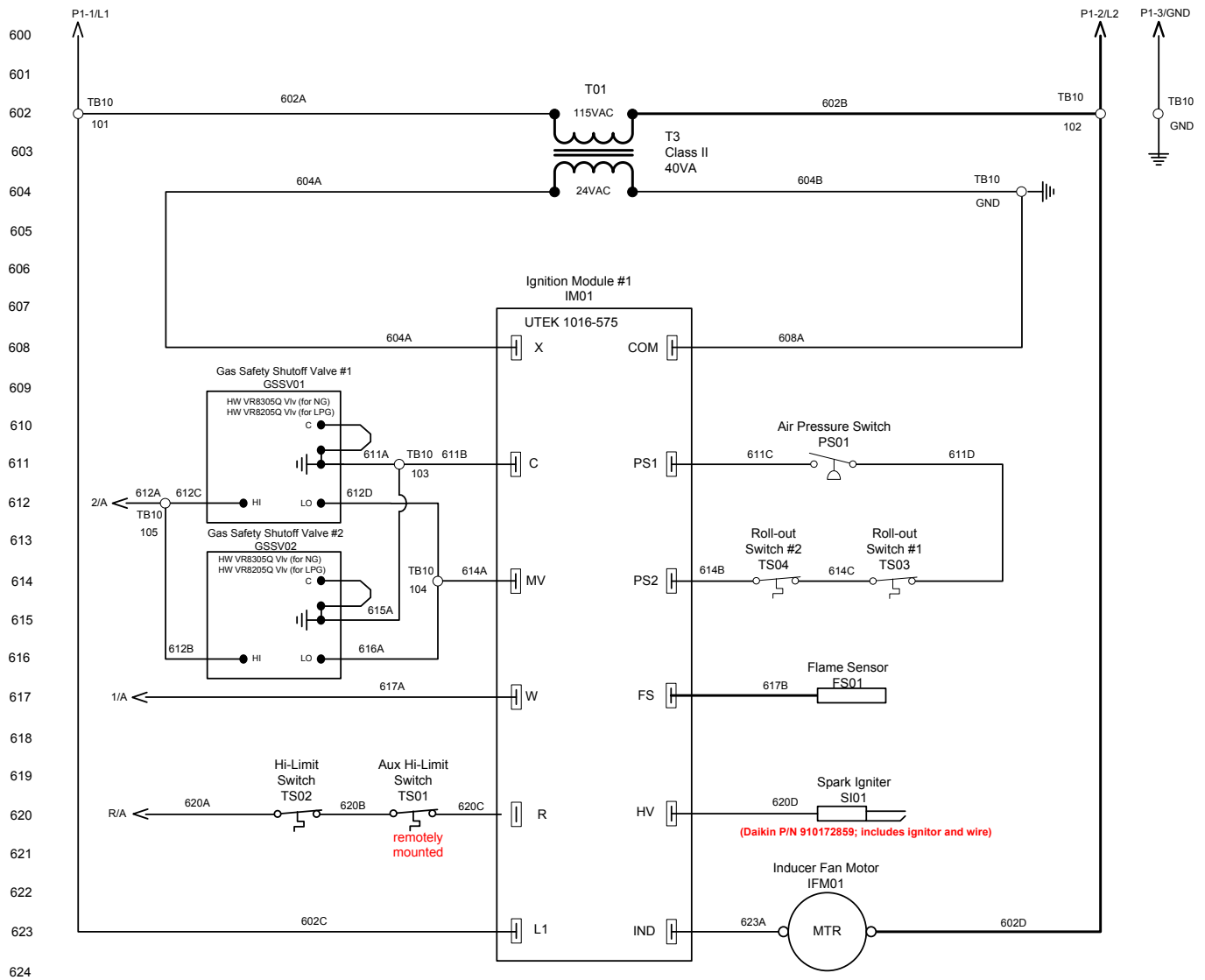
Figure 55: Typical 2 Stage Control Gas Furnace, 300 MBH — DPS 016-028 shown



**LED Diagnostic Information**

- Steady Off: No power or Control hardware fault
- Steady On: Power applied, Control OK
- 1 Flash: Combustion fan motor energized, Pressure switch open
- 2 Flashes: Combustion fan motor off, Pressure switch closed
- 3 Flashes: Ignition lockout from too many trials
- 4 Flashes: Ignition lockout from too many flame losses within single call for heat
- 5 Flashes: Control hardware fault detected

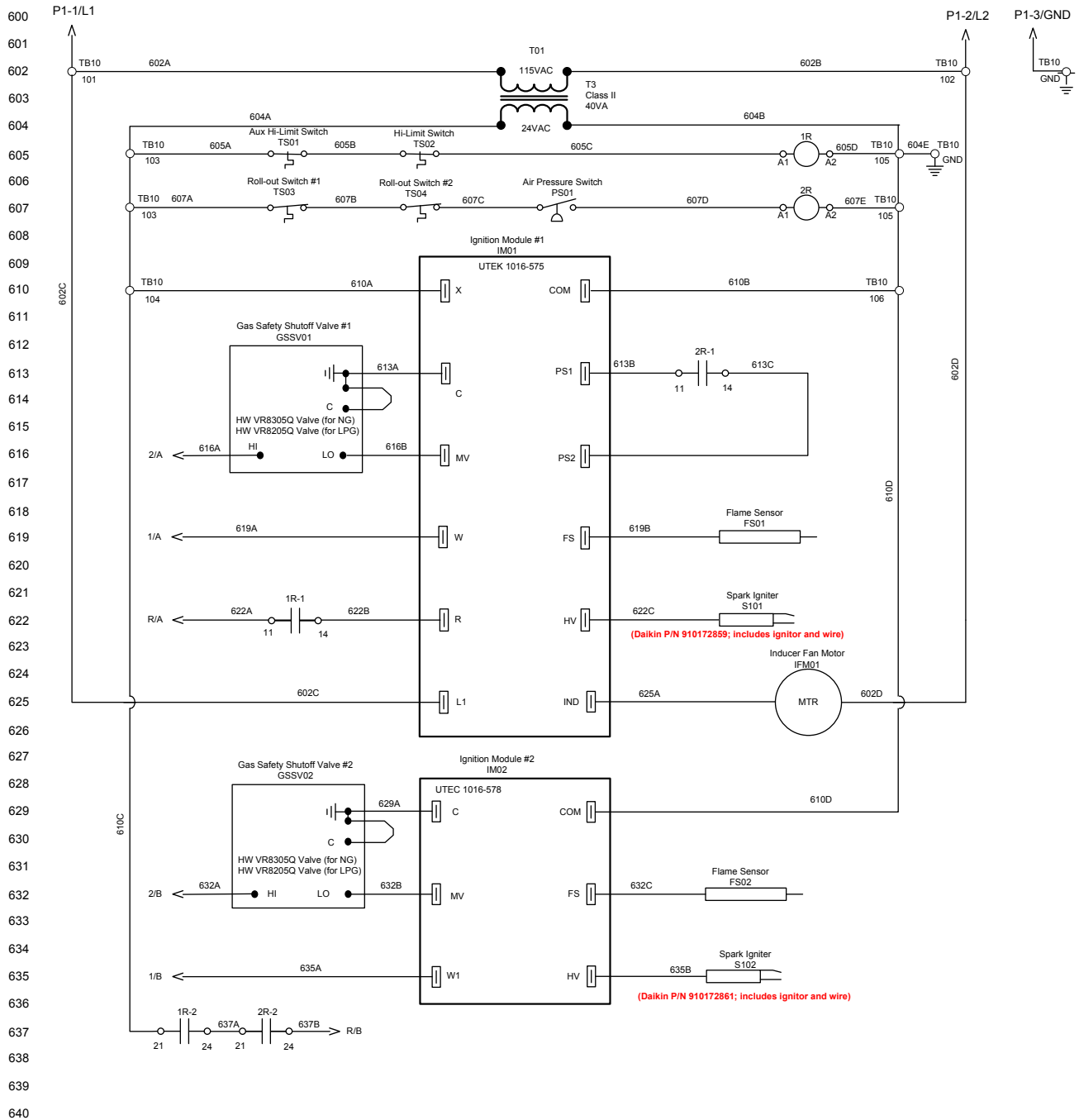
Figure 56: Typical 2 Stage Control Gas Furnace, 450/600 MBH — DPS 016–028 shown



**LED Diagnostic Information**

- Steady Off: No power or Control hardware fault
- Steady On: Power applied, Control OK
- 1 Flash: Combustion fan motor energized, Pressure switch open
- 2 Flashes: Combustion fan motor off, Pressure switch closed
- 3 Flashes: Ignition lockout from too many trials
- 4 Flashes: Ignition lockout from too many flame losses within single call for heat
- 5 Flashes: Control hardware fault detected

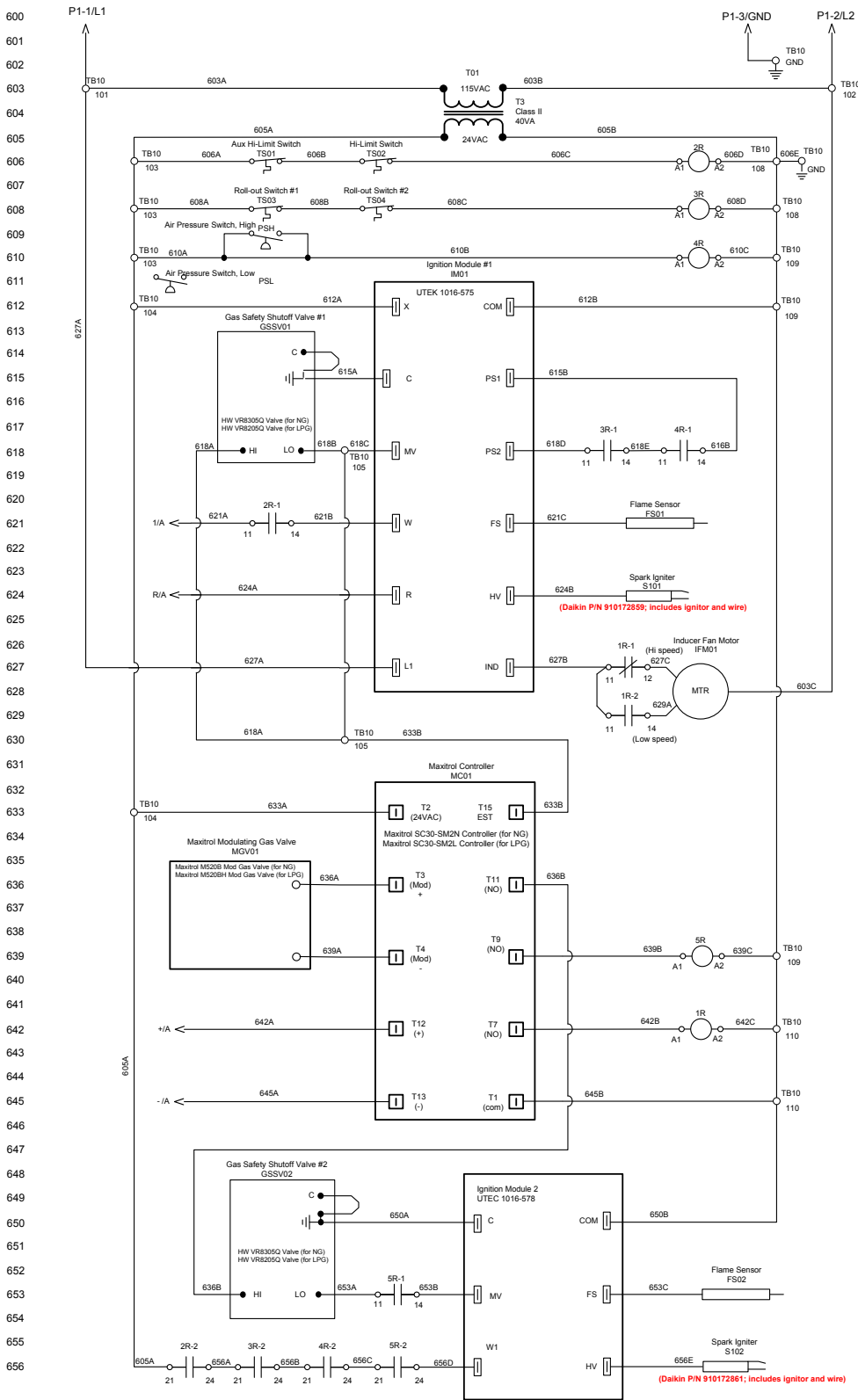
Figure 57: Typical 4 Stage Control Gas Furnace, 300/450/600 MBH — DPS 016–028 shown



**LED Diagnostic Information**

- Steady Off: No power or Control hardware fault
- Steady On: Power applied, Control OK
- 1 Flash: Combustion fan motor energized, Pressure switch open
- 2 Flashes: Combustion fan motor off, Pressure switch closed
- 3 Flashes: Ignition lockout from too many trials
- 4 Flashes: Ignition lockout from too many flame losses within single call for heat
- 5 Flashes: Control hardware fault detected

Figure 58: Typical Modulating Control Gas Furnace, 300/450/600 MBH — DPS 016–028 shown



**LED Ignition Module Diagnostic Information**

- Steady Off: No power or Control hardware fault
- Steady On: Power applied, Control OK
- 1 Flash: Combustion fan motor energized, Pressure switch open
- 2 Flashes: Combustion fan motor off, Pressure switch closed
- 3 Flashes: Ignition lockout from too many trials
- 4 Flashes: Ignition lockout from too many flame losses within single call for heat
- 5 Flashes: Control hardware fault detected

**LED Modulating Control Status**

- PWR (blue): Main Power
- SU (yellow): Start Up
- R1 (red): Relay 1 energized
- R2 (red): Relay 2 energized
- R3 (red): Relay 3 energized
- AFS (green): AFS (Air Flow Switch)
- MOD (green): Modulation



## Hot Water Heater Design

**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 Applied.

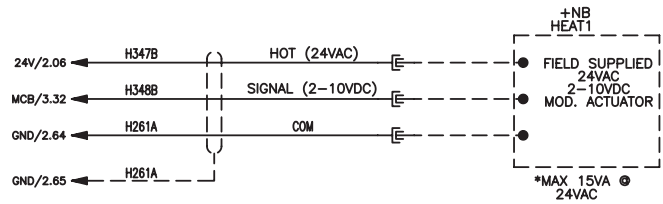
If the 10th digit of the model number is a “W”, the rooftop unit was furnished with a factory installed hot water coil (Example: DPS010AHCW). The hot water coil comes with a piping vestibule for field supplied and installed control valve and piping. The coil is furnished with ODM copper connections. The Rebel commercial rooftop units are available with a low heat (one row coil) or a high heat (two row coil) configuration (3 rows also offered on DPS 016–028).

Hot water coils are not recommended for use with entering air temperatures less than 40°F (4°C). No control system can guarantee a 100% safeguard against coil freeze up. Glycol solutions or brines are the only freeze-safe media for operation of water coils at low entering air temperatures.

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 dielectric fittings as well as appropriate water treatment.

Figure 59: Hot Water Heating Schematic



### Field Installed Freeze Stats

Field installed freeze stats can be added. The freeze stat contacts should be wired to the MicroTech III digital input X5 as shown in . MicroTech III will turn the fans OFF, shut the outdoor air damper, open the valve and issue an alarm when the normally closed contact opens between terminals 111 and 112.

Field Installed Freeze Stat Schematic

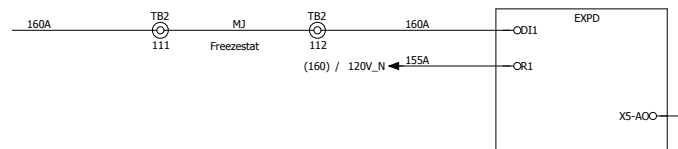


Table 28: Heating Capacity and Water Pressure Drop – Hot Water Coils

| Unit | MBH   | GPM  | WPD | Connection Size |
|------|-------|------|-----|-----------------|
| 3    | 61.4  | 6.1  | 1.0 | 1.375 Sweat     |
| 4    | 72.9  | 7.3  | 1.4 | 1.375 Sweat     |
| 5    | 82.6  | 8.2  | 1.7 | 1.375 Sweat     |
| 6    | 91.6  | 9.2  | 2.2 | 1.375 Sweat     |
| 7.5  | 149.7 | 15.0 | 3.1 | 1.375 Sweat     |
| 10   | 176.9 | 17.8 | 4.2 | 1.375 Sweat     |
| 12   | 195.9 | 19.6 | 5.1 | 1.375 Sweat     |
| 15   | 221.4 | 22.1 | 6.4 | 1.375 Sweat     |
| 16   | 347   | 35.5 | 0.7 | 1.375 Sweat     |
| 18   | 376   | 38.4 | 1.2 | 1.375 Sweat     |
| 20   | 403   | 41.1 | 1.3 | 1.375 Sweat     |
| 25   | 464   | 47.3 | 1.4 | 1.375 Sweat     |
| 28   | 497   | 50.7 | 1.6 | 1.375 Sweat     |

Nominal airflow, 60°EAT, approximately 180°–160° water. WPD does not include a field supplied valve pressure drop. 2-row performance shown, 1-row coil also available.

## System Description

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.

### Definitions

The following are descriptions of various components related to the enthalpy wheel construction (Figure 60):

**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 (circumferential) or to the (inner) post.

**Cassette** - The steel structure that houses the rotor. Cassettes are of punched sheet metal panel 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.

### Arrangements

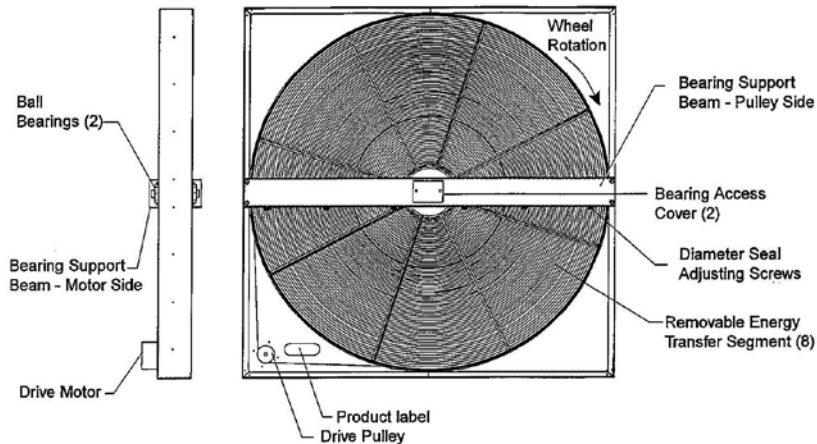
Two arrangements are offered for the enthalpy wheel:

1. Single enthalpy wheel with economizer and bypass (Figure 60). This arrangement is available for all units.
2. Single enthalpy wheel without economizer (100% outdoor air unit).

### 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.

**Figure 60: Wheel Construction (Side-by-Side)**

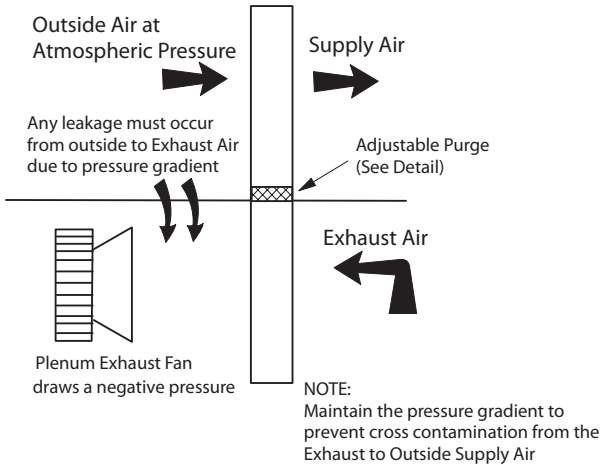


(1) Currently, only the Over-Under configuration is offered on Daikin rooftop systems and air handlers.

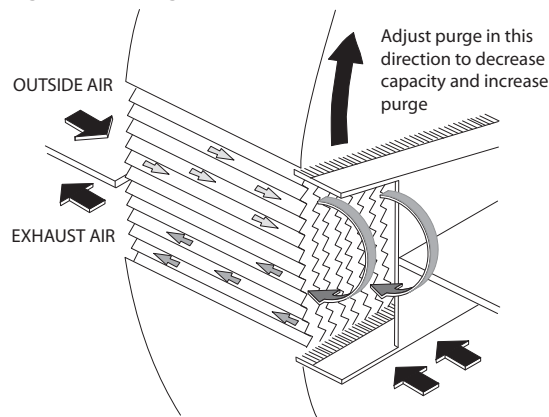
**Purge and Pressurization**

Pressurization is critical to minimize crossover from exhaust to supply and to allow the purge to operate.

