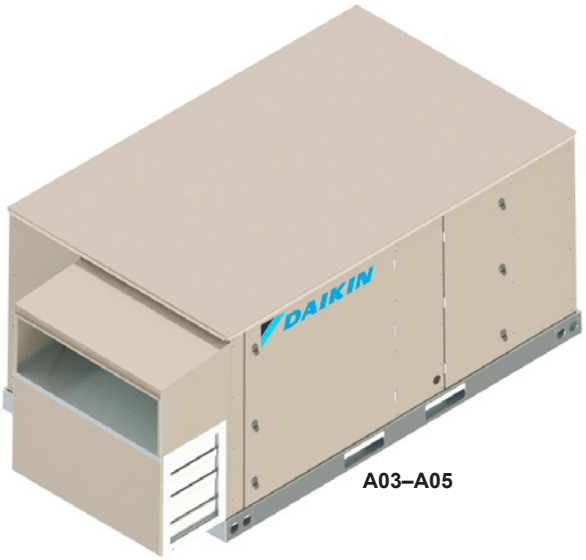
Installation and Maintenance Manual IM 1260-2

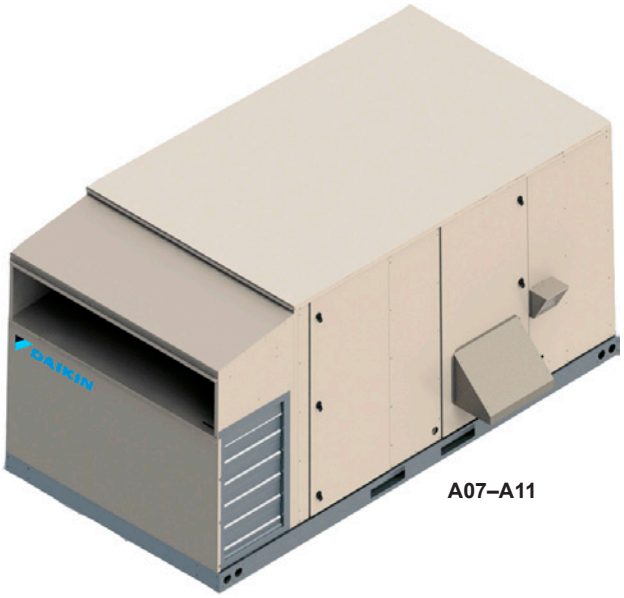
Group: **Applied Air Systems**
Part Number: **IM 1260**
Date: **July 2018**

Rebel®
Outdoor Chilled Water Air Handling Systems

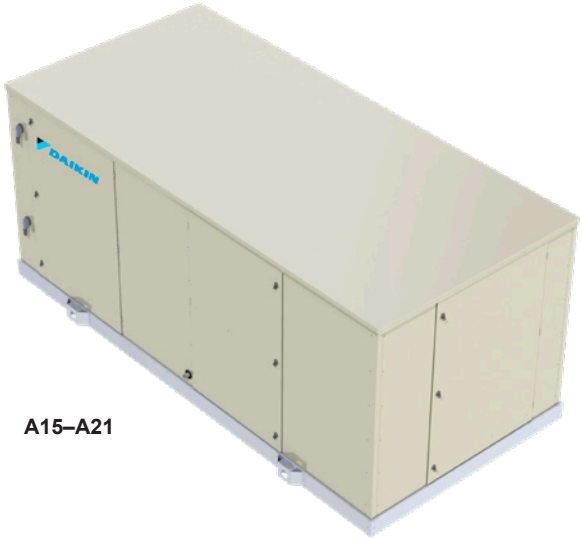
Packaged Heating & Cooling
Models DAH A03 – A21
500 to 11,500 cfm (3 to 21 ft²)
Energy Recovery Wheel, Energy Recovery CORE®



A03–A05



A07–A11



A15–A21

General Information

This manual provides general information about the Daikin Rebel Commercial Packaged Chilled Water or Heating Only Rooftop Unit, model DAH. 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 (DAH A03 – A21)

DAH – A11 – A H H G 4

Daikin Packaged System

Nominal capacity
A03 = 3 sq. t.
A04 = 4 sq.ft.
A05 = 5 sq.ft.
A07 = 7 sq.ft.
A09 = 9 sq.ft.
A11 = 11 sq.ft.
A15 = 15 sq.ft.
A19 = 19 sq.ft.
A21 - 21 sq.ft.

Design vintage
A = Vintage 1

Cooling efficiency
H = High

Unit style
W = air handler with cooling coil
Y = air handler without cooling coil

Heat medium
Y = None (cooling only)
G = Natural gas heat
E = Electric heat
W = Hot water heat

Line voltage
2 = 208 volt power supply
3 = 230 volt power supply
4 = 460 volt power supply

Installer Responsibilities

⚠ CAUTION

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

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

Receiving Inspection

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

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

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

Service Clearance

⚠ CAUTION

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

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

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

Ventilation Clearance

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

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

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

Unit(s) Surrounded by Solid Walls:

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

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

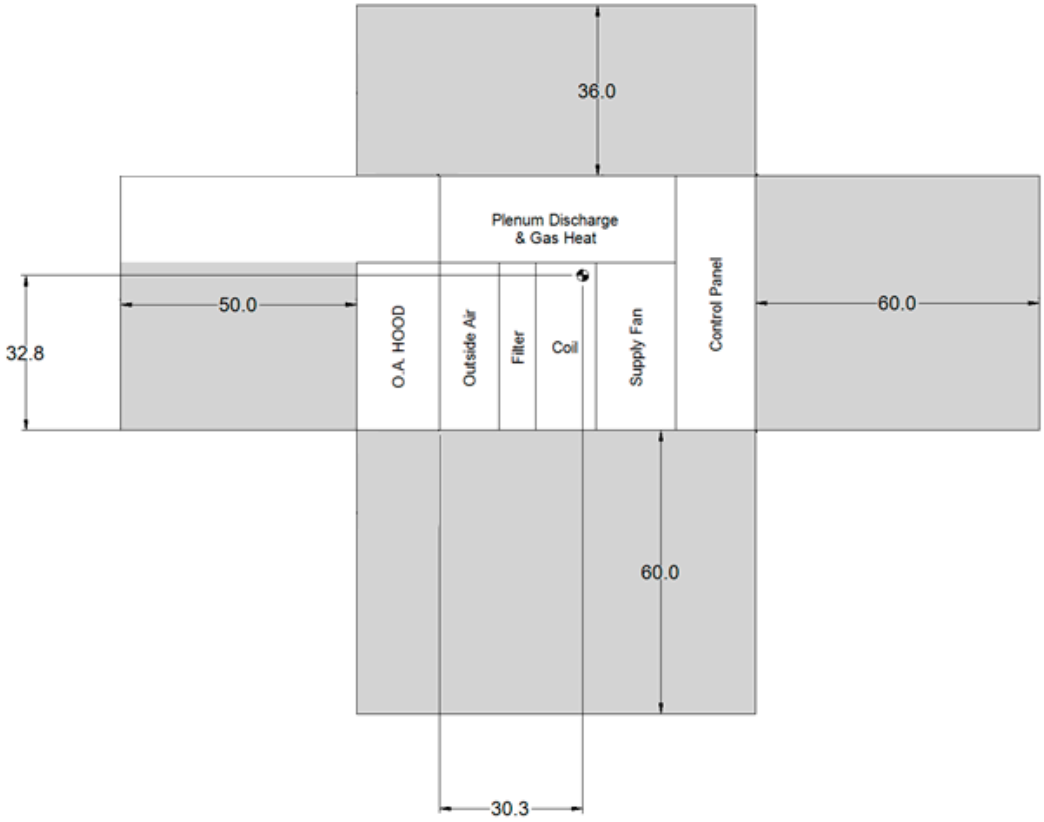
If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified (see Figure 1). This is particularly important to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

Overhead Clearance

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.

Figure 1: Service Clearances

Small Cabinet
A03—A05



Medium Cabinet
A07—A11

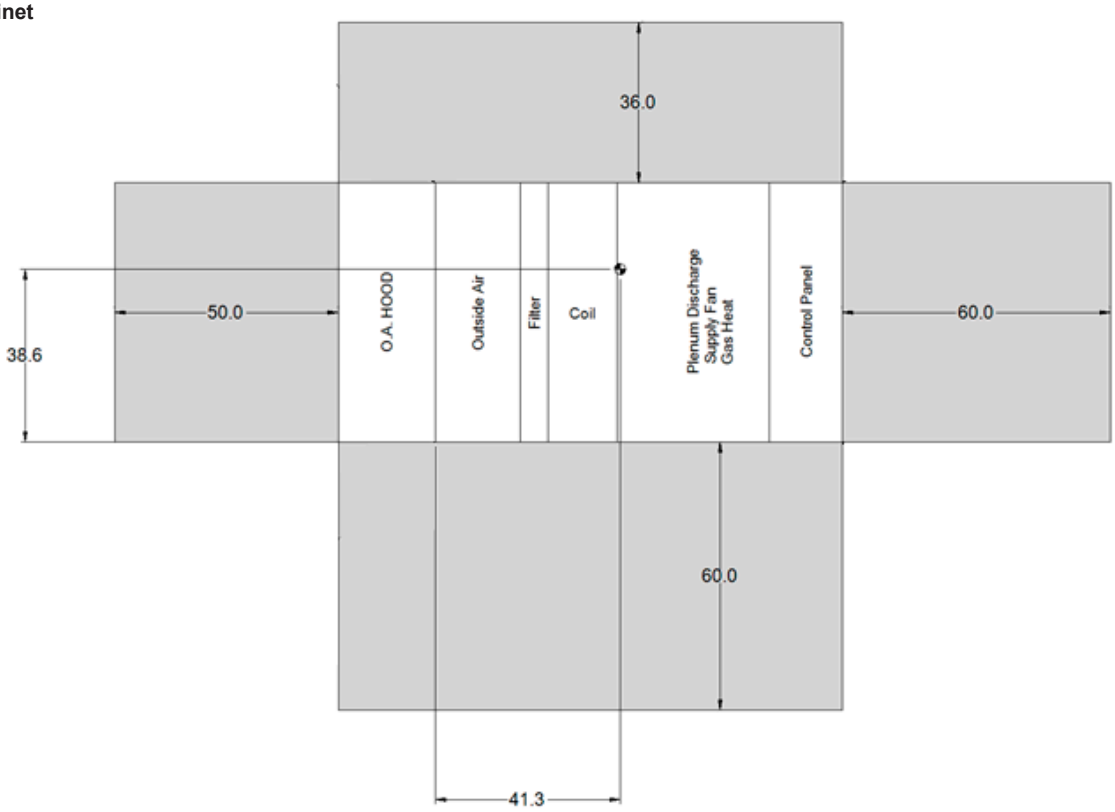
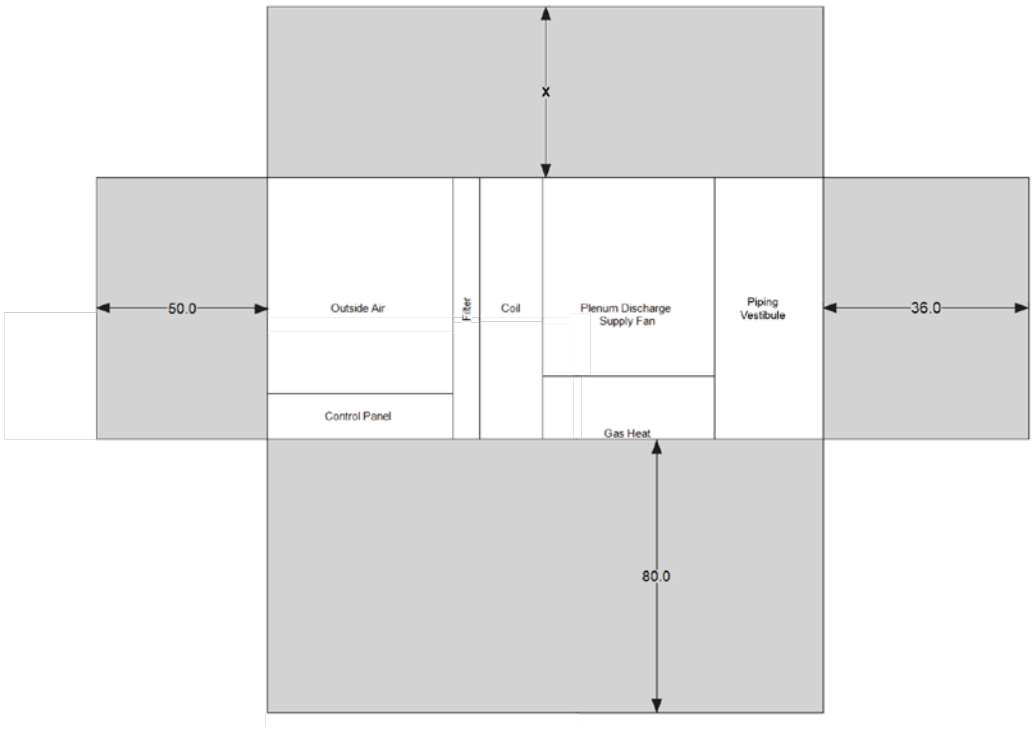


Figure 1 continued: Service Clearances

Large Cabinet
A15—A21



NOTES:
X = 60" with ERW, 36" without ERW

Roof Curb Assembly and Installation

⚠ WARNING

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

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

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

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

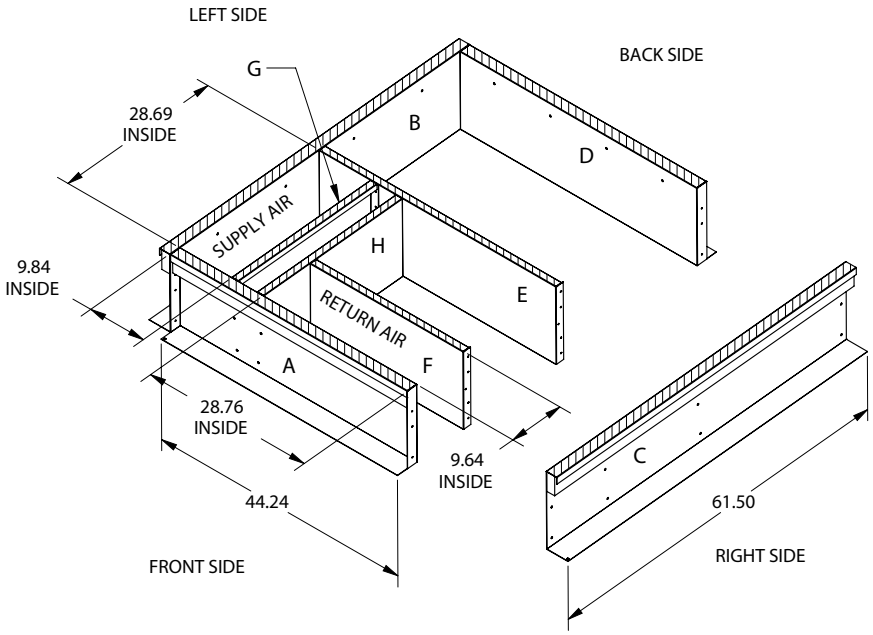
The gasketed top surface of the curb seals against the unit when it is set on the curb. These flanges must not support the total weight of the duct work. See Installing Ductwork on page 17 for details on duct connections. It is critical that the condensate drain side of the unit be no higher than the opposite side.

Assembly Instructions

Assembly of a typical roof curb is shown in Figure 2 on page 8, Figure 3 on page 9.

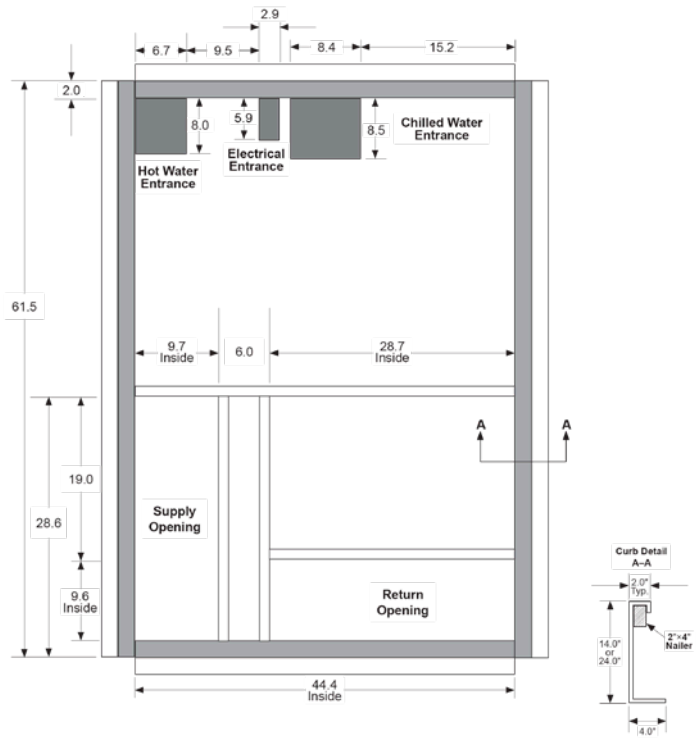
1. Set curbing parts A thru G per dimensions shown over roof opening or on a level surface. Note location of supply air opening. Check alignment of all mating screw holes.
2. Screw curbing parts together using fasteners provided. Leave all screws loose until curb is checked to be square.
3. Square entire curbing assembly and securely tighten all screws.
4. Position curb assembly over roof openings. Curb must be level within 0.25 inches from side to side and 1.50 inches over its length. Check that top surface of curb is flat with no bowing or sagging.
5. Weld curb assembly in place. Caulk all seams watertight. Remove backing from 0.25" × 1.5" wide gasket and apply to surfaces shown by crosshatching.
6. Check that electrical connections are coordinated.

Figure 2: Roof Curb Assembly (DAH A03—A05)[1]



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

Standard Roof Curb – Small Cabinet



Roof Curb for ERW – Small Cabinet

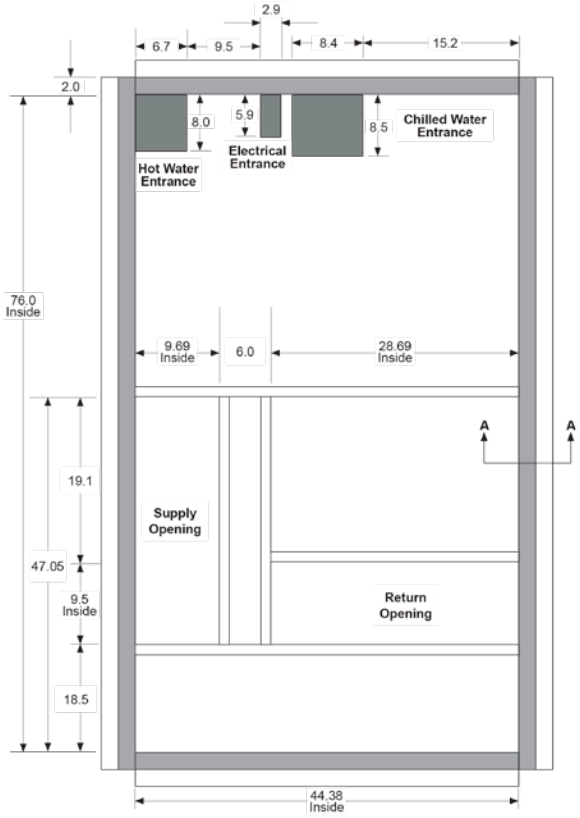
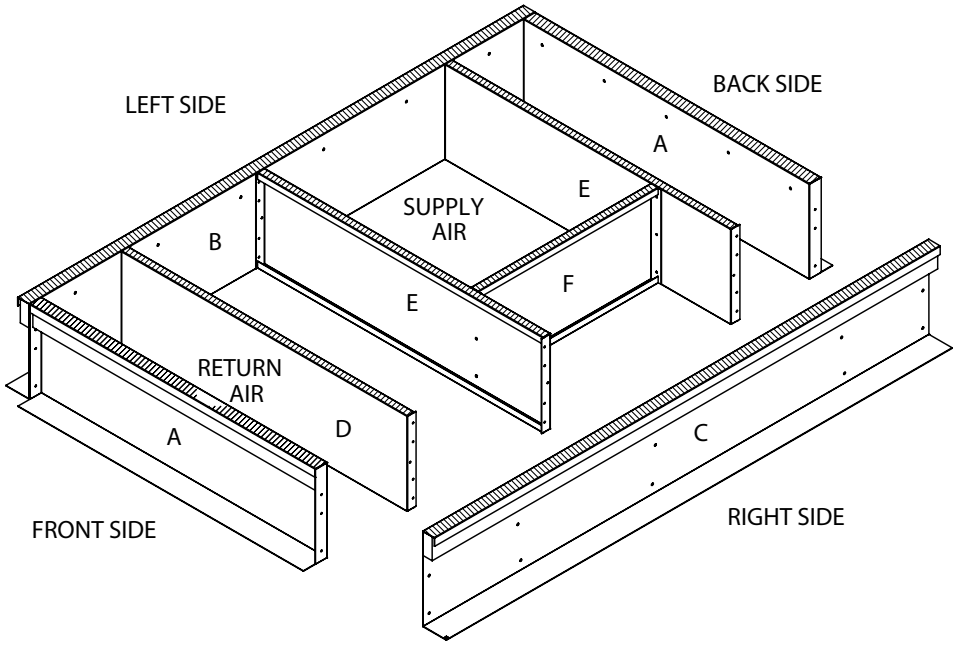
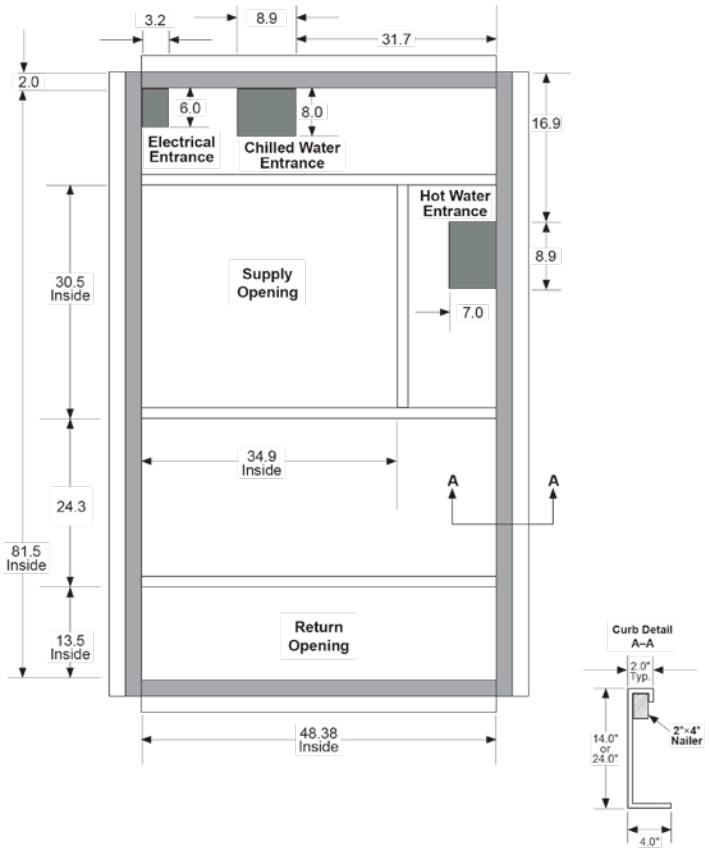


Figure 3: Roof Curb Assembly (DAH A07–A11)[1]



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

Standard Roof Curb – Medium Cabinet



Roof Curb for ERW – Medium Cabinet

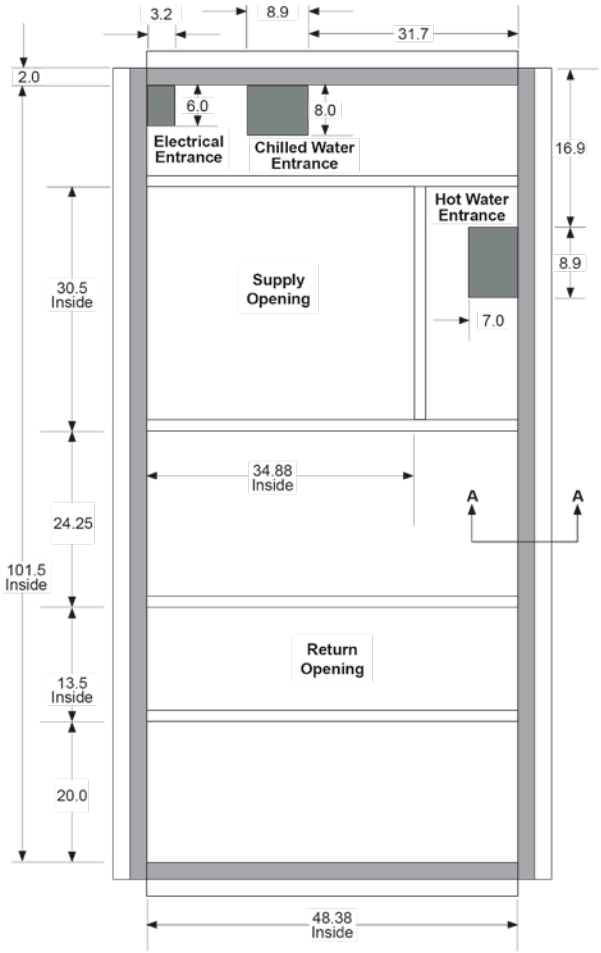
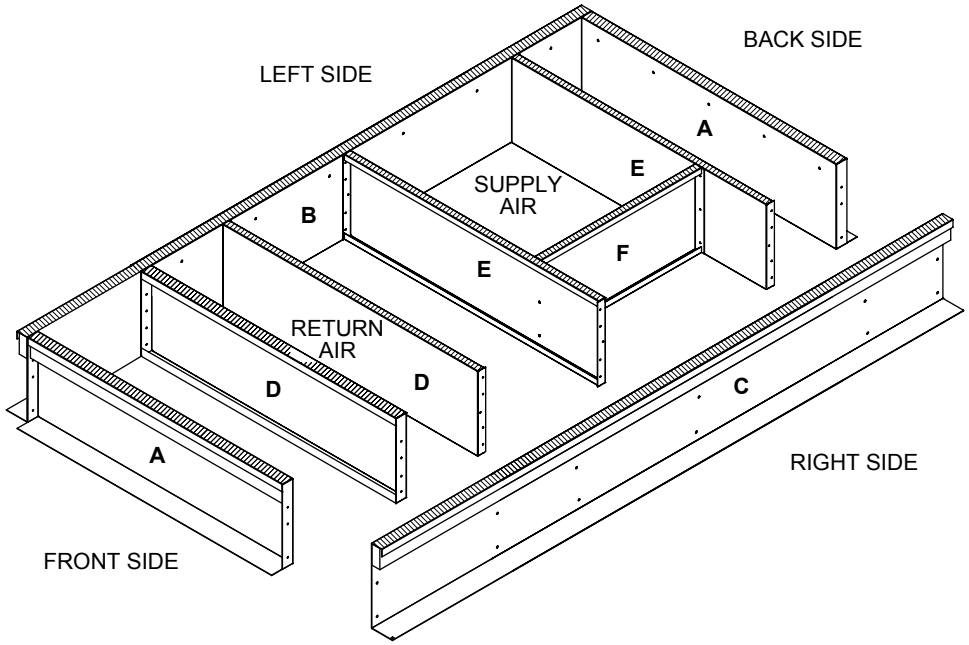
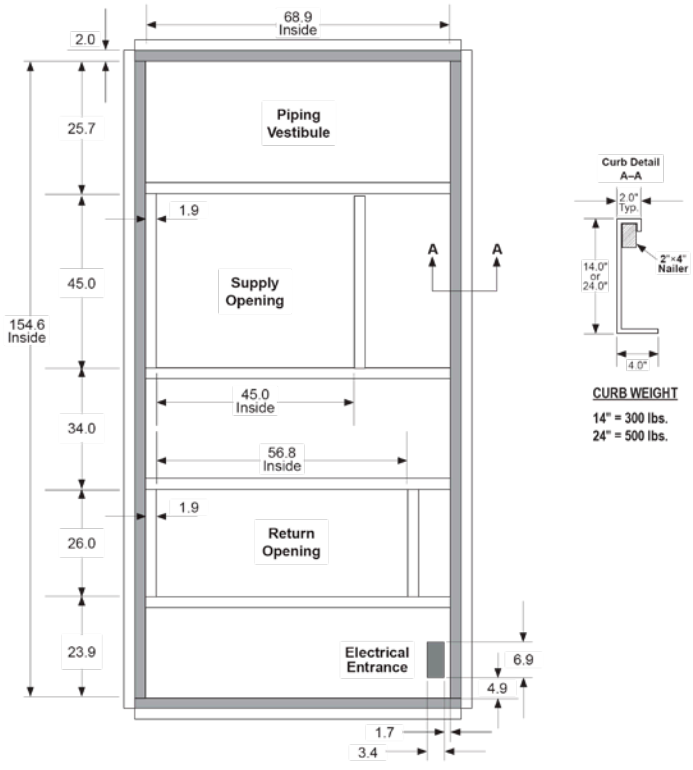


Figure 4: Roof Curb Assembly (DAH A15–A21)[1]



