



Installation and Maintenance Manual

IM 1125-6

Group: **Applied Air Systems**

Part Number: **IM 1125**

Date: **September 2014**

Rebel™ Commercial Packaged Rooftop Systems

Heating and Cooling
Models DPS003 – 015A
R-410A Refrigerant
MicroTech® III Unit Controller
Energy Recovery Wheel



3-6 tons



7-15 tons
with Energy Recovery

People and ideas you can trust.™

| | | | |
|--|-----------|---|-----------|
| Introduction | 3 | Unit Options | 52 |
| General Information | 3 | ECM Motor | 54 |
| Hazard Identification Information | 3 | Wiring Diagrams | 56 |
| DPS – 010 – A H H G 4 | 3 | Sequence of Operation | 64 |
| Mechanical Installation | 4 | Operating States | 64 |
| Installer Responsibilities | 4 | Pre-Start of Unit | 66 |
| Receiving Inspection | 4 | Servicing Control Panel Components | 66 |
| Service Clearance | 4 | Check, Test and Start Procedures | 67 |
| Ventilation Clearance | 4 | Energy Recovery Wheel | 68 |
| Overhead Clearance | 5 | Final Control Settings | 69 |
| Rigging and Handling | 8 | Maintenance | 70 |
| Damper Assemblies | 9 | Performing Service Maintenance | 70 |
| Electrical Installation | 12 | Refrigerant Charge | 72 |
| Refrigeration System | 15 | Service and Warranty Procedures | 74 |
| Optional Modulating Hot Gas Reheat | 23 | Replacement Parts | 74 |
| Modulating Hot Gas Reheat | 23 | In-Warranty Return Material Procedure | 74 |
| Optional Electric Heat | 27 | Warranty Registration Form | 75 |
| Electric Heater Design | 27 | Quality Assurance Survey Report | 77 |
| Optional Gas Heat | 28 | Appendix – Keypad/Display Menu Structure | 78 |
| Gas Furnace Design | 28 | | |
| Installation | 29 | | |
| Sequence of Operation (Staged Control) | 32 | | |
| LP Conversion (Staged Furnace Only) | 32 | | |
| Altitude Conversion | 32 | | |
| Start-Up Procedures | 33 | | |
| Service | 34 | | |
| Maintenance | 34 | | |
| Optional Hot Water Heat | 43 | | |
| Hot Water Heater Design | 43 | | |
| Optional Energy Recovery Wheel | 44 | | |
| Optional Outdoor Air Monitor | 46 | | |
| Thermal Dispersion Airflow Measurement Technology | 46 | | |

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 | IM 916 |
| BACnet® Integration | IM 917 |
| LONWORKS® Integration | IM 918 |
| DPS Unit Controller Discharge Air Control (VAV or CAV) Space Comfort Control (SCC) | OM 1141 |
| Rebel Quick Start Guide | OM 1164 |

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.

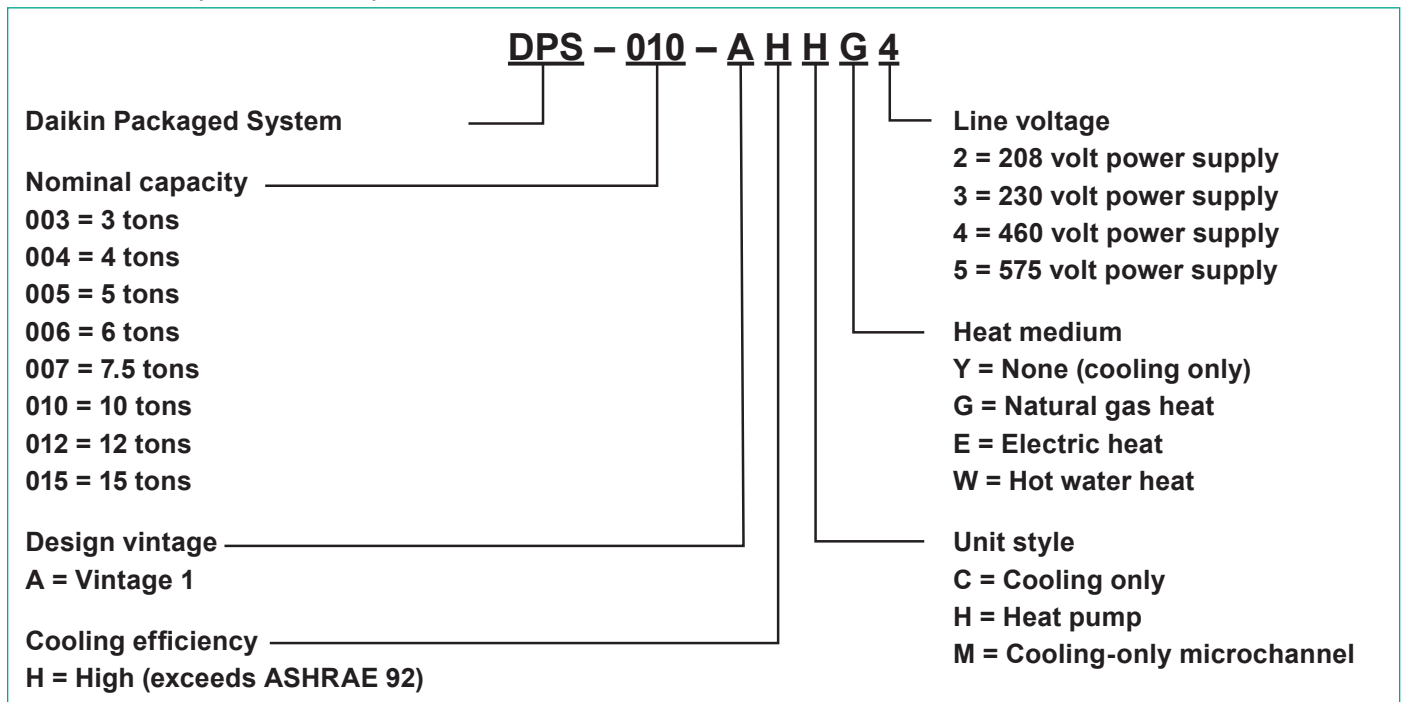
WARNING

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 003–015)



Installer Responsibilities

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

CAUTION

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

Receiving Inspection

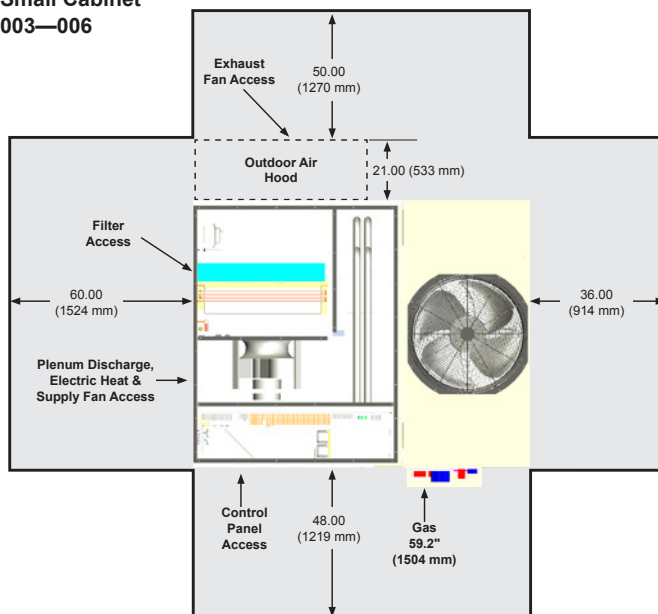
When the equipment is received, all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. **If the unit has become dirty during shipment (winter road chemicals are of particular concern), clean it when received.**

All units should be carefully inspected for damage when received. Report all shipping damage to the carrier and file a claim. In most cases, equipment is shipped F.O.B. factory and claims for freight damage should be filed by the consignee.

Before unloading the unit, check the unit nameplate to make sure the voltage complies with the power supply available.

Figure 1: Service Clearances

**Small Cabinet
003—006**



Service Clearance

Allow service clearances as approximately indicated in [Figure 1](#). Also, McQuay 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.

CAUTION

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

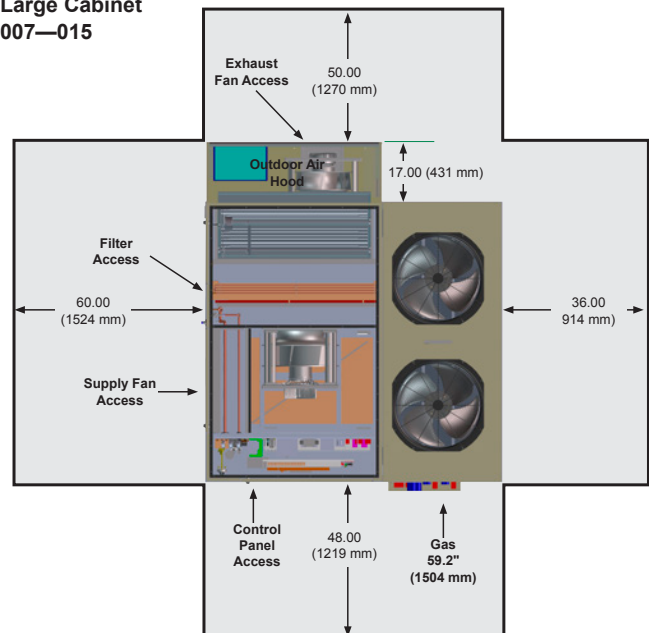
Ventilation Clearance

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).

**Large Cabinet
007—015**



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.

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

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

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

⚠ WARNING

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

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

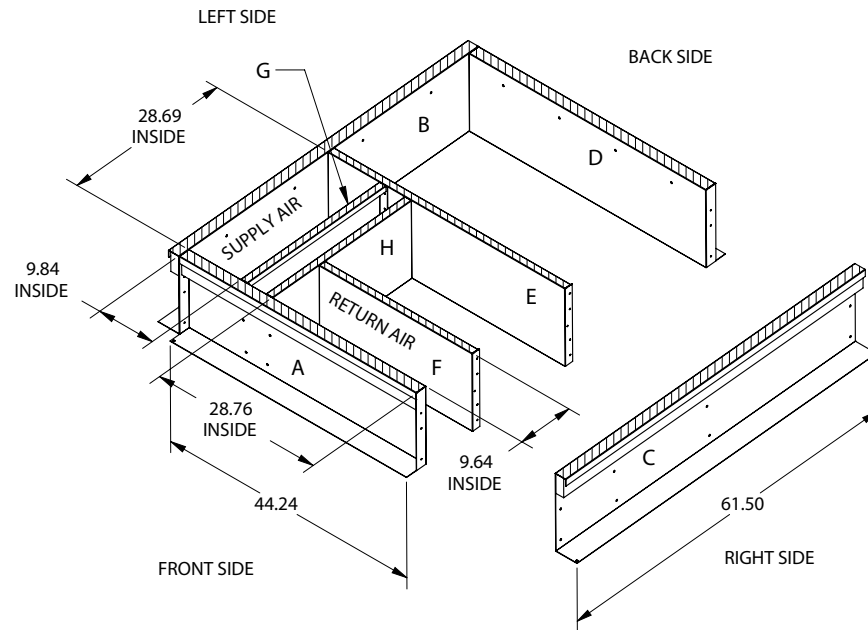
The gasketed top surface of the curb seals against the unit when it is set on the curb. These flanges must not support the total weight of the duct work. See [Installing Ductwork on page 10](#) for details on duct connections. It is critical that the condensate drain side of the unit be no higher than the opposite side.

Assembly Instructions

Assembly of a typical roof curb is shown in [Figure 2 on page 6](#) and [Figure 3 on page 7](#).

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 .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 .25 x 1.50 wide gasket and apply to surfaces shown by crosshatching.
6. Check that electrical connections are coordinated.

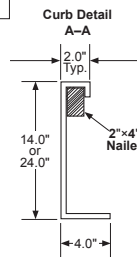
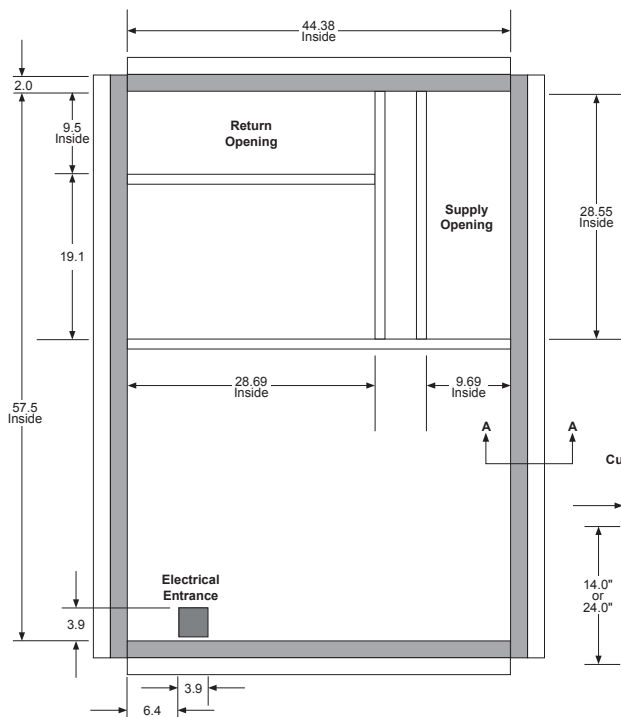
Figure 2: Roof Curb Assembly (DPS 003—006)¹



NOTE: 1. Check submittal drawing for gas/water/electrical/supply/return air opening

NOTE: Horizontal above the roof gas connection only

Standard Roof Curb – "A" Cabinet



Roof Curb for ERW – "A" Cabinet

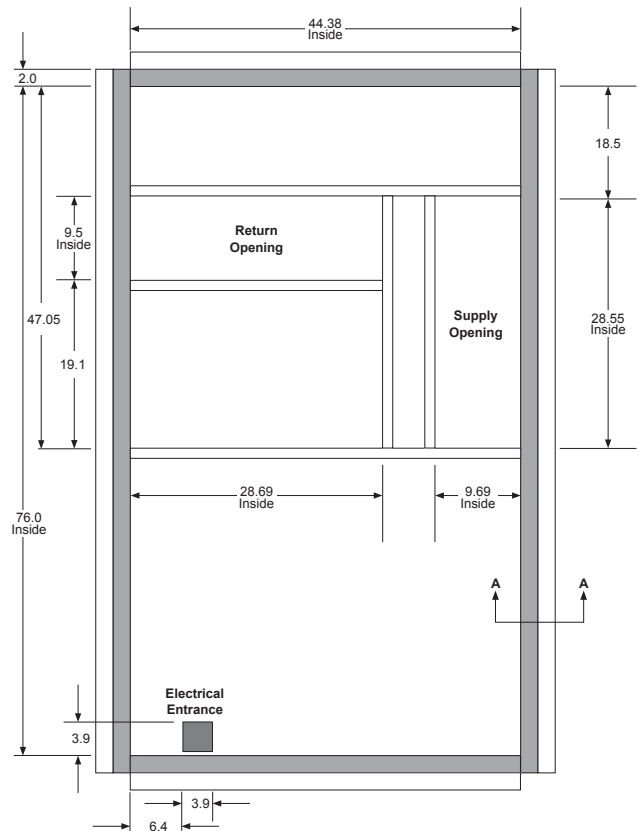
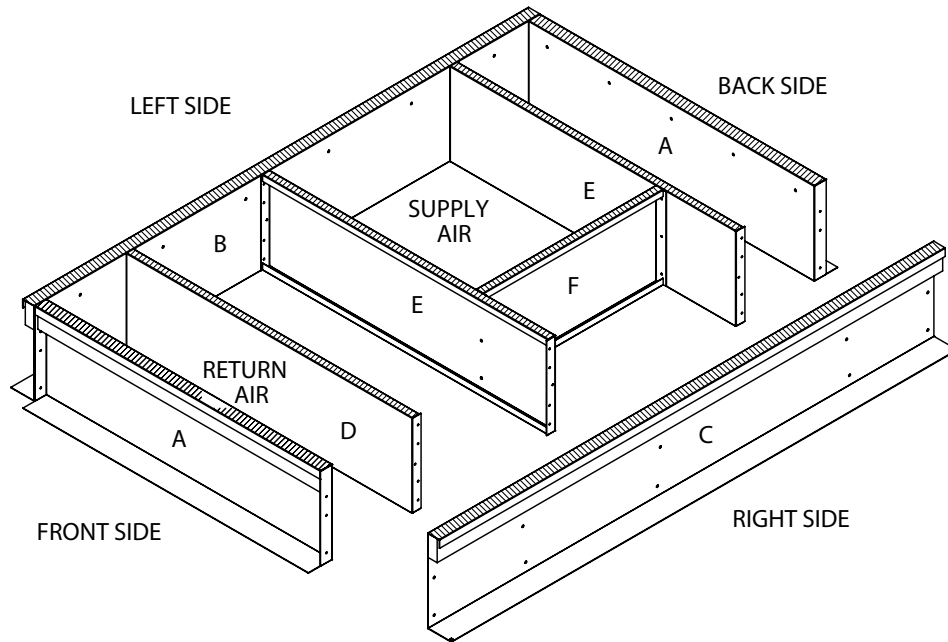


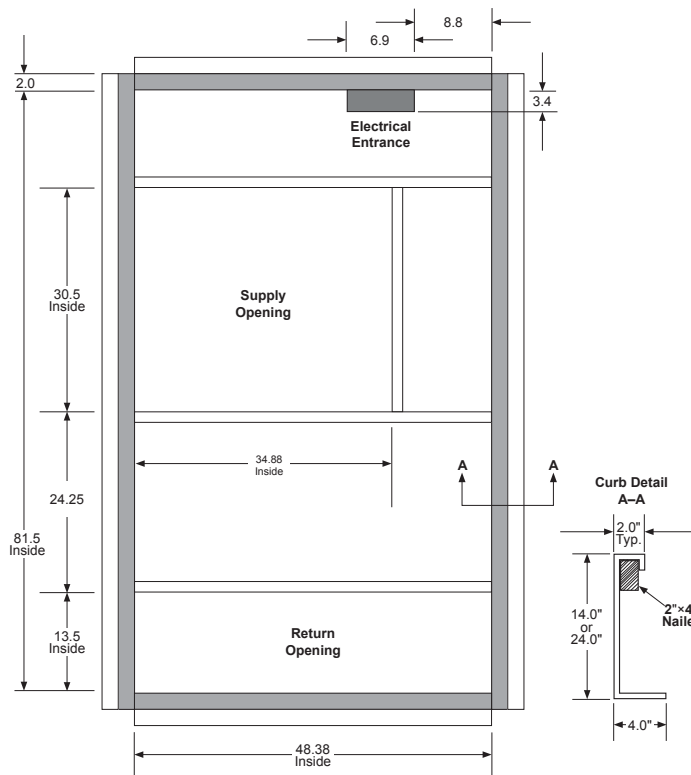
Figure 3: Roof Curb Assembly (DPS 007-015)¹



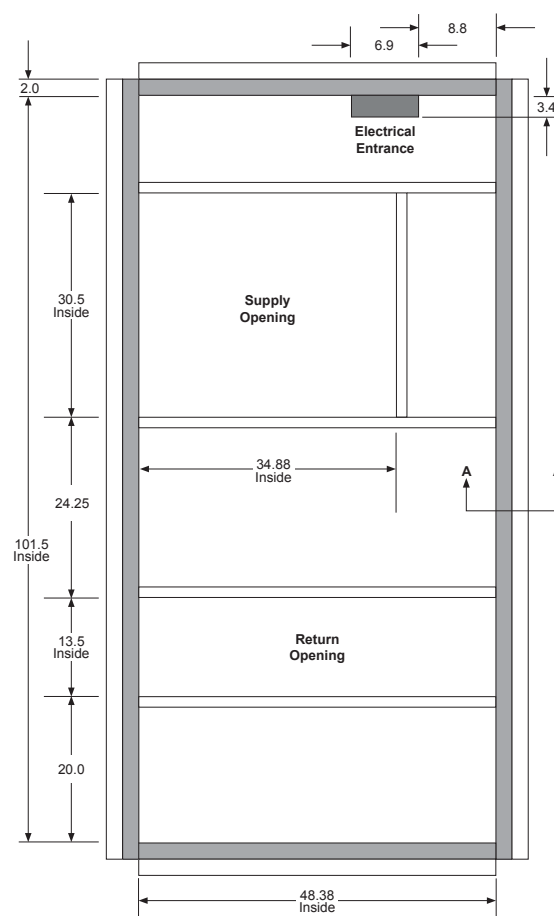
NOTE: 1. Check submittal drawing for gas/water/electrical/supply/return air opening

NOTE: Horizontal above the roof gas connection only

Standard Roof Curb – "B" Cabinet



Roof Curb for ERW – "B" 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** (see Figure 4). Figure 4 is an example of an instruction label 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.

Table 2: Unit Component Weights

| Size | 003 | 004 | 005 | 006 | 007 | 010 | 012 | 015 |
|--------------------------|------|------|------|------|------|------|------|------|
| Base Weight ¹ | 1058 | 1058 | 1058 | 1058 | 1600 | 1600 | 1600 | 1600 |
| Heat Pump | 1058 | 1058 | 1058 | 1058 | 1600 | 1600 | 1600 | 1600 |
| Electric Heat | 45 | 45 | 45 | 45 | 100 | 100 | 100 | 100 |
| Hot Water 2 Row | 16.5 | 16.5 | 16.5 | 16.5 | 30 | 30 | 30 | 30 |
| Hot Water 1 Row | 20 | 20 | 20 | 20 | 31 | 31 | 31 | 31 |
| Gas Heat | 93 | 93 | 93 | 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 |
| Power Exhaust | 201 | 201 | 201 | 201 | 346 | 346 | 346 | 346 |
| High Capacity Coil | 105 | 105 | 105 | 105 | 215 | 215 | 215 | 215 |

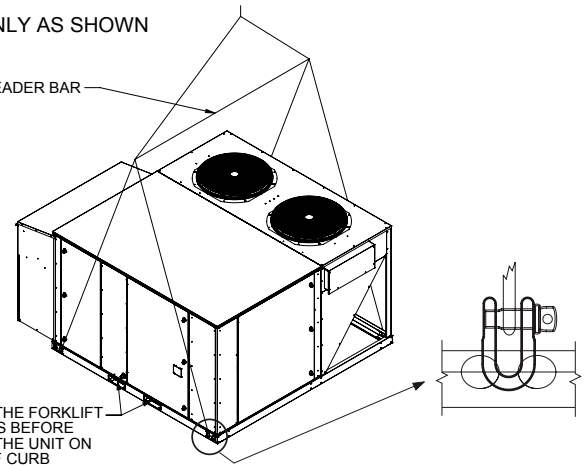
NOTE: 1. Includes standard cooling coil

Figure 4: Rigging Label

LIFT ONLY AS SHOWN

USE SPREADER BAR

REMOVE THE FORKLIFT CHANNELS BEFORE SETTING THE UNIT ON THE ROOF CURB



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

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

Table 3: Fan Assembly Weights

| Diameter | Weight |
|----------|---------|
| 12 Inch | 35 lbs |
| 14 Inch | 38 lbs |
| 16 Inch | 55 lbs |
| 18 Inch | 87 lbs |
| 20 Inch | 91 lbs |
| 22 Inch | 115 lbs |

Table 4: Energy Wheel Weight Additions

| | 30% OA | Econo | 100% OA |
|---------------|--------|-------|---------|
| Small Cabinet | 160 | 175 | 160 |
| Large Cabinet | 225 | 250 | 300 |

Table 5: Curb Weights

| Unit | Curb Size (Height) | |
|------------|--------------------|---------|
| | 14 Inch | 24 Inch |
| 3–6 Ton | 156 | 230 |
| 7.5–15 Ton | 200 | 295 |

Unit Piping - Condensate Drain Connection

The unit is provided with a 3/4" male NPT condensate drain connection. For proper drainage, level the unit and drain pan side to side and install a P-trap.

Figure 5 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.