**Figure 61: Purge and Pressurization**



**Figure 62: Purge Detail**



**Drive Motor**

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

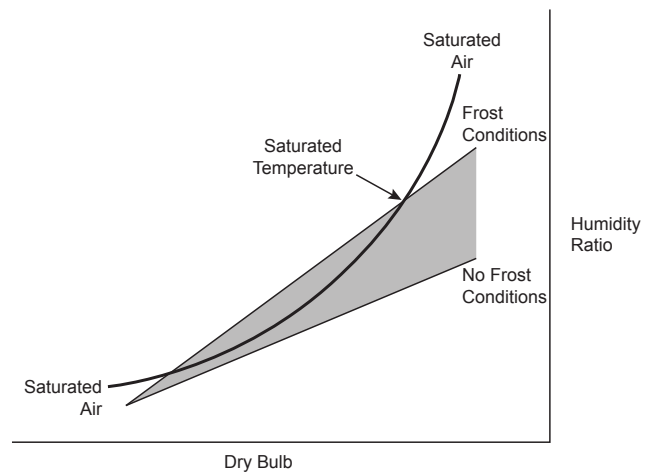
**Frost Protection Option**

During extremely cold winter conditions, exhaust air stream To circumvent this possibility, 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 63: 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 63](#)).

**Variable 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 63](#)).

**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 two sides. Install exhaust hood over the barometric relief dampers by installing two sides first and then install the top.

**Variable Speed Frequency Control**

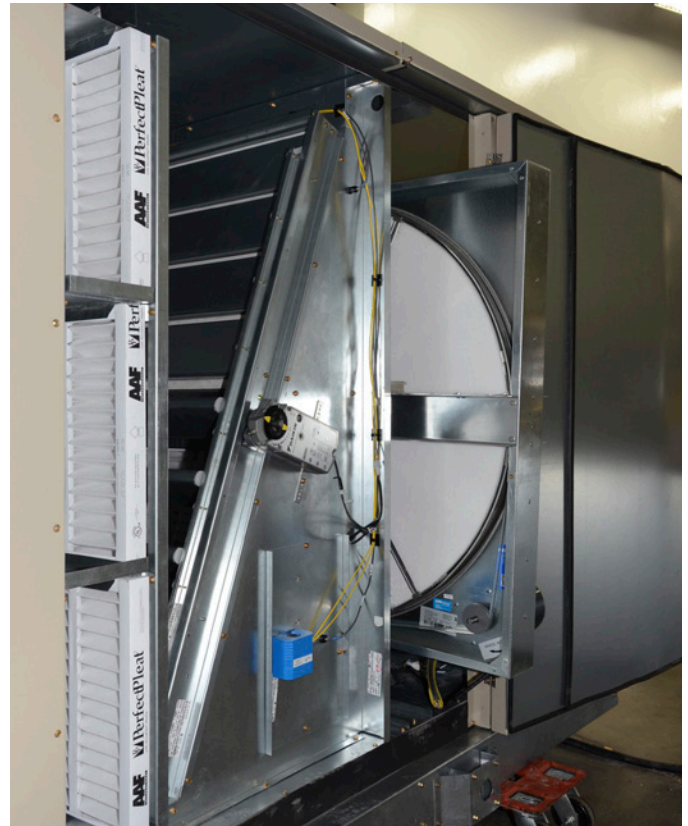
A variable frequency drive is included with the frost protection option and it controls the speed of the enthalpy wheel. The unit has also been programmed for the recommended range of wheel speed operation. Typical wheel speed is 45 RPM, but the programming can allow for wheel speeds above or below 45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

Enthalpy wheel speed will be controlled by exhaust temperature measurement.

**Slide-Out Wheel**

The wheel can be pulled out to facilitate cleaning and servicing ([Figure 64](#)). Unplug the control wires before sliding the wheel out of position.

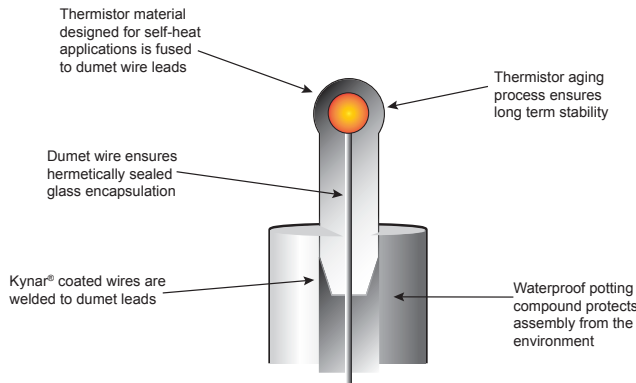
**Figure 64: Slide-Out Energy Recovery Wheel**



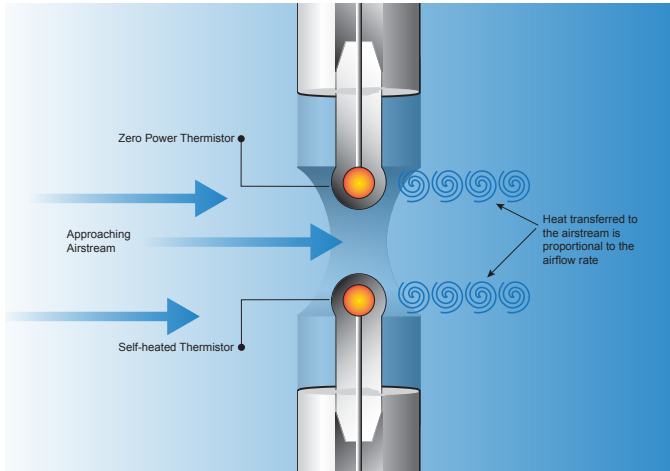
## Thermal Dispersion Airflow Measurement Technology

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 an accuracy of 2% of the reading.

**Figure 65: Bead-in-Glass Thermistor**



**Figure 66: 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 84 on page 116](#) for navigating the Controller keypad)

1. Set LCD1 U/M to "CFM"
2. Set AR1 (see [Table 29](#))
3. Set OUT1 U/M =CFM
4. Set OUT1 =0-10V
5. Set FSI (see [Table 29](#))

**Table 29: Settings by Cabinet Size**

| Model   | Unit Size      | Area sq.ft. (AR1) | Full scale output CFM (FS1) |
|---------|----------------|-------------------|-----------------------------|
| 003-006 | Small cabinet  | 2.25              | 2,400                       |
| 007-015 | Medium cabinet | 4.5               | 6,000                       |
| 016-028 | Large Cabinet  | 10.25             | 11.0                        |

Figure 67: MicroTech III Controller

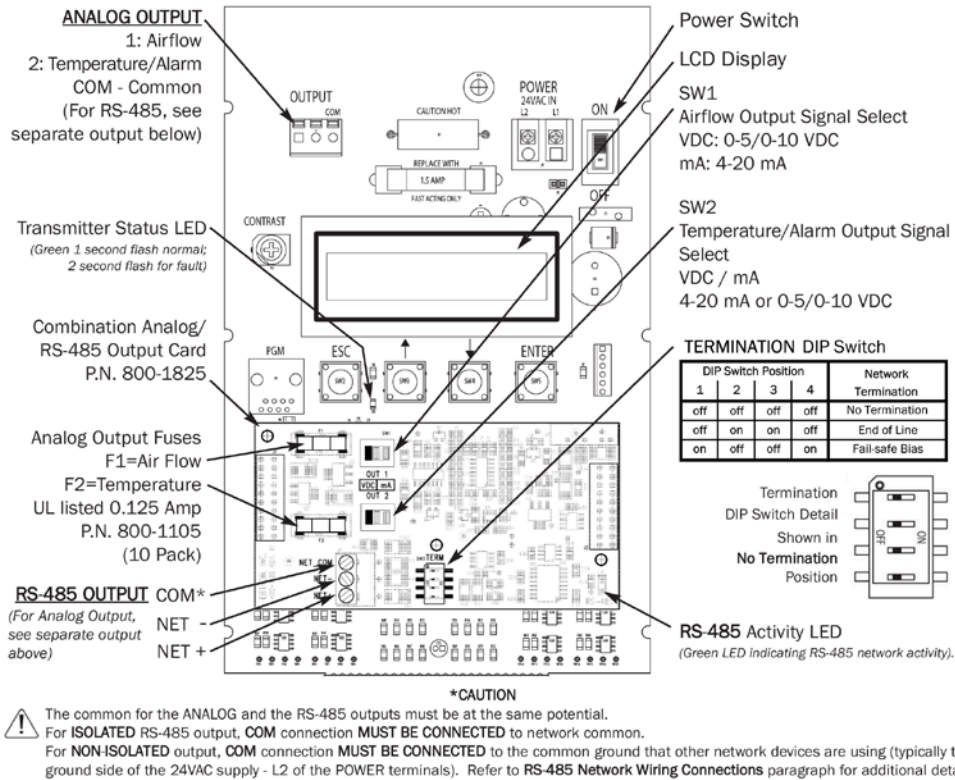
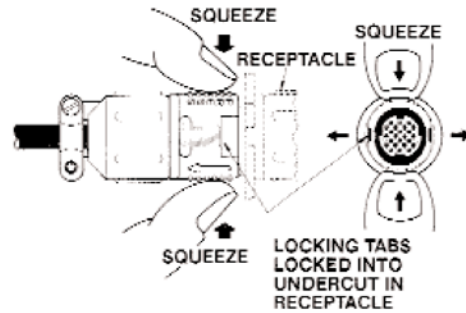
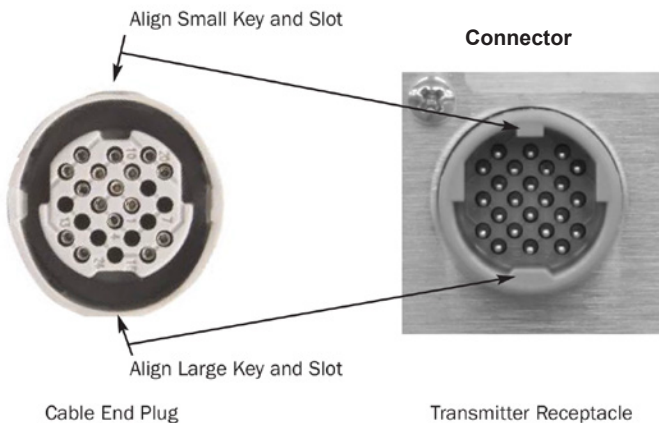


Figure 68: Transmitter and Connector Detail



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 83 on page 114](#).

### 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 McQuay 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 81 on page 110](#)). 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 × 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.


**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 88](#) for the \*ALT= menu item, and set this value 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 88](#).

 **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 30: 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 31: 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.   |

Rebel (size 003–015) SAFs and all EAFs utilize ECM [electronically commutated external rotor] motors. ECM motor speed is controlled by unit mounted, MicroTech III, static pressure and temperature controls to reliably maintain comfort conditions.

These ECM motors include locked rotor, phase failure, low voltage, high temperature and short circuit protection as well as built in soft start logic. Details are provided in the vendor's IOM manual.

Customer design speed is programmed into the ECM motor based on desired CFM and ESP. Design speed can be changed as follows as long as the fan's maximum RPM is not exceeded per [Table 32](#).

- Go into the MicroTech III keypad / display [see OM 1141 for detailed instructions]
- On the main menu, go to commission unit
- Go to SF [or RF/EF] set up menu
- find Max SAF [or EAF] RPM
- Enter the desired maximum RPM

**Table 32: ECM Motor Fan Size Maximum RPM**

| Wheel Diameter (mm) | SAF Max RPM | EAF Max RPM |
|---------------------|-------------|-------------|
| 12" (310)           | 2580        | 2580        |
| 14" (355)           | 2600        | 2600        |
| 16" (400)           | 2040        | 2550        |
| 22" (560)           | 1750        | NA          |

**NOTE:** 2-16" (400 mm) EAFs are available on sizes 016–028. Each uses the same valves.

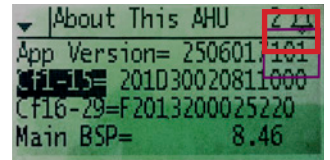
**ECM Motor Setup**

**(Required when replacing exhaust fans)**

ECM - Electronically Commutated Motor communicates via modbus RS485 twisted pair cables to the Microtech III controller. Microtech III can address the ECM for a supply, return, or exhaust fan operation based on a unique modbus address. A replacement ECM is shipped out from the warehouse with an address of "1" which is a direct replacement for a supply fan and does not require additional setup. If the ECM is being used as a return or exhaust fan, it needs to be setup with an address of "2"

**Addressing Return Or Exhaust ECM**

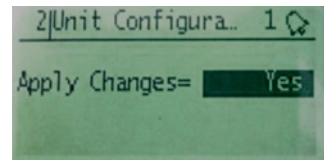
1. Close the MMP or shut the circuit breakers to the supply and energy recovery drives to keep modbus communication enabled only at the return/exhaust ECM.
2. Verify the RS485 output on the Microtech III controller is connected at terminals A and B to TB1 terminals 39 and 40 respectively.
3. Make sure the shield for the twisted pair cable is terminated at TB terminal 41 only.
4. At the drive, verify wires from the controller side terminals 39 and 40 are terminated at the ECM terminals RSA and RSB. See [Detail B on page 84](#).
5. At the Microtech III controller enter a level 2 password of 6363 and click on "About This AHU" to verify if code 101 is being used (310 for Maverick). If any other codes are being used, please consult with McQuay Warranty Service group for technical support.



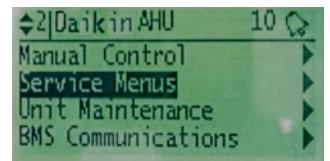
6. Press the middle rectangular button to go back to the main menu.



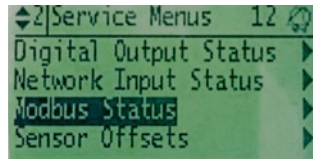
7. Scroll down and click on the "Unit Configuration Menu"
8. Scroll to the "SAF type" and set it to EBM VAV
9. Scroll to the "RAF type" and set it to EBM VAV
10. Scroll up to "Apply Changes" and set it to Yes. Wait for the controller to restart.



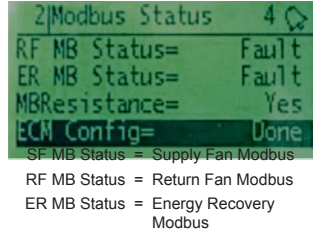
11. Enter the level 2 password again and go into "Service Menu"



- Click on the “Modbus Status” menu

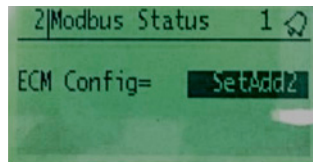


- If the drive return drive is wired correctly and is communicating then the SF MB status will show “OK” while the RF MB status will show “Fault”. Verify wiring connections and 3-phase power to the ECM if both SAF and RF status show “Fault.”



- Click on the “ECM Config” menu

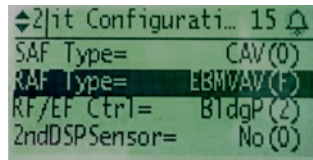
- Set “ECM config” to “SetAdd2”



- The controller will revert back to the “ECM Config” menu but now the SF MB Status will show fault while the RF MB Status will show ok.

- Hit the middle rectangular button to go back to the main menu.

- Click on the “Unit Configuration” menu and set the SAF type back to the original setting.



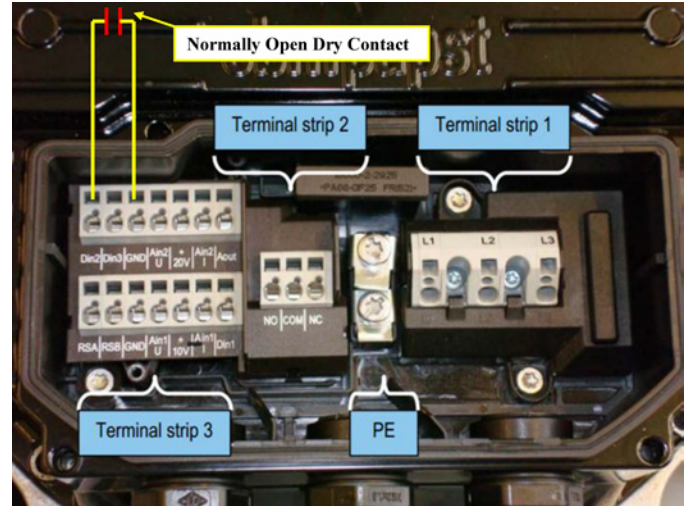
- Scroll up and set “Apply changes” to yes.

- Reset MMPs for the supply and energy recovery drive to observe ER MB Status and SF MB Status show “OK”

### ECM Smoke Purge or Ventilation Override

Microtech III has been configured via modbus to perform a ventilation override if terminals Din2 and GND at Terminal strip 3 on the ECM are made. Install an isolation relay that would make a dry NO contact across the return/exhaust fan Din2 and GND per [Detail A on page 83](#).

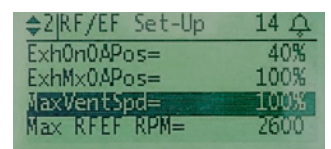
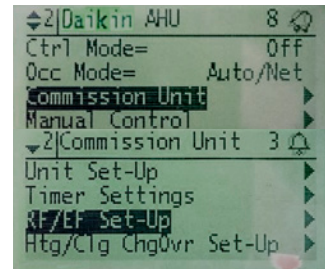
Figure 69: Smoke Purge Wiring



In a smoke situation, the field wired smoke detector would eliminate 24VAC to the DI4 terminal at the Microtech controller issuing an emergency fault at the Microtech keypad. The entire unit would shut down in which case the field would need to configure the NO to close upon a smoke shutdown and allow the return/exhaust fan to run. Setting the speed of the drive during ventilation override is described below.

#### Setting the RF/EF max vent speed:

- After entering the controller password 6363, click on “Commission Unit”
- Scroll down and click on “RF/EF Set-Up”
- Scroll down to “MaxVentSpd” and select the desired speed for the ECM during a smoke shutdown.



## 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 1141](#) 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

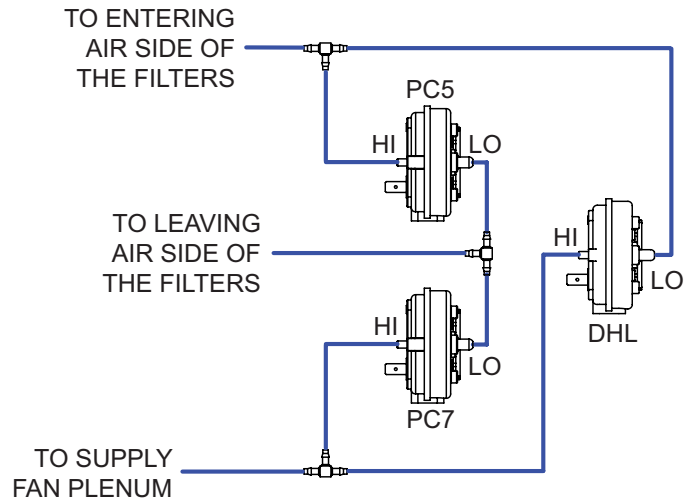
Economizer units may include exhaust fan options. For units with CAV applications, the exhaust fans can be ordered as staged control or they may be ordered with building pressure control. The building pressure control option has an inverter that runs the exhaust fan motors and is controlled by the static pressure sensor number 2 (SPS2). 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.

## 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 70](#). 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 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.

Figure 70: Pressure Tubing Diagram



All VAV units also have the PC7 and PC5 switches as standard (see [Figure 70](#)). These switches are tied into the Duct High Limit switch (DHL) as shown in [Figure 70](#).

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 1141](#)).

