Installation and Start-up Manual

IM 1287-5

Group: **Applied Air Handling**
Part Number: **IM1287-5**
Date: **April 2023**

Rebel Applied™ Packaged Rooftop

Heating and Cooling
Models DPSA, DAHA
20 to 52 Tons
R-410A Refrigerant

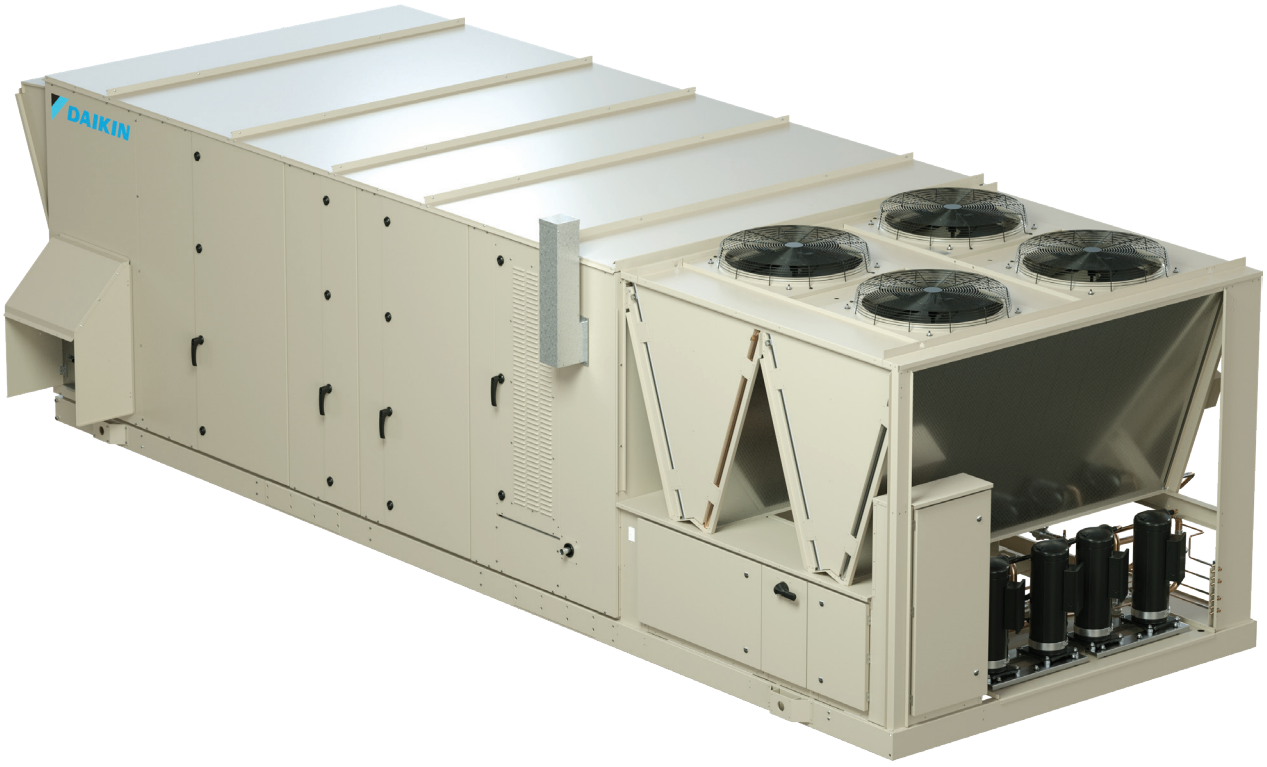


Table of Contents

Introduction

This manual provides installation information about the Rebel Applied rooftop unit - model DPSA. In addition to an overall description of the unit, it includes mechanical and electrical installation and start-up procedures. For operations and/or maintenance procedures, see OM 1288.

Table 1: Program Specific Rooftop Unit Literature

Product	Manual Title	Manual Number
Rebel Applied- model DPSA	Unit Installation and Start Up	IM 1287
	Unit Operations and Maintenance	OM 1288
	Non-Daikin Applied	See vendor manuals

Nameplate Information

Unit Nameplate

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

Compressor Nameplate

On units that utilize the tandem compressor design, each compressor includes an individual nameplate.

Gas Burner Nameplate

On units that include gas heat, the cabinet furnace nameplate is located next to the furnace access door. It includes the gas pressures, minimum/maximum input, maximum temperature rise, and minimum CFM. The furnace rating plate is included on the furnace; this includes the burner model number.

Electric Heater Nameplate

On units that include electric heat, the cabinet electric heater nameplate is located next to the electric heater access door. The electric heater rating plate is included on the electric heater; this includes the electric heater model number.

Fusing

The use of properly sized time delay fuses, in accordance with nameplate data, is permitted for this unit.

Hazardous Information Messages

⚠ CAUTION

Caution indicates potentially hazardous situations which can result in injury, death, and property damage if not avoided.

⚠ WARNING

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

⚠ WARNING

Warning indicates potentially hazardous situations for PVC (Polyvinyl Chloride) and CPVC (Chlorinated Polyvinyl Chloride) piping in chilled water systems. In the event the pipe is exposed to POE (Polyester) oil used in the refrigerant system, the pipe can be chemically damaged and pipe failure can occur.

⚠ DANGER

Danger (Danger lightning sign) indicates a hazardous situation which will result in death or serious injury if not avoided.

⚠ DANGER

Danger (Danger gas sign) indicates a hazardous gas situation which will result in death or serious injury if not avoided.

⚠ NOTICE

Notices give important information concerning a process, procedure, special handling or equipment attributes.

Figure 1: Nomenclature

D PS A 050 A 4 B S

Daikin Applied Rebel

Packaged DX Cooling System
- PS = Packaged DX Cooling
- AH = Air Handler
- FS = Permanent Split System

Applied

Unit Size
- B00 = B cabinet, no cooling coil
- B24 = B cabinet, 24 ft² coil
- B29 = B cabinet 29 ft² coil
- B34 = B cabinet 34 ft² coil
- 020 = 20 ton
- 025 = 25 ton
- 030 = 30 ton
- 031 = 31 ton
- 034 = 34 ton
- 035 = 35 ton
- 040 = 40 ton
- 050 = 50 ton
- 052 = 52 ton

Vintage

Voltage
- 2 = 208V
- 3 = 230V
- 4 = 460V
- 5 = 575V

Cabinet Size
- B = B cabinet (20 – 52 tons)

Cooling Configuration
- 0 = No cooling, heat only
- C = Chilled water coil
- S = Standard efficiency air-cooled DX
- H = High efficiency air-cooled DX
- P = Premium efficiency air-cooled DX

Unit Description

Figure 2 shows a typical DPSA unit. Figure 3 shows a typical DPSA unit with the locations of the major components. These figures are for general information only. See the project's certified submittals for actual specific dimensions and locations.

Figure 2: DPSA Unit, Typical

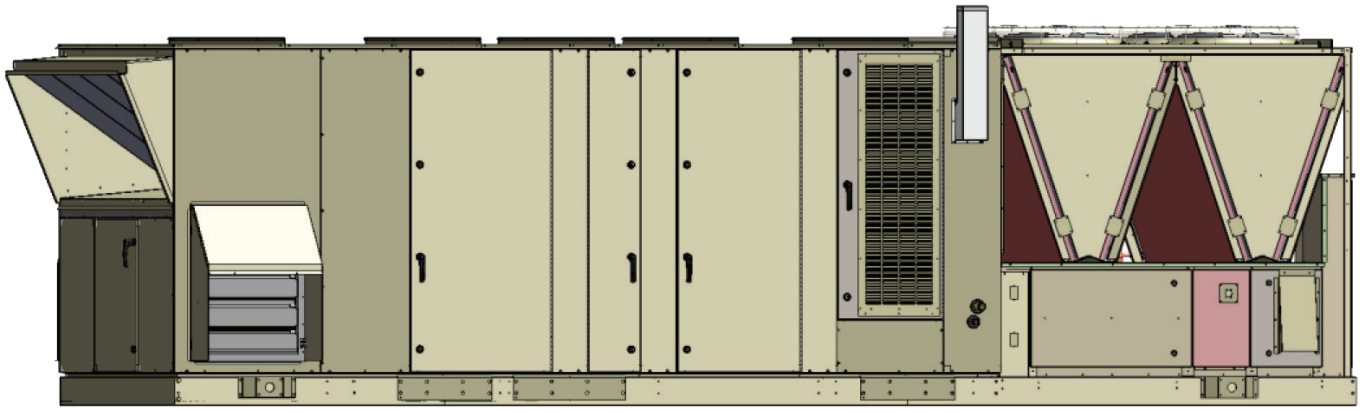
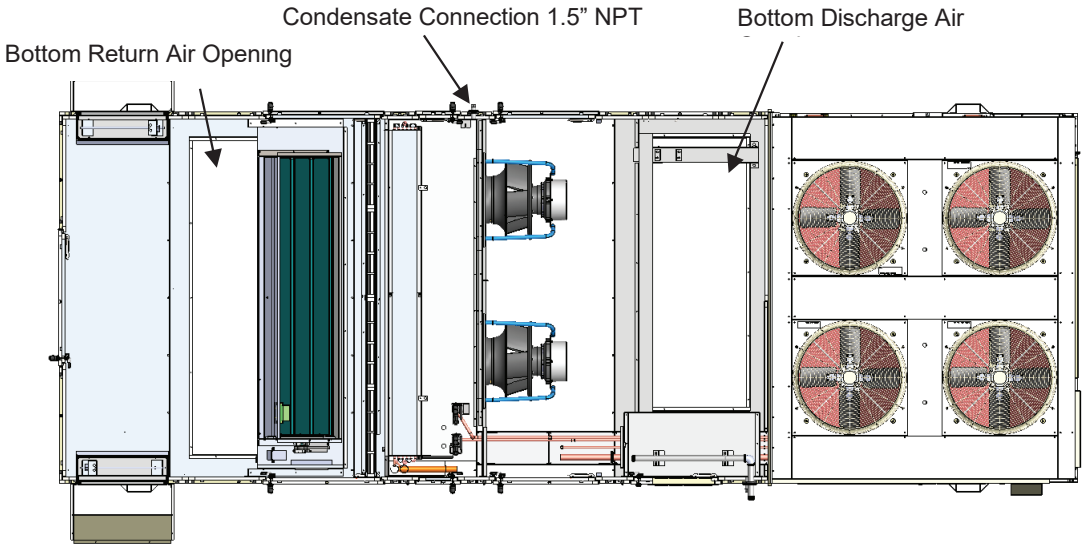


Figure 3: Typical Component Locations—DPSA Units

Top View



Side View

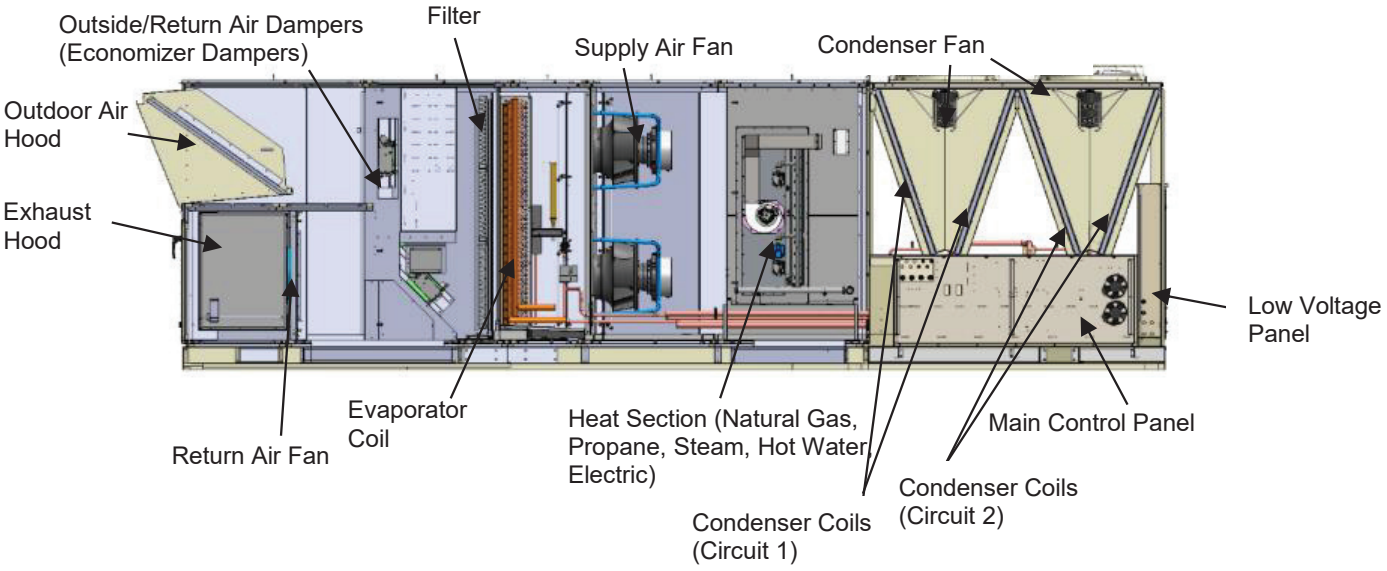
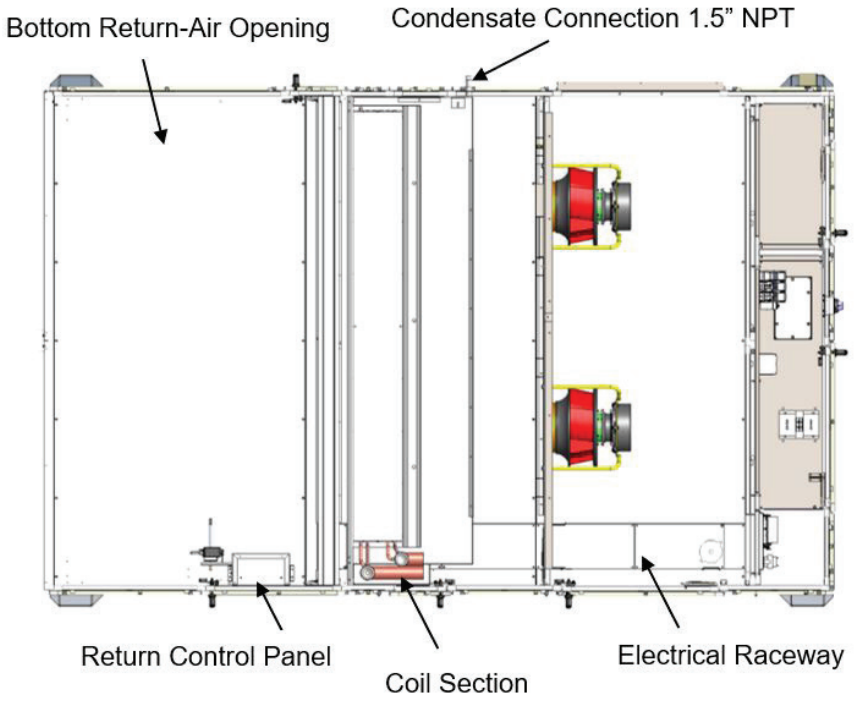


Figure 4: Typical Component Locations—DAHA Unit

Top View



Side View

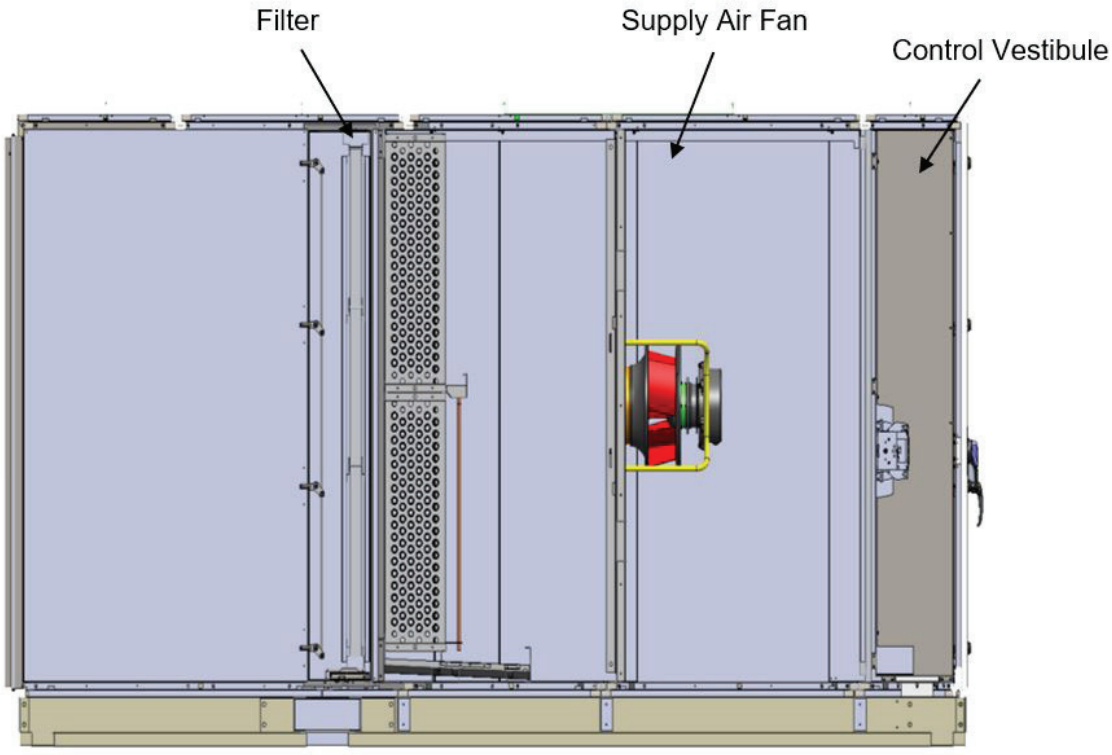
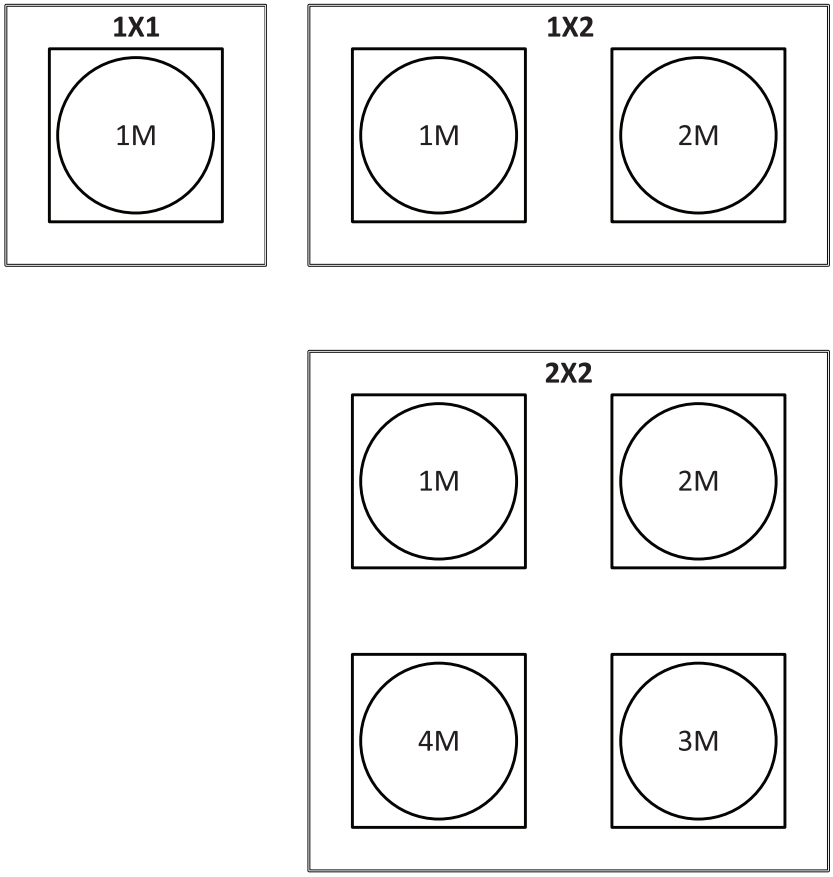


Figure 5: ECM Fan Array Identification



Notes:
1. “M” identifies Master fan -MT4 will communicate via modbus to these fans

Refrigeration Piping

This section presents the unit refrigeration piping diagrams for the various available configurations.

Figure 6: Schematic, Standard Circuit

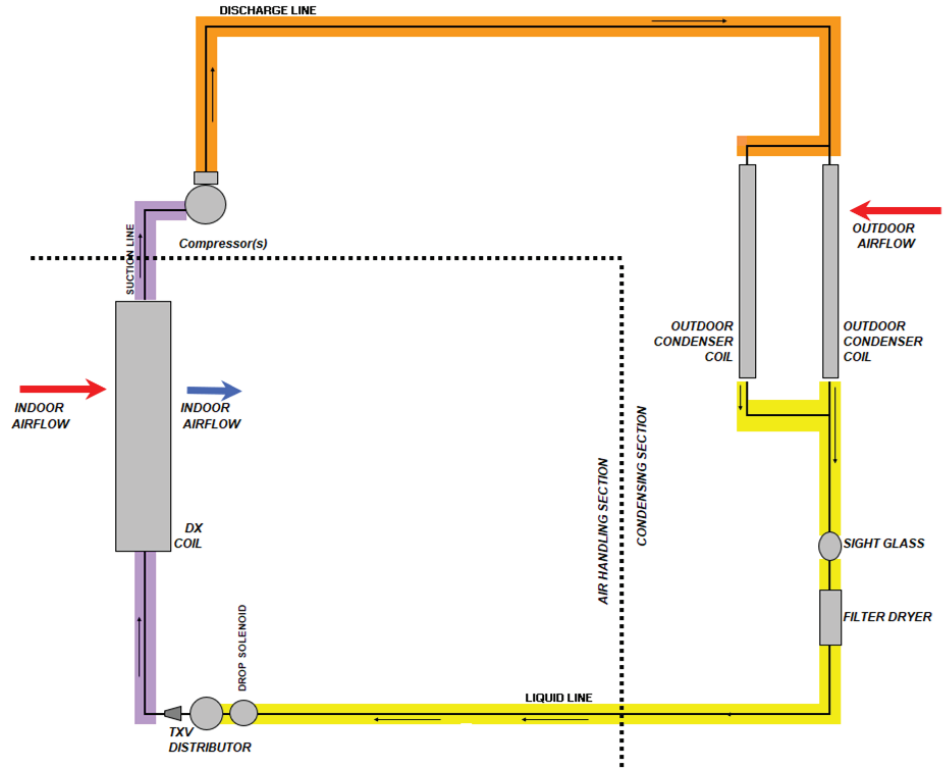


Figure 7: Schematic, Hot Gas Bypass Circuit

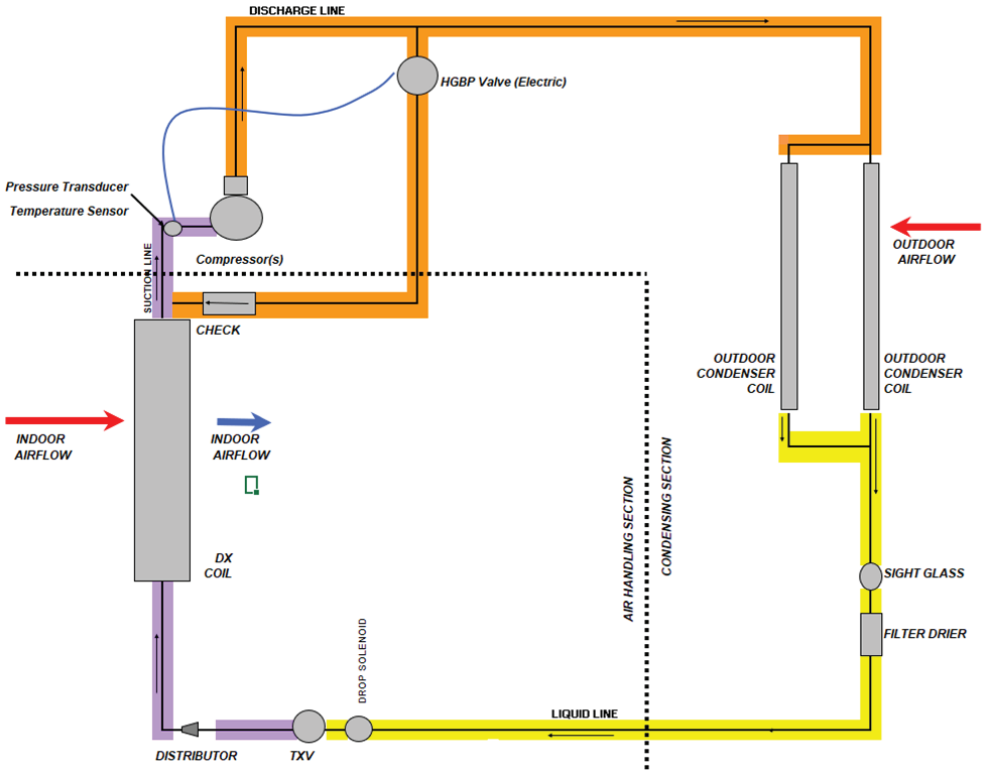


Figure 8: Schematic, MHGRH Circuit

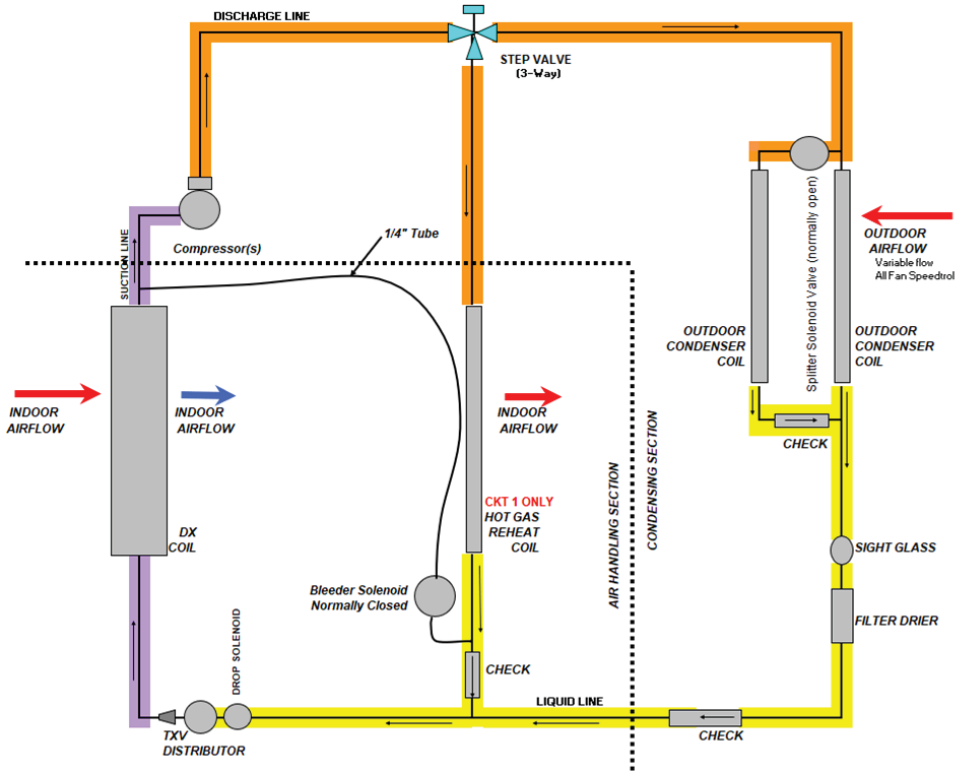


Figure 9: Schematic, LSCRH Circuit 1

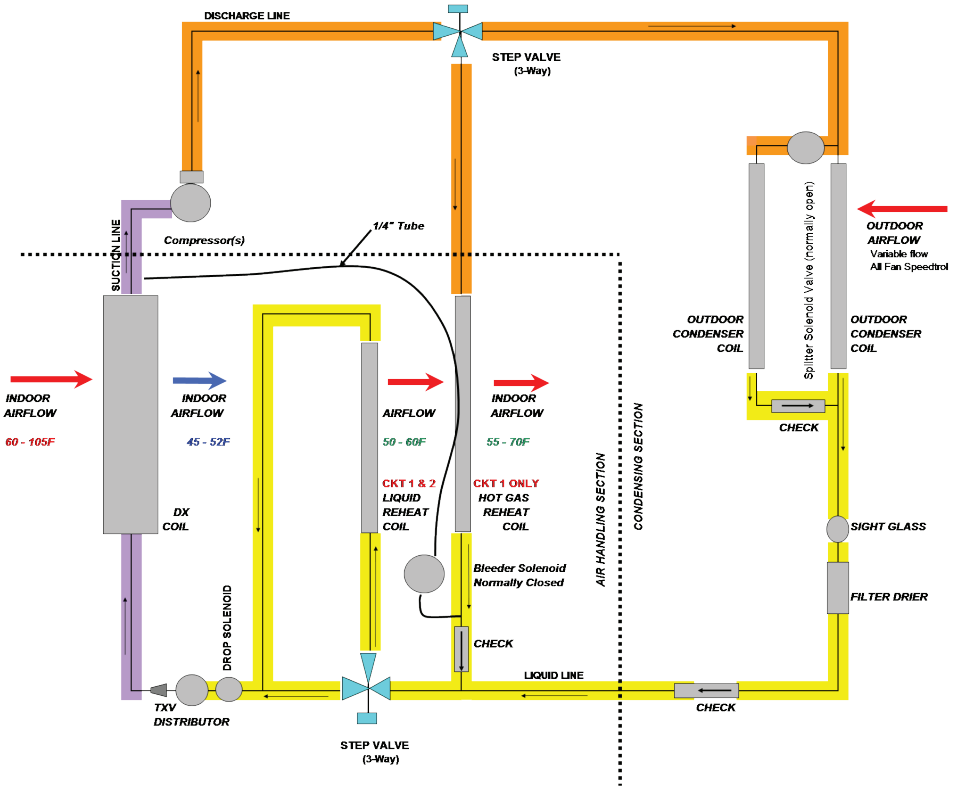


Figure 10: Schematic, LSCRH Circuit 2

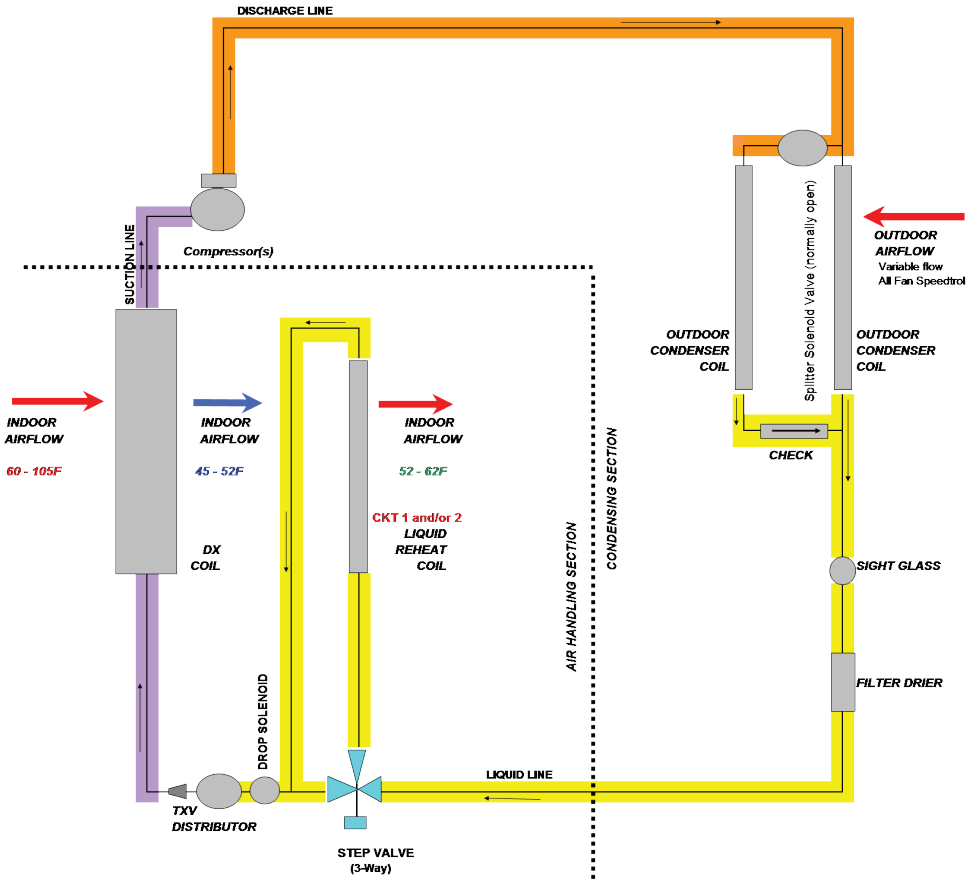
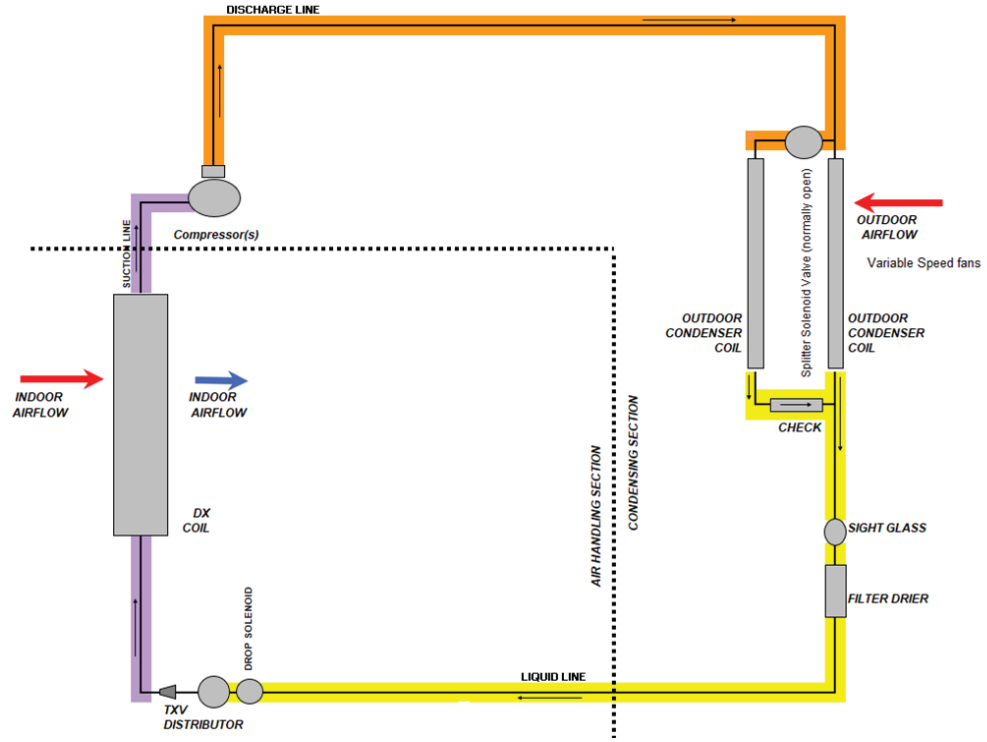