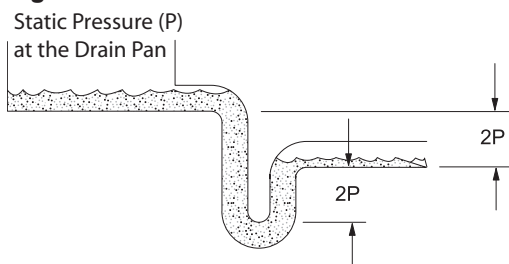
If condensate is piped into the building drainage system, pitch the drain line away from the unit a minimum of 1/8" per foot. The drain line must penetrate the roof external to the unit. Refer to local codes for additional requirements. Sealed drain lines require venting to provide proper condensate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

WARNING

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

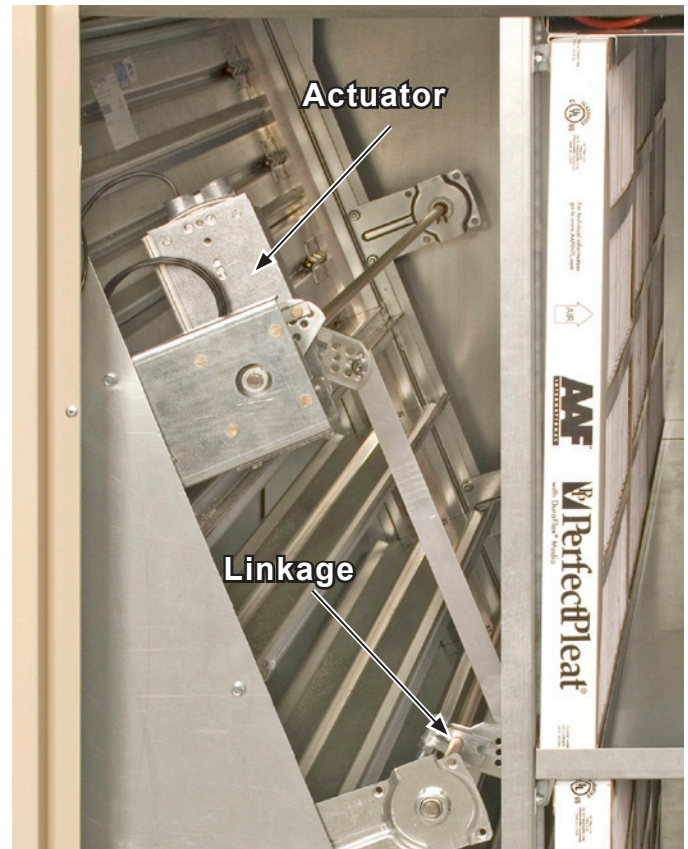
Figure 5: Condensate Drain Connection



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 6: 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 6). 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

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

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

CAUTION

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

Installing Ductwork

On vertical-supply/vertical-return units, if a Daikin roof curb is not used, the installing contractor should make an airtight connection by attaching field fabricated duct collars to the bottom surface of the unit's duct opening. Do not support the total weight of the duct work from the unit.

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

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

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

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

WARNING

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

Table 6: AHRI CFM Ratings

| Unit Size | AHRI Rated CFM | Unit Size | AHRI Rated CFM |
|-----------|----------------|-----------|----------------|
| 3 | 1140 | 7.5 | 2885 |
| 4 | 1550 | 10 | 3850 |
| 5 | 1810 | 12 | 4620 |
| 6 | 2310 | 15 | 4690 |

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 8](#)).
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 7](#)). Connect the tubes to appropriate barbed fittings (on SPS1) in the control panel. (Fittings are sized to accept 3/16" ID tubing.)

Figure 7: Wiring Chase

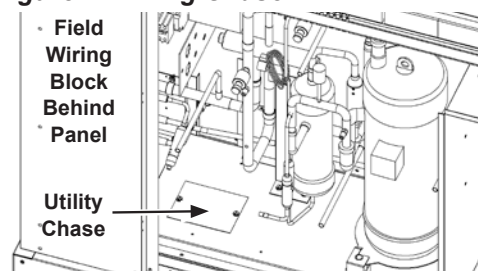
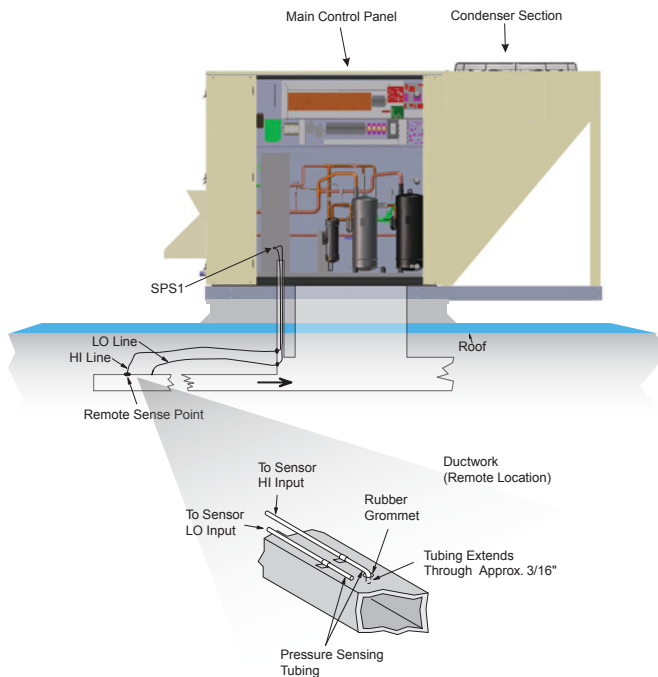


Figure 8: Duct Static Pressure Sensing Tubing Installation



Installing Building Static Pressure Sensor Taps

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

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

CAUTION

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

Building Pressurization Applications

1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor fitting. This facilitates connecting a manometer or pressure gauge if testing is required.
2. Locate the building pressure (high) tap in the area that requires the closest control. Typically, this is a ground level floor that has doors to the outside.

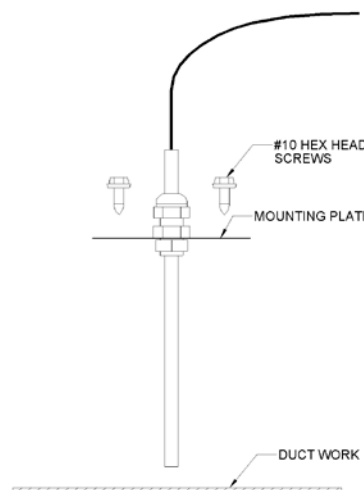
3. Locate the building tap so it is not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
4. Route the building tap tube through the curb and feed it into the unit through the knockout in the bottom of the control panel (refer to Figure 7). Connect the 1/8" 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 1/8" 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 9: Discharge Air Temperature Sensor Installation



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 inside 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 7](#) and also [Table 7](#)). Refer to the unit nameplate to determine the number of power connections.

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.

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

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 7 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.

⚠ 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.

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.

Table 7: 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.

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).

⚠ WARNING

Electrical shock hazard. Can cause severe injury or death.

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

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.

⚠ 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.

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 8: Electric Heat Data¹

| 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 | | | |

NOTE: 1. Maximum temperature rise equals 60°F

Table 9: Amp Draw Data

| Unit Size | Compressor RLA | | | | | | | | Compressor LRA | | | | | | Compressor Size | | Condenser Fan FLA* | | | |
|-----------|-------------------------|------|-----|-------|----------------------|------|-----|--|----------------|-------|------|--------------|------|------|-----------------|--------|--------------------|-----|-----|-----|
| | Compressor 1 - Variable | | | | Compressor 3 - Fixed | | | | Compressor 1 | | | Compressor 3 | | | Comp 1 | Comp 3 | Qty | 208 | 230 | 460 |
| | Voltage | | | | Voltage | | | | Voltage | | | Voltage | | | [P/N] | [P/N] | | | | |
| Tons | 208 | 230 | 460 | [%] | 208 | 230 | 460 | | 208 | 230 | 460 | 208 | 230 | 460 | | | | | | |
| 3 | 7.7 | 7.0 | 3.5 | 45.0% | 0.0 | 0.0 | 0.0 | | 143.8 | 130.0 | 65.0 | 0.0 | 0.0 | 0.0 | JT1G | NA | 1 | 0.9 | 0.8 | 0.4 |
| 4 | 10.0 | 9.0 | 4.5 | 55.0% | 0.0 | 0.0 | 0.0 | | 143.8 | 130.0 | 65.0 | 0.0 | 0.0 | 0.0 | JT1G | NA | 1 | 0.9 | 0.8 | 0.4 |
| 5 | 11.9 | 10.8 | 5.4 | 68.0% | 0.0 | 0.0 | 0.0 | | 143.8 | 130.0 | 65.0 | 0.0 | 0.0 | 0.0 | JT1G | NA | 1 | 2.0 | 1.8 | 0.9 |
| 6 | 15.0 | 13.6 | 6.8 | 89.0% | 0.0 | 0.0 | 0.0 | | 143.8 | 130.0 | 65.0 | 0.0 | 0.0 | 0.0 | JT1G | NA | 1 | 2.0 | 1.8 | 0.9 |
| 7.5 | 11.9 | 10.8 | 5.4 | 68.0% | 8.6 | 7.8 | 3.9 | | 143.8 | 130.0 | 65.0 | 67.5 | 73.7 | 37.1 | JT1G | JT71G | 2 | 2.0 | 1.8 | 0.9 |
| 10 | 10.0 | 9.0 | 4.5 | 59.0% | 17.5 | 15.8 | 7.9 | | 143.8 | 130.0 | 65.0 | 93.1 | 84.2 | 42.1 | JT1G | JT170G | 2 | 2.0 | 1.8 | 0.9 |
| 12 | 15.0 | 13.6 | 6.8 | 89.0% | 17.5 | 15.8 | 7.9 | | 143.8 | 130.0 | 65.0 | 93.1 | 84.2 | 42.1 | JT1G | JT170G | 2 | 2.0 | 1.8 | 0.9 |
| 15 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | N/A | N/A | N/A | N/A | N/A | N/A | JT150J | JT170G | N/A | N/A | N/A | N/A |

| Horse Power | Supply Fan FLA | | | | Exhaust Fan FLA | | | |
|-------------|----------------|------|-----|-----|-----------------|-----|-----|-----|
| | Voltage | | | | Voltage | | | |
| | 208 | 230 | 460 | kW | 208 | 230 | 460 | kW |
| 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 |
| 4 | 8.8 | 7.4 | 4.0 | 3.0 | 8.8 | 7.4 | 4.0 | 3.0 |
| 8 | 13.5 | 12.2 | 6.1 | 6.0 | — | — | — | — |

NOTE: * Values are for total condenser fan FLA, on 7.5-12 and 15T units the value include both fans
575 Amp Draws: Compressors and motors will be run off a 575 to 460V transformer. Motors will be nameplated at 460V.
For MCA & MOP calculations the motor's FLA will be multiplier by 80% (575/460) and calculation is run as normal.

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 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 10: Refrigeration Circuit for Large Cabinet Cooling Only (DPS) unit with Modulating Hot Gas Reheat

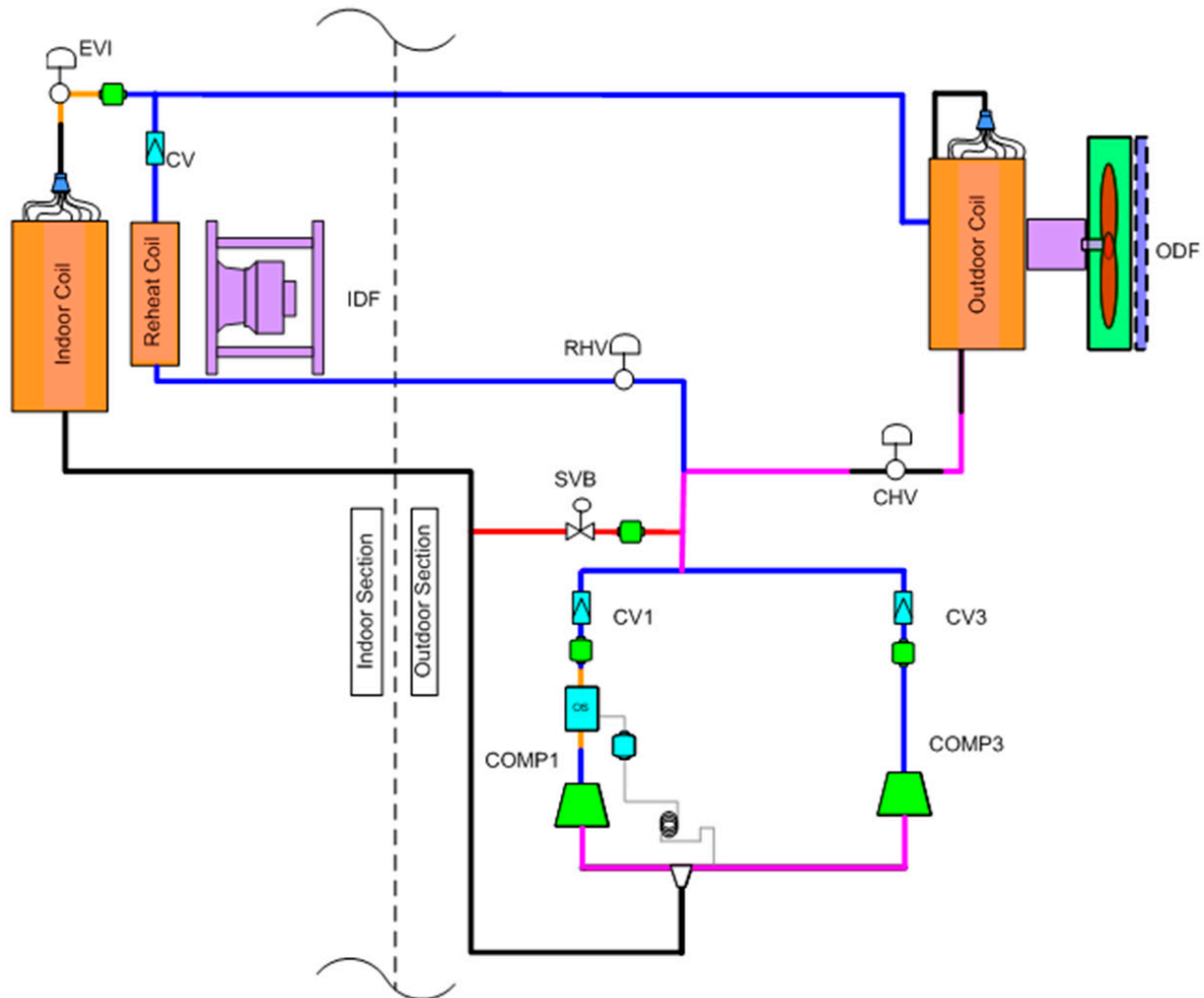
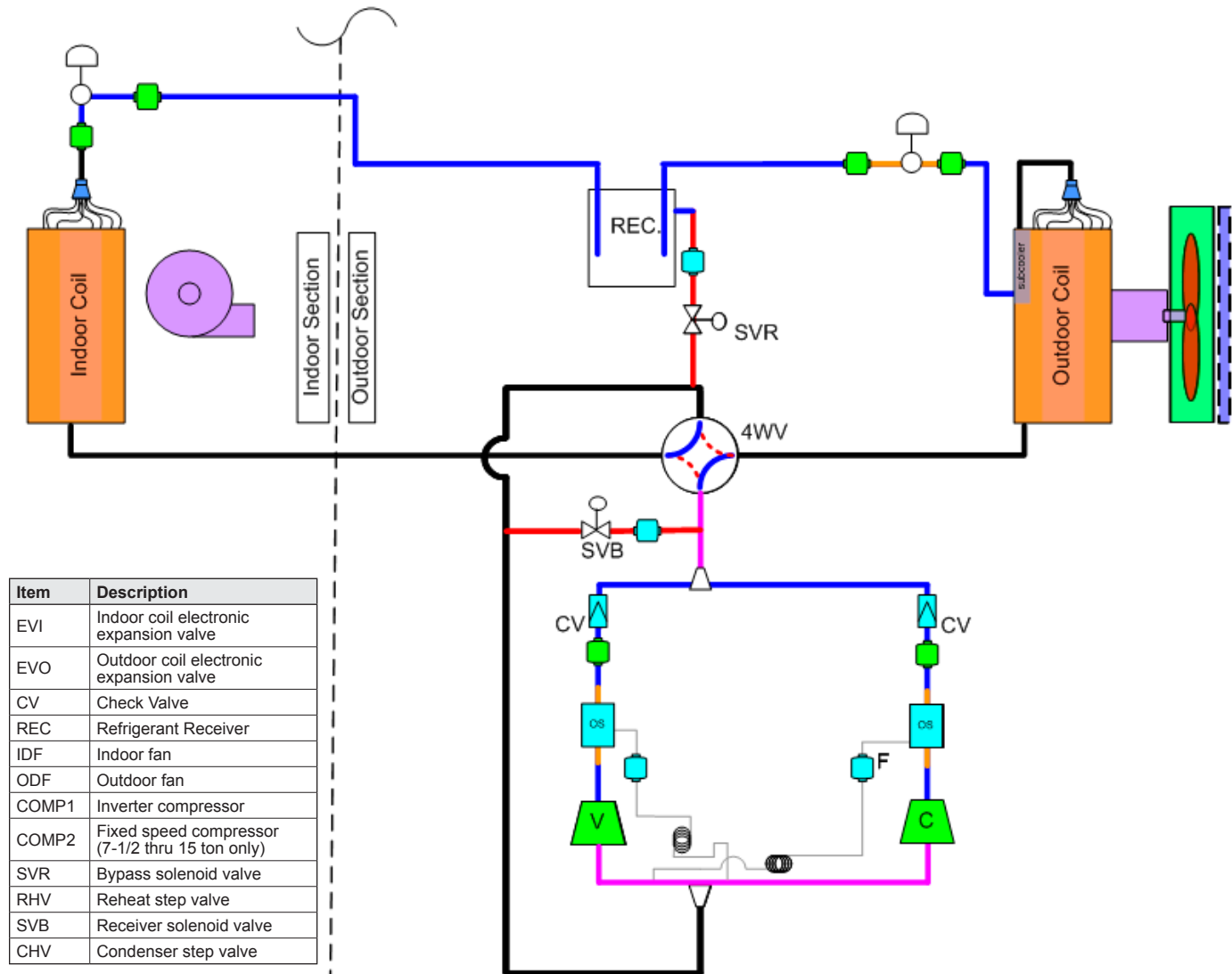


Figure 11: Refrigeration Circuit for Large Cabinet Heat Pump (DPH) unit with Modulating Hot Gas Reheat

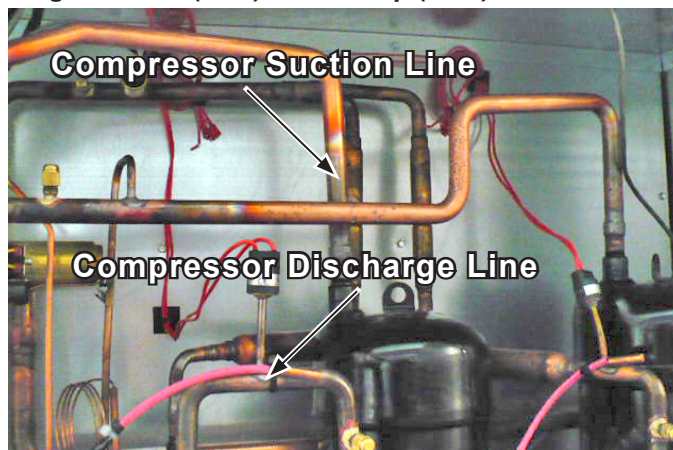


Component Description

Variable Speed Compressor

A variable speed compressor (COMP1) is used on all Rebel Units, DPS. On small cabinet units (3–6 Tons) the variable speed compressor will be the only one present. On large 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. This is an efficient contrast to other products that require intermittent oil return cycles.

Figure 12: Compressor Suction and Discharge on Large Cabinet (7.5T) Heat Pump (DPH)



Fixed Speed Compressor (7–15 Only)

The fixed speed compressor (COMP3) is used on all large 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 13: Compressor Tandem on Large Cabinet (7.5T) Heat Pump (DPH)



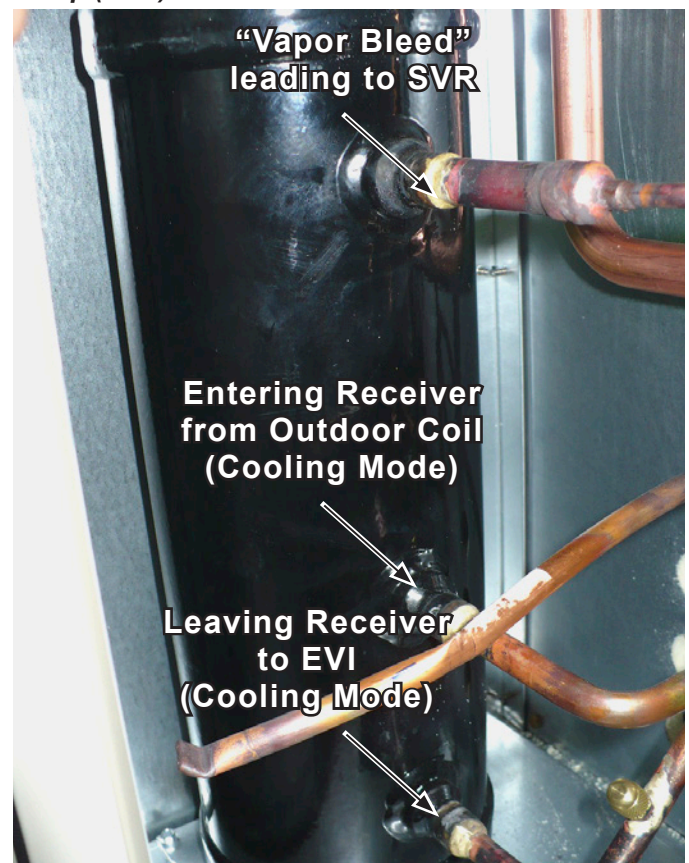
Receiver

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 14: Receiver on Large Cabinet (7.5T) Heat Pump (DPH)



Oil Separator

All Rebel, DPS(H), 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 15: Oil Separator



Figure 16: Secondary Oil Separator



Check Valve

All Rebel Units will have check valves on each of the compressor discharge lines. On large 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.

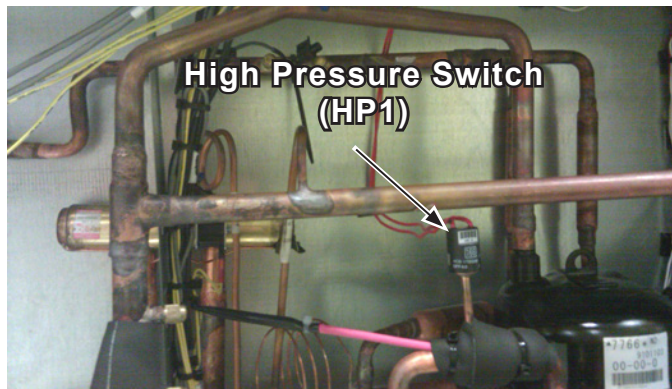
Figure 17: Discharge Line Check Valves on Large Cabinet (7.5T) Heat Pump (DPH)



High Pressure Switch

All Rebel Units will have a high pressure switch on each compressor. Large 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.

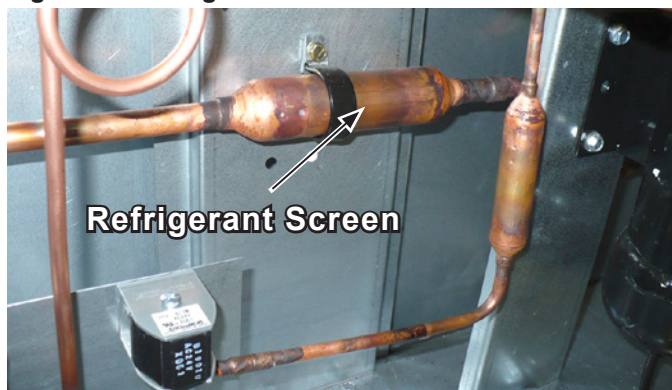
Figure 18: High Pressure Switch



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.

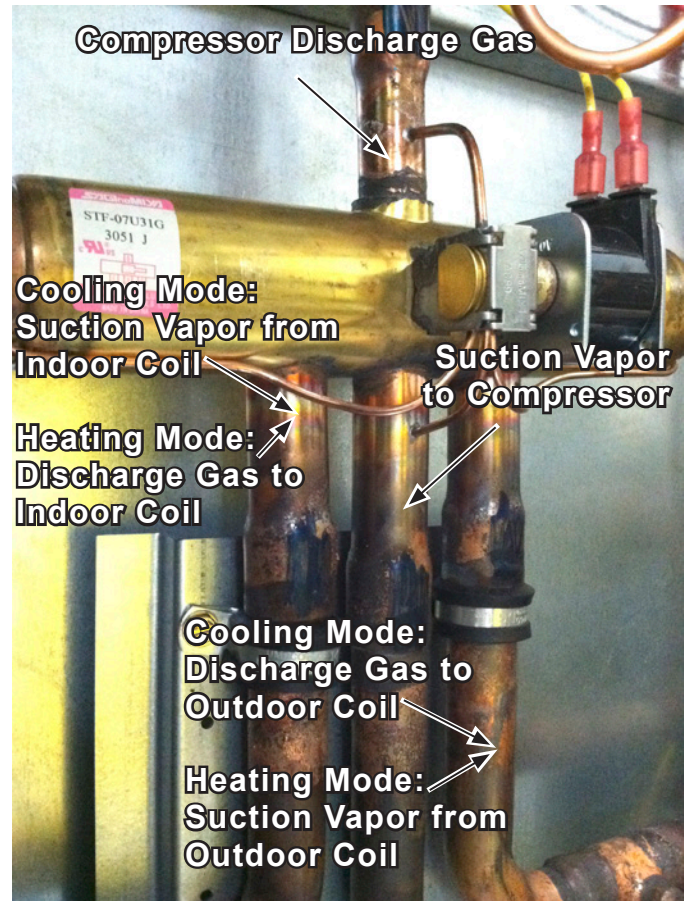
Figure 19: Refrigerant Screen



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.