### 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 71](#) for a branch circuit diagram.

Figure 71: Unit Powered GFCI Receptacle Schematic

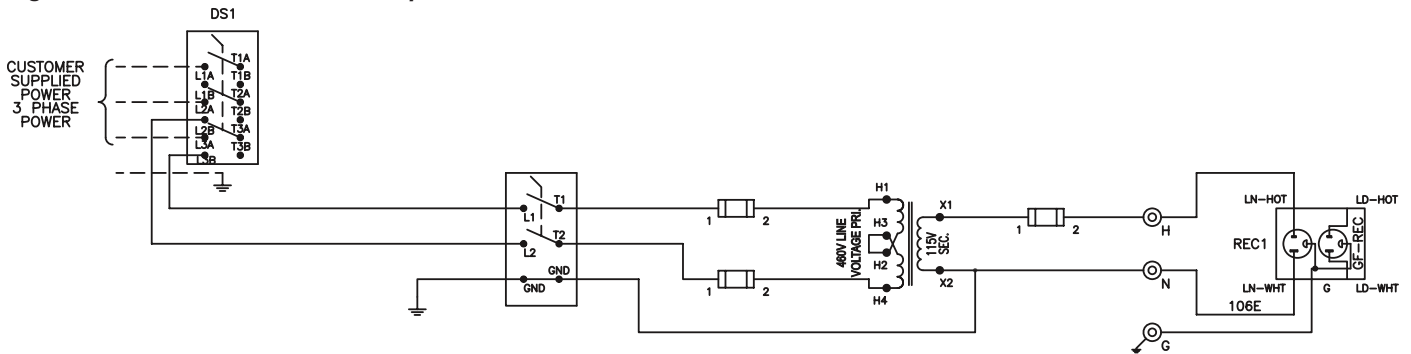


Figure 72: Typical CAV\_VAV 208-230 VAC Wiring (1 of 4) — DPS 003–006 shown

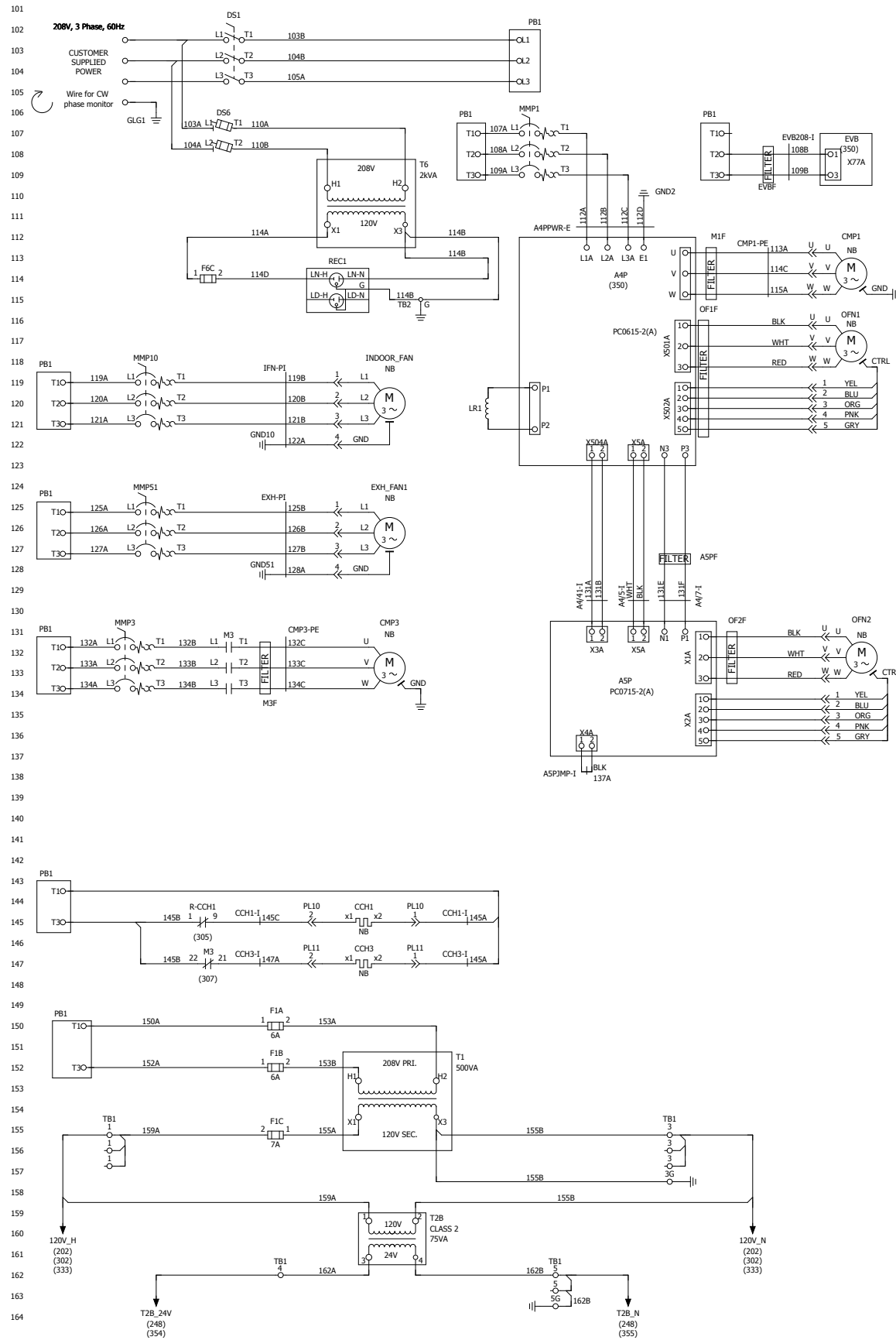


Figure 72 continued: Typical CAV\_VAV 208-230 VAC Wiring (2 of 4) — DPS 003-006 shown

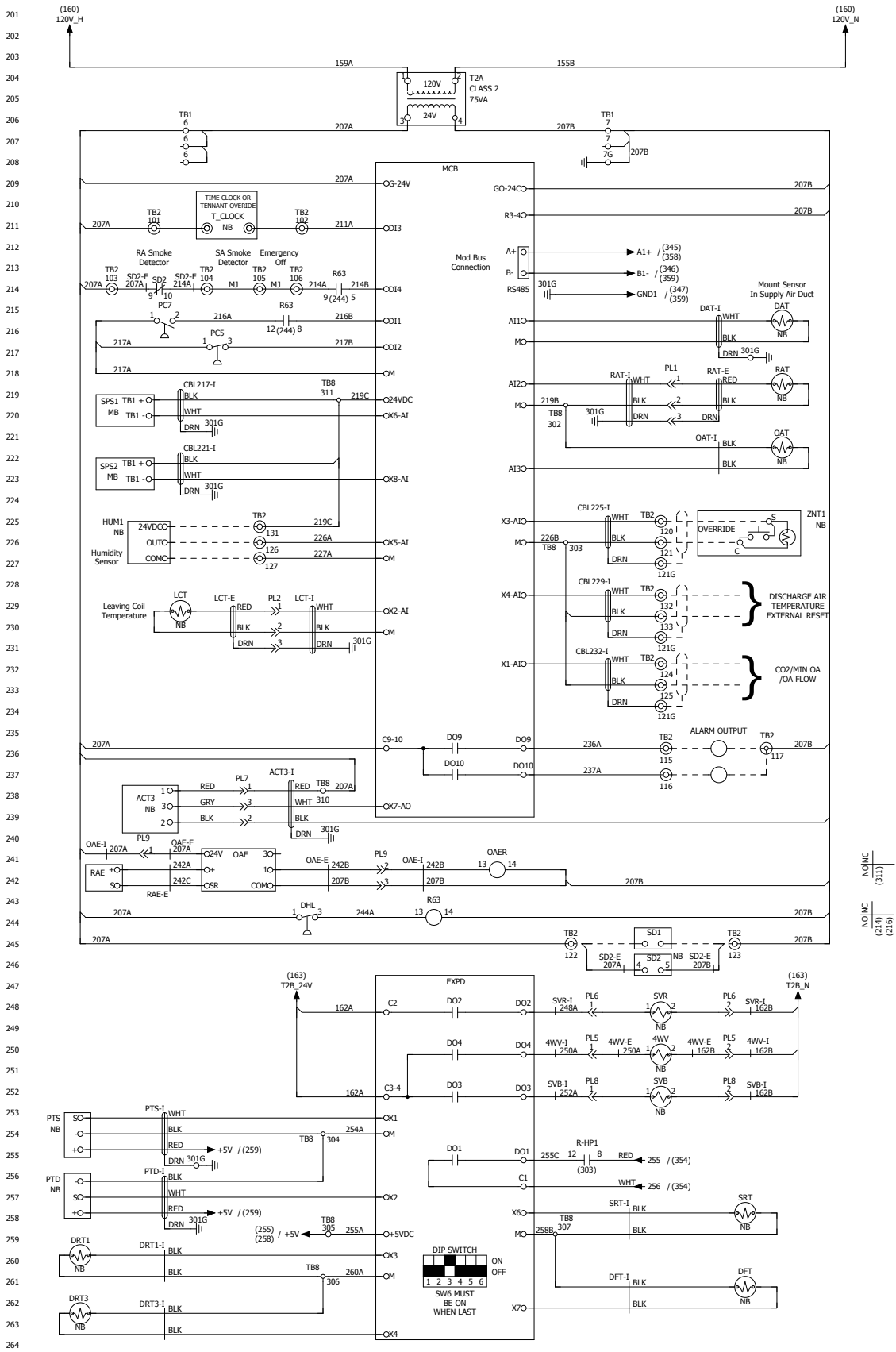


Figure 72 continued: Typical CAV\_VAV 208-230 VAC Wiring (3 of 4) — DPS 003-006 shown

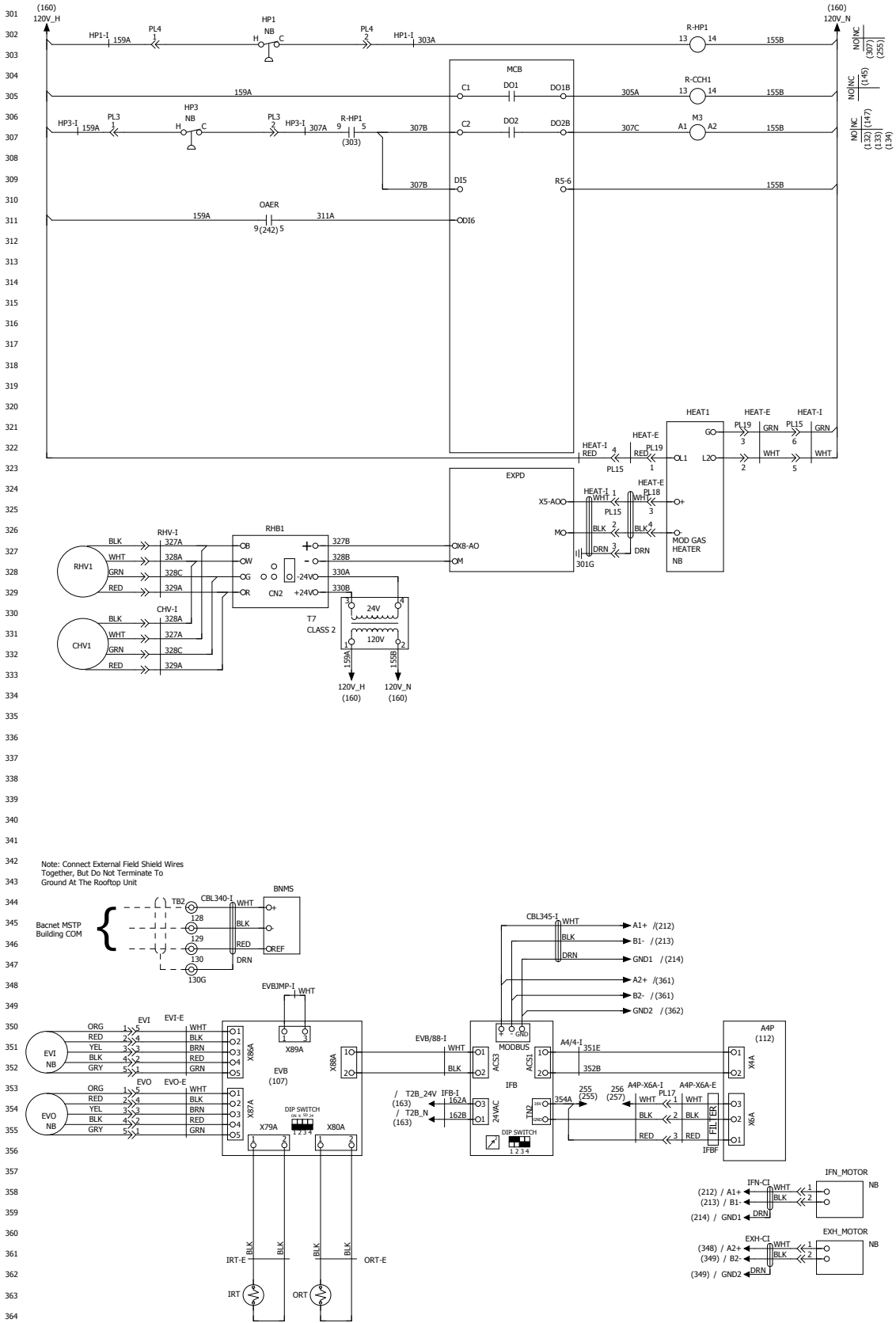




Figure 72 continued: Typical CAV\_VAV 208-230 VAC Wiring (4 of 4) — DPS 003-006 shown

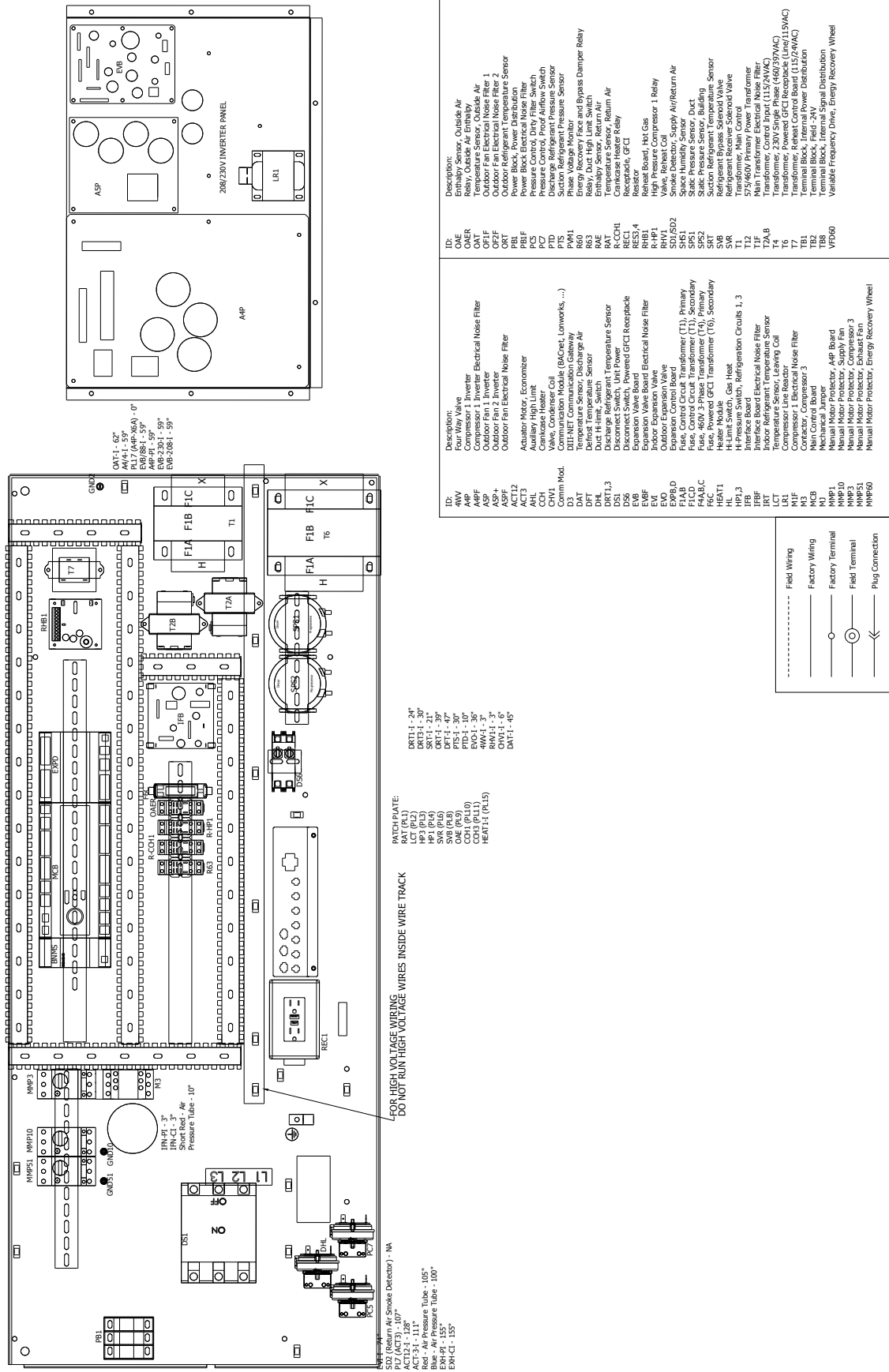


Figure 73: Typical CAV\_VAV 460 VAC Wiring (1 of 4) — DPS 003–006 shown

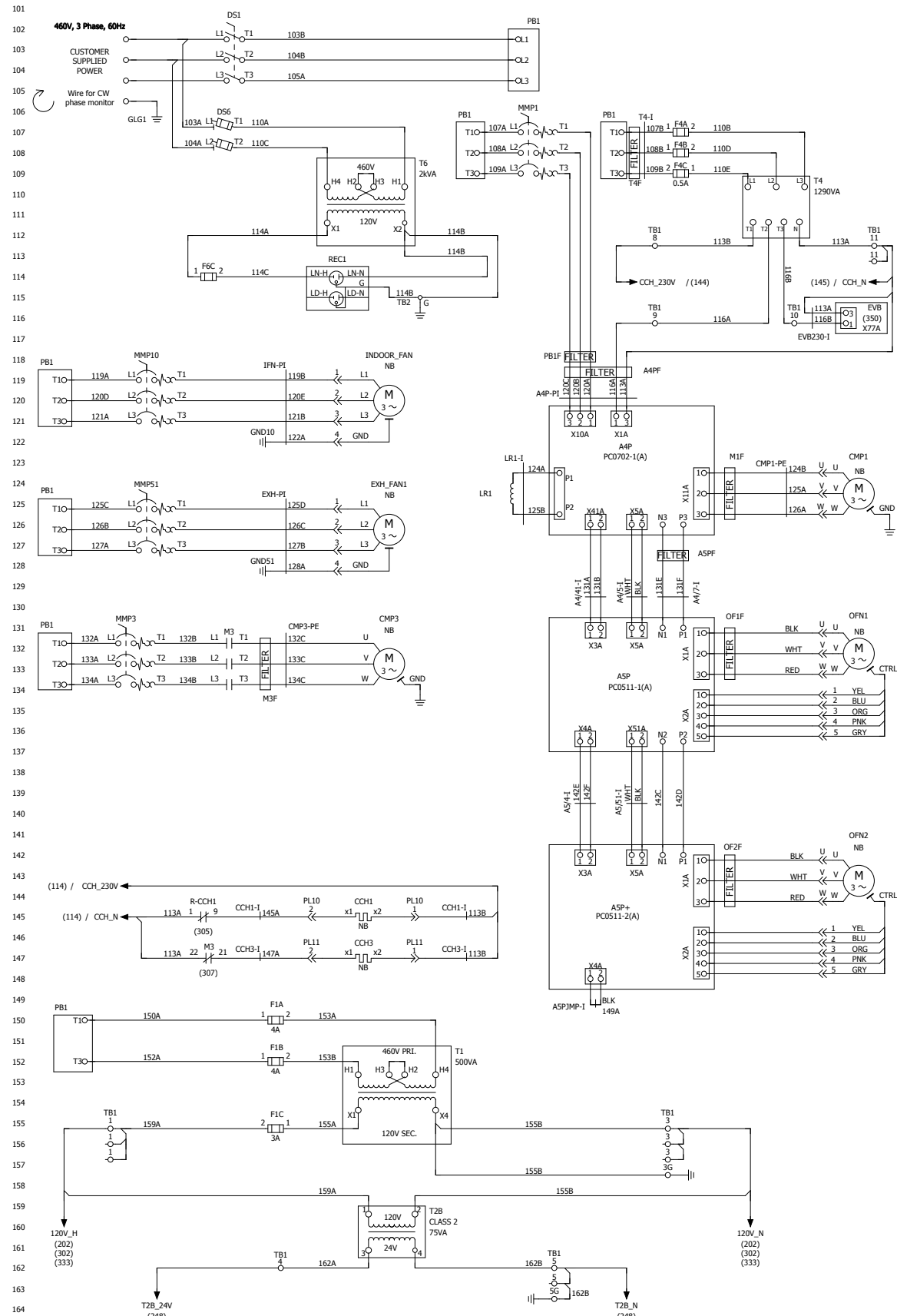


Figure 73 continued: Typical CAV\_VAV 460 VAC Wiring (2 of 4) — DPS 003-006 shown