Figure 11: Low Ambient Circuit Schematic



Low Ambient Configurations
Speedtrol (Variable speed fans) down to 25F
Speedtrol (Variable speed fans) + Splitter solenoid down to -10F

Figure 12: Variable Speed Cooling Circuit Diagram (Unit Models 020 thru 040)

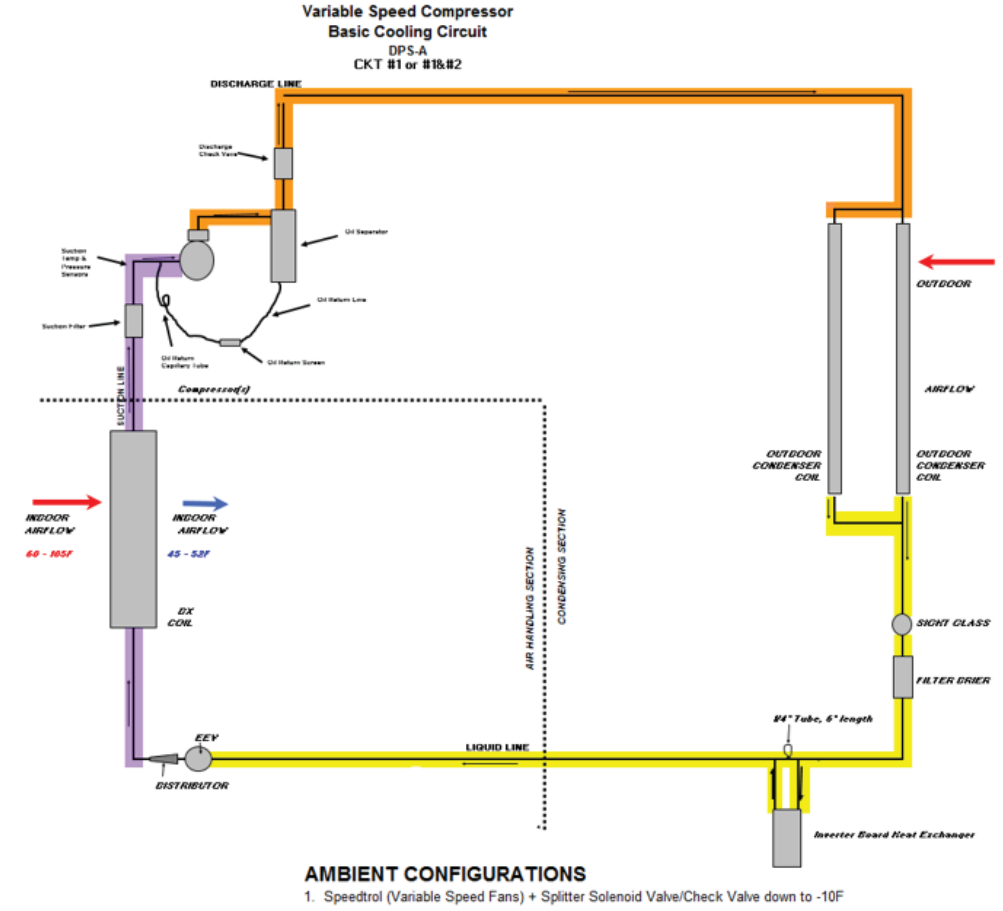
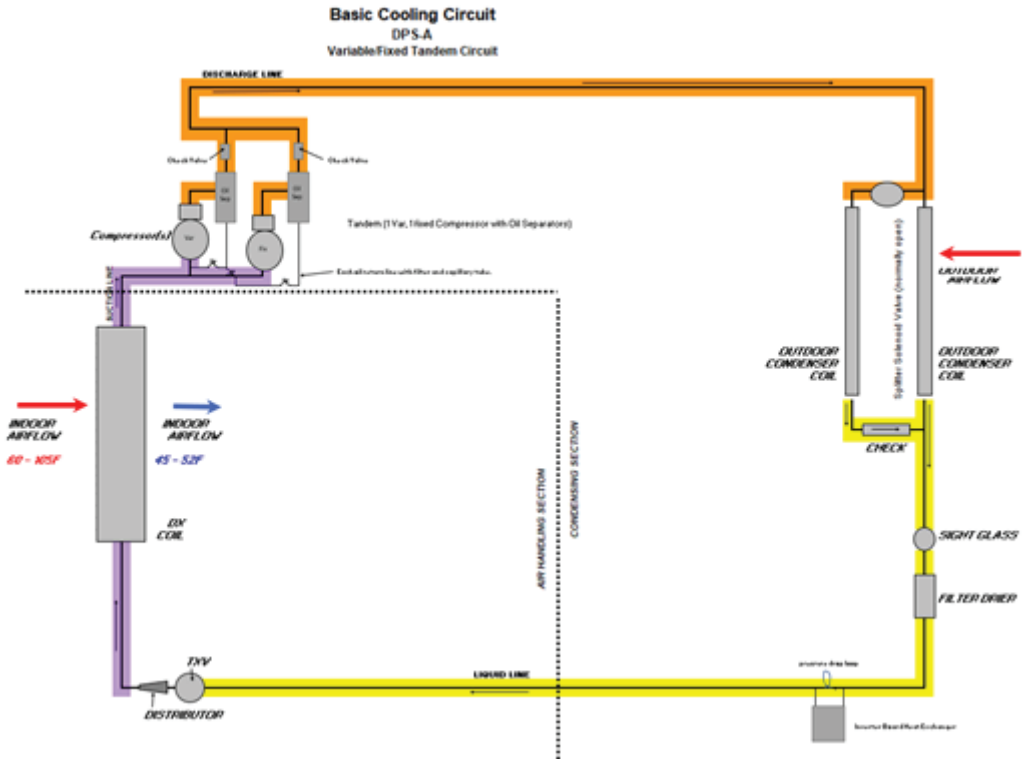
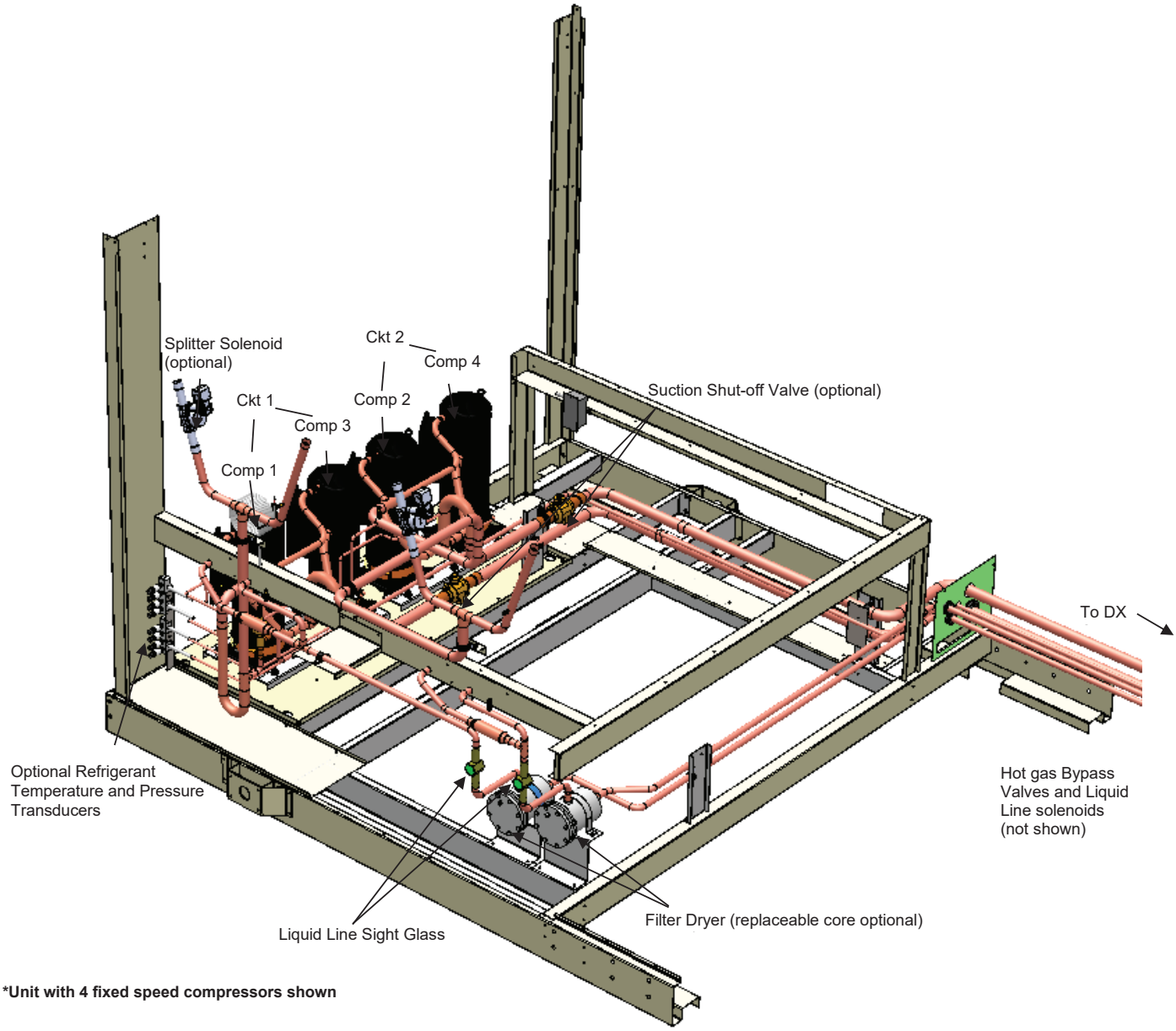


Figure 13: Variable / Fixed Tandem Cooling Circuit Diagram (Unit Models 050 thru 052)



Condenser and Compressor Piping

Figure 14: Condenser Piping, Compressors, 1 to 2 Compressors per Circuit are Provided*



***Unit with 4 fixed speed compressors shown**

Figure 15: Condenser and Compressor Piping (Inverter Compressors)

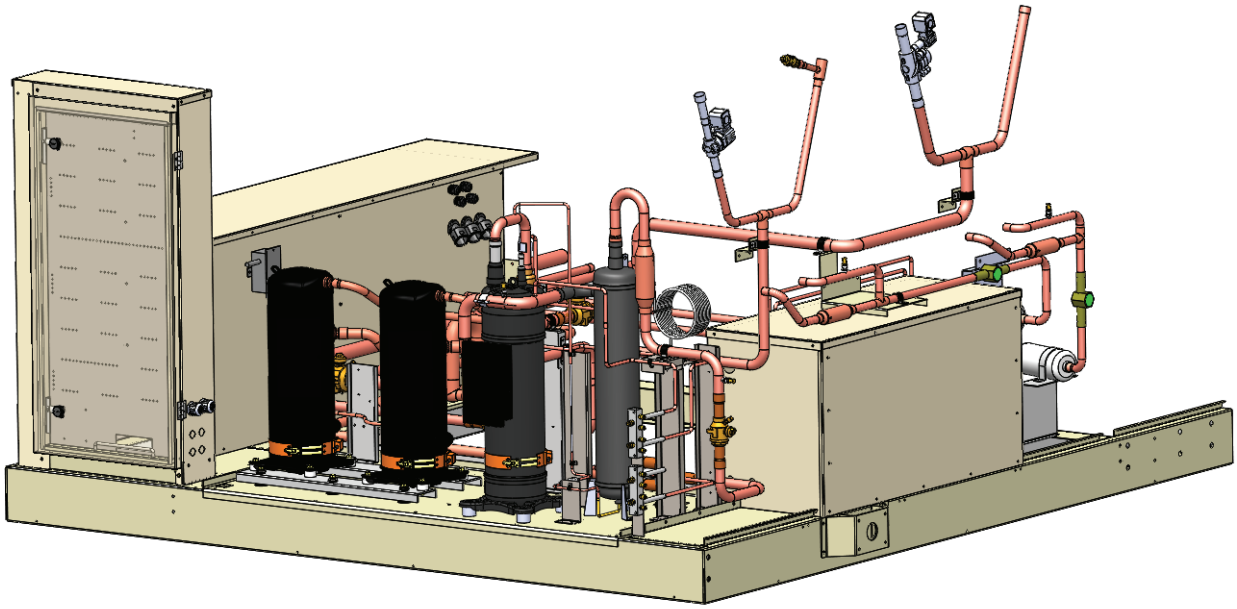


Figure 16: Inverter Compressor Piping Detail (Inverter / Fixed Tandem option)

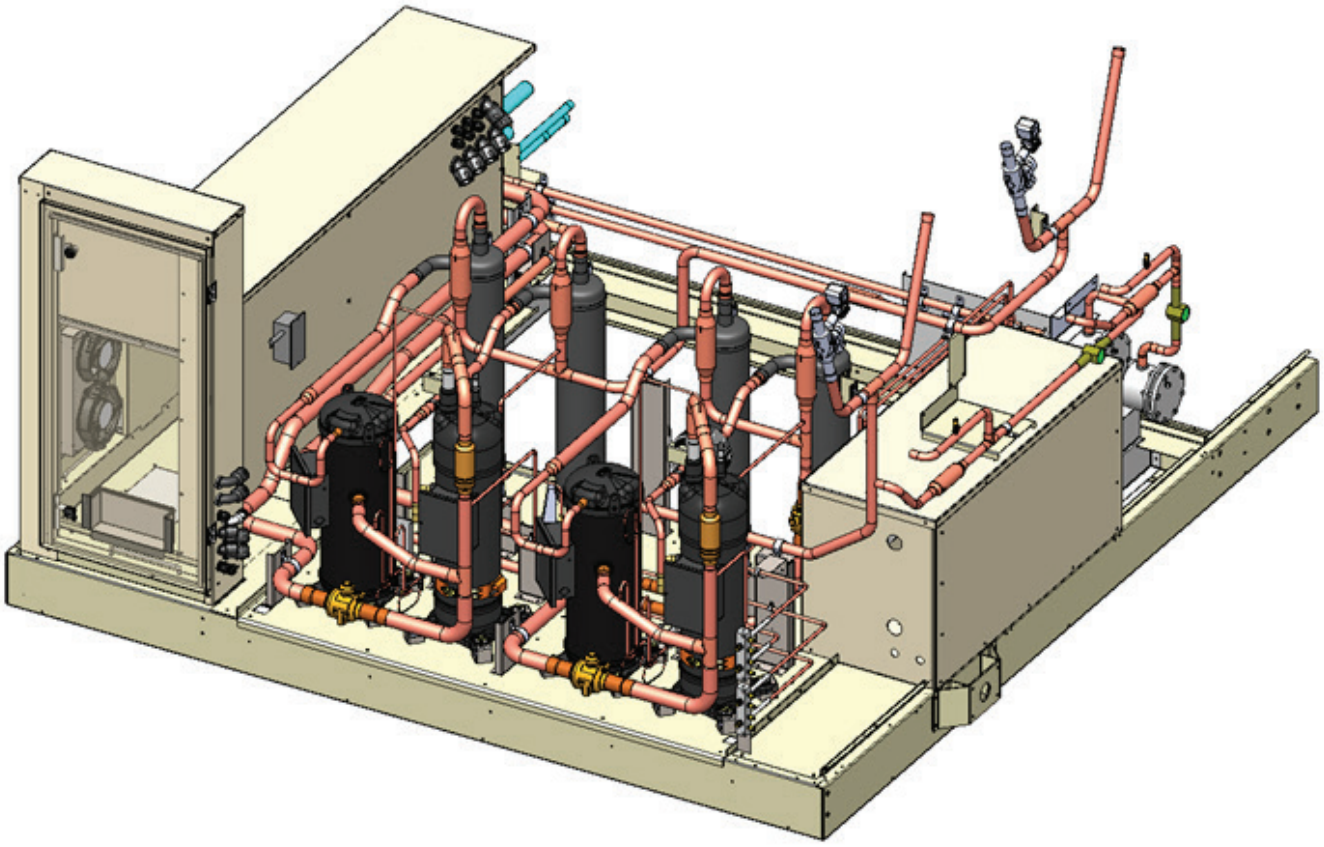
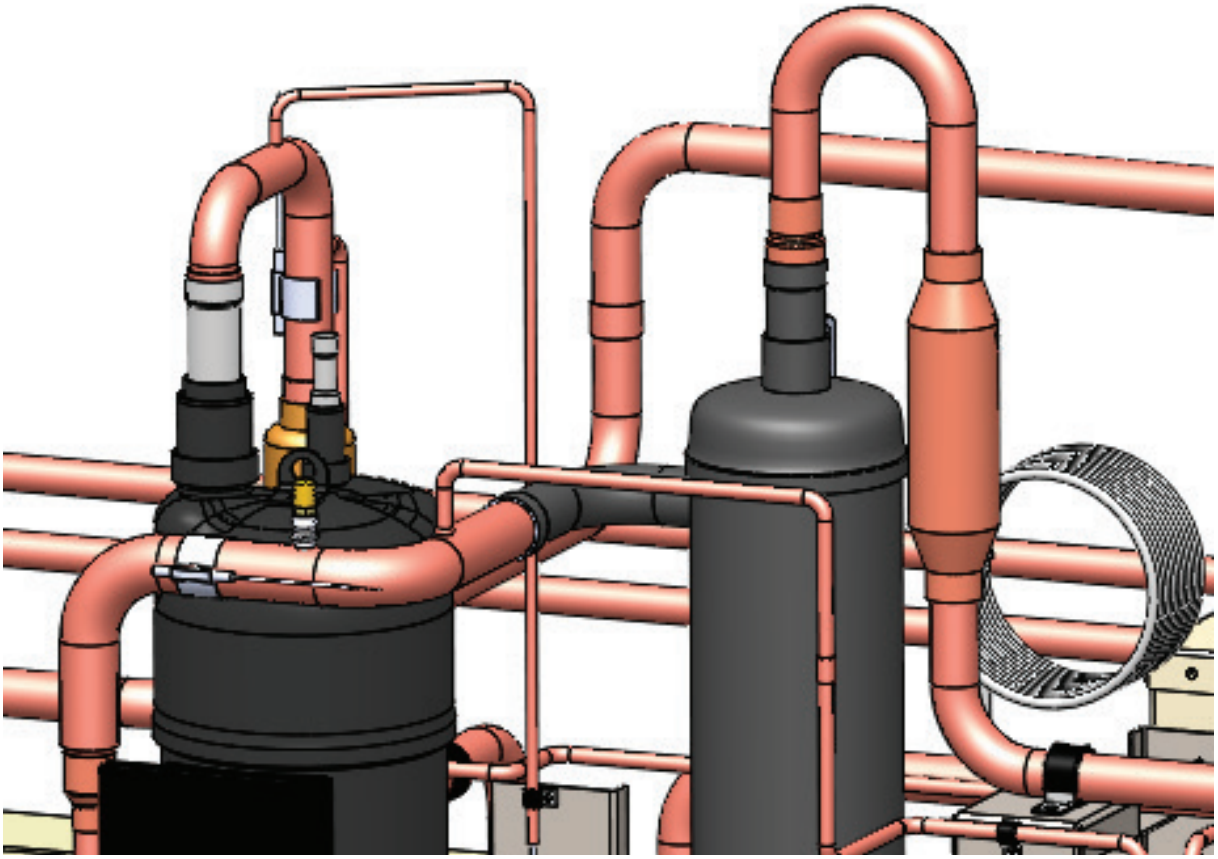


Figure 17: Inverter Compressor Piping Detail



VFD Inverter Box

Figure 18: VFD Inverter Box Refrigerant Connections, Front

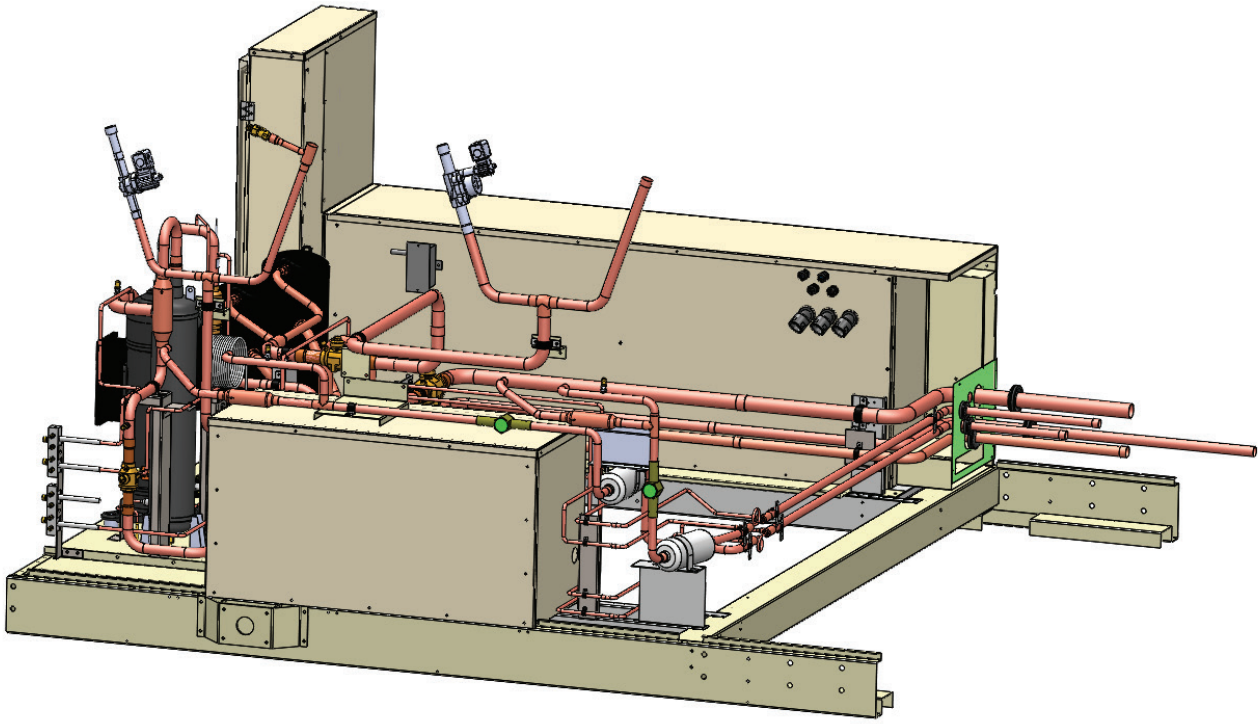


Figure 19: VFD Inverter Box Refrigerant Connections, Back

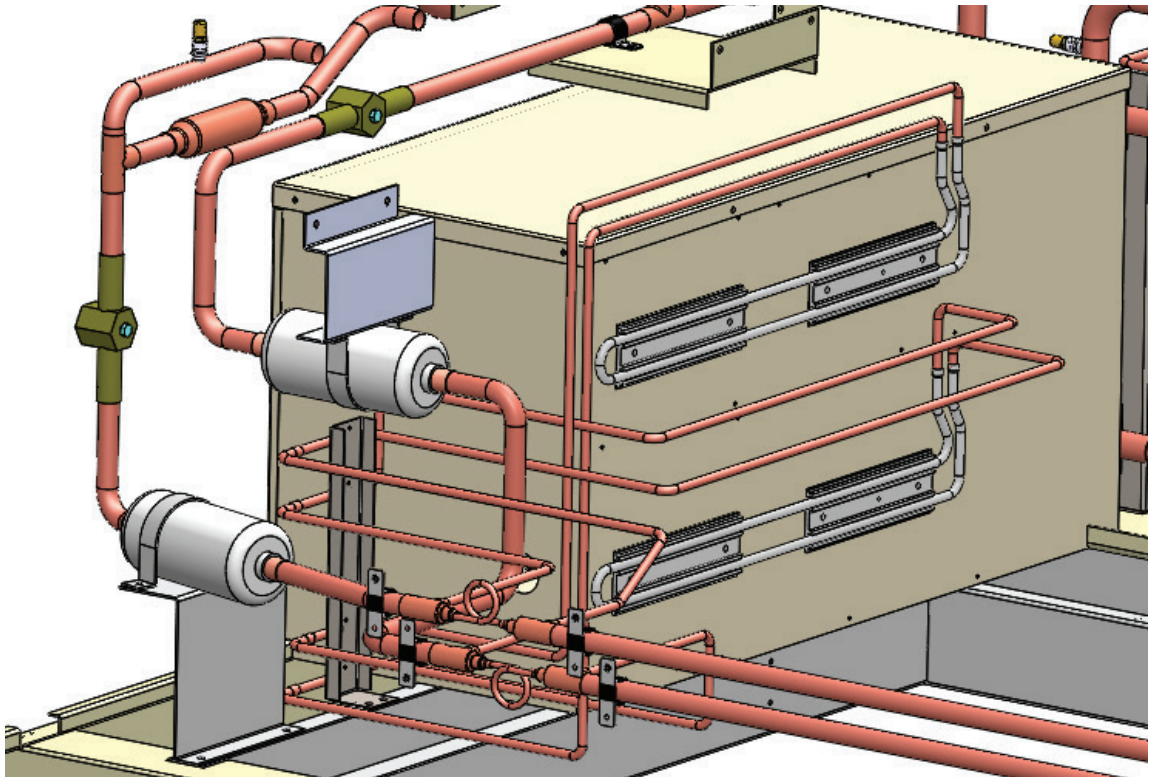
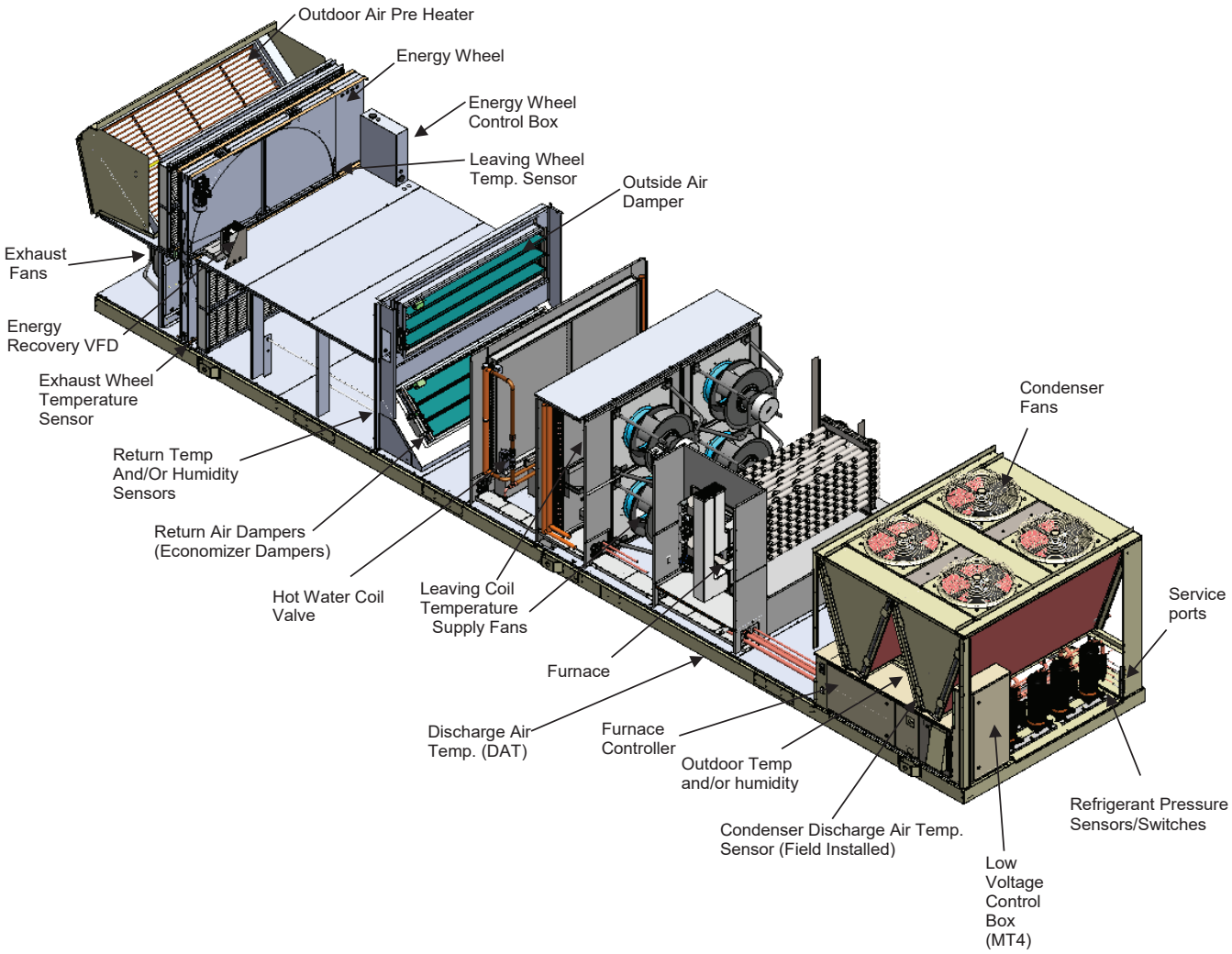


Figure 20: VFD Inverter Box Components

Controlled Component Locations

Figure 21 shows basic control and component locations within a typical unit

Figure 21: Control and Component Locations



Control Panel

The unit control panels and their locations are shown in the following figures. These figures show a typical unit. Specific unit configurations may differ.

Figure 22: Control Panel Locations (DPSA Unit)

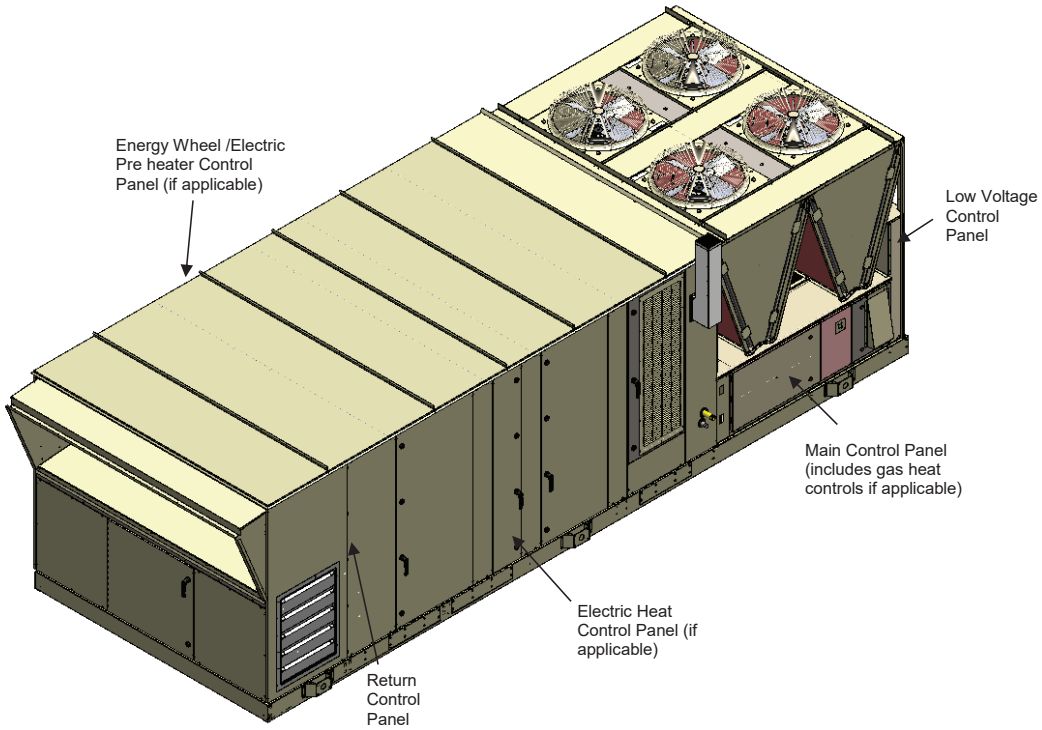


Figure 23: Control Panel Locations (DAHA Unit)

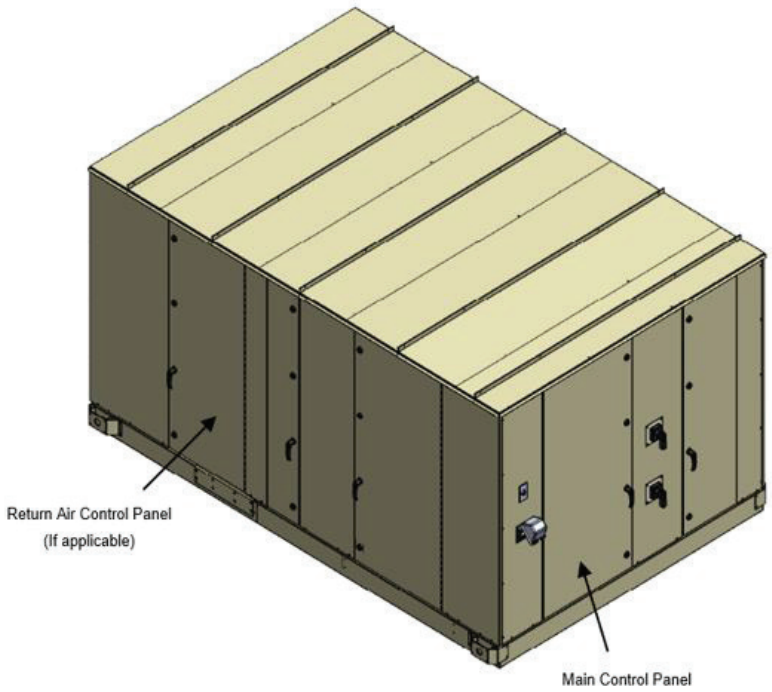


Figure 24: Typical Main Control Panel (DPSA Unit)

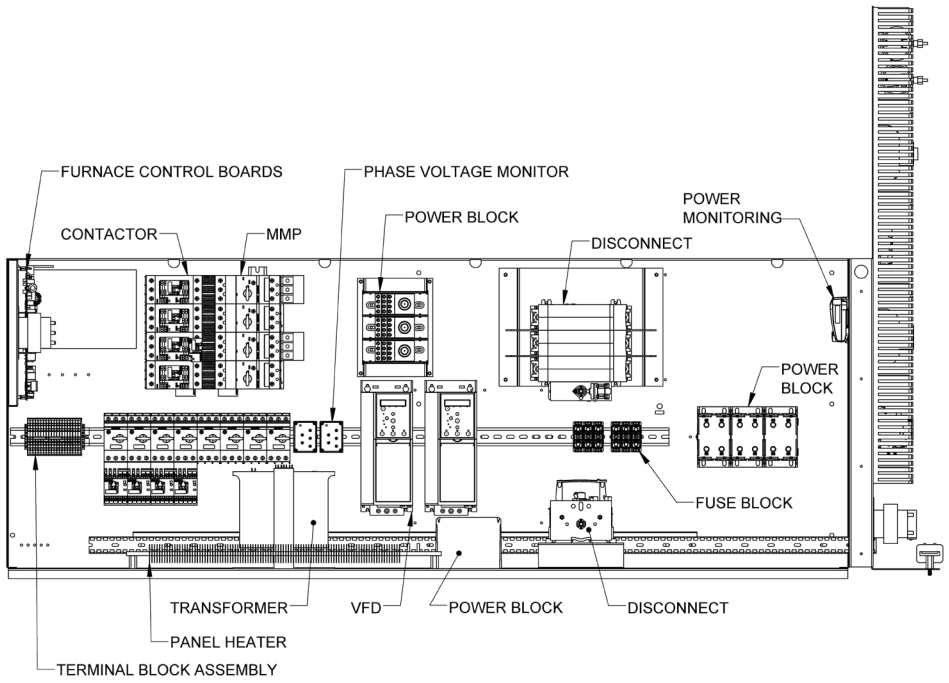


Figure 25: Typical Main Control Panel (DAHA Unit)