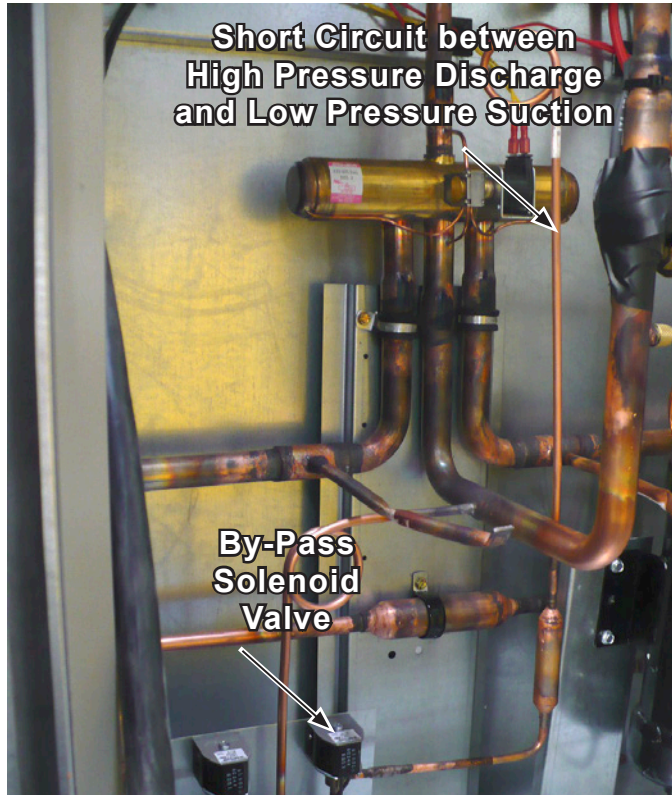
Figure 20: Four-Way Valve



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. In order to increase compressor longevity the SVB will open during compressor start-up to minimize the necessary starting torque and inrush current.

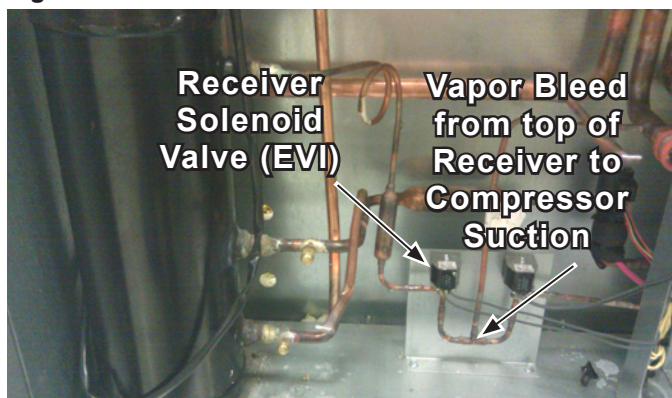
Figure 21: By-pass Solenoid Valve



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.

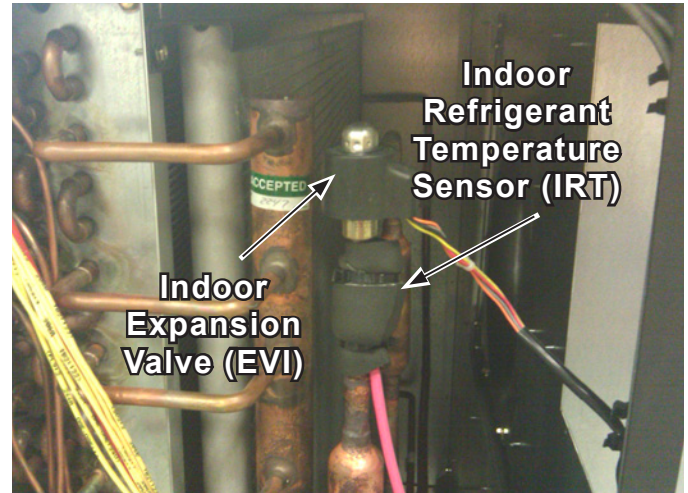
Figure 22: Receiver Solenoid Valve



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 23: 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).

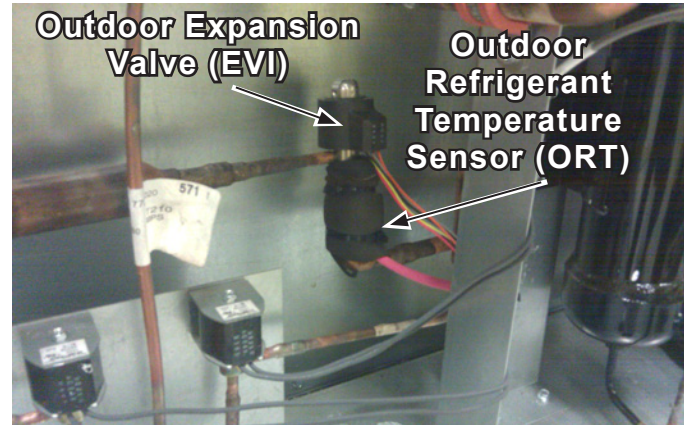
Indoor Refrigerant Temperature

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 24: 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.

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 setpoint.

Defrost

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 McQuay'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 10: 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 |

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 25) will control how much hot gas is routed to the indoor coil to maintain a discharge air setpoint.

Figure 25: Dual 2-Way Valve Refrigeration Schematic (Cooling Model Shown)

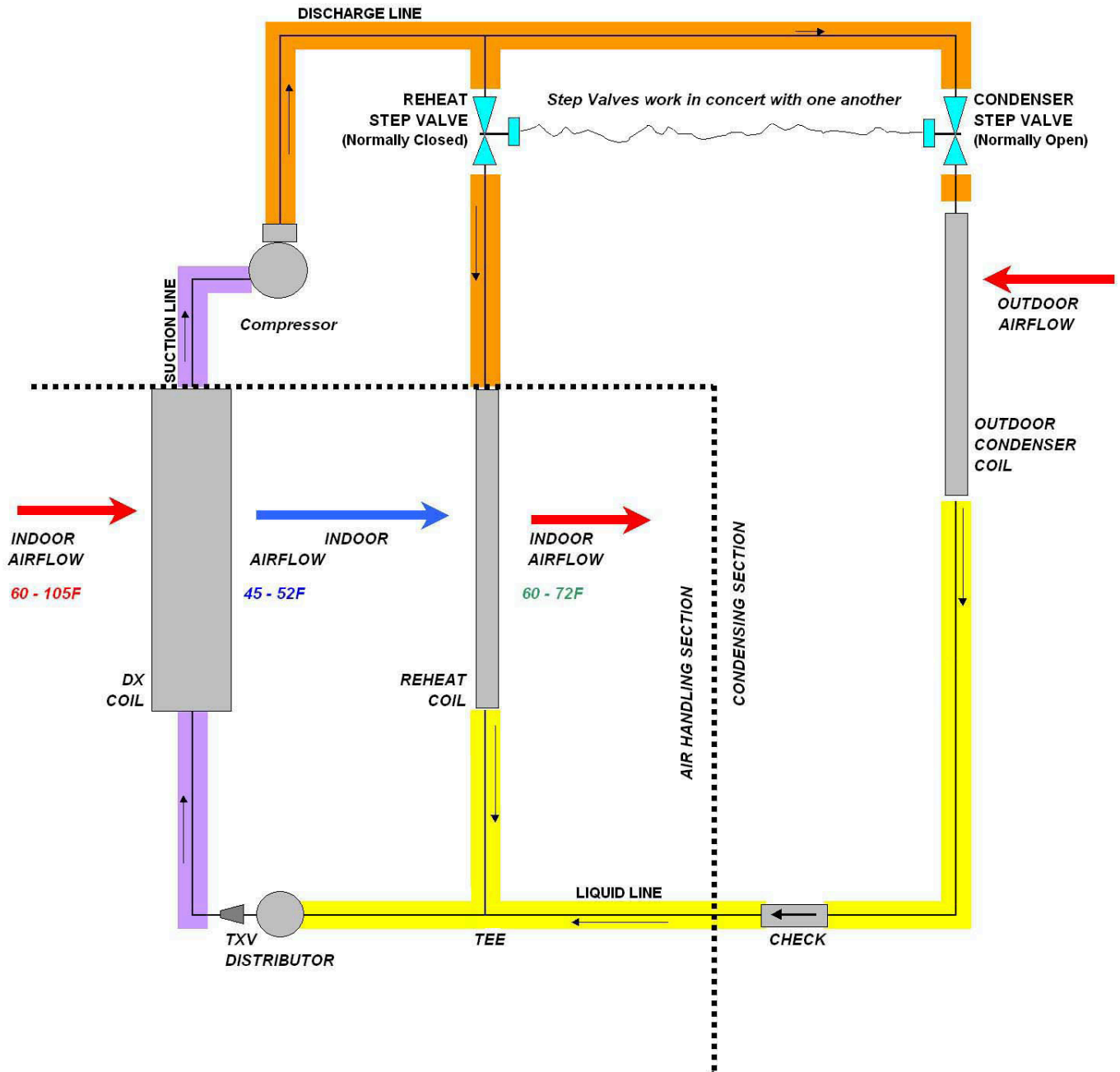
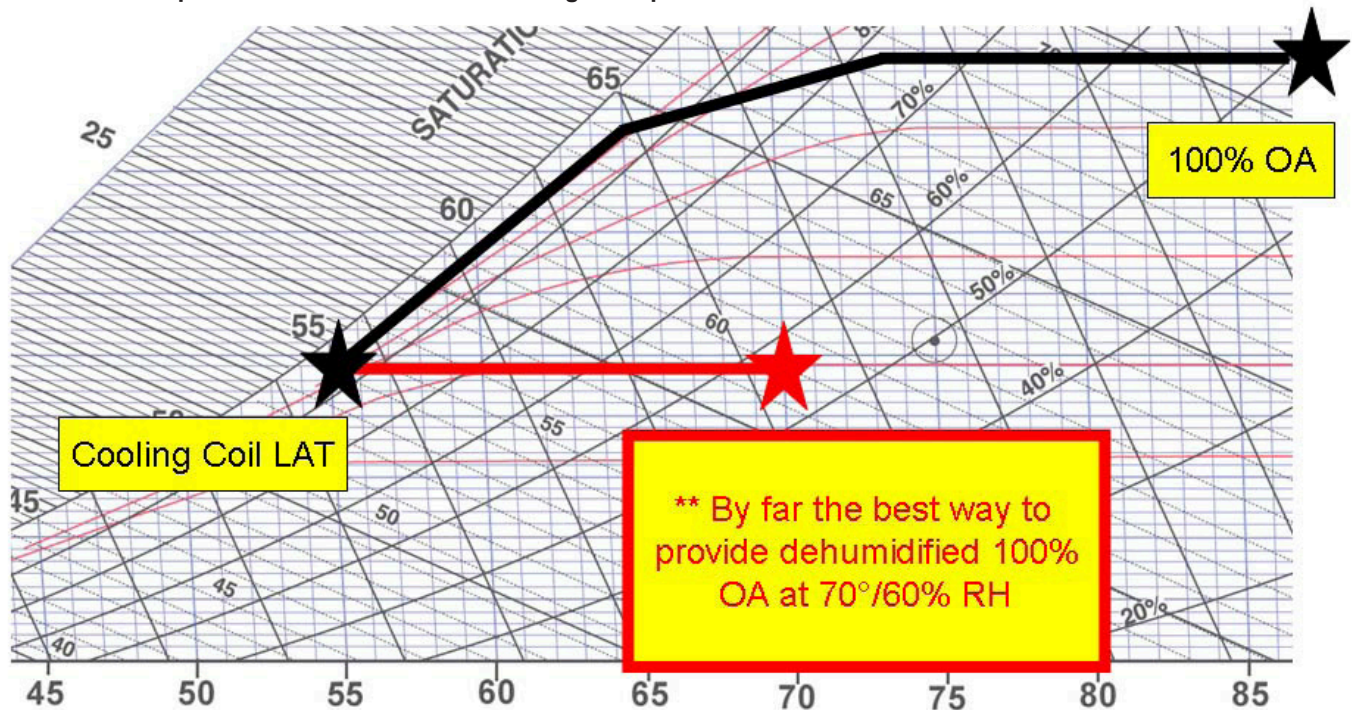


Figure 26: Ideal for Neutral Air Ventilation Control

- 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.

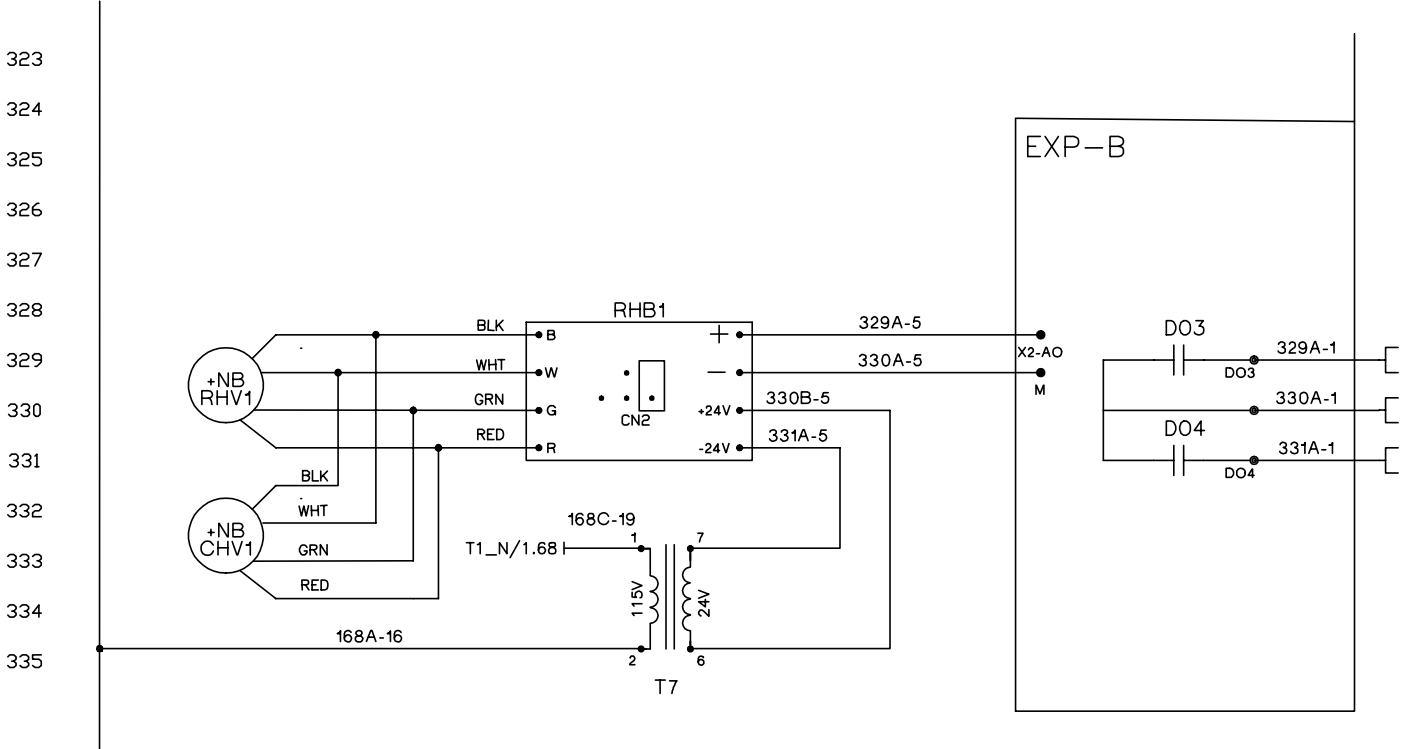
Control & Arrangement

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 27: Modulating Hot Gas Reheat Schematic



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 commercial rooftop units are available with 4-stage heat output (see capacities in [Table 21](#)). 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 11: DPS 003 – 015 Electric Heating Capacities

| Unit | Nom cfm | Stages | Heat 1 | | | | Heat 2 | | | | Heat 3 | | | | Heat 4 | | | |
|------|---------|--------|--------|-------|----------------------|---------|--------|-------|----------------------|---------|--------|-------|----------------------|---------|-------------------|--------|----------------------|---------|
| | | | kW | MBh | Delta T ¹ | Min cfm | kW | MBh | Delta T ¹ | Min cfm | kW | MBh | Delta T ¹ | Min cfm | kW | MBh | Delta T ¹ | Min cfm |
| 003 | 1200 | 2 | 6 | 20478 | 15.8 | 316 | 12 | 40956 | 31.6 | 632 | 18 | 61434 | 47.4 | 948 | — | — | — | — |
| 004 | 1600 | 2 | 6 | 20478 | 11.9 | 316 | 12 | 40956 | 23.7 | 632 | 18 | 61434 | 35.6 | 948 | 30 | 102390 | 59.3 | 1580 |
| 005 | 2000 | 2 | 6 | 20478 | 9.5 | 316 | 12 | 40956 | 19.0 | 632 | 18 | 61434 | 28.4 | 948 | 30 | 102390 | 47.4 | 1580 |
| 006 | 2400 | 2, SCR | 6 | 20.5 | 7.9 | 316 | 12 | 40.9 | 15.8 | 632 | 18 | 61.4 | 23.7 | 948 | 30 | 102.4 | 39.5 | 1580 |
| 007 | 3000 | 4, SCR | 18 | 61.4 | 19.0 | 948 | 36 | 122.9 | 37.9 | 1896 | 54 | 184.3 | 56.9 | 2844 | 72.0 ² | 245.8 | 60.0 ³ | 3793 |
| 010 | 4000 | 4, SCR | 18 | 61.4 | 14.2 | 948 | 36 | 122.9 | 28.4 | 1896 | 54 | 184.3 | 42.7 | 2844 | 72.0 ² | 245.8 | 56.9 | 3793 |
| 012 | 4800 | 4, SCR | 18 | 61.4 | 11.9 | 948 | 36 | 122.9 | 23.7 | 1896 | 54 | 184.3 | 35.6 | 2844 | 72.0 ² | 245.8 | 47.4 | 3793 |
| 015 | 4800 | 4, SCR | 18 | 61.4 | 11.9 | 948 | 36 | 122.9 | 23.7 | 1896 | 54 | 184.3 | 35.6 | 2844 | 72.0 ² | 245.8 | 47.4 | 3793 |

NOTE: 1. Temperature is calculated at nominal air flow
2. Not available in 208 & 230 Volt
3. 60 degree max rise

Electric Heater Data¹

Table 12: DPS 003 – 015 Electric Heater Data (Maximum Temp. 60°F)

| kW | Voltage | Amps | kW | Voltage | Amps | kW | Voltage | Amps |
|----|---------|------|----|---------|-------|----|---------|-------|
| 6 | 208 | 16.7 | 30 | 208 | 83.3 | 72 | 208 | 199.9 |
| | 230 | 15.1 | | 230 | 75.3 | | 230 | 180.7 |
| | 475 | 7.3 | | 475 | 36.5 | | 475 | 87.5 |
| | 575 | 6.0 | | 575 | 30.1 | | 575 | 72.3 |
| 12 | 208 | 33.3 | 36 | 208 | 99.9 | | | |
| | 230 | 30.1 | | 230 | 90.4 | | | |
| | 475 | 14.6 | | 475 | 43.8 | | | |
| | 575 | 12.0 | | 575 | 36.1 | | | |
| 18 | 208 | 50.0 | 54 | 208 | 149.9 | | | |
| | 230 | 45.2 | | 230 | 135.6 | | | |
| | 475 | 21.9 | | 475 | 65.6 | | | |
| | 575 | 18.1 | | 575 | 54.2 | | | |

NOTE: 1. Maximum temperature rise = 60°

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 13). 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 30).

Figure 28: Gas Heat Section

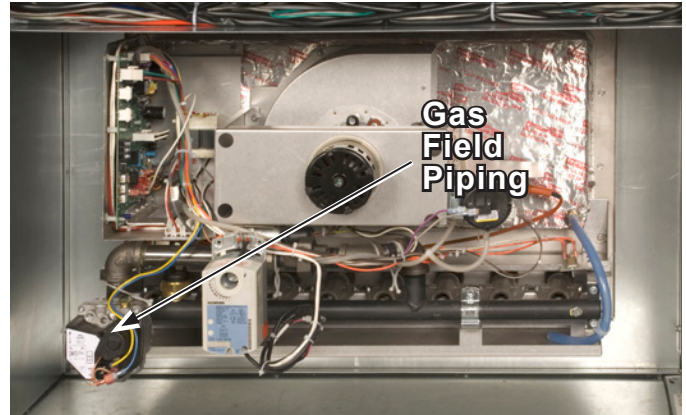
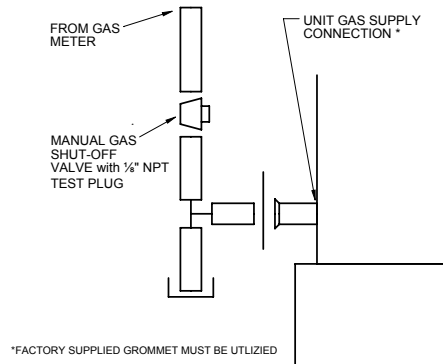


Figure 29: Field Gas Heat Connections



Gas Heating Capacity Data

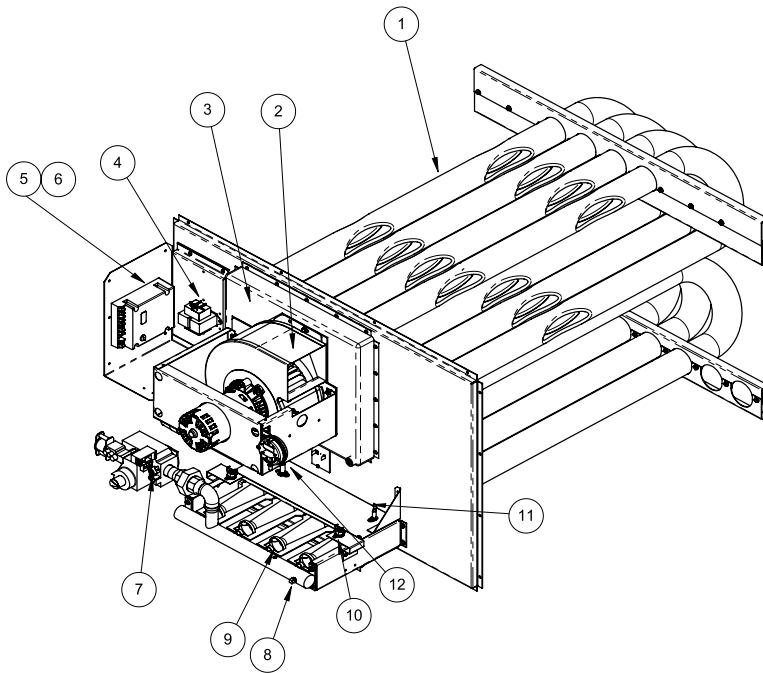
Table 13: DPS 003-015 Gas Heating Capacities

| 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 ¹ | 5:1 | | | 10:1 | | |
| Maximum Temperature Rise ³ | 60/100 | | | | | |
| Gas Connection Size | 1/2" | | | 3/4" | | |
| Min/Max External Static Pressure | 0.5"/2.5" | | | | | |
| Gas Main Pressure | | | | | | |
| 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 |
| Manifold Pressure Natural Gas (per gas valve) | | | | | | |
| Stage 1 (in. wc) | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Stage 2 (in. wc) | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| Low fire ² | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Manifold Pressure Propane | | | | | | |
| Stage 1 (in. wc) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Stage 2 (in. wc) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Low fire ² | N/A | 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°

Figure 30: Staged Furnace Assembly



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

Warranty Exclusion

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

⚠ WARNING

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

⚠ WARNING

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

Ventilation & Flue Pipe Requirements

The 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.