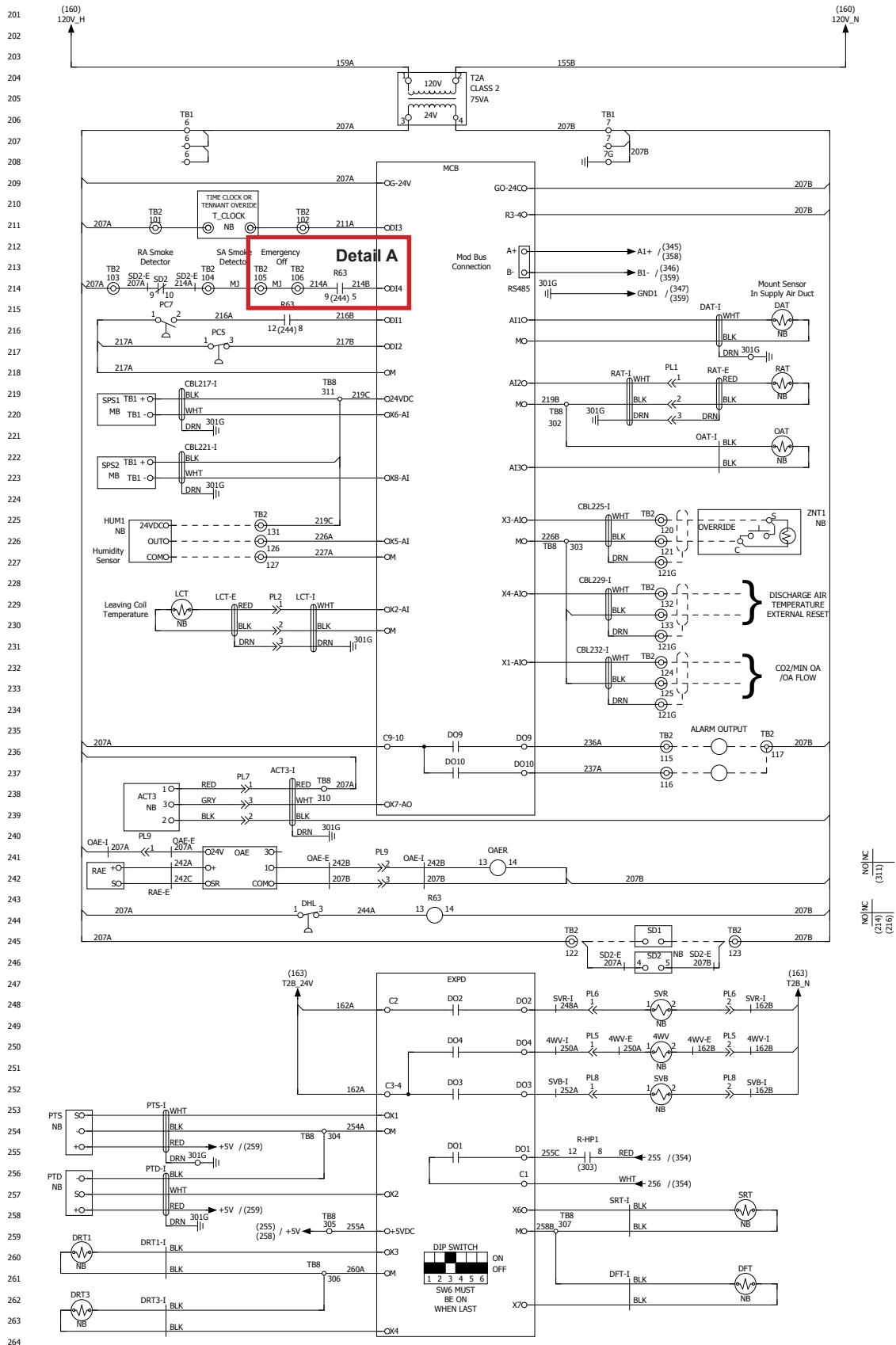


Figure 73 continued: Typical CAV\_VAV 460 VAC Wiring (3 of 4) — DPS 003-006 shown

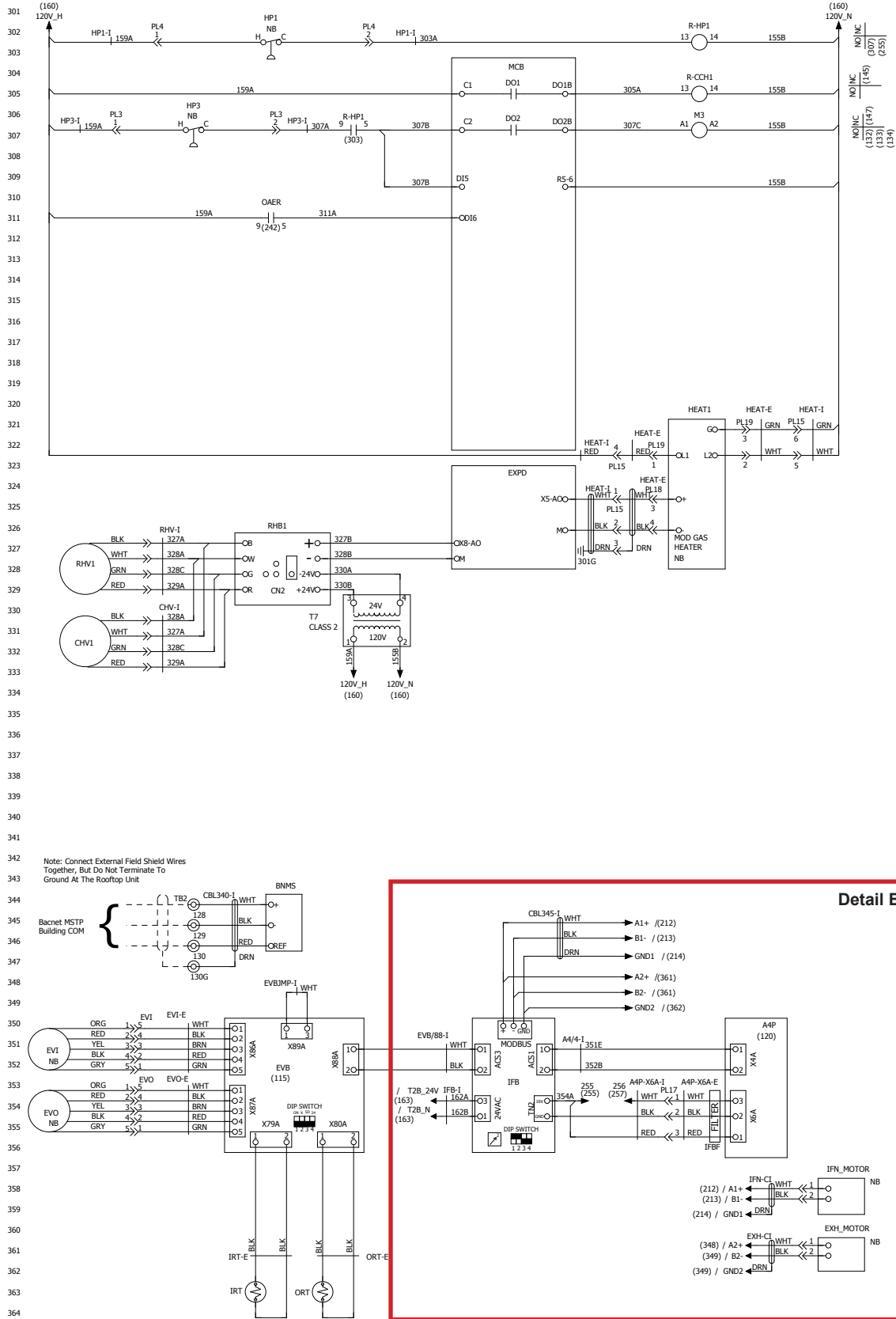




Figure 74: Typical 575 Volt Wiring (1 of 4) — DPS 007-015 shown with 460 to 575 Transformer

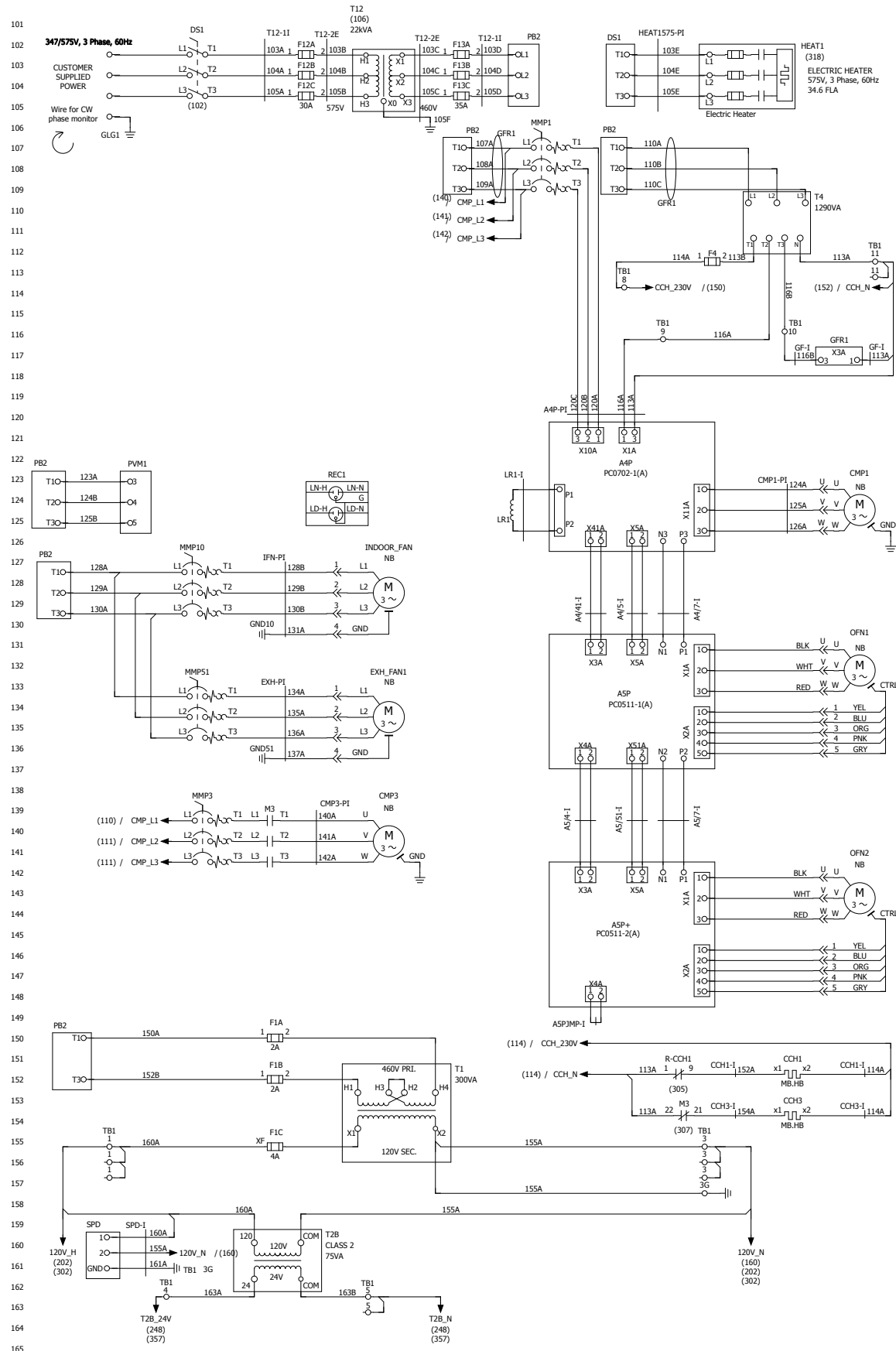


Figure 74 continued: Typical 575 Volt Wiring (2 of 4) — DPS 007-015 shown with 460 to 575 Transformer

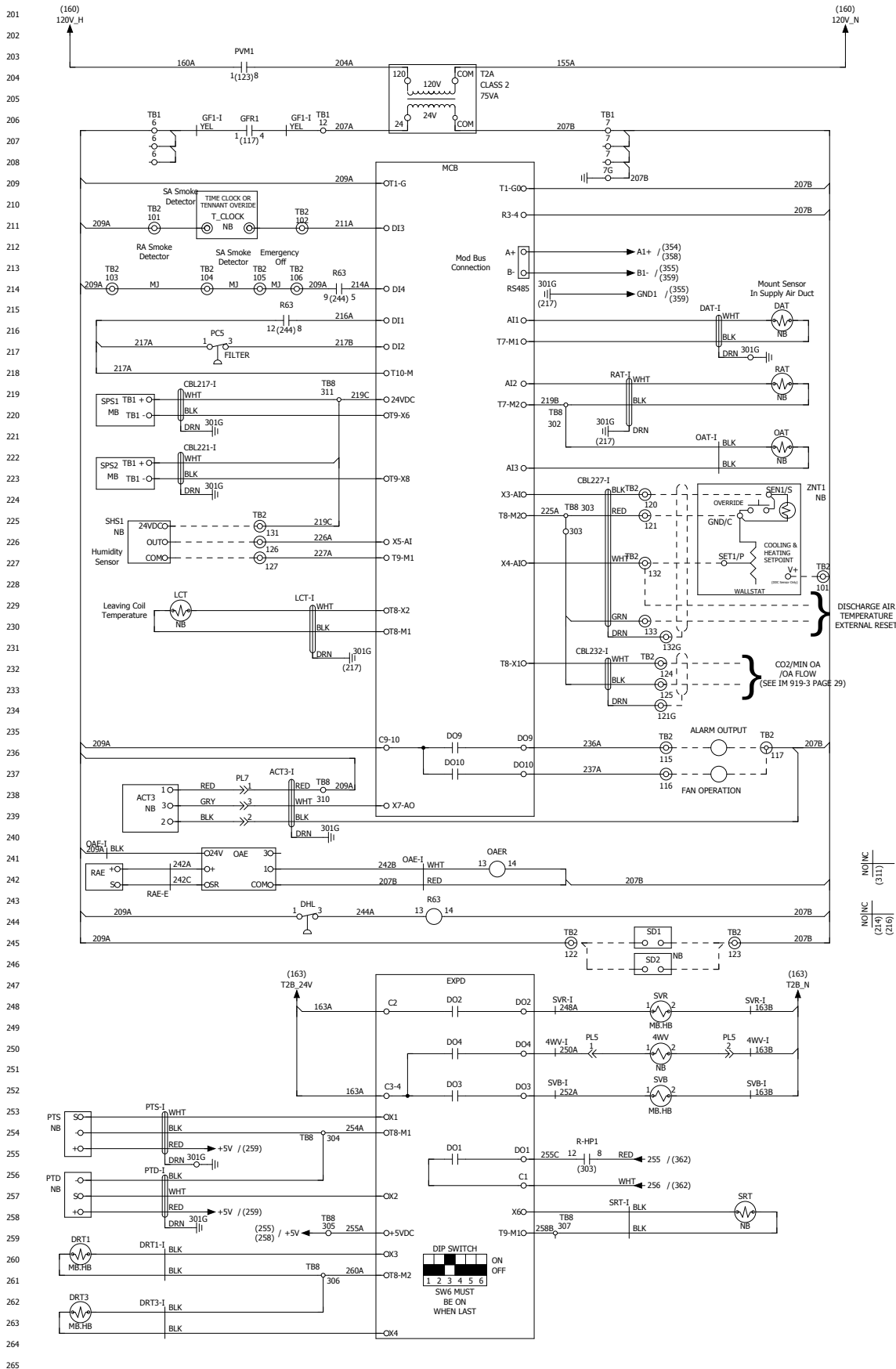


Figure 74 continued: Typical 575 Volt Wiring (3 of 4) — DPS 007-015 shown with 460 to 575 Transformer

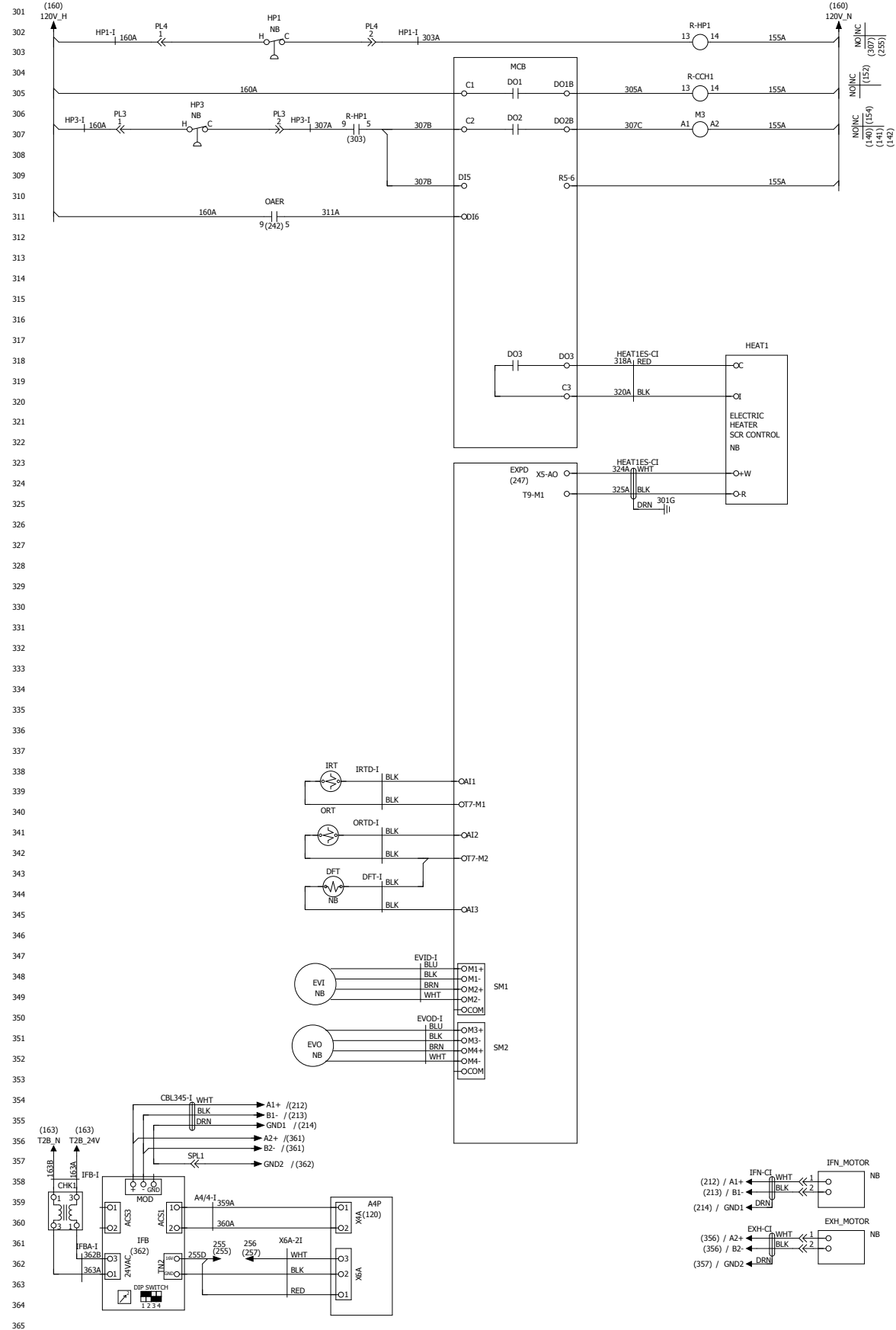
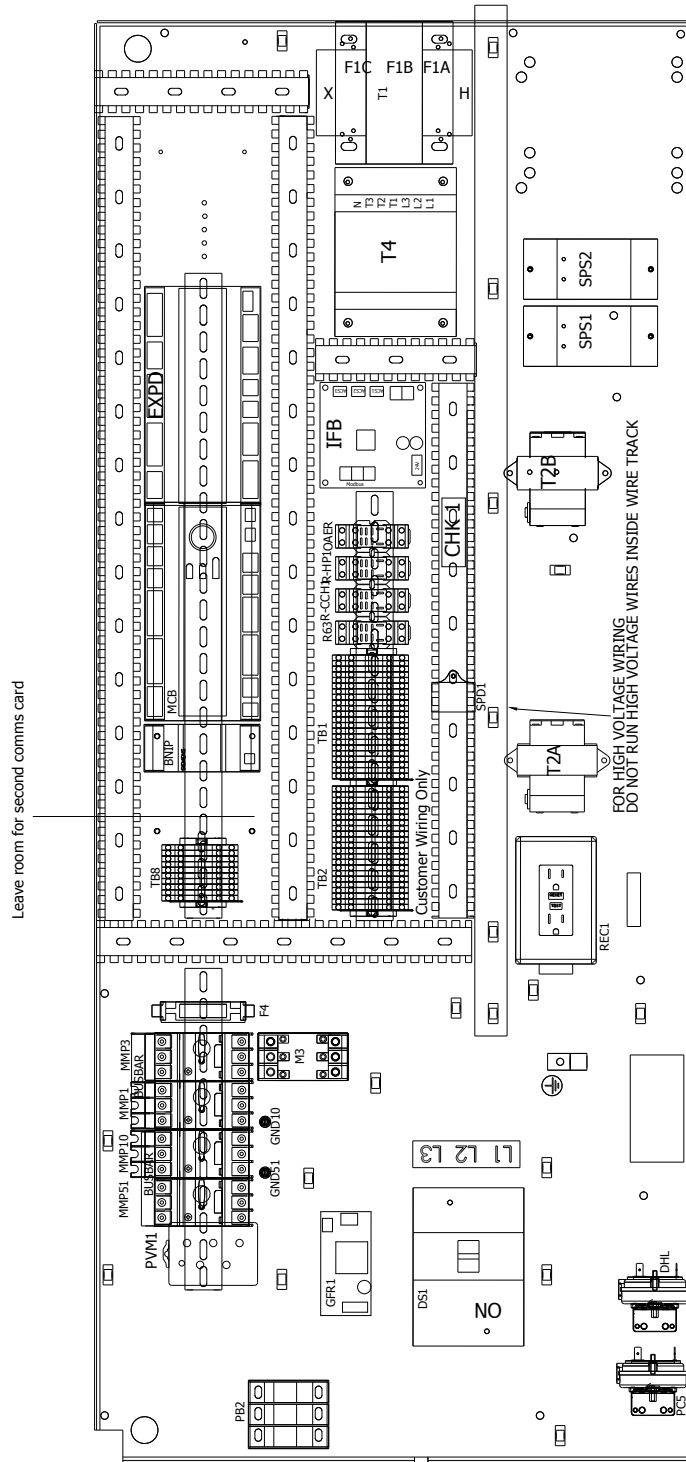
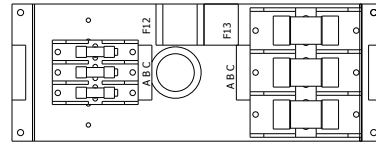