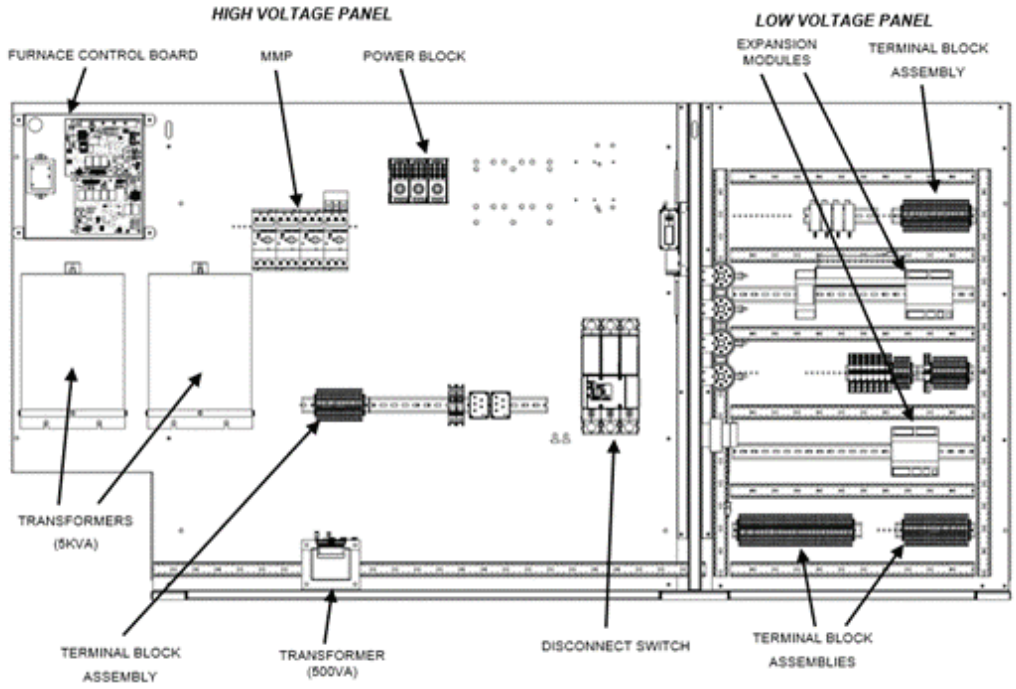


Figure 26: Typical Low Voltage Control Panel (DPSA Unit)

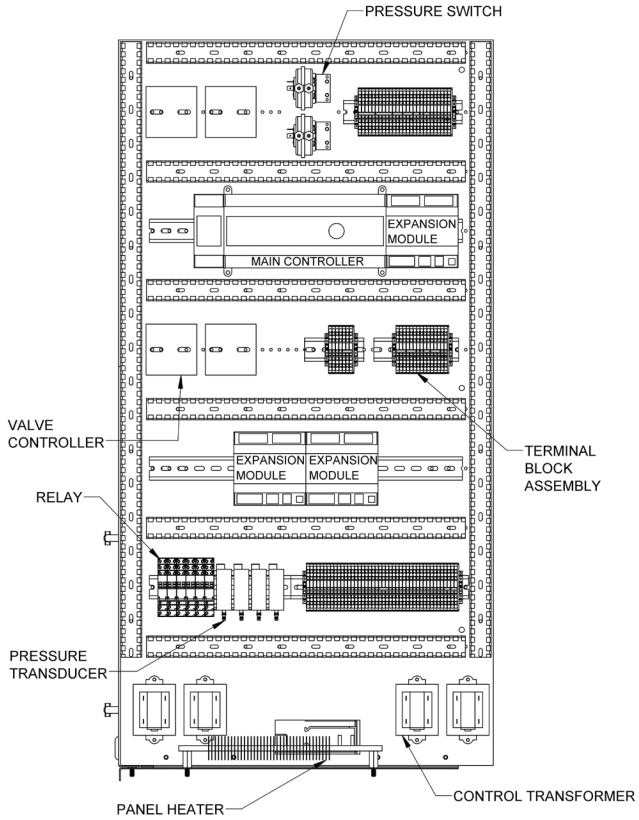


Figure 27: Typical Low Voltage Control Panel (DAHA Unit)

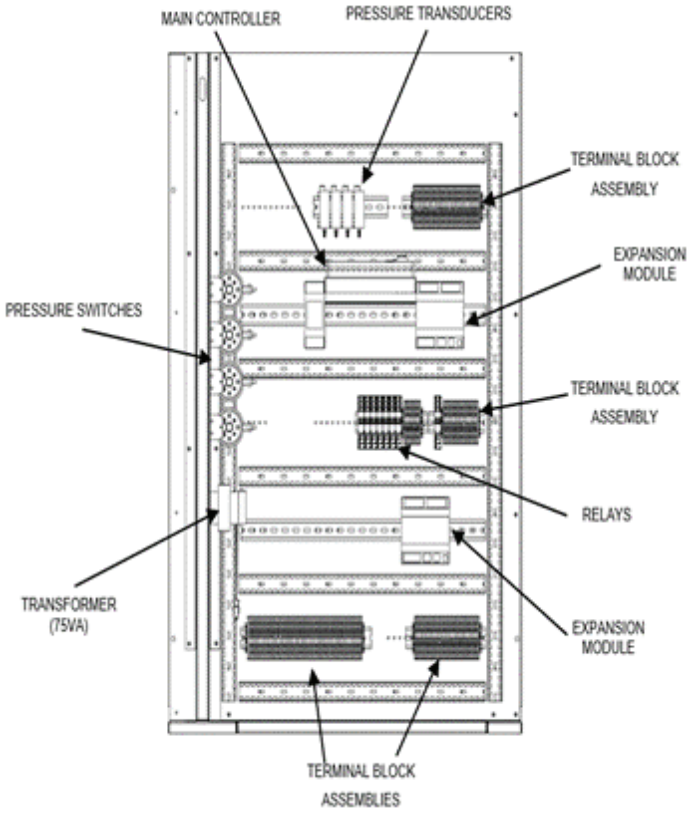


Figure 28: Typical Return Control Panel (with Prop Exhaust Fan VFD)

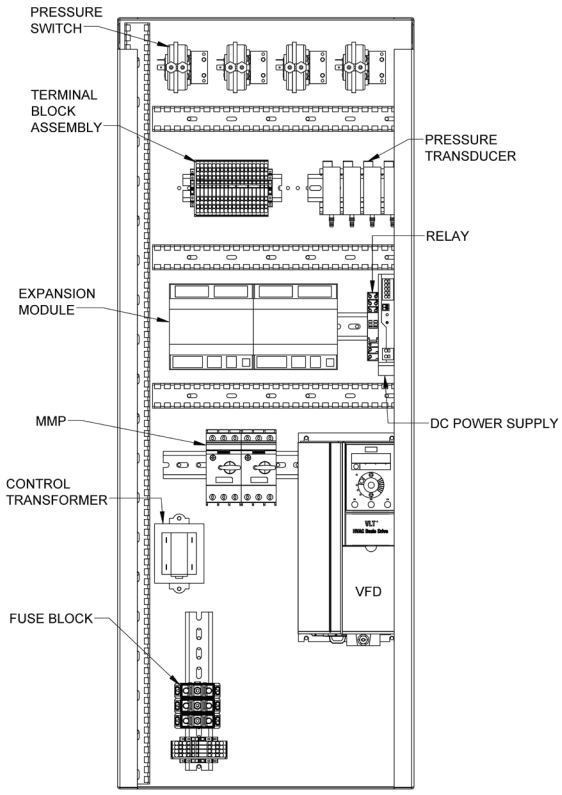


Figure 29: Typical Return Control Panel (without Prop Exhaust Fan VFD)

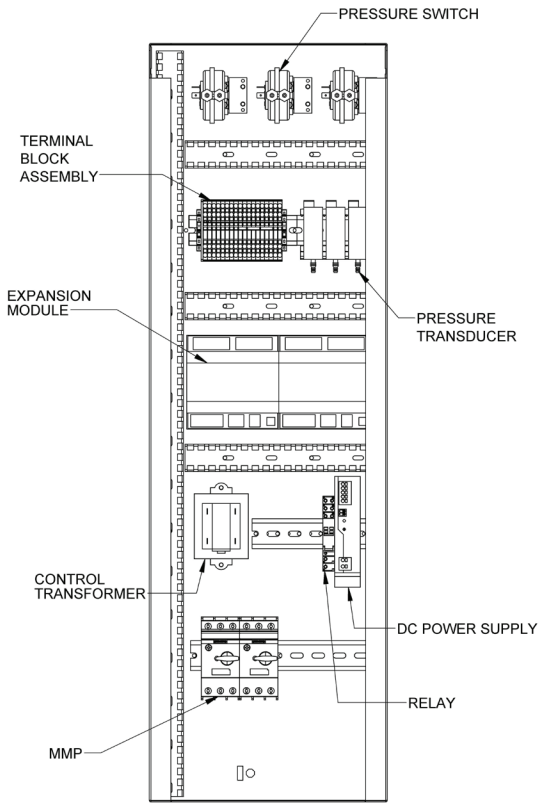
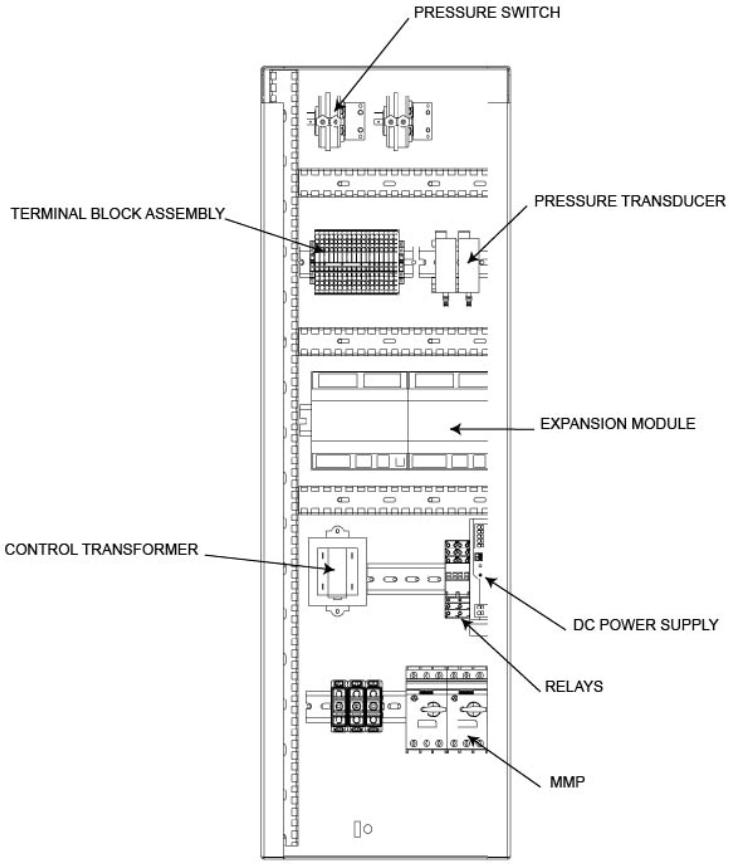


Figure 30: Typical Return Control Panel (with Energy Recovery Wheel)



Installation

⚠ WARNING

Sharp edges on sheet metal and fasteners can cause personal injury. Please wear appropriate personal protective equipment (PPE) such as gloves, protective clothing, footwear, eye protection, etc. 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.

⚠ NOTICE

Unit/equipment must be installed in a location that is not accessible to the general public.

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.

Remove all shipping protection prior to installation

Unit Clearances

Service Clearance

Allow service clearance as indicated in Figure 31 or Figure 32. Figure 31 denotes clearances required if large component replacement would be completed through side access doors. Figure 32 denotes clearances needed if large component replacement would be completed from the top of the unit (with a crane) after removing roof panels. Also, Daikin Applied recommends providing a walkway around the entire unit for access to controls and serviceable components.

Figure 31: DPSA Unit Service Clearances (Scenario A)

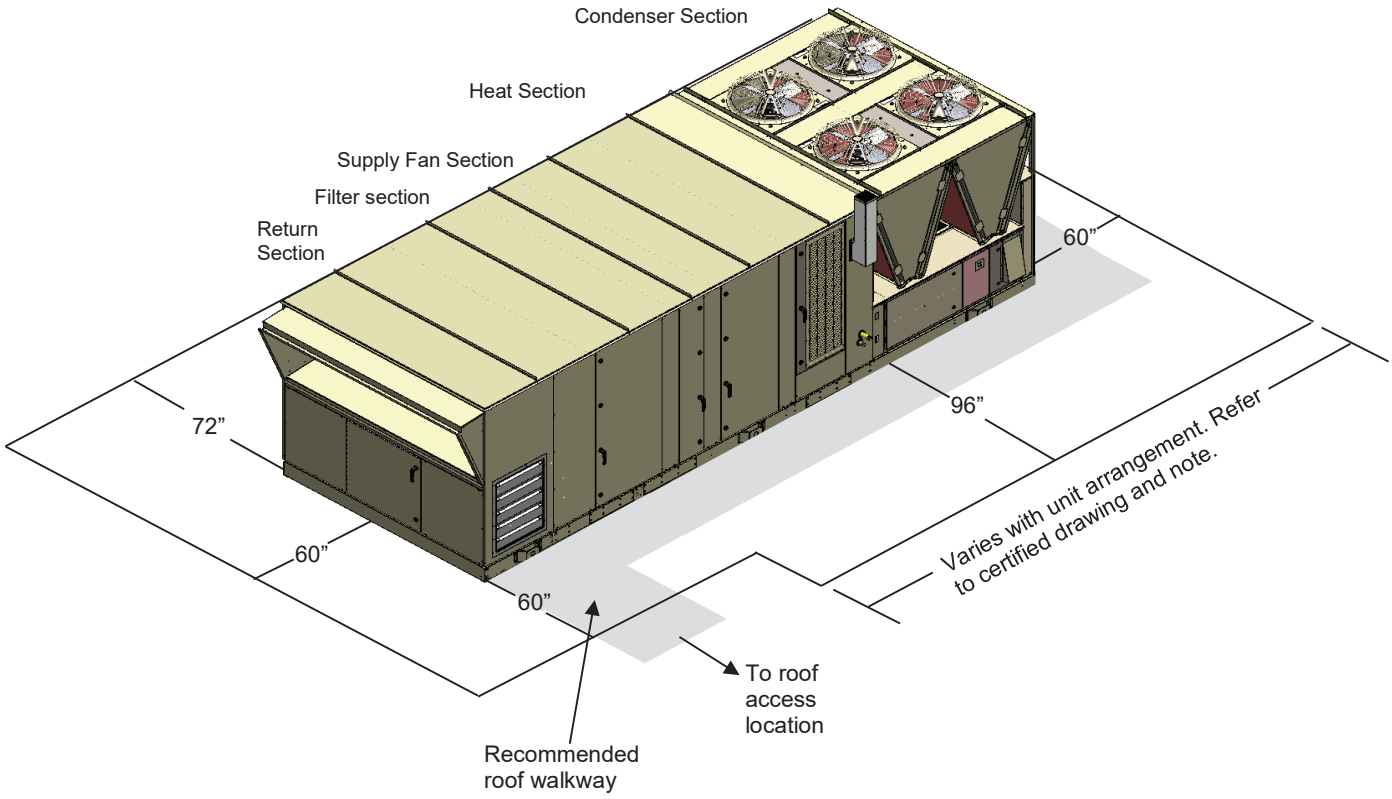


Figure 32: DPSA Unit Service Clearances (Scenario B)

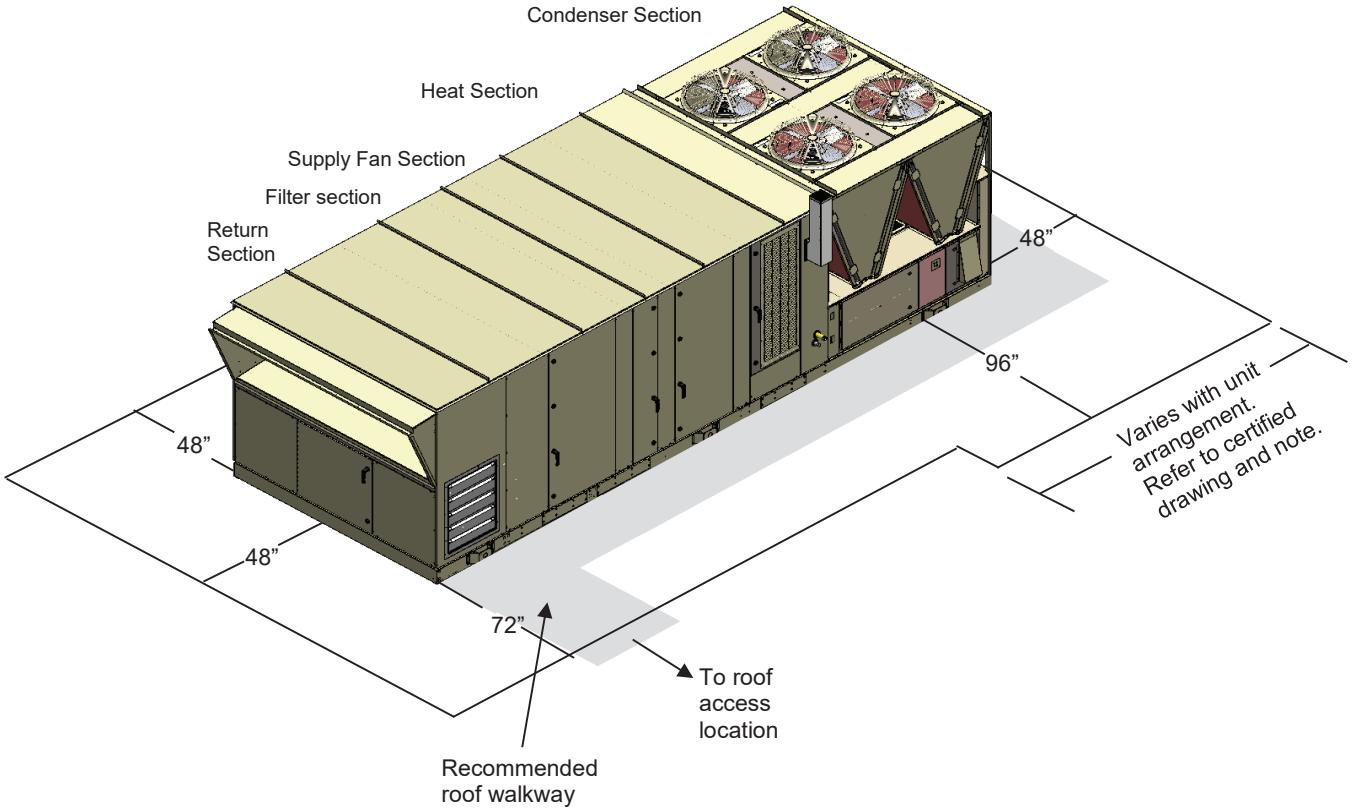


Figure 33: DAHA Unit Service Clearances (Scenario A)

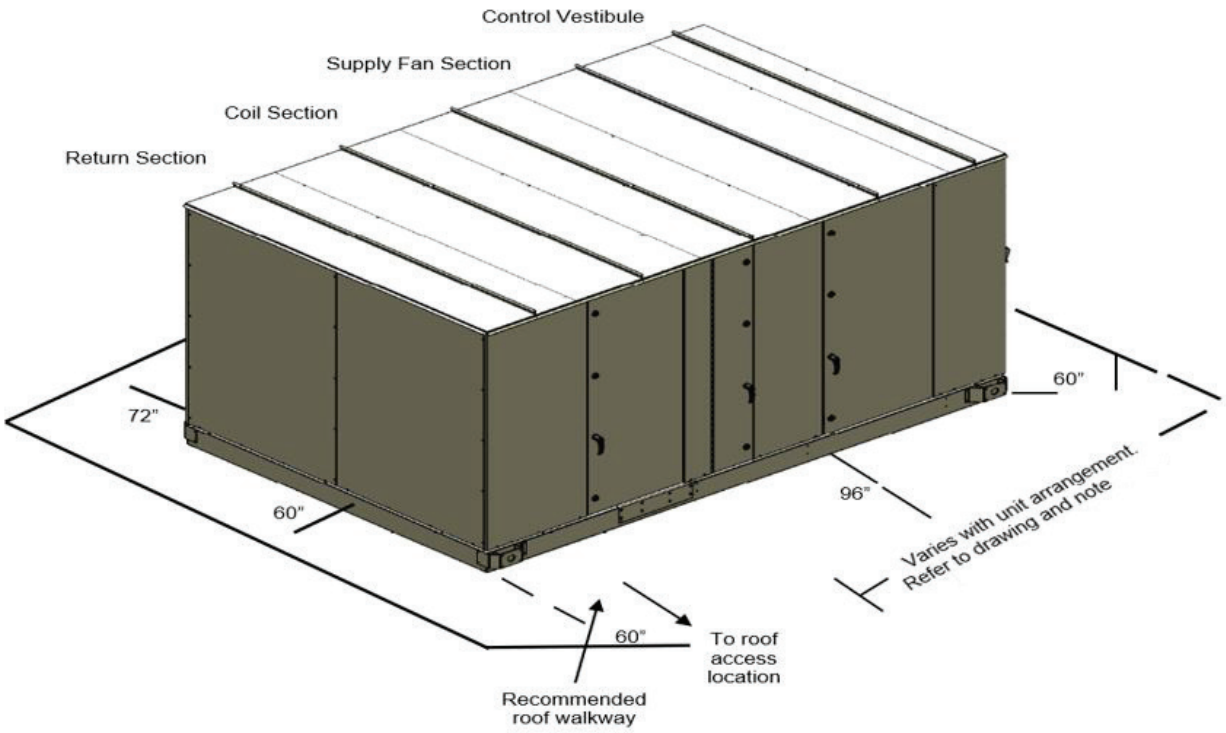
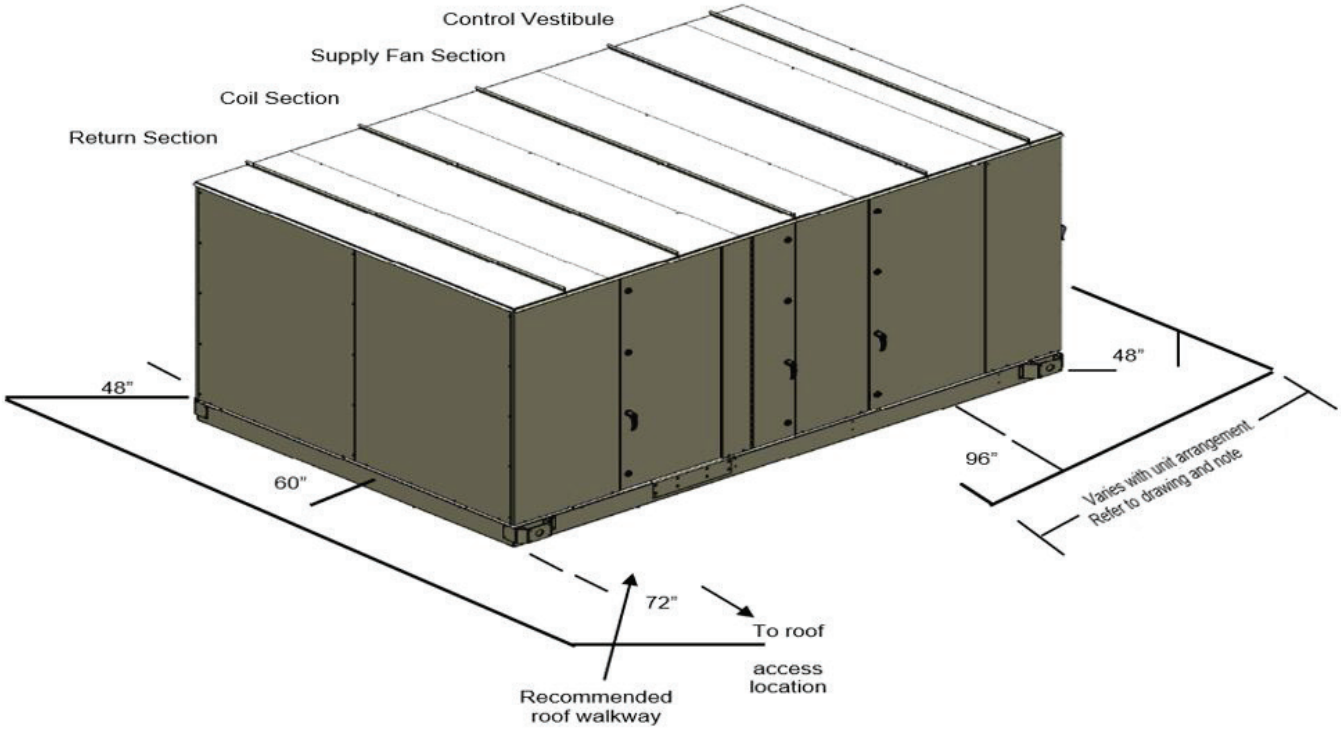


Figure 34: DAHA Unit Service Clearances (Scenario B)



Ventilation Clearance

Figure 35 denotes minimum ventilation clearance recommendations. The system designer must consider each application and provide adequate ventilation. If this is not done, the unit will 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 31.
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).

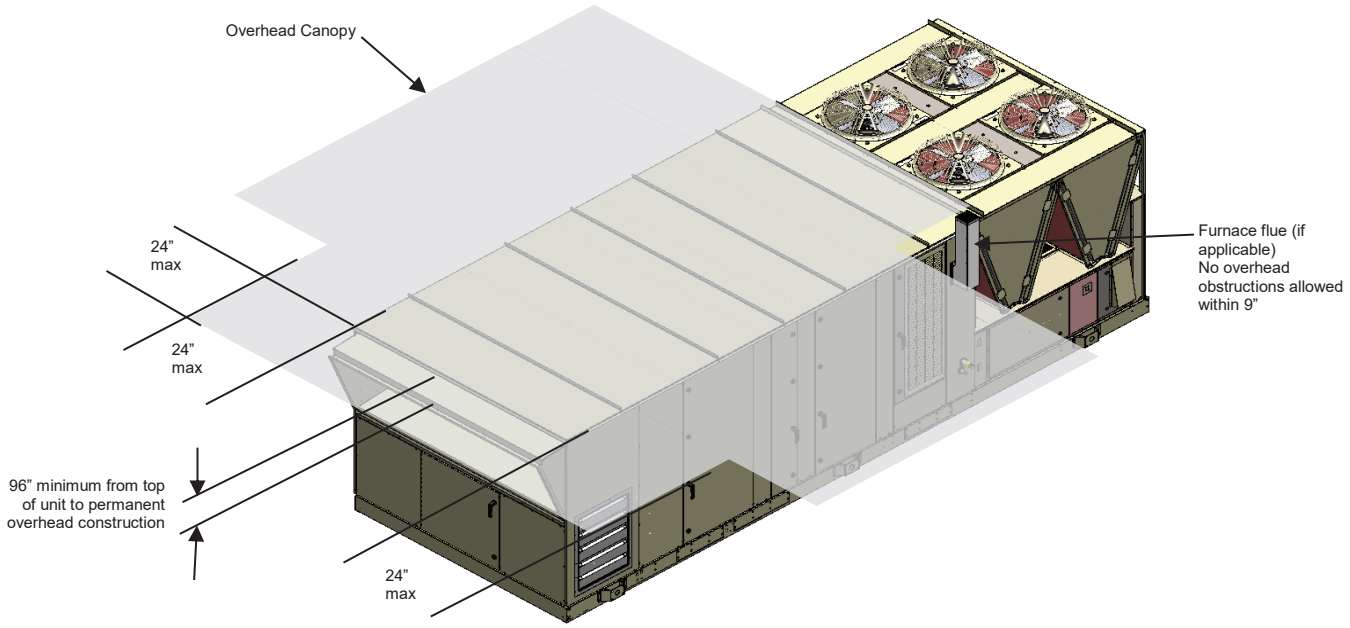
Do not locate outside air intakes near exhaust vents or other sources of contaminated air.

If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified (Figure 31). This is particularly important to prevent blowing snow from entering outside air intake and to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

Overhead Clearance

1. If clearances from Scenario B (Figure 32) are applied to the installation, then unit must not have any overhead obstructions over any part of the unit.
2. If unit is surrounded by solid walls or screens, then unit must not have any overhead obstructions over any part of the unit.
3. The area above the condenser must be unobstructed in all installations to allow vertical air discharge.
4. The following restrictions must be observed for overhead obstructions above the air handler section where ground clearances noted in scenario A are applied (i.e. if Figure 31 is applicable, then Figure 35 shows allowable overhead canopy) :
    a. There must be no overhead obstructions above the furnace flue, or within 9" (229 mm) of the flue box.
    b. Overhead obstructions must be no less than 96" (2438 mm) above the top of the unit.
    c. There must be no overhead obstructions in the areas above the outside air intake and exhaust dampers that are farther than 24" (610 mm) from the side of the unit.

Figure 35: Overhead Clearance



Roof Curb Assembly and Installation

⚠ WARNING

Mold can cause serious illness and property damage. 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. It is critical that the condensate drain side of the unit be no higher than the opposite side.

Integral supply and return air duct flanges are provided with the DPSA standard roof curb, allowing connection of duct work to the curb before the unit is set.

The gasketed top surface of the duct flanges seals against the unit when it is set on the curb.