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

Standard Roof Curb – Large Cabinet



Roof Curb for ERW – Large Cabinet

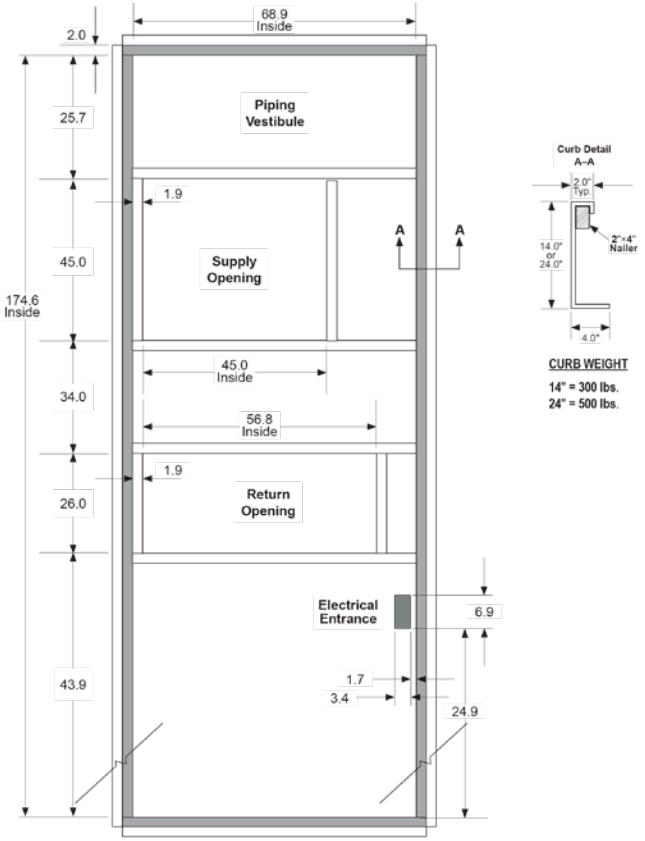
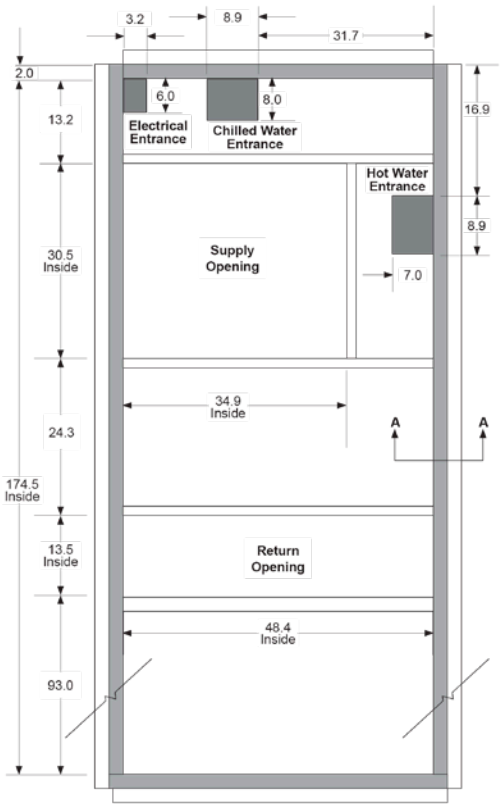
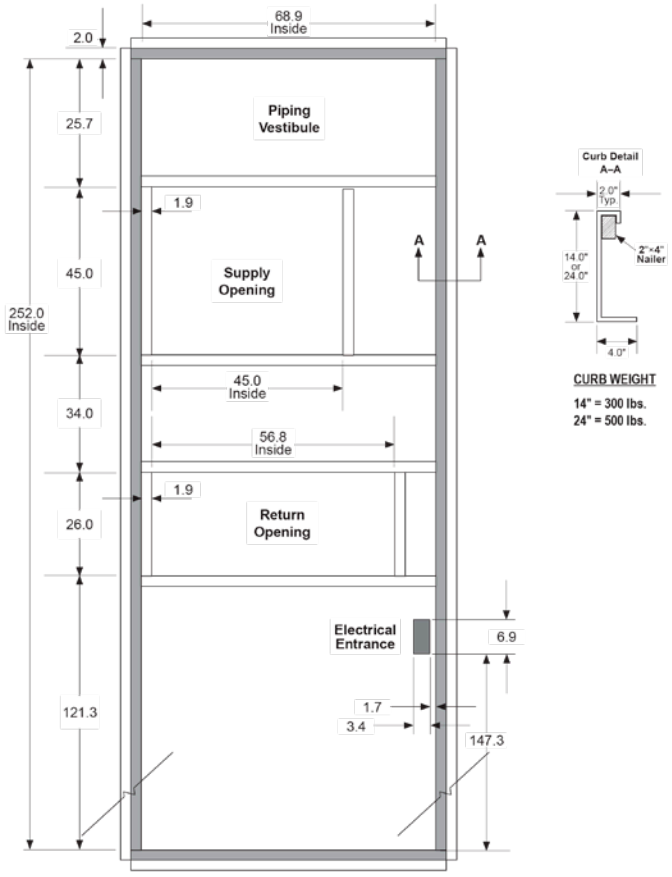


Figure 5: Roof Curb Assembly (DAH A07, A11, A15—A21) with CORE ERV

CORE Roof Curb – Medium Cabinet



CORE Roof Curb – Large Cabinet



Rigging and Handling

⚠ WARNING

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

⚠ WARNING

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

⚠ CAUTION

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

⚠ CAUTION

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

Rigging holes for shackles are integral on the unit base. **Use four independent lines, securing one end of a line to a unit base lifting point and the other end of the line to an associated spreader bar lifting point**, Figure 6.

Use spreader bars to prevent damage to the unit cabinet. Avoid twisting or uneven lifting of the unit. The cable length from the bracket to the hook should always be longer than the distance between the outer lifting points.

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

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

Figure 6: Rigging Label A03–A11

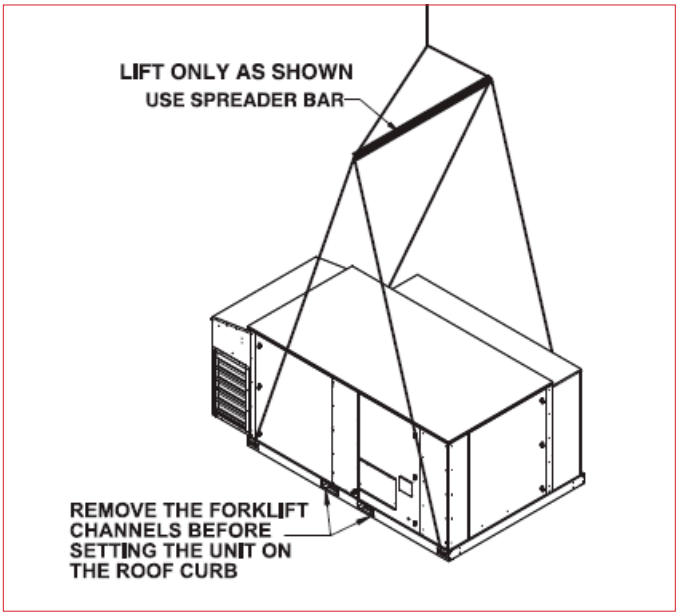


Table 2: Physical Data—Unit Weights DAH A03 through A21

Model	Small Cabinet			Medium Cabinet			Large Cabinet		
	A03	A04	A05	A07	A09	A11	A15	A19	A21
Weight (lbs.)									
Base Weight[1]	600	620	640	975	1,000	1,050	2,050	2,113	2,150
High Capacity Coil[2]	15	18	22	23	37	44	97	120	134
Electric Heat	45			100			228		
Hot Water 1 Row	11			32			60		
Hot Water 2 Row	16			41			100		
Hot Water 3 Row	—			—			140		
Gas Heat	75			186			175/225/275		
Economizer	163			308			500		
Energy Recovery Weight Adds (lbs.)									
Wheel 100% OA	160			300			350		
Wheel Mixed Air	175			250			400		
CORE® Recovery	—			1,450			2,260		

1. Includes standard cooling coil.
2. Dry coil weight.

Size A03–A11 Fan Weights (lbs.)	
Indoor fan (diameter)	
12"	87
14"	91
16"	115
22"	115

Size A15-A21 Fan Weights (lbs)	
Indoor fan (diameter)	
16"	100
20"	150
24"	260
Indoor Motor (hp)	
1	36
1.5	41
2	40
3	69
5	84
7.5	115
10	128
15	211
20	225

Curb Weights (lbs.)	14"	24"
A03—A05	156	230
A07—A11	200	295
A15—A21	566	657

*Excludes CORE curbs.

Unit Piping - Condensate Drain Connection

⚠ WARNING

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

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

Figure 7 shows the layout of the condensate drain connection. The distance from the drain pan outlet to the horizontal run of the P-trap should be a distance of twice the static pressure in the drain pan.

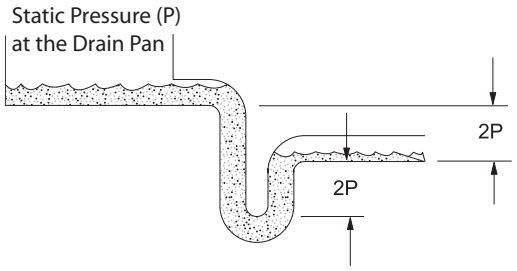
Example: If the static pressure as measured in the drain pan is 1.5", then the distance between the drain outlet and the horizontal run should be 3".

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

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

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

Figure 7: Condensate Drain Connection



Unit Piping – Chilled Water Coil

The unit is provided with a chilled water connection of 3/4" to 2-1/2" male NPT for A03–A21 units (Table 3). All piping connecitons are through the base into the piping vestibule with no need for external piping or vestibule (Figure 8 for A03-A05, Figure 9 A07–A11, and Figure 10 A15–A21). All coils come fully piped to the end vestibule. Piping connections are marked for supply and return in the vestibule.

Daikin recommends the installation of a strainer in the water line upstream of all water coils.

Table 3: Chilled Water Piping Connecitons

Cabinet	Coil Rows	Piping Connection Size
A03	3	3/4"
A03	5	3/4"
A04	3	3/4"
A04	5	3/4"
A05	3	3/4"
A05	5	3/4"
A07	3	1"
A07	5	1"
A09	3	1-1/4"
A09	5	1-1/4"
A11	3	1-1/4"
A11	4	1-1/4"
A11	5	1-1/4"
A15	3	2"
A15	5	2-1/2"
A19	3	2"
A19	5	2-1/2"
A21	3	2"
A21	5	2-1/2"

Figure 8: A03–A05 Through-the-Base Connections

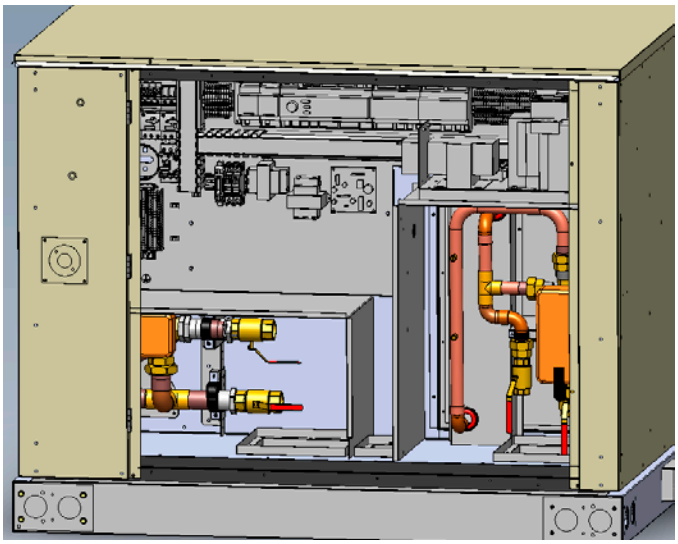


Figure 9: A07-A11 Through-the-Base Connecitons

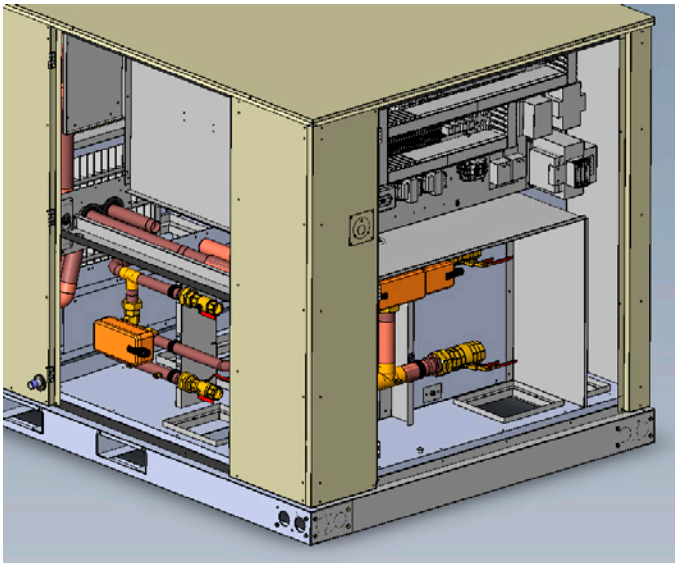
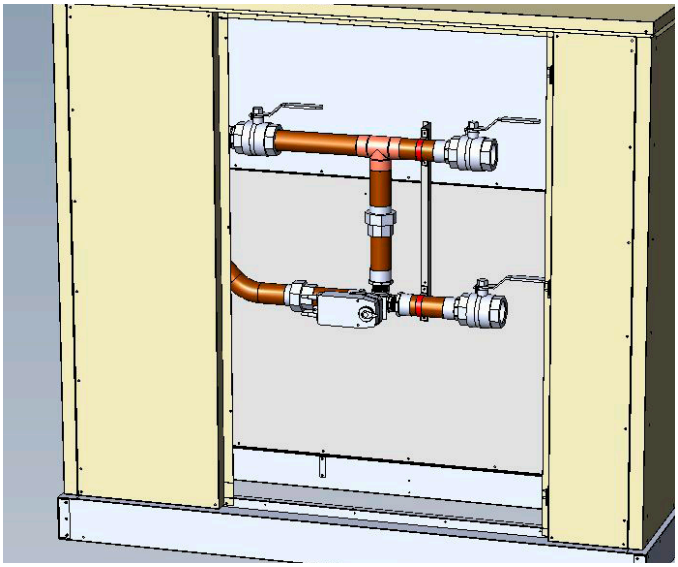


Figure 10: A15-A21 Through-the-Base Connecitons



Unit Piping – Hot Water Coil

The unit is provided with a hot water connection of 3/4" to 1-5/8" male NPT for A03–A21 units. (Table 4) All piping connecitons are through the base into the heating vestibule with no need for external piping or vestibule (Figure 8 for A03-A05, Figure 9 A07–A11, and Figure 10 A15–A21). All coils come fully piped to the heating vestibule. Piping connections are marked for supply and return in the vestibule.

Daikin recommends the installation of a strainer in the water line upstream of all water coils.

Table 4: Hot Water Piping Connections

Cabinet	Coil Rows	Piping Connection Size
A03	1 or 2	3/4"
A04	1 or 2	3/4"
A05	1 or 2	3/4"
A07	1 or 2	1"
A09	1 or 2	1"
A11	1 or 2	1"
A15	1, 2, or 3	1-5/8"
A19	1, 2, or 3	1-5/8"
A21	1, 2, or 3	1-5/8"

Winterizing Water Coils

Coil freeze-up can be caused by such things as air stratification and failure of outdoor dampers and/or preheat coils. Routine draining of water cooling coils for winter shutdown cannot be depended upon as insurance against freeze-up. Severe coil damage may result. It is recommended that all coils be drained as thoroughly as possible and then treated in the following manner.

Fill each coil independently with an antifreeze solution using a small circulating pump and again thoroughly drain

Check freezing point of antifreeze before proceeding to next coil. Due to a small amount of water always remaining in each coil, there will be a diluting effect. The small amount of antifreeze solution remaining in the coil must always be concentrated enough to prevent freeze-up

Carefully read instructions for mixing antifreeze solution used. Some products have a higher freezing point in their natural state than when mixed with water.

Water Control Valves

When the Rebel Air handler is selected with water control valves the unit is shipped with valves mounted and controlers wired to the control panel. See Table 3 and Table 4 for the field connection sizes for the control valves. Union connections are factory mounted around the control valves to allow for easy field service of the water piping.

Control valves are marked in the direction of flow, with a forged brass body and stainless steel stem and ball.

All valves are controlled with a factory mounted and wired actuator that are 24V power with a 2-10 VDC proportional control signal. The actuators are all NEMA 2 rated. All actuators are spring return to the open position.

Water Piping Connections General Guidelines

1. If sealant compound is not provided for fittings, apply Teflon tape to the connections to help prevent leaks.
2. Ensure proper insulation of supply and return piping. Proper insulation prevents loss of air handler capacity, overheating of end compartments, and/or moisture dripping.
3. The piping to and from the unit must be protected from outside air and freeze conditions. It must be suitably insulated for condensation and for heat loss or gain. Penetrations entering the unit end compartments must be fitted/sealed for unit integrity.
4. Supply and return shutoff valves are recommended at each unit.
5. Water strainers are recommended upstream of all water coils.
6. Coils are factory-equipped with vents for venting the system.
7. Be sure to install control valves on the correct air handler. Indiscriminate mixing of valves in the field can result in valves improperly sized for the desired flow rate, which can result in poor operation and coil freezeups.
8. Do not connect a unit to the supply and return piping until the water system has been cleaned and flushed completely. After this is done, the initial connection should have all valves wide open in preparation for water system flushing again.

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 11: 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 11). The damper is set so that the crank-arm moves through a 90-degree angle to bring the economizer dampers from full open to full close. Mechanical stops are placed in the crank-arm mounting bracket. Do not remove stops. Driving the crank-arm past the stops results in damage to the linkage or damper.

Outdoor Air Dampers (0% to 30%)

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

The damper position may be set at the unit controller keypad (refer to OM 1141 for further detail). During unit operation, the damper is driven to the position set at the unit controller. During the OFF cycle, the damper is automatically closed.

Cabinet Weather Protection

⚠ CAUTION

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

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

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

Installing Ductwork

⚠ WARNING

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

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

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

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

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

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

Table 5: Maximum CFM Ratings

Unit Size	Max nominal CFM
A03	1500
A04	2000
A05	2500
A07	3500
A09	4500
A11	5500
A15	7500
A19	9500
A21	11500

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 13).
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 12). Connect the tubes to appropriate barbed fittings (on SPS1) in the control panel. (Fittings are sized to accept 3/16" ID tubing.)

Figure 12: Typical Wiring Chase, Size A03–A05 shown

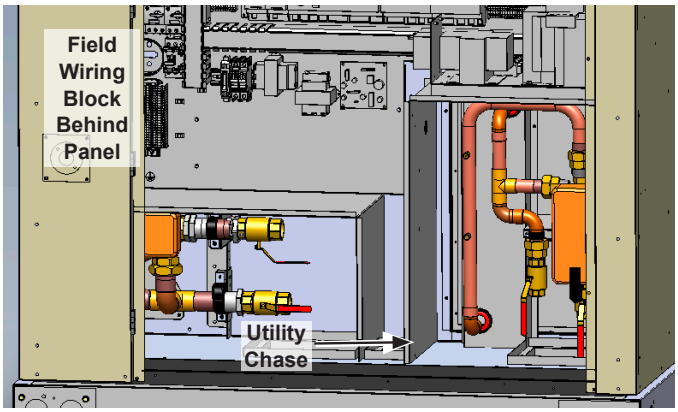
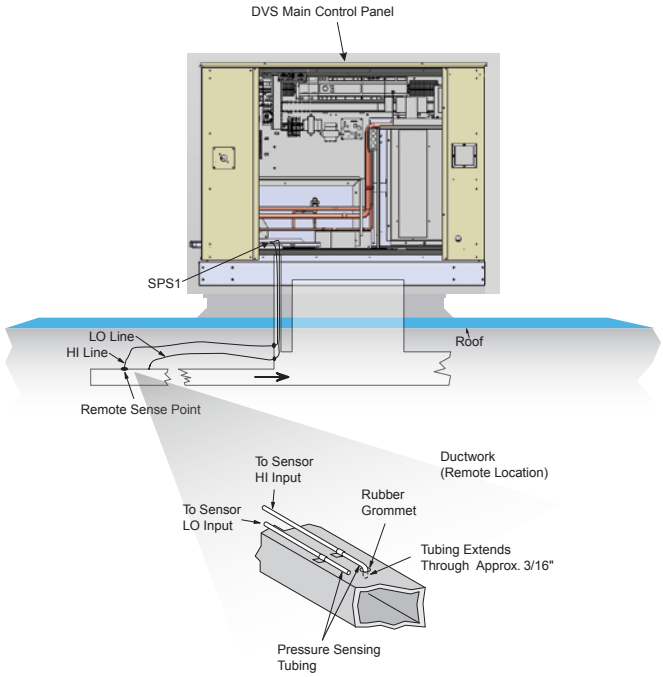


Figure 13: Duct Static Pressure Sensing Tubing Installation



Installing Building Static Pressure Sensor Taps

⚠ CAUTION

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

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

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

Building Pressurization Applications

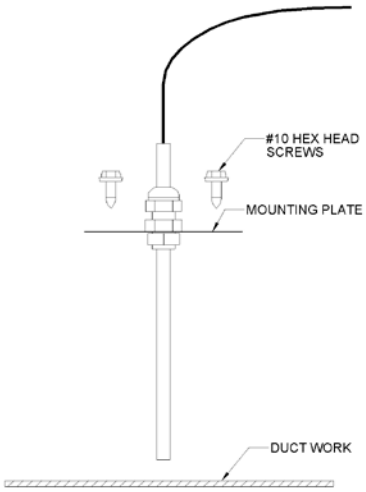
1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor fitting. This facilitates connecting a manometer or pressure gauge if testing is required.
2. Locate the building pressure (high) tap in the area that requires the closest control. Typically, this is a ground level floor that has doors to the outside.
3. Locate the building tap so it is not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
4. Route the building tap tube through the curb and feed it into the unit through the knockout in the bottom of the control panel (refer to Figure 12). Connect the 3/16" ID tube to the (high) fitting for sensor SPS2.
5. Locate the reference pressure (low) tap on the roof. Keep it away from the condenser fans, walls, or anything else that may cause air turbulence. Mount it high enough above the roof so it is not affected by snow. Not connecting the reference tap to the sensor results in unsatisfactory operation.
6. Use an outdoor static pressure tip (Dwyer A306 or equivalent) to minimize the adverse effects of wind. Place some type of screen over the sensor to keep out insects. Loosely packed cotton works well.
7. Route the outdoor tap tube out of the main control panel through a small field-cut opening in the upright. Seal the penetration to prevent water from entering. Connect the 3/16" ID tube to the (low) fitting for sensor SPS2.

Discharge Air Temperature Sensor

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

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

Figure 14: Discharge Air Temperature Sensor Installation



⚠ DANGER

Hazardous voltage. Can cause severe injury or death.

Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

⚠ WARNING

Provide proper line voltage and phase balance.

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

⚠ WARNING

Electrical shock hazard. Can cause severe injury or death.

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

⚠ DANGER

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

Pre-Construction

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

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

Lab Pressurization Applications

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

Electrostatic Discharge (ESD)

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

When inspecting/repairing Rebel Rooftop units the technician or building owner must take precautions to ground themselves to the unit.

Electrostatic Discharge (ESD) can damage components in a manner that is not always readably 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.

In order to prevent ESD damage, the technician and the unit must both be at the same electrical 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 as well as the control panel backpane. The next step is to attach a grounded wrist or ankle strap to the copper tubing or backpane. 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.

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 12 and also Table 6). Refer to the unit nameplate to determine the number of power connections.

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

Table 6: Recommended Field Power Wiring

Ampacity (MCA)	Number of Power Wires Per Phase	Wire Gauge	Insulation Temperature Rating (°C)
20	1	14	75
25	1	12	75
35	1	10	75
50	1	8	75
65	1	6	75
85	1	4	75
100	1	3	75
115	1	2	75
130	1	1	75
150	1	1/0	75
175	1	2/0	75
200	1	3/0	75
230	1	4/0	75
255	1	250	75

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

⚠ WARNING

Provide proper line voltage and phase balance.
Improper line voltage or excessive phase imbalance constitutes product abuse. Severe electrical component damage will occur.

⚠ WARNING

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

⚠ DANGER

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

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

The minimum circuit ampacity (MCA) is shown on the unit nameplate. Refer to Table 6 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 or other applicable local 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%. (This can be calculated by finding 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.) Daikin suggests contacting the local power company for correction of improper voltage or phase imbalance.

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

A grounded conductor lug is provided in the control panel. Size the grounding conductor in accordance with Table 250-95 of the National Electrical Code or applicable local code.

In compliance with the National Electrical Code, a 120 V factory mounted service receptacle outlet is optional. This outlet must be powered by a field connected 15 A, 120V power supply, unless unit power outlet was utilized. Leads are brought into the unit through the bottom of the main control panel.

Daikin does not recommend the use of Rebel units in facilities with corner grounded delta power.

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.
- 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).

The Rebel rooftop units are available with the following field control connections on Table 7.

Table 7: No Control I/O List

Device	Input Signal	Output Signal
Air Flow Monitor	NA	2-10VDC or 4-20mA
Chilled Water Valve Control	2-10VDC	NA
Dirty Filter	NA	dry contact
Duct High Limit	NA	dry contact
ERW Enable	Dry Contact	NA
ERW Control, mod	2-10VDC or 4-20mA	2-10VDC or 4-20mA
ERW Control, staged	Dry Contact	NA
Exhaust Fan Control	0-10VDC	NA
Exhaust Fan Enable	Dry Contact	NA
Heat Control Staged	2 or 4 Dry Contacts	NA
Heat Control, Gas Mod	2-10VDC	NA
Heat Control, Hot Water	2-10VDC	NA
Heat Control, SCR	0-10VDC	NA
Heat Enable	Dry Contact	NA
OA Damper	0-10VDC	NA
Supply Fan Control	0-10VDC	NA
Supply Fan Enable	Dry Contact	NA

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.

Daikin recommends the proper use of personal protection equipment (PPE) whenever starting or servicing a Rebel unit.

Before Start-Up

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

Table 8: DAH A03–A021 Electric Heat Data[1]

KW	Voltage	Amps
10	208	27.8
	230	25.1
	460	12.6
	575	10.1
20	208	55.6
	230	50.3
	460	25.1
	575	20.1
30	208	83.4
	230	75.4
	460	37.7
	575	30.2
45	208	125.1
	230	113.1
	460	56.5
	575	45.2
60	208	166.7
	230	150.8
	460	75.4
	575	60.3
72	208	200.1
	230	180.9
	460	90.5
	575	72.4
90	208	250.1
	230	226.2
	460	113.1
	575	90.5
120	—	—
	—	—
	460	150.8
	575	120.6
150	—	—
	—	—
	460	188.5
	575	150.8

1. Maximum temperature rise equals 60ºF.

Table 9: Amp Draw Data

Horse Power	Supply Fan FLA (DAH A03-A11)				Exhaust Fan FLA (DAH A03-A21)				Supply Fan FLA (A15-A21)			
	Voltage				Voltage				Voltage			
	208	230	460	kW	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	5.0	4.6	2.3	1.7	5.0	4.6	2.3	1.7	—	—	—	—
3	—	—	—	—	—	—	—	—	9.9	9.0	4.5	3.4
4	8.8	7.4	4.0	3.0	8.8	7.4	4.0	3.0	—	—	—	—
5	—	—	—	—	—	—	—	—	16.1	14.0	7.0	5.3
7.5	—	—	—	—	—	—	—	—	25.0	21.6	10.8	8.2
8	13.5	12.2	6.1	6.0	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	33.0	28.0	14.0	11.0
15	—	—	—	—	—	—	—	—	44.8	40.6	20.3	16.2
20	—	—	—	—	—	—	—	—	61.0	50.0	25.0	20.0

Optional Electric Heat

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 68.0ºF and a deadband of 1.0ºF would enter heating mode if the control temperature is reached. When this takes place, the heating mode of operation will begin and the 1st Stage of heating operation will start.

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, DAHA09AHWE). The Rebel rooftop units are available with 2- or 4-stage heat output (see capacities in Table 10. 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 (internal MT3 or field controlled points Table 7, wiring diagram Figure 47), 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 10: Heating Capacity – Electric Heaters

Unit	Stages	Option #1				Option #2				Option #3				Option #4				Option #5				Option #6				Option #7				Option #8				Option #9			
		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	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	KW	MBH	Delta T[1]	Min cfm
A03	2, SCR	6	20.5	12.6	316	12	40.9	25.1	632	18	61.4	37.7	948	30	102.4	62.9	316	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A04				9.4				18.8				28.3				47.2																					
A05				7.6				15.1				22.6				37.8																					
A07	2, SCR	18	61.4	16.2	948	36	122.8	32.3	1896	54	184.3	48.5	2844	72[2]	245.7	64.7	948	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A09				12.6				25.2				37.7				50.3																					
A11				10.3				20.6				30.9				41.2																					
A15	4, SCR	10	34.1	4.2	—[3]	20	68.2	8.4	—[3]	30	102.4	12.6	1580	45	153.5	18.9	2369	60	204.7	25.2	3159	72	245.7	30.2	3774	90	307.1	37.7	4739	120[2]	409.5	50.3	6319	150[2]	511.8	62.9	7898
A19				3.3				6.6				9.9				14.9				19.9				23.8				29.8				39.7				49.7	
A21				3				6				9				13.5				18				21.6				27				35.9				44.9	

1. Temperature is calculated at nominal air flow.
2. Not available in 208 and 230 volt.
3. 60 degree max rise

Optional Gas Heat

Daikin Tubular Heater Series

Package Heater Module

ANSI Z83.8-2013/CSA 2.6-2013

⚠ WARNING

Fire or explosion hazard .