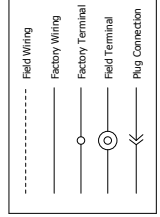
Figure 74 continued: Typical 575 Volt Wiring (4 of 4) — DPS 007-015 shown with 460 to 575 Transformer



575V Transformer Fuse Panel



| ID        | Description                                      | ID     | Description                            |
|-----------|--|--------|--|
| 4WV       | Four Way Valve                                   | MWP3   | Manual Motor Protector, Compressor 3   |
| A4PF      | Compressor 1 Inverter Electrical Noise Filter    | MWP51  | Manual Motor Protector, Exhaust Fan    |
| AS1A      | Actuator Motor, Revovery Wheel                   | MWR60  | Main Control Board                     |
| AS5A      | Actuator Motor, Revovery Wheel                   | OAL    | Outdoor Air Leakage                    |
| AS5F      | Actuator Motor, Revovery Wheel                   | OAR    | Outdoor Air Relay                      |
| ACT12     | Actuator Motor, Revovery Wheel                   | OAT    | Outdoor Air Temperature Sensor         |
| AN1       | Alarm Notification                               | OP1    | Outdoor Fan Electrical Noise Filter 1  |
| AN13      | Alarm Notification                               | OP2    | Outdoor Fan Electrical Noise Filter 2  |
| CH        | Compressor Case Heater                           | ORT    | Outdoor Refrigerant Temperature Sensor |
| CHV1      | Compressor Case Heater                           | PB1    | Power Block, Power Distribution        |
| Comm Mod. | Communication Module (64Circuits, Lanworks, ...) | PB2    | Power Block, Power Distribution        |
| DAT       | Defrost Temperature Sensor                       | PB3    | Power Block, Power Distribution        |
| DFT       | Defrost Temperature Sensor                       | PC5    | Pressure Control, Dry Filter Switch    |
| DR1       | Discharge Refrigerant Temperature Sensor         | PCS    | Pressure Control, Proof Airflow Switch |
| DR1.3     | Discharge Refrigerant Temperature Sensor         | PDS    | Phase Voltage Monitor                  |
| DS1       | Disconnect Switch, Unit Power                    | PV41   | Pressure Control, Proof Airflow Switch |
| DS2       | Disconnect Switch, Circuit 2 Dual Disconnect     | R63    | Reheat Control Board                   |
| DS5       | Disconnect Switch, Unit Power                    | RAE    | Refrigerant Accumulator                |
| E5L       | Expansion Valve Board Electrical Noise Filter    | RAE    | Refrigerant Accumulator                |
| E5V       | Expansion Valve Board Electrical Noise Filter    | R-CCH1 | Refrigerant Control Heater             |
| E6V       | Expansion Valve Board Electrical Noise Filter    | RECE1  | Receptacle, GFCI                       |
| EVI       | Expansion Valve Board Electrical Noise Filter    | RES3.4 | Refrigerant Receiver Soleenrod Valve   |
| EXRD      | Expansion Valve Board Electrical Noise Filter    | RH-1   | Refrigerant Receiver Soleenrod Valve   |
| EXRD      | Expansion Valve Board Electrical Noise Filter    | RH-1   | Refrigerant Receiver Soleenrod Valve   |
| EXRD      | Expansion Valve Board Electrical Noise Filter    | RH-1   | Refrigerant Receiver Soleenrod Valve   |
| EXRD      | Expansion Valve Board Electrical Noise Filter    | RH-1   | Refrigerant Receiver Soleenrod Valve   |
| EXRD      | Expansion Valve Board Electrical Noise Filter    | RH-1   | Refrigerant Receiver Soleenrod Valve   |
| EXRD      | Expansion Valve Board Electrical Noise Filter    | RH-1   | Refrigerant Receiver Soleenrod Valve   |

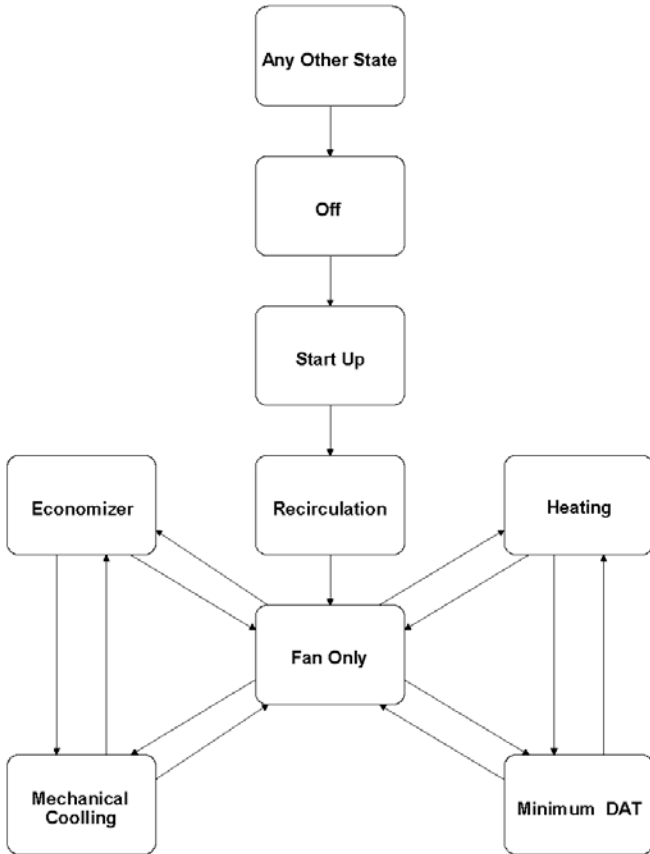


| ID     | Description                            | ID    | Description                                     |
|--------|--|-------|---|
| MWP3   | Manual Motor Protector, Compressor 3   | SPS1  | Static Pressure Sensor, Duct                    |
| MWP51  | Manual Motor Protector, Exhaust Fan    | SPS2  | Static Pressure Sensor, Duct                    |
| MWR60  | Main Control Board                     | SVR   | Refrigerant Receiver Soleenrod Valve            |
| OAL    | Outdoor Air Leakage                    | SVR   | Refrigerant Receiver Soleenrod Valve            |
| OAR    | Outdoor Air Relay                      | T1    | Transformer, Main Control                       |
| OAT    | Outdoor Air Temperature Sensor         | T1F   | Transformer, Main Control                       |
| OP1    | Outdoor Fan Electrical Noise Filter 1  | T2A   | Transformer, Control Input (115/240VAC)         |
| OP2    | Outdoor Fan Electrical Noise Filter 2  | T2B   | Transformer, 230V Single Phase (460/377VAC)     |
| ORT    | Outdoor Refrigerant Temperature Sensor | T4    | Transformer, Reheat Control Board (115/240VAC)  |
| PB1    | Power Block, Power Distribution        | T7    | Transformer, Reheat Control Board (115/240VAC)  |
| PB2    | Power Block, Power Distribution        | TB1   | Terminal Block, Field - 2W                      |
| PB3    | Power Block, Power Distribution        | TB2   | Terminal Block, Field - 2W                      |
| PC5    | Pressure Control, Dry Filter Switch    | TR1   | Transformer, Reheat Control Board (115/240VAC)  |
| PCS    | Pressure Control, Proof Airflow Switch | VFR60 | Variable Frequency Drive, Energy Recovery Wheel |
| PDS    | Phase Voltage Monitor                  |       |   |
| PV41   | Pressure Control, Proof Airflow Switch |       |   |
| R63    | Reheat Control Board                   |       |   |
| RAE    | Refrigerant Accumulator                |       |   |
| R-CCH1 | Refrigerant Control Heater             |       |   |
| RECE1  | Receptacle, GFCI                       |       |   |
| RES3.4 | Refrigerant Receiver Soleenrod Valve   |       |   |
| RH-1   | Refrigerant Receiver Soleenrod Valve   |       |   |
| RH-1   | Refrigerant Receiver Soleenrod Valve   |       |   |
| RH-1   | Refrigerant Receiver Soleenrod Valve   |       |   |
| RH-1   | Refrigerant Receiver Soleenrod Valve   |       |   |

## Operating States

The transition from any operating state to another is graphically represented in Figure 75.

Figure 75: Operating 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 (Electric Resistance, Gas Furnace, or Hot Water Heat)

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.

Auxiliary heating will be used with mechanical (heat pump) heating to maintain set point.

### 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  $\frac{1}{2}$  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 change-over setpoint by more than  $\frac{1}{2}$  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.

## Pre-Start of Unit

**⚠ DANGER**

**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 1141) before operating or servicing.

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

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 Applied.

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 maintenance of the unit.

## Spring Isolated Fans

### DPS 016–028 Only

**⚠ WARNING**

Moving machinery hazard. Can cause severe injury or death. Before servicing equipment, disconnect power and lockoff. More than one disconnect may be required to de-energize unit. Prior to operating the fans for the first time, refer to [Check, Test and Start Procedures on page 94](#).

### Releasing Spring Mounts

The supply fan on DPS 016–028 units is spring isolated due to the relatively larger fan and increased applied energy.

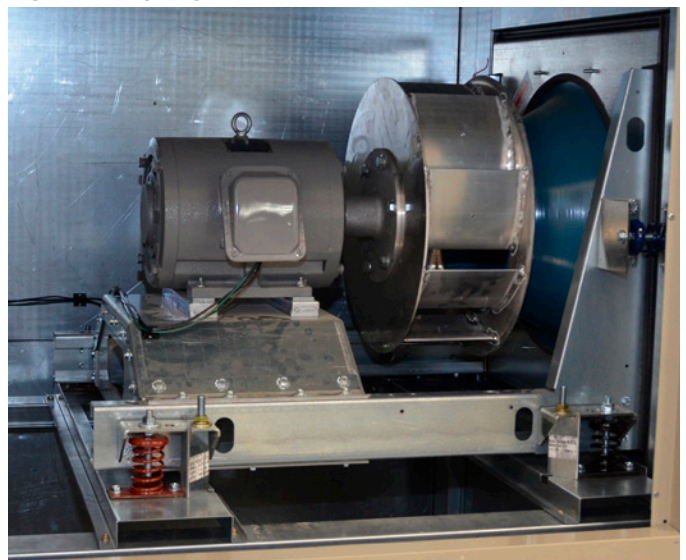
The spring-mounted supply fan is locked down with four shipping bolts for shipment. Remove each shipping bolt before operating the fans. [Figure 76](#) shows a typical spring mount with a height adjustment nut and a shipping bolt. After removing the shipping bolts, rock the fan assembly by hand to check 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 76: Spring Mounts**



## Servicing Control Panel Components



**DANGER**

**Hazardous voltage. May cause severe injury or death.**

Disconnect electric power before servicing equipment

### Before Start-Up

1. Remove shipping bolts from compressor(s).
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 evaporator condensate drain is trapped and that the drain pan is level.
13. If unit is curb mounted, verify that the curb is properly flashed to prevent water leakage.
14. 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.
15. Determine which optional controls are included with the unit.
16. 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.

### Phasing the Rebel Unit

The supply and return fans, inverter compressor, and condenser fans are all inverter driven and are DC voltage motors. Care has to be taken to ensure proper phasing.

1. With a phase rotation indicating tool ensure phase rotation per the wiring diagrams on the inside door of the control panel.

### Fan Start-Up

1. Verify all duct isolation dampers are open.
2. Place the unit into the "Fan Only" mode through the keypad.
3. 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.
4. 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 0°F.

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. With the supply fan operational, prepare for compressor operation. Verify that the crankcase heaters are operating. **These should operate for at least 24 hours before starting the compressors.**

### Perform the Following Procedure:

**NOTICE**

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

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 phased correctly between the inverter board and compressor.
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.

### 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. Subcooling can be read from the MicroTech III unit controller.

## Set Up for Optimum Control

*The Outdoor air sensor must be calibrated.*

- Compare the MicroTech III OAT reading to an external temperature measuring device. See Appendix, Figure 85 on page 118 go to the Quick Menu and OA Temp [pink path.]
- If there is more than 1.0°F difference between the two readings [Note the OAT reading should be taken after the outdoor fans have been running for at least 1 minute.] then correct this difference on the keypad. Go to Service Menus (Appendix, Figure 81 and then Figure 84 on page 116), Sensor Offsets [orange path.] find OA temp, and make the required adjustment. The adjustment has a range setting of +/- 10.0°F.

*Proper discharge and suction super heat is critical*

- Suction super heat is monitored at the display screen. Appendix, see Figure 81 and then Appendix, Figure 83 on page 114, go to commission unit, expansion valve set up, and super heat [yellow path.]
- Discharge super heat is not shown directly but is the difference between discharge temperature and saturated discharge temperature and both can be monitored at the display screen. See Figure 81 and Figure 83.
  - Go to commission unit (Figure 83), expansion valve set up, and disch sat tmp [yellow path.]
  - Go to view/set unit (Figure 81 and Figure 82), temperatures, DRT1 [inverter compressor] and DRT 2 [fixed speed compressor] [green path]
- If, after all motor speeds are constant +/- 5 hz for 15 minutes for either compressor, suction superheat drops below 5°F, or discharge superheat drops below 18°F, or discharge superheat drops below 30°, then proceed as follows.
  - Set the SS Hi Base to 2°F. See Figure 81 and Figure 83, go to commission unit, expansion valve set up, and SS Hi Base [yellow path.]
  - Contact the factory to diagnose why super heat is too low.
- If super heats do not reach steady state [less than 10°F variation for 2 minutes] then
  - Set the SS Hi Base to 2°F. See Figure 81 and Figure 83. Go to commission unit, expansion valve set up, and SS Hi Base [yellow path.]
  - Contact the factory to diagnose why the unit is hunting.

## Air Balancing

### WARNING

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

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 airflow 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

Minimum and maximum airflow/rpm settings can be adjusted using the MicroTech III controller. Refer to OM 1141 for details.

## 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.

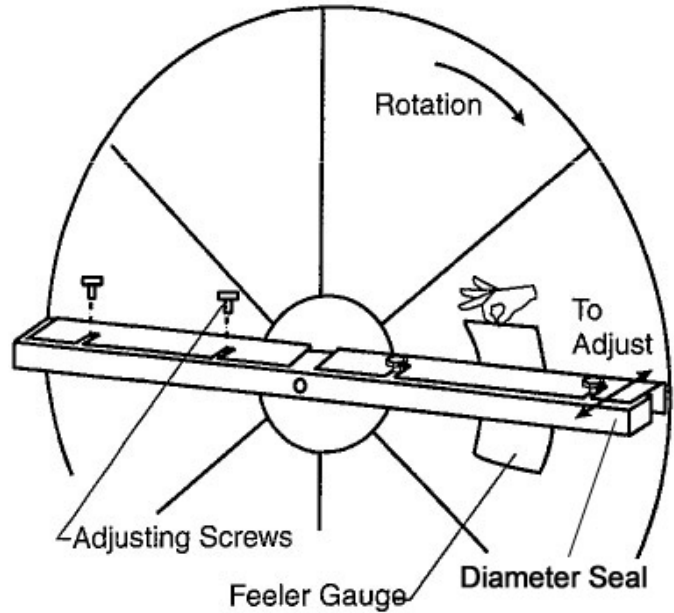
### Diameter Seal Adjustment

**WARNING**

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

1. Loosen diameter seal adjusting screws. See [Figure 77](#).
2. Move adjustable diameter seals away from wheel.
3. Using a ¼ inch feeler gauge, adjust the diameter against the wheel. See [Figure 77](#).
4. Tighten diameter seal adjusting screws.
5. Apply power per the start up procedure.

**Figure 77: Energy Recovery Wheel Adjusting**





## Final Control Settings

### 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 data.

## 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.

 **IMPORTANT**

**Gas or Hot 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.

 **DANGER**

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

 **WARNING**

**Sharp edges are inherent to sheet metal parts, screws, clips, and similar items. May cause personal injury.**

Exercise caution when servicing equipment.

## 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.

 **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.

## 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:

- All blowers, including furnace inducer, have sealed bearings. No lubrication is necessary.
- Tighten all wire connections.
- Clean the outside and inside 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.
- Clean or replace the filters as required.
- 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.
- Periodic removal of snow drifts will be required in northern climates

## Unit Storage

### Location

The Rebel 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. 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.

**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 Applied 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 adequate for current conditions.

**Filter Replacement**

This unit is provided with filters are show in [Table 33](#). These filters are disposable and should be replaced periodically. Unit is equipped with a filter pull to assist in this process. See [Figure 78](#).

**Table 33: Filter Sizes**

| Cabinet Size | Filter Size   |
|--------------|---------------|
| 003—006      | 4 - 16" × 16" |
| 007—015      | 4 - 24" × 24" |
| 016—028      | 9 - 18" × 24" |

**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.

**Figure 78: Rebel Filter Section**



**Fans**

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

**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. Wheel distorted from overspeed.
2. Bent shaft.
3. Motor imbalance.
4. Fan section not supported evenly on foundation.

**Periodic Service and Maintenance**

- Check all moving parts for wear every six months. The Rebel unit is equipped with a direct drive, variable speed fan/motor combination. When equipped, the exhaust fan will be the same. There are no belts or pulleys to maintain. The bearing are permanently sealed and do not require periodic greasing.