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.

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 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.

⚠ 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.

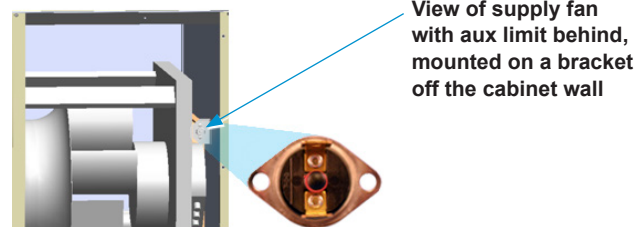
Auxiliary Limit Switch Function

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.

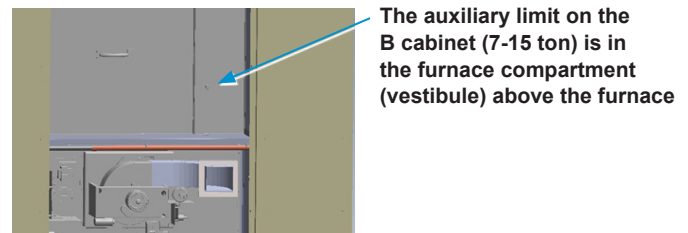
Figure 31: 3-6 Ton—Auxiliary Limit Switch



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.

Figure 32: 7-15 Ton—Auxiliary Limit Switch



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

Table 14: 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 15: Specific Gravity Other Than 0.60

| Specific Gravity | Multiplier |
|--------------------|------------|
| 0.50 | 1.100 |
| 0.60 | 1.000 |
| 0.70 | 0.936 |
| 0.80 | 0.867 |
| 0.90 | 0.816 |
| 1.00 | 0.775 |
| PROPANE-AIR | |
| 1.10 | 0.740 |
| PROPANE | |
| 1.55 | 0.622 |
| BUTANE | |
| 2.00 | 0.547 |

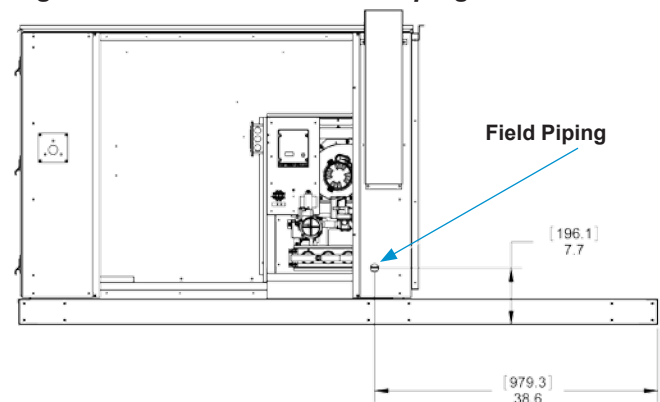
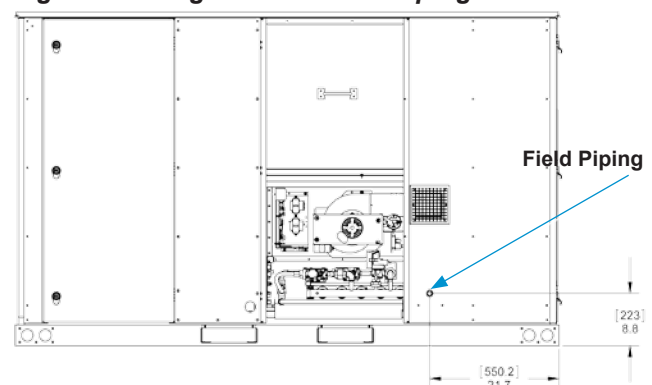
Table 16: Pressure Drop Other Than 0.3"

| 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 33](#) or [Figure 34](#)).
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.

Figure 33: Small Cabinet Gas Piping

Figure 34: Large Cabinet Gas Piping


Sequence of Operation (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 checked 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.

Sequence of Operation (Modulating Burner)

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.

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.

LP Conversion (Staged Furnace 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 17](#) for part numbers.

The LP gas valve maintains the proper manifold pressure for LP gas. See [Table 17](#). The correct burner orifices are included in the kit.

Table 17: Furnace Identification for LP Conversion

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

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.

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 18](#) for part numbers.

Table 18: Furnace Identifications for Altitude

| Staged Operation | |
|------------------|-----------|
| 2000—2999 | 300049578 |
| 3000—3999 | 300049579 |
| 4000—4999 | 300049580 |
| 5000—5999 | 300049581 |
| 6000—6999 | 300049582 |

Start-Up Procedures

Start-Up Responsibility

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

1. The furnace must not operate at an airflow below the specified Minimum Airflow CFM (refer to [Table 13 on page 28](#)). 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 13 on page 28](#)).

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.

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.

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 12 on page 27](#) & [Table 13 on page 28](#) 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.

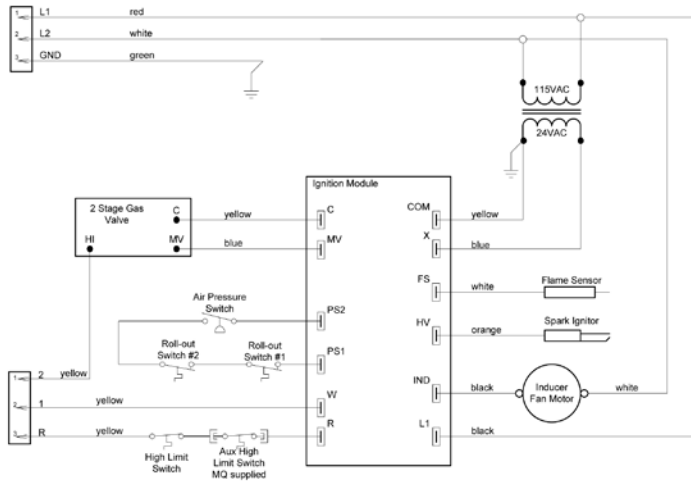
Yearly

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.

Ignition Control Module for Gas Furnace

Figure 35: 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 |

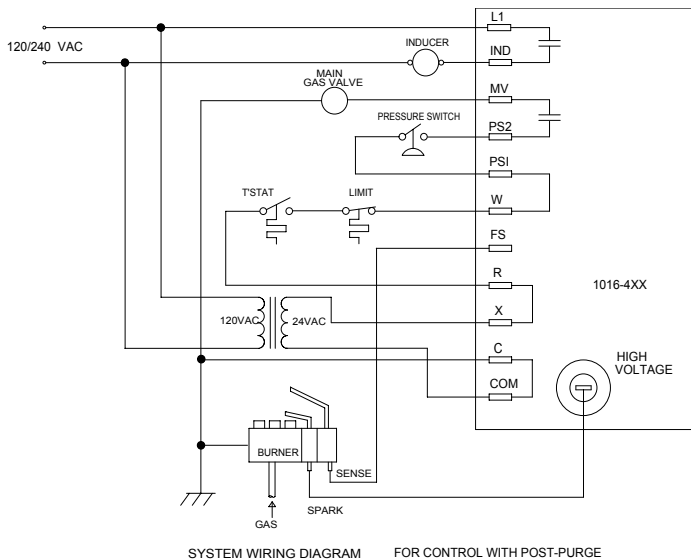
Ignition Control Module LED Diagnostics

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

Table 19: LED Indicator and Fault Conditions

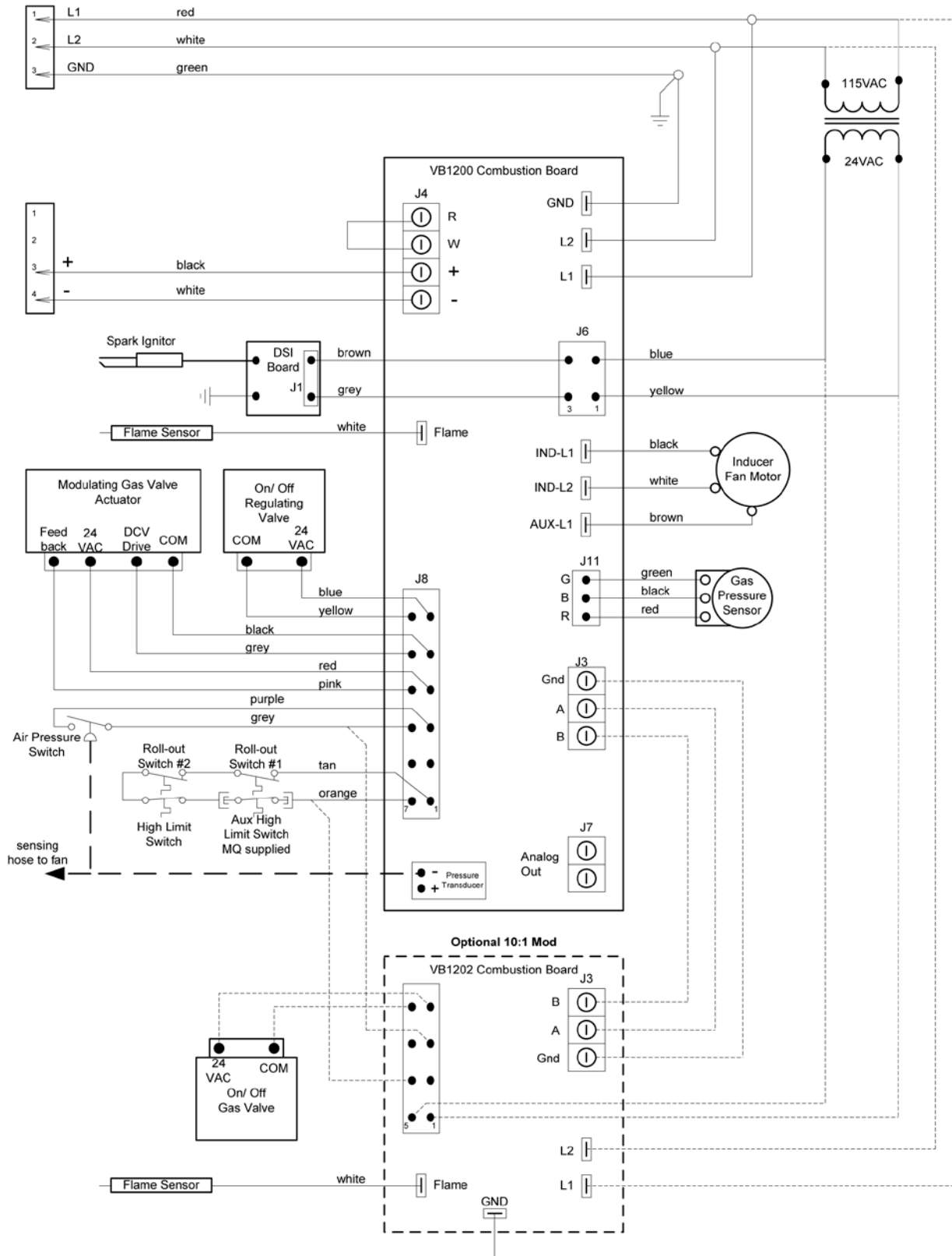
| Indicator | Fault Condition |
|------------|---|
| Steady Off | No power or control hardware fault |
| Steady On | Power applied, control OK |
| 1 Flash | Combustion fan motor energized, pressure switch open |
| 2 Flashes | Combustion fan motor off, pressure switch closed |
| 3 Flashes | Ignition lockout 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 36: Utec 1016-400 Wiring



Ignition Control Module for Modulating Gas Furnace

Figure 37: Typical Modulating Gas Furnace Electrical Schematic with Sensor



Variable Furnace Controller

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

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 20: 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. |
| nA.t Or L.P. | Burner fuel type, for example, natural gas or LP. |
| 6A.5. Or L.P. | |
| 1.0 1 | Software version, for example, v1.01 |

Table 21: 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 22: Functional Alerts

| Display Information | Alert | Description | Possible Cause | Solution |
|---------------------|---|--|--|--|
| A.O. 1 | Failed ignition attempt <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 "E.O. 1" in the LOCKOUT ERRORS section. | See "E.O. 1" in the LOCKOUT ERRORS section. |
| A.O. 2 | 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. 2. Re-install / replace flame sensor. |
| | | | C. Unstable flame pattern | 1. Check that all burner assembly components are properly installed. 2. Check that all seals between the vestibule area and the heat exchanger area are tight. 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. 2. Check 24 VAC to gas valve assembly. 3. Check inlet pressure to safety gas valve. 4. Check outlet pressure from the safety gas valve. 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) 2. Check alignment and set screw connection between ball valve and actuator. |
| A.O. 3 | Insufficient Combustion Air <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. 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 19: Functional Alerts

| Display Information | Alert | Description | Possible Cause | Solution |
|---------------------|-------------------|--|---|--|
| A.O.4 | Limited Low Fire | 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. | A. Low gas line pressure | 1. Insure gas supply is connected to furnace and check for proper line pressure. |
| | | | B. Insufficient intermediate gas manifold pressure through gas safety valve | 1. Check for faulty gas valve wiring. 2. Check 24 VAC to gas valve assembly. 3. Check inlet pressure to safety gas valve. 4. Check outlet pressure from the safety gas valve – adjust as needed. 5. Replace safety gas valve if faulty. |
| | | | C. Faulty burner operation | 1. Check for proper mounting of the burner assembly. 2. Check burner orifice for proper size and blockage. |
| | | | D. Faulty flame sensor | 1. Check flame rod wiring and connections. 2. Check for proper alignment of flame rod. 3. Clean flame rod sensor. |
| | | | E. Improper alignment of the modulating actuator and the gas ball valve | 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). 2. Insure that the set screw on the actuator is tightened to the ball valve stem. |
| | | | F. Blocked or improper venting | 1. Check air inlet and outlet for blockage. 2. Check venting configuration for excessive venting length, improper sizing, etc. |
| A.O.5 | Weak Flame Signal | The flame signal level is less than optimal for this furnace. Maintenance of the flame sensing components is advised. | 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. 2. Re-install / replace flame sensor. |
| | | | C. Unstable flame pattern | 1. Check that all burner assembly components are properly installed. 2. Check that all seals between the vestibule area and the heat exchanger area are tight. 3. Insure that the combustion door gasket is in place and the door is properly installed. |

Table 23: Lockout Errors

| Display Information | Alert | Description | Possible Cause | Solution |
|---------------------|---|--|--|---|
| 888 | Ignition Board Failure | Ignition board start-up checks have detected an error. | A. Faulty transformer | 1. Check 24-volt transformer for correct output. 2. Check connections and wiring to control board and other components connected to the 24 volt source. 3. Replace if necessary. |
| | | | B. Faulty control board | 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. 2. Replace control board if necessary. |
| E.O. 1 | Failed Ignition Maximum Retries 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 | 1. Insure gas supply is connected to furnace and check for proper line pressure. |
| | | | B. Gas valve control turned "OFF" | 1. Turn gas valve to the "ON" position. |
| | | | C. No spark from direct spark ignition | 1. Check ignition voltage (115 VAC from board to transformer) and wiring. 2. Check 24 VAC transformer for DSI board. |
| | | | D. Insufficient intermediate gas manifold pressure through gas safety valve | 1. Check for faulty gas valve wiring. 2. Check 24 VAC to gas valve assembly. 3. Check inlet pressure to safety gas valve. 4. Check outlet pressure from the safety gas valve – adjust as needed. 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. (7 – 10 VDC depending on model) 2. Check alignment and set screw connection between ball valve and actuator (See Modulating Gas Valve Alignment procedure). |
| | | | F. Burners do not light | 1. Check spark rod assembly for proper location, spark gap, etc. 2. Check for proper mounting of the burner assembly. 3. Check burner orifice for proper size and blockage. |
| | | | G. Burners light and remain lit for about 5 seconds | 1. Check flame rod wiring and connections. 2. Check for proper alignment of flame rod. 3. Clean flame rod sensor. |

Table 20: 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 | 1. Check filter / replace if dirty. 2. Check for improperly sized duct system. 3. Check for faulty blower motor. 4. Check for faulty blower motor wiring. |
| | | | B. Primary limit switch failure | 1. Check for an open primary limit switch at ambient temperature. |
| | | | C. Fuse is blown | 1. Check and replace fuse on the board. 2. Make sure fuse socket is tight, crimp fuse terminals if necessary. |
| | | | D. Faulty primary limit switch wiring | 1. Check primary limit wiring continuity from the switch to the control board. |
| E.O.3 | Modulation Valve Failure | The control lost the position feedback from the modulating gas valve actuator. | A. Faulty modulation valve actuator wiring | 1. Insure wiring is connected per unit wiring diagram. 2. Check for loose pins or bad connections. 3. Check for frayed wiring or shorts to ground. |
| | | | | 1. Insure actuator has 24 V power. |
| | | | | 2. Insure actuator is receiving valid drive signal from the control board (2 – 10 VDC). |
| | | | B. Modulation valve actuator failure | 3. Check for actuator feedback to the control board (2 – 10 VDC). |
| E.O.4 | Air Sensor Failure 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. <i>The pressure switch MUST be open prior to inducer activation.</i> | A. Faulty wiring or connections | 1. Check pressure switch wiring. 2. Check inducer wiring. 3. Check for plugged or disconnected vacuum hoses. |
| | | | B. Faulty pressure switch | 1. Replace pressure switch. |
| | | | C. Faulty pressure sensor, located on the board | 1. Replace board. |
| E.O.5 | Air Sensor Failure 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. <i>The pressure switch MUST close to initiate an ignition sequence.</i> | A. Faulty wiring or hose connections | 1. Check pressure switch wiring. 2. Check inducer wiring. 3. Check for broken or disconnected vacuum hoses. |
| | | | B. Blocked or improper venting | 1. Check air inlet and outlet for blockage. 2. Check venting configuration for excessive venting length, improper sizing, etc. |
| | | | C. Faulty pressure switch | 1. Replace pressure switch. |

Table 20: Lockout Errors

| Display Information | Alert | Description | Possible Cause | Solution |
|---------------------|--|--|---|---|
| E.0.6 | Gas Sensor Failure Pressure Sensor Reading Low | The gas sensor reading is too low compared to the expected value for the modulating gas valve actuator position. <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 to 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 Pressure Sensor Reading High | The gas sensor reading is too high compared to the expected value for the modulating gas valve actuator position. <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 to 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. 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. 2. Check for loose pins or bad connections. 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. 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. 2. Insure I.D. plug is properly inserted into the mating connector on the control board. 3. With the I.D. plug installed, cycle power to the furnace. The board will display the I.D. plug identity upon power-up. 4. Install correct I.D. plug as needed. |

Hot Water Heater Design

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.

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 di-electric fittings as well as appropriate water treatment.

⚠ CAUTION

Coil freeze possible. Can damage equipment.

Follow instructions for mixing antifreeze solution. Some products have higher freeze points in natural state than when mixed with water. The freezing of coils is not the responsibility of McQuay International.

Figure 38: Hot Water Heating Schematic

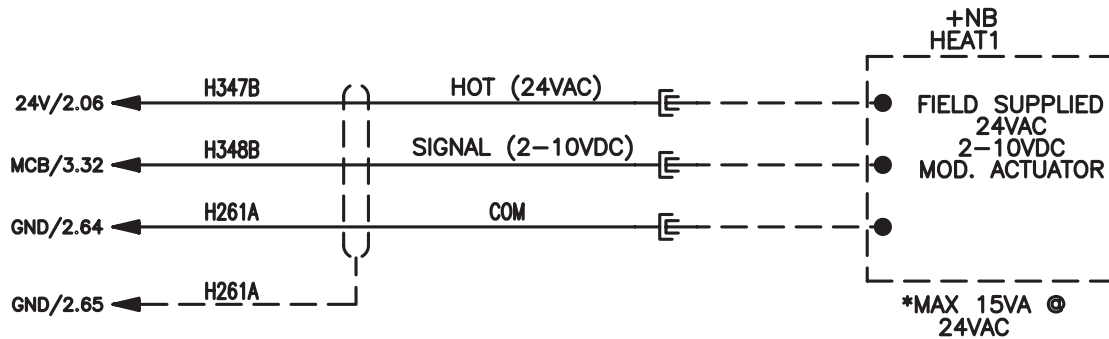


Table 24: Heating Capacity and Water Pressure Drop – Hot Water Coils

| 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 |

Nominal airflow, 60°F 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.

Arrangements

Two arrangements are offered for the enthalpy wheel:

1. Single enthalpy wheel with economizer and bypass (Figure 40). 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.

Definitions

The following are descriptions of various components related to the enthalpy wheel construction (Figure 40):

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.

Purge and Pressurization

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

Figure 39: Purge and Pressurization

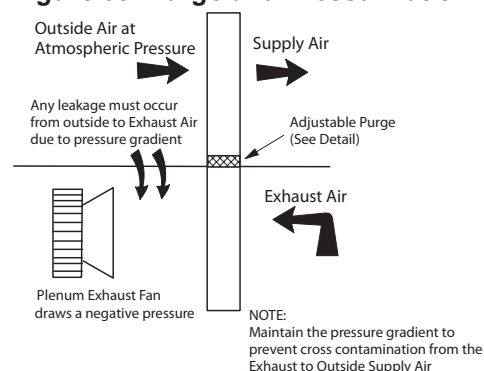
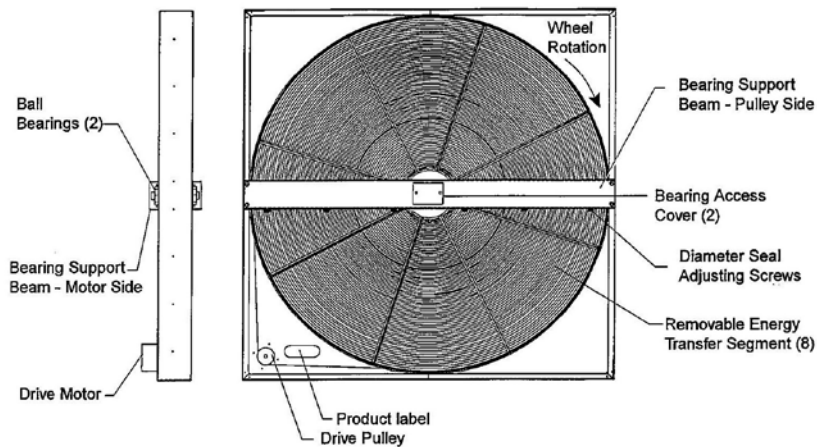
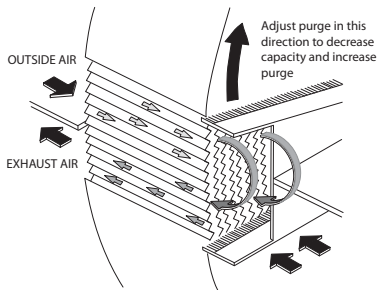


Figure 40: Wheel Construction (Side-by-Side)



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

Figure 41: 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.

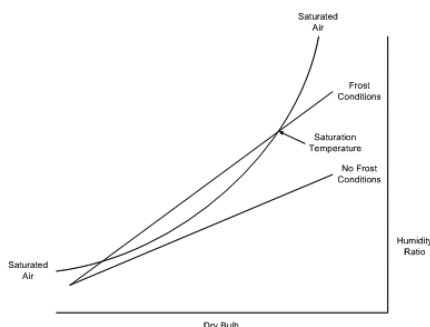
Frost Protection Option

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 42: 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 42).

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 42).

Energy Recovery Exhaust Hoods

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

Variable Speed Frequency Control

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

Enthalpy wheel speed will be controlled by exhaust temperature measurement.