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

Failure to follow safety warnings exactly could result in serious injury, death or property damage. Be sure to read and understand the installation, operation and service instructions in this manual. Improper installation, adjustment alteration, service or maintenance can cause serious injury, death or property damage.

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

What to do if you small gas:

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

NOTICE

DAT heater series modules are a recognized furnace component design certified by Intertek Testing Services (ETL).

For outdoor installation and installation downstream from refrigeration systems in cabinet applications.

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

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

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

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

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

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

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

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

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

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

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

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

Warranty Exclusion

⚠ 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.

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.

Ventilation & Flue Pipe Requirements

⚠ CAUTION

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

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

⚠ WARNING

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 .

⚠ NOTICE

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.

⚠ 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.

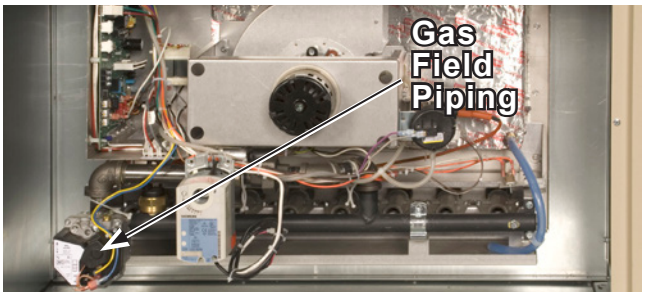
Gas Furnace Design

If the 10th digit in the model number is a “G”, the rooftop unit was furnished with a factory installed furnace (Example, DAHA09AHWG). The Rebel commercial rooftop units are available with either the low, medium and high heat input

furnace (see capacities in Table 11). 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 (internal MicroTech III or external points from Table 7, wiring diagram Figure 47) 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 15).

Figure 15: Typical Gas Heat Section (Size A03 shown)



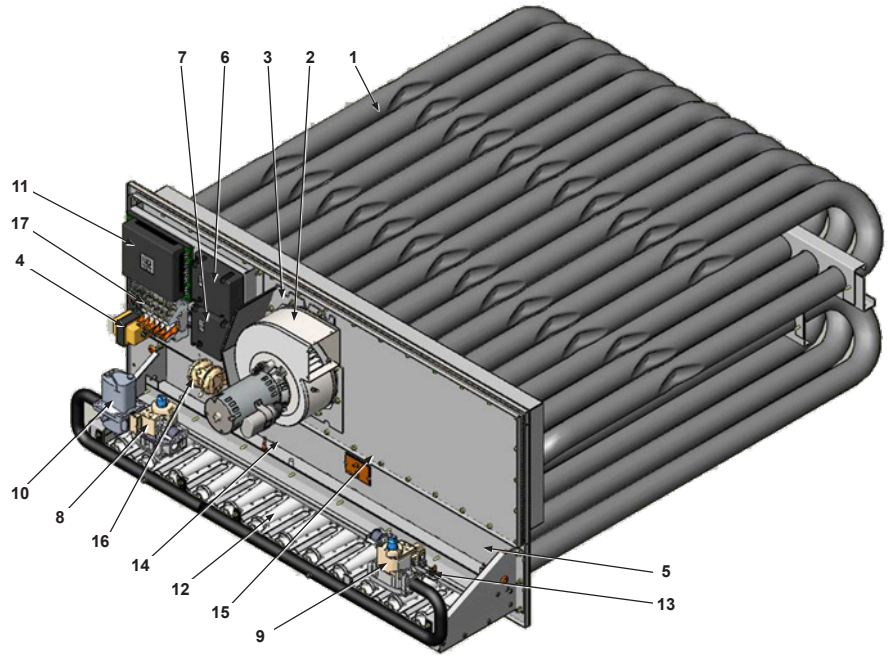
Gas Heating Capacity Data

Table 11: DAH A03-A21 Gas Heating Capacities

Data	Unit Size								
	A03–A05			A07–A11			A15–A21		
	Low Heat	Med Heat	High Heat	Low Heat	Med Heat	High Heat	Low Heat	Med Heat	High Heat
Heating Input (MBh)	50	100	150	200	300	400	300	450	600
Heating Output	40	80	120	160	240	320	240	360	480
Steady State Efficiency	0.8								
Number of Stages	2						4		
Turndown[1]	5:1			5:1 or 10:1			12:1		
Maximum Temperature rise[3]	60 / 100								
Gas Connection Size	1/2"			3/4"			3/4"		
Min/Max External Static Pressure	0.5" / 2.5"								
Gas Minimum Pressure									
Natural Gas (in. wc)	7 – 14								
Propne Gas (in. wc)	12 – 14								
Manifold Pressure Natural Gas (per gas valve)									
Stage 1 (in. wc)	1.2						0.88		
Stage 2 (in. wc)	3.5						3.5		
Low Fire[2]	0.4						0.88 (staged) 0.26 (mod)		
Manifold Pressure Propane Gas (per gas valve)									
Stage 1 (in. wc)	2.3						2.50		
Stage 2 (in. wc)	10.0						10.0		
Low Fire[2]	N/A						2.5 (staged) 0.74 (mod)		

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

Figure 16: Typical Modulating Furnace Assembly (A15–A21 shown)



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

Electrical

⚠ 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.

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 .

Gas Pressure Requirements

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

Gas Piping

Gas piping must be sized to provide the minimum required pressure at the burner when the burner is operating at maximum input. Consult your local utility on any questions on gas pressure available, allowing piping pressure drops, and local piping requirements. The weight of field supplied gas piping must be supported by field supplied brackets or hangers.

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

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

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

Auxiliary Limit Switch Function

The auxiliary limit switch is a manually resetable 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 (3-5 sq ft.), the auxiliary limit resides in the fan compartment between the furnace heat exchanger and the fan. To access the switch, the fan compartment door must be opened. Be sure all power to the unit is disconnected before opening the fan compartment door.

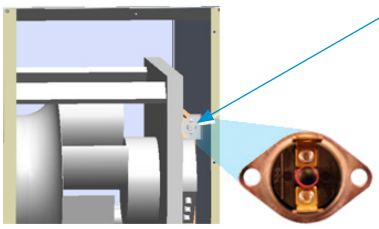
Once the fan compartment door is opened the auxiliary limit switch can be found behind the supply fan on a bracket mounted to the cabinet wall.

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

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

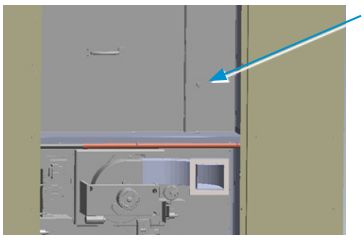
NOTE: The auxiliary limit switch is in the water piping section on A15–A21 units above the furnace vestibule. The red button of the auxiliary limit switch must be depressed in order to reset the limit and allow the furnace to be powered.

Figure 17: A03 – A05 Auxiliary Limit Switch



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

Figure 18: A07 – A11 Auxiliary Limit Switch



The auxiliary limit on the B cabinet (A07–A11 ton) is in the furnace compartment (vestibule) above the furnace

Table 12: Capacity of Pipe Natural Gas (CFH)

Pipe Length (ft .)	With Pressure Drop of 0 .3" Wc and 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 13: 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 14: 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 19, Figure 20).
2. Route gas supply pipe through hole. Carefully plan pipe route and fitting locations to avoid interference with swinging of doors, etc.
3. The Rebel unit does not have an option for gas piping through the curb.
4. Field piping to be supported such that it does not generate a force (weight) and/or torque (twist) on the Factory gas manifold(s).

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

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

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

Figure 19: Rebel A03 – A05 Gas Piping

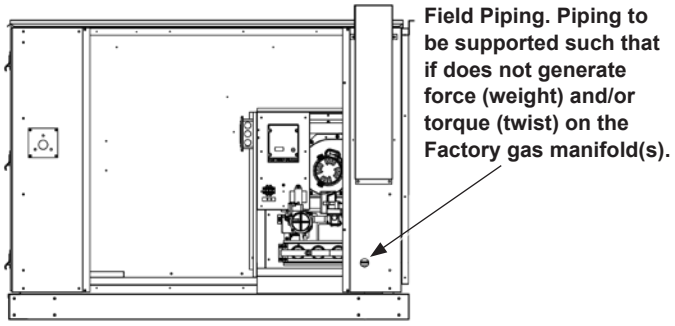


Figure 20: Rebel A07 – A11 Gas Piping

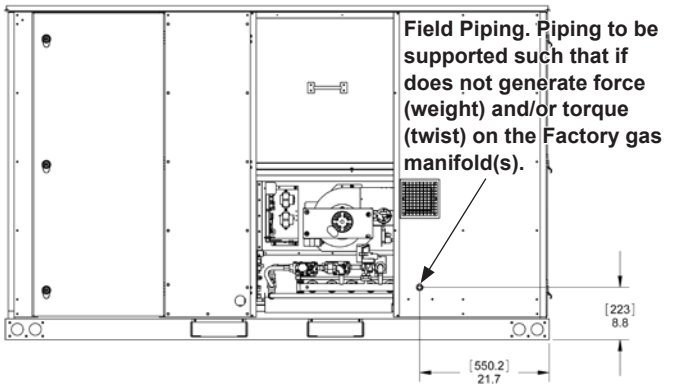


Figure 21: Field Gas Heat Connections

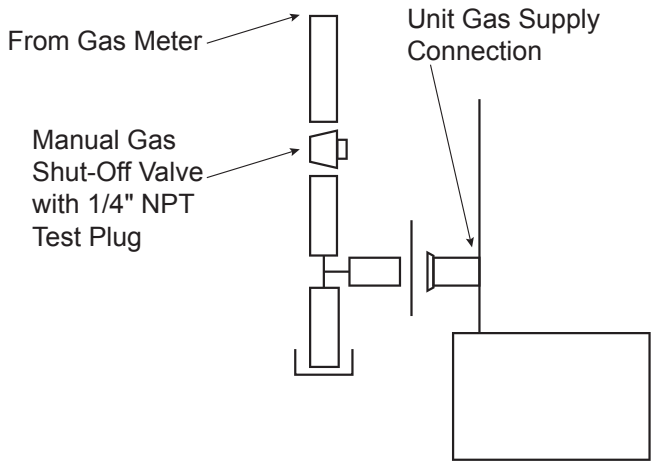
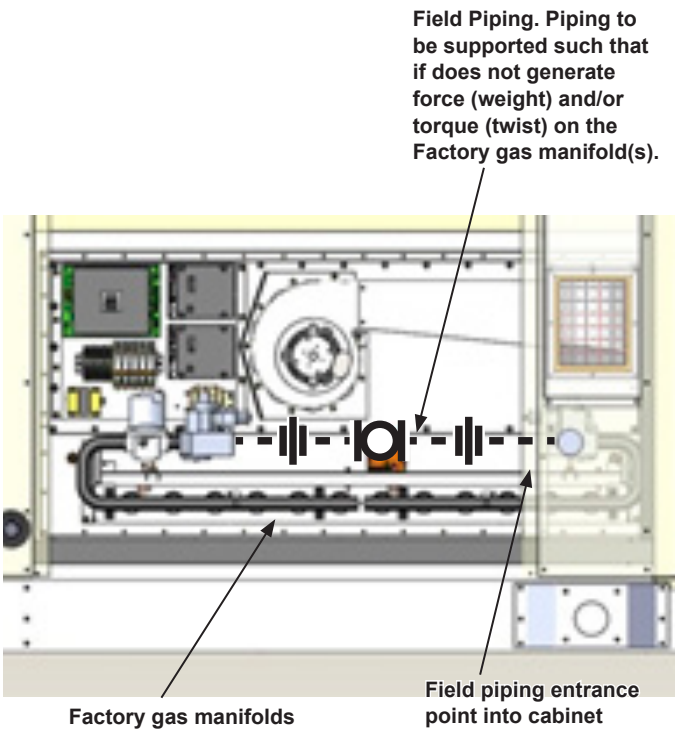


Figure 22: Rebel A15–A21 Gas Piping



DAH A15–A21 Gas Pipe Manifold Pressure Adjustment

For Two Stage Furnace

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 23) and confirm pressure is at 7.0" wc for natural gas or 11.0" for propane. Adjust upstream pressure reducing gas regulator as required to obtain 7.0" wc gas pressure for natural gas or 11.0" for propane.
2. The gas pipe manifold pressure for high fire (stage #2) should be set at 3.5" wc for natural gas or 10.0" for propane. Adjust the High Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 23) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.
3. The gas pipe manifold pressure for low fire (stage #1) should be set at 0.88" wc for natural gas or 2.5" for propane. Adjust the Low Pressure Adjustment Honeywell VR8305Q Gas Safety Control Valve (Figure 23) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

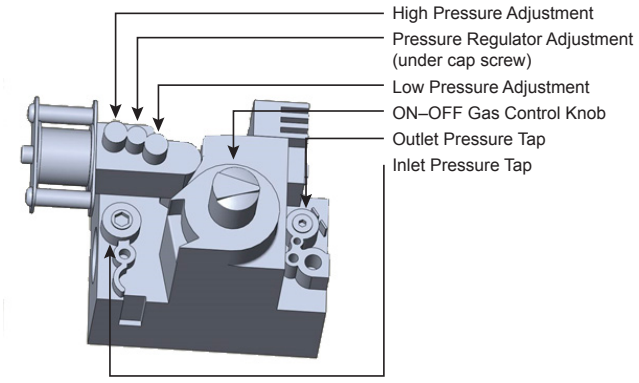
For Modulating Furnace:

1. Read gas pressure at the Inlet Pressure Tap of the Honeywell VR8305Q Gas Safety Control Valve (Figure 23) and confirm pressure is at 7.0" wc for natural gas or 10.0" for propane. Adjust upstream pressure reducing gas regulator as required to obtain 7.0" wc natural gas pressure or 10.0 for propane.
2. The gas pipe manifold pressure for high fire should be set at 3.5" wc for natural gas or 8.2" for propane. Adjust the High Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 23) as required. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.
3. The gas pipe manifold pressure for low fire (stage #1) should be set at 0.26" wc for natural gas or 0.74" for propane.

   Adjust the Low Pressure Adjustment on the Honeywell VR8305Q Gas Safety Control Valve (Figure 23) as required until pressure at the Honeywell VR8305Q Gas Safety Control Valve Outlet Pressure Tap reads 0.26" wc for natural gas or 0.74" for propane. Screwing the adjustment clockwise will increase pressure; counter clockwise will decrease pressure.

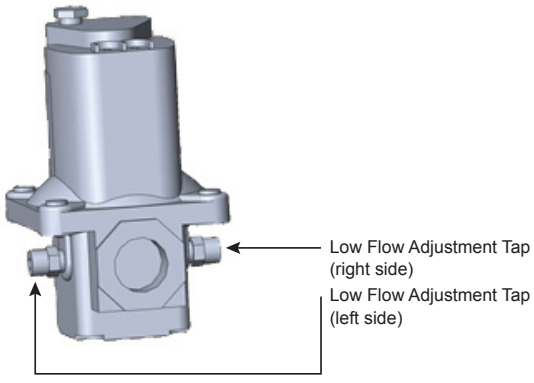
   Adjust the Maxitrol M520B Modulating Valve (Figure 24) Low Flow Adjustment screw until the gas pipe manifold pressure reads 0.26" w.c. for natural gas or 0.74" for propane.

Figure 23: Honeywell VR8305Q Gas Safety Control Valve Used for Both Staged and Modulating Furnaces



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

Figure 24: Maxitrol M520B Modulating Valve



DAH A03–A11 Sequence of Operation with MicroTech Controller

⚠ DANGER

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

⚠ WARNING

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

Staged Control

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

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

Modulating Control

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

1. Unit DDC controller calls for heat.
2. Furnace DDC control module receives a call for heat.
3. Furnace safety switches and DDC control are checked for safe conditions.
4. 45 second prepurge cycle starts. Proof of airflow switch is checked for combustion airflows.
5. Spark ignitor is activated.
6. Gas valve receives a signal to open fully.
7. Burner is ignited and runs for 20 seconds in high fire. Note: if call for heat is interrupted during this timing, the furnace will be locked in for the 20 seconds cycle.
8. Gas valve and induction blower motor receives a signal to modulate burner output to match the unit discharge air temperature setting.

LP Conversion (Staged Furnace Only)

For Rebel A and B Cabinets Only

Convert the furnace in this unit using the liquefied petroleum (LP) gas valve spring and burner nozzles supplied in the conversion kit. See Table 15 for part numbers.

The LP gas valve maintains the proper manifold pressure for LP gas. See Table 15. The correct burner orifices are included in the kit.

Table 15: Furnace Identification for LP Conversion

Unit Size	Staged Furnace
3 – 5 Sq.Ft. Coil Unit	300049725
7 – 11 Sq.Ft. Coil Unit	300049583

Altitude Conversion

For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), contact Daikin Parts. See Table 16 for part numbers.

Table 16: Furnace Identifications for Altitude (DAH A03–A11)

Elevation	Part Number
Staged Operation	
2000–2999	300049578
3000–3999	300049579
4000–4999	300049580
5000–5999	300049581
6000–6999	300049582

Start-Up Procedures

Start-Up Responsibility

⚠ DANGER

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

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

1. The furnace must not operate at insufficient airflow or temperature rise greater than specified (refer to Table 12 on page 29). 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 12 on page 29).

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

Before Start-Up

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

Start-Up Preliminary

Close gas main.

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

DAH A15–A21 Sequence of Operation

⚠ DANGER

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

⚠ WARNING

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

Staged Control

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

1. Unit DDC control calls for heat.
2. Furnace DDC control module receives a call for heat.
3. High limits switch(s) are checked for safe conditions.
4. Proof of air flow switch is checked for combustion induced draft airflow.
5. 30 second pre-purge cycle starts.
6. Spark ignitor is activated for 3 seconds.
7. Gas valve receives a command for stage 1 heat
8. Burner is ignited.
9. Unit DDC controller calls for stage 2 of heat.
10. Furnace DDC controller receives a stage 2 heat command.
11. Gas valve receives a command for stage 2 of heat.

Modulating Control

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

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

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 17 on page 36 & Table 12 on page 29 for an explanation of the diagnostic information.

Maintenance

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

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

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

Monthly

Check air filters and replace if dirty.

Twice Yearly

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

Yearly

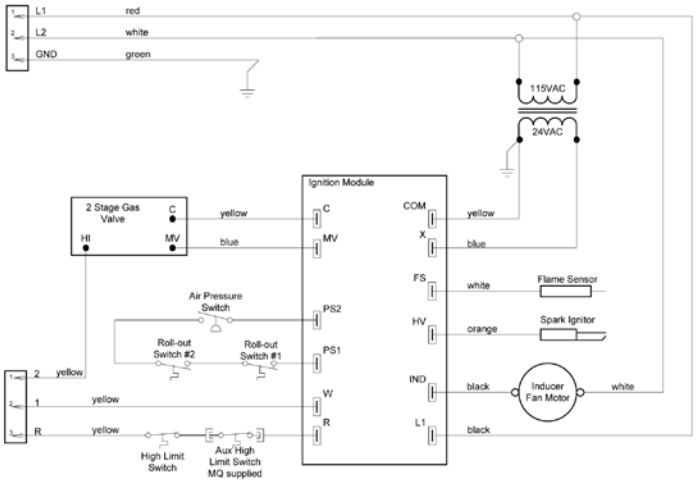
The heater and the venting system shall be inspected once a year by a qualified service agency

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

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

DAH A03–A11 Ignition Control Module for Staged Gas Furnace

Figure 25: 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

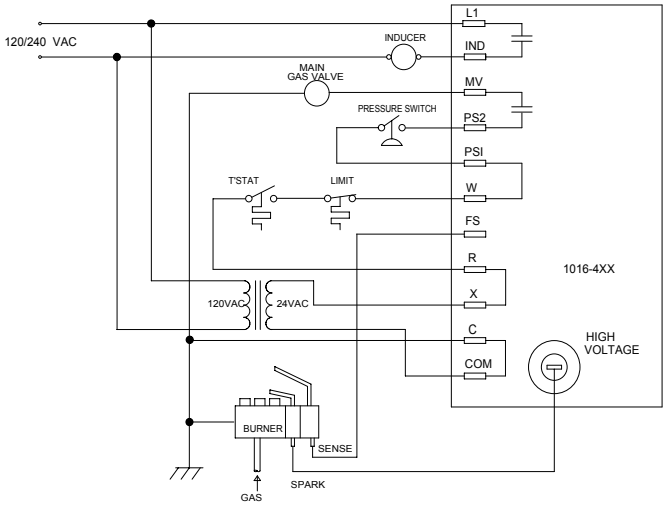
Ignition Control Module LED Diagnostics

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

Table 17: 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

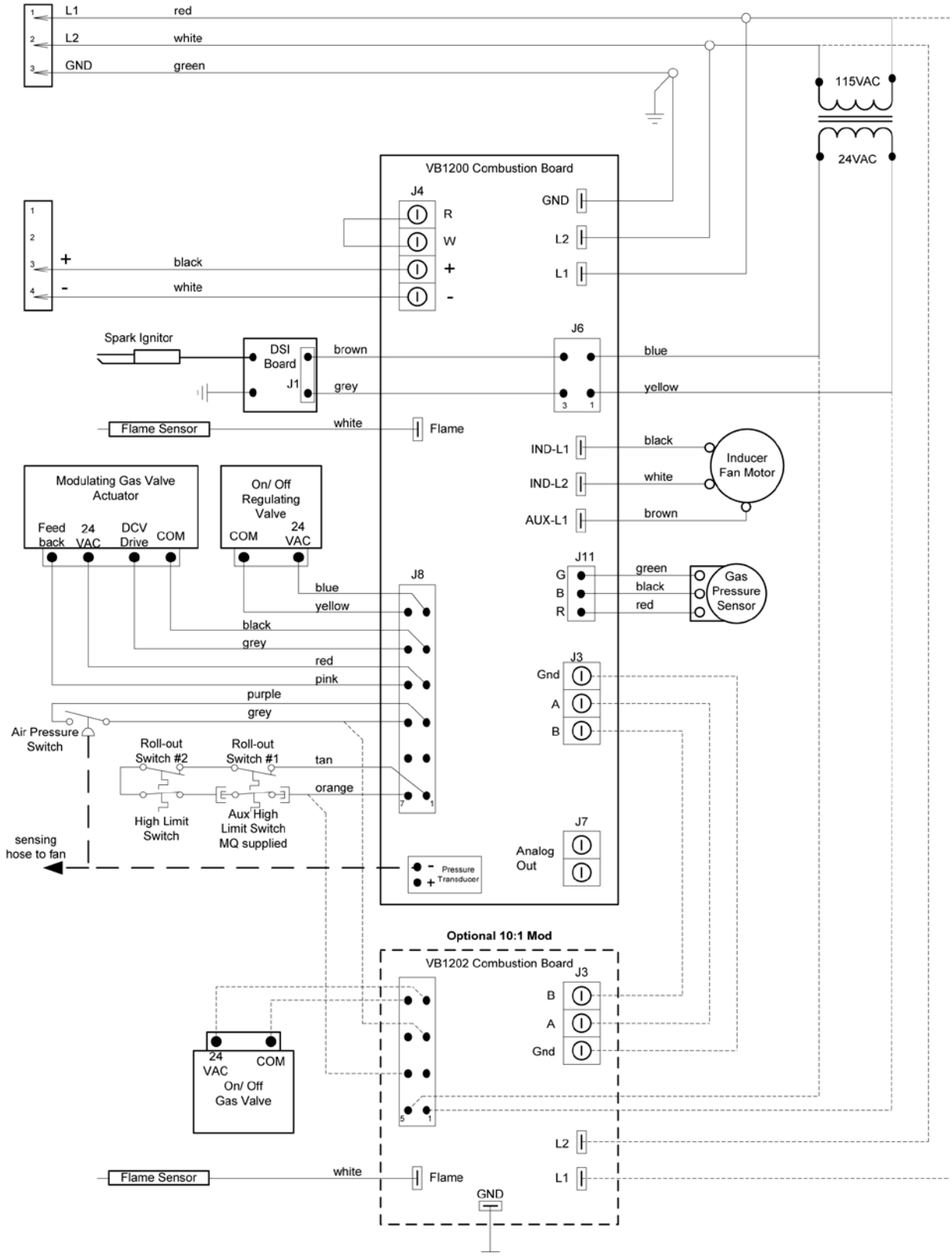
Figure 26: Ignition Control Wiring



SYSTEM WIRING DIAGRAM FOR CONTROL WITH POST-PURGE

DAH A03–A11 (only) Ignition Control Module for Modulating Gas Furnace

Figure 27: Typical Modulating Gas Furnace Electrical Schematic with Sensor



DAH A03–A11 Gas Furnace Ignition and Control Troubleshooting

Variable Furnace Controller

Daikin's furnace controller is an electronic device that delivers full control of the modulating furnace. Control includes sequencing, ignition, safety, modulation of the control valve, and the induced draft motor. Inputs to the furnace control board are an 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 18: 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.
GA.S. or L.P.	
1.01	Software version, for example, v1.01

Table 19: Normal Furnace Operation

Display Information	Mode	Description
OFF	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.
I.gn	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 20: Functional Alerts — DAH A03–A11 only

Display Information	Alert	Description	Possible Cause	Solution
A.0. 1	Failed ignition attempt *Maximum number of allowed retries not met*	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.0. 1" in the LOCKOUT ERRORS section.	See "E.0. 1" in the LOCKOUT ERRORS section.
A.0.2	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.0.3	Insufficient Combustion Air *Furnace Functional*	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 20 continued: Functional Alerts

Display Information	Alert	Description	Possible Cause	Solution
A.0.4	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.0.5	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 21: Lockout Errors — DAH A03–A11 only

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.0.1	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 21 continued: Lockout Errors

Display Information	Alert	Description	Possible Cause	Solution
E.02	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.03	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.
			B. Modulation valve actuator failure	1. Insure actuator has 24 V power.
				2. Insure actuator is receiving valid drive signal from the control board (2 – 10 VDC).
				3. Check for actuator feedback to the control board (2 – 10 VDC).
E.04	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. *The pressure switch MUST be open prior to inducer activation.*	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.05	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. *The pressure switch MUST close to initiate an ignition sequence.*	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 21 continued: Lockout Errors

Display Information	Alert	Description	Possible Cause	Solution
E.06	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. *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*	A. Modulating actuator / ball valve not properly aligned	1. Perform Modulating System Gas Valve Alignment procedure as defined in the service manual.
			B. Line pressure too low	1. Insure line pressure is properly adjusted for the gas and application. Correct as necessary.
			C. Intermediate regulated pressure too low	1. Insure the safety gas valve(s) are properly adjusted to the specified outlet pressure. Adjust per the installation instructions as necessary.
			D. Wrong gas pressure sensor installed	1. Insure the proper gas sensor – either Natural Gas or LP – is installed. Replace as needed.
			E. Gas pressure sensor faulty	1. Insure gas sensor is installed properly and wired per the unit wiring diagram. Replace as necessary.
E.07	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. *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*	A. Modulating actuator / ball valve not properly aligned	1. Perform Modulating System Gas Valve Alignment procedure as defined in the service manual.
			B. Line pressure too high	1. Insure line pressure is properly adjusted for the gas and application. Correct as necessary.
			C. Intermediate regulated pressure too high	1. Insure the safety gas valve(s) are properly adjusted to the specified outlet pressure. Adjust per the installation instructions as necessary.
			D. Wrong gas pressure sensor installed	1. Insure the proper gas sensor – either Natural Gas or LP – is installed. Replace as needed.
			E. Gas pressure sensor faulty	1. Insure gas sensor is installed properly and wired per the unit wiring diagram. Replace as necessary
E.08	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.09	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.Id	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.