## Refrigerant Charge

The Rebel unit has many configurable options that can affect the refrigerant charge. Actual unit charge is given on the unit's data plate found on the inside of the control panel. The Rebel unit uses electronic expansion valves that maintain peak efficiency. Liquid sub-cooling and suction super heat float and should not be used as an indication that charge needs to be added or removed from the system. If a leak is suspected, the full charge should be removed and weighed. Weight should be compared against the unit nameplate data. Unit should be re-charged with the amount given on the unit nameplate.

POE and PVE oil is hygroscopic and does absorb moisture when exposed to atmosphere. Steps should be taken to minimize exposure time to atmosphere during any maintenance where the sealed system is to be opened.

Rebel 003–015 refrigerant systems use only Polyvinylether (PVE) oil. Rebel 016–028 refrigerant systems use only Polyester (POE) oil.

### IMPORTANT

Do not use POE oil in DPS 003–015 refrigerant systems and do not use PVE oil in DPS 016–028 refrigerant systems.

## Re-charging the unit

The entire system must be evacuated using a suitable vacuum pump. The quality of vacuum is measured using a suitable micron gauge that has been calibrated. The vacuum level reading should be taken directly from the sealed system, not at the vacuum pump. The minimum vacuum level is 300 microns Hg. The vacuum pump should be isolated from the system and the observed. Decay should not be greater than 500 microns after 15 minutes.

The crankcase heaters should be on during the evacuation procedure. This will help boil any dissolved refrigerant in the oil.

R410A is a zeotropic refrigerant that is made up of more than one compound. It must be charged as a liquid from the canister. Charging is to be done by weight and must match the unit nameplate found on the inside of the control panel door.

When re-charging the unit there might be alarms in the MT III controller and the Building Automation System that need to be cleared.

## MicroTech III keypad instructions for charging and/or evacuation

### Evacuating the charge:

- Navigate to the Exp Valve Set-Up Menu
- Set ManCtrl EV Op=Man
- Navigate to the Manual Control Menu
- Set Manual Ctrl=ManCtrl
- Set RcvSol Valve=Open (Heat Pump only)
- Set BP Sol Valve=Open
- Set EVO Cmd=100% (Heat Pump only)
- Set EVI Cmd=100%
- Reclaim refrigerant

### Charging the system:

#### Static Charge (Step 1)

- Navigate to the Manual Control Menu
- Set RcvSol Valve=Close (Heat Pump only)
- Set Reheat Valve=50% (if present)
- Set EVO Cmd=30% (Heat Pump only)
- Set EVI Cmd=30%
- → When PTS>20psi: Navigate to Exp Valve Set-Up
- Set ManCtrl EV Op=Auto

#### Dynamic Charge (Step 2)

- Clear any active alarms (ex: Charge Loss: Problem generated while removing charge)
- Navigate to Manual Control
- Set BP Sol Valve=Close
- Set Supply Fan=On
- Set SAF Spd Cmd=50%
- Set INV/OF Ena=On
- Set INV=On
- → When Clg State=Normal:
- Navigate to Manual Control
- Set INV Cmp Cmd=50%
- Set BP Sol Valve=Open
- Set OA Fan=On
- Set OA Fan Cmd=50%

Vary INV Cmp Cmd to maintain Te (temperature evaporator) below 59°F. Keep an eye on Discharge Superheat to shoot for minimum of 18°F, adjust the refrigerant being entered into the system if Discharge Superheat begins to drop below 18°F.

See [OM 1141-1](#) for more information on keypad operation.

## Servicing Refrigerant Sensors or Switches

**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.

## Servicing Optional Electric Heater

**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.

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

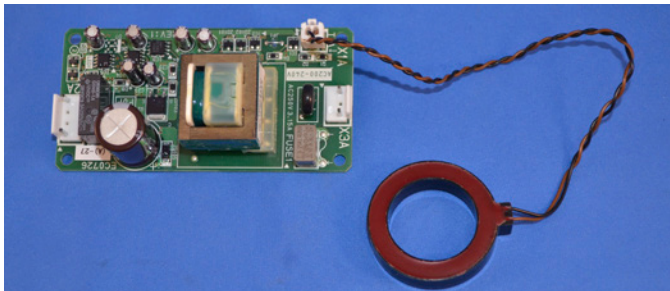
1. Measure continuity through all fuses.
2. Check that all electrical connections are tight. Look for signs of arcing.
3. Check the resistance to ground for each circuit. It should be infinite.
4. Check the resistance phase to phase for each circuit.
5. Check all contactors.

## Servicing the Compressor Ground Fault Interrupter

The Rebel 003–015 units are equipped with a ground fault interrupter on the compressor(s). This is a two part device with a current sensing donut on the power wires to the compressor(s) and a PCB. The device is intended for personal safety by continuously monitoring the balance between the three phase power and the neutral conductor. It is not intended to provide overcurrent or short circuit protection to the equipment.

The device works by opening the 120V controls circuit in a fault condition. An open condition on the ground fault interrupter indicates the compressor has been grounded.

Figure 79: Ground Fault Interrupter



## Phase Voltage Monitor (PVM)

The phase voltage monitor (Figure 80) 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 80) to indicate the following items in Table 34.

Figure 80: Phase Voltage Monitor

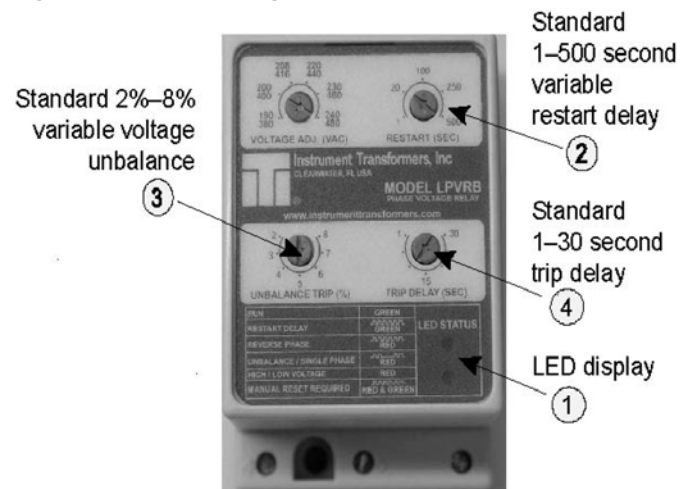


Table 34: LED Indication

| 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 deenergized)                               | Red LED - steady on                                |
| Phase reversal (relay deenergized)                                    | Red LED - pulse on, off, on, off, etc.             |
| Restart delay (fault cleared, PVM pending restart, relay deenergized) | Green LED - pulse on, off, on, off, etc.           |

**Other features:**

- Standard 2% to 8% variable voltage unbalance (“3” in Figure 80).
- 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).

## Cleaning Option E Coated Coils

 **WARNING**

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

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.

### 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 130°F) will reduce surface tension, increasing the ability to remove chlorides and dirt. Pressure washer PSI must not exceed 900 psig and the nozzle should remain at least 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 35](#)). 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.

**Table 35: Option E Coated Coil Recommended Cleaning Agents**

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

## Replacement Parts

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.

## 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 Parts Department 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 personnel of McQuay International 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 our 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.

- NOTE:**
1. Unit does not require high pressure switch testing
  2. Refrigerant pressures can be checked from the MT III controller. Refrigerant gages are not needed.
  3. Ensure proper unit phasing
  4. Compressor 3 might not operate during startup due to ambient conditions and compressor operating envelope.



## Rebel 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 3 model number: \_\_\_\_\_ Serial number: \_\_\_\_\_

- NOTE:**
1. Unit does not require high pressure switch testing
  2. Refrigerant pressures can be checked from the MT III controller. Refrigerant gages are not needed.
  3. Ensure proper unit phasing.
  4. Compressor 3 might not operate during startup due to ambient conditions and compressor operating envelope.





Rebel 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?
B. Has the discharge static pressure reference been properly located in the building?
C. Do fans turn freely?
D. Electrical service corresponds to unit nameplate?

D1. Voltage at Terminal Block | Disconnect 1-2 V 2-3 V 1-3 V

- E. Unit phased correctly?
F. Is the main disconnect adequately fused and are fuses installed?
G. Are crankcase heaters operating, and have they been operating 24 hours prior to start-up?
H. Are all electrical power connections tight?
I. Is the condensate drain trapped?

II. FAN DATA

- A. Check rotation of supply fan?
B. Voltage at supply fan motor: 1-2 V 2-3 V 1-3 V
C. Supply fan motor amp draw per phase: 1-2 A 2-3 A 1-3 A
D. What is the supply fan rpm?
E. Record supply static pressure at unit in inches of H2O:
F. Record return static pressure at unit (with outside air dampers closed) in inches of H2O:

III. START-UP COMPRESSOR OPERATION

- A. Do compressors have holding charge?
B. Are compressor shipping brackets removed?
C. Are compressors rotating in the right direction?
D. Do condenser fans rotate in the right direction?
E. Ambient temperature (°F):
F. Compressor amperage:
Compressor #1: Phase 1 Phase 2 Phase 3
Compressor #3: Phase 1 Phase 2 Phase 3



**Rebel Equipment Warranty Registration Form (continued)**

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

**IV. PERFORMANCE DATA (Unit to run at steady state for 15 minutes)**

- A. Discharge pressure, one compressor: . . . . . Circuit #1 \_\_\_\_\_ psig
- B. Suction pressure, one compressor: . . . . . Circuit #1 \_\_\_\_\_ psig
- C. Liquid temperature (°F): . . . . . \_\_\_\_\_
- D. Suction line temperature °F from unit controller: . . . . . \_\_\_\_\_
- E. Discharge line temperature °F from unit controller: . . . . . \_\_\_\_\_
- F. Superheat temperature °F from unit controller: . . . . . \_\_\_\_\_
- G. Sub-cooling line temperature °F from unit controller: . . . . . \_\_\_\_\_
- H. Record discharge air temperature at discharge of unit (°F): . . . . . \_\_\_\_\_
- I. Are all control refrigerant lines secure to prevent excessive vibration and wear? . . . . . Yes No N/A
- J. Are all valve caps and packing tight after start-up? . . . . . Yes No N/A
- K. Did unit control DAT to DAT setpoint? . . . . . Yes No N/A

**V. Hot Water Coil**

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

**VI. 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

**VII. ELECTRIC HEAT**

- 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



**Rebel Equipment Warranty Registration Form (continued)**

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

**VIII. FURNACE CHECK, TEST, & START**

- A. Gas pressure at main (inches w.c.): . . . . . \_\_\_\_\_
- B. Gas pressure at manifold (inches w.c.): . . . . . \_\_\_\_\_
- C. High limit control OK? . . . . . Yes No N/A
- D. Flame failure shutoff (seconds): . . . . . \_\_\_\_\_
- E. Airswitch OK? . . . . . Yes No N/A
- F. Main Gas Valve Close-Off OK? . . . . . Yes No N/A
- G. Modulation Gas Heat Performance

| <b>Gas Pressure</b> |                   |
|---------------------|-------------------|
| <b>Mod. Valve</b>   | <b>Reg. Valve</b> |
| 25% _____ in Wc.    | 25% _____ in Wc.  |
| 50% _____ in Wc.    | 50% _____ in Wc.  |
| 75% _____ in Wc.    | 75% _____ in Wc.  |
| 100% _____ in Wc.   | 100% _____ in Wc. |

**IX. 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](mailto: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.



### 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

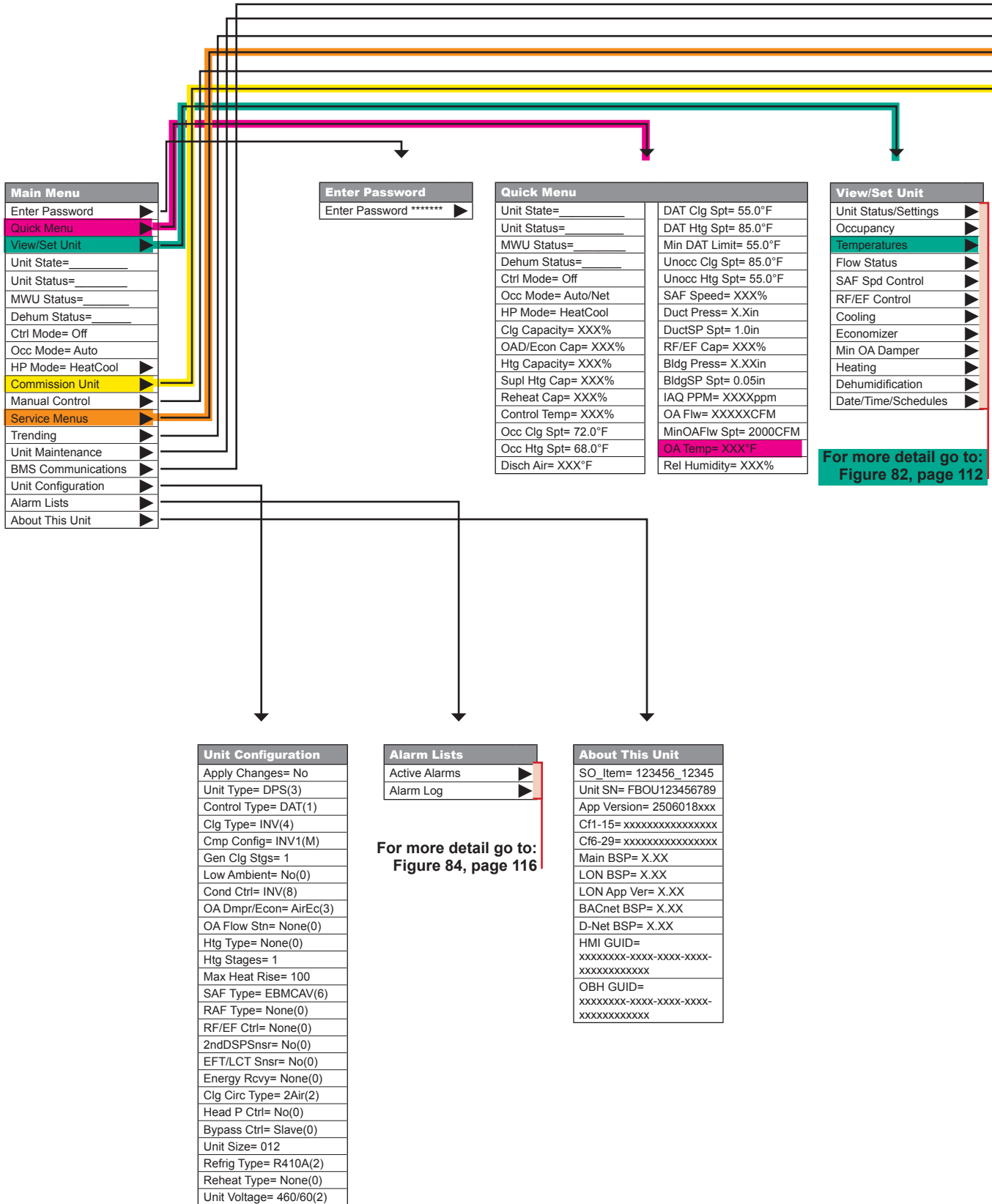
Comments \_\_\_\_\_

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".

*Addendum follows*

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 81: 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 83, page 114

| 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%      |  |
| Var Cmp=               |  |
| Var Cmp Cmd=           |  |
| VComp Emg Stop=        |  |
| 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%       |  |
| RH Output=             |  |
| ERec Wheel= Off        |  |
| ER Whl Cmd= 0%         |  |
| ER BP Dmpr Cl= Off     |  |
| ER BP Dmpr Op= Off     |  |
| Alm Output= Off        |  |
| Fan Op Out= Off        |  |

For more detail go to:  
Figure 84, page 116

| Service Menus          |   |
|------------------------|---|
| Timer Settings         | ▶ |
| Operating Hours        | ▶ |
| Save/Restore Settings  | ▶ |
| Active Alarms          | ▶ |
| Alarm Log              | ▶ |
| Event Log (65300)      |   |
| Data Snapshots (65500) |   |
| Alarm/Event Config     |   |
| Analog Input Status    | ▶ |
| Universal I/O Status   | ▶ |
| Digital Input Status   | ▶ |
| Digital Output Status  | ▶ |
| Network Input Status   | ▶ |
| Modbus Status          | ▶ |
| IP Set Up              |   |
| D3 Status              | ▶ |
| Sensor Offsets         | ▶ |
| Reset Counte= XXXX     |   |
| Last Reset Info        |   |

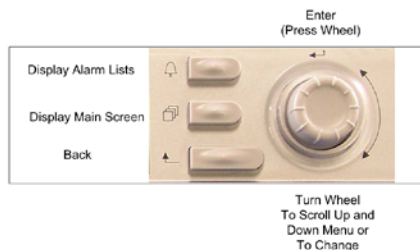
For more detail go to:  
Figure 86, page 118

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

| Unit Maintenance |  |
|------------------|--|
| Operating Hours  |  |

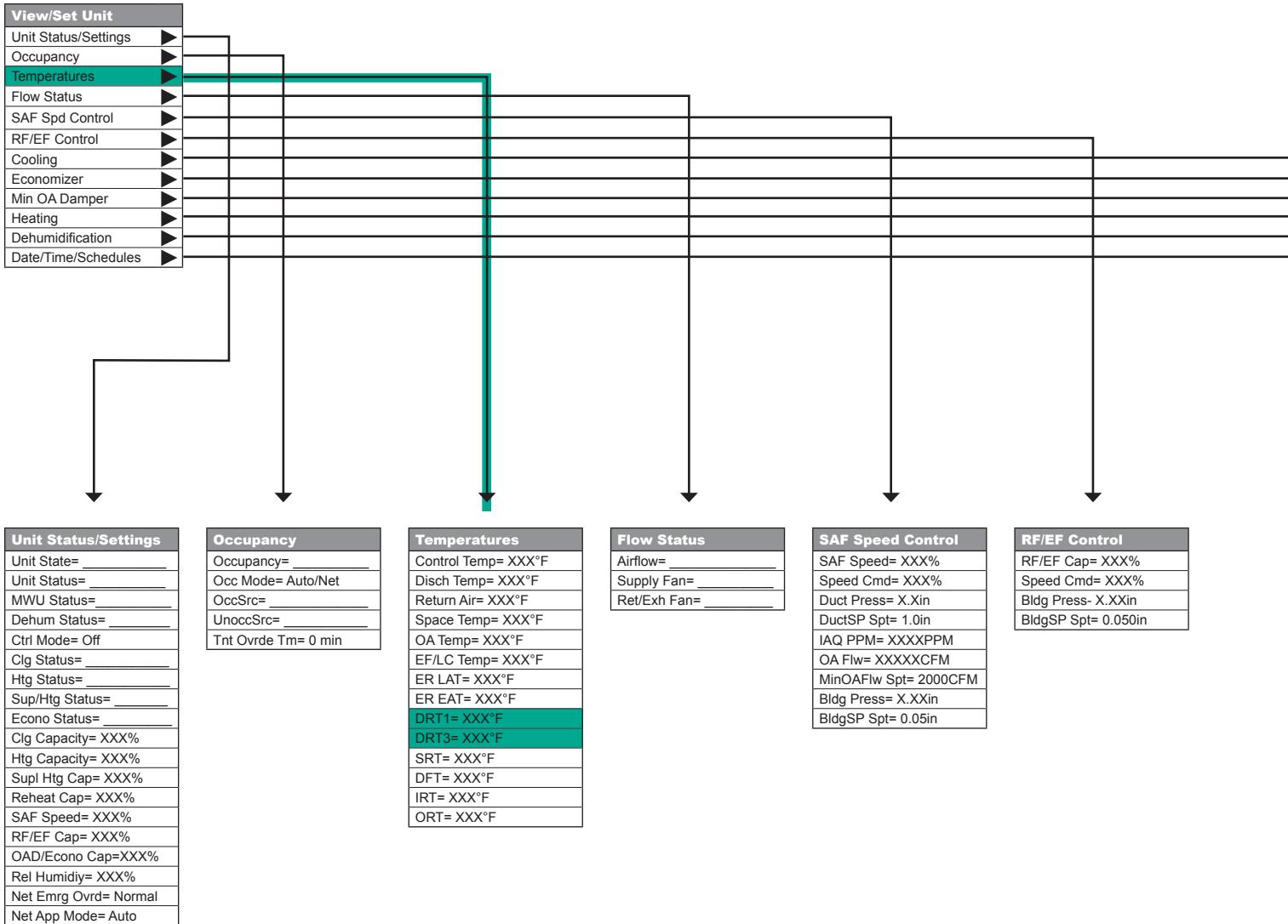
| BMS Communications  |   |
|---------------------|---|
| LON Set-Up          | ▶ |
| BACnet MSTP Set-Up  | ▶ |
| BACnet IP Set-Up    | ▶ |
| D-Net Set-Up        | ▶ |
| Network Unit Set-Up | ▶ |