Thermal Dispersion Airflow Measurement Technology

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

Figure 43: Bead-in-Glass Thermistor

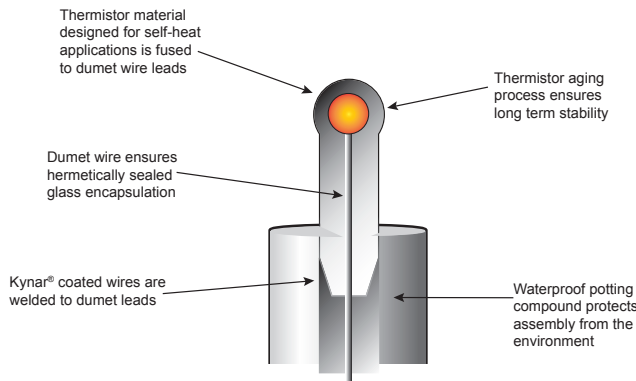
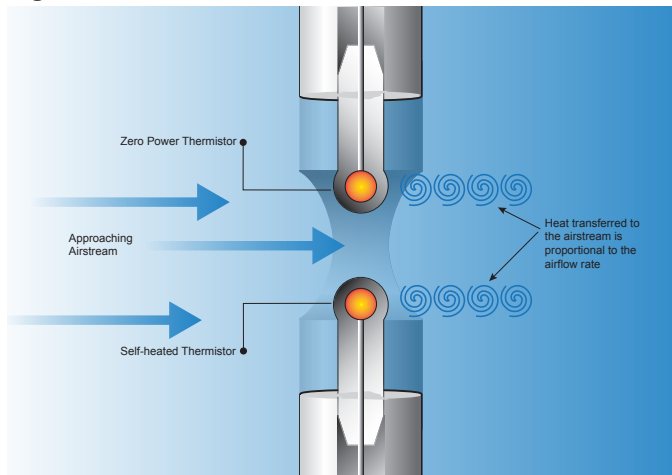


Figure 44: Bead-in-Glass Thermistor Probe



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 61 on page 88](#) for navigating the Controller keypad)

1. Set LCD1 U/M to "CFM"
2. Set AR1 (see [Table 25](#))
3. Set OUT1 U/M =CFM
4. Set OUT1 =0–10V
5. Set FSI (see [Table 25](#))

Table 25: Settings by Cabinet Size

| Unit size | Area sq.ft. (AR1) | Full scale output CFM (FS1) |
|---------------|-------------------|-----------------------------|
| Small cabinet | 2.25 | 2,400 |
| Large cabinet | 4.5 | 6,000 |

Figure 45: MicroTech III Controller

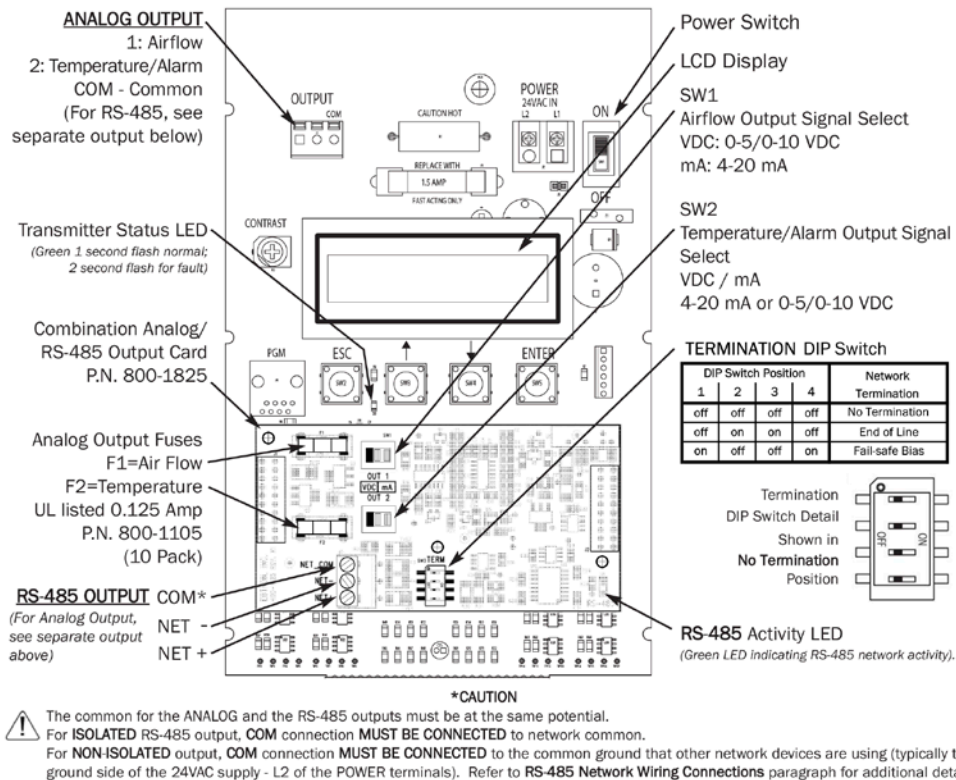
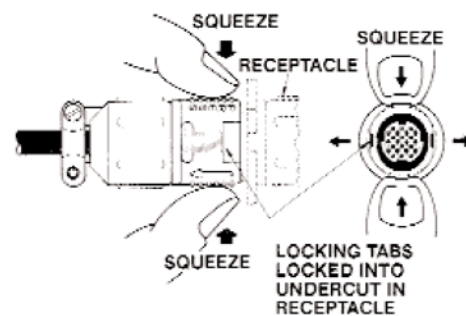
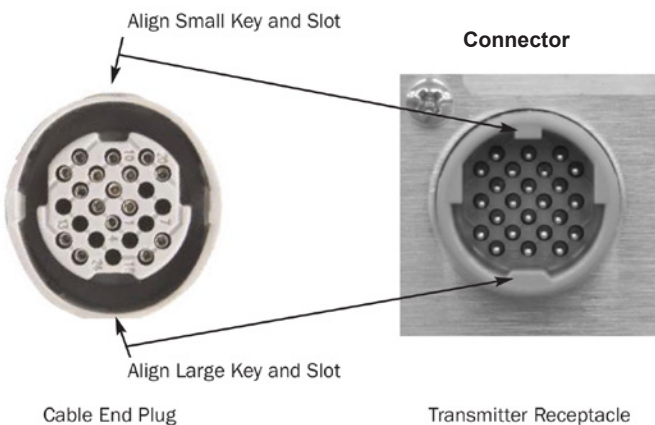


Figure 46: Transmitter and Connector Detail



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 56 on page 82](#).

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 54 on page 78](#)). 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 61](#) 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 61](#).

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 26: 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 27: Transmitter Troubleshooting

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

Economizer Enthalpy Control

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

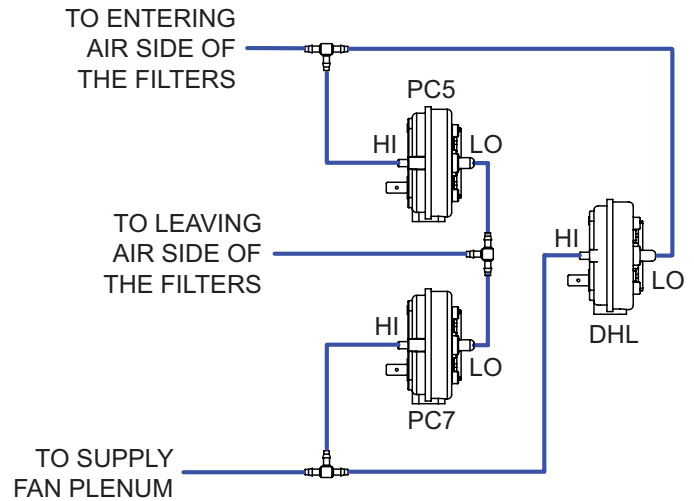
Economizer units may include exhaust fan options. For units with CAV applications, the exhaust fans can be ordered as staged control or they may be ordered with building pressure control. The building pressure control option has an inverter that runs the exhaust fan motors and is controlled by the static 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 47](#). The proof of airflow switch 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 47: Pressure Tubing Diagram



All VAV units also have the PC7 and PC5 switches as standard (see [Figure 47](#)). These switches are tied into the Duct High Limit switch (DHL) as shown in [Figure 47](#).

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).

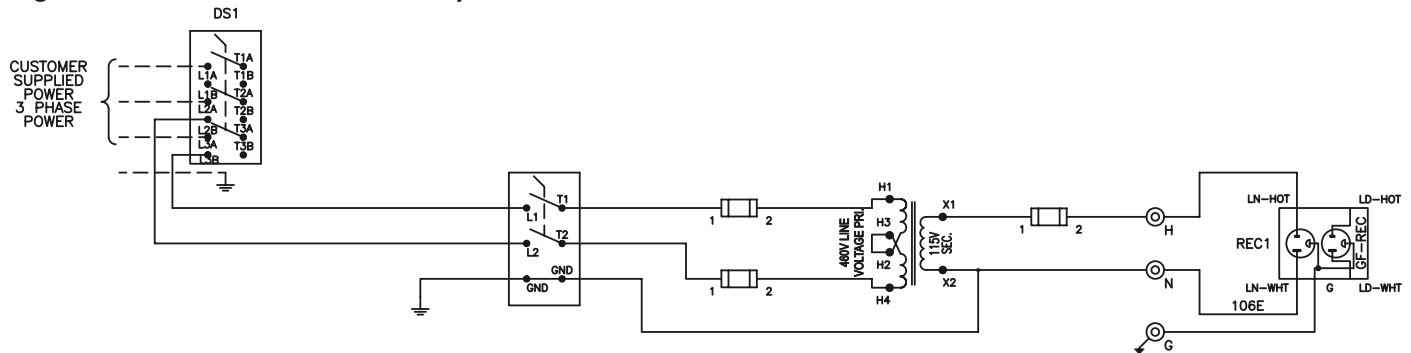
Convenience Receptacle (Field Powered)

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 48](#) for a branch circuit diagram.

Figure 48: Unit Powered GFCI Receptacle Schematic



Rebel SAFs and 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 28](#).

- 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 28: Fan Size Maximum RPM

| Wheel Diameter | SAF Max RPM | EAF Max RPM |
|----------------|-------------|-------------|
| 310 mm | 2580 | 2580 |
| 355 mm | 2600 | 2600 |
| 400 mm | 2040 | 2550 |
| 560 mm | 1750 | NA |

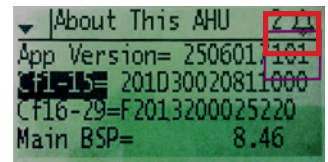
ECM Motor Setup

(Required when replacing exhaust fans)

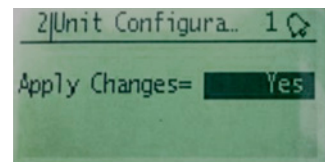
ECM - Electronically Commutated Motor communicates via modbus RS485 twisted pair cables to the Microtech III controller. Microtech III can address the ECM for a supply, return, or exhaust fan operation based on a unique modbus address. A replacement ECM is shipped out from the warehouse with an address 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

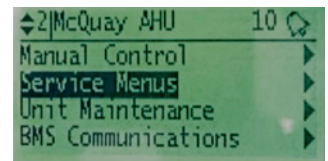
1. Close the MMP or shut the circuit breakers to the supply and energy recovery drives to keep modbus communication enabled only at the return/exhaust ECM.
2. Verify the RS485 output on the Microtech III controller is connected at terminals A and B to TB1 terminals 39 and 40 respectively.
3. Make sure 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 62.
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.



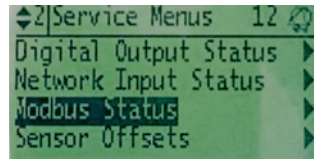
7. Scroll down and click on the "Unit Configuration Menu"
8. Scroll to the "SAF type" and set it to EBM VAV
9. Scroll to the "RAF type" and set it to EBM VAV
10. Scroll up to "Apply Changes" and set it to Yes. Wait for the controller to restart.



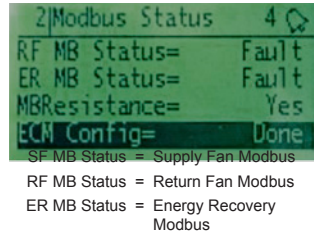
11. Enter the level 2 password again and go into "Service Menu"



12. Click on the "Modbus Status" menu

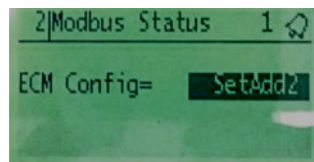


13. If the drive return drive is wired correctly and is communicating then the SF MB status will show "OK" while the RF MB status will show "Fault". Verify wiring connections and 3-phase power to the ECM if both SAF and RF status show "Fault."



14. Click on the "ECM Config" menu

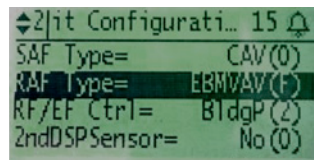
15. Set "ECM config" to "SetAdd2"



16. 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.

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

18. Click on the "Unit Configuration" menu and set the SAF type back to the original setting.



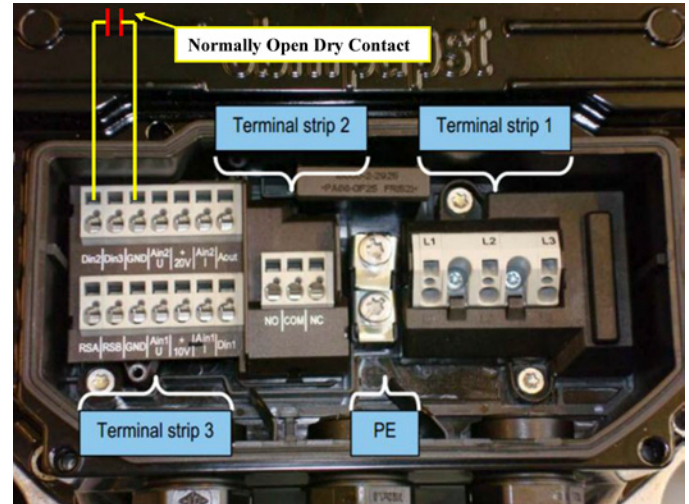
19. Scroll up and set "Apply changes" to yes.

20. 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 61](#).

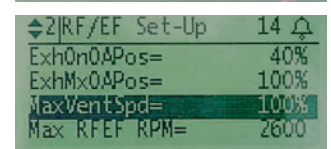
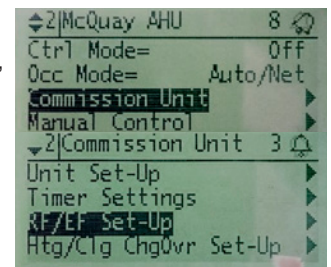
Figure 49: Smoke Purge Wiring



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:

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



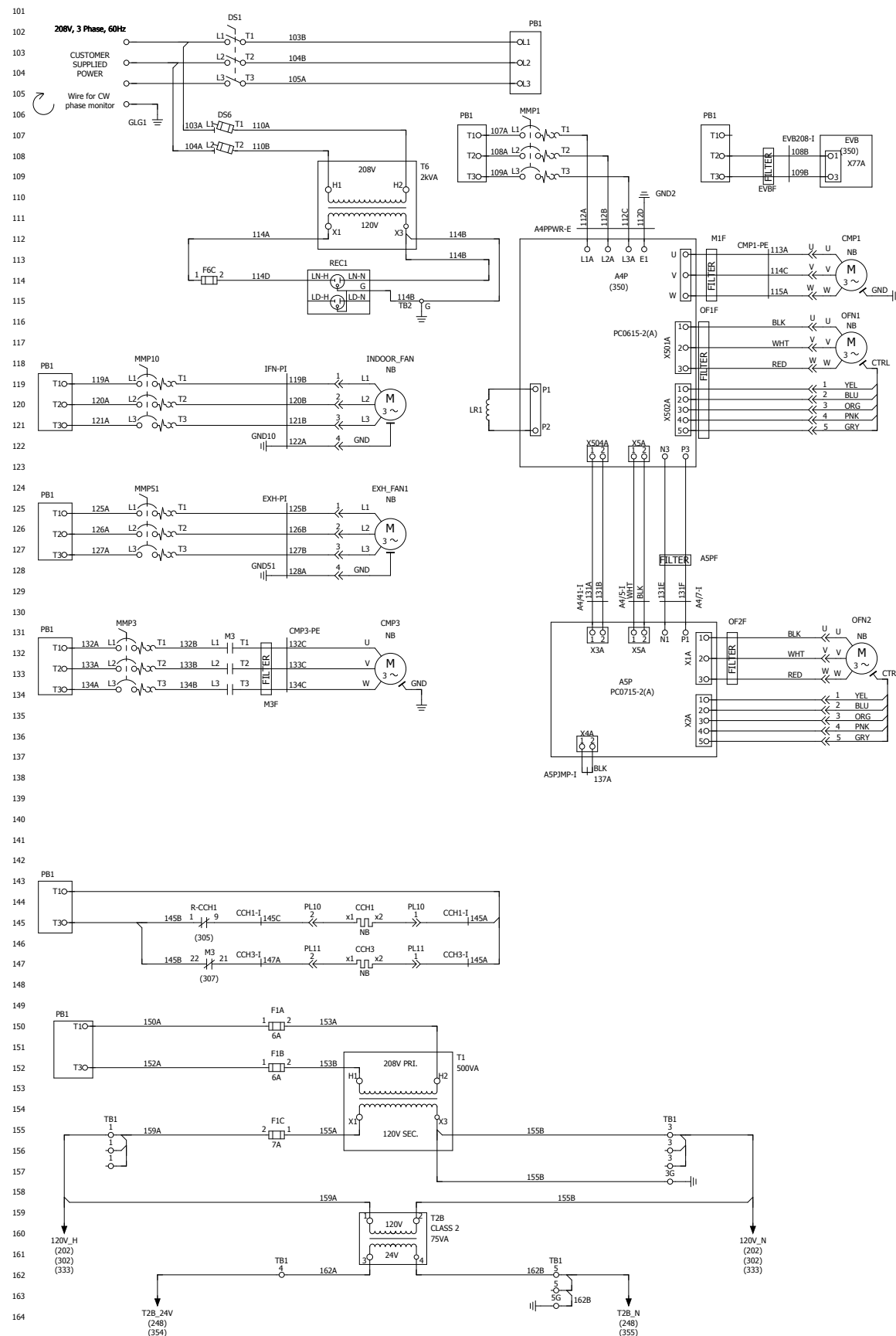


Figure 35 (continued): CAV_VAV 208-230 VAC Wiring (2 of 4)

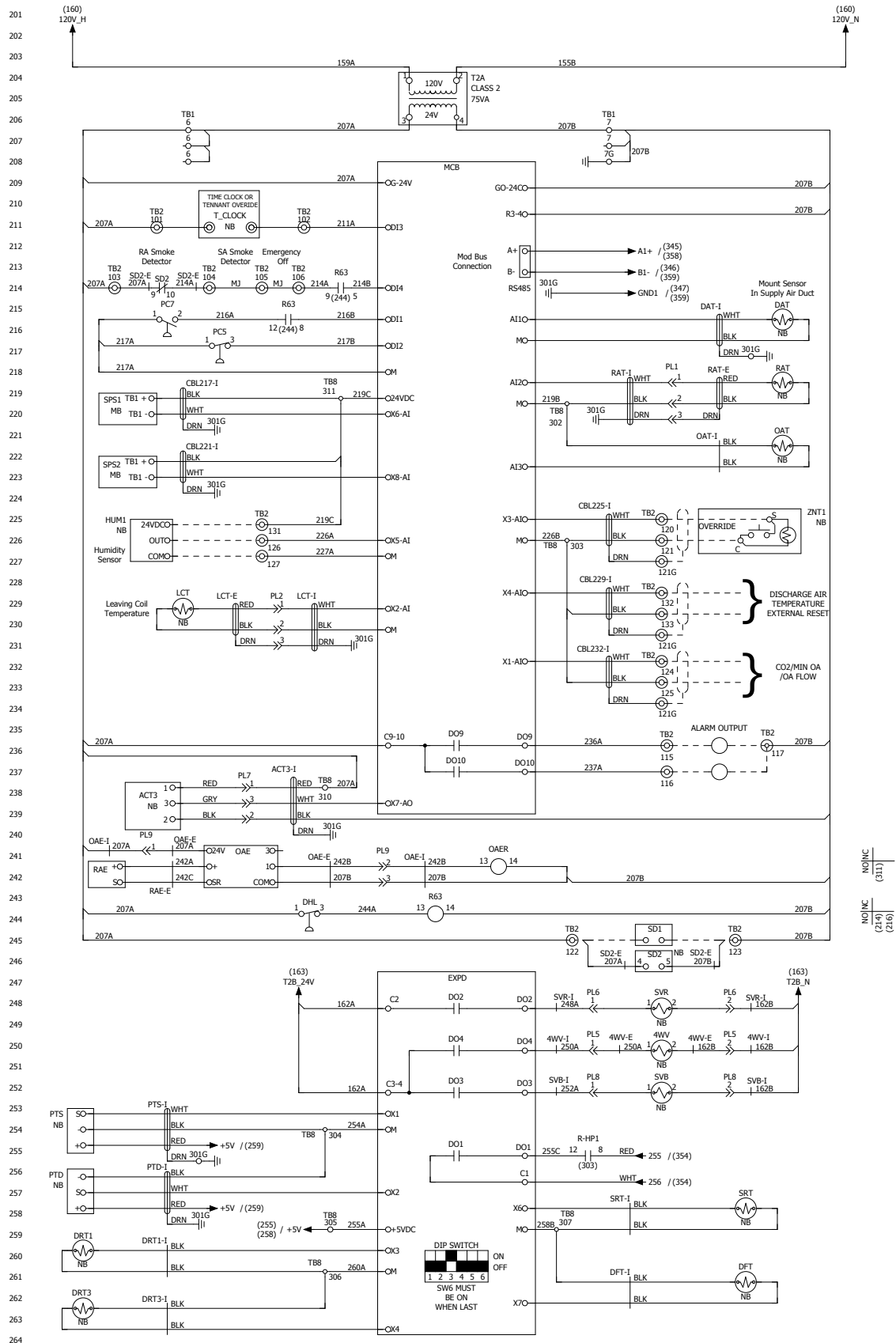
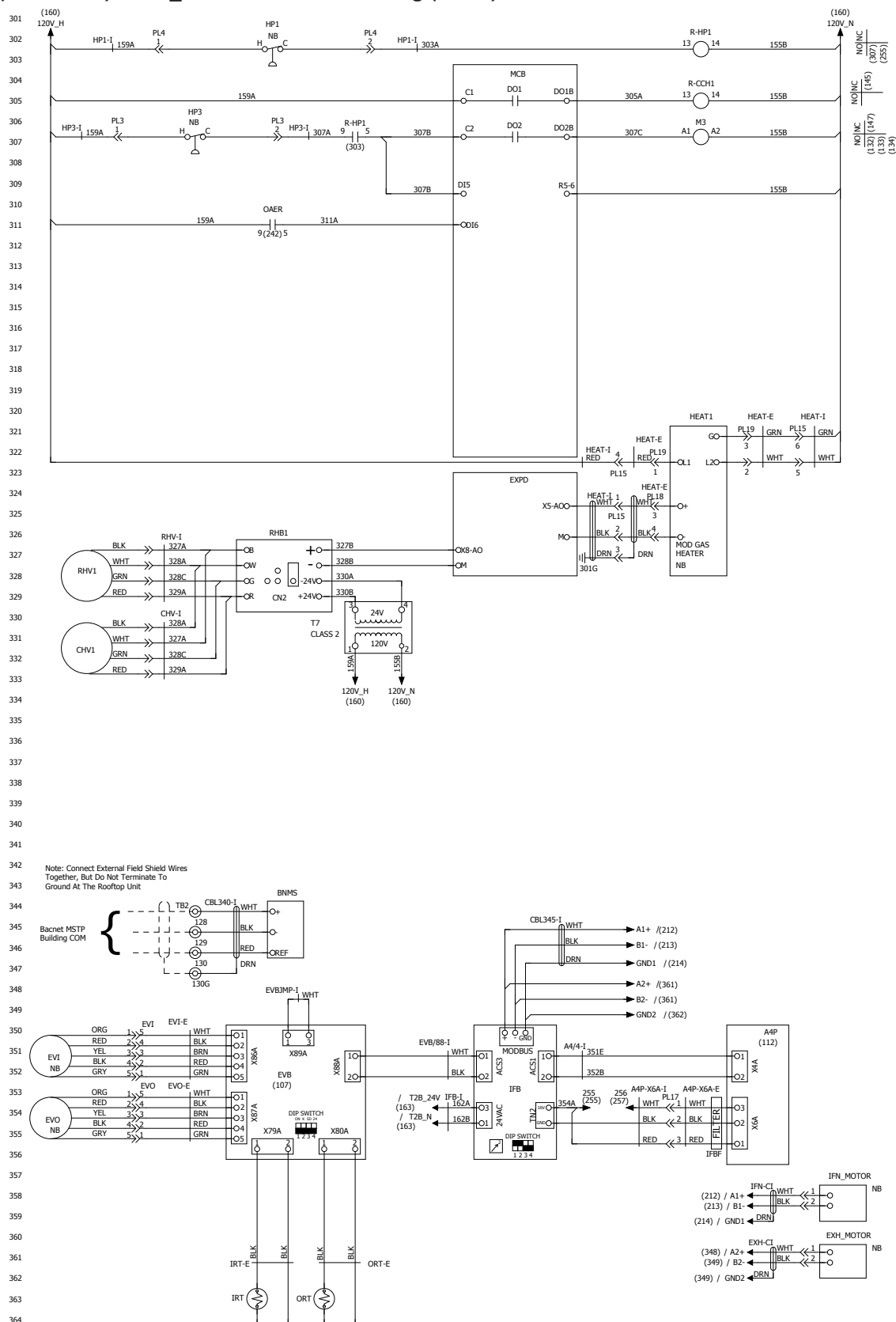