DAH A15–A21 Gas Furnace Ignition Troubleshooting

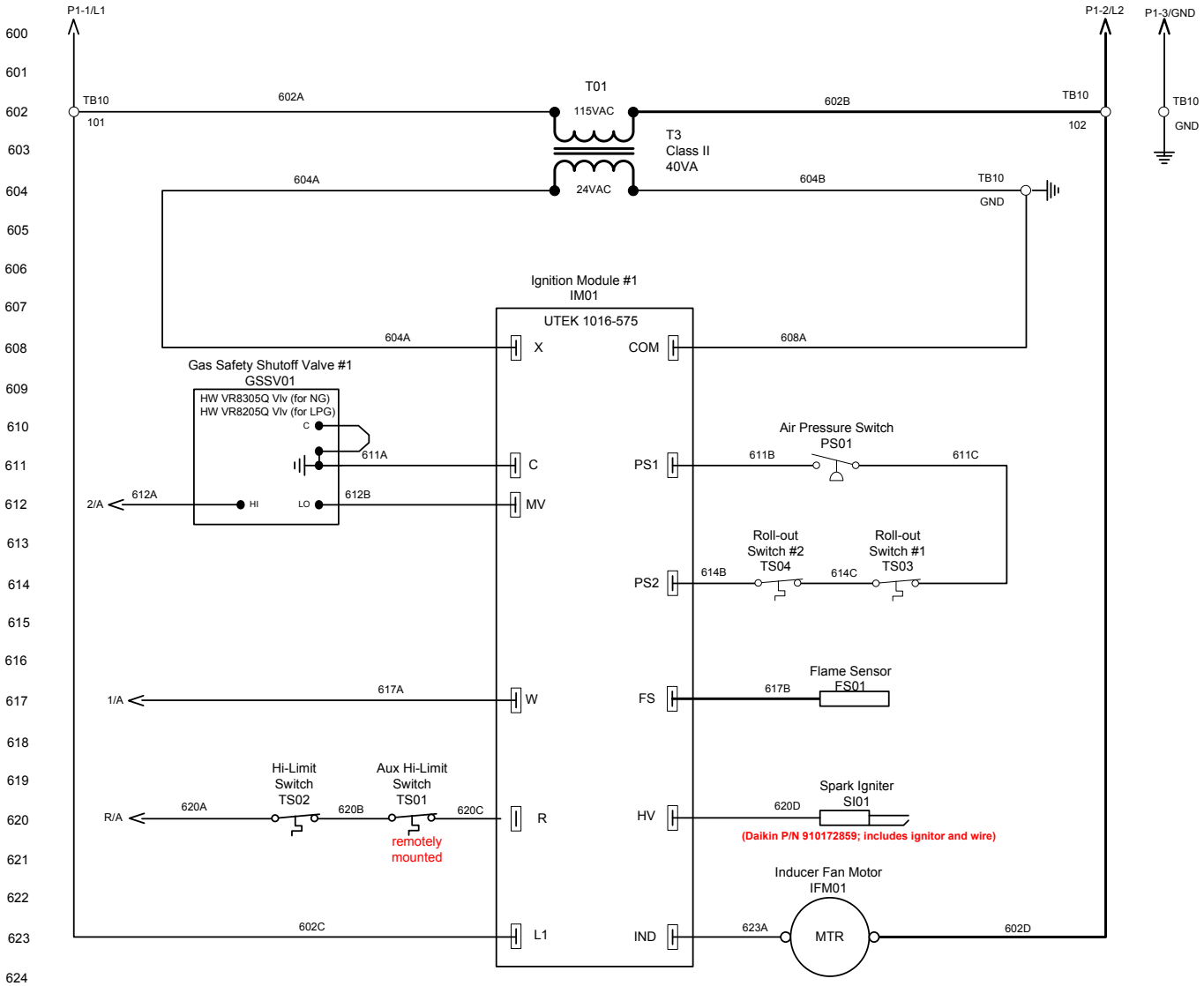
Table 22: 300/450/600 MBH Staged Ignition Control Troubleshooting Guide (UTEC 1016 Ignition Board)

LED Indicator	System Status	Fault Description	Possible Causes and Corrective Action
Steady ON	System Normal	N/A	N/A
LED OFF	Lockout	LED is OFF	1. Check 120V is being supplied to heater transformer. 2. Check that 24 VAC is being supplied by transformer. Replace transformer if not being supplied 24 VAC.
1 Flashes	Lockout	Combustion air pressure switch contact is open with inducer fan running.	1. Check air pressure switch hose and hose connection between switch and fan. 2. Check reset switch is not tripped for rollout switch(s). 3. Check high limit switch is not open 4. Replace pressure switch if contact does not close when fan is running.
2 Flashes	Lockout	Combustion air pressure switch contact is closed when inducer fan is not running.	1. Check wiring between PS1 and PS2 on ignition control board for correct connection and proper wiring. 2. Check pressure switch functions correctly with and without pressure. 3. Replace pressure switch if fails to function correctly.
3 Flashes	Lockout	Ignition locked out from too many ignition attempts	1. Verify gas supply is present. 2. Verify gas safety valve is working correctly. 3. Verify gas manifold pressure is adequate and correct. 4. Check spark igniter is not cracked or dirty. Check spark igniter wire is not covered with oil and debris or cracked. Check wire is connected correctly. 5. Check flame sensor wiring. Check to see if flame sensor is grounded.
4 Flashes	Lockout	Ignition lockout from too many flame losses within a single heat.	1. Check pressure switch hose for leaks or poor connection 2. Check for condensate in pressure switch hose. 3. Check pressure tap on combustion blower and combustion pressure switch for blockage. 4. Check functionality of combustion inducer fan.
5 Flashes	Lockout	Control hardware fault detected	1. Change ignition board.

Table 23: Modulating Control LED Status Indicator

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

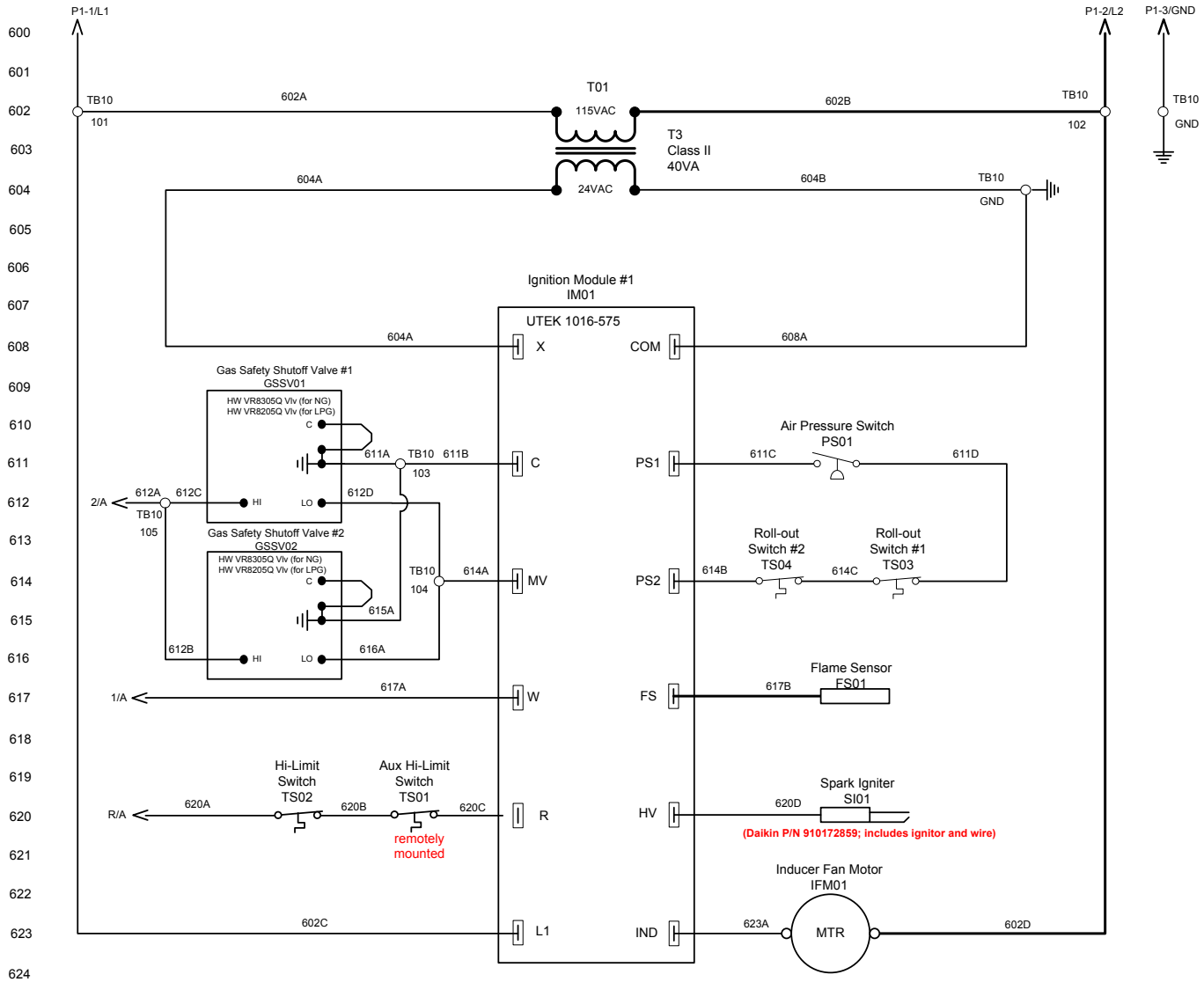
Figure 28: Typical 2 Stage Control Gas Furnace, 300 MBH — DAH A15–A21 shown



LED Diagnostic Information

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

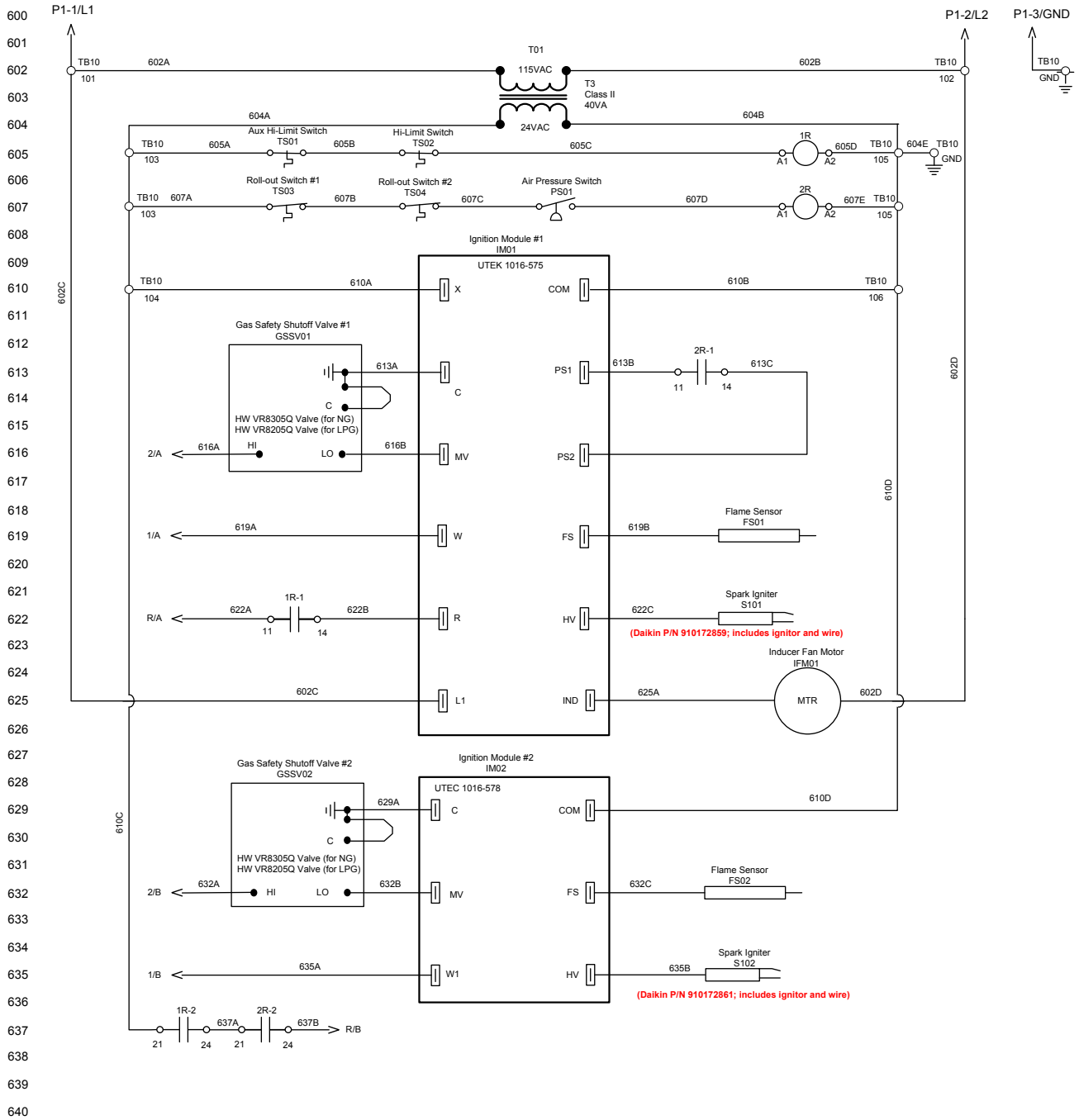
Figure 29: Typical 2 Stage Control Gas Furnace, 450/600 MBH — DAH A15–A21 shown



LED Diagnostic Information

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

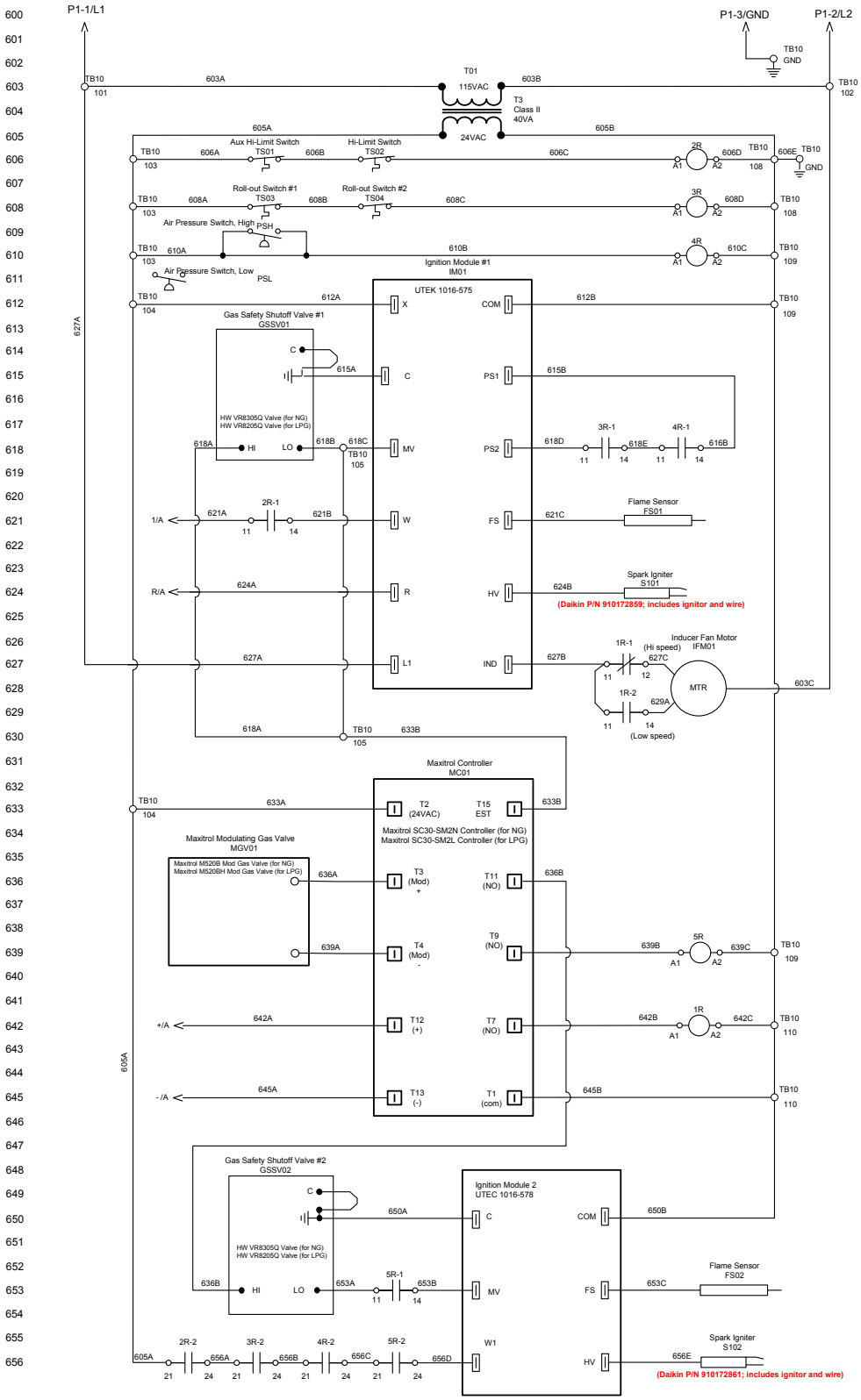
Figure 30: Typical 4 Stage Control Gas Furnace, 300/450/600 MBH — DAH A15–A21 shown



LED Diagnostic Information

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

Figure 31: Typical Modulating Control Gas Furnace, 300/450/600 MBH — DAH A15–A21 shown



LED Ignition Module Diagnostic Information

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

LED Modulating Control Status

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

Optional Hot Water Heat

Hot Water Heater Design

⚠ CAUTION

Coil freeze possible. Can damage equipment.

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

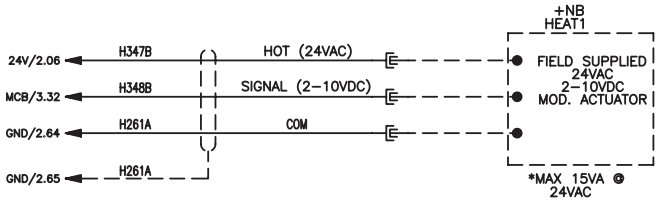
If the 10th digit of the model number is a “W”, the rooftop unit was furnished with a factory installed hot water coil (Example: DPS010AHCW). The hot water coil comes with a piping vestibule for field supplied and installed control valve and piping. The coil is furnished with ODM copper connections. The Rebel commercial rooftop units are available with a low heat (one row coil) or a high heat (two row coil) configuration (3 rows also offered on DAH A15–A21).

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.

Figure 32: Hot Water Heating Schematic



Field Installed Freeze Stats

Field installed freeze stats can be added. The freeze stat contacts should be wired to the MicroTech III digital input X5 as shown in Figure 33. MicroTech III will turn the fans OFF, shut the outdoor air damper, open the valve and issue an alarm when the normally closed contact opens between terminals 111 and 112.

Figure 33: Field Installed Freeze Stat Schematic

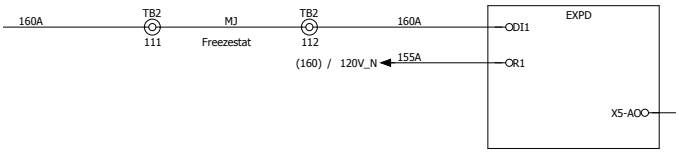


Table 24: Heating Capacity and Water Pressure Drop – Hot Water Coils

Unit	MBH	GPM	WPD	Connection Size
A03	61.4	6.1	1.0	3/4"
A04	72.9	7.3	1.4	3/4"
A05	82.6	8.2	1.7	3/4"
A07	149.7	15.0	3.1	1"
A09	195.9	19.6	5.1	1"
A11	221.4	22.1	6.4	1"
A15	347.0	35.5	0.7	1-5/8"
A19	403.0	41.1	1.3	1-5/8"
A21	497.0	50.7	1.6	1-5/8"

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

System Description

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

Definitions

The following are descriptions of various components related to the enthalpy wheel construction (Figure 34):

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

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

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

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

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

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

Hub - The center support of an enthalpy wheel.

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

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

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

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

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

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

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

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

Arrangements

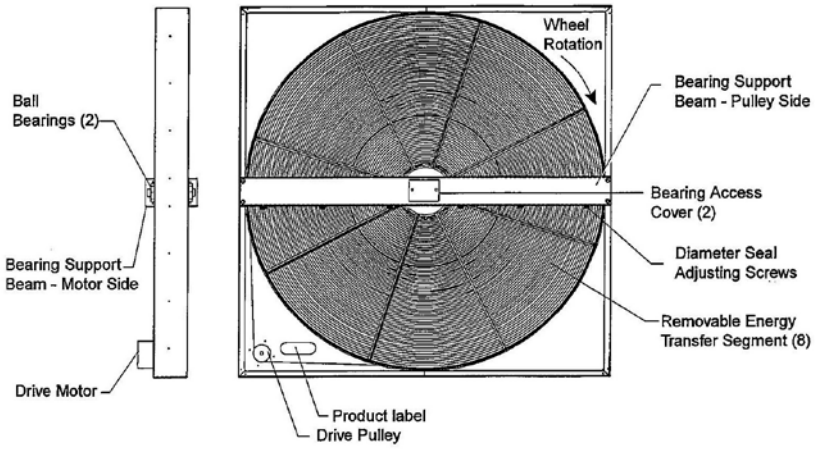
Two arrangements are offered for the enthalpy wheel:

1. Single enthalpy wheel with economizer and bypass (Figure 34). This arrangement is available for all units.
2. Single enthalpy wheel without economizer (100% outdoor air unit).

Wheel Construction

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

Figure 34: Wheel Construction (Side-by-Side)



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

Purge and Pressurization

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

Figure 35: Purge and Pressurization

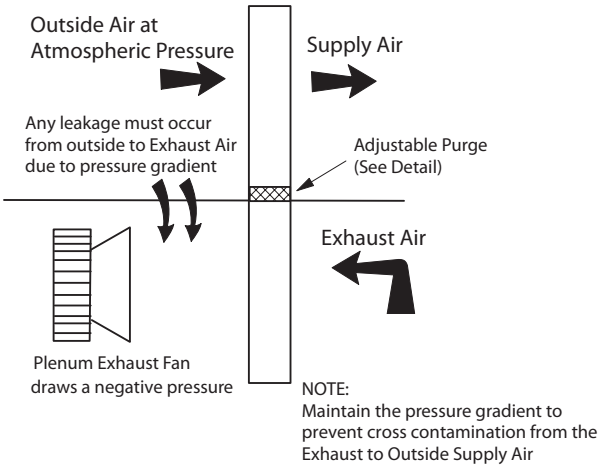
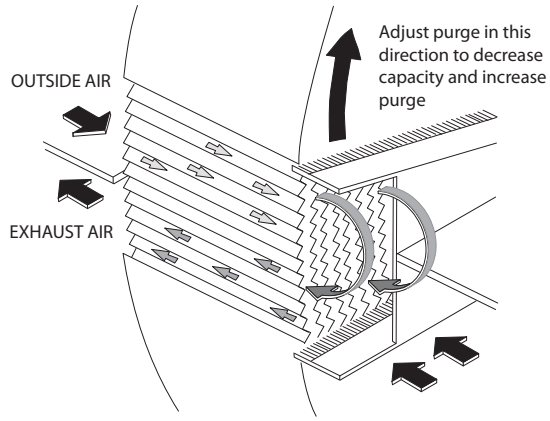


Figure 36: Purge Detail



Drive Motor

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

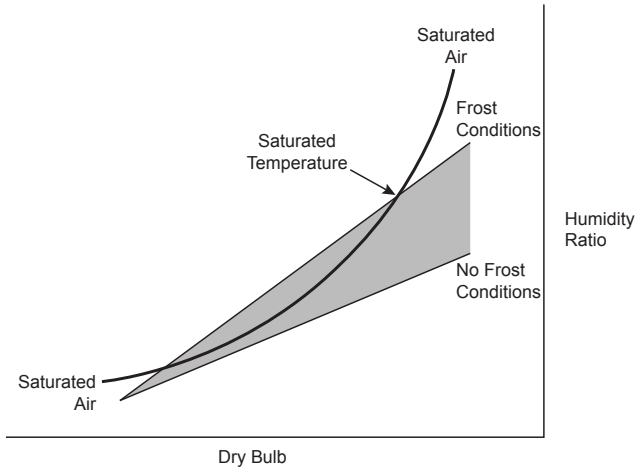
Frost Protection Option

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 37: 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 37).

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 37).

Energy Recovery Exhaust Hoods

Units with the optional energy recovery section have one or two (depending on model) exhaust dampers.

No Controls ERW

When no controls are provided with the Reble Air Handler, the energy recovery wheel control logic is provided by the field. Table 25 provides a list of contact points to allow field-enabled control.

Table 25: Energy Recovery Wheel Points with no Controls

Device	Input Signal	Output Signal
ERW Enable	Dry Contact	NA
ERW Control, Mod	2-10VDC or 4-20mA	2-10VDC or 4-20mA
ERW Control, Staged	Dry Contact	NA

Variable Speed Frequency Control

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

Enthalpy wheel speed will be controlled by exhaust temperature measurement.

Slide-Out Wheel

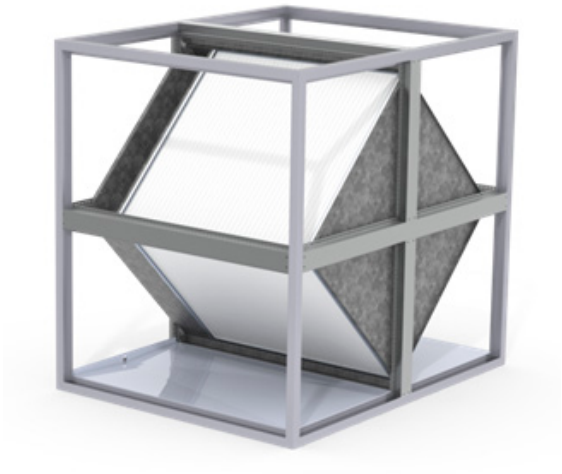
The wheel can be pulled out to facilitate cleaning and servicing (Figure 38). Unplug the control wires before sliding the wheel out of position.

Figure 38: Slide-Out Energy Recovery Wheel

CORE® Construction

Your Daikin enthalpy heat exchanger is delivered completed assembled and ready to run. The core is built to provide many years of trouble free service with minimal maintenance following proper installation and commissioning.

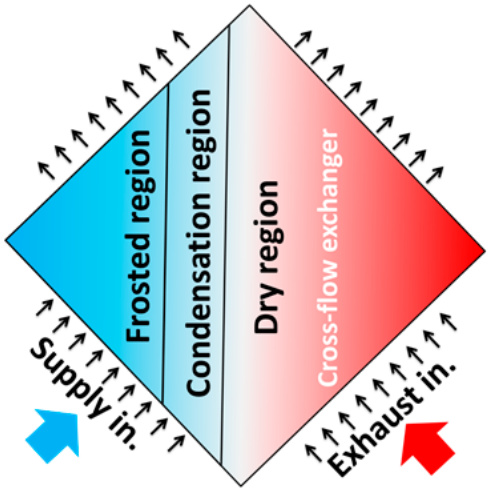
Figure 39: Enthalpy CORE with Outdoor Air Bypass



Frost Protection Option

During extremely cold winter conditions, the bypass is opened on the outdoor air side of the core. This minimizes the cold air across the core allowing the warm exhaust air to warm the heat exchanger and prevent the accumulation of frost build up on the unit. This is internally controlled with the MicroTech III controller

Figure 40: Enthalpy CORE Frost Region



Defrost Control

With this method the enthalpy core's outdoor air is bypassed around the heat exchanger periodically for a defrost time duration when the outdoor air temperature is below an outdoor frost temperature threshold setpoint.

Cleanable Core

The heat exchanger can be accessed from the side access doors. The exchanger is water washable and can be cleaned in-place or easily slid out along the built-in track for better access to the opposite end of the CORE. It is important to wash the CORE at least once a year using tap water and mild detergent.

1. Do not use a high-pressure water source
2. If the CORE is heavily soiled, prepare a solution of less than 1:100 parts water to mild detergent. Otherwise clean water will suffice.
3. It is suggested to clean the COREs in the vertical orientation external to the unit, but not required. Verification of adequate draining is required prior to washing
4. Rinse until the presence to dirt and detergent is no longer present.
5. Allow the plates to dry.

Unit cleaners that are acceptable and not acceptable to come in contact with CORE.