These flanges must not support the total weight of the ductwork. It is critical that the condensate drain side of the unit be no higher than the opposite side. Assembly of a typical DPSA roof curb is shown in Figure 36 and Figure 37. Assembly of a typical DPSA plenum curb is shown in Figure 37 and can also have a full perimeter variation (Figure 38)

Curb Assembly instructions

1. Set curbing parts in accordance with assembly instructions provided with unit. Take careful note of the location of return and supply air openings or plenum divider (Figure 36, Figure 37, Figure 38, or Figure 39.
2. If applicable, set other curbing parts in place making sure that the orientation complies with the assembly instructions. Check alignment of all mating bolt holes. See Figure 40, Detail A.
3. Bolt curbing parts together using fasteners provided. Tighten all bolts finger tight.
4. Square entire curbing assembly and securely tighten all bolts.
5. Position curb assembly over roof openings. Curb must be level from side to side and over its length. Check that top surface of the curb is flat with no bowing or sagging.
6. Weld curbing in place. Caulk all seams watertight. Remove backing from 0.25" (6 mm) thick × 1.50" (38 mm) wide gasketing and apply to surfaces shown by crosshatching.
7. Flash curbing into roof as shown in Figure 40, Detail A.
8. Be sure that electrical connection are coordinated (see Figure 47)

Figure 36: Standard Roof Curb Assembly

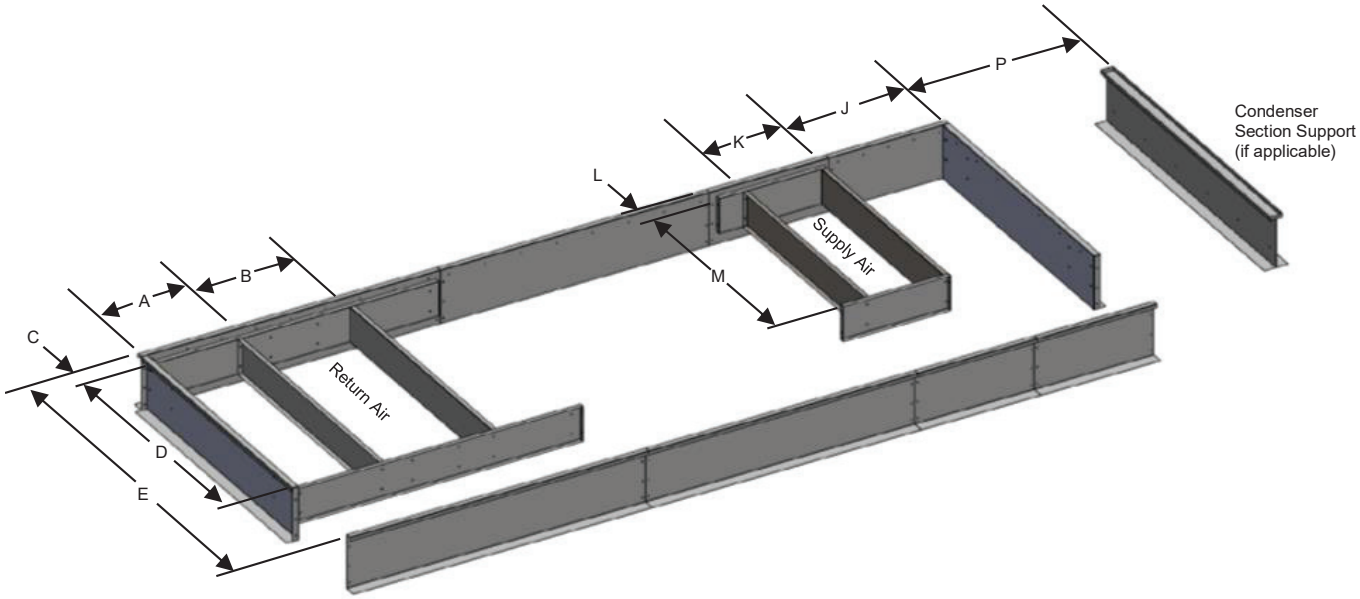


Figure 37: Scenario B – Standard Plenum Curb Assembly

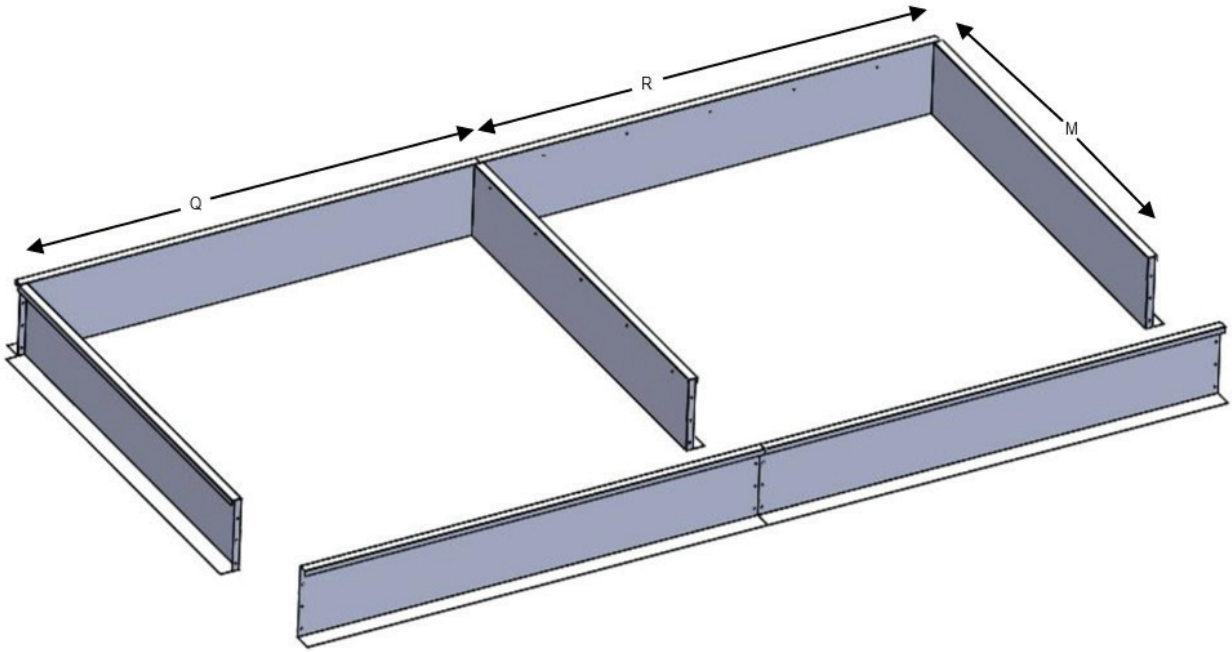


Figure 38: Full Perimeter Plenum Curb Assembly

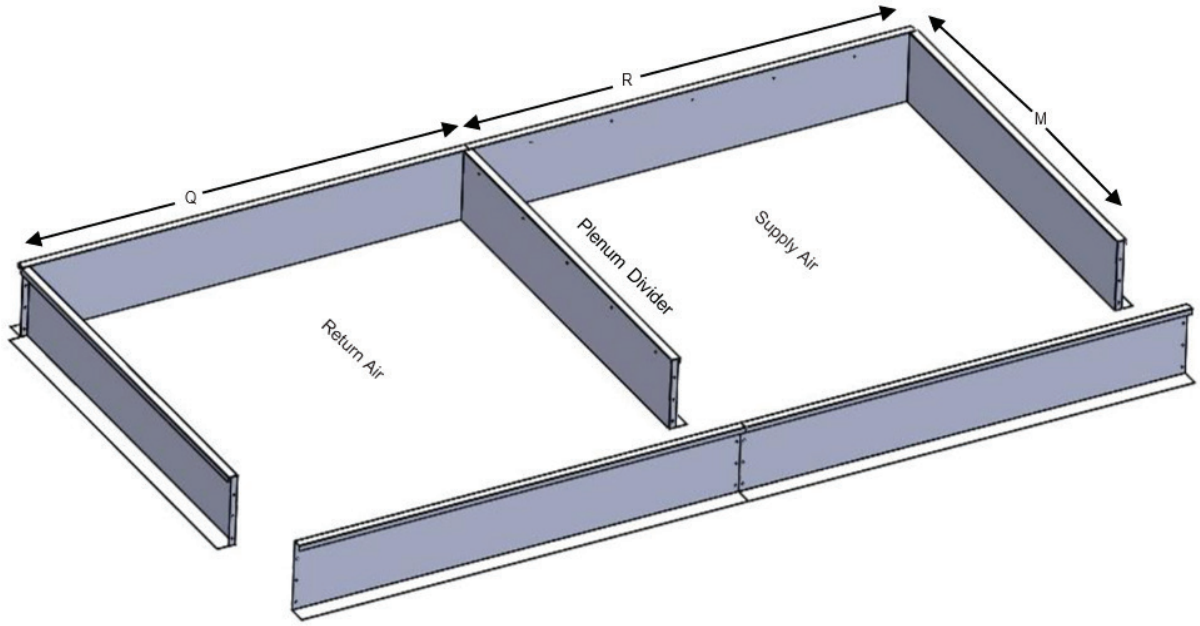


Figure 39: Scenario B – Full Perimeter Roof Curb Assembly

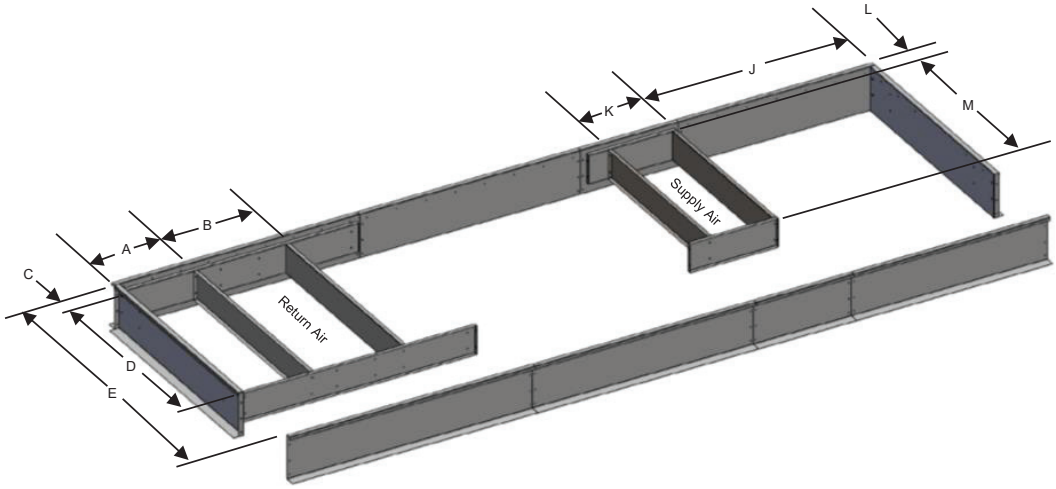
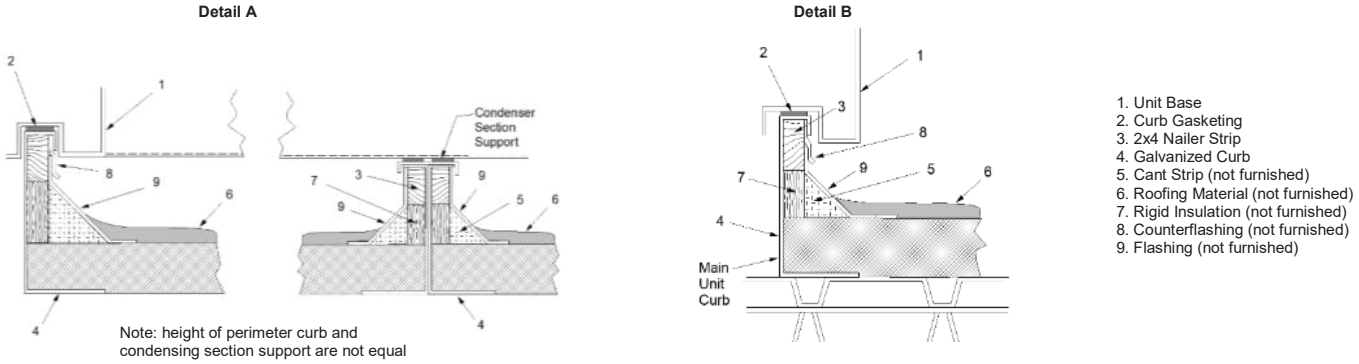


Figure 40: Detail Views



Full Condenser Floor Sealing for Electrical Penetrations

⚠ NOTICE

All penetrations made through full condenser floor models must be sealed to prevent leaks. Failure to do so could result in property damage.

Notes before following this procedure:

- Read through these instructions completely before starting work on the unit.
- These instructions assume the unit has been properly placed and there is adequate room to work below the unit for building conduit connections.
- These instructions assume component selections are appropriately sized. The installer must determine the correct hole sizes based on component selections.
- These instructions apply to Rebel Applied Full Floor Condenser type units.
- Each penetration will require a:
  - conduit hub
  - pipe nipple
  - lock nut
  - conduit flange plate
  - conduit coupler

1. Access, Measure, and Drill

- Open the door to the main control panel section and locate the main panel plate. Remove the fasteners holding the main panel plate in position to access the condenser floor (DPSA unit shown).

Figure 41: Main Control Panel Section

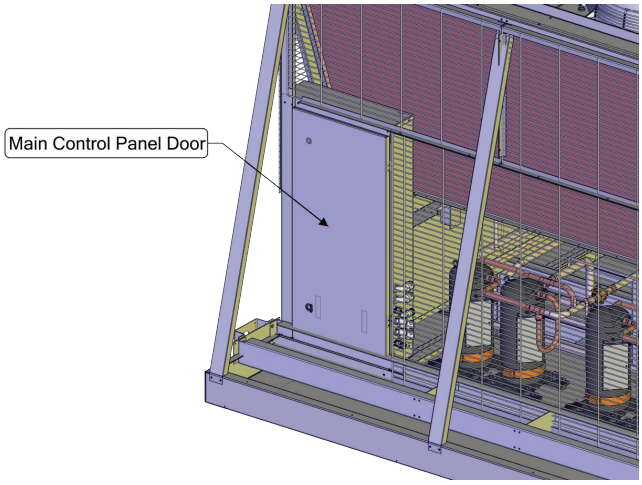


Figure 42: Main Panel Plate Location

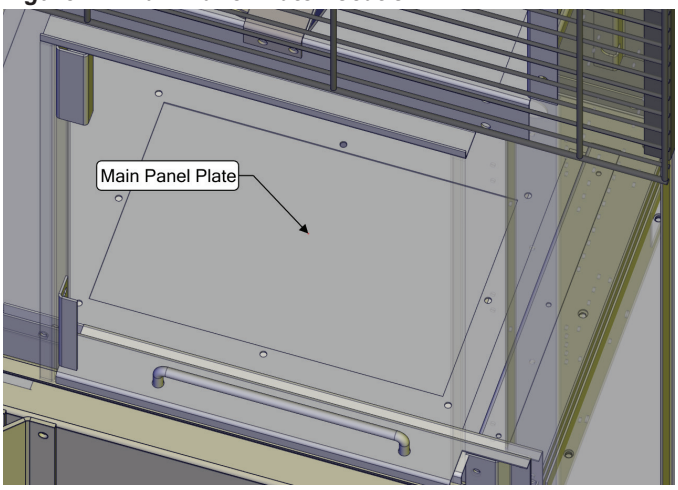
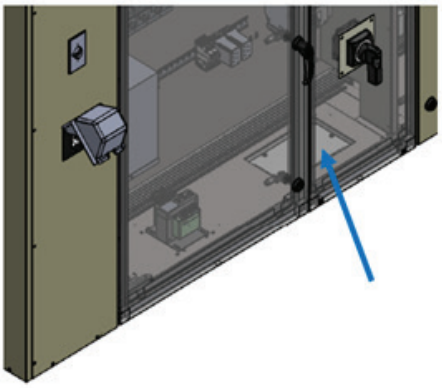


Figure 43: DAHA Unit Panel Plate Example

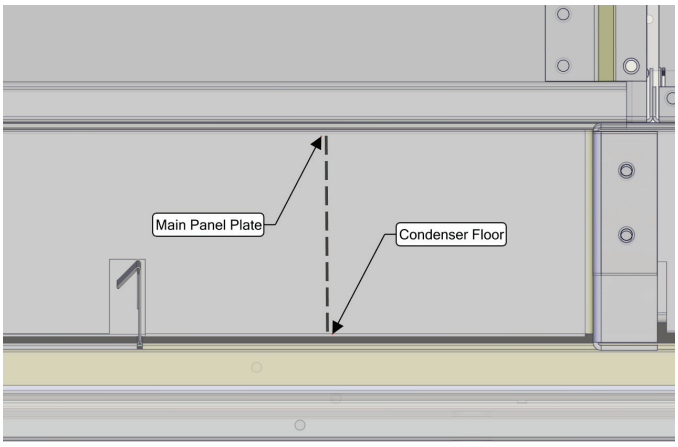


- Identify the correct placement for drilling holes in the main panel plate and the condenser floor.
- Drill concentric holes in the main panel plate and the condenser floor based on the selected conduit hub and pipe nipple.

2. Measure

- Place the main panel plate back into position.
- Measure the distance from the bottom of the plate to the top of the condenser floor (retain this measurement for building the assembly).
- Remove the main panel plate.

Figure 44: Condenser Floor and Main Panel Plate Measurement

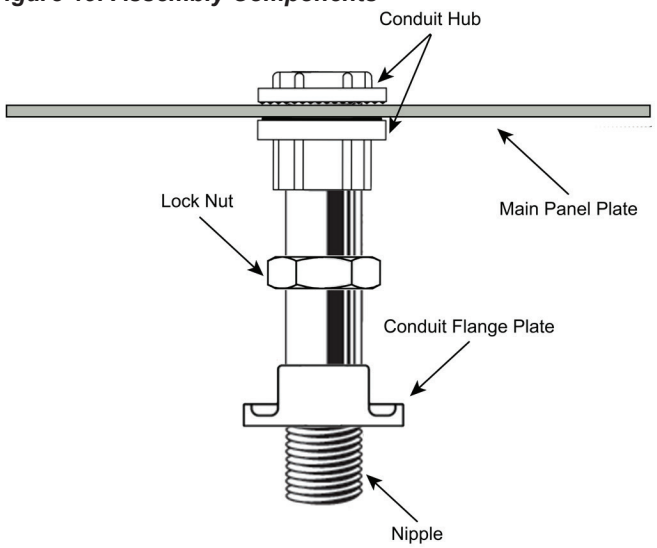


3. Build Assembly

- Spin the conduit flange plate onto the pipe nipple.
- Spin the lock nut onto the pipe nipple.
- Firmly attach the pipe nipple to the bottom of the conduit hub.
- Remove the top of the conduit hub to place the main panel plate into position.
- Hand tighten the top of the conduit hub to the main panel plate.
- Spin the conduit flange so that the bottom of the flange is the correct distance from the main panel plate using the measurement made previously in Step 3 (bottom of plate to top of condenser floor).

NOTE: It is better for conduit flange placement to be too long than too short.

Figure 45: Assembly Components



4. Check Placement

- Place assembly into position.
- Ensure that the conduit flange plate is resting on the condenser floor
- It is acceptable for the main panel plate to be slightly above the bottom of the main control panel (no more than 1/8”). This will help when creating the final seal.

5. Prepare for Sealing

- Remove the assembly from position and remove the top of the conduit hub to remove the main panel plate.
- Place the assembly back into position.

6. Measure and Drill

- Mark and drill the top of the condenser floor to create fastener holes for the conduit flange plate.

NOTE: There are two layers of 0.022” steel sheet metal that need to be drilled through. Between this steel is the foam insulation of the panels.

7. Seal with Caulk

- Remove the assembly from position.
- Make a complete bead of caulk around the pipe nipple hole and each of the fastener holes drilled for the conduit flange plate. This will help prevent water from entering the building.

8. Align Assembly

- Lower assembly into the condenser floor penetration, aligning the holes in the conduit flange plate to the holes in the condenser floor.

9. Secure Conduit Flange Plate

⚠ NOTICE

Do not use excessive force when tightening fasteners, or they will strip.

- Secure the conduit flange plate to the condenser floor using the correct size fasteners. Screw BY HAND to snug the fasteners to the condenser floor.

10. Fix Position

- Spin the lock nut downward and snug to the conduit flange plate.

NOTE: Do not allow the nipple to spin while doing this.

11. Repeat Steps 1-10 for Additional Penetrations

- As necessary, repeat Steps 1-10 for additional electrical penetrations.
- Steps 12-14 define the final instructions necessary to complete each electrical penetration.

12. Position and Secure Main Panel Plate

- Position the main panel plate over the conduit hub.
- Tighten the top of the conduit hub to the assembly.

13. Finalize Assembly

- Attach a conduit coupler to the bottom of the pipe nipple for each assembly.
- The unit is now ready to have the building conduit attached and wire pulled.

Curb Assemblies

Table 2: Rebel Applied Roof Curb Assembly Dimensions, Return Configurations

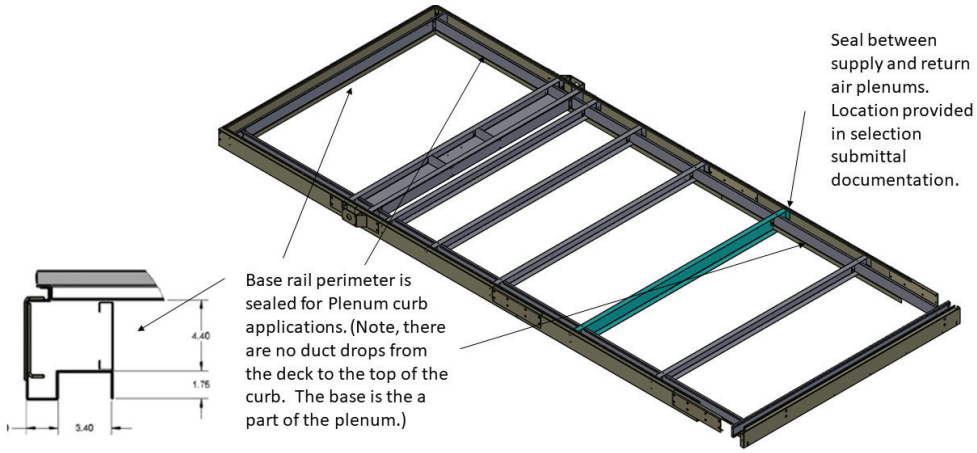
Unit Size	Return Configuration	A	B	C	D	E
		in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
B-Cabinet	None	3.70 (94)	36 (914)	3.70 (94)	82.0 (2083)	55.75 (1416)
	Standard Return Fans					
	Offset Return Fans					
	Prop Exhaust					
	High Static Exhaust	30.86 (784)				
	Energy Wheel	56.86 (1444)				

Table 3: Rebel Applied Roof Curb Assembly Dimensions, Supply Configurations

Unit size	Supply Configuration	J	K	L	M	P
		in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
B-Cabinet	Standard Discharge	4.03 (102)	24.75 (629)	1.5 (38)	70.5 (1791)	55.75 (1416)
	Short Out of Air Stream	52.03 (1322)				
	Long Out of Air Stream	76.03 (1931)				
B-Cabinet with A-Condenser	Standard Discharge	4.03 (102)	24.75 (629)	1.5 (38)	70.5 (1791)	34.75 (883)
	Short Out of Air Stream	52.03 (1322)				
	Long Out of Air Stream	76.03 (1931)				

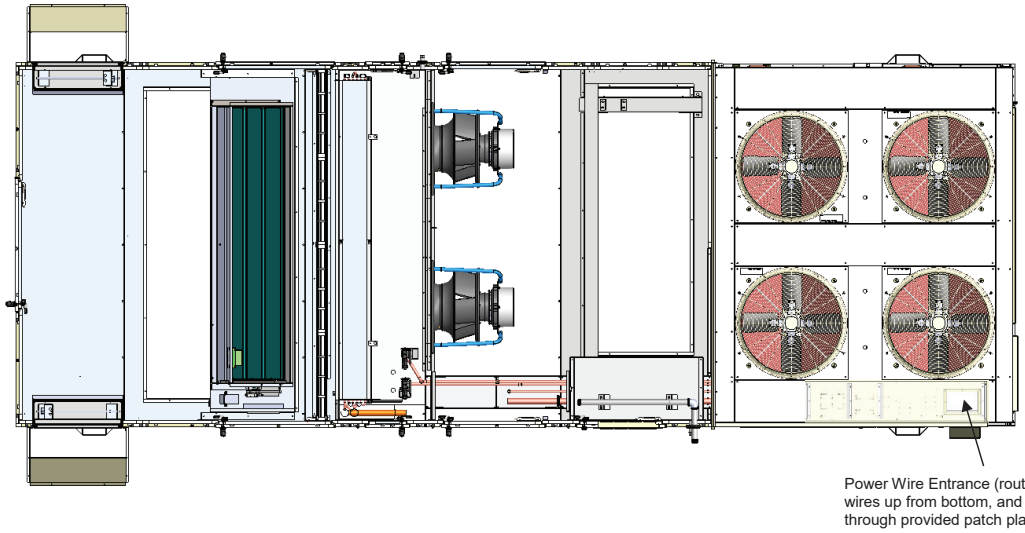
NOTE: Dimensions Q and R can be found in unit documentation (submittal)

Figure 46: Plenum Curb Intermediate Steel Structure Member and Cross Section Details



The base of the unit has structural steel between the floor of the unit and the curb sealing surface. For plenum curb applications, extra insulation and sealing is required. Consult the factory before application with a plenum curb.

Figure 47: Typical Power Wire Entrance, Curb View, See Project Certified Drawings



Post and Rail Mounting

⚠ WARNING

The unit must be level side to side and over the entire length. Equipment damage can result if the unit is not level.

⚠ WARNING

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

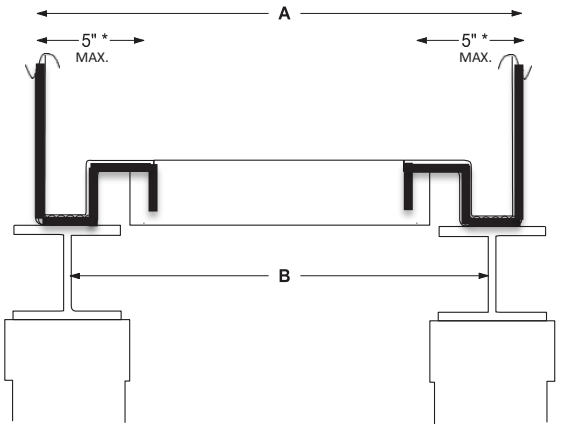
⚠ CAUTION

Use all lifting points. Improper lifting can cause injury, death, and property damage.

When mounting by post and rail, run the structural support the full length of the unit. Locate the structural member at the base of the unit as shown in Figure 48, assuring the structural steel is well supported by the structural member.

If resilient material is placed between the unit and the rail, insert a heavy steel plate between the unit and the resilient material to distribute the load. Seal cabinet penetrations (electrical, piping, etc.) properly to protect against moisture and weather.

Figure 48: Post and Rail Mounting



* Beam can extend beneath unit no more than 5" to allow adequate space for duct connections and electrical entry.

Table 4: Post and Rail Mounting Dimensions

B Cabinet	
A	96.5"
B	94.5"

Rigging and Handling

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. When shipping the unit, the addition of shims is recommended to maintain a level surface. Doors should remain closed during lifts and while being transported. Open doors only if on flat and level surface. 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.

Re-caulk field assembled options such as external piping or vestibules per the installation instructions provided with the option.

Lifting Brackets

Lifting brackets with 2" (51 mm) diameter holes are provided on the sides of the unit.

Cabling

- Dedicated Cables from each lift connection point to spreader bars are required.
- No Looped Cables, Pulleys or other "self-leveling" rigging methods are allowed as the can cause excessive flexing and damage
- Mid-Point connection points receive two cables each or a dedicated spreader bar can be used instead.
- The Cable length from the spreader bar to the hook should always be longer than the distance between the outer lifting points

Spreader Bars

- Perpendicular spreader bars should be used for each lift point.
- A Longitudinal spreader bar along the length of the unit is required for units with more than 6 lift points to limit the cable angles and the resulting stress on the unit structure.
- Spreader bars should be at least 96" to 100" (2438 to 2540 mm) wide to prevent damage to the unit cabinet.

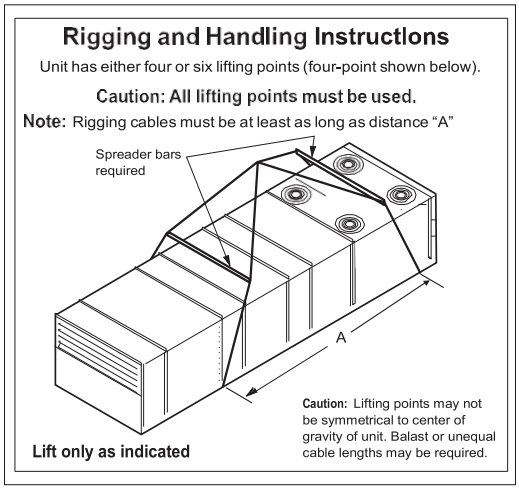
If the unit is stored at the construction site for an intermediate period, take these additional precautions:

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 and lock the handles
6. If there are isolation dampers, make sure they are properly installed and fully closed to prevent the entry of animals and debris through the supply and return air openings.
7. Cover the supply and return air openings on units without isolation dampers.

Figure 49 shows an example of the rigging instruction label shipped with each unit.

Figure 49: Rigging and Handling Instruction Label Lifting Points

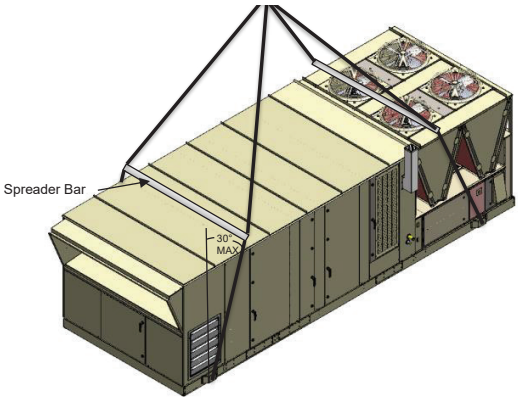


Lifting points are predetermined from factory. When lifting, make sure all factory installed lifting lugs are used. Figure 19 gives examples of typical 4 point and 6 point lifting configurations. Unit must remain level during all lifts. Also shown in Figure 50, lifting cable angle from vertical should never be greater than 30°. Be aware that the center of gravity for each may not necessarily be in the geometric center of the unit. Refer to certified drawings for center of gravity location.

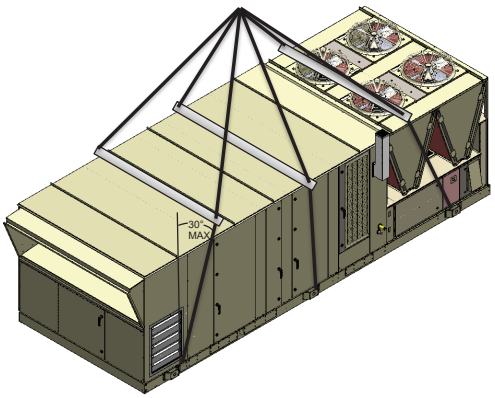
NOTE: Be careful of lifting cable proximity to handles to prevent damage

Figure 50: DPSA Lifting Points

4 Lifting Points



6 Lifting Points



6 Lifting Points (alternative)

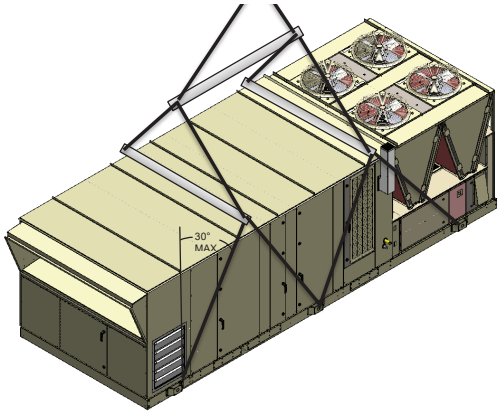
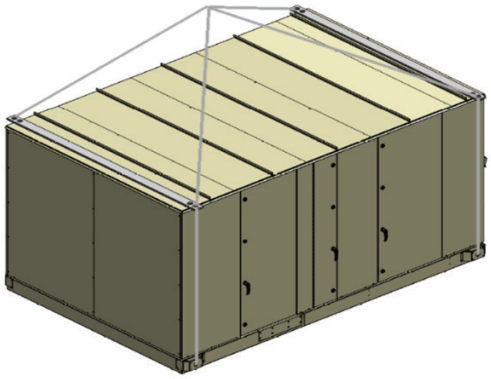


Figure 51: DAHA Unit Lifting Points

4 Lifting Points



Shipping Splits

Reassembly of Shipping Splits

DPSA units are typically shipped complete, however, an optional configuration is available that allows for the unit to be split into 2 or 3 sections for easier shipping and handling. If this configuration is ordered, assembly of the split modules is required on site. Please read and follow this instruction manual to ensure proper assembly and installation. A separate parts kit (Figure 52) will be shipped for each split in the cabinet. The kit contains the necessary components to reassembly the cabinet modules. The kit contents may differ from Figure 52 depending on the exact unit configuration and split location in the cabinet.

Figure 52: Kit for Reassembly of Shipping Splits

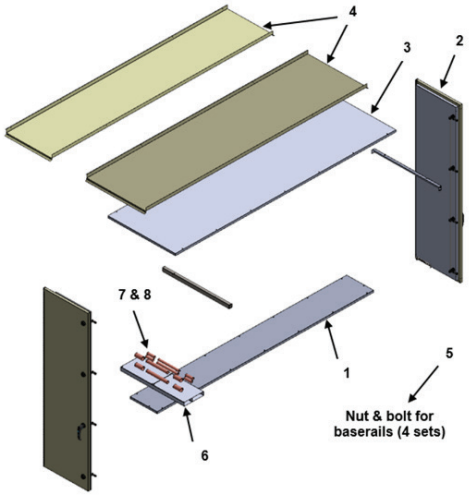
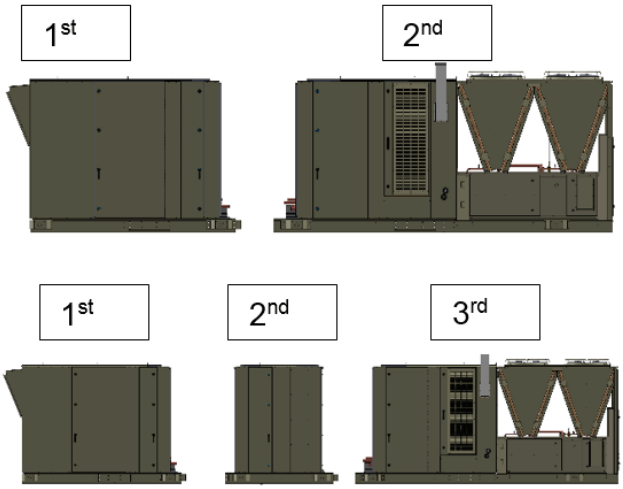


Table 5: Shipping Split Reassembly Kit

Components
2” deck panel (x1) (panel screws included)
2” doors (x2) (screws included for hinges)
2” roof panel (x1) (panel screws included)
Rain covers (x2) (hardware included)
Bolt, nut, and washer set for base rails (x4)
Parts for wire raceway
Up to 7 tubes
Up to 14 slip joints

The cabinet modules must be reassembled on the roof curb in the proper order. The return section should be set in place first, followed by the center section (if applicable), and the condenser section last (Figure 53).

Figure 53: Potential Split Locations and Order of Assembly on Curb

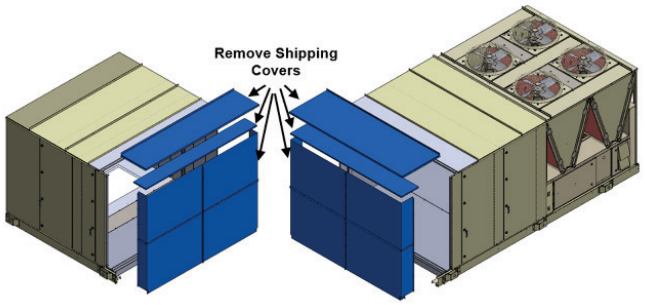


The instructions for setting and leveling the curb found in “Roof Curb Assembly and Installation” on page 29 must be followed to allow for the proper reassembly of the cabinet components. To ensure proper alignment and sealing of the cabinet panels it is critical that the curb is level and square before assembly.

Reassembly Procedure

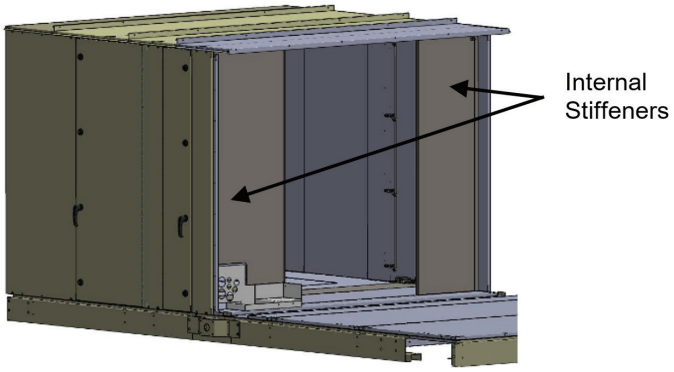
1. Always follow proper rigging and lifting procedures when moving the cabinet modules. See “Rigging and Handling” on page 35.
2. Remove the galvanized shipping covers. The open ends of the cabinet will be exposed once they are removed. The galvanized shipping covers will not be used during re-assembly and can be recycled. The cabinet will be resealed once the unit is reassembled using the supplied parts kit.

Figure 54: Remove Shipping Covers



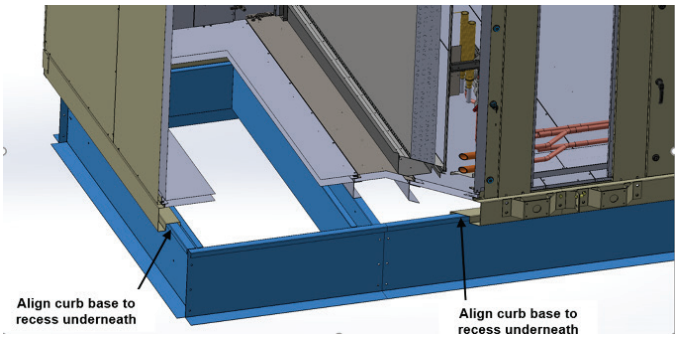
NOTE: Do not remove the Internal stiffeners at this time. They will help keep the cabinet square during the lift of the module to the roof curb (Figure 55)

Figure 55: Do Not Remove Stiffeners Before Lift



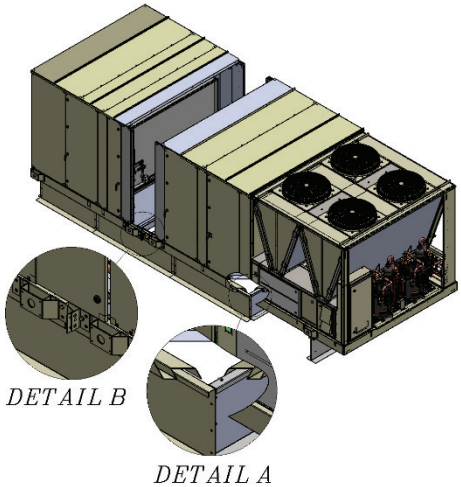
3. Set the return end section over roof curb pocket (Figure 56). Make sure locators underneath are aligned in the right place.

Figure 56: Align Locators Underneath



4. Carefully lower section into place, making sure the roof curb engages the recesses in the unit base (Figure 57).

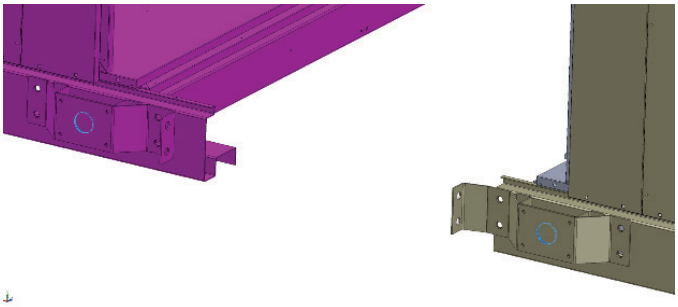
Figure 57: Set Sections Over Roof Curb



The design of the lifting lugs is such to help align the 2 sections on the curb. It is critical that the unit base is co-planar down the air tunnel. The squareness of the unit air tunnel helps guarantee that the panels seal properly and keep out rain and prevent unit air leakage.