Figure 35 (continued): CAV_VAV 208-230 VAC Wiring (3 of 4)



[illegible]

Figure 51: CAV_VAV 460 VAC Wiring (1 of 4)

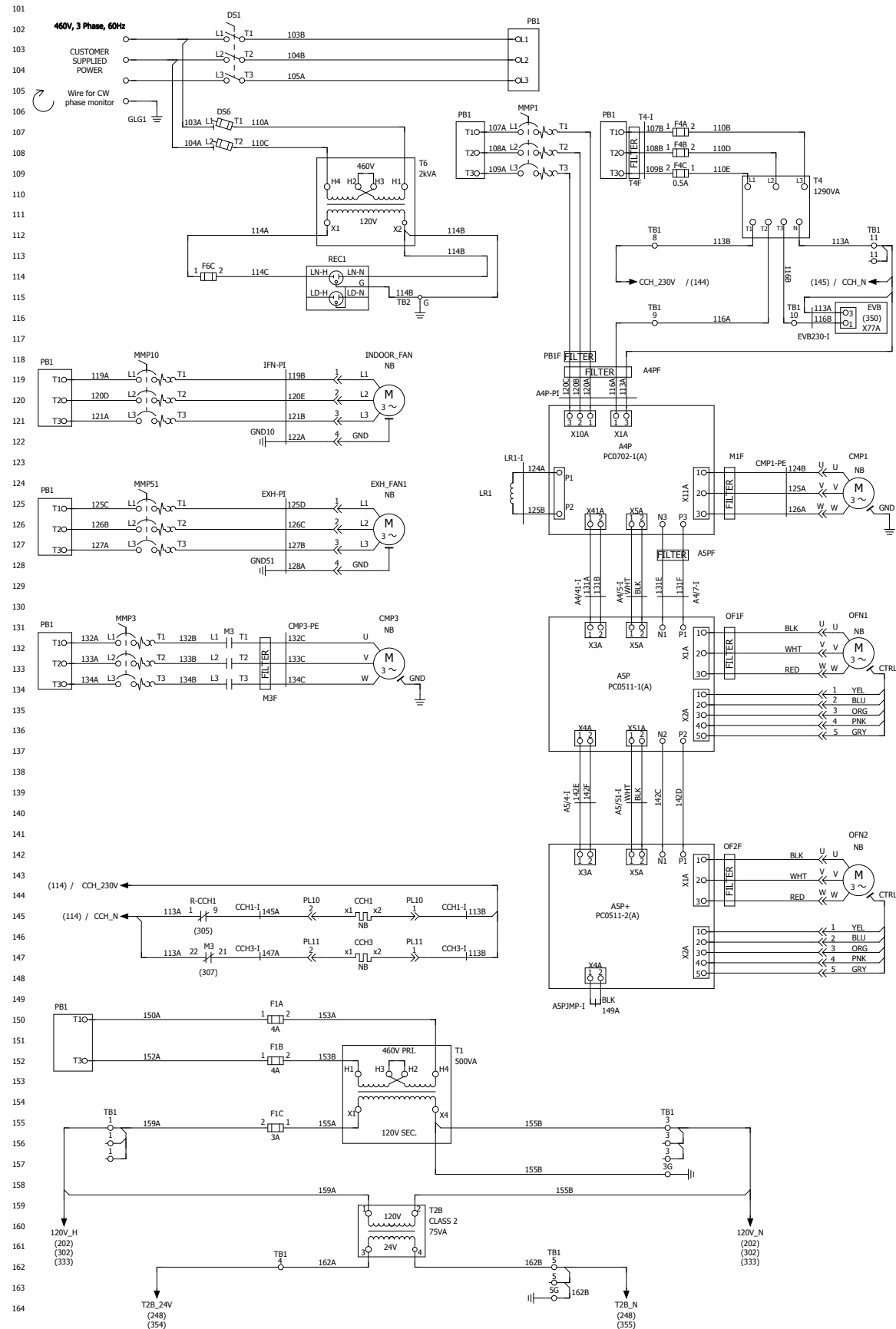


Figure 35 (continued): CAV_VAV 460 VAC Wiring (2 of 4)

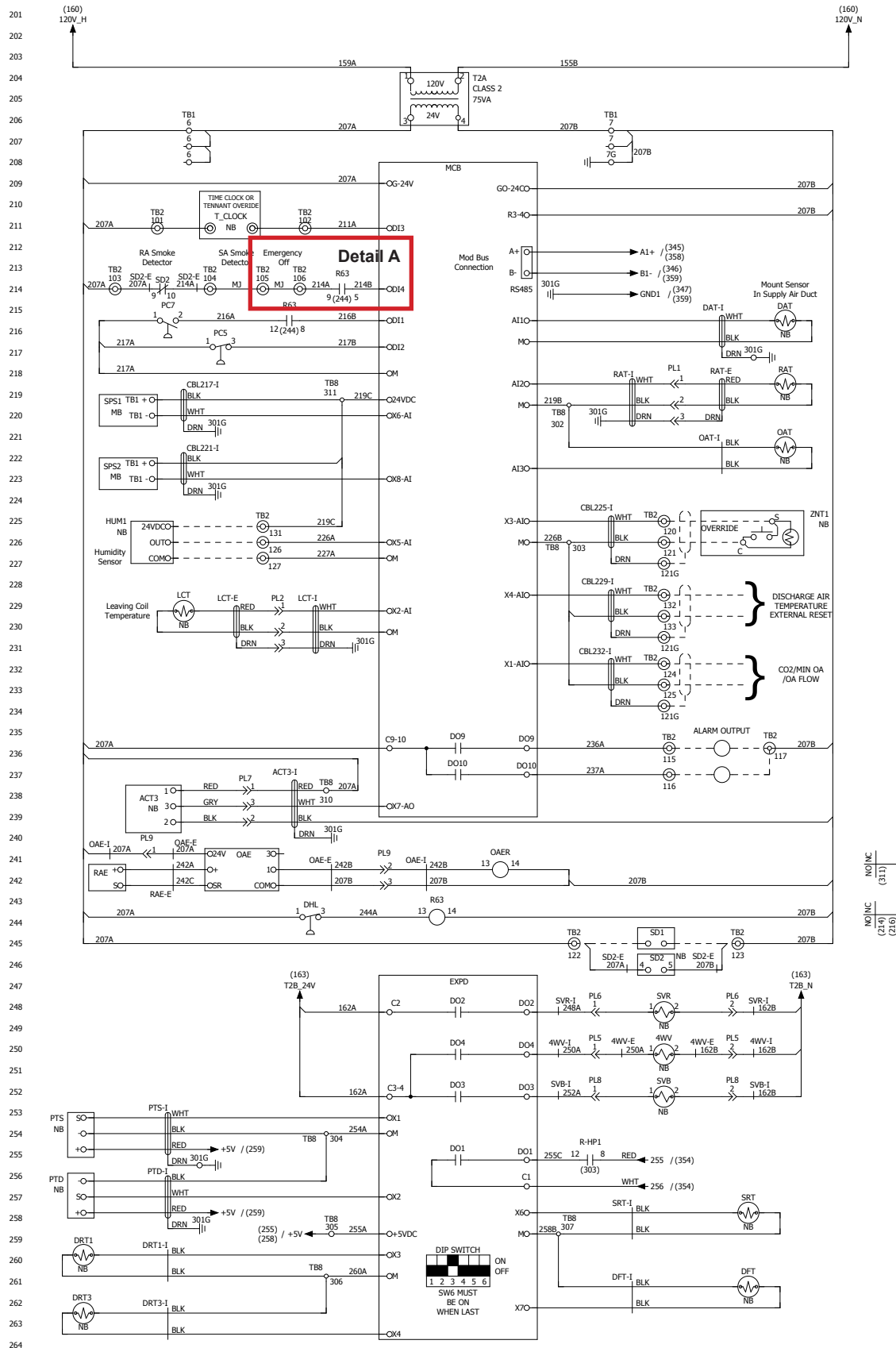
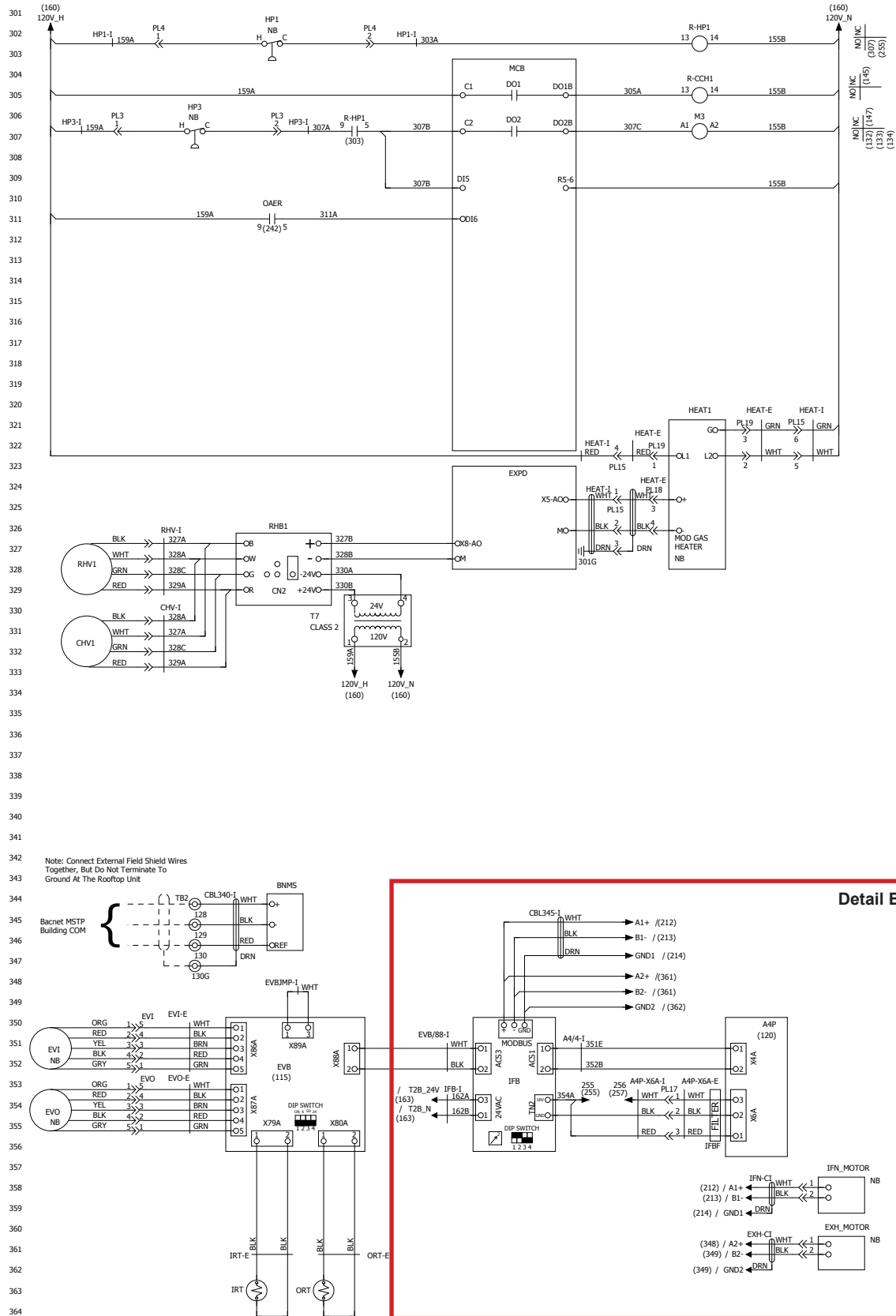


Figure 35 (continued): CAV_VAV 460 VAC Wiring (3 of 4)

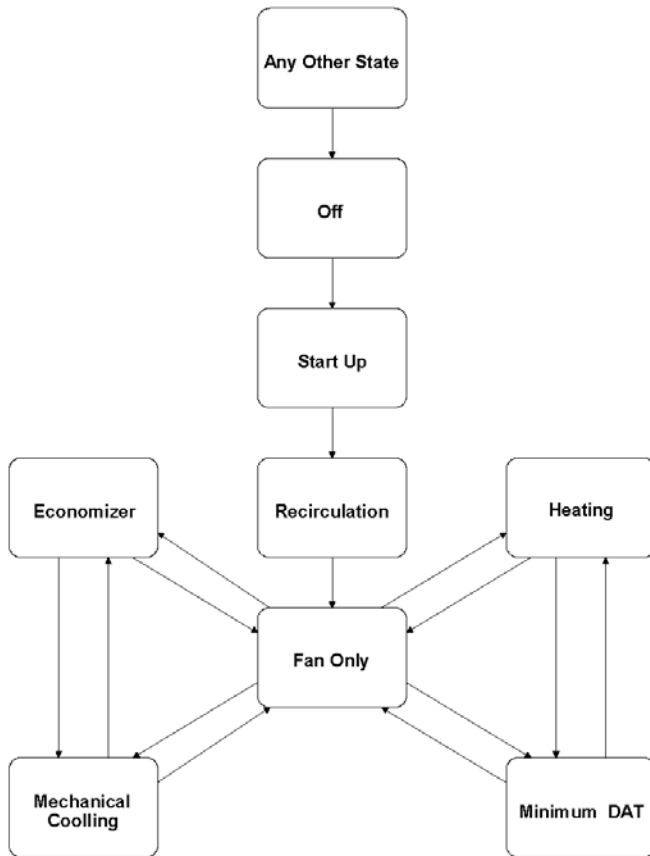


[illegible]

Operating States

The transition from any operating state to another is graphically represented in Figure 52.

Figure 52: 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 ½ the deadband.

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

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

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

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

Variable Air Volume (Discharge Air Controller)

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

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

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

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

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

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

Economizer

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

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

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

Pre-Start of Unit

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

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.

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.

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.

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.

With the supply fan operational, prepare for compressor operation.

1. 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 58 on page 86 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 54 and then Figure 57 on page 84), 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 54 and then Appendix, Figure 56 on page 82, 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 54 and Figure 56.
 - Go to commission unit (Figure 56), expansion valve set up, and disch sat tmp [yellow path.]
 - Go to view/set unit (Figure 54 and Figure 55), 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 54 and Figure 56, 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 54 and Figure 56. 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.

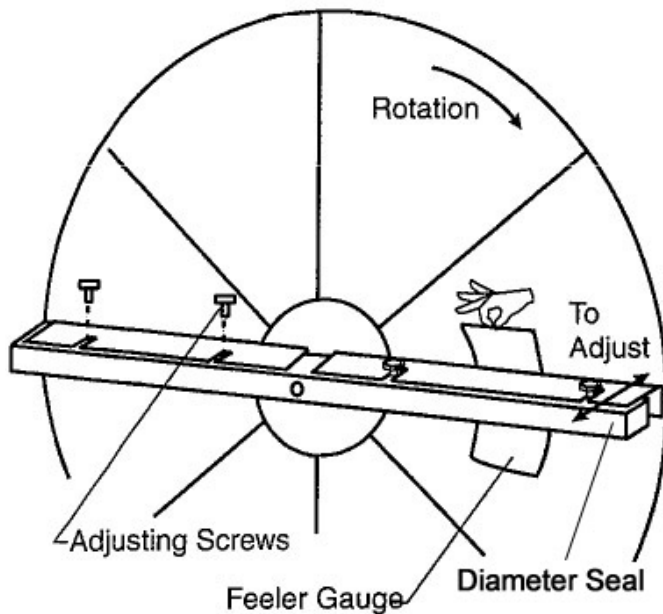
Diameter Seal Adjustment

WARNING

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

1. Loosen diameter seal adjusting screws. See Figure 53.
2. Move adjustable diameter seals away from wheel.
3. Using a ¼ inch feeler gauge, adjust the diameter against the wheel. See Figure 53.
4. Tighten diameter seal adjusting screws.
5. Apply power per the start up procedure.

Figure 53: 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

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

IMPORTANT

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

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

- 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

- McQuay International recommends that the electronic control equipment in the unit be stored in a 5% to 95% RH (non-condensing) environment.
- 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.
- 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 29 on page 71](#). These filters are disposable and should be replaced periodically. Unit is equipped with a filter pull to assist in this process. See [Figure 54](#).

Table 29: Filter Sizes

| Cabinet Size | Filter Size |
|--------------|---------------|
| 003—006 | 4 - 16" x 16" |
| 007—015 | 4 - 24" x 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 54: 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

- Wheel imbalance.
 - Dirt or debris on wheel blades.
 - Wheel distorted from overspeed.
- Bent shaft.
- Motor imbalance.
- 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, ECM (Electronically Commutated Motor) fan / motor combination with a built in inverter. When equipped, the exhaust fan will be the same. The motor utilizes a brushless DC voltage with a permanent magnet rotor. 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.

The Rebel unit uses Polyvinylether (PVE) oil that was designed for Rebel with R-410A air conditioning systems. Only PVE oil is to be used in the Rebel refrigeration system.



IMPORTANT

Do not use Polyolester (POE) oil in the Rebel unit.

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.

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:

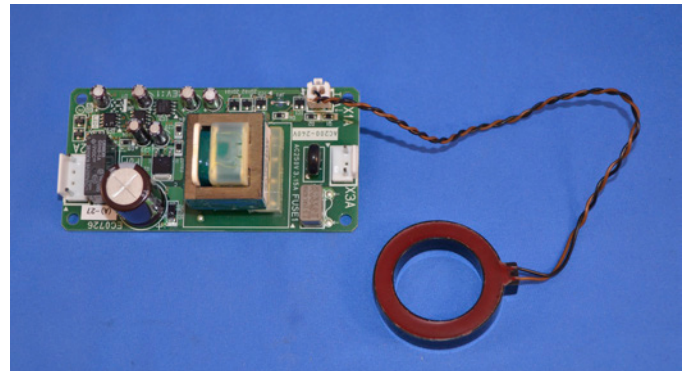
1. Measure continuity through all fuses.
2. Check that all electrical connections are tight. Look for signs of arcing.
3. Check the resistance to ground for each circuit. It should be infinite.
4. Check the resistance phase to phase for each circuit.
5. Check all contactors.

Servicing the Compressor Ground Fault Interrupter

The Rebel unit is 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 55: Ground Fault Interrupter



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: _____ GOI 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? | Yes | No | N/A |
| B. Has the discharge static pressure reference been properly located in the building? | Yes | No | N/A |
| C. Do fans turn freely? | Yes | No | N/A |
| D. Electrical service corresponds to unit nameplate? | Yes | No | N/A |

Volts _____ Hertz _____ Phase _____

- | | | | |
|--|-----|----|-----|
| E. Unit phased correctly? | Yes | No | N/A |
| F. Is the main disconnect adequately fused and are fuses installed? | Yes | No | N/A |
| G. Are crankcase heaters operating, and have they been operating 24 hours prior to start-up? | Yes | No | N/A |
| H. Are all electrical power connections tight? | Yes | No | N/A |
| I. Is the condensate drain trapped? | Yes | No | N/A |

II. FAN DATA

- | | | | |
|---|-------------|-------------|-------------|
| A. Check rotation of supply fan? | Yes | No | N/A |
| B. Voltage at supply fan motor: | 1-2 _____ V | 2-3 _____ V | 1-3 _____ V |
| C. Supply fan motor amp draw per phase: | 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 H ₂ O: | _____ | | |
| F. Record return static pressure at unit (with outside air dampers closed) in inches of H ₂ O: | _____ | | |

III. START-UP COMPRESSOR OPERATION

- | | | | |
|---|---------------|---------------|---------------|
| A. Are compressor shipping brackets removed? | Yes | No | N/A |
| B. Are compressors rotating in the right direction? | Yes | No | N/A |
| C. Do condenser fans rotate in the right direction? | Yes | No | N/A |
| D. Ambient temperature (°F): | _____ | | |
| E. 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. 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



Rebel Equipment Warranty Registration Form (continued)

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

VIII. MAINTAINING MICROTECH CONTROL PARAMETER RECORDS

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

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

Signature _____ Startup date: _____

Return completed form by mail to:

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

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

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



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 G.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?

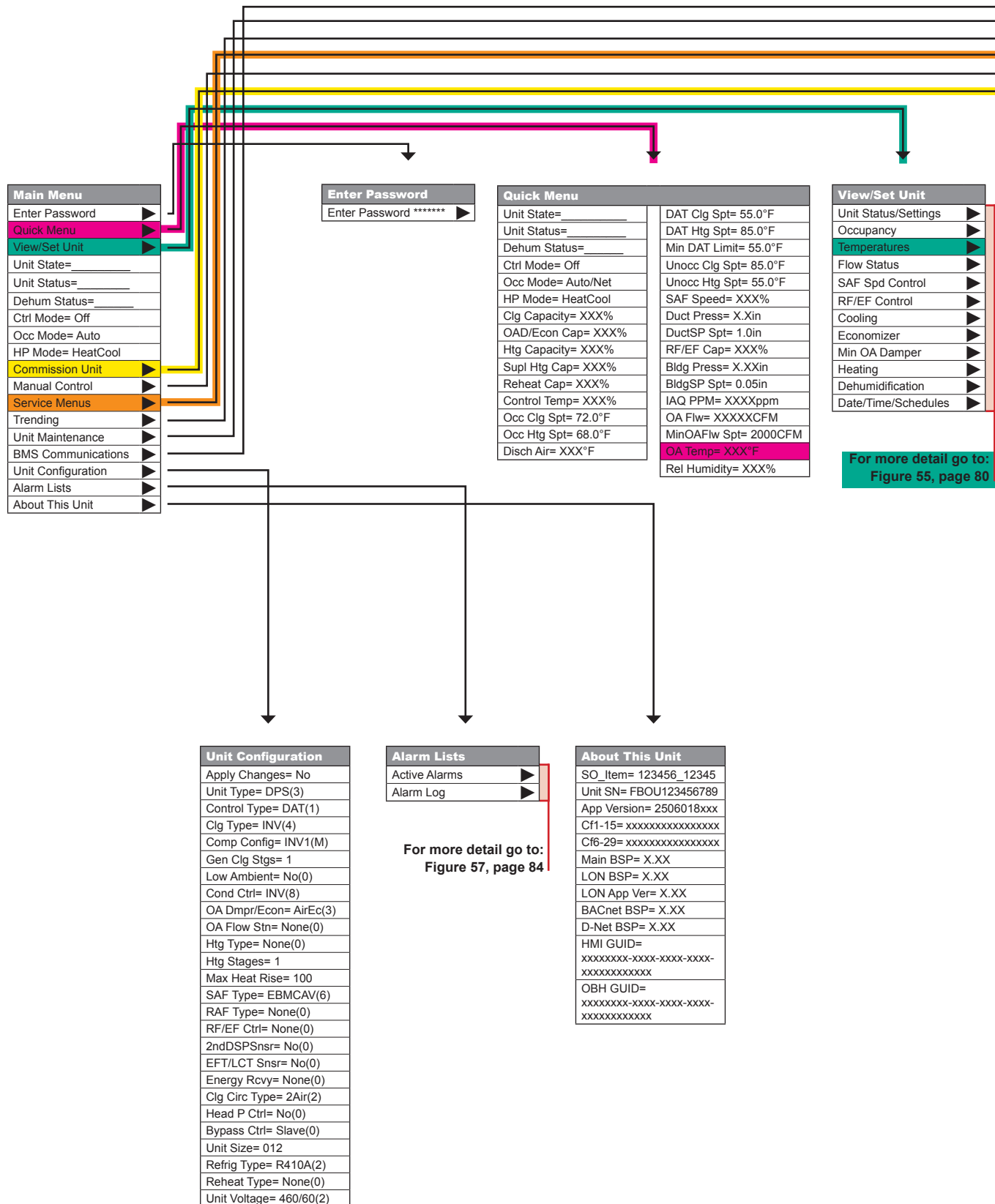
| | | | | |
|--|-----------|------|------|------|
| | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
 11. How does the quality of Daikin Applied products rank in relation to competitive products?