Table 26: Cleaner Recommendations

Cleaner	Recommendation
Viper Expanding Foam	OK
CalSpray–nu-Brite	Avoid Contact
CalSpray–evap foam	OK
HD CalClean 1:40	OK
HD CalClean 1:5	Avoid Contact
Fantastik w/ Bleach	Avoid Contact
Fantastik Original	Avoid Contact

Thermal Dispersion Airflow Measurement Technology

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

Figure 41: Bead-in-Glass Thermistor

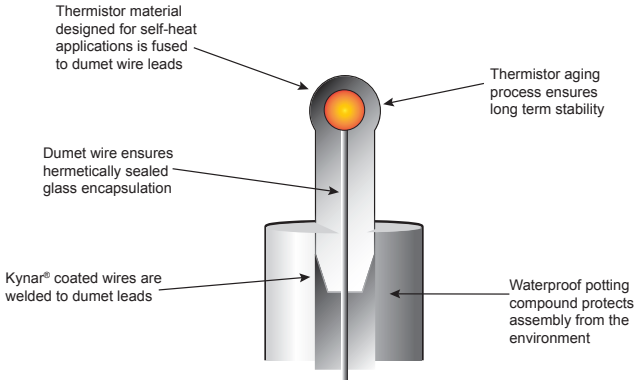
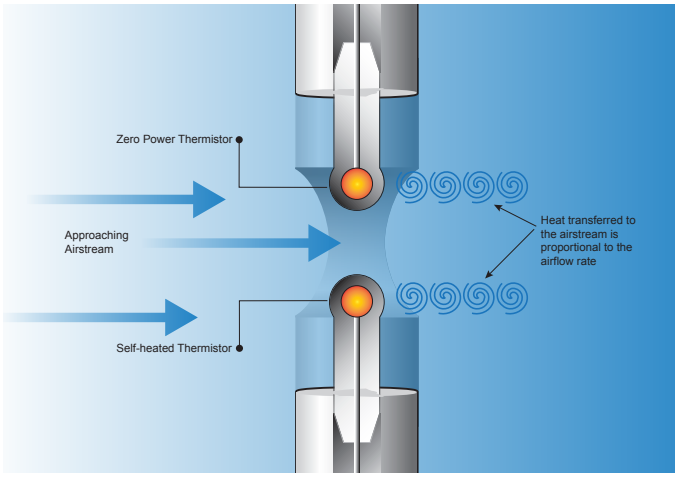


Figure 42: Bead-in-Glass Thermistor Probe



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 101 for navigating the Controller keypad)

1. Set LCD1 U/M to "CFM"
2. Set AR1 (see Table 27)
3. Set OUT1 U/M =CFM
4. Set OUT1 =0–10V
5. Set FSI (see Table 27)

Table 27: Settings by Cabinet Size

Model	Unit Size	Area sq.ft. (AR1)	Full scale output CFM (FS1)
A03–A05	Small cabinet	2.25	2,400
A07–A11	Medium cabinet	4.5	6,000
A15–A21	Large Cabinet	10.25	11.0

Figure 43: MicroTech III Controller

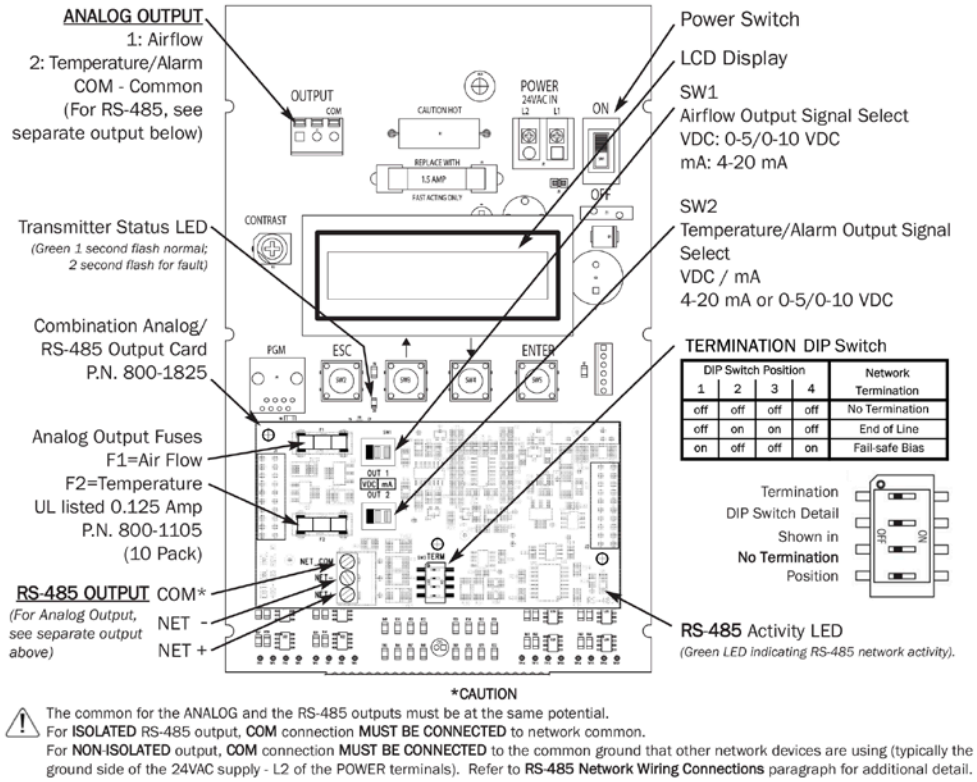
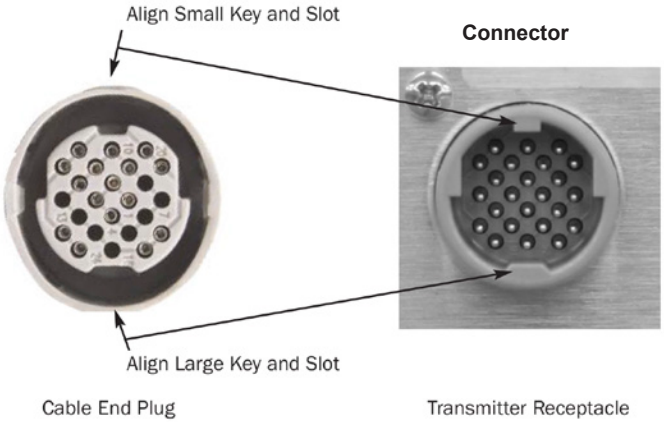
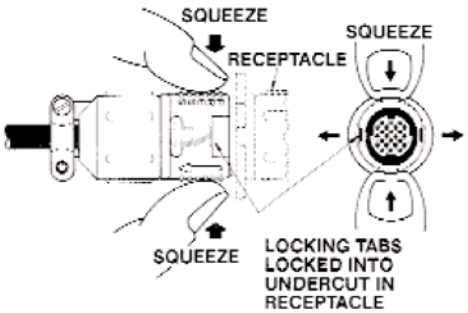


Figure 44: Transmitter and Connector Detail

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 57 on page 96.

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 55 on page 92). 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 62 for the *ALT= menu item, and set this vale to the installation altitude.

Adjusting The Digital Output Filter

The digital output filter is useful for dampening signal fluctuations resulting from transient wind gusts on outdoor air intakes or excessive turbulence generated from duct disturbances. The digital output filter range can be set between 0 (OFF) and 99%. Increasing the filter percentage limits the allowable change of the output signal. To change the amount of filtering, enter the Setup menu and set “*FILTER1={desired value}” as shown in Figure 62.

⚠ 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 28: 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 29: Transmitter Troubleshooting

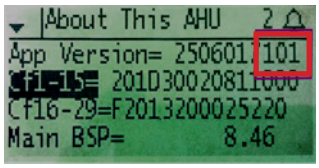
Problem	Possible Cause	Remedy
The host control system is unable to communicate with the transmitter.	Output card is not securely mounted on main circuit board.	Turn the transmitter power "OFF" and press the output card firmly onto main circuit board. Turn the transmitter power back "ON".
	Network signal 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.

VFD Motor Setup

VFD – variable frequency drives communicate via modbus RS485 twisted pair cables to the Microtech III controller. Microtech III can address the VFD for a supply or ERW operation based on a unique modbus address. A replacement VFD is shipped out from the warehouse with a default address of “1” which is a direct replacement for a supply fan.

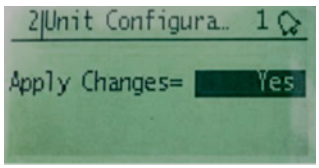
Addressing Supply or ERW VFD

1. Verify the RS485 output on the MicroTech III controller is connected at terminals A and B to TB1 terminals 39 and 40 respectively for SAF, and 24 and 25 for ERW.
2. Make sure the shield for the twisted pair cable is terminated at TB terminal 41 only.
3. At the drive, verify wires from the controller side terminals are terminated at the VFD terminals.
4. Program the VFD according to Table 30 based on the SAF or ERW and motor nameplate.
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. If any other codes are being used, please consult with the Daikin Technical Response group for technical support.

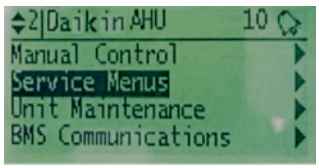


6. Press the middle rectangular button to go back to the main menu.

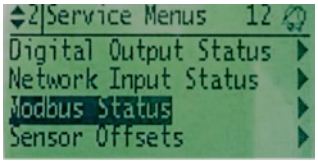
7. Scroll down and click on the “Unit Configuration Menu”.
8. Scroll to the “SAF type” and set it to M4 VAV or scroll to the “Energy Rec” and set it to ABB/M4_5.
9. Scroll up to “Apply Changes” and set it to Yes. Wait for the controller to restart.



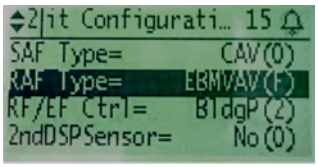
10. Enter the level 2 password again and go into “Service Menus”



11. Click on the “Modbus Status” menu



12. If the drive return drive is wired correctly and is communicating then the SF MB or ER MB status will show “OK”. Verify wiring connections and 3-phase power to the SAF or ERW if status shows “Fault”.
13. If power is not correct, disconnect power to unit and troubleshoot as required.
14. Hit the middle rectangular button to go back to the main menu.
15. Click on the “Unit Configuration” menu and set the SAF type back to the original setting.



16. Scroll up and set “Apply changes” to yes.
17. Reset MMPs for the supply and energy recovery drive to observe ER MB Status and SF MB Status show “OK”

Table 30: VFD Parameter Settings

MD4 Parameters		DAH	
Number	Name	SAF (A15-A21)	ERW (ALL)
9802	COMM PROT SEL	STD MODBUS	STD MODBUS
9901	LANGUAGE	ENGLISH	ENGLISH
9902	APPLIC MACRO	HVAC DEFAULT	HVAC DEFAULT
9905	MOTOR NOM VOLT1	460	460
9906	MOTOR NOM CURR1	24	0.5
9907	MOTOR NOM FREQ1	60	60
9908	MOTOR NOM SPEED1	1775	1775
9909	MOTOR NOM POWER	20	0.2
1001	EXT1 COMMANDS	COMM	COMM
1102	EXT1/EXT2 SEL	EXT1	EXT1
1103	REF1 SELECT	COMM	COMM
1104	REF1 MIN	0	0
1105	REF1 MAX	60	60
1106	REF2 SELECT	KEYPAD	KEYPAD
1201	CONST SPEED SEL	NOT SEL	NOT SEL
1601	RUN ENABLE	COMM	COMM
1604	FAULT RESET SEL	COMM	COMM
1607	PARAM SAVE	DONE	DONE
1608	START ENABLE 1	COMM	COMM
1611	PARAMETER VIEW	LONG VIEW	LONG VIEW
2101	START FUNCTION	SCAN START	SCAN START
2202	ACCELER TIME 1	60	60
2203	DECELER TIME 1	60	60
2605	U/F RATIO	LINEAR	LINEAR
3003	EXTERNAL FAULT 1	NOT SEL	NOT SEL
3009	BREAK POINT FREQ	45	45
3101	NUMBER TRIALS	5	5
3103	DELAY TIME	3	3
3104	AR OVERCURRENT	ENABLE	ENABLE
3404	OUTPUT 1 DSP FORM	DIRECT	DIRECT
3405	OUTPUT1 UNIT	Hz	Hz
3415	SIGNAL3 PARAM	SPEED	SPEED
3418	OUTPUT3 DSP FORM	DIRECT	DIRECT
3421	OUTPUT3 MAX	1800 rpm	1800 rpm
4201	GAIN	Daikin Software Version	
4202	INTEGRATION TIME2	228	204
5302	EFB STATION ID2	1	3
5303	EFB BAUD RATE	192	192
5304	EFB PARITY	8 NONE 2	8 NONE 2
5306	EFB OK MESSAGES	Usually a large number that grows	
5307	EFB CRC ERRORS	0	0
5308	EFV UART ERRORS	Should be small number that rarely grows unless com error	
5309	EFB STATUS	ON-LINE	ON-LINE
8120	INTERLOCKS	NOT SEL	NOT SEL
1002	EXT2 COMMANDS	NOT SEL	NOT SEL
1301	MINIMUM AI1	MTIII min is 20 Hz	
1302	MAXIMUM AI1	MTIII max is 60 hz	
1303	FILTER AI1	Will be the HVAC default values	
3502	INPUT SELECTION		
4210	SET POINT SEL		
1202	CONST SPEED 1		
1401	RELAY OUTPUT 1		

NOTES:

1. Vary depending on motor nameplate
2. These values depend on the application

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

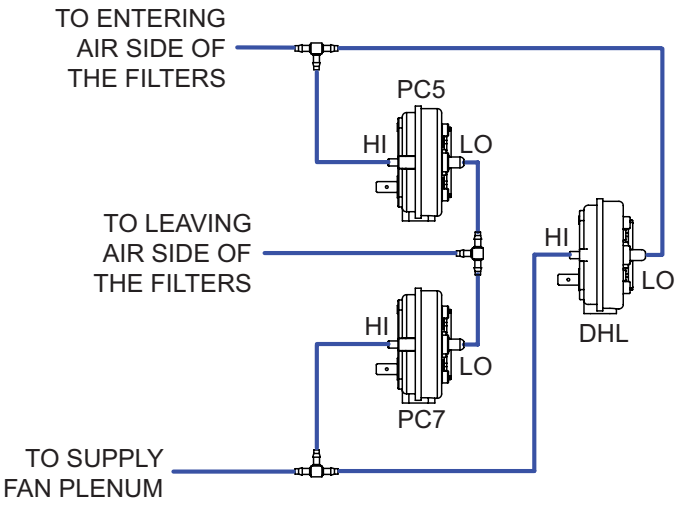
Economizer units may include exhaust fan options. For units with CAV applications, the exhaust fans can be ordered as staged control or they may be ordered with building pressure control. The building pressure control option has an inverter that runs the exhaust fan motors and is controlled by the static 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 45. The proof of airflow switches senses the pressure difference between the positive pressure in the supply air fan compartment and the suction pressure on the leaving air side of the filters. The differential pressure is factory set for this switch. The dirty filter switch senses the pressure difference across the filter; from the entering air side of the filter to the leaving air side of the filters. The switch is factory set at 1.0". When the pressure difference across the filters is sensed at this value, the dirty filter alarm will appear on the DDC controller.

Figure 45: Pressure Tubing Diagram



All VAV units also have the PC7 and PC5 switches as standard (see Figure 45). These switches are tied into the Duct High Limit switch (DHL) as shown in Figure 45.

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)

An Ground Fault Circuit Interrupter (GFCI) convenience receptacle is an option in the main control box. 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 optional in the main control box. 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 46 for a branch circuit diagram.

Figure 46: Unit Powered GFCI Receptacle Schematic

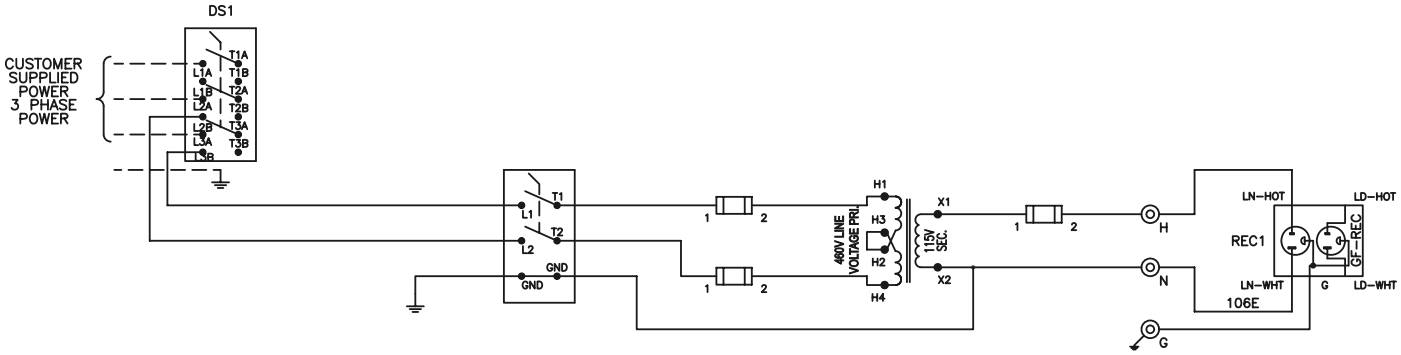


Figure 47: Typical CAV_VAV 208-230 VAC Wiring (1 of 4) — DAH A07–A11 shown

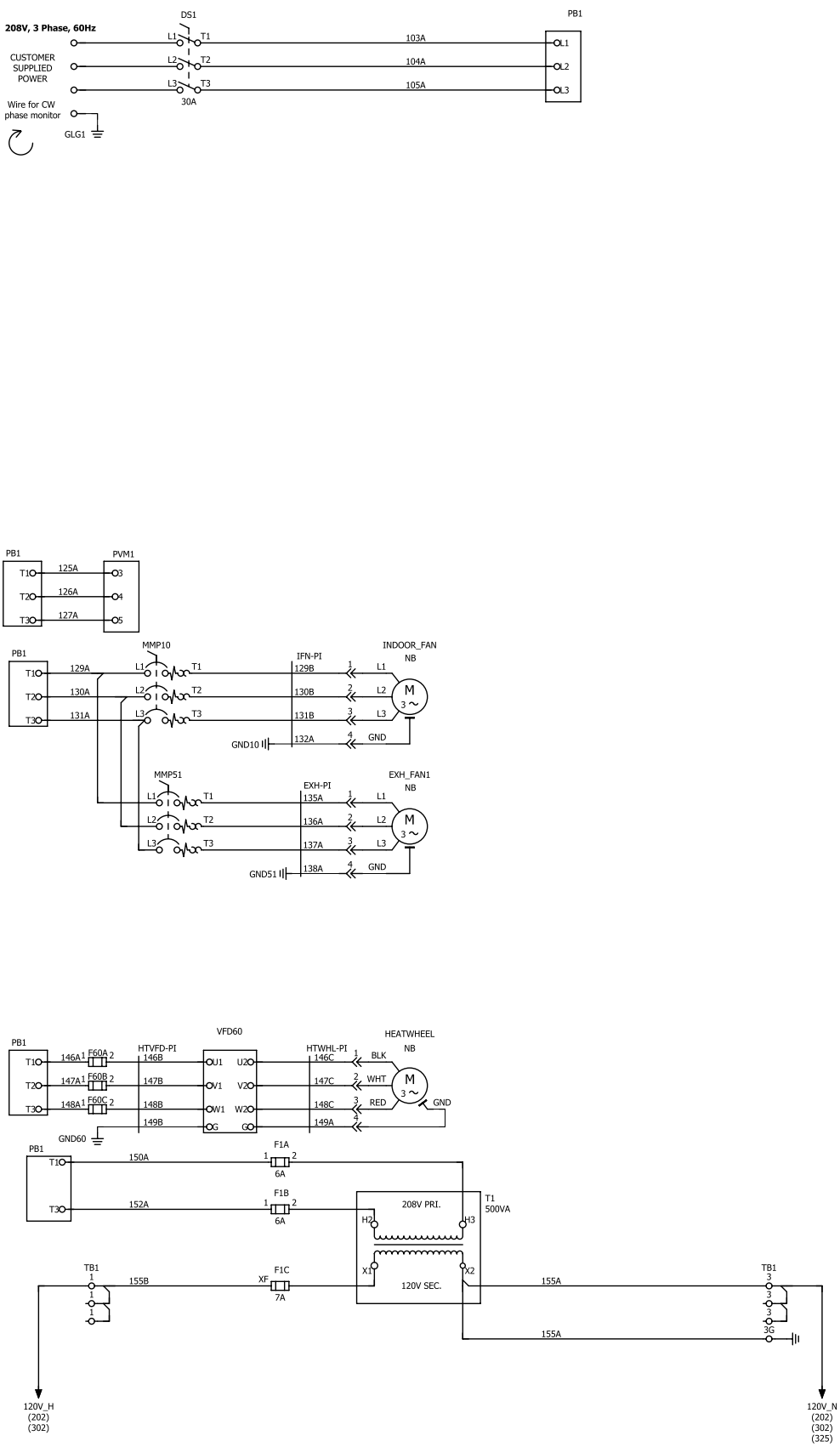


Figure 47 continued: Typical CAV_VAV 208-230 VAC Wiring (2 of 4) — DAH A07–A11 shown

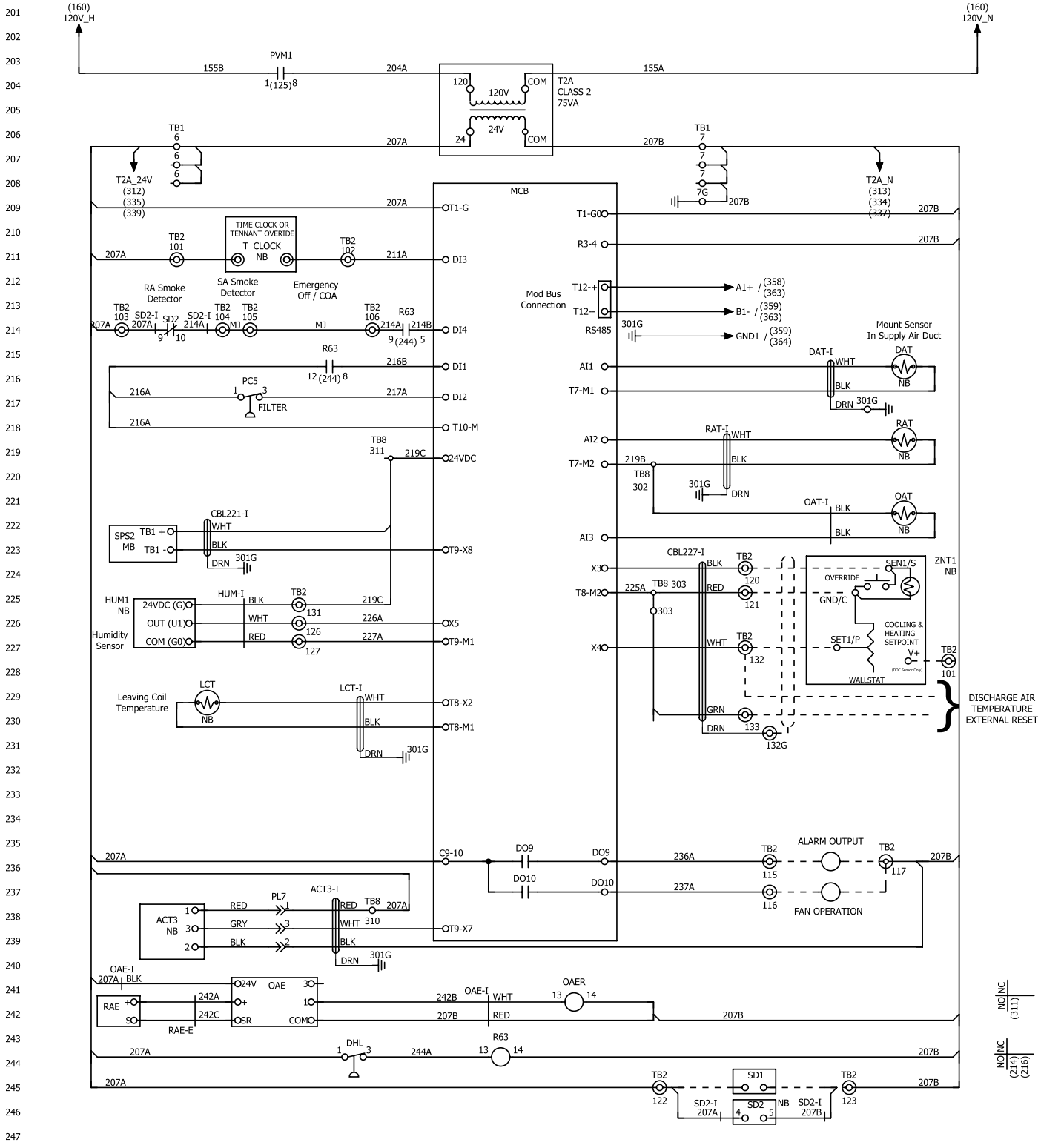


Figure 47 continued: Typical CAV_VAV 208-230 VAC Wiring (3 of 4) — DAH A07–A11 shown

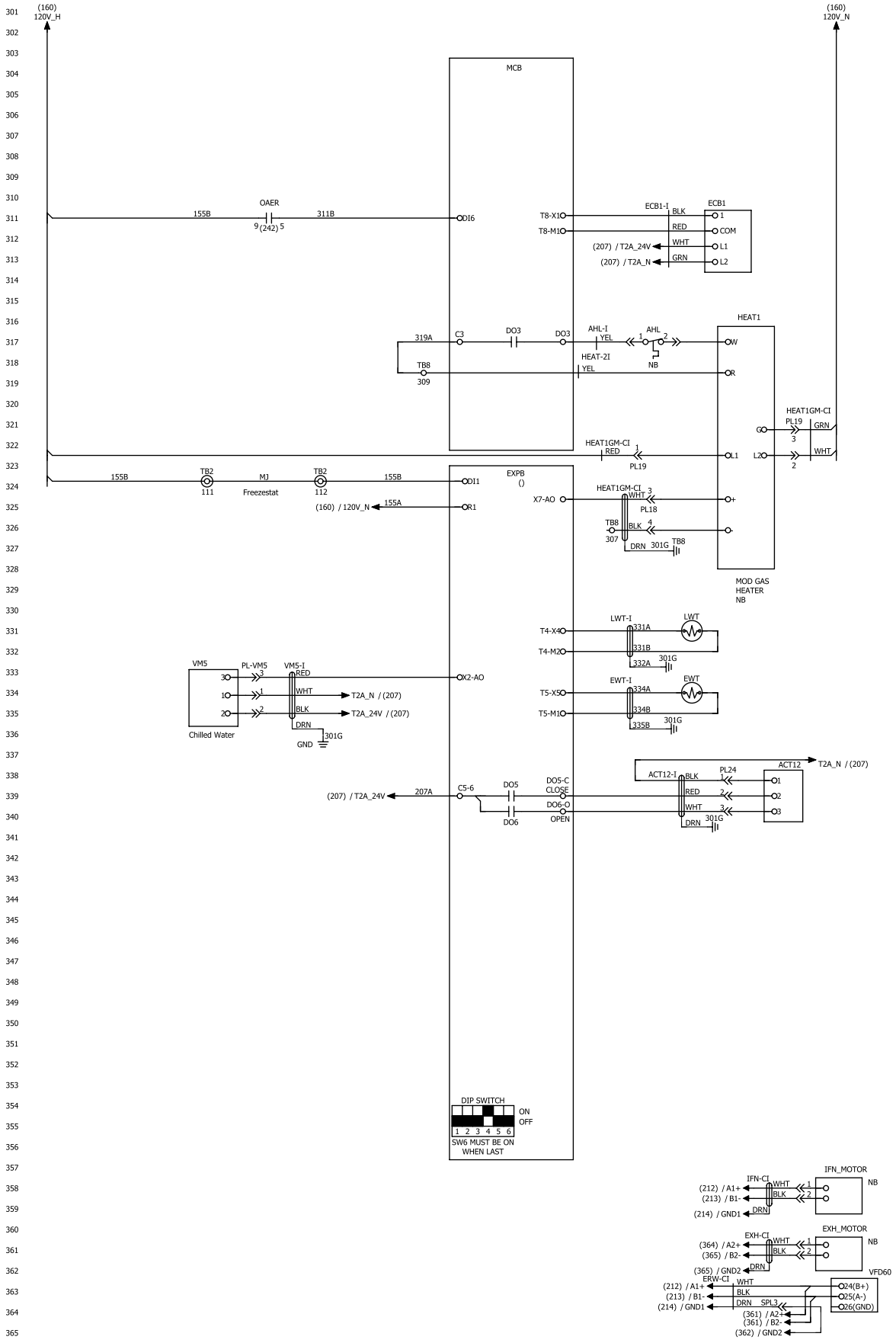


Figure 47 continued: Typical CAV_VAV 208-230 VAC Wiring (4 of 4) — DAH A07–A11shown

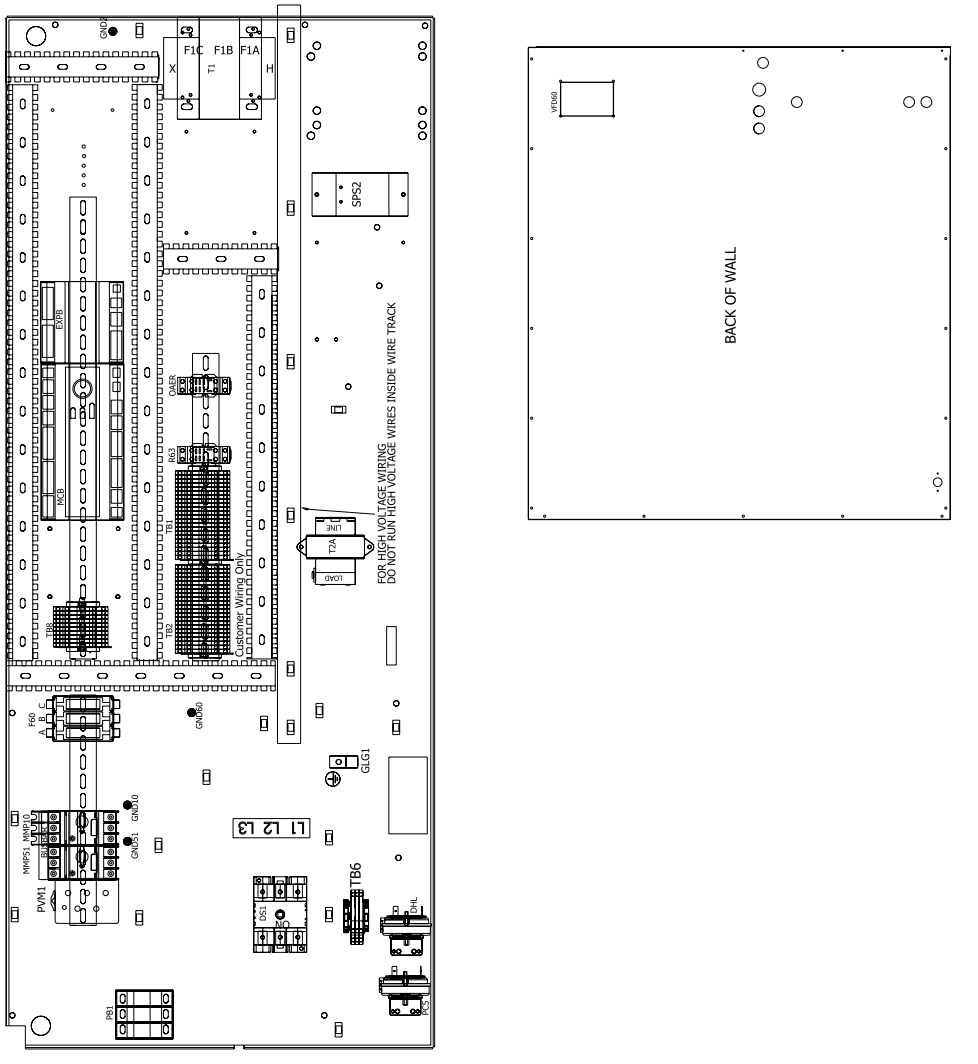


Figure 48: Typical CAV_VAV 460 VAC Wiring with no Controls (1 of 3) — DAH A07–A11 shown