5. Bring the unit bases together by pulling lifting lugs together until the base rails touch. It is acceptable to use a come-along type cable puller attached to the lifting lug eyelets to assist in pulling the sections together. If using a come-along, both sides should be pulled simultaneously. The base rails should be in line and touching after this step (Figure 58).

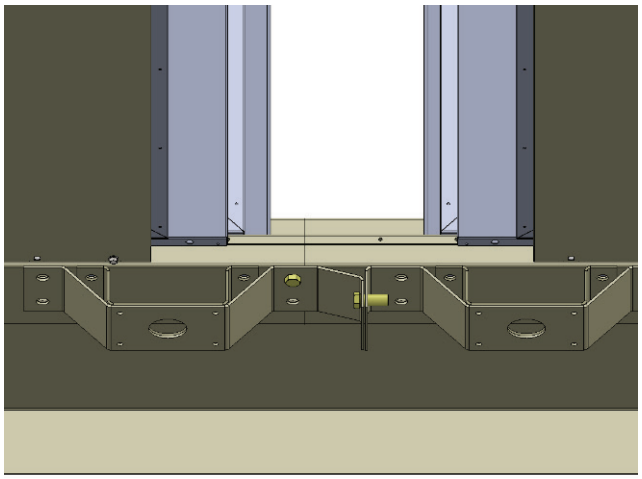
Figure 58: Bring Together Two Halves



6. Bolt together bases with the provided bolts, washers, and nuts. Check alignment of base rails for panel fitment (Figure 59).

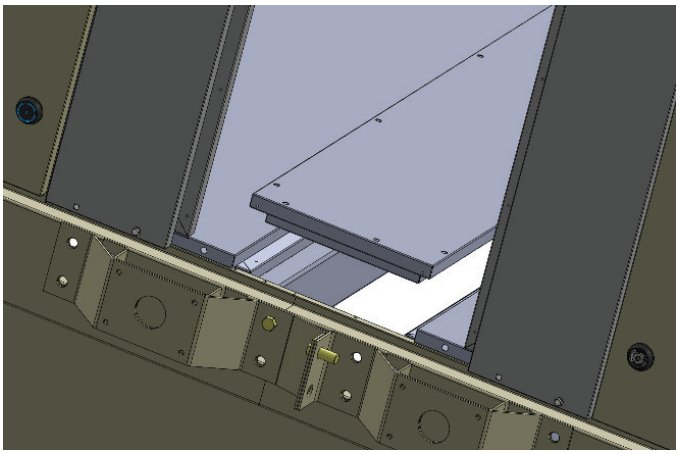
NOTE: The bolts are not to be used to pull the two sections together.

Figure 59: Assembly Base Rails



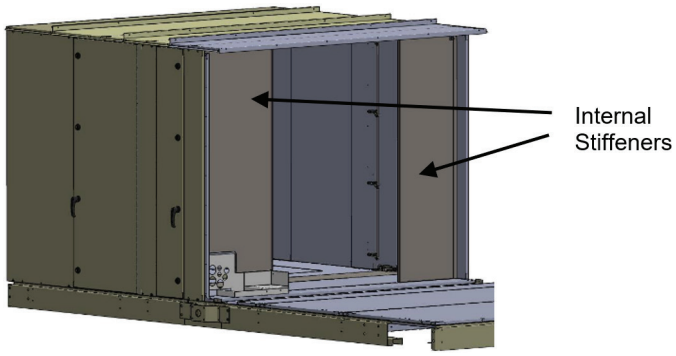
7. Place and fasten deck panel to base (Figure 59). All fasteners in the deck panel need to be fastened to a torque of 35 in·lbs and approximately flush with the deck sheet-metal.

Figure 60: Install Deck Panel to Base



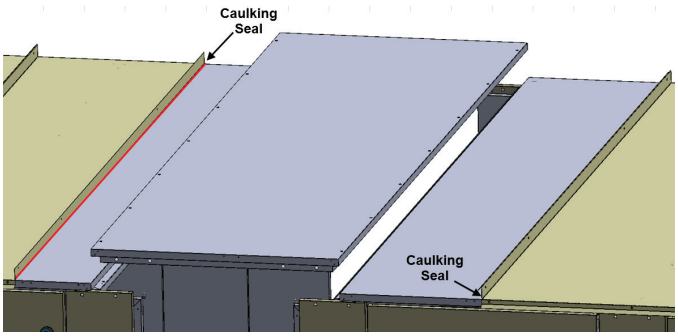
8. Remove internal stiffeners and recycle.

Figure 61: Remove Stiffeners



9. Place and fasten roof panels. There are 4 fasteners per side from the top down. Use proper ladder techniques to reach and secure these fasteners. There will be 14 fasteners in the air tunnel (pointed up). All of the holes should be used.

Figure 62: Install Roof Panels



10. Add rain covers (Figure 63) by liberally applying caulk (Figure 62) to prevent leaks from rain or moisture. Tip hemmed lip in under previous rain cover (Figure 64).

Figure 63: Install Rain Covers

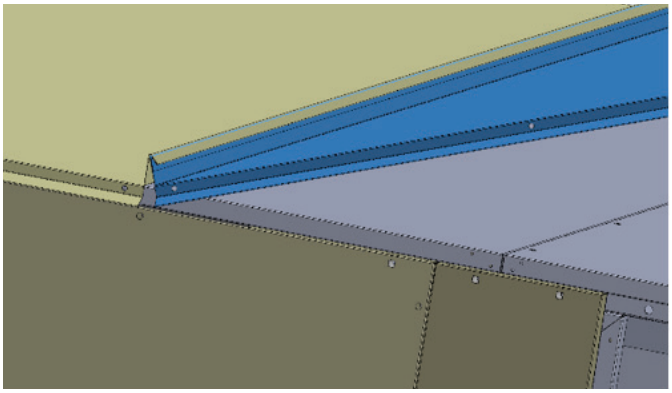
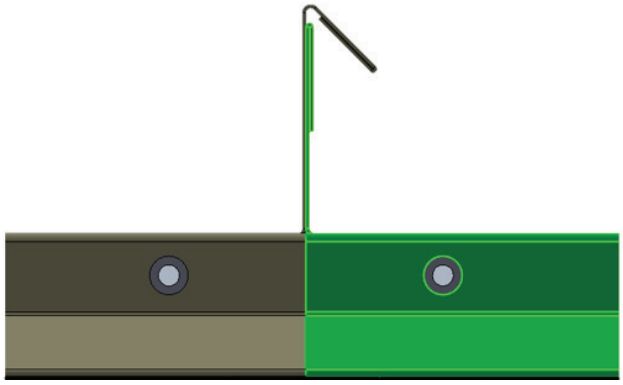
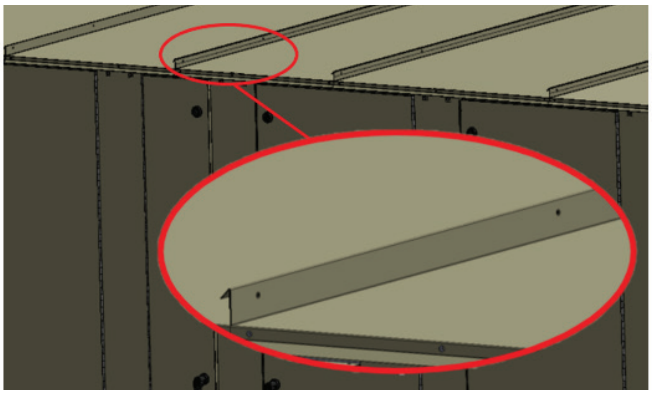


Figure 64: Standing Seam



11. Use the provided #10 sheet metal screws to secure the rain cover to the roof panels (up to 4 per side). Use the same screws to secure the standing seam (Figure 65).

Figure 65: Fasten Standing Seam



12. Install raceway junction box and connect the wiring.

⚠ DANGER

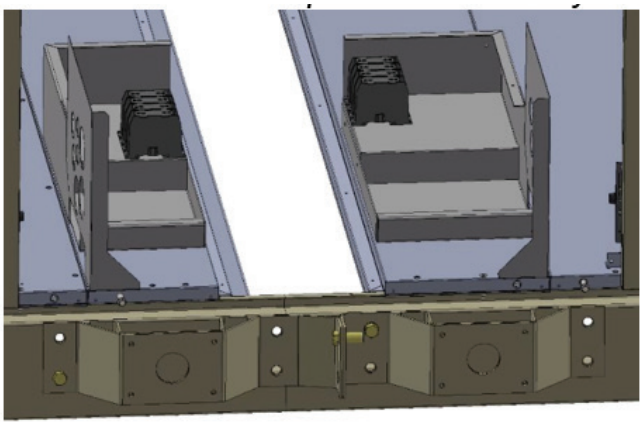
LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Hazardous voltage can cause serious injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

⚠ CAUTION

Connect the power block correctly and maintain proper phasing. Improper installation can cause severe equipment damage.

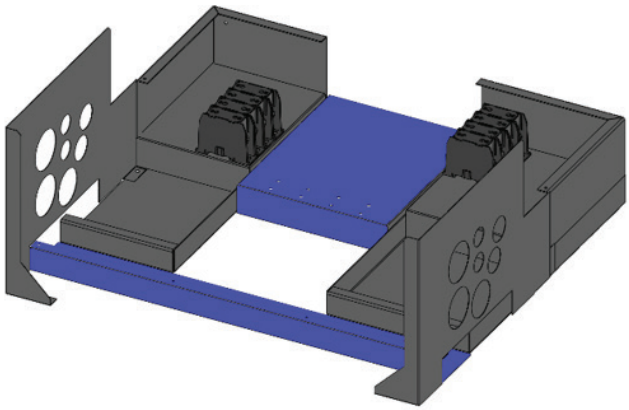
The wiring to the unit will be pulled back into either side of the shipping split modules. This wiring needs to be routed per the wiring diagram to ensure the proper operation of the unit (Figure 66). .

Figure 66: Terminal Box Prior to Assembly



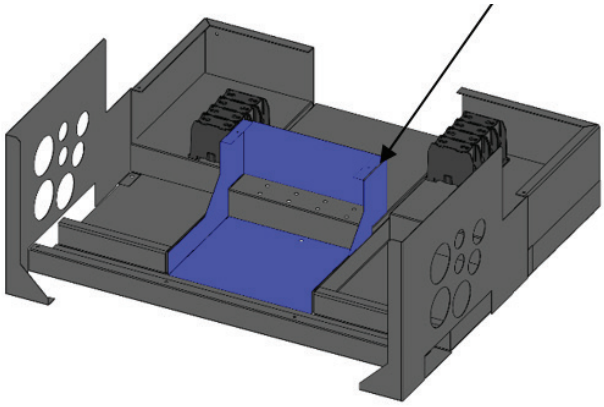
13. Install the low voltage raceway (Figure 67) by pealing back the plate and fastening in place by aligning the center hole with the hole in the deck, and the connection of the high voltage box by fastening the two screws in the back.

Figure 67: Low Voltage Raceway



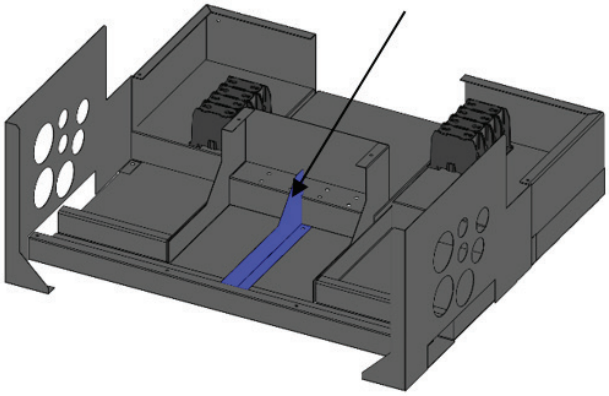
14. Install the high-to-low voltage divider (Figure 68).

Figure 68: High-to-Low Voltage Divider



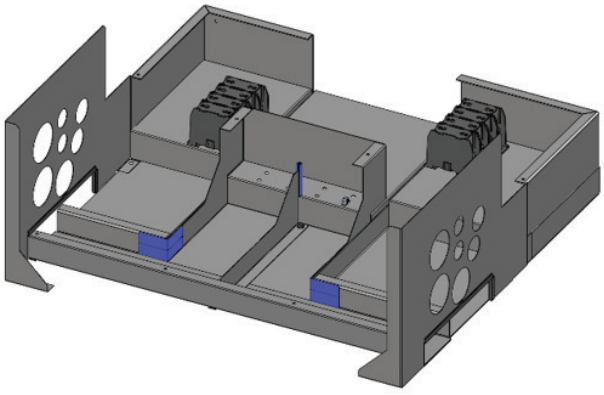
15. Install the low voltage divider (Figure 69).

Figure 69: Low Voltage Divider



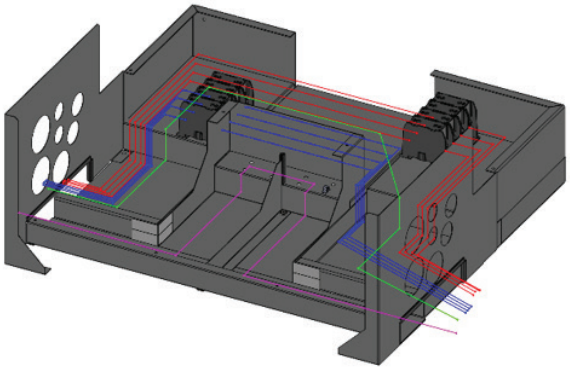
16. Install the edge protector on the low voltage divider and install the UHMW tape on the corners of the low voltage raceway (2 - 4” pieces stacked vertical on each corner).

Figure 70: Edge Protectors



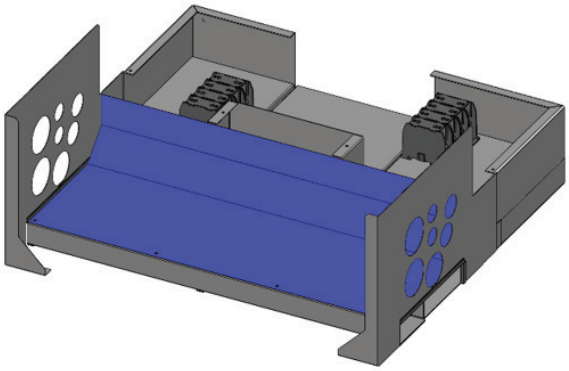
17. Connect the wires per the wiring schematic. In the low voltage raceway, connect the plugs that mate. The wires should be routed up to the platform and wire-tied such that the plugs sit on the platform. High voltage wires that are pulled back from the landing should be routed around the low voltage trough and passed into the high voltage raceway on the other side. Pull to the appropriate landing spot and connect the wires. High voltage wires that are split should be routed to the appropriate power block on the opposite side of the split. If there is pneumatic tubing for pressure switches or transducers that cross the shipping split, the tubing will need to be routed in the low voltage raceway. Connect matching labels with the provided barbed hose fitting.

Figure 71: Route Wires



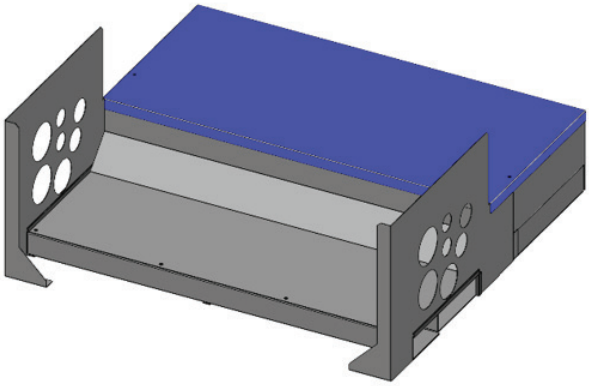
18. After all the wires have been properly connected, attach the low voltage cover (Figure 72) with the plastic clips through the holes on the front edge.

Figure 72: Low Voltage Cover



19. Attach the high voltage cover (Figure 73).

Figure 73: High Voltage Cover



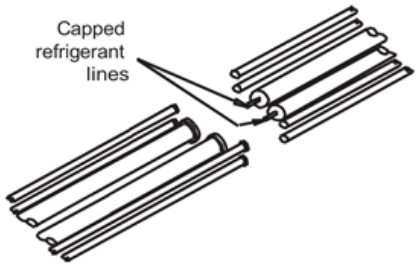
20. Make refrigeration connections.

IMPORTANT:
If the indoor coil is within 18” of the Shipping Split, remove Expansion Valve Bulbs before brazing the suction lines to prevent heat damage to the bulb. These will need to be reattached once all the brazing is completed to have a properly functioning machine. Install the sensing bulbs in the same location as received.

Refrigeration tubes are shipped with a nitrogen holding charge. This should be safely released through the depression of a Schrader valve until the charge has been reduced to atmospheric pressure.

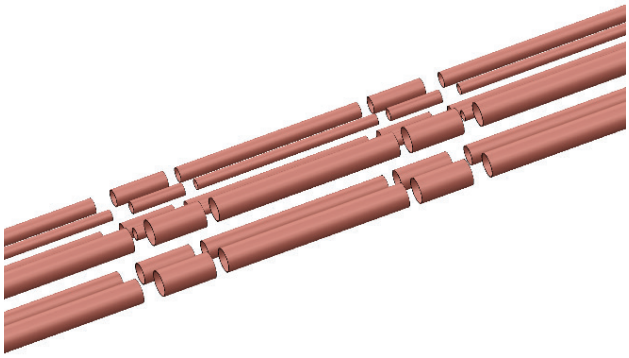
Removed the caps of the refrigeration tubing preferably by using a tube cutter. If a tube cutter is not possible, take caution to not have any remaining copper chips inside of the tube before brazing starts. Reconnect refrigerant piping. Figure 74 illustrates what the installer sees at the shipping split.

Figure 74: Braze Refrigerant Pipe Joints



Given refrigerant piping is separated by shipping splits, the procedure must be followed through per the unit's refrigerant system requirements. Figure 75 illustrates couplers and extensions to be added upon installation. Tube sizes and couplers must match manufactured tube sizes.

Figure 75: Couplers and Extensions



⚠ CAUTION

Protect wire harness from brazing heat, which can cause severe equipment damage.

21. Install the UHMW tape on the door frame (Figure 76 and Figure 77). Attach the tape to the galvanized steel frame. The vertical should be installed first. The horizontal should be installed second, overlapping the vertical strips that were previously installed (Figure 78).

Figure 76: UHMW Tape Application

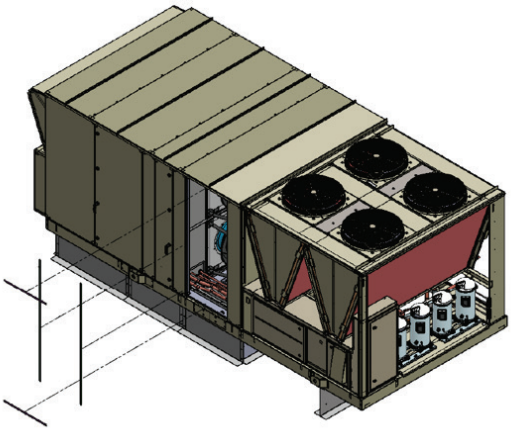


Figure 77: Tape Location

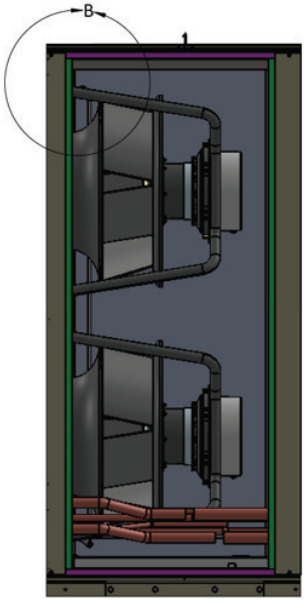
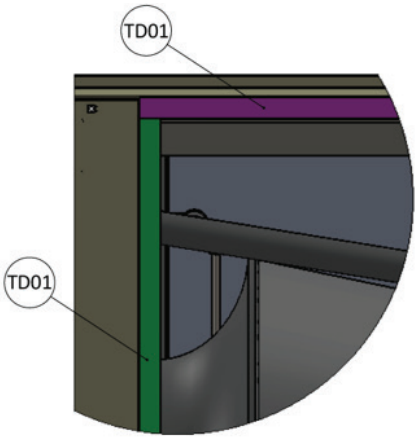
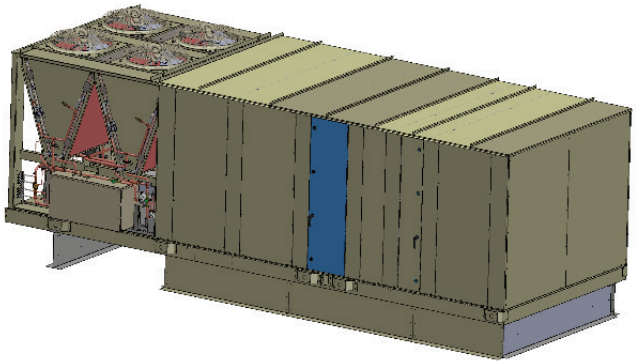


Figure 78: Tape Overlap Detail



22. Attached door hinges to vertical structure of the cabinet on both sides of the unit with handles towards condenser end and engaging strike plates (see Figure 13).

Figure 79: Install Doors



23. Leak check, evacuate, and charge the system per the unit's data plate information. It is important that standard refrigeration practices are followed for leak check, evacuation and charge for this unit. If you need assistance on these procedures, please contact Daikin Applied Technical Response Center via www.DaikinApplied.com.

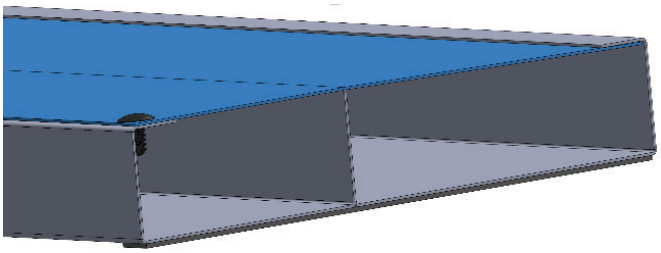
Reconnecting Power and Control Wire

⚠ CAUTION

Connect the power block correctly and maintain proper phasing. Improper installation can cause severe equipment damage.

1. Once the sections are physically reconnected, and raceway extension is installed across shipping splits (Figure 66), wires can be routed and connected.
2. Run power wires through raceway channel for high voltages (greater than 110 volts) by pulling back to control box for termination or connect to terminal blocks one-to-one at splits, per the unit's electrical schematics.

Figure 80: Separate Low Voltage Wire From High in Raceway



3. Run wire harness through raceway channel for low voltages (equal or less than 110 volts). Reconnect control wire harnesses to plugs at splits or pull back to control box for proper termination, per the unit's electrical schematics.
4. Make all electrical connections per the unit's electrical schematics.
5. Reinstall raceway cover as shown in Figure 66 after routing of the control wires is complete.

Unit Piping

Condensate Drain Connection

⚠ WARNING

Drain pans must be cleaned periodically. Uncleaned drain pans can cause illness. Cleaning should be performed by qualified personnel with an alkaline based biodegradable cleaning solution.

The unit is provided with a 1.5" male NPT condensate drain connection. Refer to certified drawings for the exact location. For proper drainage, level the unit and drain pan side to side and install a P-trap

Units may have positive or negative pressure sections. Use traps in both cases with extra care given to negative pressure sections. In Figure 81, "P" is the static pressure at the drain pan in inches W.C. As a conservative measure to prevent the cabinet static pressure from blowing or drawing the water out of the trap and causing air leakage, dimension A should be two times the maximum static pressure encountered in the coil section in inches w.c. or a minimum of 4 inches, whichever dimension is greater. Dimension B should also have a dimension of twice the maximum static pressure at the drain pan or a minimum of 8 inches, whichever dimension is greater.

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

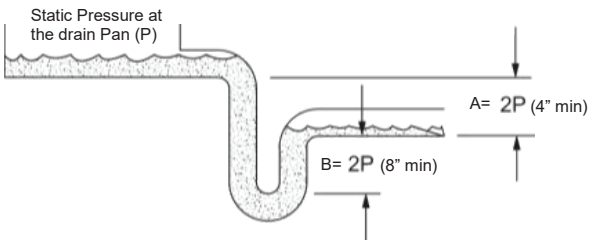
If condensate is piped into the building drainage system, pitch the drain line away from the unit a minimum of 1/8" per foot. The drain line must penetrate the roof external to the unit.

Refer to local codes for additional requirements. Sealed drain lines require venting to provide proper condensate flow.

Where the cooling coils have intermediate condensate pans on the face of the evaporator coil, copper tubes near both ends of the coil provide drainage to the main drain pan. Check that the copper tubes are in place and open before the unit is put into operation. Check that this tube is open before putting the unit into operation and as a part of routine maintenance.

Drain pans in any air conditioning unit have some moisture in them, allowing micro-organisms to grow. Therefore, periodically clean the drain pan to prevent this buildup from plugging the drain and causing the drain pan to overflow.

Figure 81: Condensate Drain Connection



Hot Water or Hot Water Integral Face and Bypass (IFB)

⚠ CAUTION

Coil freeze possible when the ambient temperature is below 35°F and can result in poor equipment operation or damage to the equipment. Follow instructions for mixing antifreeze solution used. Some products have higher freezing points in their natural state than when mixed with water. The freezing of coils is not the responsibility of Daikin Applied.

Hot water coils are not normally recommended for use with entering air temperatures below 35°F (1.6°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 temperature conditions.

NOTE: All coils have vents and drains factory installed.

Hot water coils are provided without valves as a standard unit, requiring field installation of valves and piping. As an option, the hot water coil is supplied with either a two-way or three-way valve and actuator motor from the factory. Refer to the submittal drawings to determine unit configuration. The submittal drawing will also have information about the line size connections.

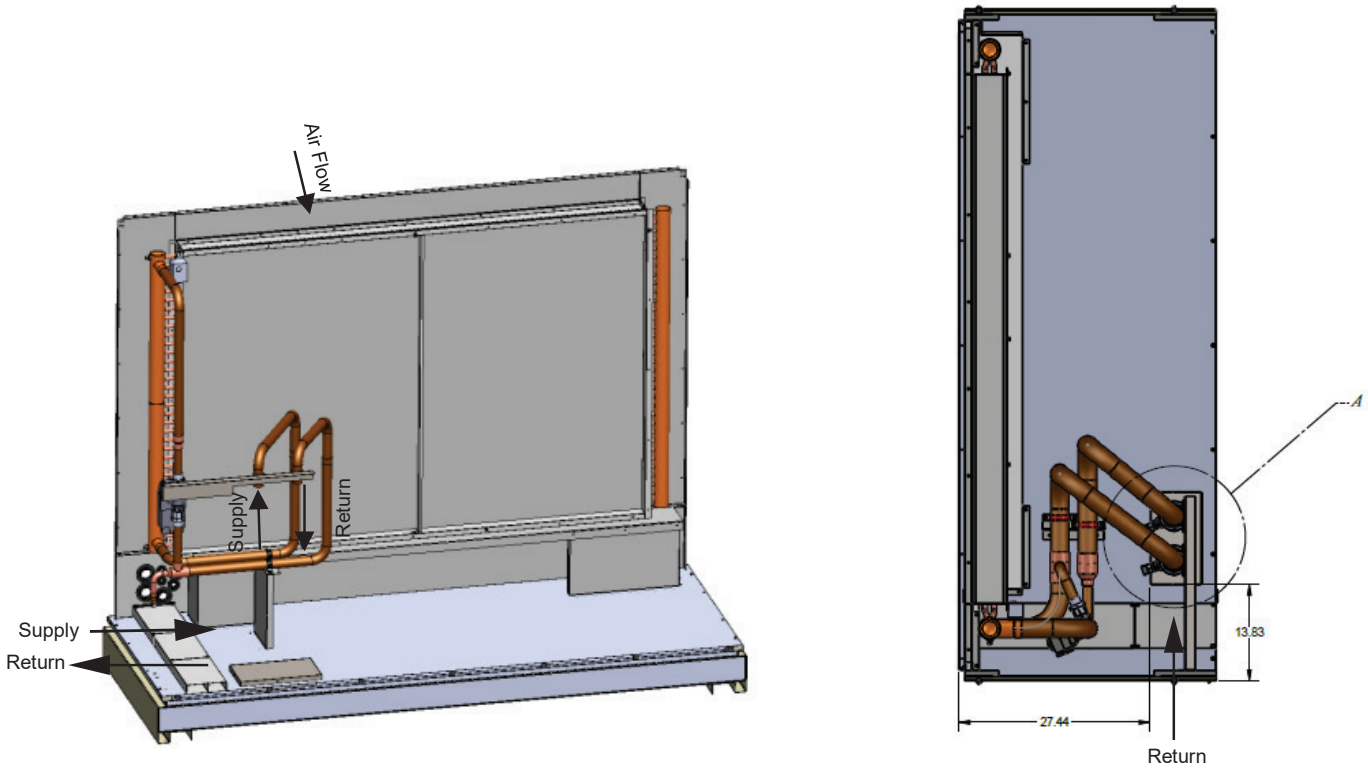
NOTE: Factory-installed water valves and piping are bronze, brass, and copper. Dissimilar metals within the plumbing system can cause galvanic corrosion. To avoid corrosion, provide proper dielectric fittings as well as appropriate water treatment when making a connection to a pipe that is not copper, bronze or brass.

A factory provided floor knockout location is provided on every unit equipped with a hot water coil. Refer to the certified drawings for the recommended piping entrance locations. Seal all piping penetrations to prevent air and water leakage.

Table 6: Hot Water Connection Size

	Hot Water Connections	
B Cabinet	1 Row	1-1/2"
	2 Row	2-1/2”

Figure 82: Hot Water Heat Section (Shown with Factory Valve and Piping, no Bypass)



NOTE: Horizontal Supply and Return will be through the fixed panel in line with the pipe connections.

Figure 83: IFB Hot Water

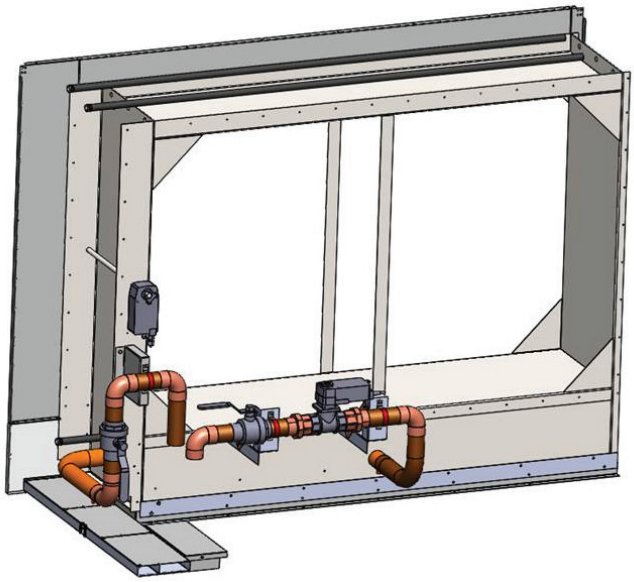
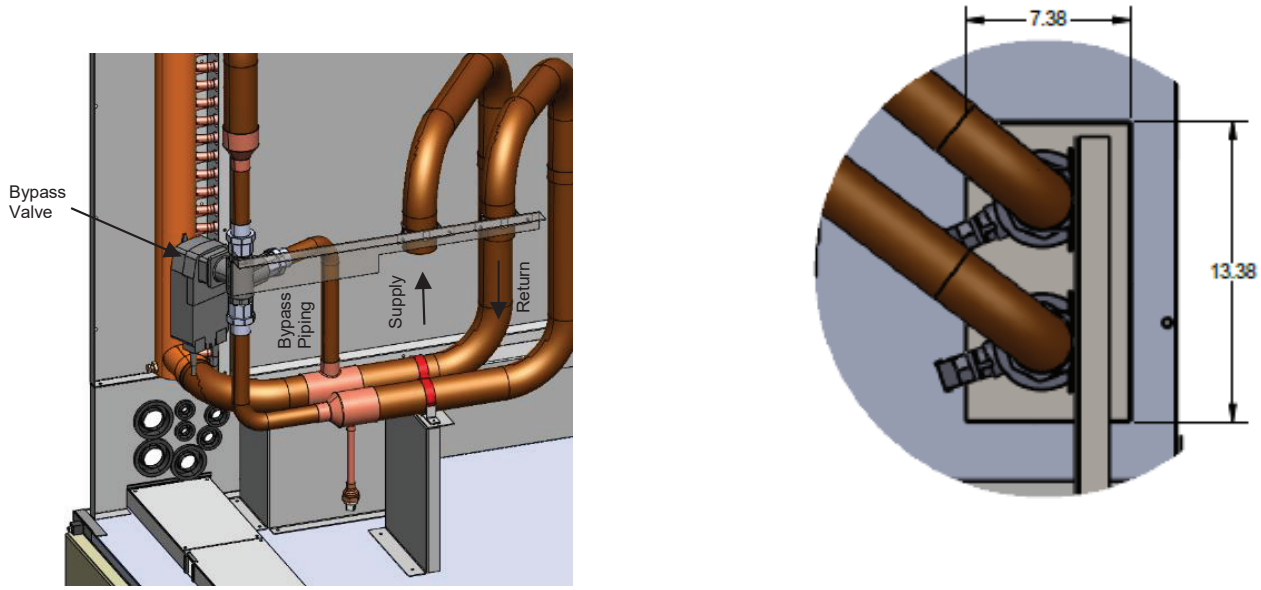


Figure 84: Hot Water Bypass Valve Package



Steam Coil or Steam Integral Face and Bypass (IFB) Coil

Steam coils are provided without valves as a standard unit, requiring field installation of valves and piping. As an option,the steam coil is supplied with a two-way valve and actuator motor from the factory. Refer to the submittal drawings to determine unit configuration. The submittal drawing will also have information about the line size connections.

The steam heat coil is pitched at 1/8" (3 mm) per foot (305 mm) to provide positive condensate removal.

Refer to the certified drawings for the recommended piping entrance locations. All piping penetrations must be sealed to prevent air and water leakage.

NOTE: The valve actuator spring returns to a stem up position upon power failure. This allows full flow through the coil.