For more detail go to:  
Figure 85, page 118

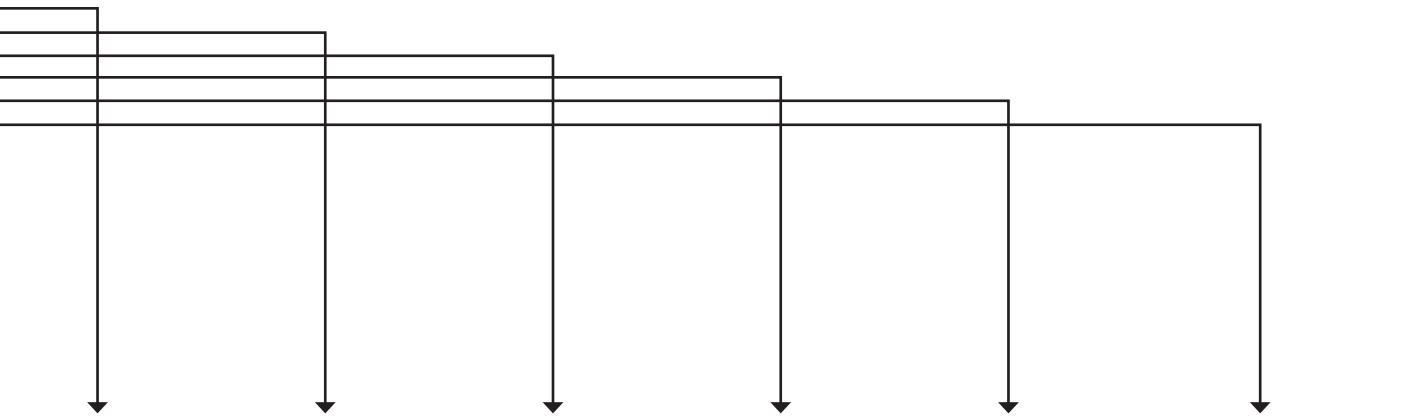


This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

**Figure 82: View/Set Unit – Keypad/Display Menu Structure**







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

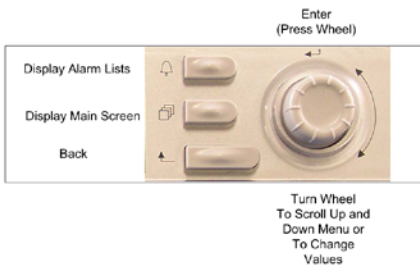
| Economizer            |
|-----------------------|
| OAD/Econo Pos= XXX%   |
| DAT Clg Spt= 55.0°F   |
| Min OA Pos= XXX%      |
| Occ Clg Spt= 72.0°F   |
| Unocc Clg Spt= 85.0°F |

| 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   |

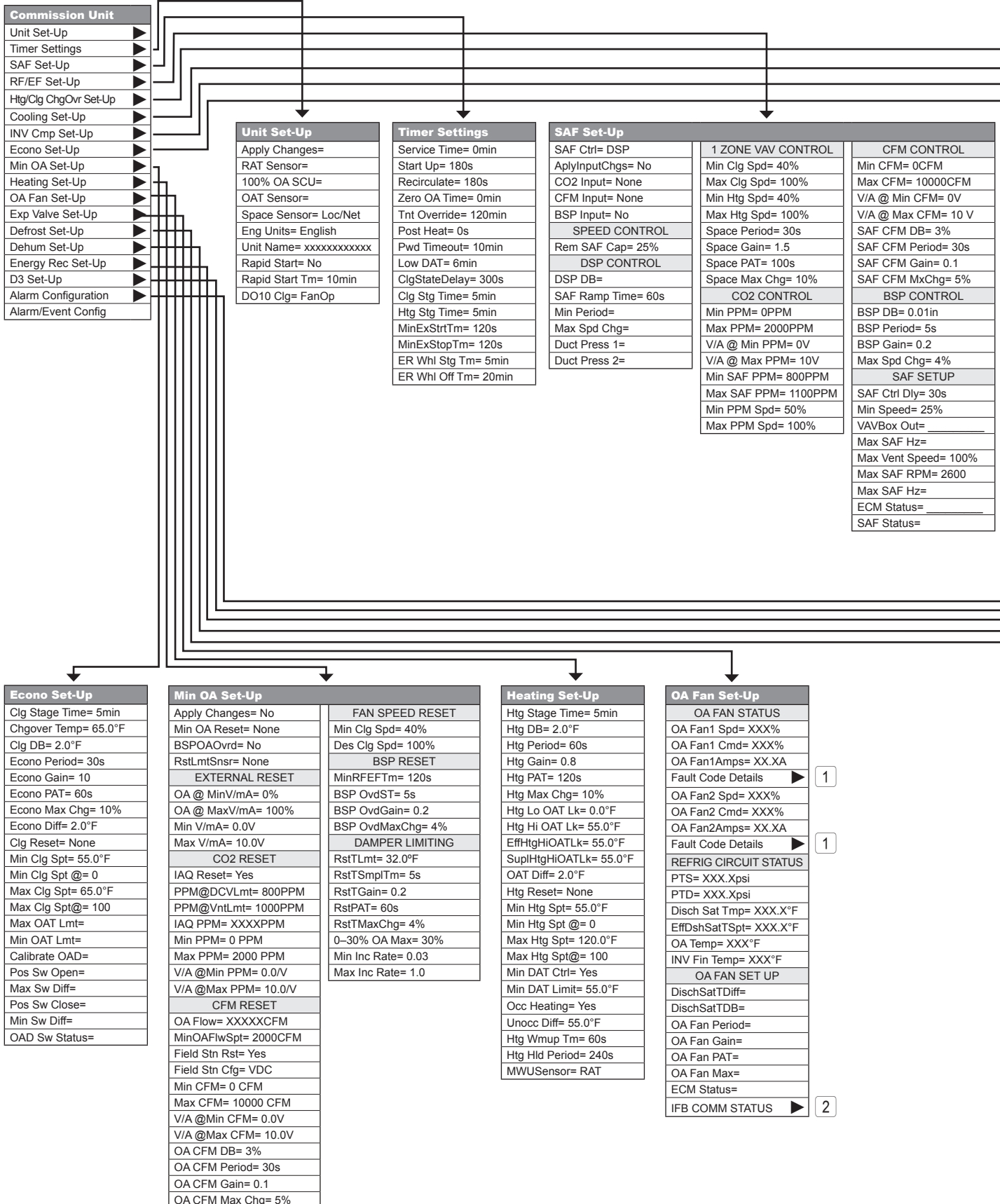
| Dehumidification   |
|--------------------|
| Dehum Status=      |
| Rel Humidity= XXX% |
| Dewpoint= XXX°F    |
| Dehum Method= None |
| RH Setpoint= 50%   |
| Dewpoint Spt= 50°F |
| Reheat Spt= XXX°F  |
| Reheat Cap= XXX%   |

| Date/Time/Schedules       |
|---------------------------|
| Time= hh:mm:ss            |
| Date= MM/DD/YY            |
| UTC Diff= -60min          |
| <b>DAILY SCHEDULE</b>     |
| 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          |
| <b>HOLIDAY DATES</b>      |
| Hol 1=MMDD/YY-MMDD/YY     |
| Hol 2=MMDD/YY-MMDD/YY     |
| Hol 3=MMDD/YY-MMDD/YY     |
| Hol 4=MMDD/YY-MMDD/YY     |
| Hol 5=MMDD/YY-MMDD/YY     |
| Hol 6=MMDD/YY-MMDD/YY     |
| Hol 7=MMDD/YY-MMDD/YY     |
| Hol 8=MMDD/YY-MMDD/YY     |
| Hol 9=MMDD/YY-MMDD/YY     |
| Hol 10=MMDD/YY-MMDD/YY    |
| <b>ONE EVENT SCHEDULE</b> |
| Beg= MMDD/YY@HH:MM        |
| End= MMDD/YY@HH:MM        |
| <b>OPTIMAL START</b>      |
| 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        |
| <b>DAYLIGHT SAVINGS</b>   |
| DLS Strt Mon= Mar         |
| DLS Strt Wk= 2nd Week     |
| DLS End Mon= Nov          |
| DLS End Wk= 1st Week      |
| DLS Active= Yes           |

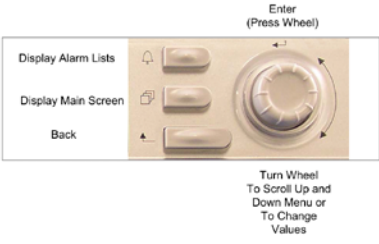
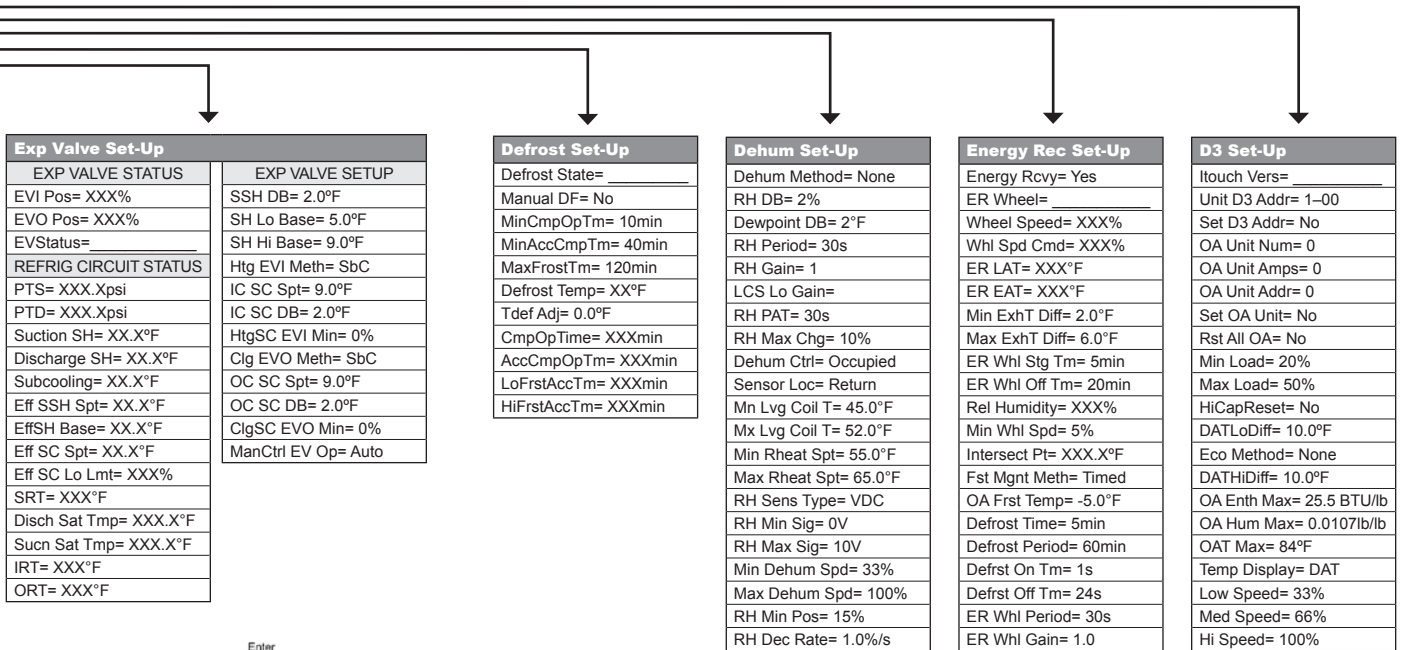
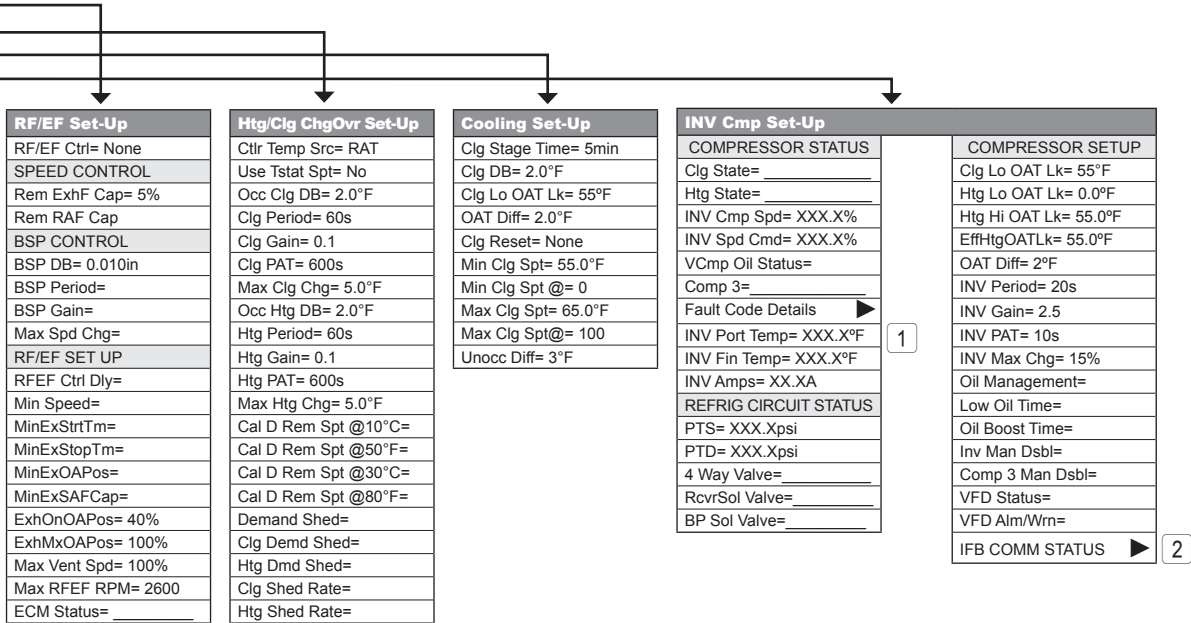


This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Figure 83: Commission Unit – Keypad/Display Menu Structure

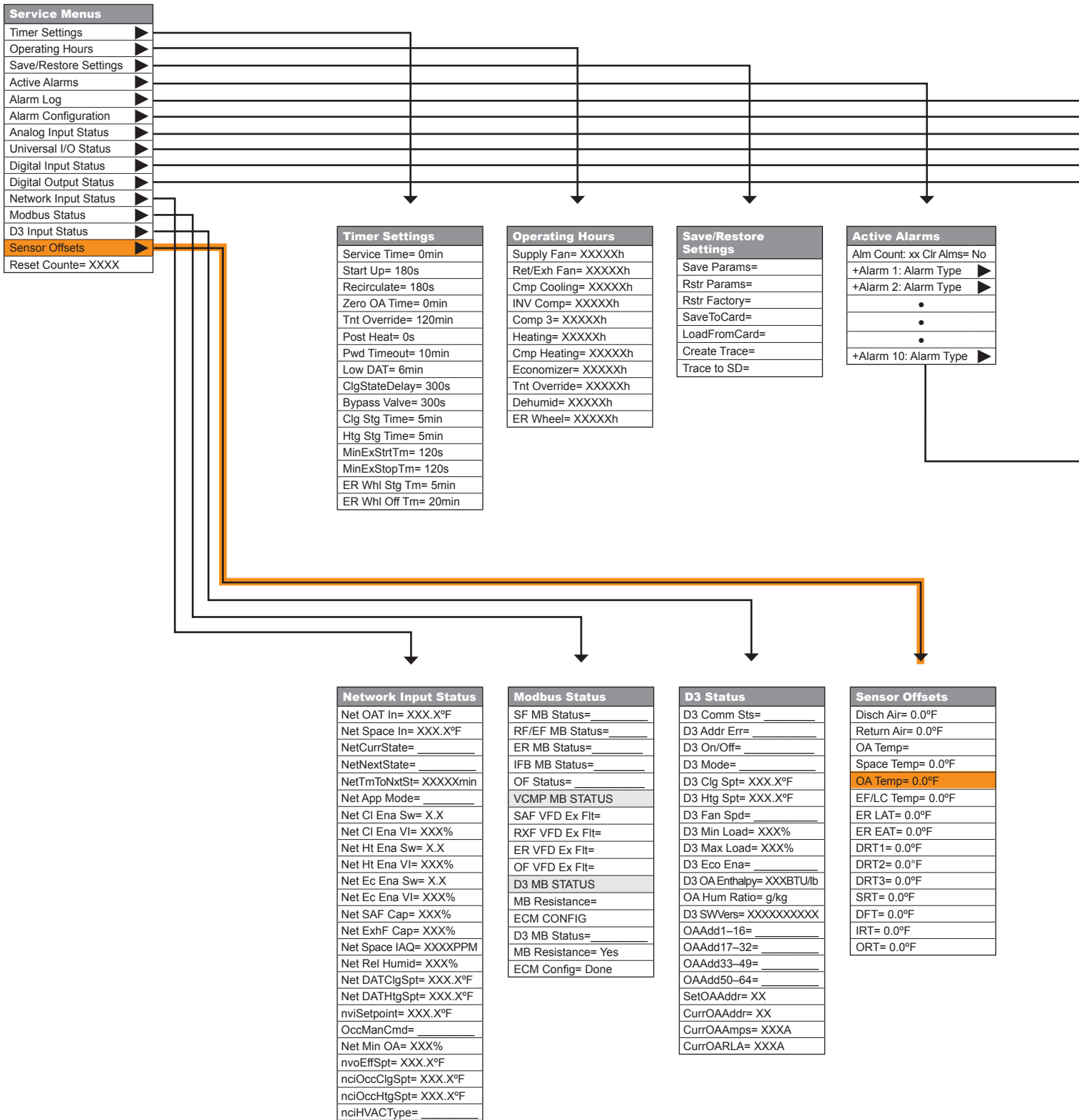


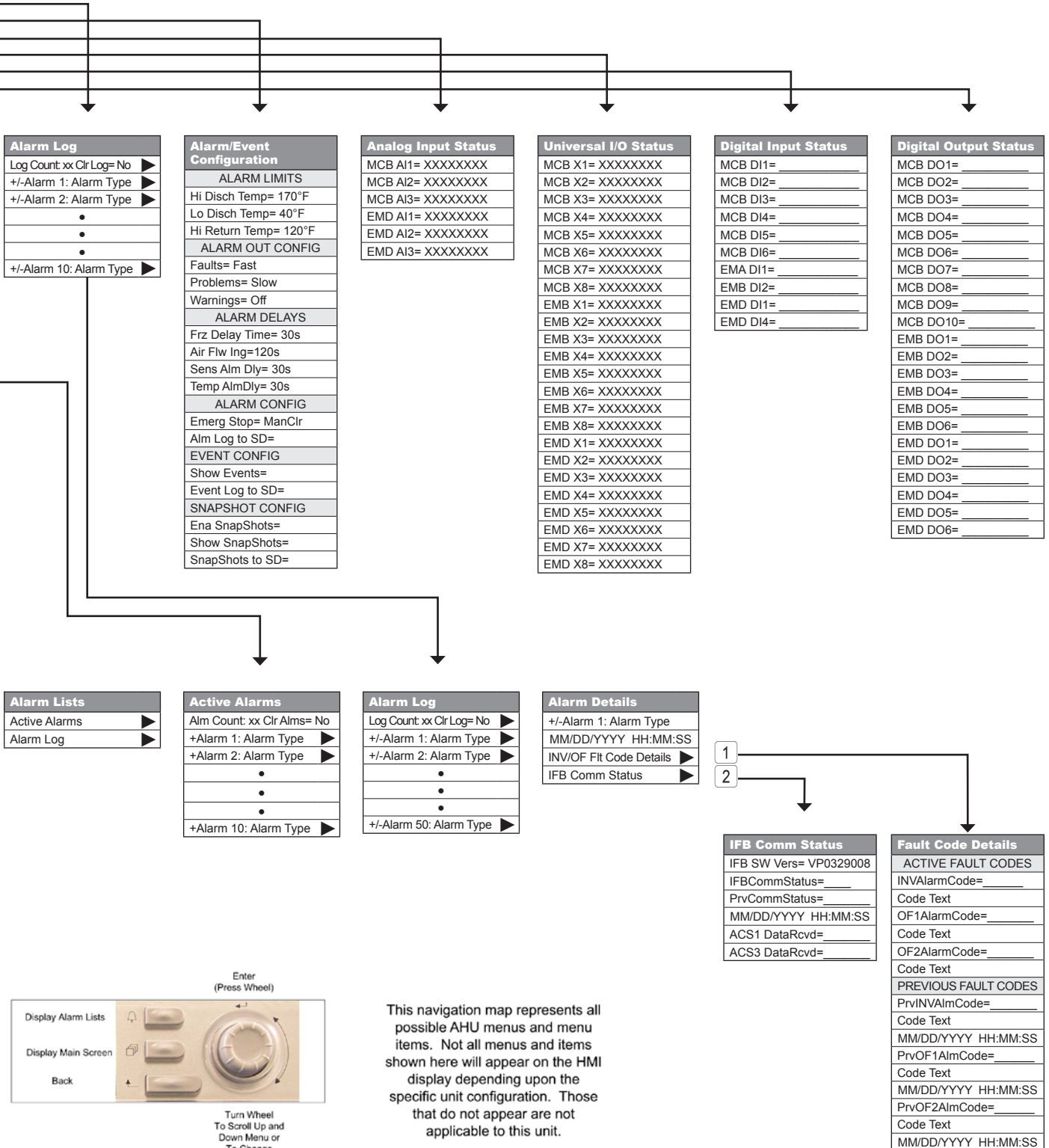
1, 2 See Figure 84, page 116 for the expansion information