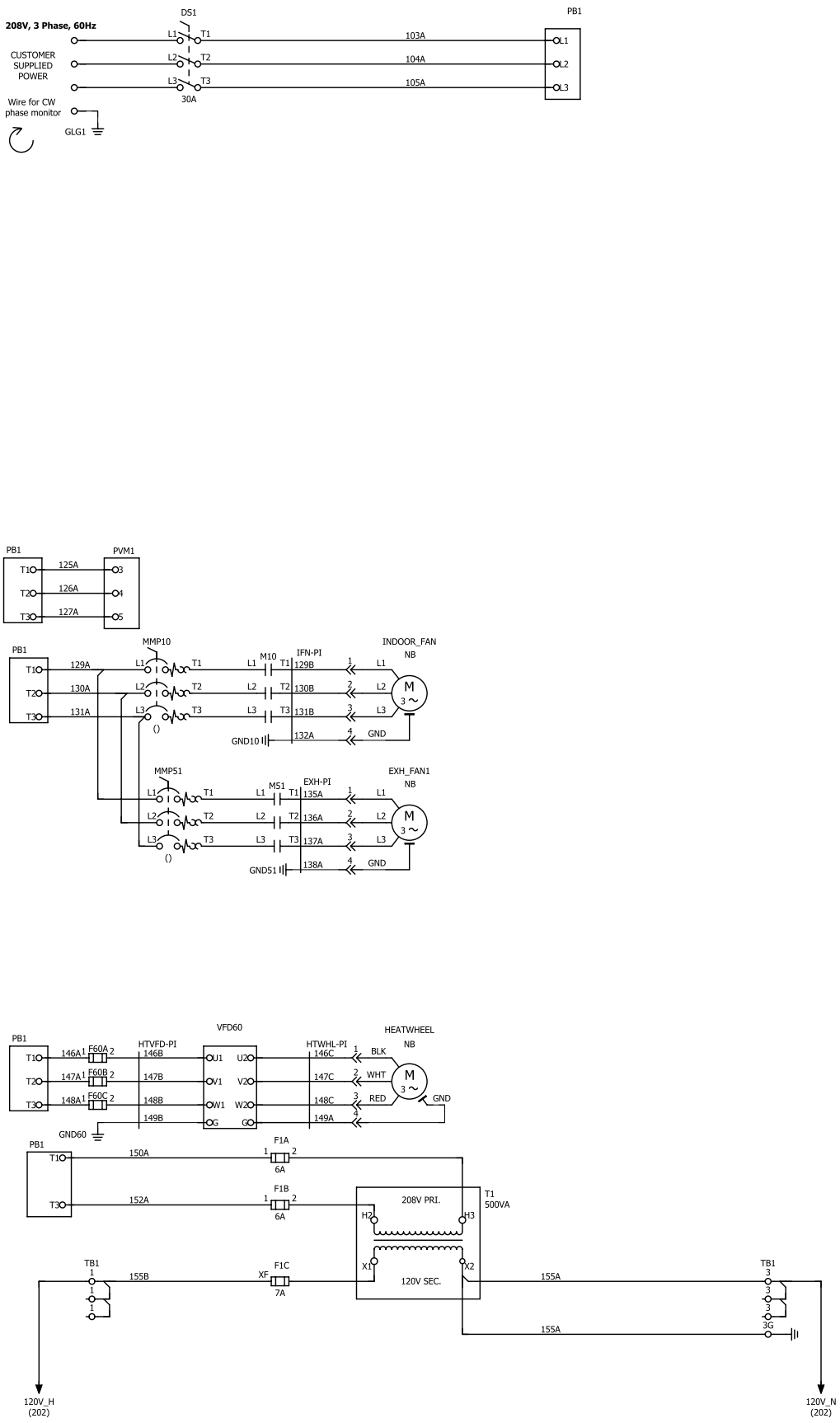


Figure 48 continued: Typical CAV_VAV 460 VAC Wiring with no Controls (2 of 3) — DAH A07–A11 shown

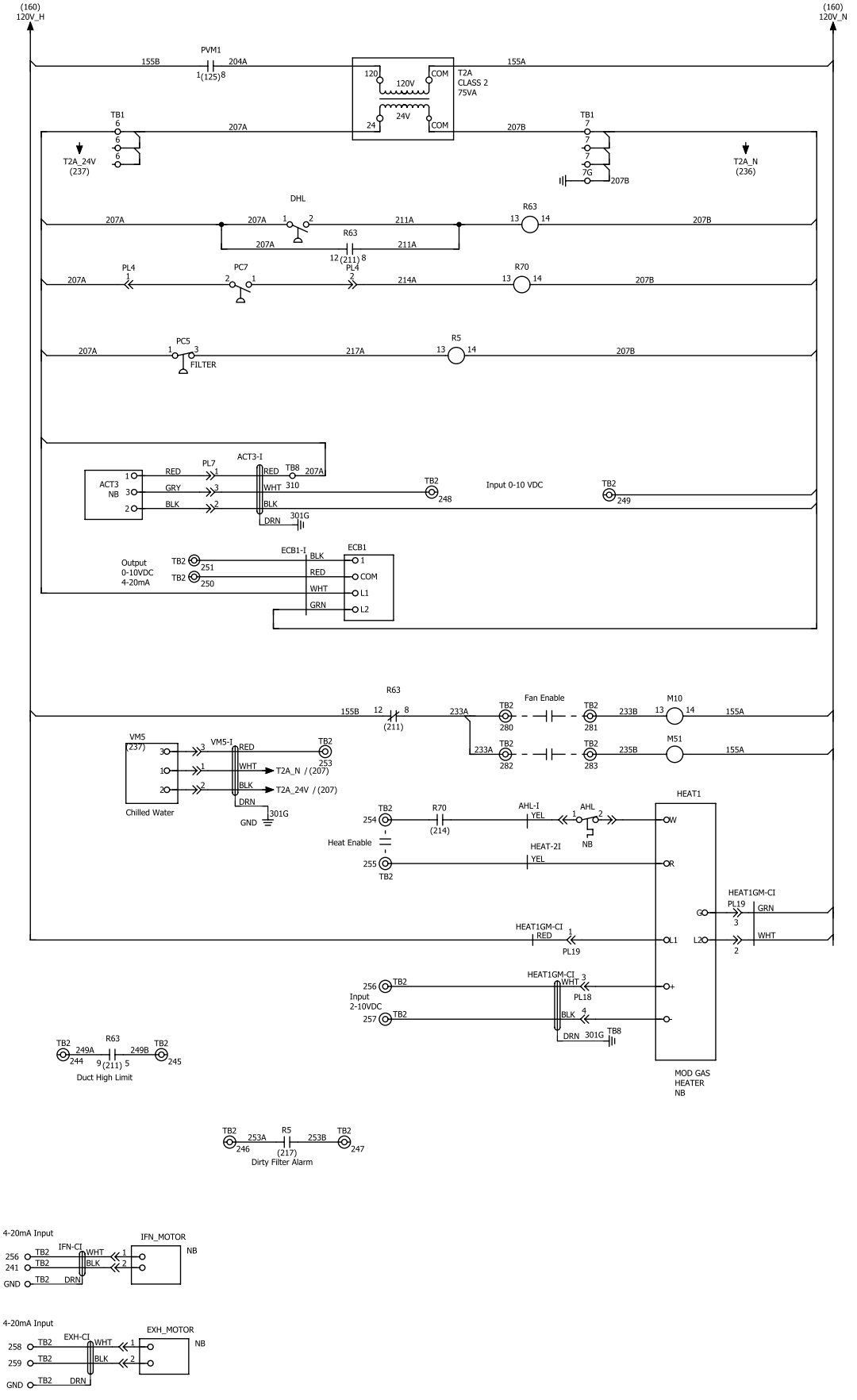


Figure 48 continued: Typical CAV_VAV 460 VAC Wiring with no Controls (3 of 3) — DAH A07–A11 shown

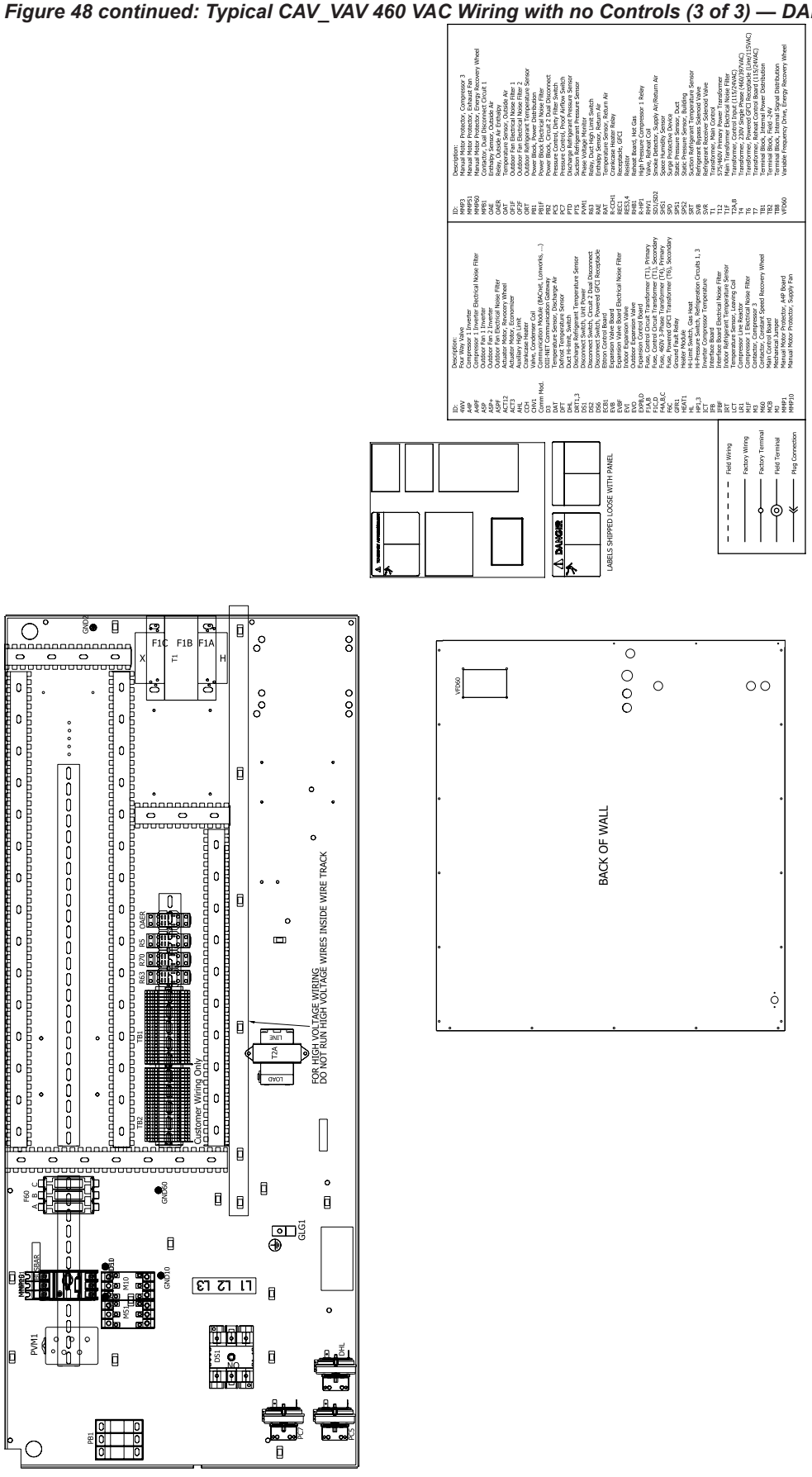


Figure 49: Typical VAV 460 VAC Wiring with Controls (1 of 4) — DAH A15–A21 shown

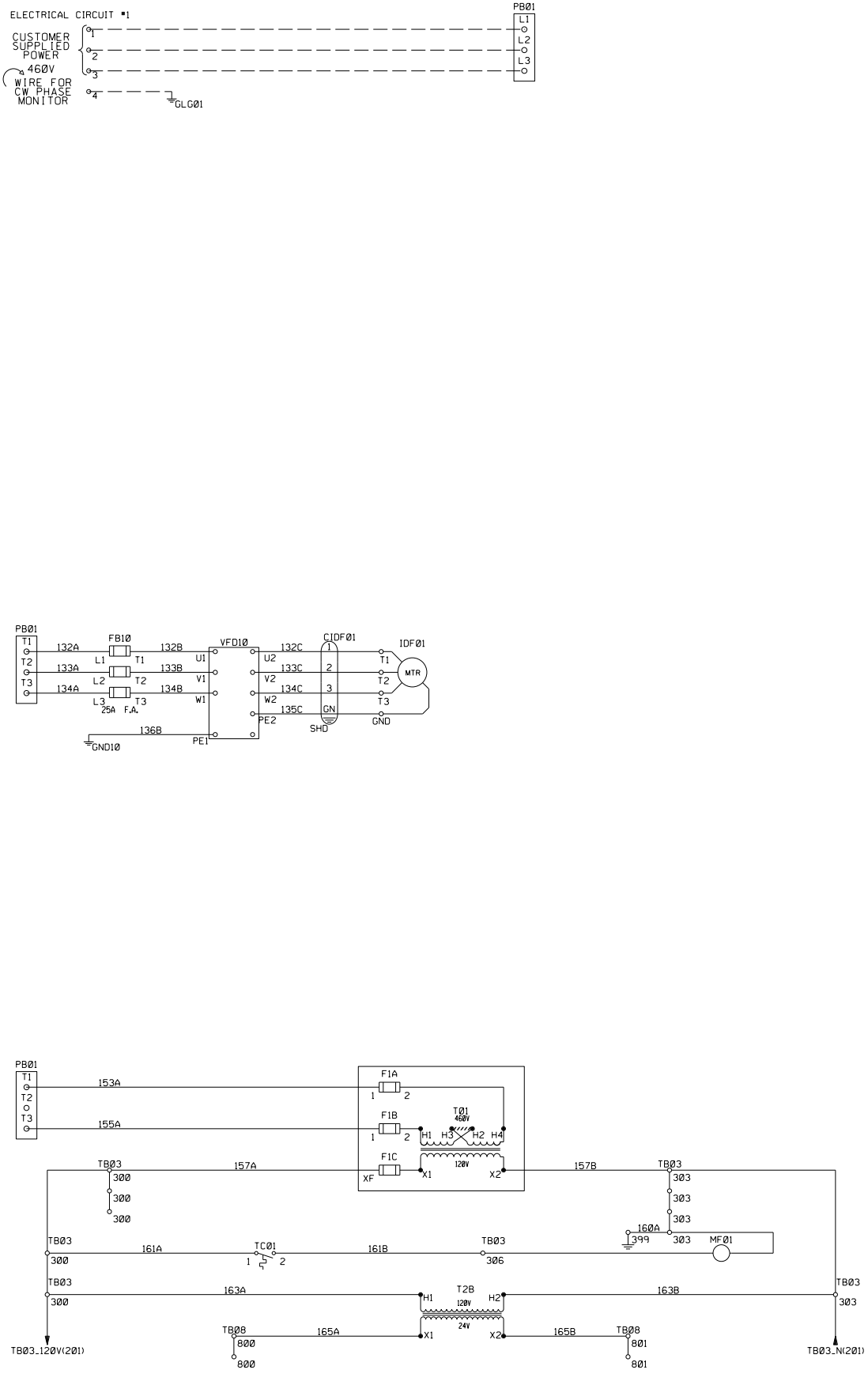


Figure 49 continued: Typical VAV 460 VAC Wiring with Controls (2 of 4) — DAH A15–A21 shown

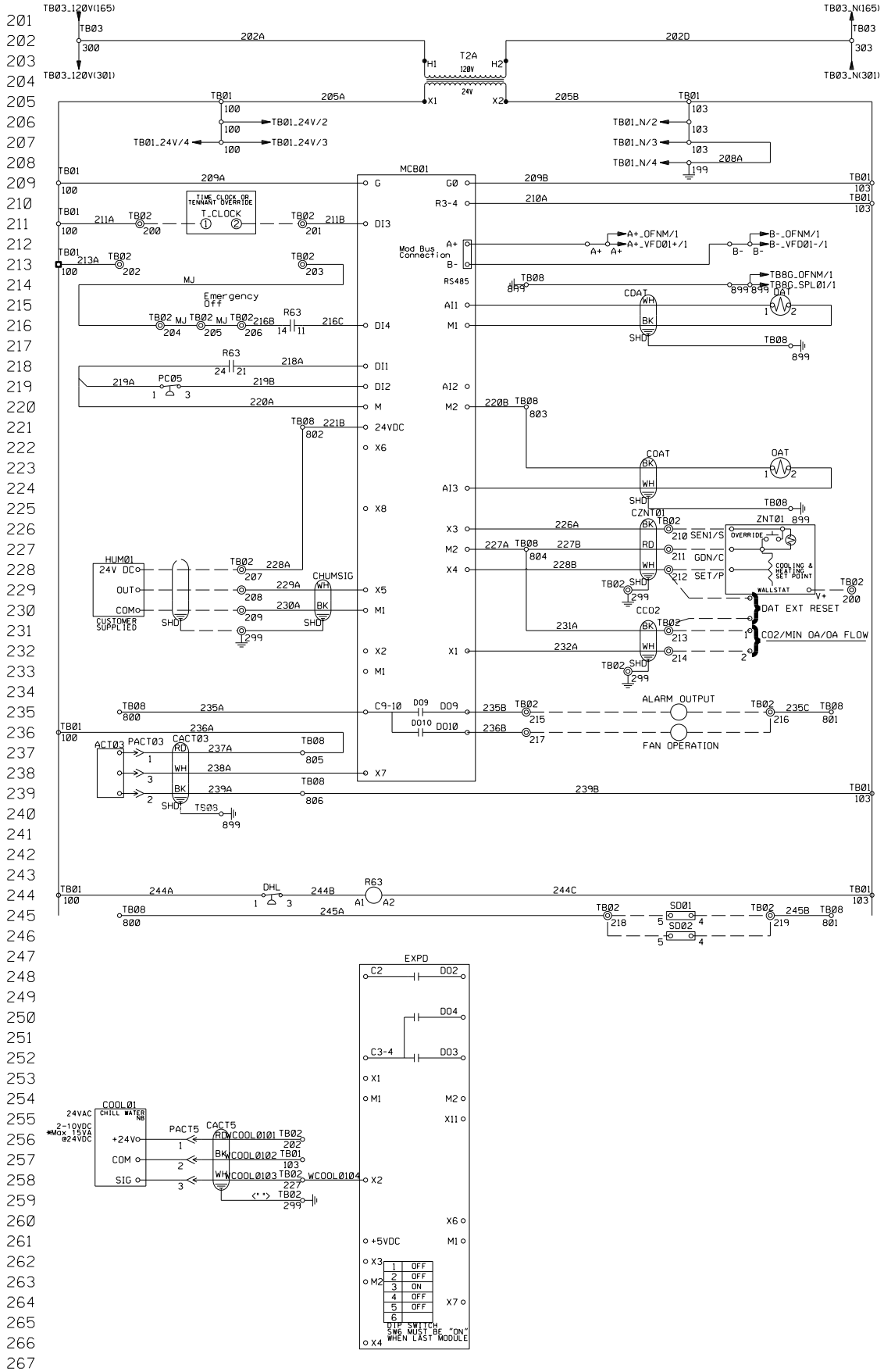


Figure 49 continued: Typical VAV 460 VAC Wiring with Controls (3 of 4) — DAH A15–A21 shown

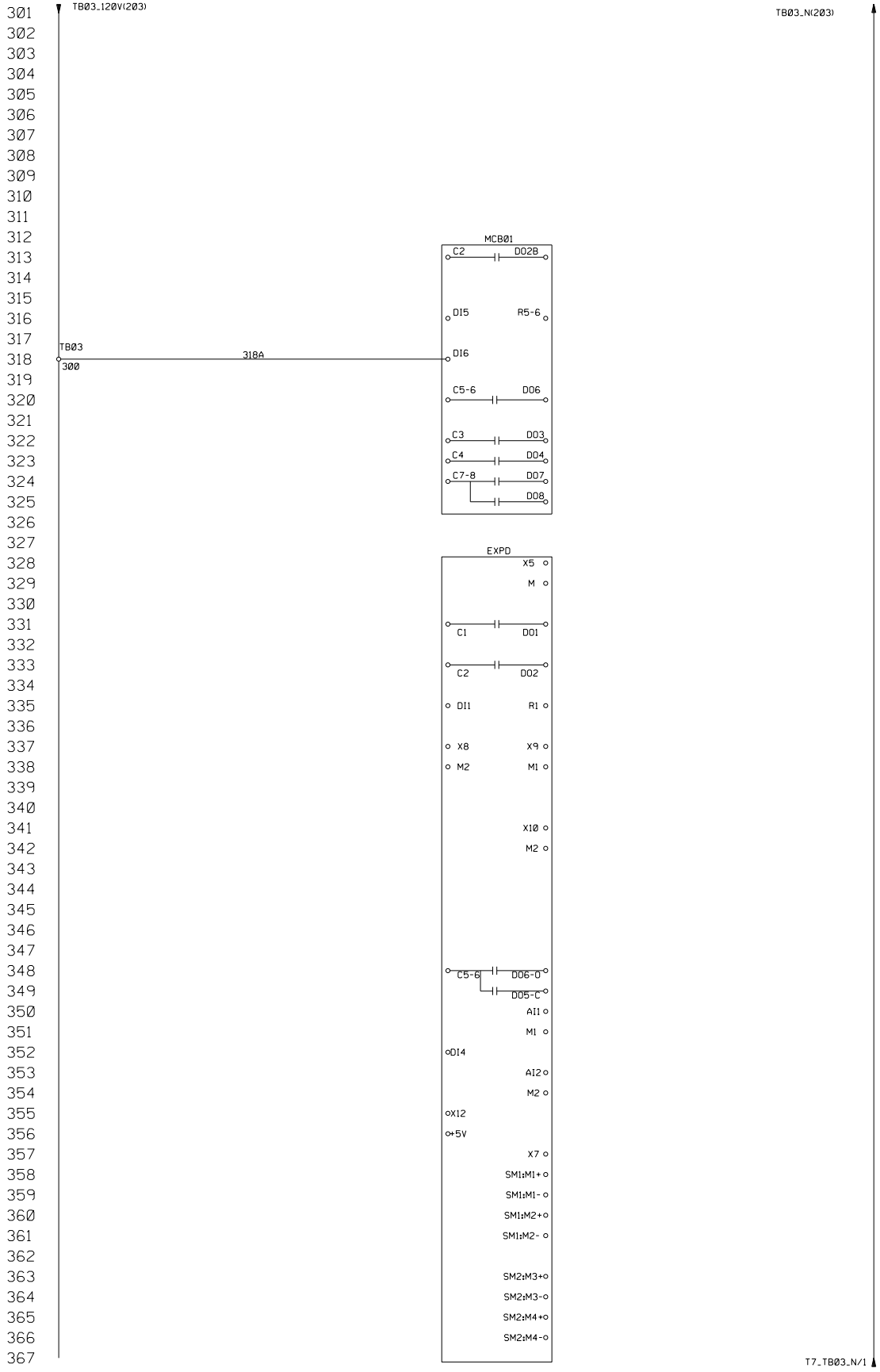
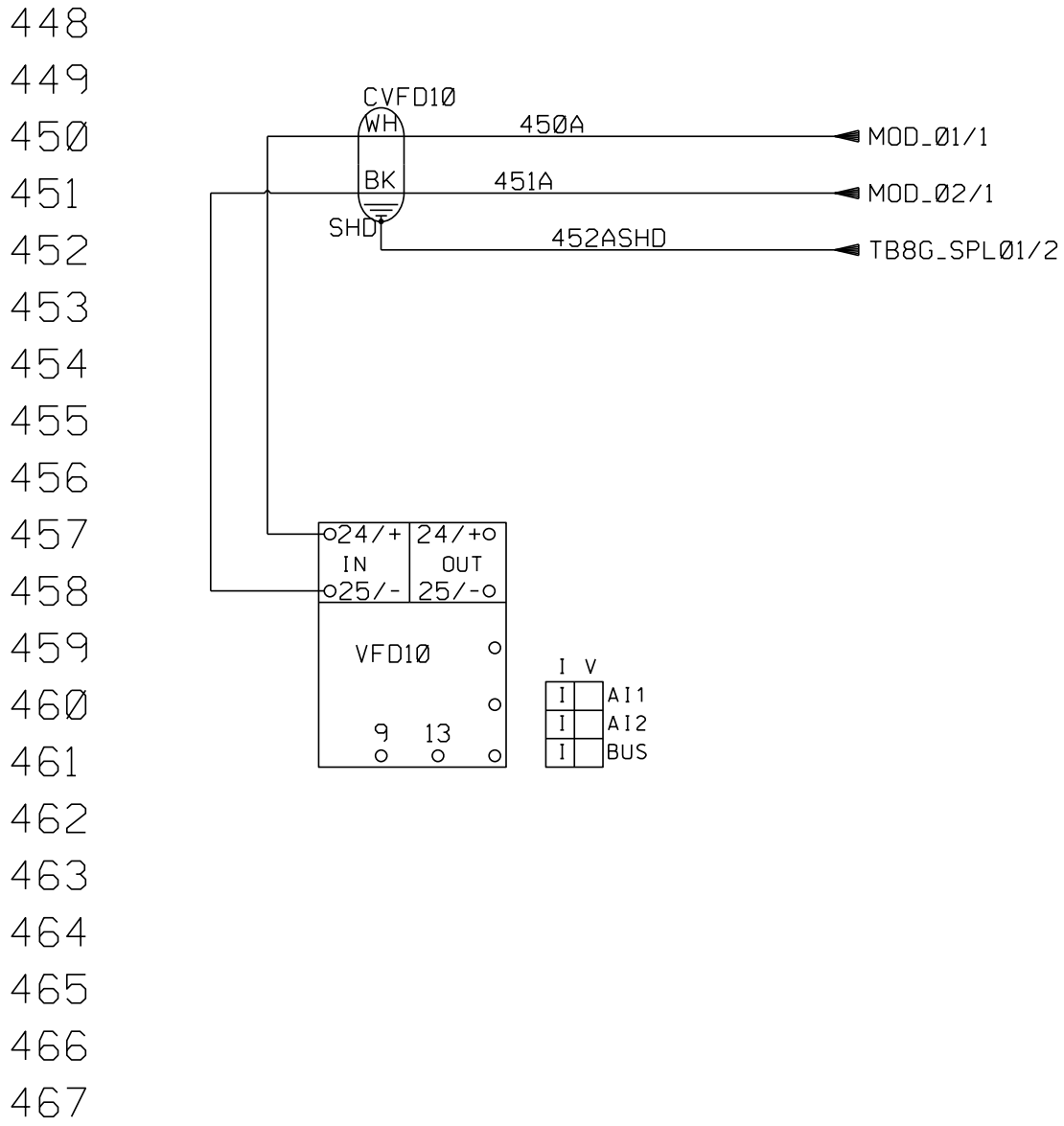


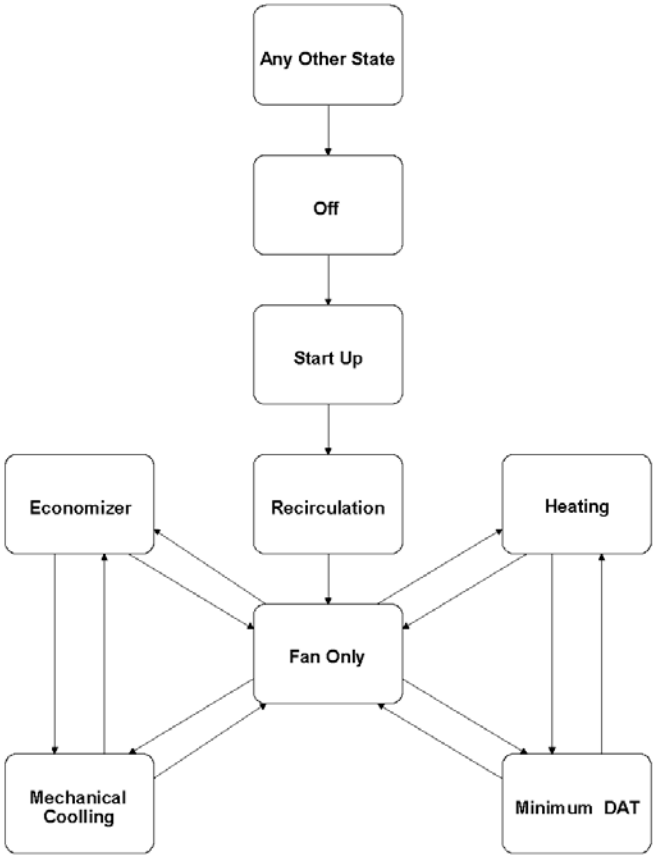
Figure 49 continued: Typical VAV 460 VAC Wiring with Controls (4 of 4) — DAH A15–A21 shown



Operating States

The transition from any operating state to another is graphically represented in Figure 50.

Figure 50: 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 coil valve will begin to open and the cooling mode of operation will begin.

The unit controller will open or close the valve to maintain the cooling setpoint temperature within the deadband. 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 cooling valve will begin to open.

The unit controller will modulate open more cooling, or modulate close, to maintain the discharge air temperature setpoint within the deadband.

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 open the valve if the economizer is at 100% open, continue economizing, or if the control temperature is satisfied, return to minimum position and transition back to “Fan Only” mode.

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

Pre-Start of Unit

⚠ DANGER

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

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

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

Read and follow this manual: “MicroTech III Unit Controller” (OM 1141) before operating or servicing.

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

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

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

Spring Isolated Fans

DAH A15–A21 Only

⚠ WARNING

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

Releasing Spring Mounts

The supply fan on DAH A15–A21 units is spring isolated due to the relatively larger fan and increased applied energy.