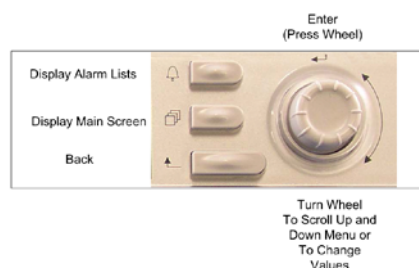
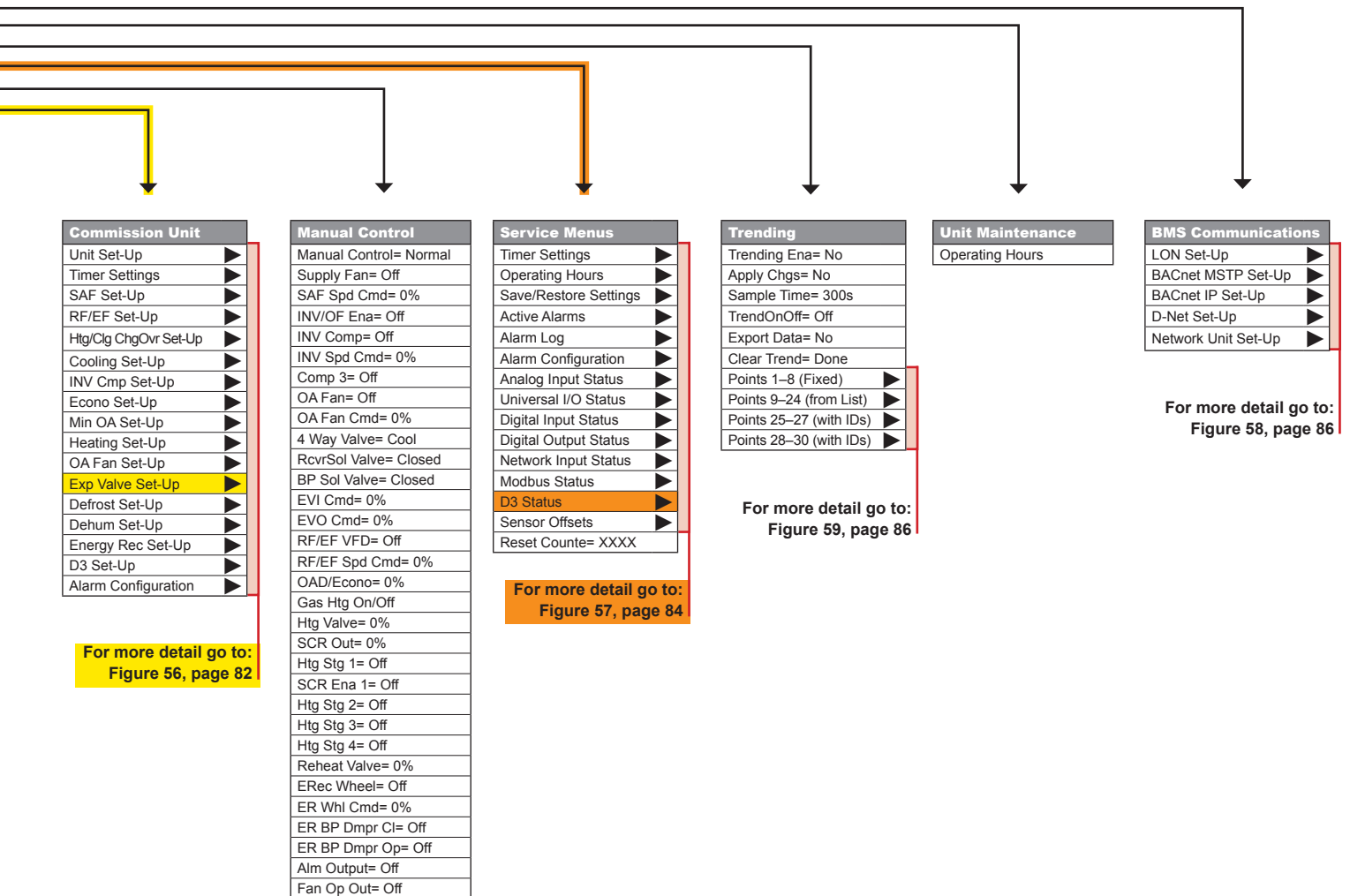
| | | | | |
|--|-----------|------|------|------|
| | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
- Comments _____

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".

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.

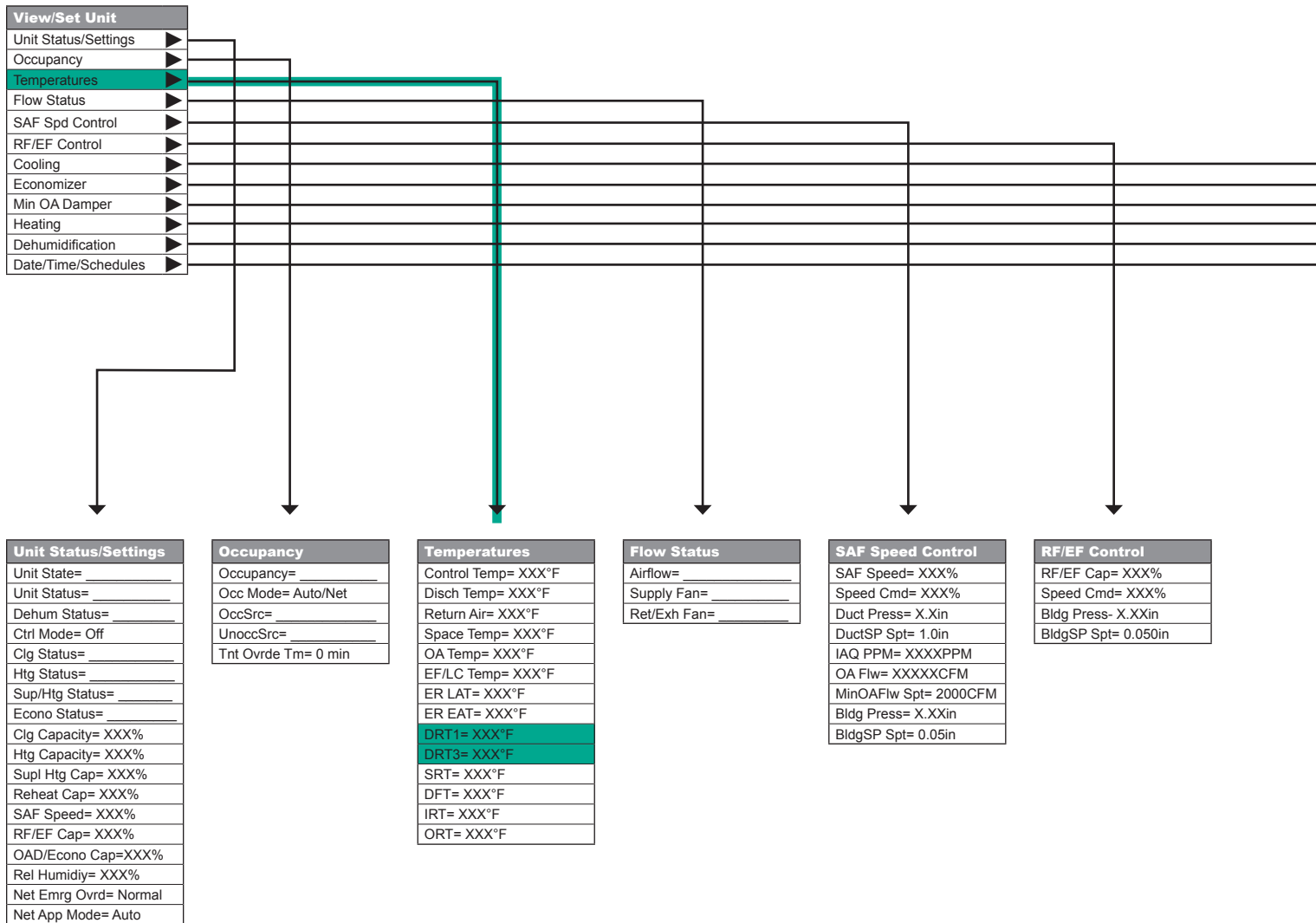
Figure 54: Main Menu – Keypad/Display Menu Structure





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 55: View/Set Unit – Keypad/Display Menu Structure



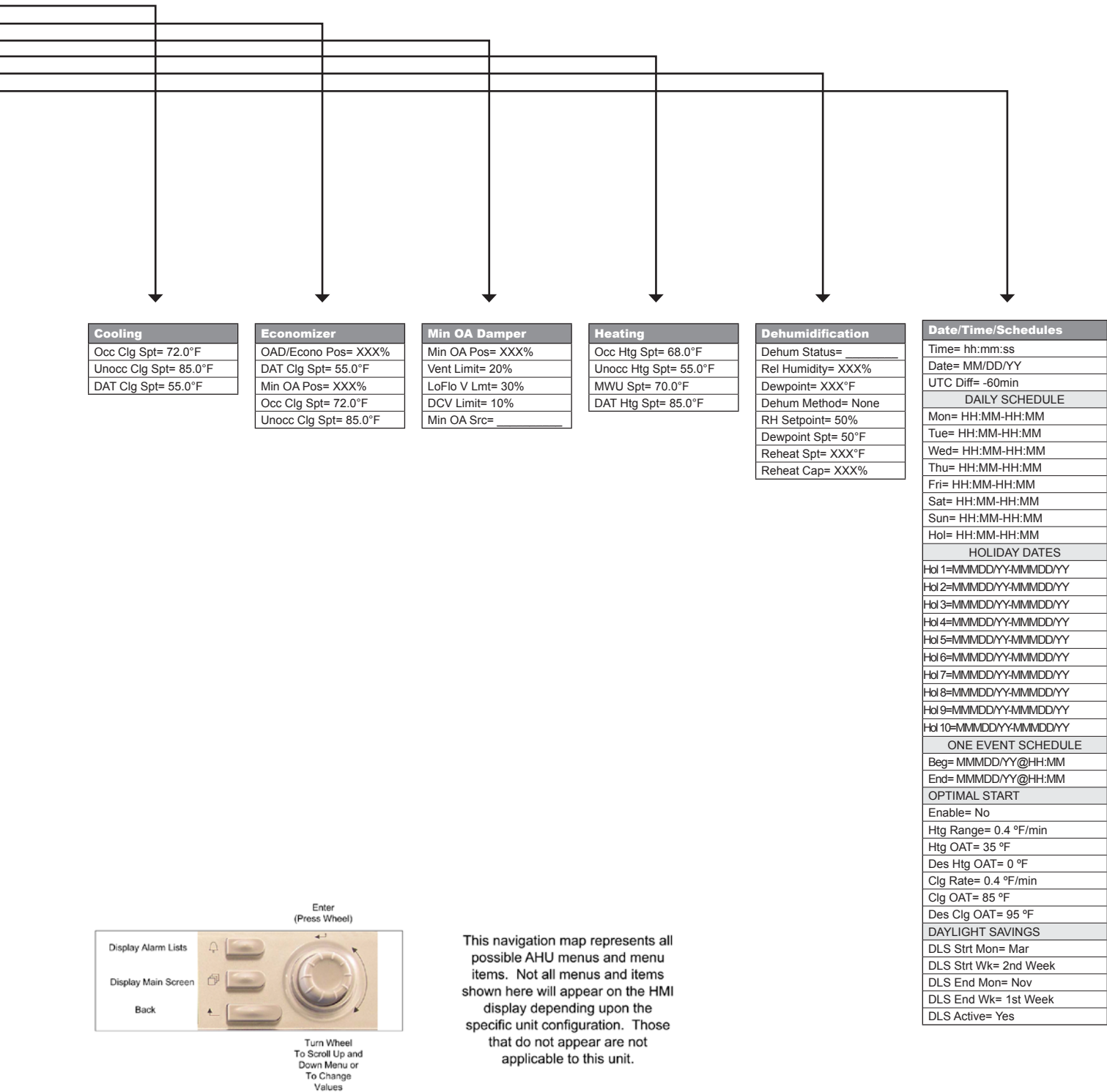
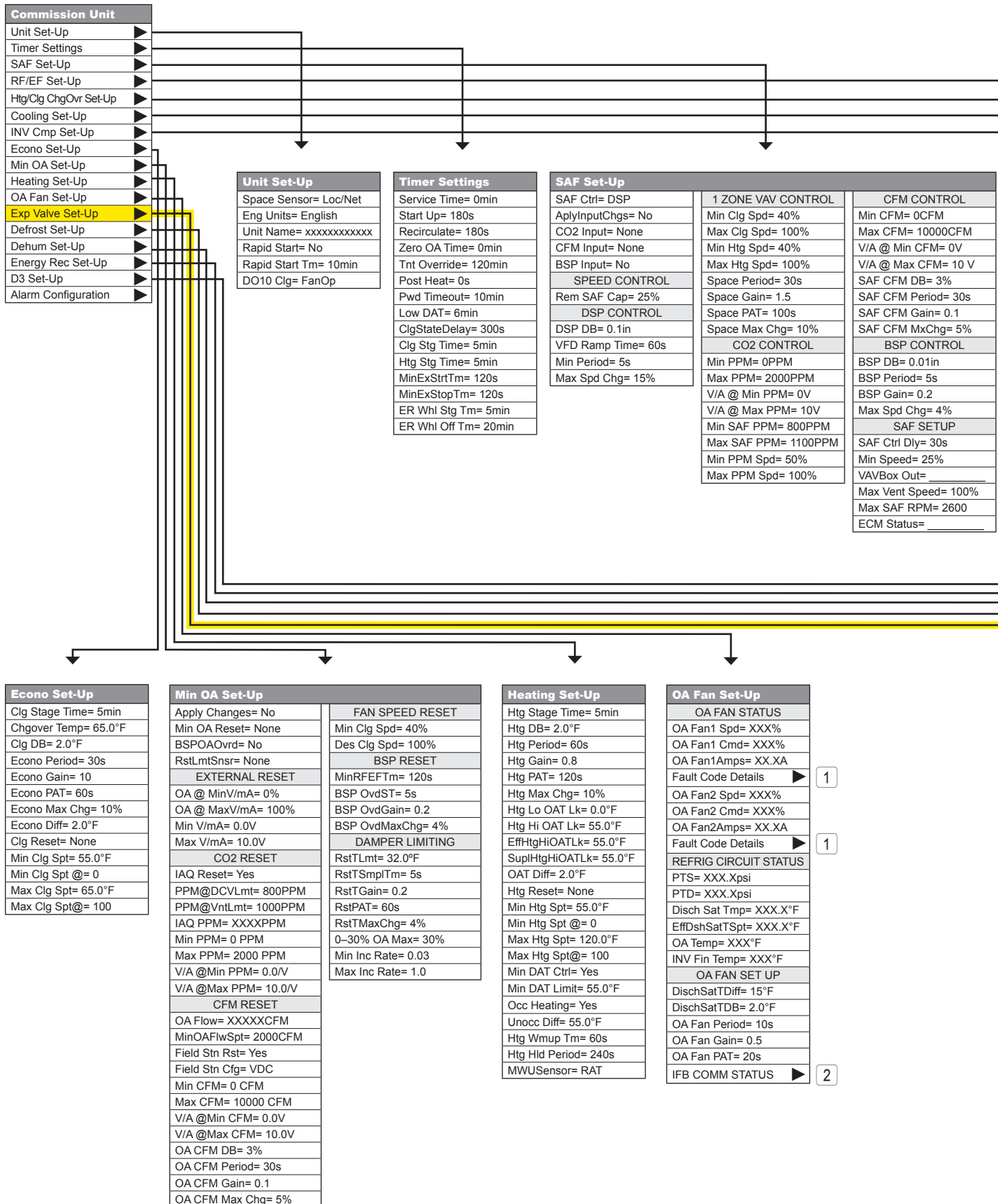
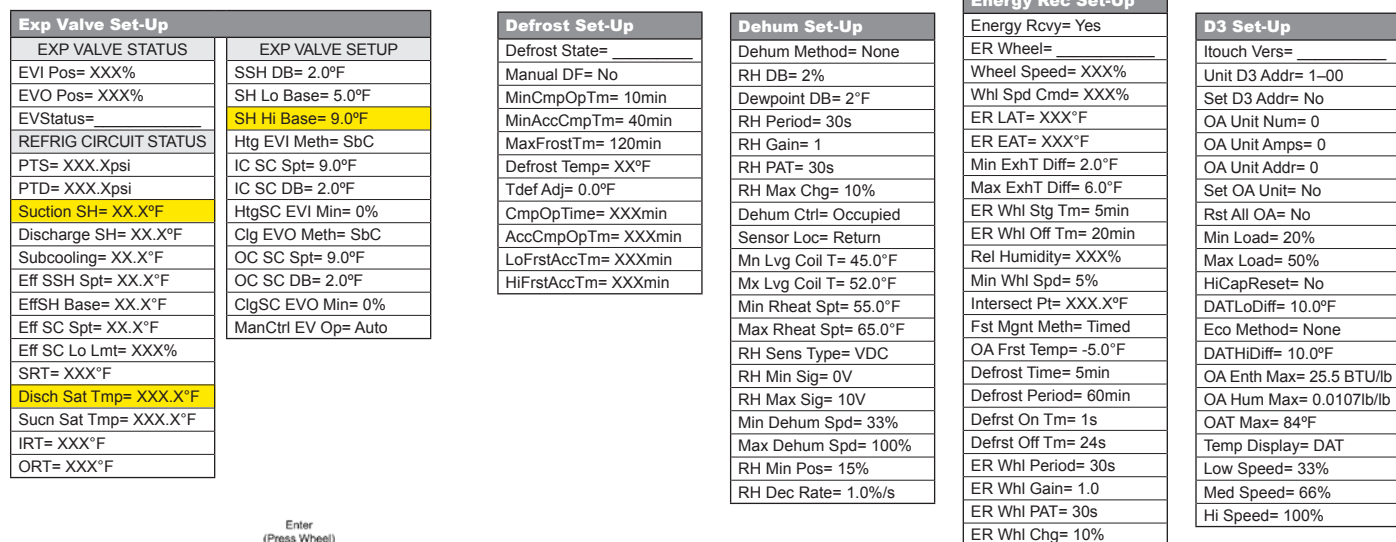
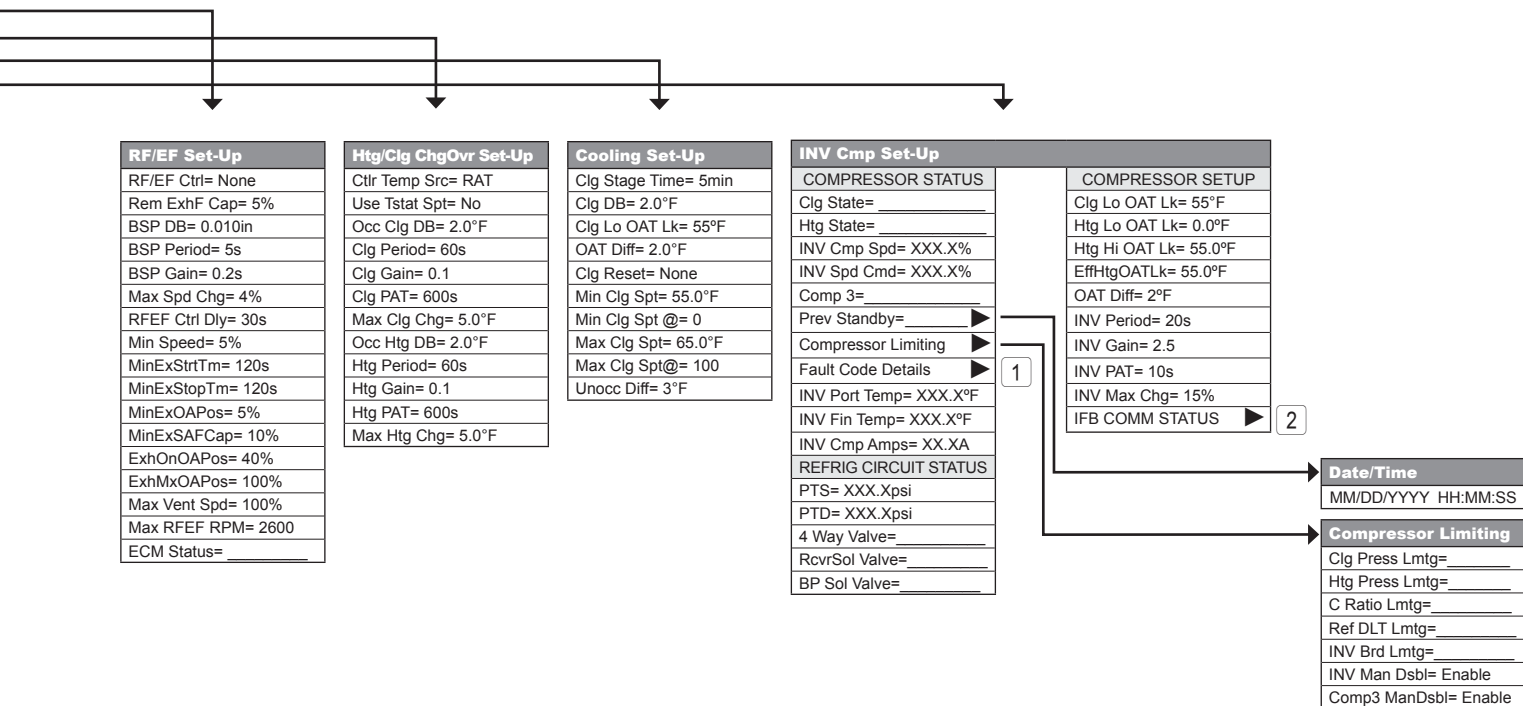


Figure 56: Commission Unit – Keypad/Display Menu Structure



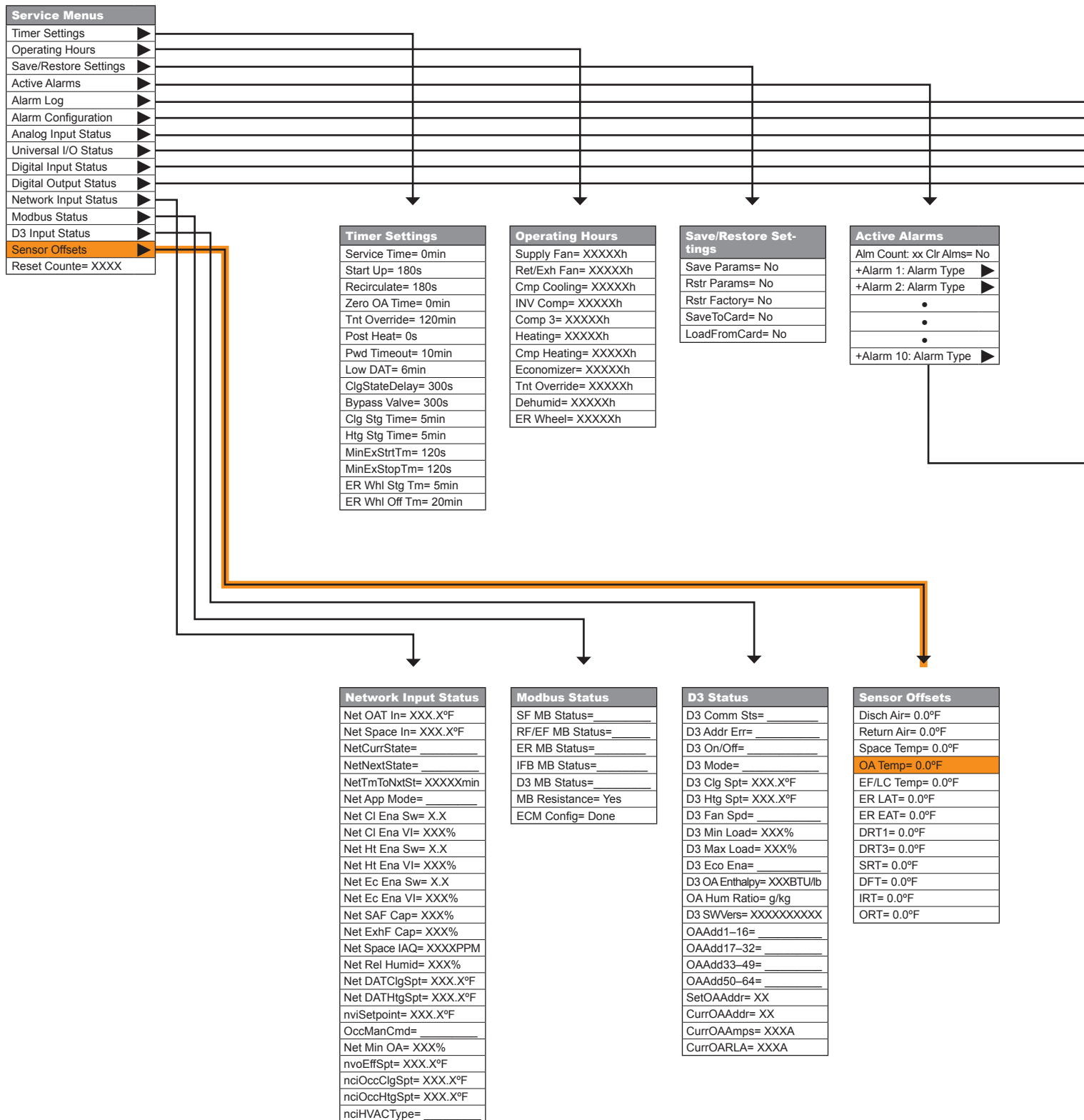
①, ② See Figure 57, page 85 for the expansion information