Table 7: Steam Connection Size

	Steam Connections	
B Cabinet	All Rows	2”

Figure 85: IFB Steam Heat Section

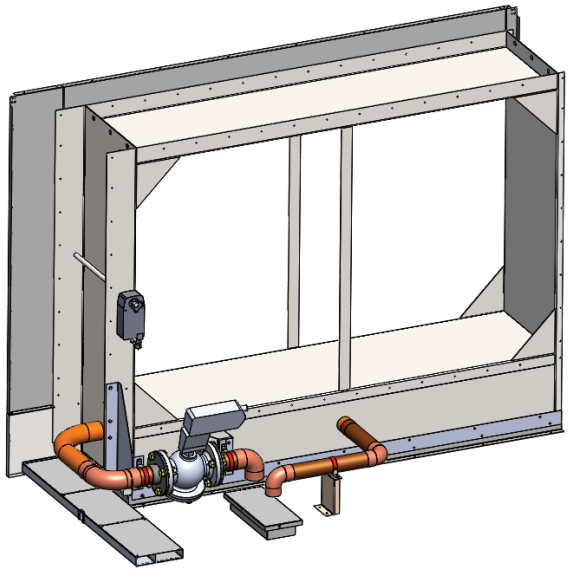
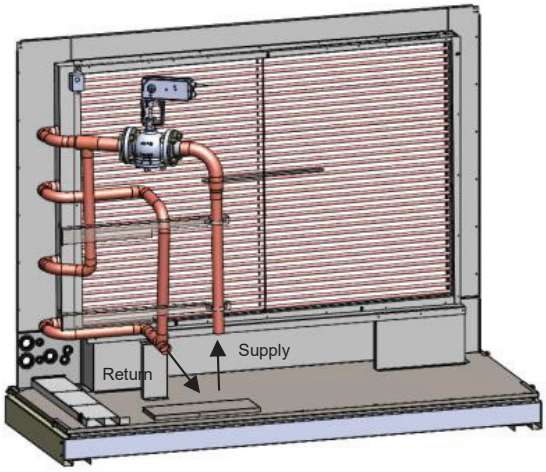
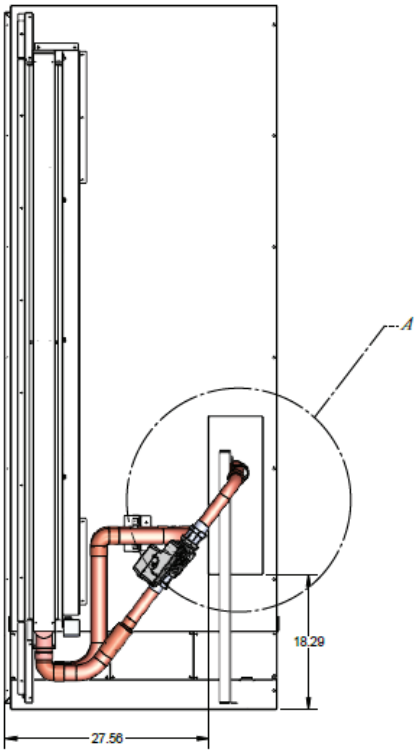
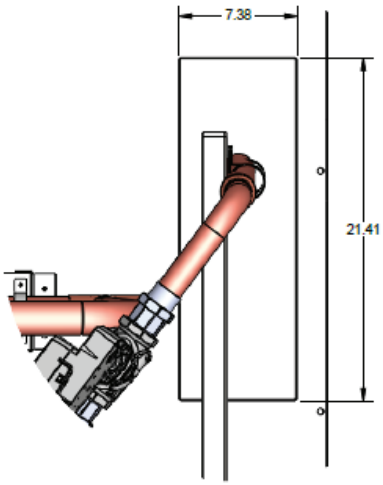


Figure 86: Steam Heat Section (Valve and Factory Piping)







Steam Piping Recommendations

1. Be certain that adequate piping flexibility is provided. Stresses resulting from expansion of closely coupled piping and coil arrangement can cause serious damage.
2. Do not reduce pipe size at the coil return connection. Carry return connection size through the dirt pocket, making the reduction at the branch leading to the trap.
3. Install vacuum breakers on all applications to prevent retaining condensate in the coil. Generally, the vacuum breaker is to be connected between the coil inlet and the return main. However, if the system has a flooded return main, the vacuum breaker to the atmosphere; the trap design should allow venting of the large quantities of air.
4. Do not drain steam mains or takeoffs through coils. Drain mains ahead of coils through a steam trap to the return line.
5. Do not attempt to lift condensate.
6. Pitch all supply and return steam piping down a minimum of 1" (25 mm) per 10 feet (3 m) of direction of flow.

Steam Trap Recommendations

1. Size traps in accordance with manufacturers' recommendations. Be certain that the required pressure differential will always be available. Do not undersize.
2. Float and thermostatic or bucket traps are recommended for low pressure steam. Use bucket traps on systems with ON/OFF control only.
3. Locate traps at least 12" (305 mm) below the coil return connection.
4. Always install strainers as close as possible to the inlet side of the trap.
5. A single tap may generally be used for coils piped in parallel, but an individual trap for each coil is preferred.

Steam Coil Freeze Conditions

If the air entering the steam coil is below 35°F (2°C), note the following recommendations:

1. Supply 5 psi (34.5 kPa) steam to coils at all times.
2. Modulating valves are not recommended. Control should be by means of face and bypass dampers.
3. As additional protection against freeze-up, install the tap sufficiently far below the coil to provide an adequate hydrostatic head to ensure removal of condensate during an interruption on the steam pressure. Estimate 3 ft. (914 mm) for each 1 psi (7 kPa) of trap differential required.
4. If the unit is to be operated in environments with possible freezing temperatures, an optional freezestat is recommended.

Chilled Water

⚠ CAUTION

Coil freeze possible when the ambient temperature is below 35°F and can result in poor equipment operation or damage to the equipment. Follow instructions for mixing antifreeze solution used. Some products have higher freezing points in their natural state than when mixed with water. The freezing of coils is not the responsibility of Daikin Applied.

Cold water coils are not normally recommended for use with entering air temperatures below 35°F (1.6°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 temperature conditions.

NOTE: All coils have vents and drains factory installed.

Cold water coils are provided without valves as a standard unit, requiring field installation of valves and piping. As an option, the cold water coil is supplied with either a two-way or three-way valve and actuator motor from the factory. Refer to the submittal drawings to determine unit configuration. The submittal drawing will also have information about the line size connections.

NOTE: All field installed piping should be insulated to prevent condensation from dripping into the cabinet.

NOTE: Factory-installed water valves and piping are bronze, brass, and copper. Dissimilar metals within the plumbing system can cause galvanic corrosion. To avoid corrosion, provide proper dielectric fittings as well as appropriate water treatment when making a connection to a pipe that is not copper, bronze or brass.

A factory provided floor knockout location is provided on every unit equipped with a cold water coil. Refer to the certified drawings for the recommended piping entrance locations. Seal all piping penetrations to prevent air and water leakage.

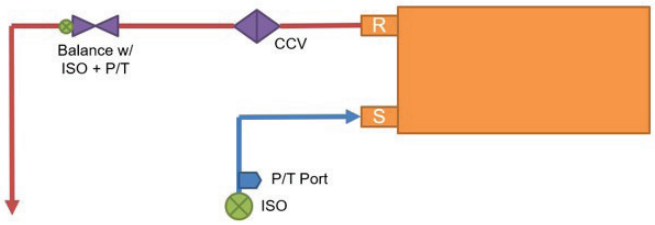
Table 8 shows the connection piping sizes based on the coil selection. Valve package connections will require a straight pipe connection and connections to the header pipe will require a coupling.

Table 8: Cold Water Connection Sizes

		Code 004 (Pos 5-7)		
		B24	B29	B34
Code 009 (Pos 12)	T	2.625	2.625	2.125
	U	2.625	3.125	2.625
	V	2.125	2.625	2.125
	W	2.625	3.125	2.625
	Y	3.125	3.125	2.625
	1	2.625	2.625	2.125
	2	3.125	3.125	2.625
	3	3.125	3.125	3.125
	4	2.625	2.500	2.125
	5	3.125	3.125	2.625
	6	3.125	3.125	3.125
	7	2.625	2.625	2.125
	8	3.125	3.125	2.625
	9	3.125	3.125	3.125

Figure 87: Chilled Water 2-Way Valve Options

Single Coil 2-Way



Stacked Coil 2-Way

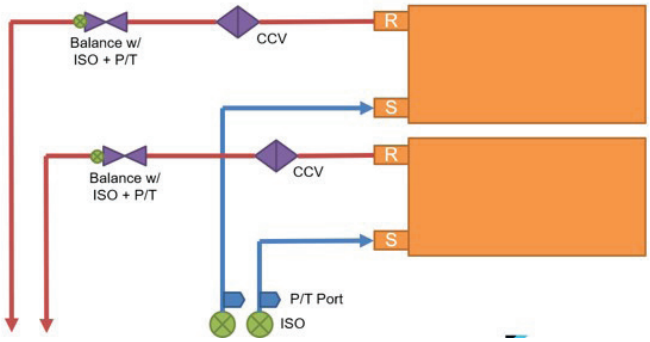
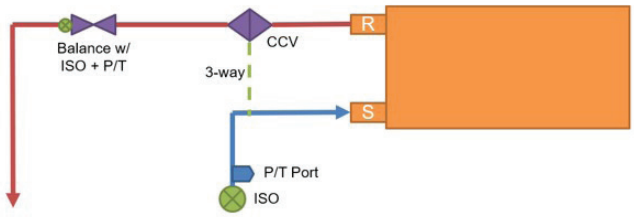
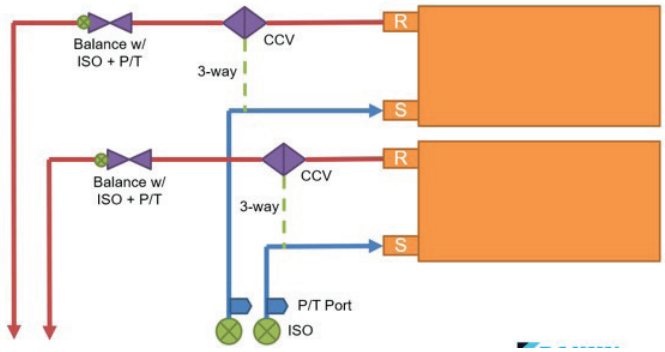


Figure 88: Chilled Water 3-Way Valve Options

Single Coil 3-Way



Stacked Coil 3-Way



Piping

On the floor panel behind the drain pan are a series of corner punches in the panel, as shown in Figure 89. When connected, this will form a 12” square signifying a safe area to run piping through.

NOTE: Field-installed piping must be supported by the building structure. Field-installed piping should not be allowed to hang from the valves or be supported by the cabinet floor.

An alternative method is to continue the valve package piping and run the piping straight through the wall panel. Be sure to properly insulate exposed piping based on your geographical location.

Figure 89: Floor Markings (Piping)

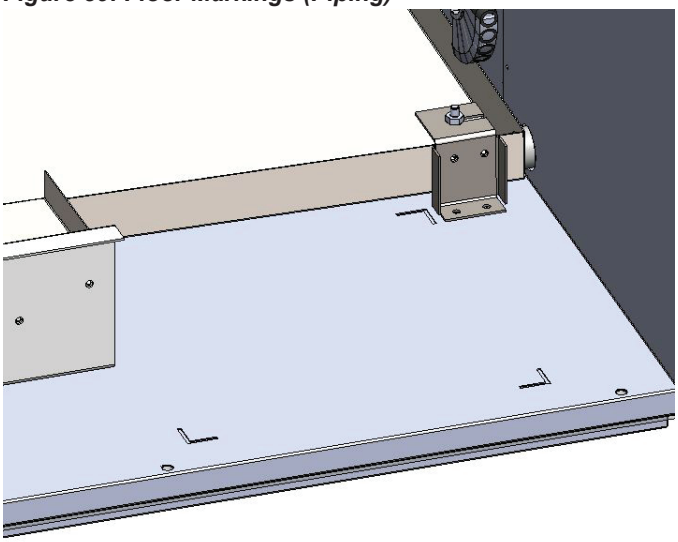
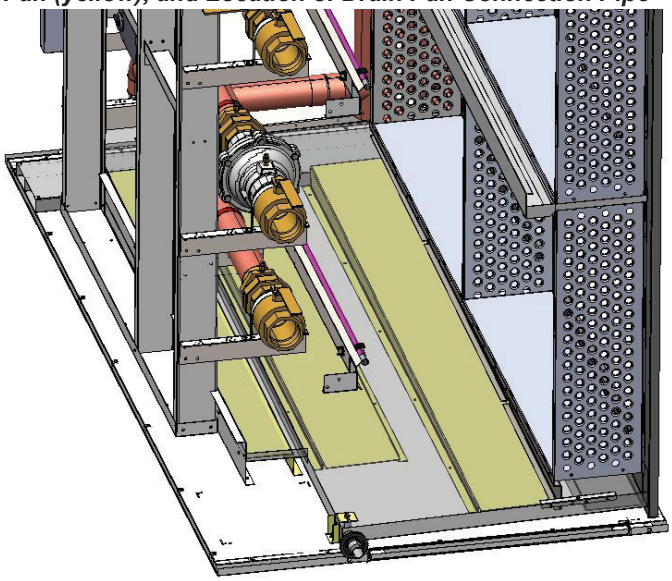


Figure 90: Supports Under Drain Pan, Secondary Drain Pan (yellow), and Location of Drain Pan Connection Pipe



Damper Assemblies

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

Economizer Dampers

Outside air intake is provided at end of the unit, and the return air path is at the bottom of the damper set. As the actuators modulate the outside air damper open, the return air damper closes. Exhaust air exits the unit through the gravity relief dampers provided at the sides of the economizer section.

The damper is set so that the actuator moves through a 90-degree angle to bring the economizer damper from full open to full close (Figure 91). Access to the actuator is from the filler section.

NOTE: Do not “overclose” low leak damper blades. The edge seal should just lightly contact the adjoining blade.

The blades will lock up if they are closed so far the seal goes over center.

Intake Hood Damper (0% to 100% outside air)

Units requiring 100% outside air are provided with a rain hood and dampers that can be controlled by a single actuator. The actuator provides two-position control for opening the dampers fully during unit operation and closing the dampers during the off cycle. No unit mounted exhaust dampers are provided. See Figure 32 for operation of the damper.

Intake Hood Damper (0% to 30% outside air)

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.

On units provided with MicroTech 4 controls, the damper position may be set at the controller keypad. During unit operation, the analog controlled actuator drives the damper to the position set on the keypad. During the OFF cycle, the damper is automatically closed.

No unit-mounted exhaust dampers are provided with this option.

Figure 91: Damper Adjustment

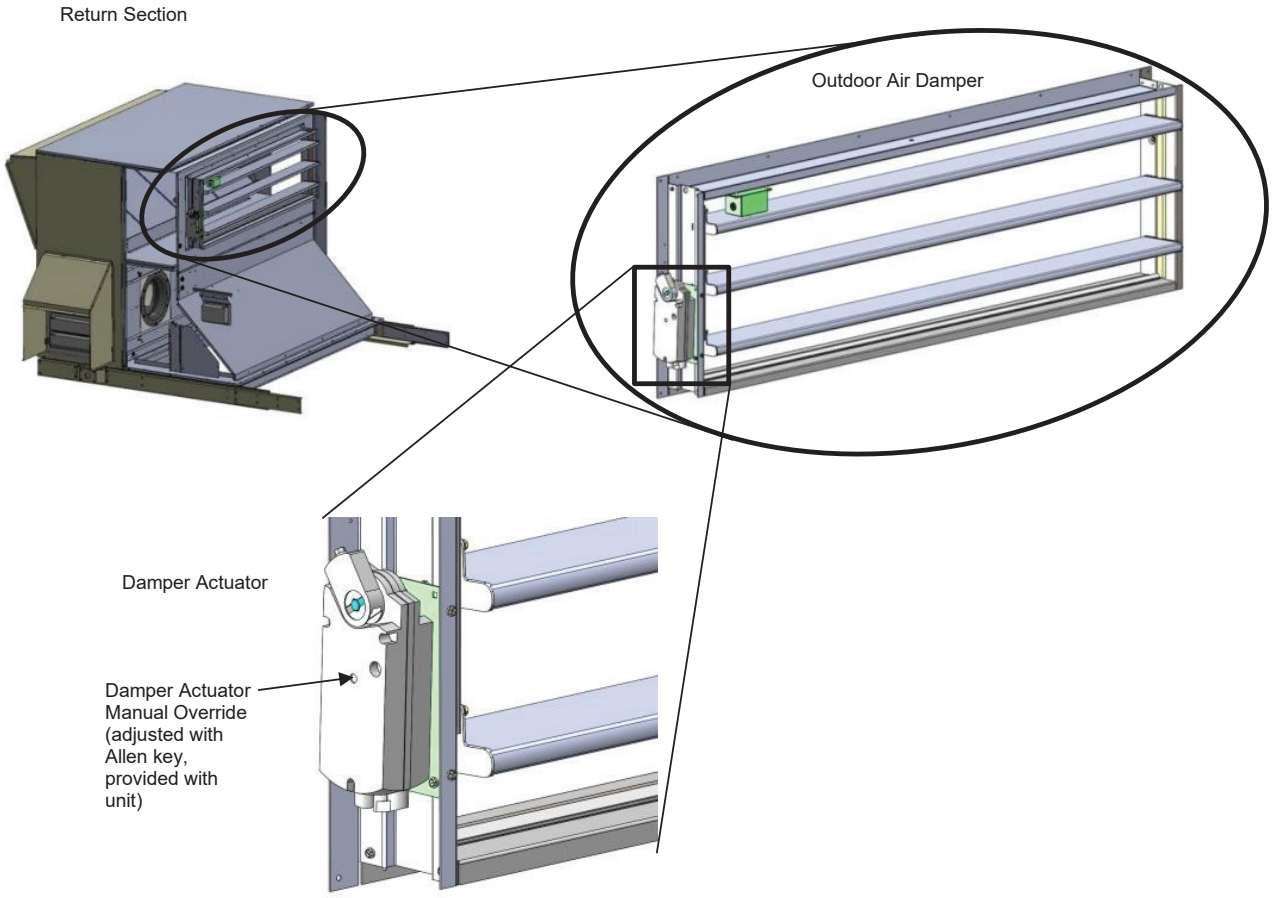
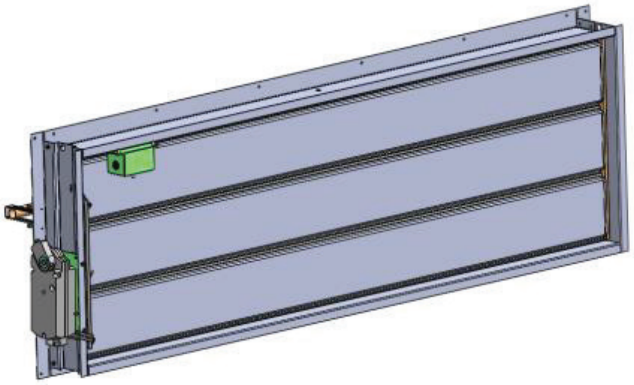
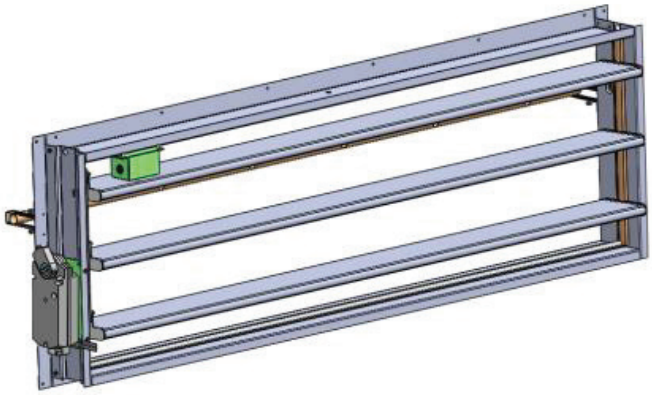


Figure 92: Intake Hood Damper Adjustment

0% Outside Air



100% Outside Air

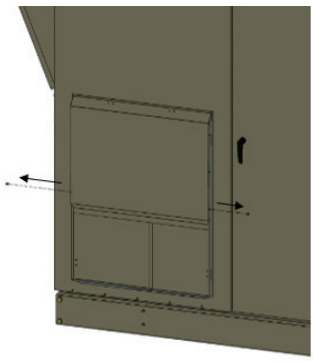


Exhaust Hood Assembly

On units equipped with exhaust dampers, a hood is provided on the unit and must be set up properly prior to operation. This section describes the procedure for setting up the hood. Failure to complete this set up may cause damage to unit.

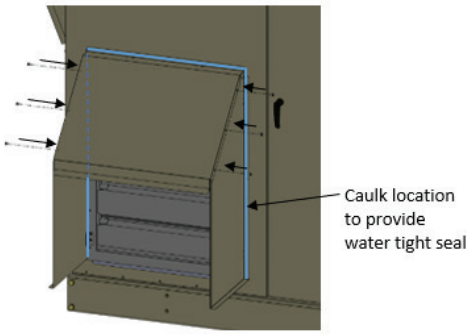
1. As shown in the figure below, the unit is shipped with the hood assembly folded in. To begin set up, remove and retain two shipping screws holding the hood pieces in place.

Figure 93: Exhaust Hood Folded In



2. Fold top of hood up.
3. Fold left side and right side out and put screws provided with unit into corresponding holes to lock in position of left side and top of the hood as shown in Figure 94 (reinstall 2 shipping screws and use 4 additional screws provided with unit).
4. Place caulk where shown below in Figure 94 to seal all seams between unit cabinet and hood to create a leak proof water tight seal.

Figure 94: Exhaust Hood Folded Out



HEPA Holding Frame, Filter, and Prefilter Installation

⚠ WARNING

Sharp edges on sheet metal and fasteners can cause personal injury. Please wear appropriate personal protective equipment (PPE) such as gloves, protective clothing, footwear, eye protection, etc. This equipment must be installed, operated, and serviced only by an experienced installation company and fully trained personnel.

These instructions are for installing AAF HEPA filters (11-1/2" depth) into AAF HEPA Holding Frames.

Please read the entire installation instructions before beginning the installation process.

Install filters into the HEPA Holding Frames only after the frames have been securely installed into existing ductwork or housing. Frames should be bolted or pop riveted together into the permanent structure through the pre-drilled holes around the outside perimeter of the frames. Frames should be sufficiently caulked and sealed to prevent any air bypass or leakage.

Required tools for filter installation:

- T-handle Hexkey, size 5/32"

Framing Components Required:

- AAF HEPA Holding Frames
  - P/N 910111491 & 910111674
- Leg Extensions, 4 per frame (A)
  - P/N 910111494
- Latches, 4 per frame
  - P/N 910111493 (B) (without prefilters)
  - P/N 910123164 (C) (with prefilters)
- Prefilter Holding Frames (when prefilters are ordered)
  - P/N 910123166 & 910123168
- Prefilter Latches (when prefilters are ordered)
  - P/N 111048304 & 111048305

Figure 95: Leg Extensions and Latches Without Prefilters

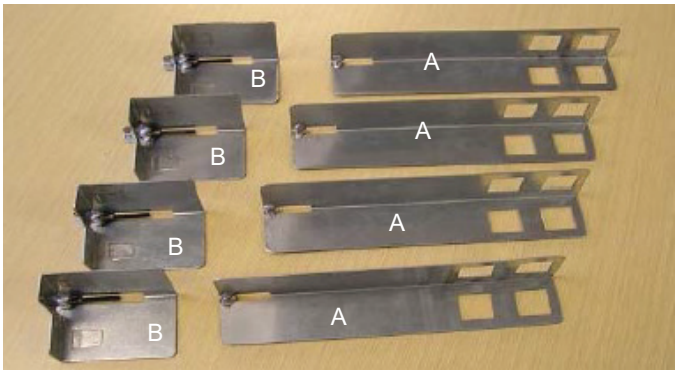


Figure 96: Leg Extensions and Latches With Prefilters

AAF HEPA Filters without Prefilters

STEP 1: At the inside corner of each frame are 4 tabs, 2 per side. Place a leg extension over the 4 tabs as shown in Figure 97, then pull back on the leg extension locking it into place (Figure 98).

Figure 97: Place Leg Extension Over the Frame Tabs

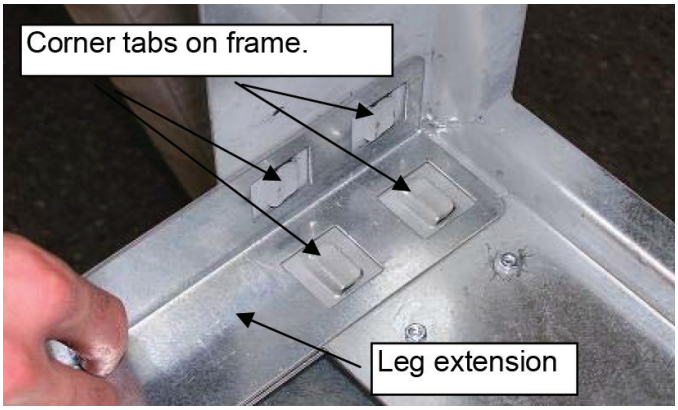


Figure 98: Pull Back to Lock the Leg Extension Into Place

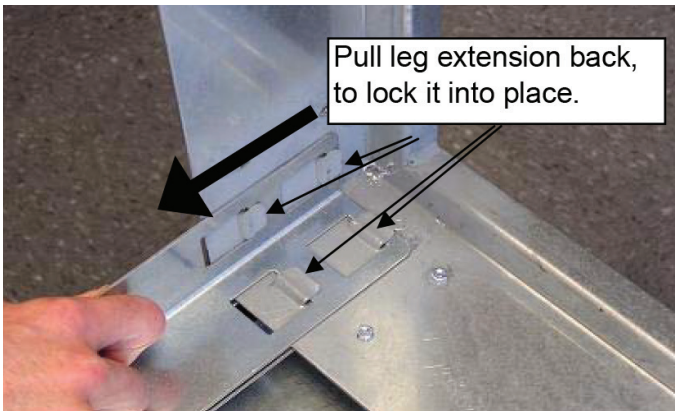
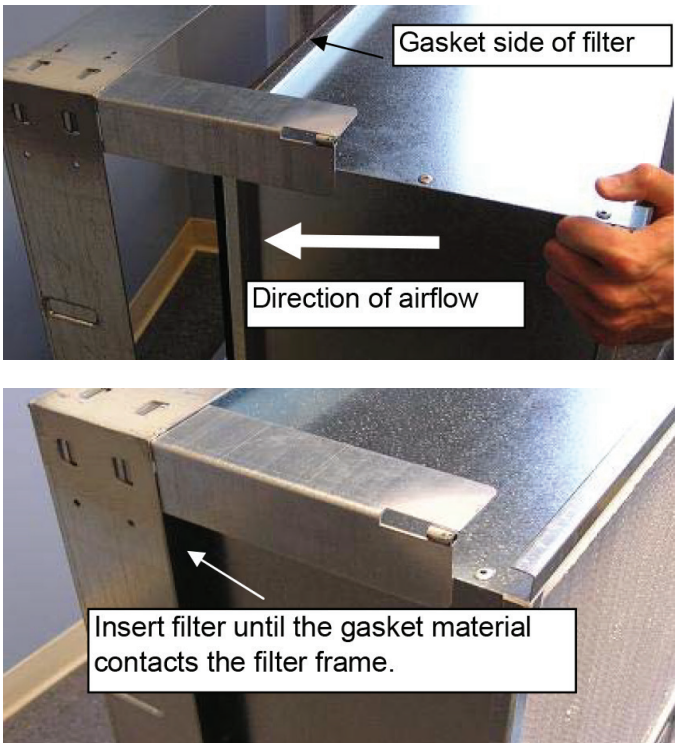


Figure 99: Frame with Leg Extensions Installed

STEP 2: Insert the HEPA filter into the HEPA Holding Frame. The HEPA should be installed with the gasket side of the filter facing the frame. Insert the filter as far into the frame as possible, so that the gasket material is contacting the frame. See Figure 100.

Figure 100: Insert HEPA Filter Into Frame Until the Gasket Comes in Contact With the Holding Frame



The filter should now be resting inside of the holding frame. When installing the filters into a frame bank of multiple frames, install the lower filters first so that the upper filters can rest on the lower filters (Figure 101).

Figure 101: Filter Placed Inside of Frame

STEP 3: Place a latch so that it overlaps the leg extension, as shown in Figure 102. Align the latches' cap screw with the threaded coupling on the end of the leg extension and tighten using the hexkey. Tighten the cap screw until there is an approximately 1/4" gap between the latch and the leg extension coupling as shown in Figure 103. Repeat this step with all 4 corners.

Figure 102: Latch Overlapping Leg Extension

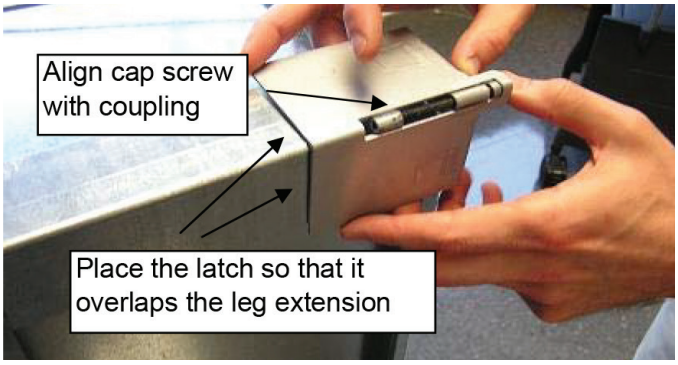
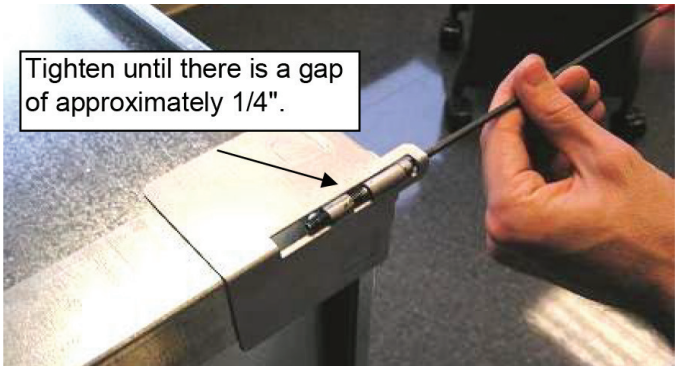


Figure 103: Tighten Cap Screw to 1/4" of the Coupling



STEP 4: Once all four corner latches have been tightened within 1/4” of the leg extension coupling, complete the installation by tightening each corner until the latch and leg extension coupling meet. This is illustrated in Figure 104.

Once all four corners have been tightened the filter should now be properly seated and sealed.

Repeat the process with all remaining filters working from the bottom to the top.

Figure 104: Tighten Until Latch and Coupling Meet

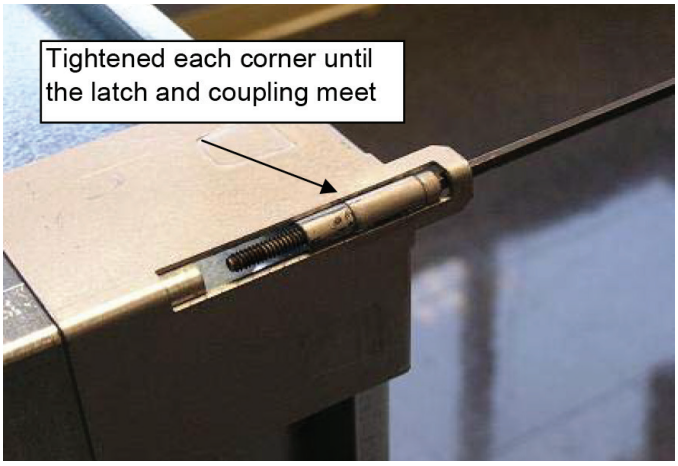


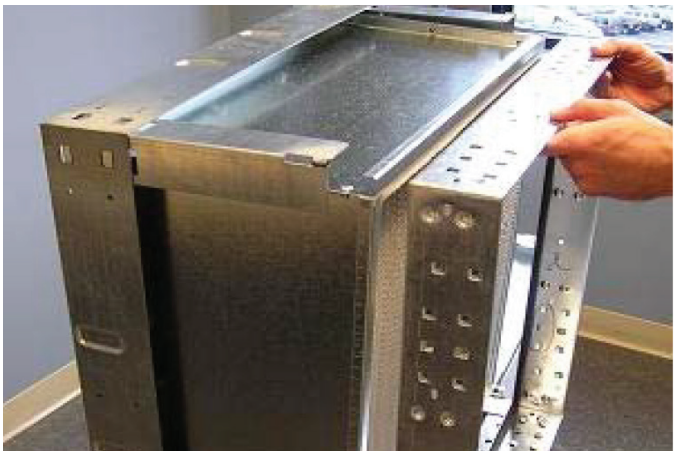
Figure 105: Properly Installed Filter Inside of the Frame

AAF HEPA Filters with Prefilters

Follow previous steps 1-2, then continue straight to step 5.

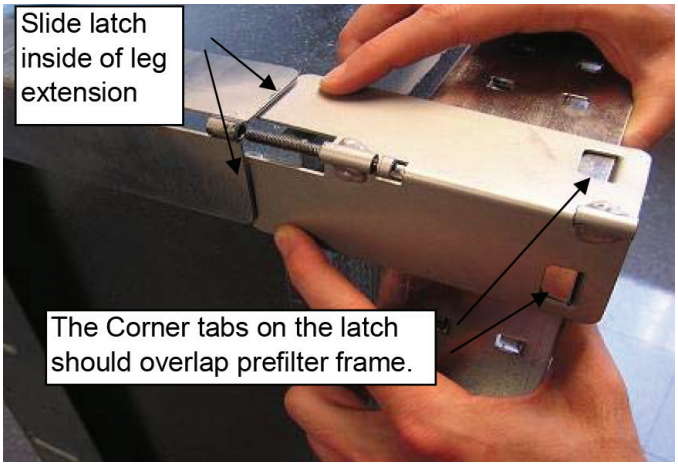
STEP 5: The prefilter holding frame should be placed directly in front of the HEPA filter as shown in Figure 106.

Figure 106: Positioning of the Prefilter Frame



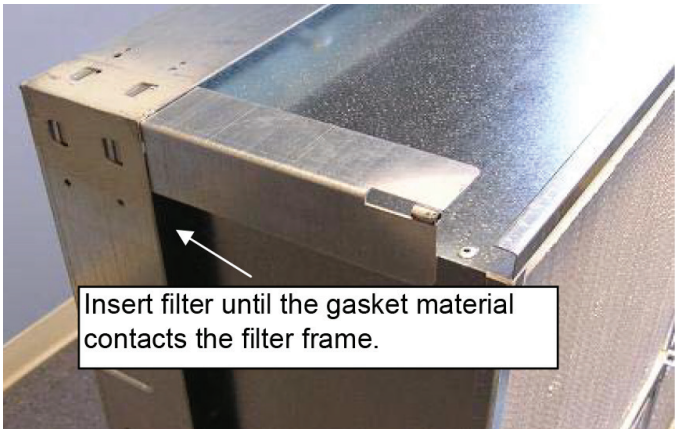
STEP 6: Place a latch so that the 2 tabs of the latch overlap the prefilter frame on each side of the corner. Slide the latch inside of the leg extension and align the latches’ cap screw with the threaded coupling on the end of the leg extension and tighten using the hexkey. See Figure 107.