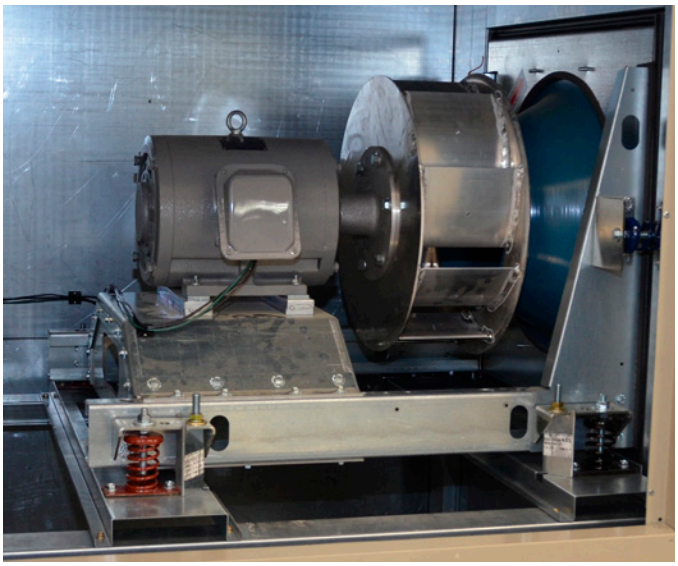
The spring-mounted supply fan is locked down with four shipping bolts for shipment. Remove each shipping bolt before operating the fans. Figure 51 shows a typical spring mount with a height adjustment nut and a shipping bolt.After removing the shipping bolts, rock the fan assembly by hand to check for freedom of movement.

Adjusting Spring Mounts

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

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

Figure 51: Spring Mounts



Servicing Control Panel Components

⚠ DANGER

Hazardous voltage. May cause severe injury or death.

Disconnect electric power before servicing equipment

Before Start-Up

1. Remove shipping bolts from compressor(s).
2. Verify that the unit is completely and properly installed with ductwork connected.
3. Verify that all construction debris is removed, and that the filters are clean.
4. Verify that all electrical work is complete and properly terminated.
5. Verify that all electrical connections in the unit control panel are tight, and that the proper voltage is connected.
6. Verify all nameplate electrical data is compatible with the power supply.
7. Verify the phase voltage imbalance is no greater than 2%.
8. Verify that gas piping is complete and leak tight.
9. Verify that the shutoff cock is installed ahead of the furnace, and that all air has been bled from the gas lines.
10. Verify installation of gas flue and outside air vents.
11. Manually rotate all fans and verify that they rotate freely.
12. Verify that the evaporator condensate drain is trapped and that the drain pan is level.
13. If unit is curb mounted, verify that the curb is properly flashed to prevent water leakage.
14. Review the equipment and service literature, the sequences of operation, and the wiring diagrams to become familiar with the functions and purposes of the controls and devices.
15. Determine which optional controls are included with the unit.

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.

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.

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

⚠ WARNING

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

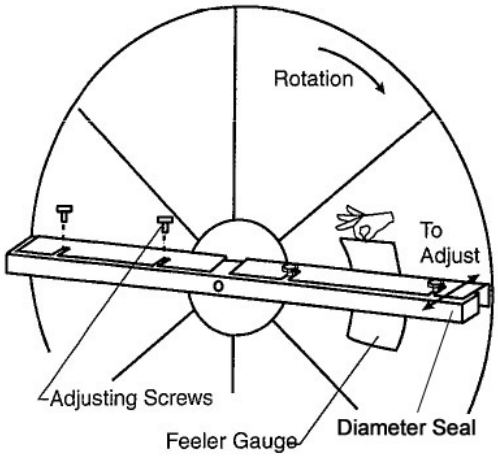
Prestartup Checks

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

Diameter Seal Adjustment

1. Loosen diameter seal adjusting screws. See Figure 52.
2. Move adjustable diameter seals away from wheel.
3. Using a ¼ inch feeler gauge, adjust the diameter against the wheel. See Figure 52.
4. Tighten diameter seal adjusting screws.
5. Apply power per the start up procedure.

Figure 52: Energy Recovery Wheel Adjusting



CORE Start-Up

1. Attach outdoor air hoods.
2. Verify bypass damper moves freely.

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 alarm limits as required.
3. Set the duct static pressure control parameters as required.
4. Set the building static pressure control parameters as required.
5. Set the economizer control parameters as required.
6. Set the date and time in keypad menu.
7. Set the operating schedule as required using keypad menus.

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

Maintaining Control Parameter Records

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

Performing Service Maintenance

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

⚠ IMPORTANT

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

⚠ DANGER

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

⚠ WARNING

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

Exercise caution when servicing equipment.

Servicing Control Panel Components

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

⚠ DANGER

Hazardous voltage. May cause severe injury or death.

Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

Planned Maintenance

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

- All blowers, including furnace inducer, have sealed bearings. No lubrication is necessary.
- Tighten all wire connections.
- Clean the outside and inside coils mechanically or with cold water, if necessary. Usually any fouling is only matted on the entering air face of the coil and can be removed by brushing or vacuuming.
- Clean or replace the filters as required.
- Check for blockage of the condensate drain. Clean the condensate pan as needed.
- Check the power and control voltages.
- Check the running amperage of all motors.
- Check and adjust all damper linkages as needed.
- Check the operation of all safety controls.
- Periodic removal of snow drifts will be required in northern climates

Unit Storage

Location

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

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

Preparation for Storage

Supply Fans

1. Depending on local climate conditions, condensate may collect on components inside the units. To prevent surface rust and discoloration, spray all bare metal parts with a rust preventive compound.

Cabinet Sections

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

Control Compartment

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

Filter Replacement

This unit is provided with filters are show in Table 31. These filters are disposable and should be replaced periodically. Unit is equipped with a filter pull to assist in this process. See Figure 53.

Table 31: Filter Sizes

Cabinet Size	Filter Size
A03-A05	4 – 16" × 16"
A07-A11	6 – 18" × 24"
A15-A21	9 – 18" × 24"
A03-A05 with ERW	6 – 16" × 16"
A07-A11 with ERW	10 – 18" × 24"
A15-A21 with ERW	13 – 18" × 24"
A07-A11 with CORE	6 – 18" × 24" 6 – 18"" × 20"
A15-A21 with CORE	11 – 18" × 24" 6 – 24" × 24"

Figure 53: Rebel Filter Section

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.

Fans

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

Vibration Levels

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

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

Vibration Causes

1. Wheel imbalance.
   a. Dirt or debris on wheel blades.
   b. Wheel distorted from overspeed.
2. Motor imbalance.
3. Fan section not supported evenly on foundation.

Periodic Service and Maintenance

Check all moving parts for wear every six months.

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

Cleaning Option E Coated Coils

⚠ WARNING

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

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

Remove Surface Loaded Fibers

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

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

Periodic Clean Water Rinse

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

Routine Quarterly Cleaning of Option E Coated Coil Surfaces

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

For routine quarterly cleaning, first clean the coil with the below approved coil cleaner (see approved products list under Recommended Coil Cleaners section, Table 32). After cleaning the coils with the approved cleaning agent, use the approved chloride remover (under the Recommended Chloride Remover section) to remove soluble salts and revitalize the unit.

Table 32: Option E Coated Coil Recommended Cleaning Agents

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

Phase Voltage Monitor (PVM)

The phase voltage monitor (Figure 54) is designed to protect three-phase loads from damaging power conditions. A microprocessor-based voltage and phase sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, its output relay is deactivated after a specified trip delay (Trip Delay). The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (Restart Delay). The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

There are two LEDs on the face of the PVM (“1” in Figure 54) to indicate the following items in Table 33.

Figure 54: Phase Voltage Monitor

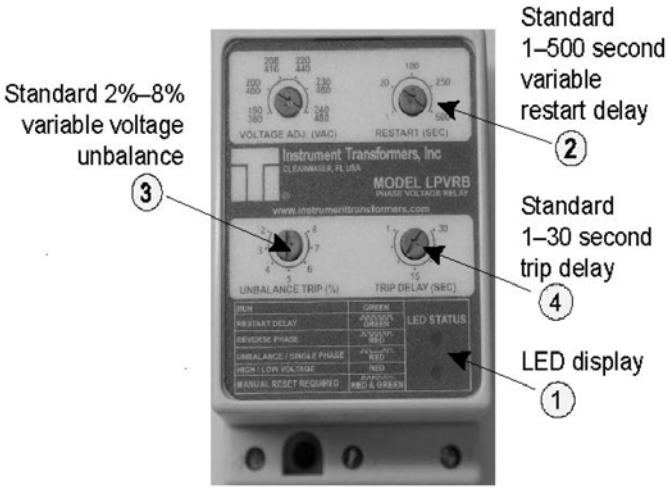


Table 33: LED Indication

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

Other features:

- Standard 2% to 8% variable voltage unbalance (“3” in Figure 54).
- Standard 1 to 500 second variable restart delay (“2”).
- Standard 1 to 30 second trip delay (“4”) (except loss of phase, which trips at 1 second non-adjustable).

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.

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 out factories and issuance of credits. All parts shall be returned to the factory designated on the return goods tag, transportation charges prepaid.

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

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

NOTE:
1. Unit does not require high pressure switch testing
2. Refrigerant pressures can be checked from the MicroTech III controller. Refrigerant gages are not needed.
3. Ensure proper unit phasing

Rebel
Equipment Warranty Registration Form

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

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

GENERAL INFORMATION

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

SOI No.: _____

Installation address: _____

City: _____ **State:** _____

Purchasing contractor: _____

City: _____ **State:** _____

Name of person doing start-up: _____

Company name: _____

Address: _____

City/State/Zip: _____

UNIT INFORMATION

Unit model number: _____

Unit serial number: _____

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

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

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

13F-4157 (06/17)

DAIKIN

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

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

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_20: . . . . . _____

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

III. START-UP COMPRESSOR OPERATION

A. Do compressors have holding charge? . . . . . ☐ Yes ☐ No ☐ N/A

B. Are compressor shipping brackets removed? . . . . . ☐ Yes ☐ No ☐ N/A

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

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

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

F. Compressor amperage:

Compressor #1: . . . . . Phase 1_____ Phase 2_____ Phase 3_____

Compressor #3: . . . . . Phase 1_____ Phase 2_____ Phase 3_____

DAIKIN

Rebel Equipment Warranty Registration Form (continued)

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

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

A. Discharge pressure, one compressor: . . . . . Circuit #1 _____ psig

B. Suction pressure, one compressor: . . . . . Circuit #1 _____ psig

C. Liquid temperature (°F): . . . . . _____

D. Suction line temperature °F from unit controller: . . . . . _____

E. Discharge line temperature °F from unit controller: . . . . . _____

F. Superheat temperature °F from unit controller: . . . . . _____

G. Sub-cooling line temperature °F from unit controller: . . . . . _____

H. Record discharge air temperature at discharge of unit (°F): . . . . . _____

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

J. Are all valve caps and packing tight after start-up? . . . . . ☐ Yes ☐ No ☐ N/A

K. Did unit control DAT to DAT setpoint? . . . . . ☐ Yes ☐ No ☐ N/A

V. Hot Water Coil

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

VI. Heat Recovery

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

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

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

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

VII. ELECTRIC HEAT

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

Volts _____ Hertz _____ Phase _____

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

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

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

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

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

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

G. FLA: L1 _____ L2_____ L3 _____

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

13F-4157 (06/17) 3

DAIKIN

Rebel Equipment Warranty Registration Form (continued)

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

VIII. FURNACE CHECK, TEST, & START

A. Gas pressure at main (inches w.c.): _____

B. Gas pressure at manifold (inches w.c.): _____

C. High limit control OK? ☐ Yes ☐ No ☐ N/A

D. Flame failure shutoff (seconds): _____

E. Airswitch OK? ☐ Yes ☐ No ☐ N/A

F. Main Gas Valve Close-Off OK? ☐ Yes ☐ No ☐ N/A

G. Modulation Gas Heat Performance

Gas Pressure

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

IX. MAINTAINING MICROTECH CONTROL PARAMETER RECORDS

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

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

Signature _____ **Startup date:** _____

Return completed form by mail to:

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

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

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.

Submit Form

Clear Form

DAIKIN

Quality Assurance Survey Report

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

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

Installation address:_____

City: _____ State: _____

Purchasing contractor:_____

City: _____ State: _____

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

Company name:_____

Address:_____

City/State/Zip: _____

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

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

   Location on unit _____

2. How would you rate the overall appearance of the product; i.e., paint, fin damage, etc.?

   Excellent☐ Good☐ Fair☐ Poor☐

3. Did all sections of the unit fit together properly? . . . . . Yes☐ No☐ N/A☐
4. Did the cabinet have any air leakage? . . . . . Yes☐ No☐ N/A☐

   Location on unit _____

5. Were there any refrigerant leaks? . . . . . Yes☐ No☐ N/A☐

   From where did it occur? . . . . . Shipping☐ Workmanship☐ Design☐

6. Does the refrigerant piping have excessive vibration? . . . . . Yes☐ No☐ N/A☐

   Location on unit _____

7. Did all of the electrical controls function at start-up? . . . . . Yes☐ No☐ N/A☐

   Comments _____

8. Did the labeling and schematics provide adequate information? . . . . . Yes☐ No☐ N/A☐
9. How would you rate the serviceability of the product?

   Excellent☐ Good☐ Fair☐ Poor☐

10. How would you rate the overall quality of the product?

    Excellent☐ Good☐ Fair☐ Poor☐

11. How does the quality of Daikin Applied products rank in relation to competitive products?

    Excellent☐ Good☐ Fair☐ Poor☐

    Comments _____

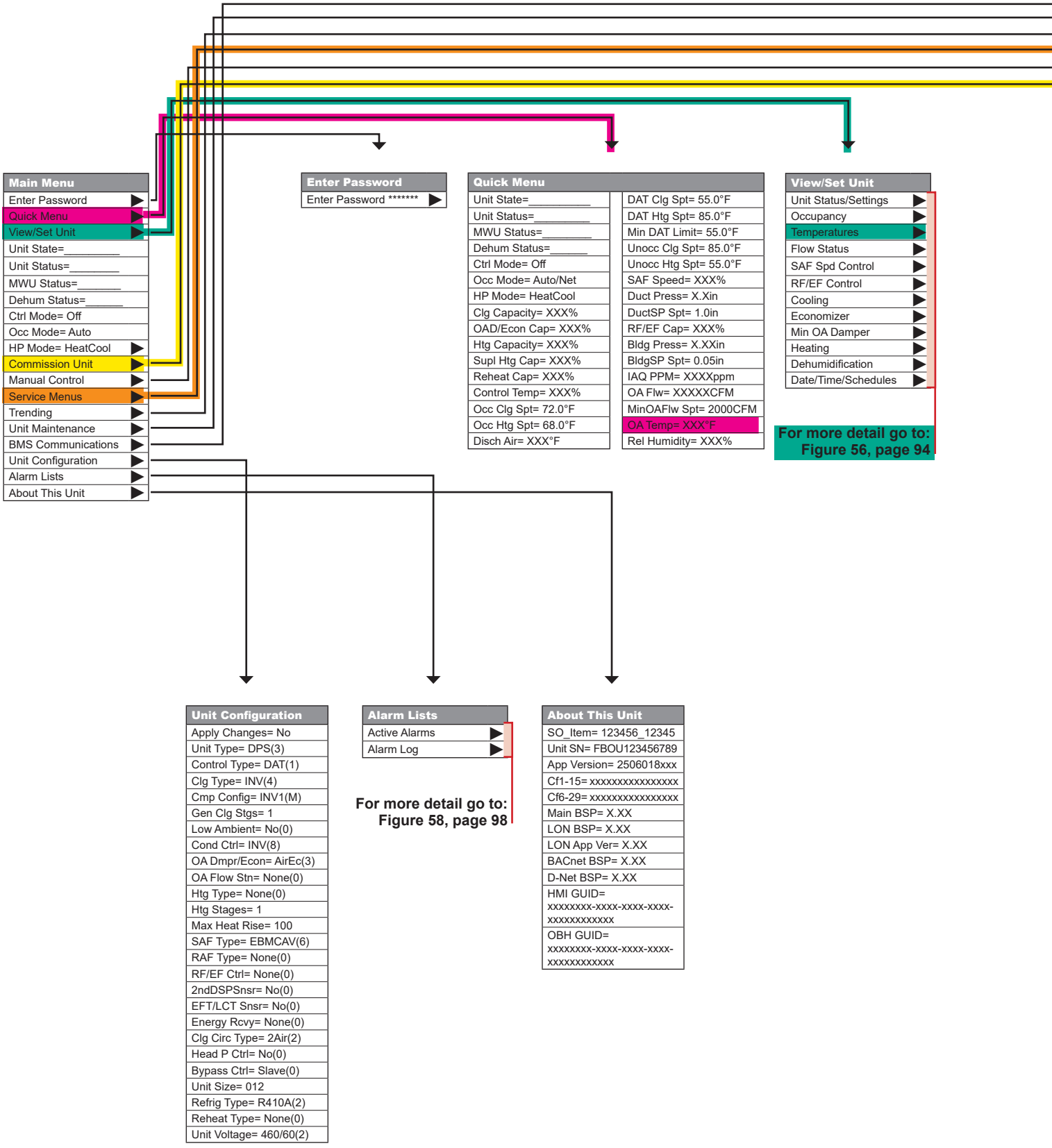
Please list any additional comments which could affect the operation of this unit; i.e., shipping damage, failed components, adverse installation applications, etc. If additional comment space is needed, write the comment(s) on a separate sheet, attach the sheet to this completed Quality Assurance Survey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

13F-4160 (02/16)

APPENDIX

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 55: Main Menu** – Keypad/Display Menu Structure*



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

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

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

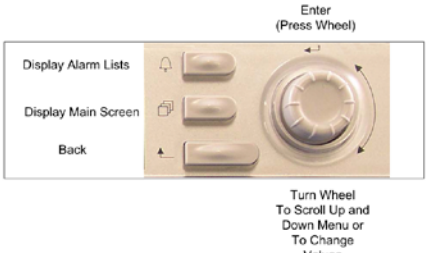
Trending
Trending Ena= No
Apply Chgs= No
Sample Time= 300s
TrendOnOff= Off
Auto Exp Time=
Export Data= No
Clear Trend= Done
Trend Full=
Points 1–8 (Fixed) ▶
Points 9–24 (from List) ▶
Points 25–27 (with IDs) ▶
Points 28–30 (with IDs) ▶

For more detail go to: Figure 60, page 100

Unit Maintenance
Operating Hours

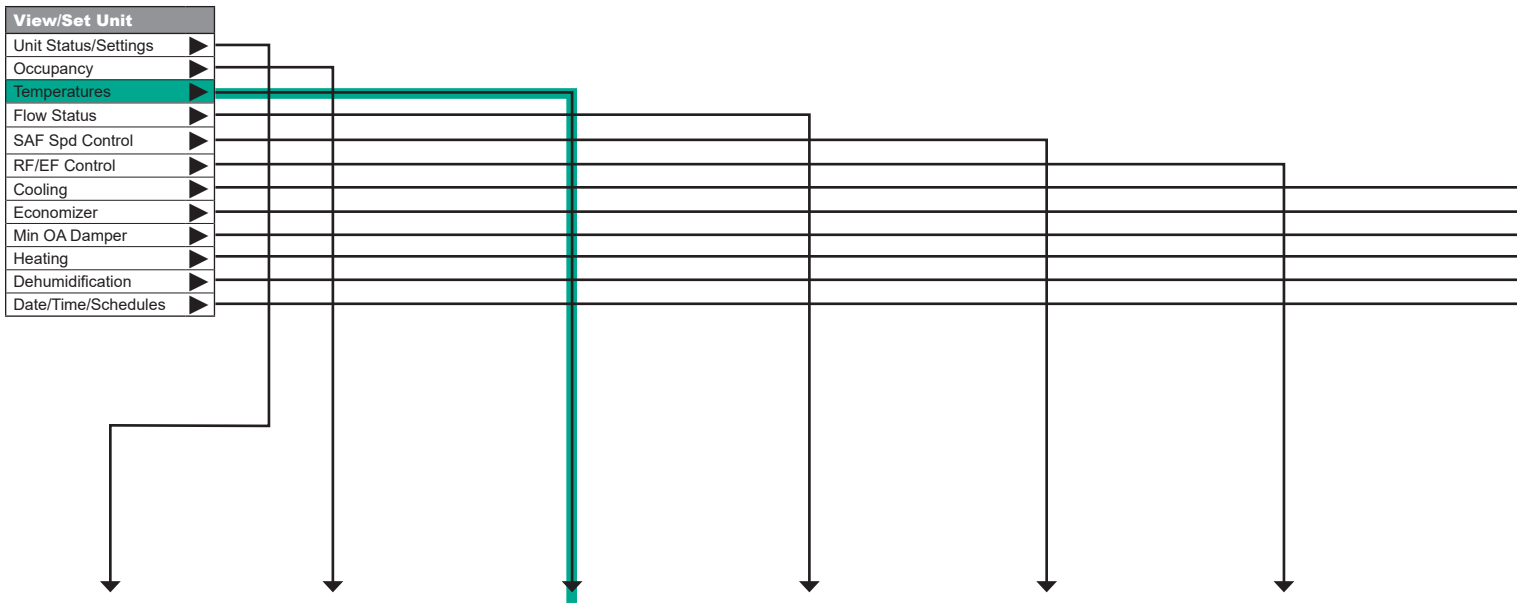
BMS Communications
LON Set-Up ▶
BACnet MSTP Set-Up ▶
BACnet IP Set-Up ▶
D-Net Set-Up ▶
Network Unit Set-Up ▶

For more detail go to: Figure 59, page 100



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

***Figure 56: View/Set Unit** – Keypad/Display Menu Structure*



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

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

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

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

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

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

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

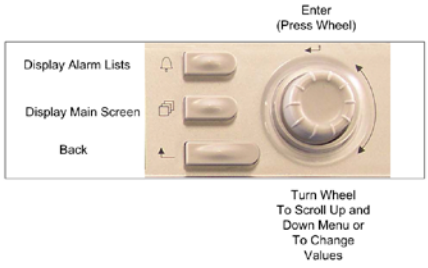
Economizer
OAD/Econo Pos= XXX%
DAT Clg Spt= 55.0°F
Min OA Pos= XXX%
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F

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

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

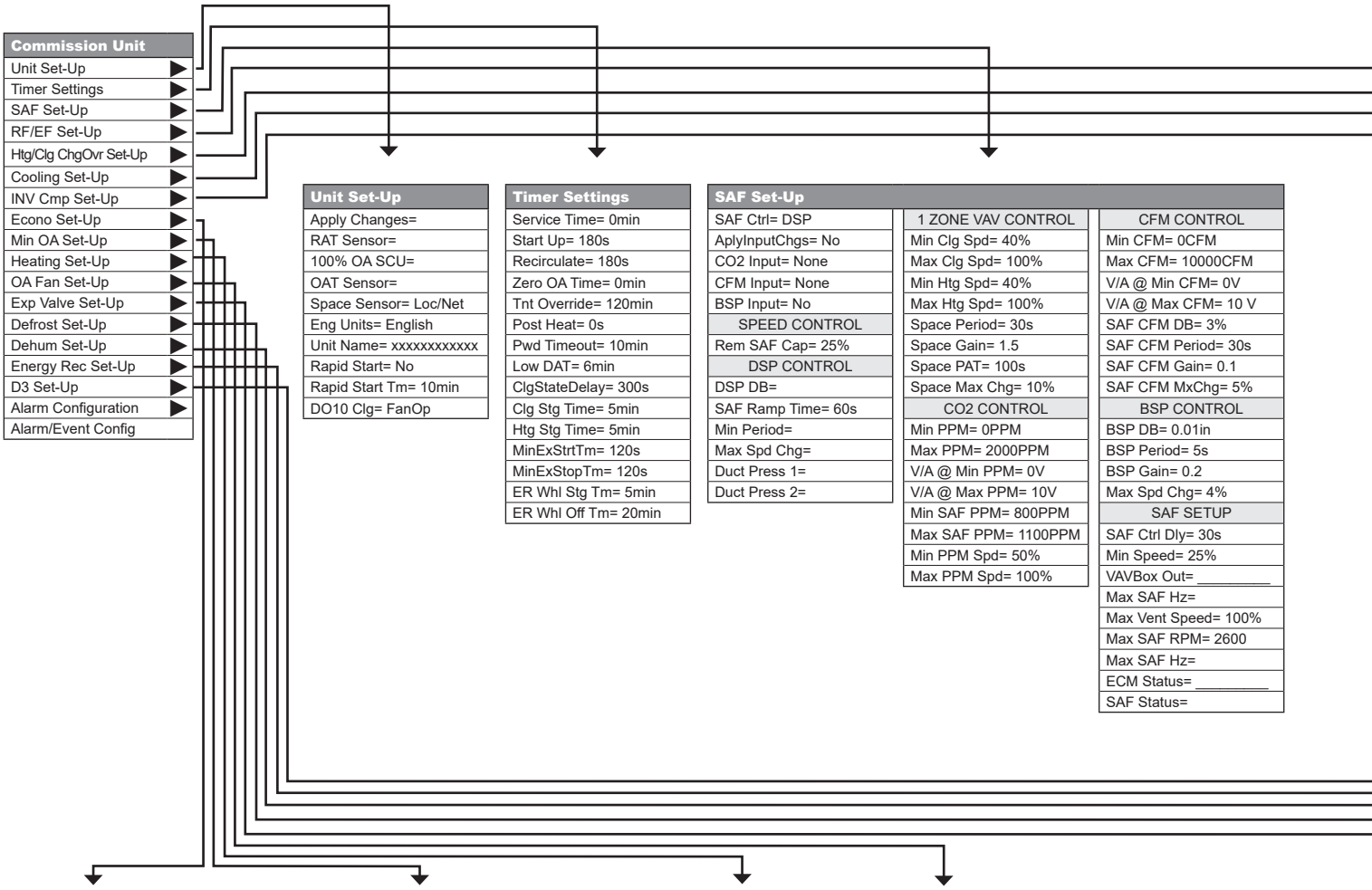
Dehumidification
Dehum Status= _____
Rel Humidity= XXX%
Dewpoint= XXX°F
Dehum Method= None
RH Setpoint= 50%
Dewpoint Spt= 50°F
Reheat Spt= XXX°F
Reheat Cap= XXX%

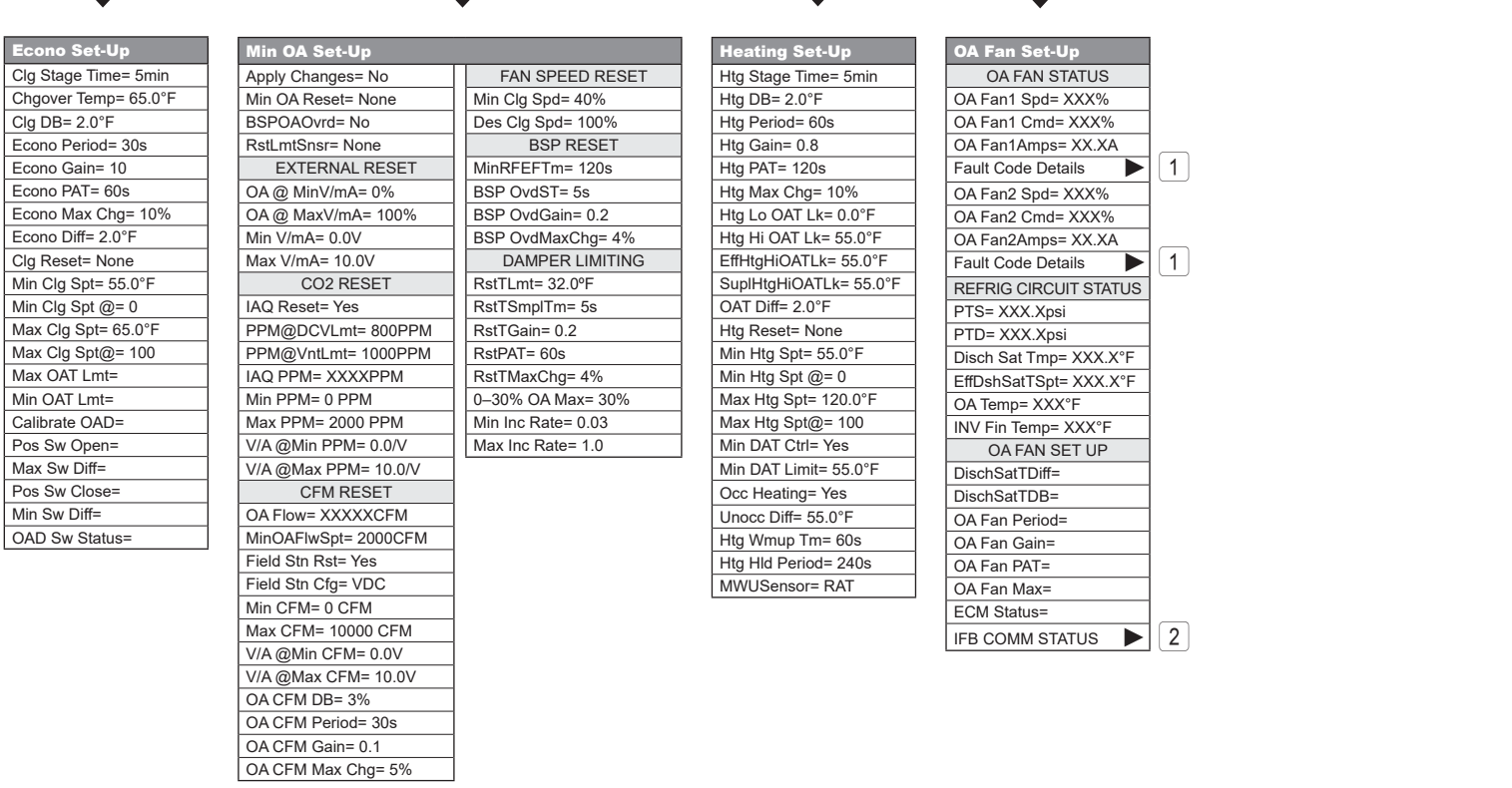
Date/Time/Schedules
Time= hh:mm:ss
Date= MM/DD/YY
UTC Diff= -60min
DAILY SCHEDULE
Mon= HH:MM-HH:MM
Tue= HH:MM-HH:MM
Wed= HH:MM-HH:MM
Thu= HH:MM-HH:MM
Fri= HH:MM-HH:MM
Sat= HH:MM-HH:MM
Sun= HH:MM-HH:MM
Hol= HH:MM-HH:MM
HOLIDAY DATES
Hol 1=MMMDD/YY-MMMDD/YY
Hol 2=MMMDD/YY-MMMDD/YY
Hol 3=MMMDD/YY-MMMDD/YY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