Turn Wheel
To Scroll Up and
Down Menu or
To Change
Values

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 57: Service Menu – Keypad/Display Menu Structure



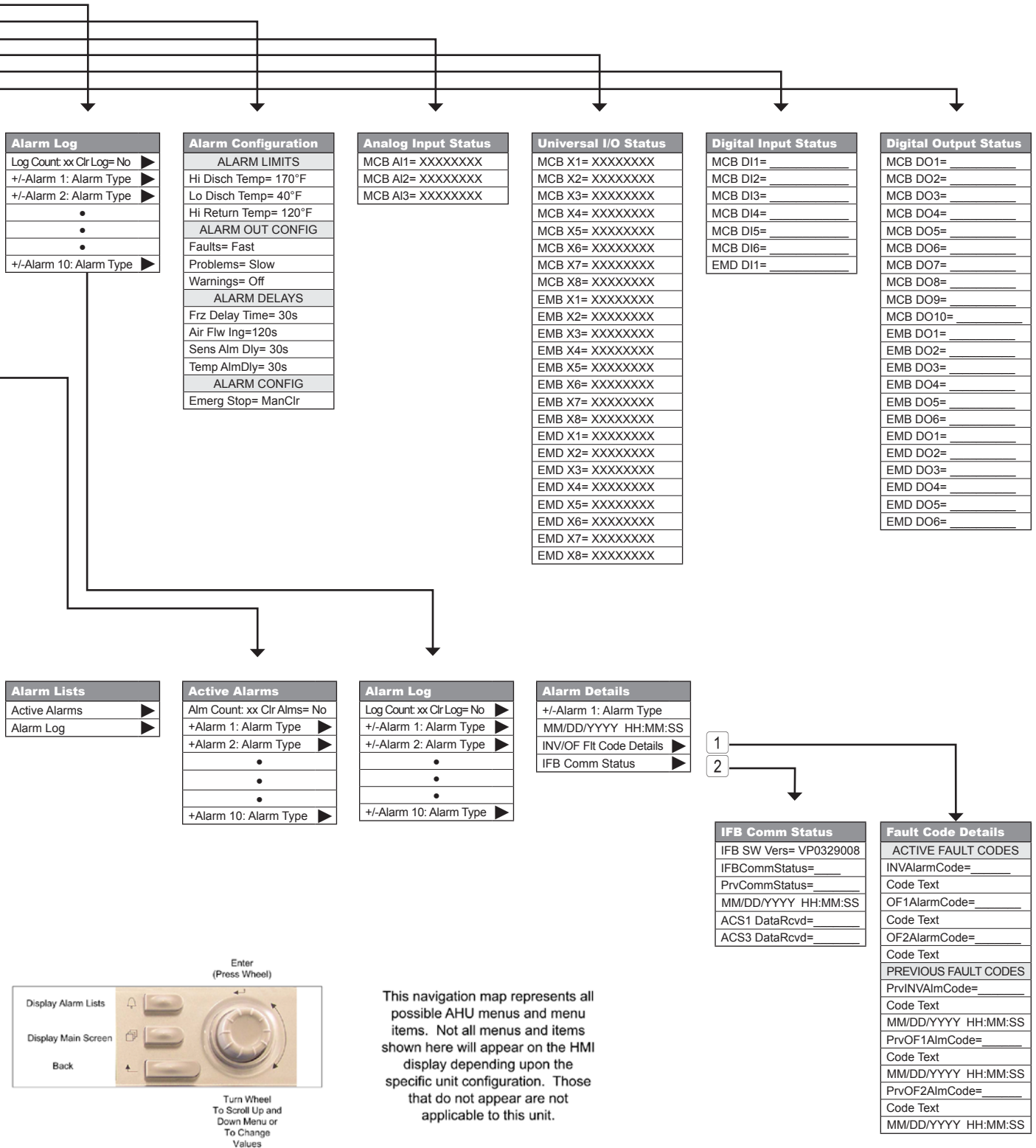


Figure 58: BMS Communications – Keypad/Display Menu Structure

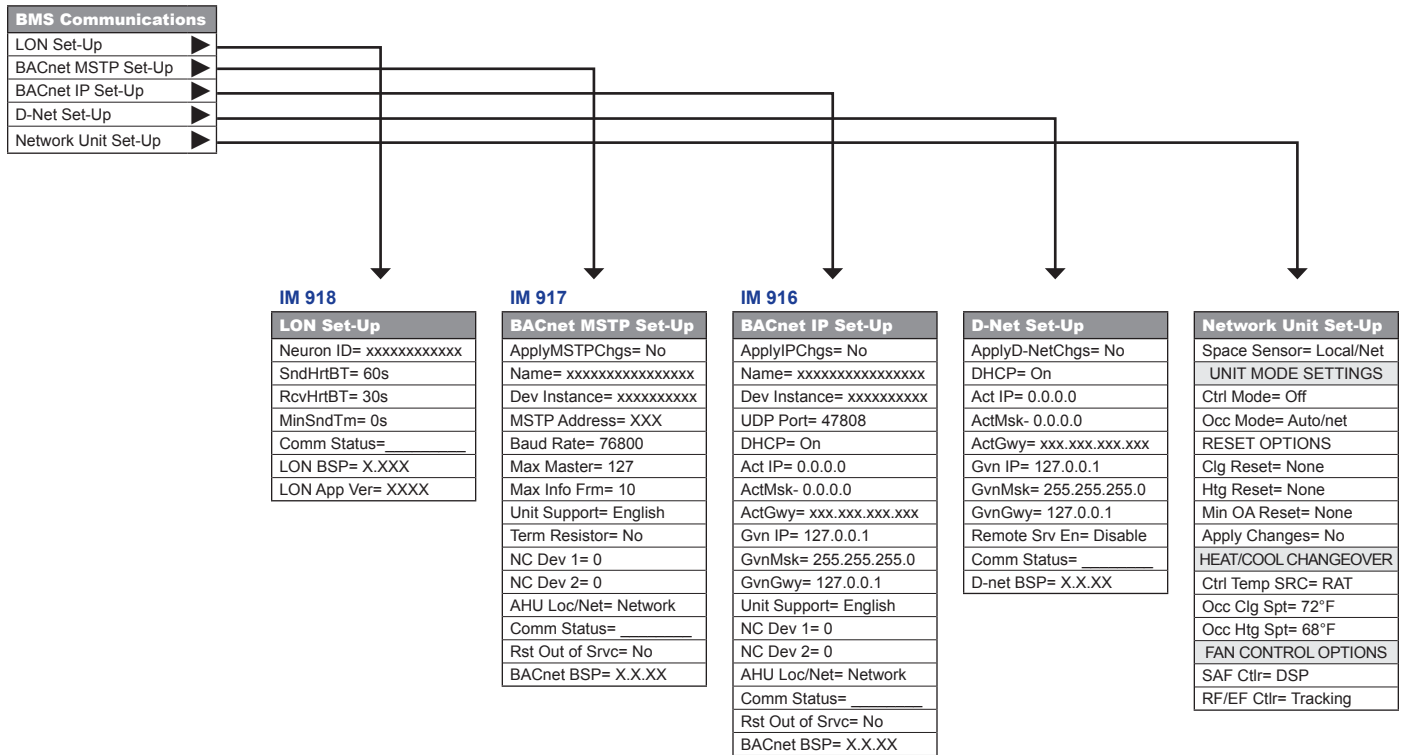


Figure 59: Trending – Keypad/Display Menu Structure

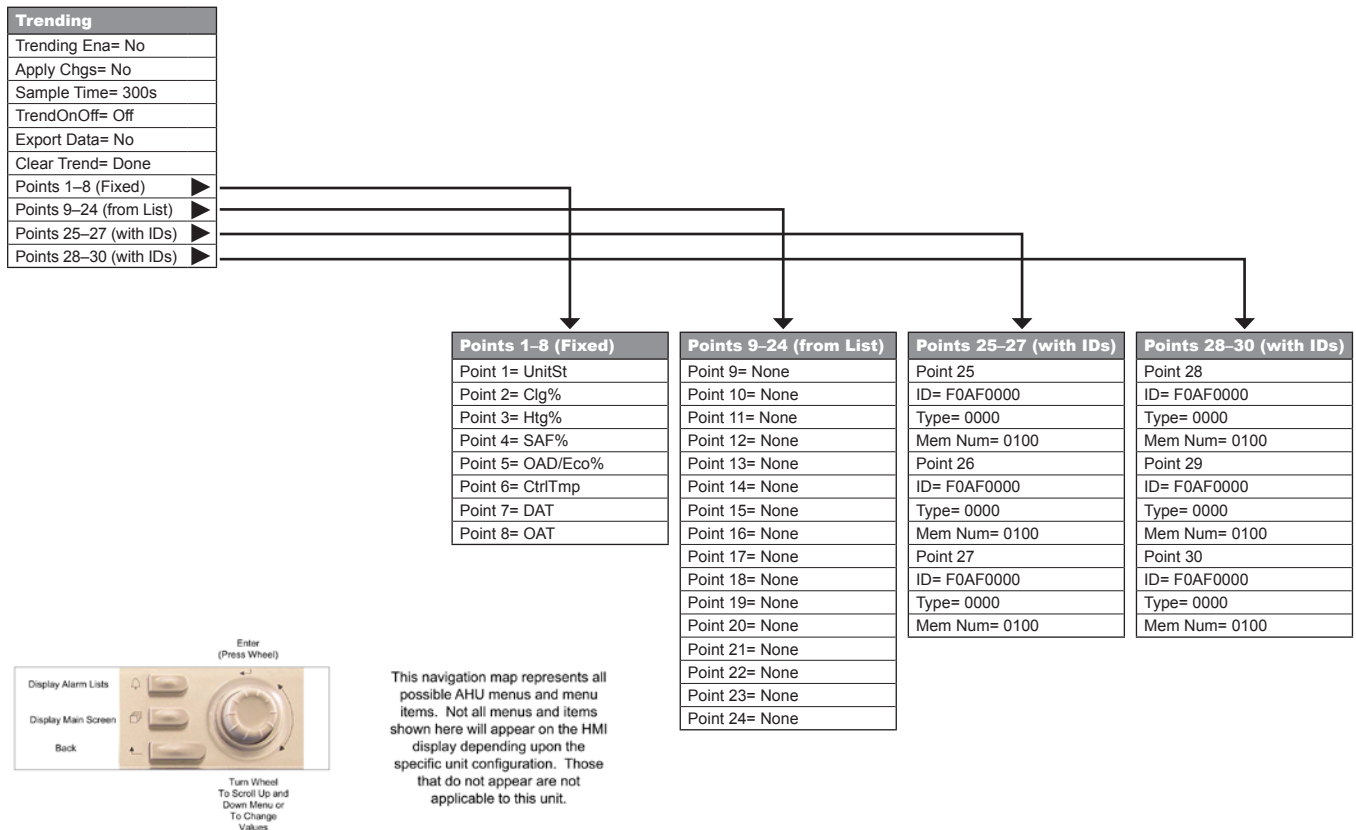
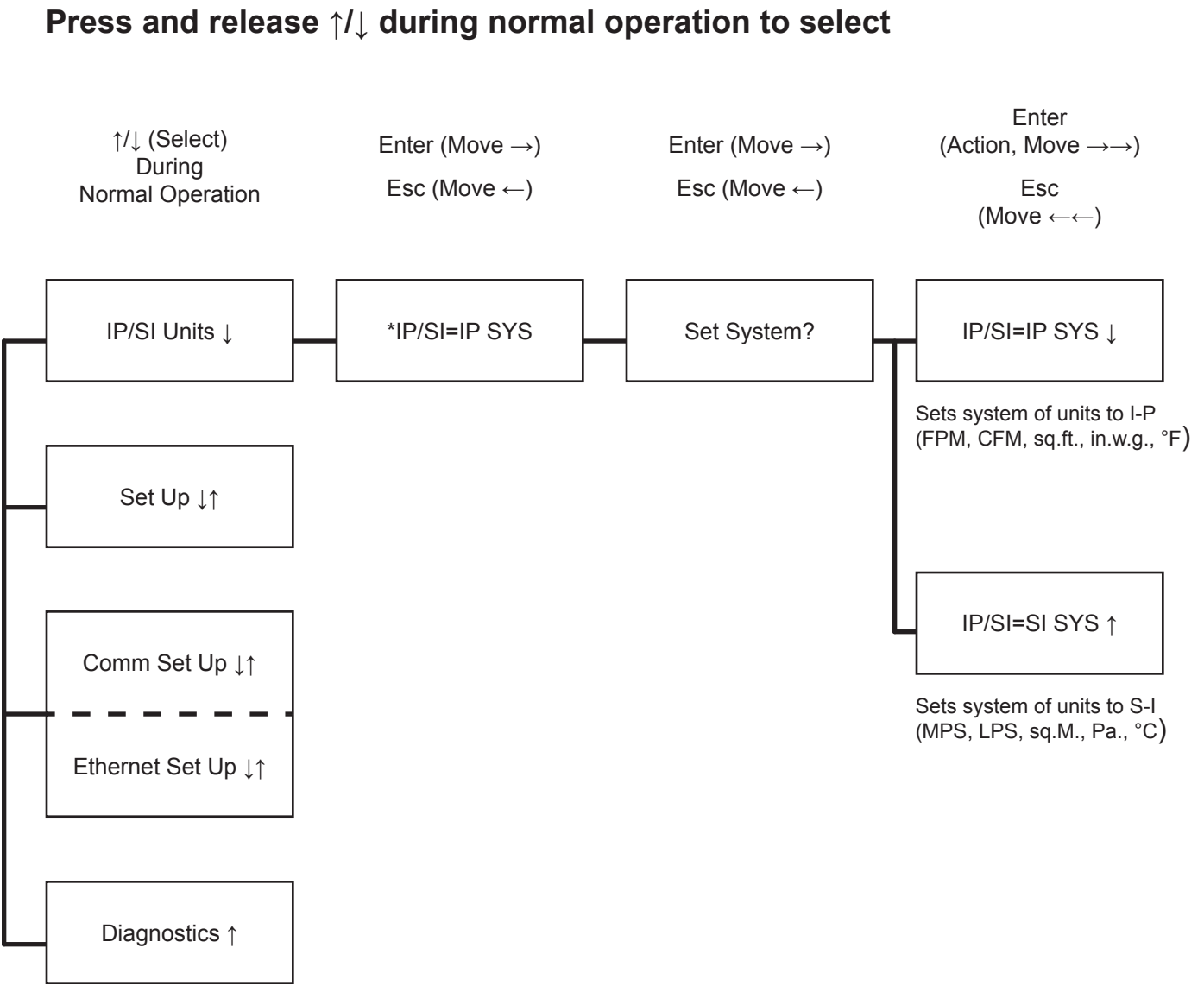


Figure 60: Optional Outdoor Air Monitor – Changing the System of Units

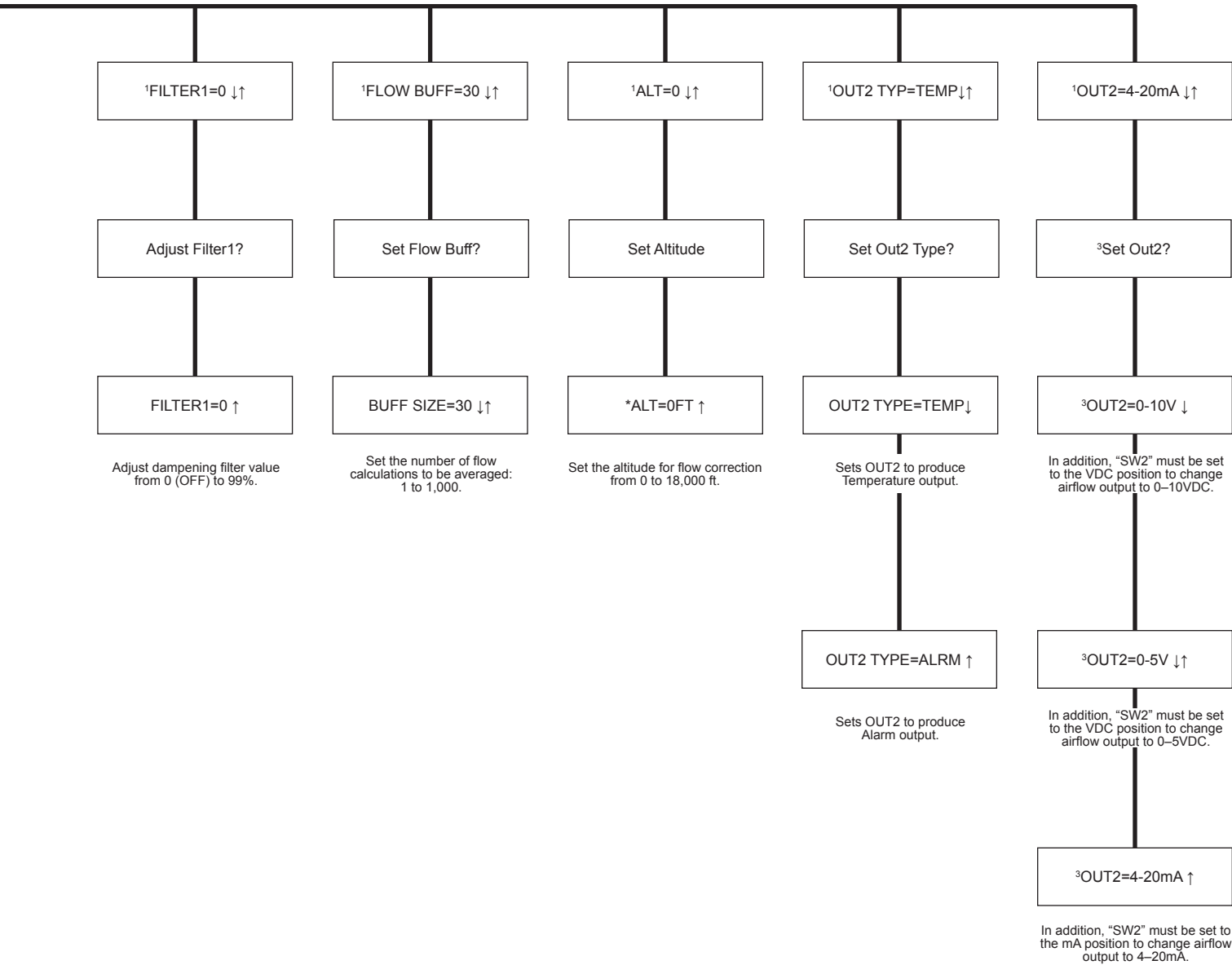


* Factory Default/Current Setting

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”.





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To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

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

Products manufactured in an ISO Certified Facility.

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Operations Manual

OM 1217-1

Group: **Controls**

Part Number: **910155572**

Date: **September 2014**

Intelligent Equipment™

Quick Start Guide

The Intelligent Equipment™ gateway by Daikin is capable of communicating using a cellular connection, Wi-Fi Ethernet connection, or hardwired LAN Ethernet connection. For Ethernet connection the gateway supports DHCP to have an IP address assigned automatically, or it can be field programmed with a static IP address.

If an Ethernet connection is to be used, for either type the customer's LAN Administrator should review and supply the following information (as necessary) **prior to going to the jobsite and commissioning the gateway.**

Allow incoming and outgoing internet traffic on TCP ports 8080, 3097, 3099 Hardwired LAN connections:

Hardwired LAN Connections

A CAT 5E Ethernet communication cable with an extra:

feet of coiled cable and a RJ45 connector on the free end has been run per local codes from the customer's LAN to the unit main control box of each unit with an Intelligent Equipment gateway.

If the gateway will be required to use a static IP address the following information will need to be supplied:

| | | |
|---------------------------------|---|-----------------|
| Internal LAN Static IP Address: | <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/> | (required) |
| IP Subnet Mask: | <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/> | (required) |
| Default Gateway: | <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/> | (required) |
| DNS Server (primary): | <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/> | (required) |
| DNS Server (secondary): | <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/> | (if applicable) |
| Proxy Server IP Address: | <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/> | (if applicable) |
| Proxy Server Port Number: | <input type="text"/> | (if applicable) |

Wi-Fi Ethernet connections

the following information will be required as well:

| | |
|--------------------------|----------------------|
| Wi-Fi network SSID: | <input type="text"/> |
| Wi-Fi network password: | <input type="text"/> |
| Wi-Fi encryption type: | <input type="text"/> |
| Wi-Fi Mode: | <input type="text"/> |
| Preferred Wi-Fi channel: | <input type="text"/> |

At the Jobsite

Cellular connection:

Prior to verifying cellular connection, remove the antenna from the shipping envelope and screw it into the magnetic cellular antenna base on the outside of the unit. Cellular signal connection can be verified if you can see live data through the IE user interface or through the web interface. For information on how to view unit live unit data through the IE user interface refer to section Cellular Configuration of [IM 1219](#). In order to verify signal strength through the Web IF configuration page follow the steps below:

- Using a laptop computer and Ethernet cable, connect to the Ethernet of the Intelligent Equipment gateway.
 - The Wi-Fi settings of the Intelligent Equipment gateway are configured using HTML Interface pages in an HTTP server. In order to access these pages, your computer must be on the same subnet as the Intelligent Equipment gateway, which is shipped set to a default IP subnet mask (**255.255.0.0**) and IP address (**172.31.255.1**). You must change the computer's network settings to match the subnet. The Wi-Fi configuration process is the same regardless of the operating system on your computer
- Bring up a web browser page and go to **172.31.255.1** to bring up the Web IF configuration page
 - When prompted, enter the User Name: "service".
 - Enter the unique password that was provided with the Gateway hardware and press ENTER.
 - This opens the Gateway home page
- Verify cellular signal strength
- Adjust antenna as necessary to establish a cellular connection

Wi-Fi connections

- Remove the antenna from the shipping envelope and screw it into the magnetic Wi-Fi antenna base on the outside of the unit.
- Using a laptop computer and Ethernet cable, connect to the Web IF configuration page of the Intelligent Equipment gateway.
 - The Wi-Fi settings of the Intelligent Equipment gateway are configured using HTML Interface pages in an HTTP server. In order to access these pages, your computer must be on the same subnet as the Intelligent Equipment gateway, which is shipped set to a default IP subnet mask (**255.255.0.0**) and IP address (**172.31.255.1**). You must change the computer's network settings to match the subnet. The Wi-Fi configuration process is the same regardless of the operating system on your computer
- Bring up a web browser page and go to **172.31.255.1**
 - When prompted, enter the User Name: "service".
 - Enter the unique password that was provided with the Gateway hardware and press ENTER.
 - This opens the Gateway home page
- Click the '**Network**' tab

- Under **wlan0 Configuration** select '**Static IP**' for Connection Type
 - Enter the IP, Subnet, and Gateway address information
- Under wlan0 DNS Servers enter the primary DNS server and click '**Add**'
 - If a secondary DNS server address is to be entered, enter it after the page has reloaded and click '**Add**'
- Click the '**Wireless**' tab
- Enter the ESSID of the network
- If Wi-Fi security is enabled enter in Wi-Fi network password and security type
- Save configuration changes, apply changes, and reboot gateway
- Verify Wi-Fi signal strength and adjust antenna as necessary

Hard-wired LAN connections

- Remove the Ethernet to USB converter from the envelope and connect it to a USB port on the Intelligent Equipment gateway
- If the Intelligent Equipment gateway will be addressed using DHCP, simply connect the Ethernet cable to the USB to Ethernet adapter
- For static IP addressing, using a laptop computer and Ethernet cable, connect to the Web IF configuration page of the Intelligent Equipment gateway.
 - The LAN settings of the Intelligent Equipment gateway are configured using HTML Interface pages in an HTTP server. In order to access these pages, your computer must be on the same subnet as the Intelligent Equipment gateway, which is shipped set to a default IP subnet mask (**255.255.0.0**) and IP address (**172.31.255.1**). You must change the computer's network settings to match the subnet. The Hardwired configuration process is the same regardless of the operating system on your computer
- Bring up a web browser page and go to **172.31.255.1**
 - When prompted, enter the User Name: "service".
 - Enter the unique password that was provided with the Gateway hardware and press ENTER.
 - This opens the Gateway home page
- Click the '**Network**' tab
- Under **wan Configuration** select '**Static IP**' for Connection Type
 - Enter the IP, Subnet, and Gateway address information
- Under **wan DNS Servers** enter the primary DNS server and click '**Add**'
 - If a secondary DNS server address is to be entered, enter it after the page has reloaded and click '**Add**'
- Save configuration changes, apply changes, and reboot gateway