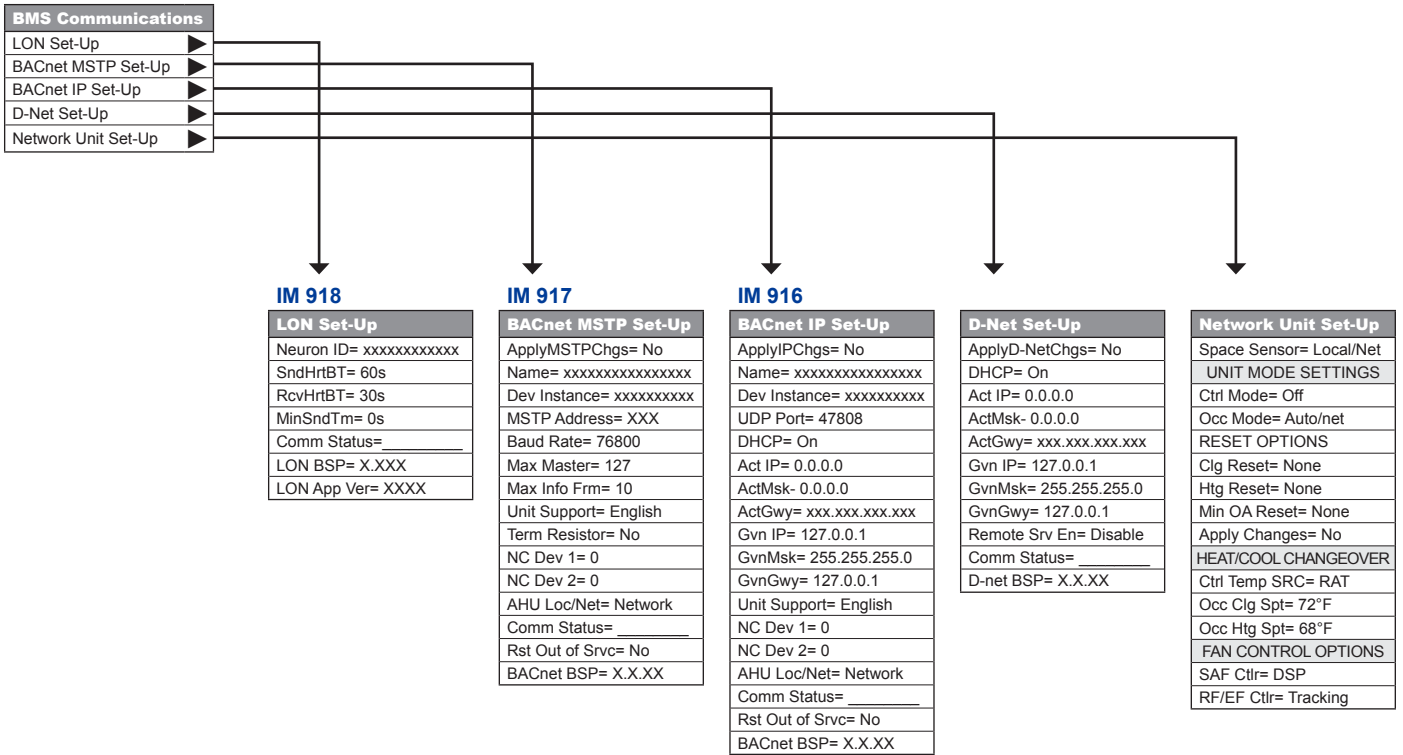
This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

**Figure 84: Service Menu – Keypad/Display Menu Structure**





**Figure 85: BMS Communications – Keypad/Display Menu Structure**



**Figure 86: Trending – Keypad/Display Menu Structure**

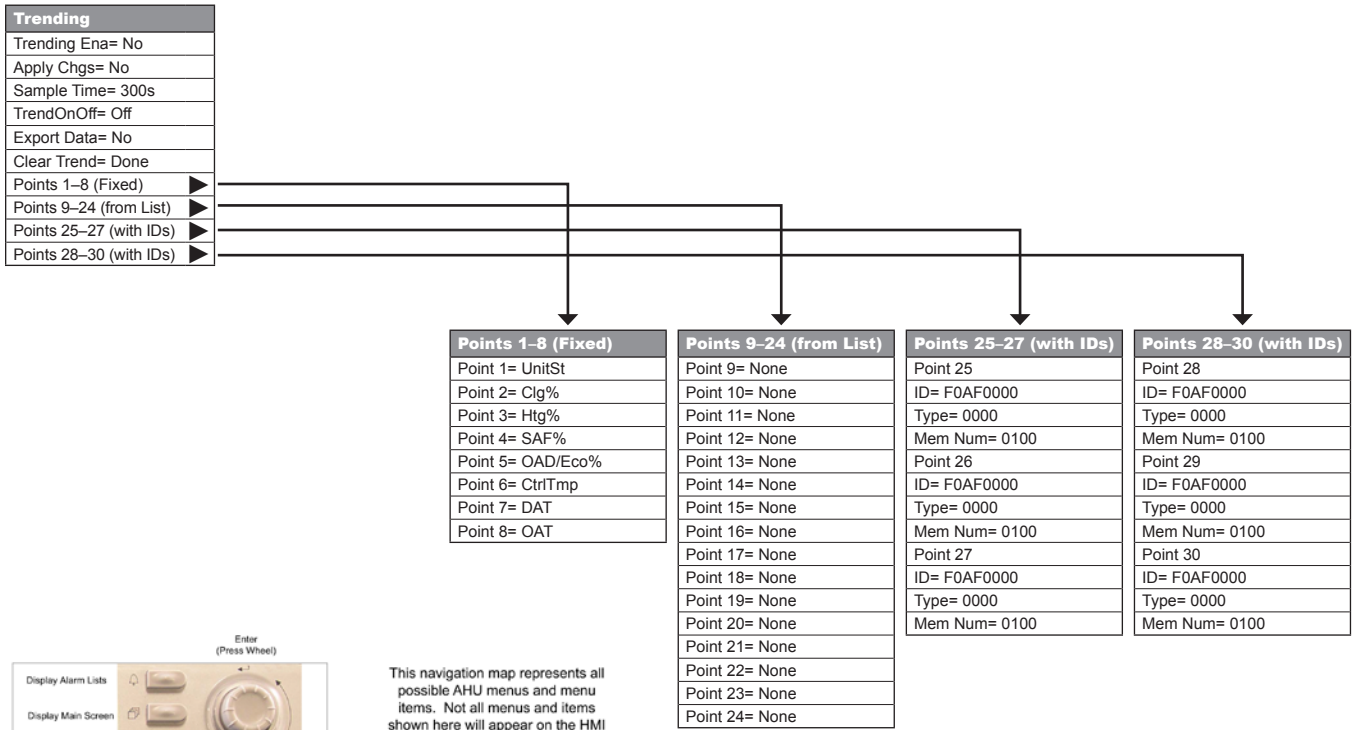
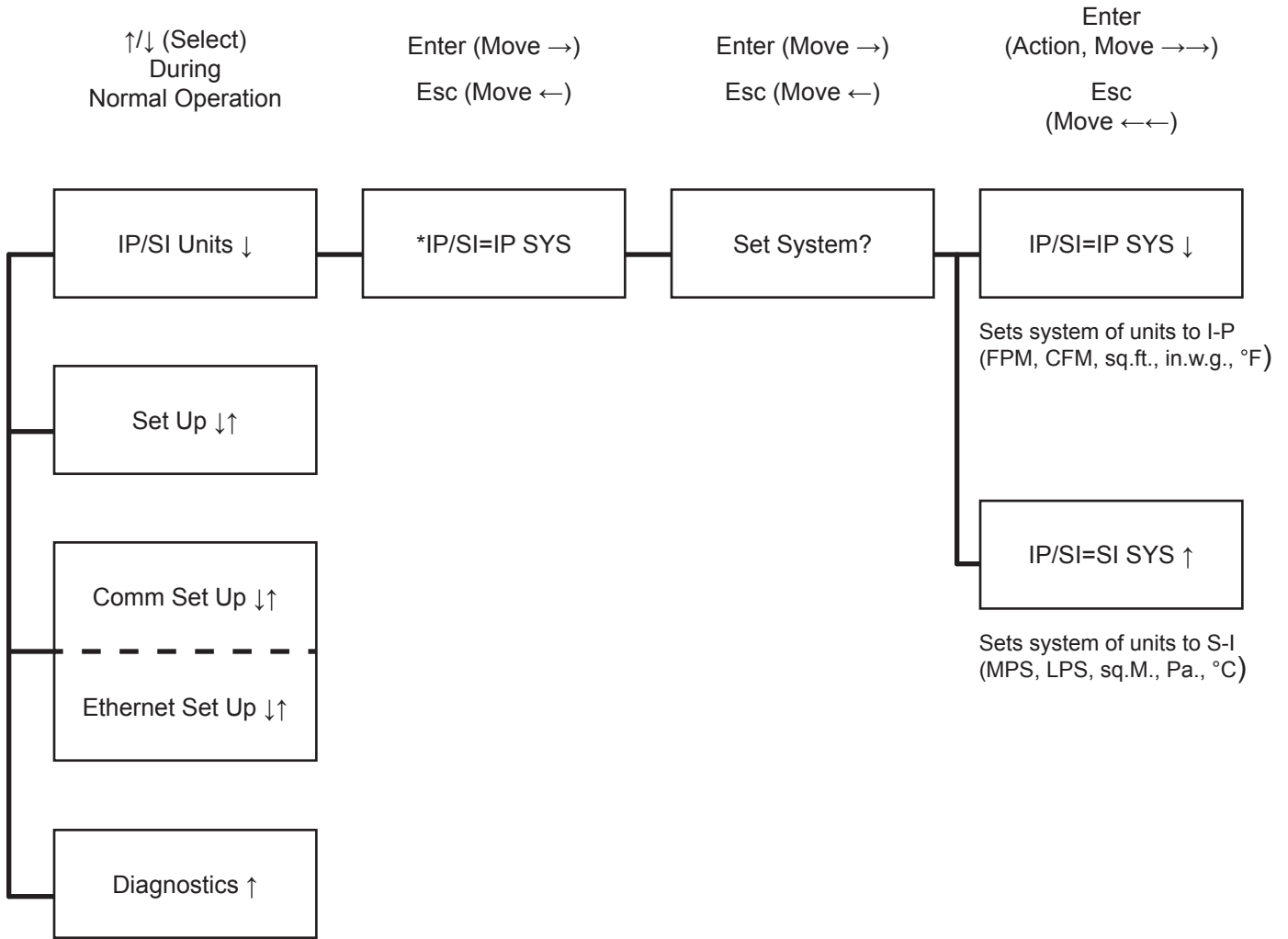


Figure 87: Optional Outdoor Air Monitor – Changing the System of Units

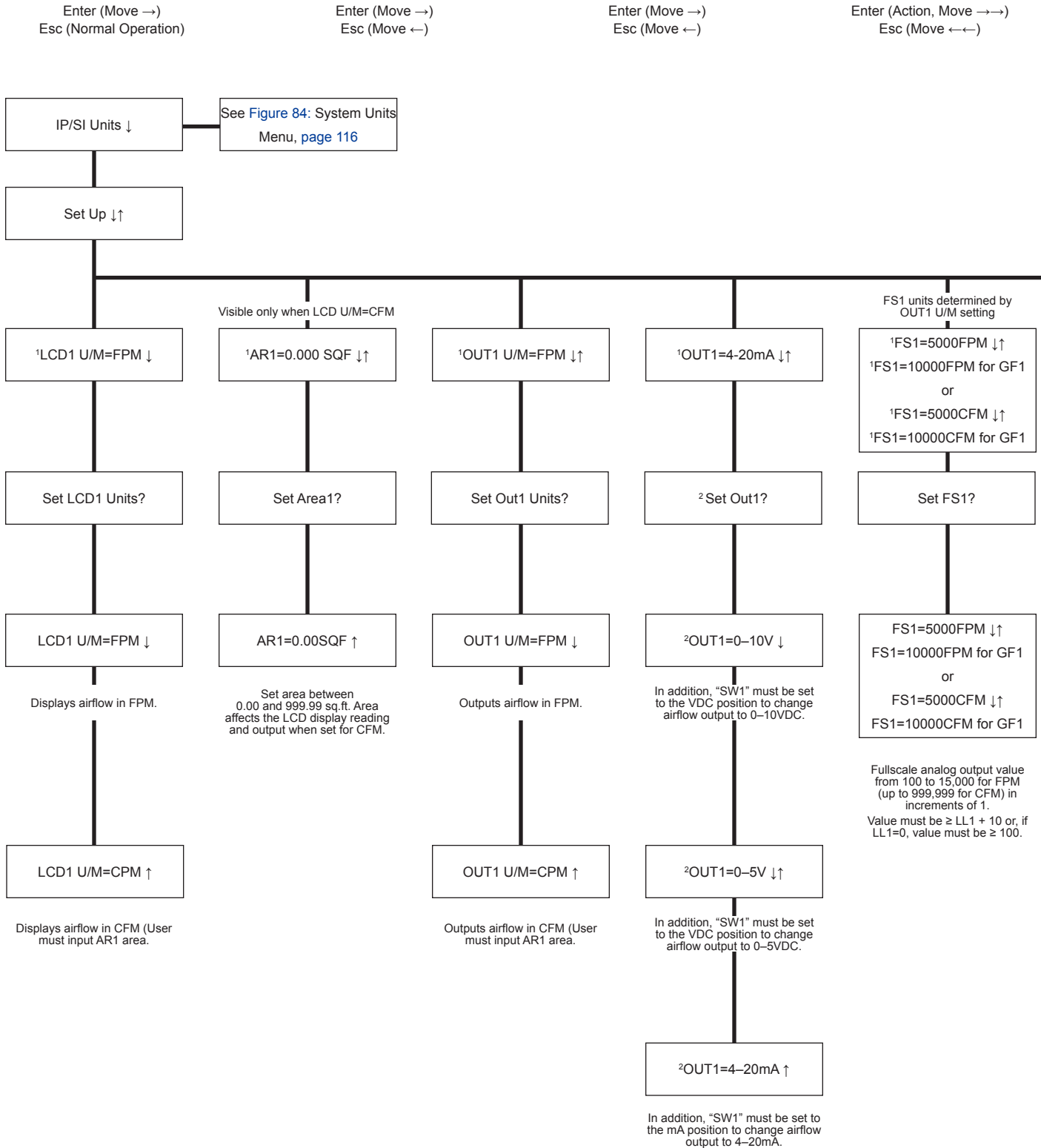
**Press and release  $\uparrow/\downarrow$  during normal operation to select**



\* Factory Default/Current Setting

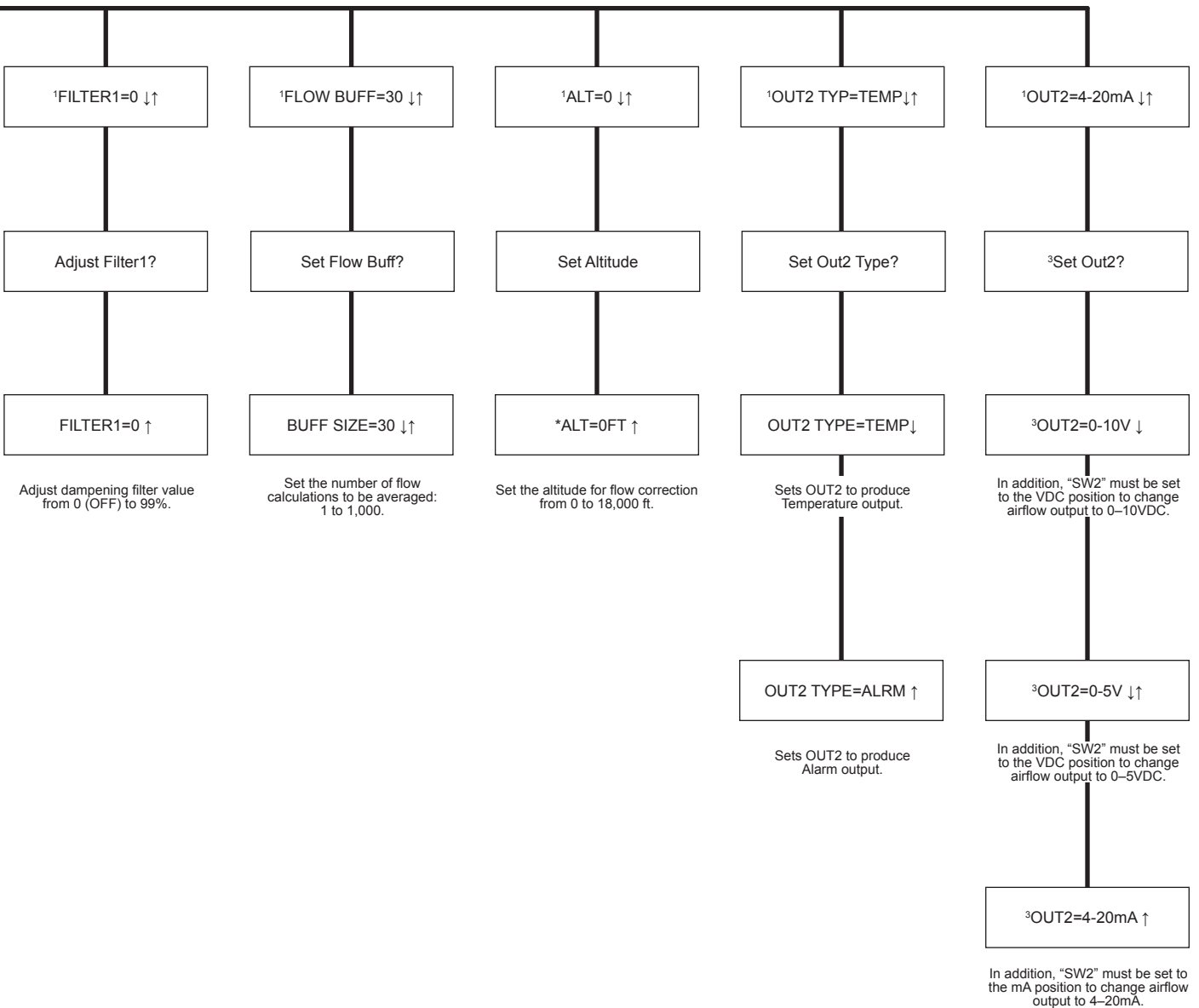
Figure 88: Optional Outdoor Air Monitor – Set Up Menu

Press and release  $\uparrow/\downarrow$  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](http://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](http://www.DaikinApplied.com).

### ***Aftermarket Services***

To find your local parts office, visit [www.DaikinApplied.com](http://www.DaikinApplied.com) or call 800-37PARTS (800-377-2787).

To find your local service office, visit [www.DaikinApplied.com](http://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](http://www.DaikinApplied.com).

Products manufactured in an ISO Certified Facility.