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

***Figure 57: Commission Unit** – Keypad/Display Menu Structure*





1, 2 See Figure 58, page 98 for the expansion information

RF/EF Set-Up
RF/EF Ctrl= None
SPEED CONTROL
Rem ExhF Cap= 5%
Rem RAF Cap
BSP CONTROL
BSP DB= 0.010in
BSP Period=
BSP Gain=
Max Spd Chg=
RF/EF SET UP
RFEF Ctrl Dly=
Min Speed=
MinExStrtTm=
MinExStopTm=
MinExOAPos=
MinExSAFCap=
ExhOnOAPos= 40%
ExhMxOAPos= 100%
Max Vent Spd= 100%
Max RFEF RPM= 2600
ECM Status= _____

Htg/Clg ChgOvr Set-Up
Ctlr Temp Src= RAT
Use Tstat Spt= No
Occ Clg DB= 2.0°F
Clg Period= 60s
Clg Gain= 0.1
Clg PAT= 600s
Max Clg Chg= 5.0°F
Occ Htg DB= 2.0°F
Htg Period= 60s
Htg Gain= 0.1
Htg PAT= 600s
Max Htg Chg= 5.0°F
Cal D Rem Spt @10°C=
Cal D Rem Spt @50°F=
Cal D Rem Spt @30°C=
Cal D Rem Spt @80°F=
Demand Shed=
Clg Demd Shed=
Htg Dmd Shed=
Clg Shed Rate=
Htg Shed Rate=

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

INV Cmp Set-Up	
COMPRESSOR STATUS	COMPRESSOR SETUP
Clg State= _____	Clg Lo OAT Lk= 55°F
Htg State= _____	Htg Lo OAT Lk= 0.0ºF
INV Cmp Spd= XXX.X%	Htg Hi OAT Lk= 55.0ºF
INV Spd Cmd= XXX.X%	EffHtgOATLk= 55.0ºF
VCmp Oil Status=	OAT Diff= 2ºF
Comp 3=_____	INV Period= 20s
Fault Code Details ▶	INV Gain= 2.5
INV Port Temp= XXX.XºF 1	INV PAT= 10s
INV Fin Temp= XXX.XºF	INV Max Chg= 15%
INV Amps= XX.XA	Oil Management=
REFRIG CIRCUIT STATUS	Low Oil Time=
PTS= XXX.Xpsi	Oil Boost Time=
PTD= XXX.Xpsi	Inv Man Dsbl=
4 Way Valve=_____	Comp 3 Man Dsbl=
RcvrSol Valve=_____	VFD Status=
BP Sol Valve=_____	VFD Alm/Wrn=
	IFB COMM STATUS ▶ 2

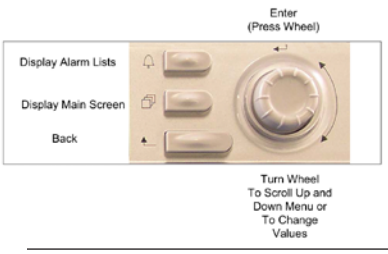
Exp Valve Set-Up	
EXP VALVE STATUS	EXP VALVE SETUP
EVI Pos= XXX%	SSH DB= 2.0ºF
EVO Pos= XXX%	SH Lo Base= 5.0ºF
EVStatus=_____	SH Hi Base= 9.0ºF
REFRIG CIRCUIT STATUS	Htg EVI Meth= SbC
PTS= XXX.Xpsi	IC SC Spt= 9.0ºF
PTD= XXX.Xpsi	IC SC DB= 2.0ºF
Suction SH= XX.XºF	HtgSC EVI Min= 0%
Discharge SH= XX.XºF	Clg EVO Meth= SbC
Subcooling= XX.X°F	OC SC Spt= 9.0ºF
Eff SSH Spt= XX.X°F	OC SC DB= 2.0ºF
EffSH Base= XX.X°F	ClgSC EVO Min= 0%
Eff SC Spt= XX.X°F	ManCtrl EV Op= Auto
Eff SC Lo Lmt= XXX%	
SRT= XXX°F	
Disch Sat Tmp= XXX.X°F	
Sucn Sat Tmp= XXX.X°F	
IRT= XXX°F	
ORT= XXX°F	

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

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

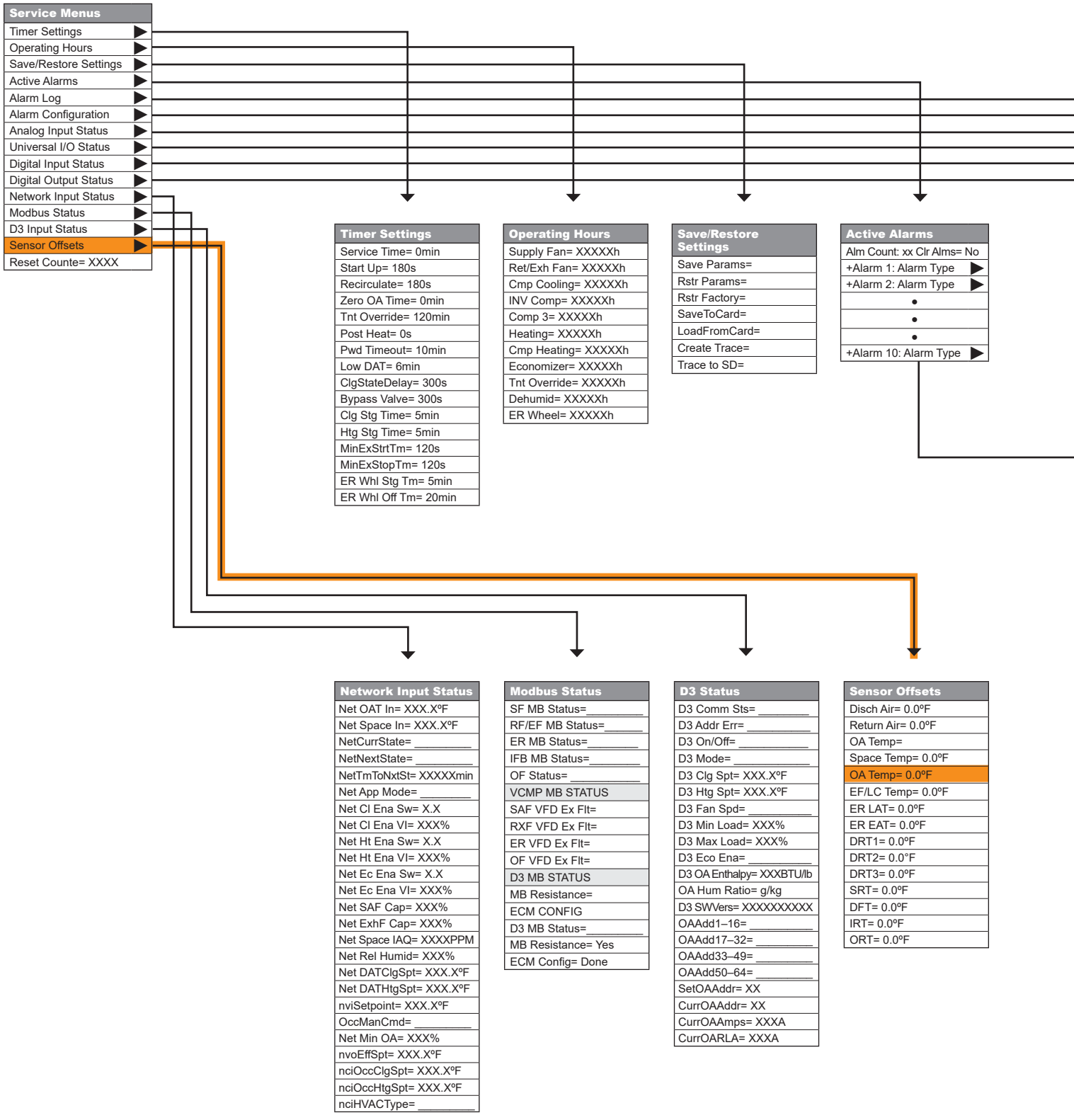
Energy Rec Set-Up
Energy Rcvy= Yes
ER Wheel= _____
Wheel Speed= XXX%
Whl Spd Cmd= XXX%
ER LAT= XXX°F
ER EAT= XXX°F
Min ExhT Diff= 2.0°F
Max ExhT Diff= 6.0°F
ER Whl Stg Tm= 5min
ER Whl Off Tm= 20min
Rel Humidity= XXX%
Min Whl Spd= 5%
Intersect Pt= XXX.XºF
Fst Mgnt Meth= Timed
OA Frst Temp= -5.0°F
Defrost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

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



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

***Figure 58: Service Menu** – Keypad/Display Menu Structure*



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

Alarm/Event Configuration
ALARM LIMITS
Hi Disch Temp= 170°F
Lo Disch Temp= 40°F
Hi Return Temp= 120°F
ALARM OUT CONFIG
Faults= Fast
Problems= Slow
Warnings= Off
ALARM DELAYS
Frz Delay Time= 30s
Air Flw Ing=120s
Sens Alm Dly= 30s
Temp AlmDly= 30s
ALARM CONFIG
Emerg Stop= ManClr
Alm Log to SD=
EVENT CONFIG
Show Events=
Event Log to SD=
SNAPSHOT CONFIG
Ena SnapShots=
Show SnapShots=
SnapShots to SD=

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

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

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

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

Alarm Lists
Active Alarms ▶
Alarm Log ▶

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

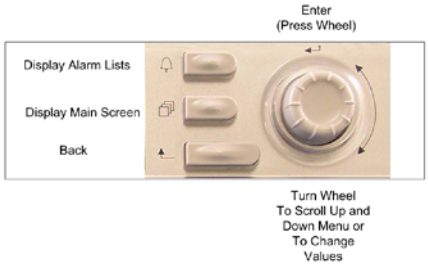
Alarm Log
Log Count: xx Clr Log= No ▶
+/-Alarm 1: Alarm Type ▶
+/-Alarm 2: Alarm Type ▶
•
•
•
+/-Alarm 50: Alarm Type ▶

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

1
2

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

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



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

***Figure 59: BMS Communications** – Keypad/Display Menu Structure*

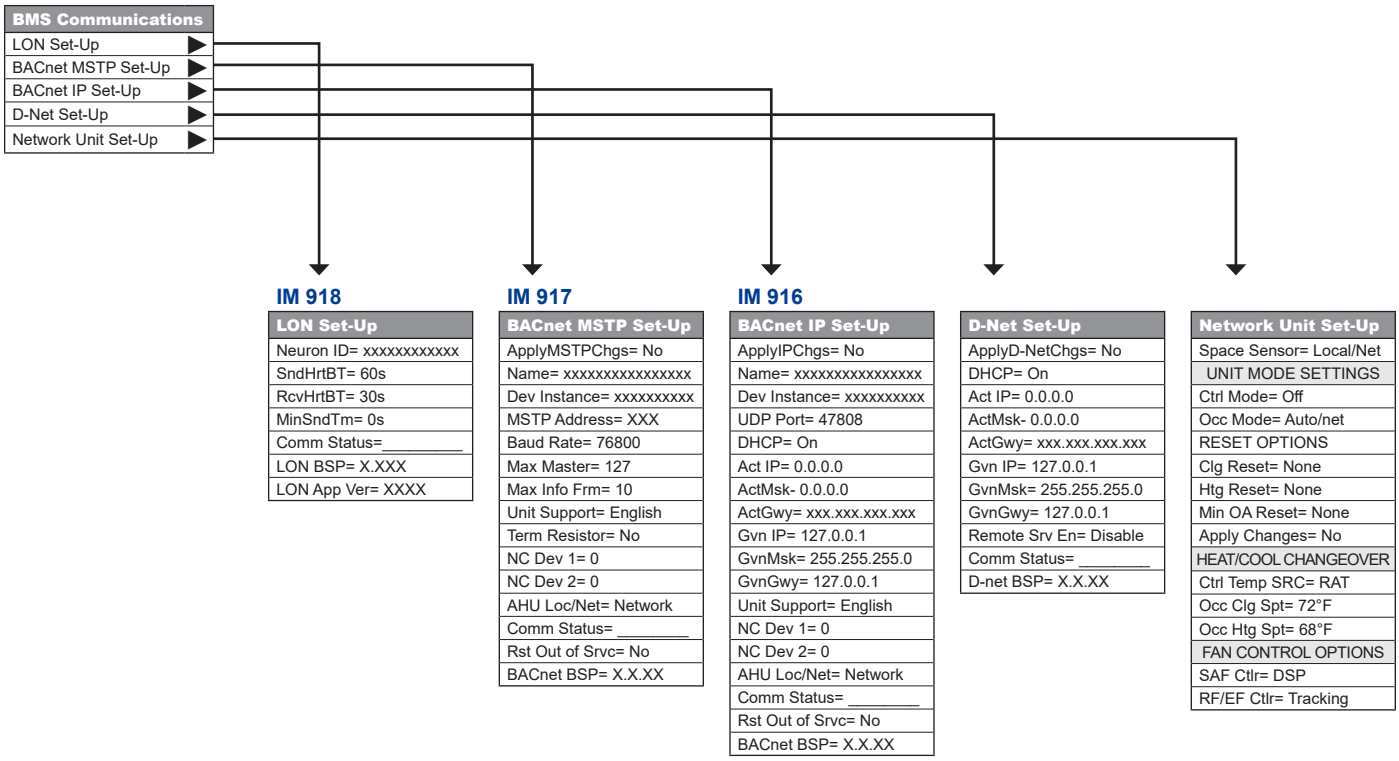


***Figure 60: Trending** – Keypad/Display Menu Structure*

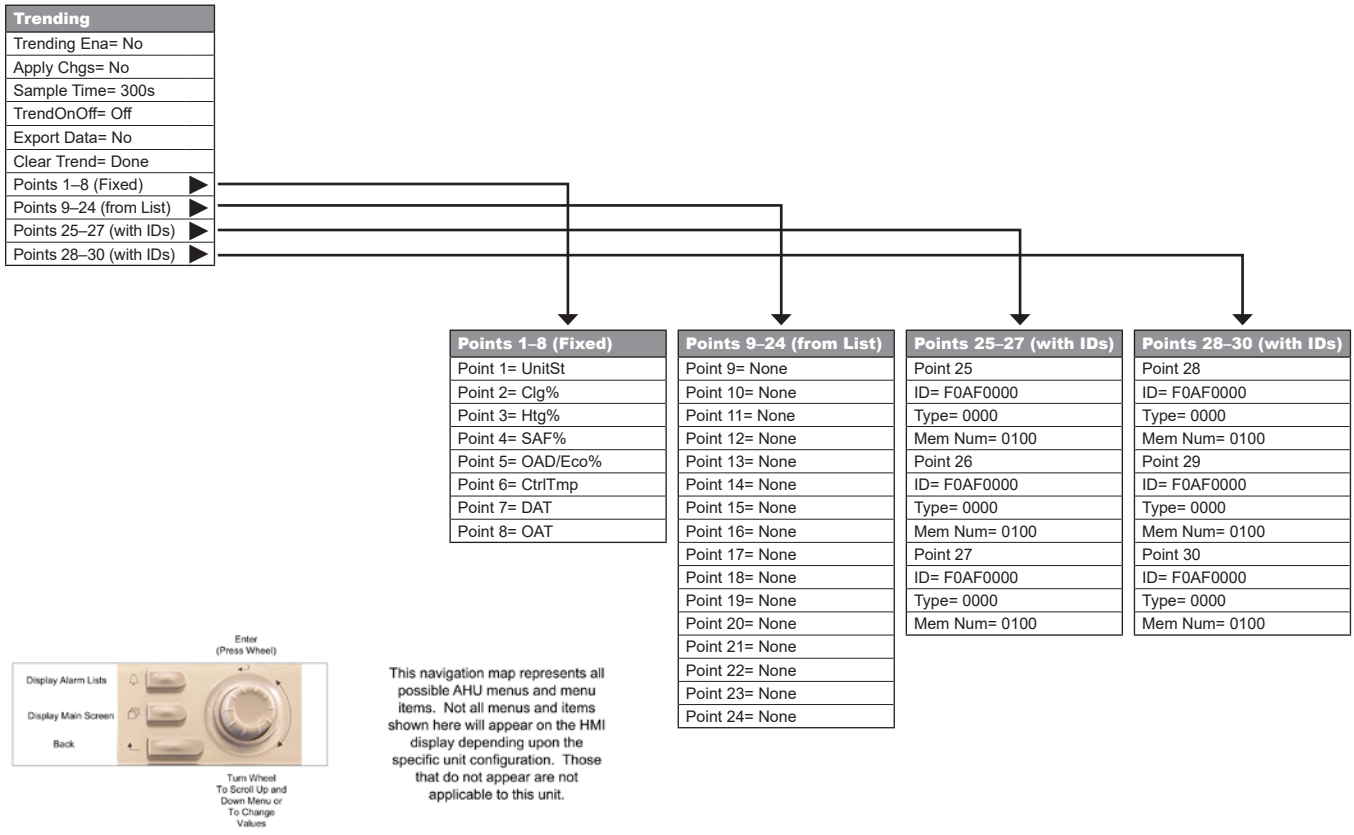
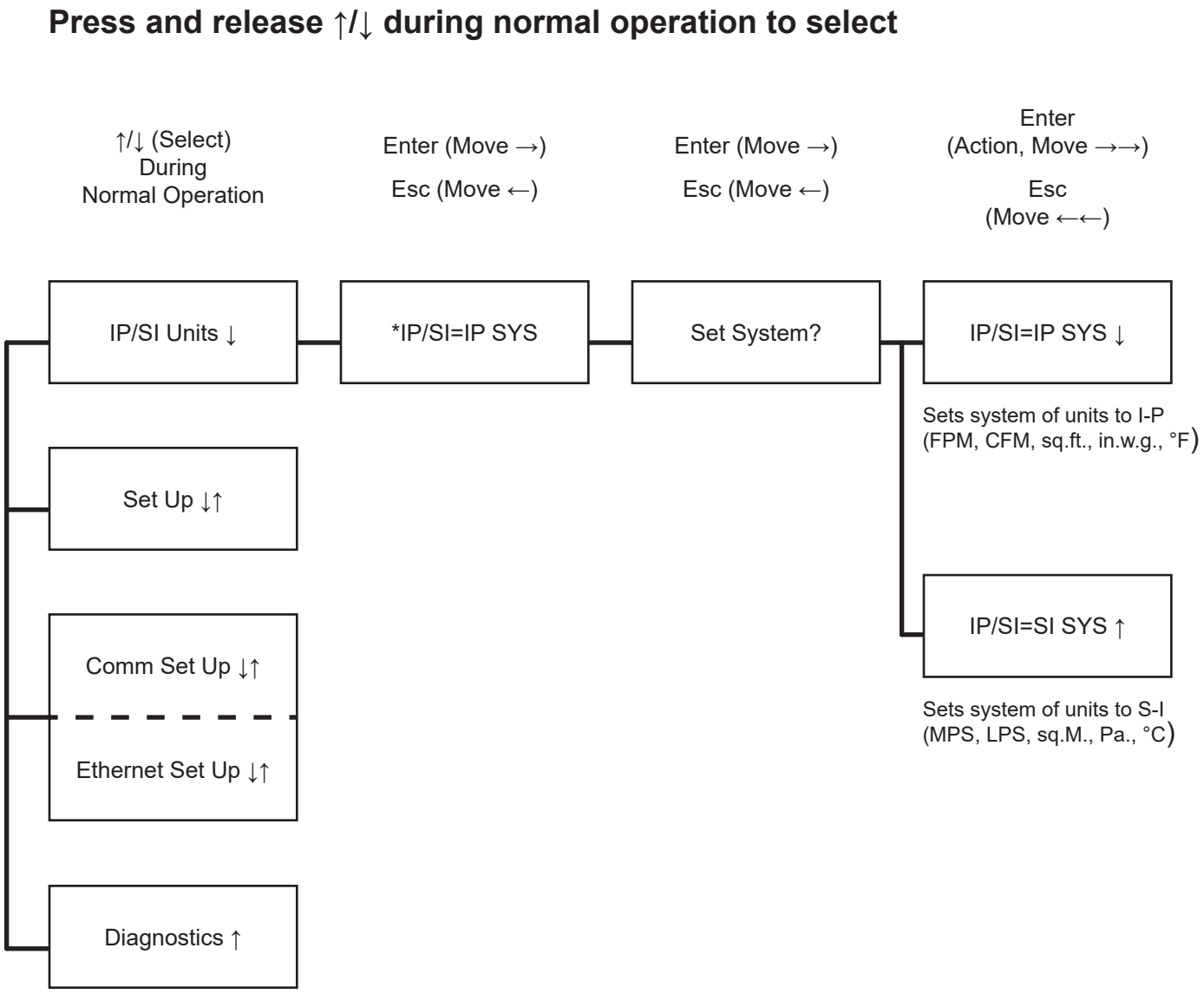


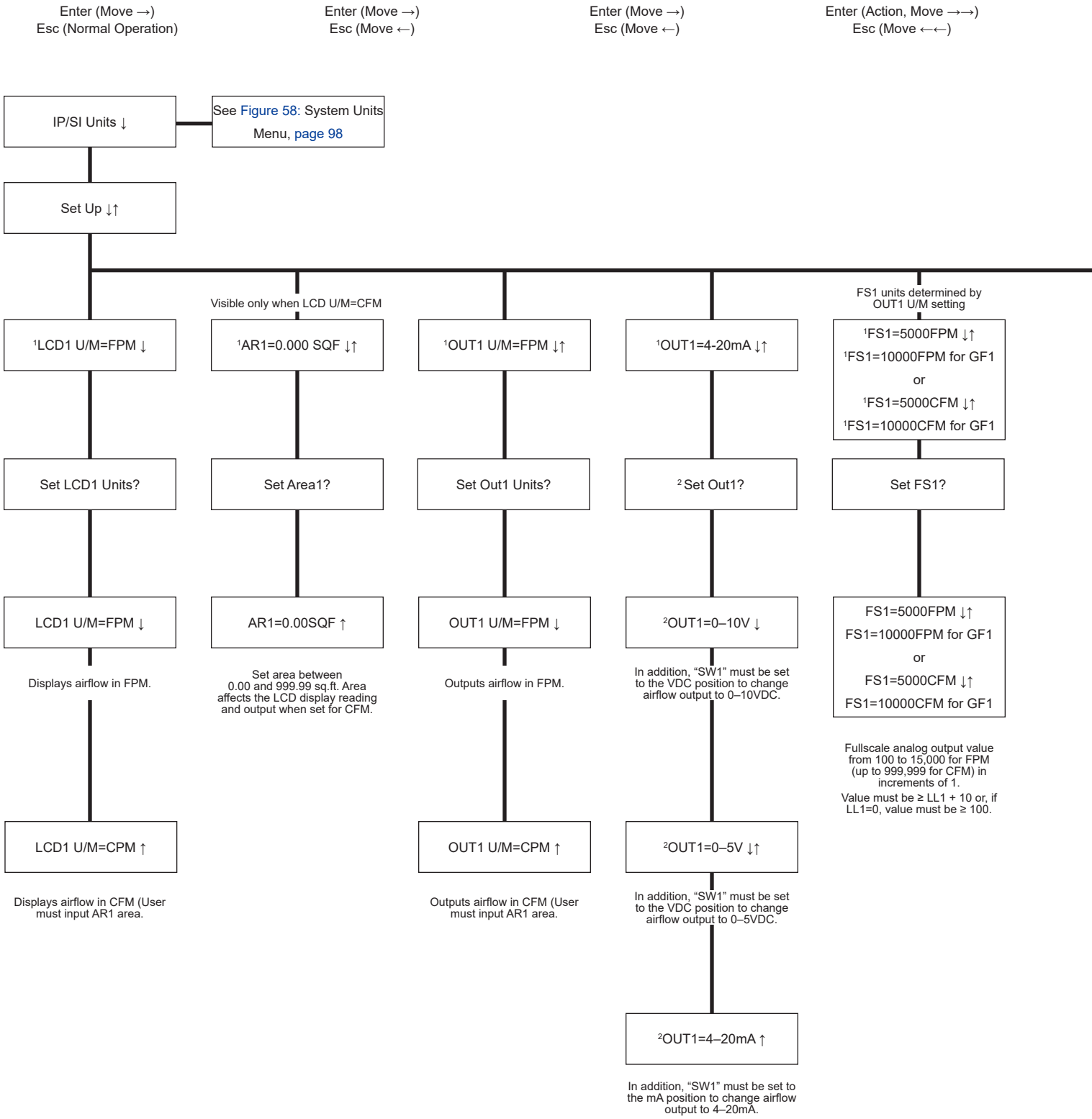
Figure 61: Optional Outdoor Air Monitor *– Changing the System of Units*



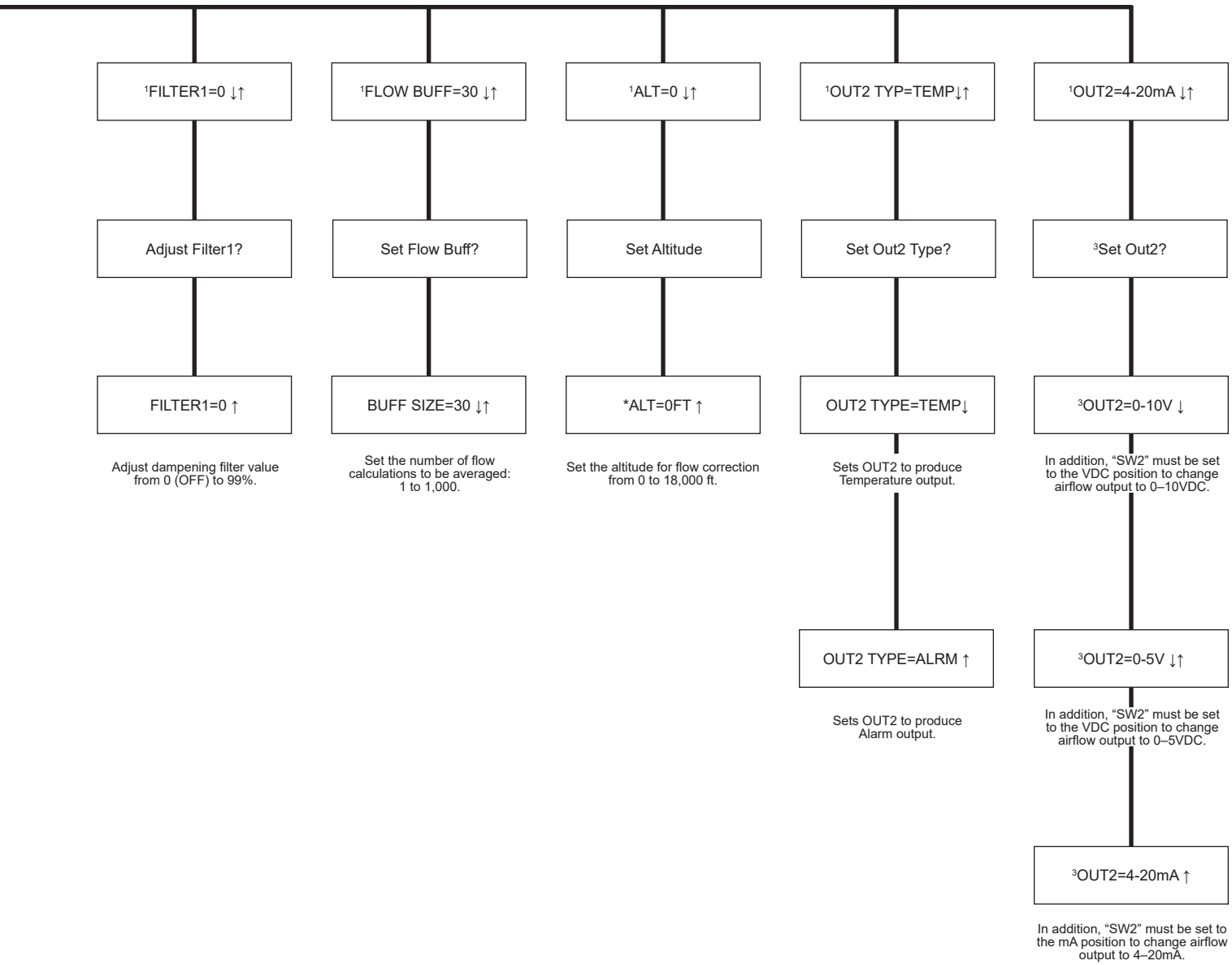
* Factory Default/Current Setting

***Figure 62: Optional Outdoor Air Monitor** – Set Up Menu*

Press and release ↑/↓ during normal operation to select



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



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