Figure 107: Latch Positioning for Prefilter Frame



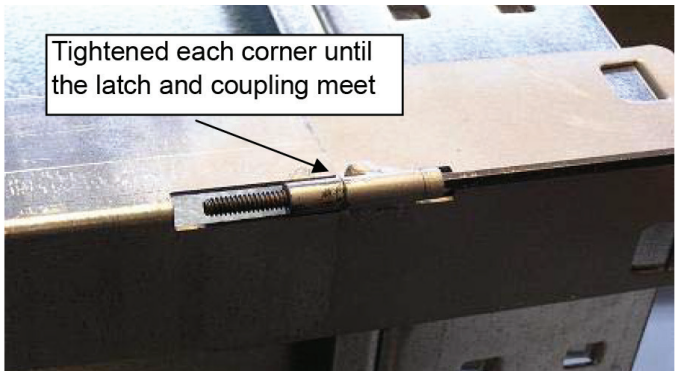
Tighten the cap screw until there is an approximately 1/4” gap between the latch and the leg extension coupling as shown in Figure 108. Repeat this step with all 4 corners.

Figure 108: Tighten Cap Screw to 1/4” of the Coupling



STEP 7: Once all four corner latches have been tightened within 1/4” of the leg extension coupling, tighten each corner until the latch and leg extension coupling meet. This is shown in Figure 109.

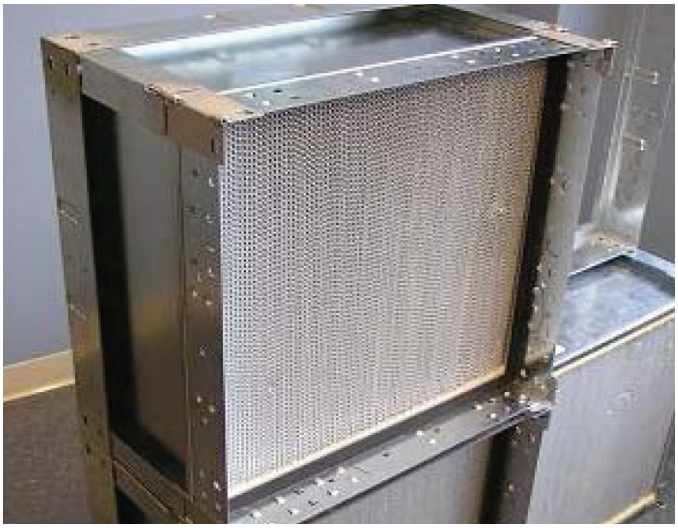
Figure 109: Tighten until Latch and Coupling Meet



Once all four corners have been tightened the HEPA filter should now be properly seated and sealed (Figure 110).

Repeat the process with all remaining filters working from the bottom to the top.

Figure 110: Properly Installed HEPA Filter



STEP 8: To complete the installation, add the appropriate prefilter latches to the prefilter holding frame (Figure 111). Once latches are installed, place the prefilter in the frame, secure with the latches and the installation is complete (Figure 112).

Repeat with all remaining prefilters and frames.

Figure 111: Installation of Prefilter Into Frame

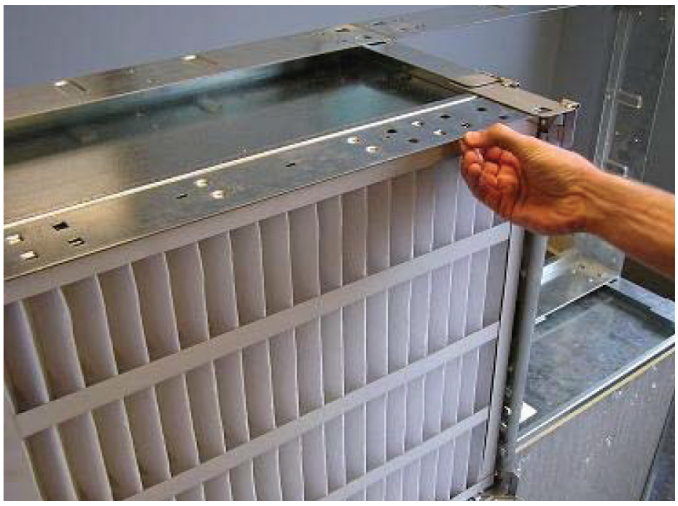
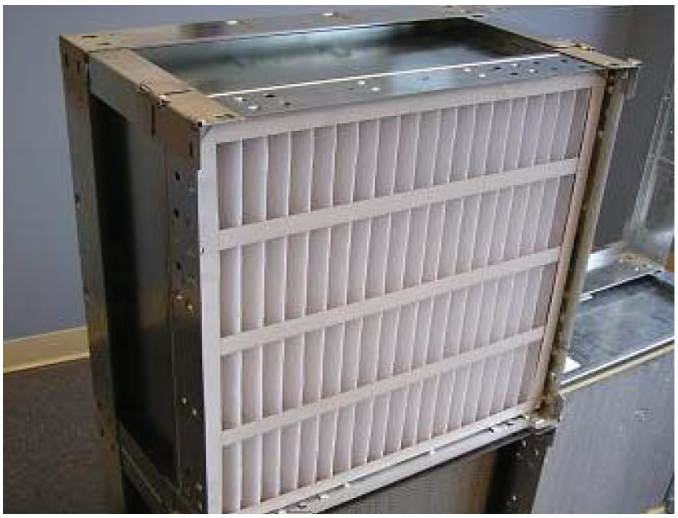


Figure 112: Completed Assembly



Installing Ductwork

WARNING

Mold can cause serious illness or property damage. Materials such as gypsum wallboard can promote mold growth when damp. Such materials must be protected from moisture that can enter units during maintenance or normal operation.

On bottom-supply/bottom-return units, if a Daikin Applied roof curb is not used, installing contractor should make an airtight connection by attaching field fabricated duct collars to the

bottom surface of either the roof curb's duct flange or the unit's duct opening. Do not support the total weight of the duct work from the unit or these duct flanges. See Figure 113.

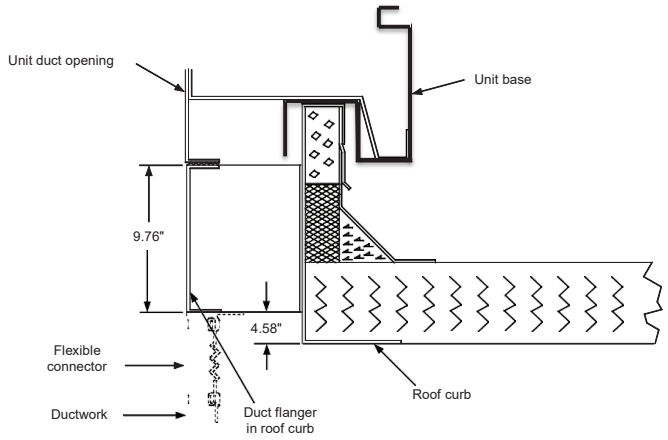
Use flexible connections between the unit and ductwork to avoid transmission of vibration from the unit to the structure.

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.

Figure 113: Installing Duct Work



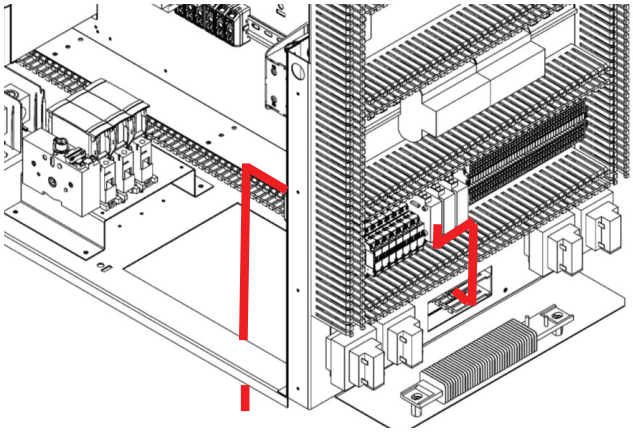
Installing Duct Pressure Taps

Units that will operate as a VAV unit require a reading of the duct static pressure. This requires that pressure taps be field installed and plumbed back to the pressure sensors in the unit. There may be up to two duct static pressure sensors on a unit; DSP1 is provided when the unit is built for VAV operation and an additional sensor DSP2 is optional. When present, these sensors are located within the Low Voltage Control Panel shown in Figure 3 on page 6.

Carefully locate and install the field provided pressure tap. Improperly locating or installing the DSP1 or DSP2 tap may cause unsatisfactory operation of the building VAV system. Consider the following pressure tap location and installation recommendations. The installation must comply with all applicable 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. Differentiate between the duct pressure (HI) and reference pressure (LO) taps by using different color tubing or by tagging the tubes. Daikin Applied recommends 3/16" I.D. plastic 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 pressure tap in a non-turbulent flow area of the duct. Keep it several duct diameters away from take-off points, bends, neckdowns, attenuators, vanes, or other irregularities that may create turbulent air flow.
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 pressure 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.
7. Locate the reference pressure (LO) tap somewhere near the duct pressure tap within the building.
8. If the reference pressure tap is not connected to the sensor, unsatisfactory operation will result.
9. Route the tubes between the curb and the supply duct, feeding them into the Main Control Panel through the Panel Entrance Plate. Connect the tubes to their respective inlets on the appropriate pressure sensor in the Low Voltage Control Panel. See Figure 114 for the suggested routing for the tubing.

Figure 114: Recommended Tubing Route to Sensors



Indoor Air Quality (IAQ) Installations

⚠ WARNING

POSSIBLE EXPOSURE TO ULTRAVIOLET RADIATION AND HAZARDOUS VOLTAGE!

Failure to disconnect power before servicing could result in severe electrocution or burns leading to serious injury or death. This product contains components that emit Ultraviolet Light radiation (UV-C) which can be harmful to the skin and unprotected eyes. Disconnect all electrical power, including remote disconnects, and ensure UV lights are off before servicing. Follow proper LOCKOUT/TAGOUT procedures to ensure the power cannot be energized while in service.

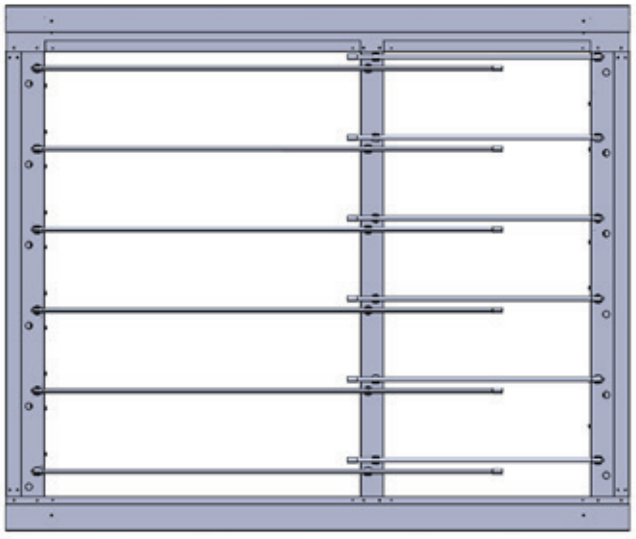
Installing UV Lamps

Units equipped with an IAQ section will be shipped with all sheet metal and wiring in place. The UV lamps will need to be installed in the field. The lamps are packaged inside the unit for protection during transit.

- Wear cotton or polyester gloves and safety glasses while handling the lamps.

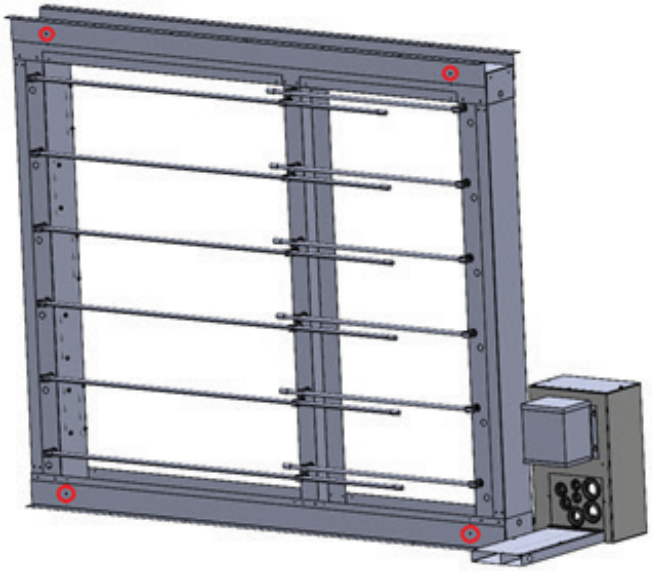
The UV light rack utilizes two different lamp lengths to span the entire width inside of the cabinet. There will be one 33” and one 61” long lamp used per row of lights. This unit will have 6 rows total. The 33” and 61” lamps are slightly offset in each row as seen in Figure 115.

Figure 115: Front View of IAQ Section (facing downstream)



The IAQ sheet metal rack is held into place with 4 screws to secure it to the air handler. To ease the installation of UV lamps, unscrew these 4 fasteners at the corners of the rack as detailed in Figure 116. After the fasteners are removed, disconnect the power at the base of the right side of the rack as seen in Figure 117.

Figure 116: IAQ Rack Fastener Locations



Once the power has been disconnected, slide the rack out of the unit 1/3 of the way so you can access the lamp clips that are the furthest apart while standing outside the unit as seen in Figure 118.

Figure 117: IAQ Rack Power Location

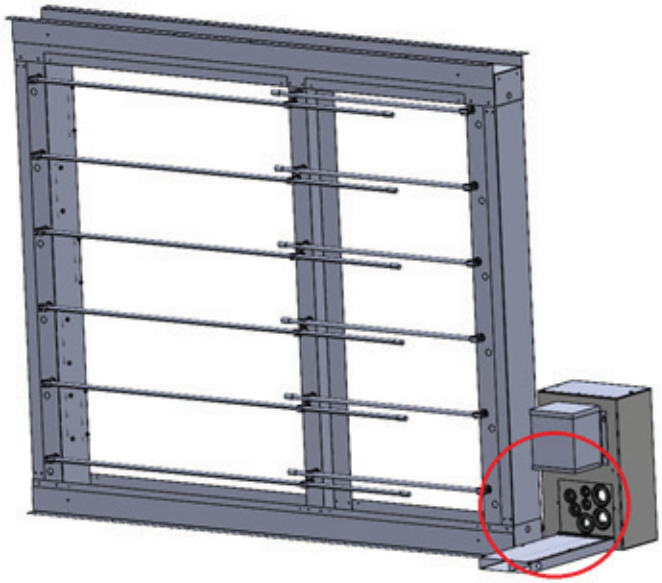
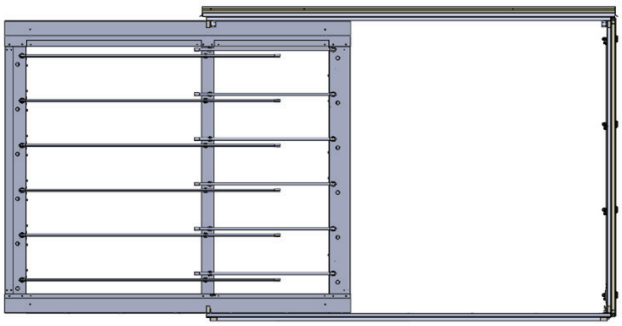


Figure 118: IAQ Rack Partially Removed for 61" Bulb Installation



- Carefully remove the lamps from the packaging and install them one at a time. There are black lamp clips already installed in the sheet metal rack that will be used to hold the UV lamps.
- The 61" lamp will be mounted to the clips that are furthest to the left of the unit and the clips in the center of the unit. The 33" lamps are staggered above the 61" lamp.
- The receiving power connection to the lamp must be facing the outer edge of the unit so that power can easily be connected/disconnected to the lamp. This connection has 4 pins on it and is on the end of the bulb.

Place the UV lamp evenly between the two clips and press the bulb into the center of the spring clip until the bulb is held firmly in the center semicircle. When pressing the bulb into the clip, apply pressure to the lamp directly above the clip to prevent fracturing the lamp as detailed in Figure 119.

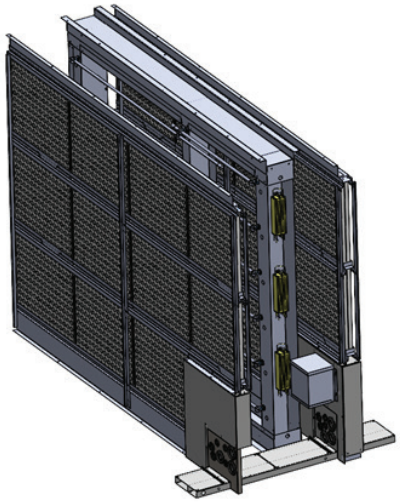
Figure 119: Spring Clip Handling

Once the bulb is installed into the clip, connect the wire harness to the end of the bulb. The wire harness is shielded by a flexible metal conduit and will already be installed in the unit. There will be one power harness per bulb.

Installing PCO Panels and Carbon Filters

- Photocatalytic oxidation panels (PCO) are located upstream and/or downstream of the UV lights depending on the option configured in the unit.
- PCO panels and carbon filters will slide into a traditional filter rack downstream of the UV lights, where there will be a 2"-wide filter rack as seen in Figure 120.
- PCO panels should be mounted upstream of the carbon filters. Carbon filters should be replaced at the same interval as the coil pre filters.
- PCO panels will require cleaning once a year or more if there is excess buildup of particulate on the panels. Wash with low pressure water and leave to air dry. Once all panels are dry, they can be reinstalled in the unit.

Figure 120: IAQ Rack with PCO Panels Upstream and PCO Panels and Carbon Filters Downstream of UV lights



Replacing UV Light Bulbs

Ultraviolet bulbs should be replaced after 9,000 hours of use or annually, even if the bulbs still emit light. The blue light emitted from the bulb is not an indication of UV intensity. The UV light intensity emitted from the bulbs degrades over time and will no longer provide the same disinfection benefit. Replacement bulbs must be the exact same size and from the same manufacturer.

1. Disconnect power to unit and UV lamps.
2. Disconnect power harness at the base of the sheet metal rack holding the UV lamps.
3. Disconnect metal conduit power harness connected to the UV lamp.

4. For 33” bulbs, remove lamps from the right side of the unit. The 61” bulbs should be removed by unscrewing the 4 fasteners at the top and bottom corners of the sheet metal rack, disconnecting the power at the base of the right side, and then sliding the sheet metal rack 1/3 of the way out of the unit. Having the sheet metal rack partially removed from the unit allows for easier removal of the 61” lights.
5. Once all bulbs are installed and connected to a power harness, slide the rack back into the unit and reinstall the 4 mounting screws on the corners. Reconnect the power harness at the bottom right corner of the rack.

Indoor Air Quality (IAQ) Sensors

The IAQ sensor package includes 3 sensors (2 indoor sensors and 1 outdoor sensor). The indoor sensors are placed in the return and supply sections of the unit. The outdoor sensor is located in the economizer section.

The expected life of the sensors is 10 years, after which replacement is recommmended.

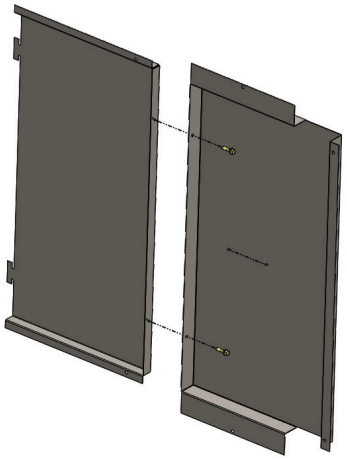
Fan Block-off Plates

Optional fan block-off plates may be ordered to HELP maintain reduced capacity functionality in the case of a supply or return fan failure. A until replacement can be procured and installed. Fan block-off plates come in two styles, upstream and downstream.

Upstream Fan Block-off Plate

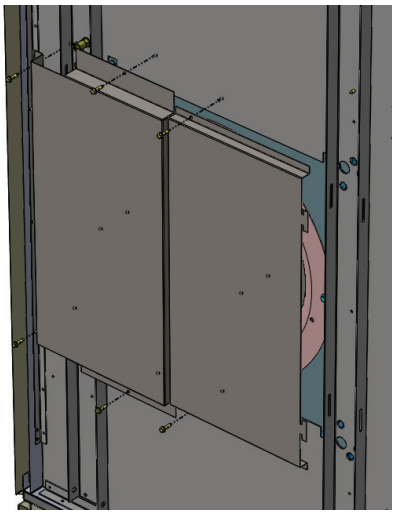
Upstream fan block-off plates are an option that can be assembled and applied without having to remove the failed fan. This block-off plate comes in two pieces which can be assembled outside the unit with the screws provided and installed on the upstream side of the fan bulkhead. Figure 121 shows the proper assembly of the two pieces.

Figure 121: Upstream Block-off Plate Assembly



Once assembled, the upstream block-off plate can be installed into the unit to cover the inlet of the fan opening. The failed fan can be left in place for storage until a replacement fan can be installed. Figure 122 shows the proper installation of the upstream fan block-off plate.

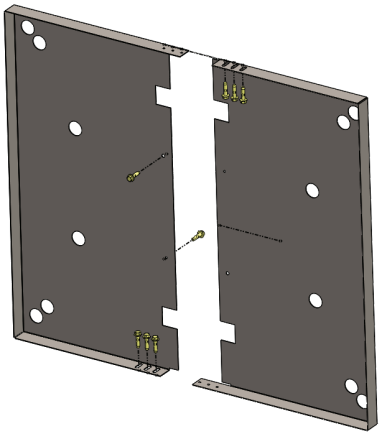
Figure 122: Installing Upstream Block-off Plate



Downstream Fan Block-off Plate

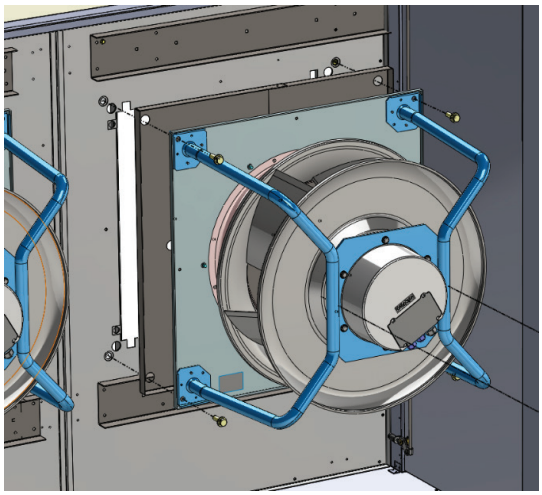
Downstream fan block-off plates are an option that requires removing the failed fan. This block off plate comes in two pieces which can be assembled outside the unit with the screws provided and installed on the downstream side of the fan bulkhead. Figure 123 shows the proper assembly of the two pieces.

Figure 123: Downstream Block-off Plate Assembly



Once assembled, the downstream block-off plate can be installed in the unit, on the downstream side of the fan wall bulkhead. The failed fan must be removed in order to install the downstream block-off plate. However, as an added feature, the failed supply fan can be reinstalled over the block-off plate, if it is deemed more convenient for storage purposes.

Figure 124: Installing Downstream Block-off Plate

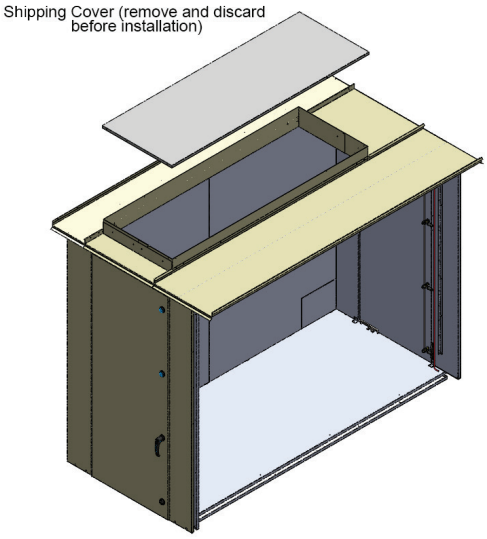


Top Discharge

On units that are in the top discharge configuration, it is the installer's responsibility to ensure there can be no leakage at or around the duct collar, or the applied ductwork. Leak proof Sealant is applied at the factory, however, additional sealant or waterproof tape should be added at installation to ensure no leakage occurs.

Figure 125 below shows the duct collar of a top discharge unit and surrounding joints and seams to be inspected and sealed.

Figure 125: Top Discharge Opening



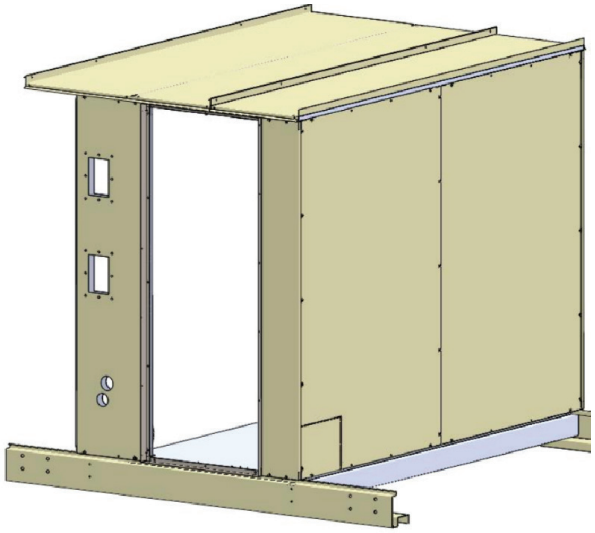
Side Discharge

On units that are in the side discharge configuration, The same rules as top discharge for unit leakage apply. It is the installer's responsibility to ensure there can be no leakage at or around the duct collar, or the applied ductwork.

Additional support must be given to ductwork to avoid the deformation of the duct collar and damage to the unit.

Figure 126 below shows the duct collar and surrounding area of a side discharge unit.

Figure 126: Side Discharge Opening



⚠ CAUTION

Please be careful when removing shipping cover and installing duct work. Damage to top panels in this area could cause leaks that could cause damage to unit and building. Inspect all seams and apply sealant and/or waterproof tape to seams prior to operation

Installing Building Static Pressure Sensor Taps

⚠ CAUTION

Please be careful when removing tubing from the fragile pressure sensor fitting. Do not use excessive force or wrench the tubing back and forth when removing the tubing. Excessive force and motion can break off and damage the sensor.

Units that are selected with the capability for direct building static pressure control require a reading of the building static pressure. This requires that pressure taps be field installed and plumbed back to the Building Static Pressure sensor (BSP) in the unit. When present, the BSP sensor is found in the Low Voltage Control Panel

Carefully locate and install the field provided pressure taps. Improperly locating or installing the BSP pressure taps may result in unsatisfactory operation. Consider the following pressure tap locations and installation recommendations. The installation must comply with all applicable local code requirements.

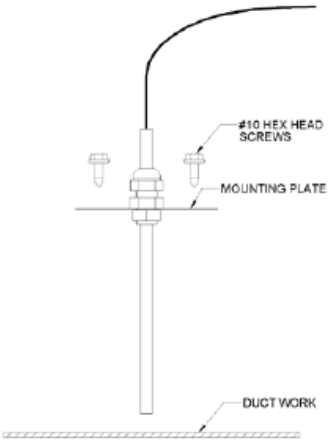
1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor fitting. This facilitates connecting a manometer or pressure gauge if testing is required.
2. Differentiate between the building pressure (HI) and outdoor pressure (LO) taps by using different color tubing or by tagging the tubes. Daikin Applied recommends 3/16" I.D. plastic tubing.
3. Regardless whether the pressure in the controlled space is to be positive or negative with respect to its reference, the building pressure tap will be the HI pressure tap on the Building Static Pressure sensor.
4. Locate the building pressure (HI) tap in the area that requires the closest control. Typically, this is a ground level floor that has doors to the outside. The location must not allow the reading to be influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
5. Route tubing between the building pressure tap and the Building Static Pressure sensor (HI) tap. The tubing should be routed between the curb and the supply duct, entering into the Main Control Panel through the Panel Entrance Plate. See Figure 114 on page 57 for the recommended route for field installed tubing to the BSP.
6. Locate the reference pressure (LO) tap in the area surrounding the controlled space. Improperly locating the reference tap may result in unsatisfactory operation.
7. If the reference pressure (LO) tap is to be located outside, locate it away from condenser fans, walls, or anything else that may cause air turbulence. The reference pressure (LO) tap must be mounted high enough above the roof or ground so that it is not affected by snow. Additionally, 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.
8. Route tubing between the reference pressure tap and the Building Static Pressure sensor (LO) tap. The tubing should be routed between the curb and the supply duct, entering the Main Control Panel through the Panel Entrance Plate. See Figure 3 on page 6 for the recommended route for field installed tubing to the BSP. Seal the penetration to prevent water from entering.

Installing Discharge Air Temperature Sensor

The discharge air temperature sensor should be installed in the supply air duct. downstream of the rooftop unit. Locate the sensor at a location that approximates the average duct temperature. To avoid the affects of radiation, the sensor should not be in direct line of sight with the gas furnace. Generally, locate the sensor 5-10’ from the unit discharge and after one duct turn to allow for air mixing. Do not install downstream of VAV boxes or other dampers.

1. Drill a 7/8” Diameter hole in the duct, insert the temperature probe and secure plate to duct using 2-#10 screws.
2. Be sure to apply gasket or sealant to back of mounting plate prior to screwing the plate to the duct to create an air tight seal.

Figure 127: Temperature Sensor Installation



Unit Wiring

Field Power Wiring

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Hazardous voltage can cause serious injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

⚠ DANGER

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

⚠ DANGER

Proper line voltage and phase balance must be provided. Improper voltage or excessive phase imbalance may result in severe damage to the electrical components within the unit.

For the unit to operate, power must be supplied to the unit through field installed service conductors. Electrical characteristics, such as Unit Voltage, Minimum Current Ampacity (MCA), and Maximum Overcurrent Protection (MOCP) are found on the Unit Nameplate. These characteristics must be considered when planning the installation of the service conductors and other applicable field wiring.

NOTE: The installation of all field wiring, must comply with all applicable local codes and ordinances. The warranty is void if the field wiring is not in accordance with these standards.

Depending on the unit configuration, the unit will come with either a Fused Disconnect, a Non-Fused Disconnect, a power block, or a combination in cases where multiple sources of power are specified. Consult the Unit Specific Electrical Schematics to determine the number of required sources of power. Refer to Table 9 for the standard multiple point power connection options and their function.

Table 9: Multiple Point Power Connection Options

Power Sources	Disconnect Designation	Load	Location
2	DS2	Supply and return fan motors plus controls	Main control panel
	DS1	Balance of unit	Main control panel
2	Field Connect	Electric heat	Electric heat control panel
	DS1	Balance of unit	Main control panel
3	Field Connect	Electric heat	Electric heat control panel
	DS2	Supply and return fan motors plus controls	Main control panel
	DS1	Balance of unit	Main control panel

The point of connection for service conductors will be within the Main Control Panel. However, on some units service conductors may be required to be installed in the Electric Heater Control Panel. Consult the Unit Specific Electrical Schematics to determine if the electric heater will require its own set of service conductors. Refer to "Daikin Applied Electric Heater Modules" on page 108 for service conductor entrance details pertaining to the electric heater.

The recommended entrance for field installed service conductors that terminate in the Main Control Panel is through the Panel Entrance Plate in the bottom right corner of the control panel enclosure. This entrance to the Main Control Panel is shown in Figure 128 on page 64 and also noted in Figure 129

When planning the installation of the service conductors, consider the information in Table 10, Table 11, and Table 12 on page 63. These tables provide details for the field wired service conductor connections including the number of ports that will be available per phase as well as the range of conductor gauge that they will accept. Table 10 provides this information for non-fused disconnects, Table 11 covers the fused disconnects, and Table 12 details power block ports.

Table 10: Non-Fused Disconnect Lug Port Details

Non Fused	Type 1 Ports			Type 2 Ports		
Disconnect Size	Qty	Min AWG	Max AWG	Qty	Min AWG	Max AWG
30	1	#10	2/0	—	—	—
60	1	#10	2/0	—	—	—
100	1	#10	2/0	—	—	—
200	1	#6	300MCM	—	—	—
400	2	1/0	250MCM	1	#4	600MCM

Table 11: Fused Disconnect Lug Port Details

Fused	Type 1 Ports			Type 2 Ports		
Disconnect Size	Qty	Min AWG	Max AWG	Qty	Min AWG	Max AWG
60	1	#14	#6	—	—	—
100	1	#12	#1	—	—	—
200	1	#6	300MCM	—	—	—
400	2	1/0	250MCM	1	#4	600MCM

Table 12: Power Block Port Details

Power Block	Type 1 Ports			Type 2 Ports		
Ampacity	Qty	Min AWG	Max AWG	Qty	Min AWG	Max AWG
510	1	#2	600MCM	12	#14	#4
760	4	#4	500MCM	—	—	—
950	2	1/0	750MCM	10	#14	2/0

Copper wire is required for all field installed conductors. Supply voltage must not vary by more than 10% of the unit voltage specified on the nameplate. Phase voltage imbalance must not exceed +/- 2%. (Calculate the average voltage of the three legs. The leg with voltage deviating the farthest from the average value must not be more than 2% away.) Contact the local power company for correction of improper voltage or phase imbalance.

The unit has an option to come with a GFCI service outlet pre-installed in order to satisfy the code requirements of NEC 210.63. If the GFCI or the service lights were selected as field powered, conductors supplying a 115V 20/15A source must be run to terminals in the control panel as shown in the example in Figure 128. These terminals are typically located in the Main Control Panel at the High Voltage Terminal Block, TBHV.

If the GFCI or service lights were selected as unit powered, then no additional wiring must be run beyond the 3 phase service conductors to power the 115V service outlet. Consult the Unit Specific Electrical Schematics to determine the installation requirements.

Figure 128: Typical Field Power Entrance – Main Control Box

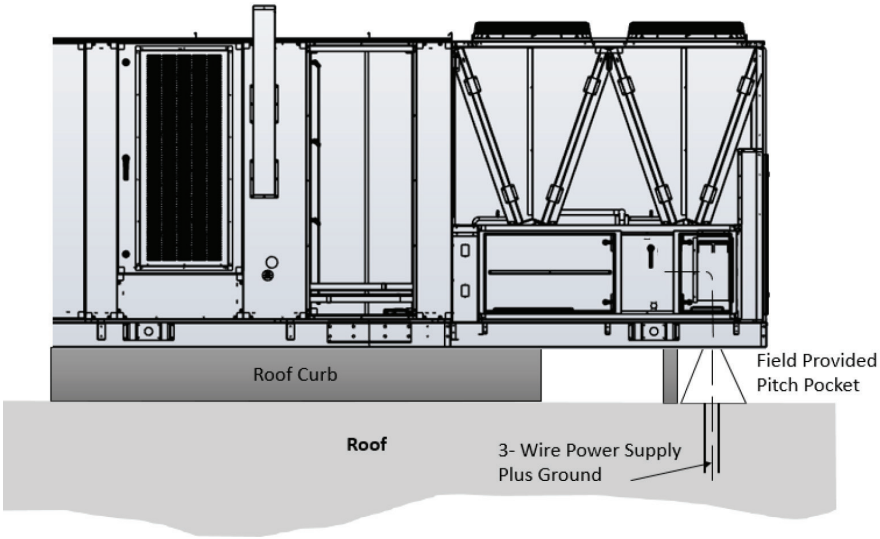


Figure 129: DPSA Unit - Typical Field Power Entrance – Panel Entrance Plate

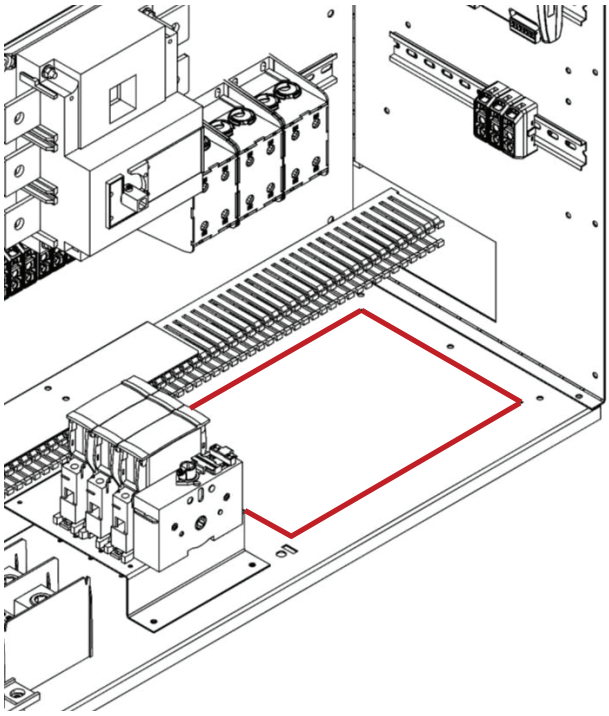


Figure 130: DAHA Unit - Typical Field Power Entrance - Power Entrance Plate

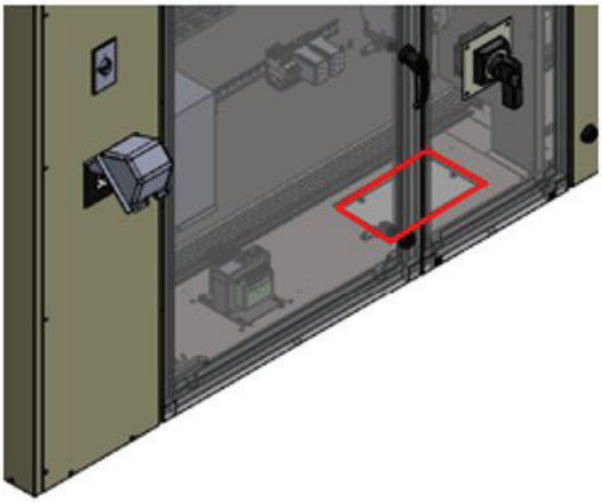
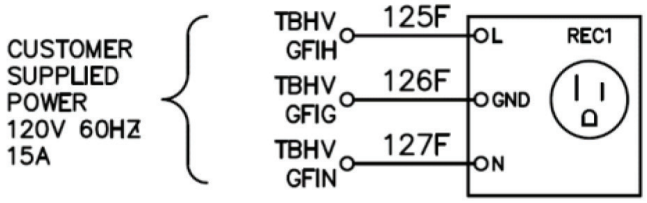


Figure 131: Field Wired GFCI Power



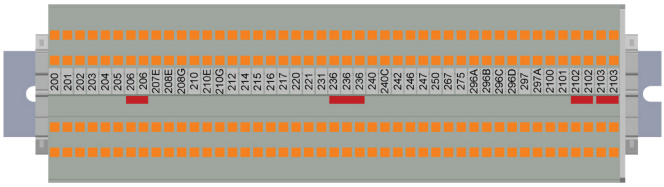
Field Control Wiring

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Electrical shock hazard that may cause severe injury or death. Connect only low voltage NEC Class II circuits to the terminal blocks. Reinstall and secure all protective front panels when the wiring installation is complete.

Rebel Applied units are available with several control schemes which may require low voltage field wiring. Use the Unit Specific Electrical Schematics to determine which control connections will be required for installation. Check unit specific electrical documentation in the door of the control panel. Figure 132 is a graphical representation of TB2 and Table 13 shows the possible field connections that can be made.

Figure 132: Graphical Representation of TB2



Rebel Applied units operate with 115V and 24V control circuit power. All field control wiring connections are made at the class II terminal block TBLV2 which is located in the Low Voltage Control Panel, shown in Figure 134

NOTE: The installation of all field wiring, must comply with all applicable local codes and ordinances. The warranty may be limited or certain aspects excluded if the field wiring is not in accordance with these standards.

If a single conduit containing 24V and 115V wiring is run above the roofline between units, consider the 24V wiring within as an NEC Class I wiring system.

Table 13: Potential field Connections and Locations on TB2

Terminal Block Number	Description	Signal
200	Power	24VAC
201	Signal for Tennant Override	Contact Closure
202	Condensate Overflow Switch Contact 1	Contact Closure
203	Condensate Overflow Switch Contact 2 & feed into SD2 E-stop series	Contact Closure
204	Feed from SD2 into E-Stop Series	Contact Closure
205	Field Provisions for E-Stop	Contact Closure
206	Field Provisions for E-Stop	Contact Closure
207E	Relative Humidity Sensor #1 (ZRH1)	4-20mA
208E	Humidity Sensor	4-20mA
208G	Relative Humidity Sensor #2 (ZRH2)	4-20mA
210	Space Temperature Sensor 1	Thermistor
210E	Space Temperature Sensor 2	Thermistor
210G	Space Temperature Sensor 3	Thermistor
212	Setpoint Adjustment, Wallstat	0-5 VDC Signal
214	CO2 / Ext OA Reset	0-10V DC
215	Alarm Output	24VAC relay
216	Alarm Return	24VAC relay
217	Fan Operation	24VAC relay
220	Freezestat Sensor Terminal 1	Contact Closure
221	Freezestat Sensor Terminal 2	Contact Closure
231	Alarm Reset	Contact Closure
236	Controller Common	
240	Local / Remote Status	Relay output
240C	System Ready Output	Relay output
242	Cooling system Interlock (From Field)	Contact Closure
246	Reheat Valve Cmd	0-10V DC
247	Cooling Capacity Input	0-10V DC
250	Cooling Actual Capacity Output	0-10V DC
267	SAF1 Capacity Cmd (From Field)	0-10V DC
275	EF Capacity Cmd (From Field)	0-10V DC
296A	Return Air SD Aux Contact	Relay output
296B	Return Air SD Aux Contact	Relay output
296C	Supply Air SD Aux Contact	Relay output
296D	Supply Air SD Aux Contact	Relay output
297	Passive Ventilation Input	Contact Closure
297A	Passive Ventilation Input	Contact Closure
2100	Smoke Purge - Purge	Contact Closure
2101	Smoke Purge - Pressurize	Contact Closure
2102	Smoke Purge - Vent	Contact Closure
2103	Smoke Purge - Shutdown	Contact Closure

Figure 133: Wiring Raceway, Air Handler Sections

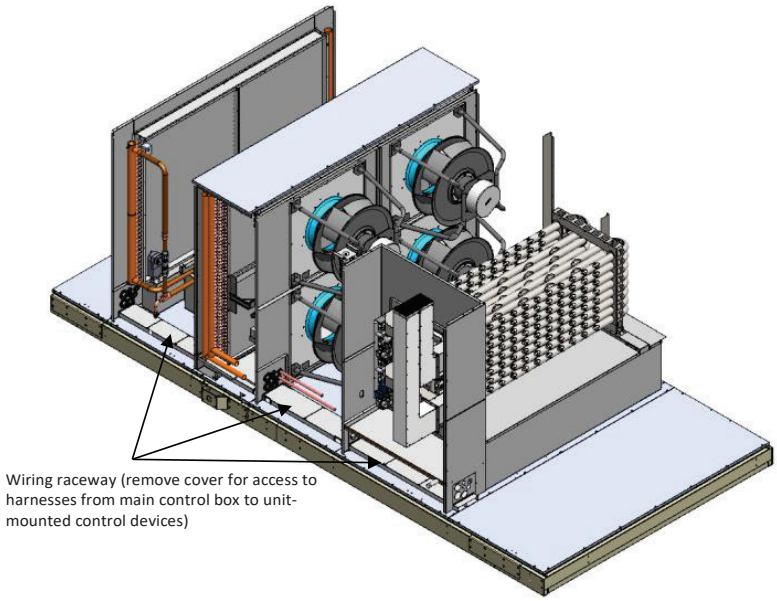
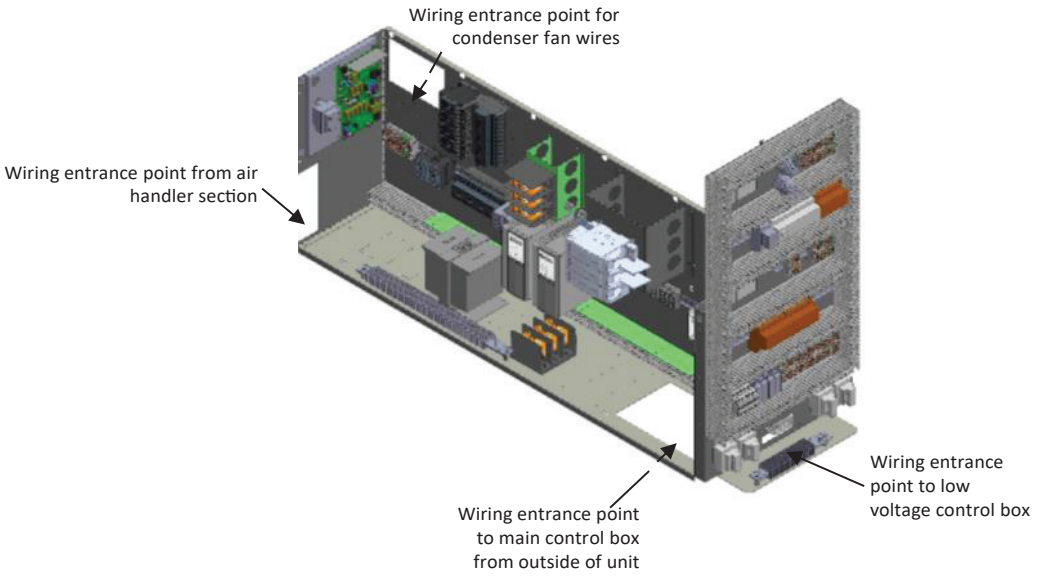


Figure 134: Wiring Connections Control Box (located in Condenser Section, Shown without Doors or Panels)

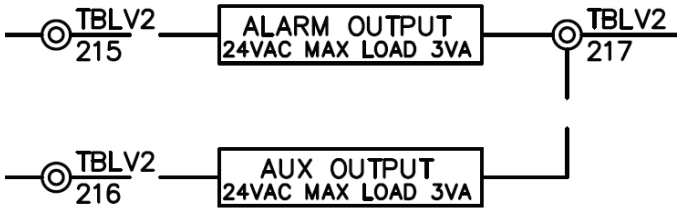


Field Output Signals

There are several output signals on the MicroTech 4 Controller that may be available for field connections. For example, the Alarm Output and the Auxiliary Output, shown in Figure 135, can be used to send signals to external systems.

A field supplied 24VAC relay must be installed in order to interface these outputs with a system external to the unit. When the respective signal is active, the signal terminal will be energized with 24VAC. The coil of the field supplied 24VAC relay must be wired between the signal terminal and the common terminal. These would be terminals TBLV2-215 and TBLV2-217 in the case of the Alarm Output and terminals TBLV2-216 and TBLV2-217 in the case of the Auxiliary Output. The field installed relay coil may draw no more than 3VA or 125mA at 24VAC.

Figure 135: Field Output Schematic



Unit Operation

Preparing Unit for Operation

Power-up

There is a 115 VAC control circuit transformer and several 24VAC circuit transformers within the unit to control the various loads and sensors within the unit. See as-built schematics that are sent with the unit to familiarize yourself with the various features and control circuits.

NOTE: Unit ships with factory installed jumpers in the emergency override circuit on TB2 between terminals 202 and 203.

Start Up Operating State

When a unit is commanded to start it will always enter the Startup operating state from the OFF operating state. The unit remains in the Startup operating state for an adjustable time period (default 180 seconds) before entering the recirculating operating state.

Recirculating Operating State

During the Start up operating state the fans remain off, the outdoor air dampers are driven closed, and variable speed supply air fan's remain at 0%. Cooling and heating are disabled, except for 100% OA heating start sequences. Recirculating Operating State Units with return air always enter the Recirculating operating state after the completion of the Startup operating state. In the Recirculating operating state fans are started and operate while the outdoor air dampers remain closed. This allows temperature conditions throughout the unit and space to equalize before temperature control begins. Cooling and heating remain disabled. The unit remains in the Recirculating operating state until the Recirculate State Timer (default 180 seconds) expires.

NOTE: 100% outdoor air units do not transition through the Recirculating operating state.

Fan Only

The unit enters the Fan Only operating state after the recirculation timer expires. Units configured for 100% outside air operation will transition directly from the Start up operating state into the Fan Only operating state. Once entering the Fan Only state of operation the unit will then, based on sensor inputs transition into any of the 4 remaining states of operation - heating, cooling, economizer, or minimum discharge air heating. Min DA

Compressor Start

Unit is shipped with stiffening brackets attached to all compressor feet to avoid unwanted vibration during transit. These must be removed after unit is set in final position and prior to start up.

Fan Operation

Within 120 seconds after the fans start, the controller expects to get feedback from the fans (via modbus) that they are operating properly. If the controller does not receive that feedback, the controller assumes the fans did not start. It then shuts down the unit and generates an alarm. Units configured for VAV control, the supply fan(s) is modulated to maintain the duct static pressure setpoint. On VAV units or CAV units equipped with return fan capacity control, the fan(s) is modulated to maintain an acceptable building static pressure.

Economizer Operation

If the unit is equipped with a 0-100% modulating economizer and the conditions are suitable for free cooling, the unit attempts to satisfy the cooling load by using the outdoor air economizer before using mechanical cooling.

If the unit is configured for Zone Temperature Control the transition to economizer operation will occur if all the following are true:

- The control temperature rises above the occupied cooling set point by more that ½ the occupied cooling high deadband
- The discharge air temperature is greater than the Min DAT limit by more than ½ the DAT heating deadband. This will prevent more cold air from being brought in when the DAT is already cold
- The economizer operation is not disabled

If the unit is configured for Discharge Air Temperature Control the transition to Mechanical cooling will occur if all the following are true:

- The control temperature rises above the occupied cooling set point by more that ½ the occupied cooling deadband
- The discharge air temperature is greater than the DAT cooling set point by more than ½ the DAT cooling deadband
- Post heat operation is complete
- Economizer operation is not disabled

Compressor Operation

Compressor Configuration - 4 Fixed

In this configuration there are four fixed speed compressors split into two equally sized cooling circuits. Two compressor staging methods are available:

CrossLoad = Alternate staging of the compressors between the two circuits leading to a more evenly loading up of the unit. The compressor staging selected is based on staging up the compressors with the least number of run hours first.

LeadLoad = Fully load up one circuit before fully loading up other circuit.

Compressor Configuration - 1 Variable, 2 Fixed

In this configuration there are three total compressors across two cooling circuits.

Circuit #1 contains one variable speed compressor.

Circuit #2 contains two fixed speed compressors.

In this configuration the variable speed compressor is the lead.

Compressor Configuration - 1 Two-speed, 2 Fixed

In this configuration there are three total compressors across two cooling circuits.

Circuit #1 contains one two-speed compressor.

Circuit #2 contains two fixed speed compressors.

In this configuration the two-speed compressor is the lead.

Compressor Configuration - 2 Variable

In this configuration there are two variable speed compressors, one on each circuit.

The two compressors operate in parallel (same speed) except when the cooling demand is lower than the capacity provided by both compressors operating at minimum speed (low demand scenarios) or when the unit is operating in dehumidification mode.

Compressor Configuration - 2 Variable, 2 Fixed

In this configuration there are two variable speed compressors and two fixed speed compressors - one of each on each circuit.

The two variable speed compressors operate in parallel (same speed) except when the cooling demand is lower than the capacity provided by both compressors operating at minimum speed (low demand scenarios) or when the unit is operating in dehumidification mode. Fixed speed compressors are switched on only if cooling demand is high enough, with circuit 1 fixed speed compressor being brought online prior to the fixed speed compressor on circuit 2.

Cross Load - 4 Fixed

During a call for mechanical cooling, if HP1 is closed, then DO1 on expansion module C closes, energizing the M1 compressor contactor. The M1 auxiliary brings on required condenser fans, liquid line solenoid valve and de-energizes the crankcase heater.

The second stage of cooling is controlled by DO1 on expansion module D. Compressor 2 is on circuit 2 and is brought on in the same manner as compressor #1, as well as the condenser fans, solenoid valve and crankcase heater on the circuit.

The 3rd stage of cooling is controlled by DO2 on expansion module C and brings on compressor 3.

The 4th stage of cooling is controlled by DO2 on expansion module D and brings on compressor 4.

Lead Load

The loading and unloading process is similar except that both compressors in the lead cooling circuit 1 energize before energizing any compressors in lag circuit 2.

Phase Voltage Monitor

The phase voltage monitor protects against high voltage, phase imbalance, and phase loss (single phasing) when any one of three line voltages drops to 74% or less of setting. This device also protects against phase reversal when improper phase sequence is applied to equipment, and low voltage (brownout) when all three line voltages drop to 90% or less of setting. An indicator run light is ON when all phase voltages are within specified limits. The phase voltage monitor is located on the load side of the power block with a set of contacts wired to the 115-volt control circuit to shut the unit down whenever the phase voltages are outside the specified limits.

External Time Clock

You can use an external time clock as an alternative to (or in addition to) the MicroTech 4 controller's internal scheduling function. The external timing mechanism is set up to open and close the circuit between field terminals 201 and 202. When the circuit is open, power is not supplied to digital input MCB- DI3. This is the normal condition where the controller follows the programmable internal schedule. When the circuit is closed, power is fed to DI3, the MicroTech 4 controller responds by placing the unit in the occupied mode, overriding any set internal schedule

VAV Box Signal/Fan Operation Signal

Digital Output #10 (MCB-DO10) may be selected as either the Fan Operation output or the VAV output via the keypad. The VAV/Fan Pop selection can be selected by accessing the Unit Setup menu in the Extended Menu section. See "Unit Wiring" on page 63 for details.

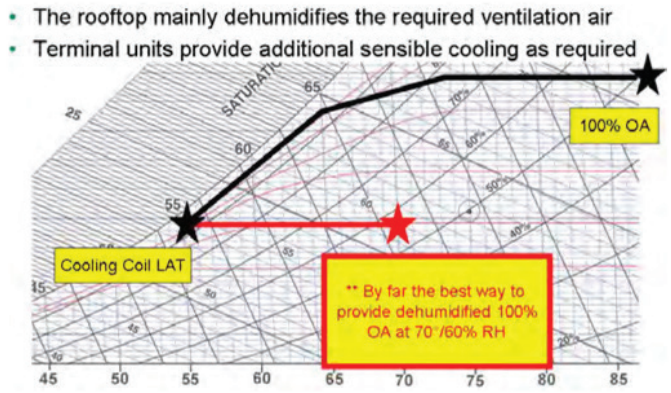
Fan Operation

The Fan Operation output is ON when the unit is not Off and when both the unit is OFF and airflow is detected. It is off when the unit is off and airflow is not detected.

Dehumidification Operation

In dehumidification mode, mechanical cooling is used to cool air low enough to lower the moisture content of the air and then reheat it to comfort conditions. There are two methods offered in the DPSA product line to accomplish this reheat –modulating hot gas reheat and modulating liquid subcool reheat.

Figure 136: Ideal for Neutral Air Ventilation Control



Modulating Hot Gas Reheat (MHGRH)

Modulating hot gas reheat (MHGRH) systems redirect a portion of the hot refrigerant coming from the compressor(s) on circuit 1 to a coil within the airstream. When there is a call for dehumidification and MHGRH is activated, the compressor(s) on circuit 1 will first be utilized to meet the cooling and dehumidification demand. If the cooling demand cannot be satisfied using only the compressor(s) on circuit 1, the compressors on circuit 2 will be staged to satisfy the remaining demand.

Modulating Liquid Subcool/Hot Gas Reheat (MLSCRH+MHGRH)

Modulating liquid subcool reheat (MLSCRH) systems redirect a portion of the warm liquid refrigerant leaving the condenser coil on both circuits to a reheat coil within the airstream as shown in Figure 8 and Figure 9. Due to the increased subcooling effect with this option, MLSCRH can increase the unit gross capacity up to 20% depending on operating conditions. When there is a call for dehumidification and MLSCRH is active, the compressors will stage/modulate accordingly to meet the leaving dx coil temperature setpoint and modulate refrigerant to the liquid reheat coil to meet the leaving unit temperature (DAT) setpoint. If the DAT setpoint cannot be satisfied by MLSCRH only, MHGRH will then be activated to assist in meeting the DAT setpoint.

Dehumidification Initiation

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

Dehumidification Termination

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

MHGRH Control & Arrangement

In conjunction with dehumidification, MHGRH is used to raise the temperature of the cooled air to a desirable value without auxiliary heat. MHGRH is comprised of a parallel coil arrangement, with both the condenser and reheat coils of the micro channel type, three-way modulating reheat valve and dual check valves. MHGRH components will always be installed in circuit #1.

During Dehumidification control with modulating Hot Gas Reheat (MHGRH) is done via Modbus signal from the main unit controller as described below.

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

55°F) when the Control Temperature is at or above the cooling changeover setpoint.

- Lead/Load Arrangement with MHGRH

  — When MHGRH is active, circuit #1 will lead and load up before starting circuit #2.

  — For reheat operation, compressor(s) in circuit #1 must be active. If the unit is operating in the cooling mode when a call for dehumidification/reheat arises, circuit

#1 will become the lead and the controller will bring on one additional stage of cooling for dehumidification. If any compressors in circuit #2 are operating at this moment they will be switched over to compressors in circuit #1. Dehumidification operation is disabled if circuit #1 is disabled for any reason.

- In the reheat mode, the minimum position for the reheat valves is 10%. The controller will modulate the reheat valves from this starting position.
- Maximum reheat signal is 85%. This will allow for the outdoor condenser to remain active in the circuit and assist with condenser pressure control.
- Reheat Capacity Limiting Feature is activated if the unit is at maximum reheat (85%) and cannot achieve DAT setpoint (minus ½ dead band) and if any compressor(s) in circuit #2 are active. One of the compressors in circuit #2 will be shut down in order to raise the DAT at the sacrifice of slightly less dehumidification capability.
- Upon termination of dehumidification (reheat), the maximum ramp down or decay rate of the reheat control valves shall be 1% per sec (or 0.1V per sec).
- The reheat valve stepper motor will require occasional re-synchronization to assure the motor and driver remain in step with one another. Every 24 hours, the reheat control valve will automatically be synchronized by driving the valve to its minimum position plus 10% over drive closed. The reheat valve will also be synchronized if there are unexpected system responses in relation to valve position.
- Dehumidification status can be found under the MTIII main system menu along with reheat capacity (valve position) display based on percentage (0-100%).
- A solenoid (SV6) and a check valve is provided to the reheat refrigeration circuit. The solenoid is normally closed and removes refrigerant from the reheat portion of the refrigerant circuit when Reheat is inactive. When Reheat is active, the solenoid closes and isolates the reheat portion of the refrigeration circuit. When the solenoid is in the open position, it meters (by pulsing) refrigerant flow as it enters the suction line. This feature reduces the amount of refrigerant needed for reheat up to 75%, compared to a flooded system arrangement. The bleed solenoid is also pulsed at the start of the circuit to remove any refrigerant that may have leaked past the stepper valve and check valve while the circuit was off.

MLSCRH+MHGRH Control & Arrangement

- In conjunction with dehumidification, the combination of MLSCRH & MHGRH is used to increase the gross cooling capacity of the unit by increasing the subcooling along with utilizing hot gas reheat to assist in controlling the temperature of air leaving the unit. This combination option is done with two separate reheat coils located downstream of the dx coil in the air handling portion of the unit.
- Operation is similar to MHGRH where compressor staging is based on leaving dx temperature and MLSRCH is modulated to achieve and maintain the DAT setpoint.
- If MLSCRH is at maximum signal and unable to achieve DAT setpoint (minus ½ dead band) then MHGRH is activated to trim the DAT to the setpoint.
- MLSCRH is installed in both circuit #1 and circuit #2.
- The minimum position for the liquid reheat valves is 15%. The controller will modulate the reheat valves from this starting position.
- The maximum reheat signal for the liquid reheat valves is 100%.
- Communication with the liquid valves is accomplished by 0-10Vdc signal from the unit controller with the use of an interface board.
- The liquid subcool reheat valve stepper motor will require occasional re-syncronization to assure the motor and driver remain in step with one another. Every 24 hours, the reheat control valve will automatically be synchronized by driving the valves to their maximum position (10 Vdc) for 60 seconds and then driving the valves to their minimum position (0%) for an additional 60 seconds. The reheat valves will also be synchronized if there are unexpected system responses in relation to the valves position.

Humidification

A unit can be ordered with factory installed humidification systems. Figure 137 shows the humidifier section as it comes from the factory. All additional piping, valve placement, and controls are to be field installed. It is the responsibility of the installer to ensure that these are safely sized, configured and installed.

Figure 137: DPSA Humidifier

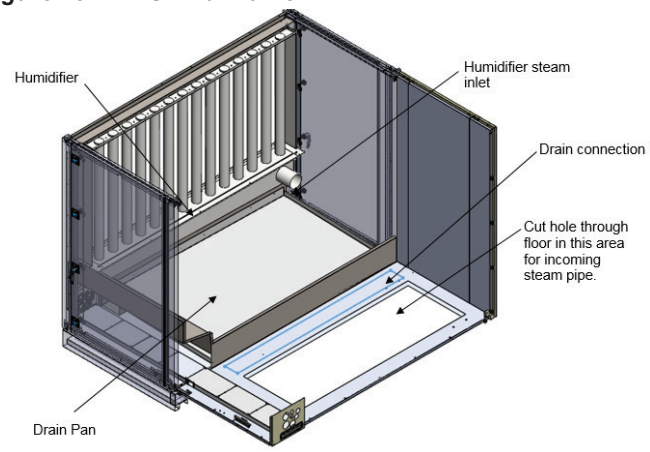


Figure 138: Humidifier Grid Drain Pan Connection

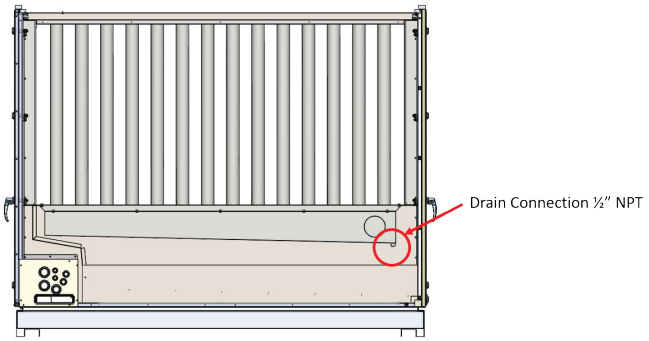
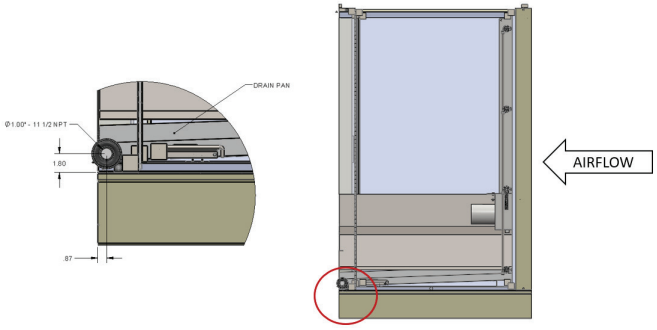


Figure 139: Humidifier Drain Pan Hole Location



Steam Supply Line Connection

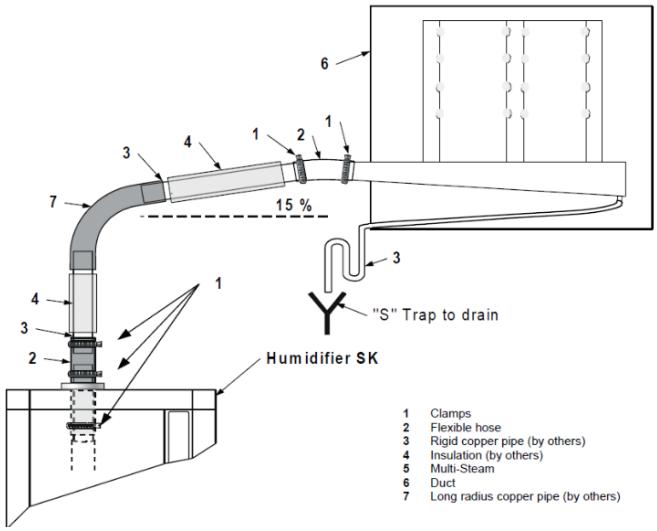
Table 14 shows pipe connection sizes.

Table 14: Humidifier Connections Sizes

Number of tubes	Tube	Steam	Steam inlet size	Drain outlet size
4	Insulated	Atmospheric	4" OD	1/2" NPT
4	Insulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
4	Uninsulated	Atmospheric	4" OD	1/2" NPT
4	Uninsulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
6	Insulated	Atmospheric	5" OD	1/2" NPT
6	Insulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
6	Uninsulated	Atmospheric	5" OD	1/2" NPT
6	Uninsulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
8	Insulated	Atmospheric	5" OD	1/2" NPT
8	Insulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
8	Uninsulated	Atmospheric	5" OD	1/2" NPT
8	Uninsulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
10	Insulated	Atmospheric	5" OD	1/2" NPT
10	Insulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
10	Uninsulated	Atmospheric	5" OD	1/2" NPT
10	Uninsulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
12	Insulated	Atmospheric	5" OD	1/2" NPT
12	Insulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
12	Uninsulated	Atmospheric	5" OD	1/2" NPT
12	Uninsulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
14	Insulated	Atmospheric	5" OD	1/2" NPT
14	Insulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT
14	Uninsulated	Atmospheric	5" OD	1/2" NPT
14	Uninsulated	Pressureized (SKD)	1-1/2" NPT	1/2" NPT

Figure 140 shows proper installation of supply line connections.

Figure 140: Humidifier Supply Line Installation

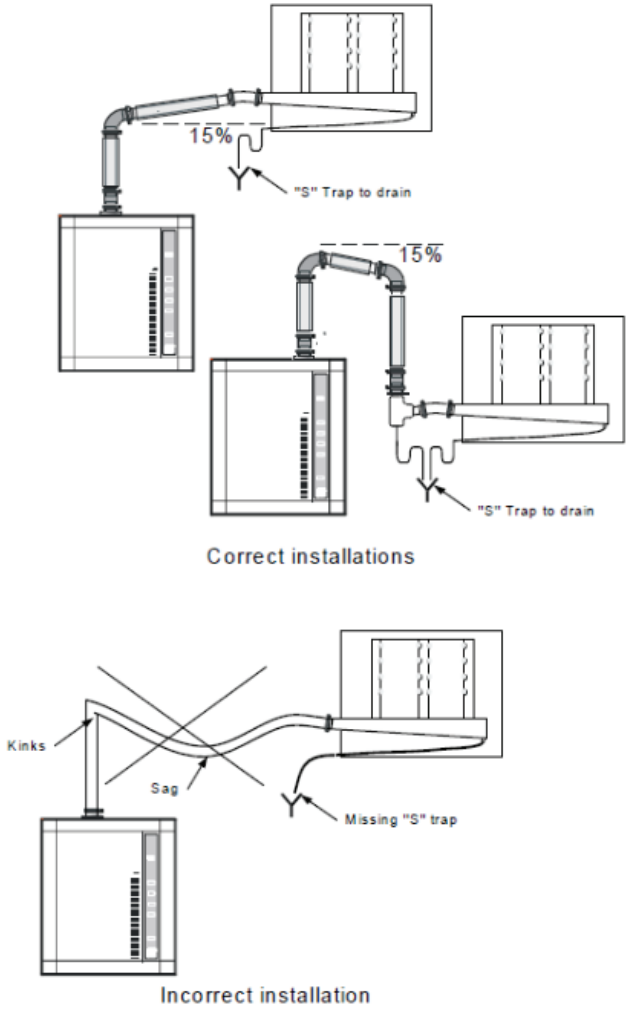


Follow the below general installation rules in order to avoid any condensation accumulation which can cause severe water accumulation in the duct or a humidifier malfunction.

⚠ IMPORTANT

Risk of malfunction. Avoid kinks, sags and areas where condensate can become trapped. Plumbing installation should conform to Local and National Codes.

Figure 141: Proper and Improper Installation Examples



1. The slope of the steam hose (rigid or flexible) should not be less than 15% (7 horizontal lengths for 1 vertical length) in order to ensure continuous drainage of condensation back to humidifier or to steam trap.
2. The lowest point of any steam hose or rigid pipe must be the humidifier. If necessary, a steam trap (S Type) should be installed higher than the static pressure of the system by at least 2 inches (51mm).
3. Total length of the steam hose or rigid pipe should not exceed 15 feet (5 meters). Longer runs will result in added condensation losses. Whenever possible, use insulated copper piping. Flexible steam hose should be used for short runs (up to 15 feet or 5m) or for interconnecting between the rigid pipe runs. For longer runs, please consult the factory.
4. Whenever using rigid copper pipe, use insulation to diminish condensation build up.

Single steam outlet

- Run one steam line from the steam outlet of the evaporation chamber of the humidifier to the Multi-Steam header (a reducer is welded at the inlet of the Multi-Steam header).
- Use steam hose and clamps to make the connection from hard insulated copper pipe to the Multi-Steam and the humidifier.

⚠ IMPORTANT

Never reduce the diameter of the steam lines. Improper size will over-pressurize the humidifier.

Condensate drain outlet

The Multi-Steam has a 1/2” (15mm) or 3/4” (20mm) NPT (or BSPT) condensate drain connection.

⚠ IMPORTANT

Remove the 1/2” (15mm) or 3/4” (20mm) cap (shipping protection) from the condensate drain before the installation.

- Run a pipe (same size as the condensate drain connection) as directly as possible from the condensate drain outlet to the floor drain with a proper slope and install a steam trap to prevent any steam leakage from the drain.
- The steam trap (S Type) should be installed higher than the static pressure of the system by at least 2 inches (51mm).

Start-up procedure

Follow this start-up procedure to avoid improper system operation:

1. Ensure that plumbing connections have been done in accordance with the instructions in this manual.
1. Verify that the steam supply line is connected properly to the Multi-Steam.
2. Verify that the Humidifier Grid is properly pitched.
3. Verify that the Humidifier Grid condensate drain is connected to the drain line.

Maintenance

- Inspect the Multi-Steam at startup and during normal operation.
- Make sure all hose connections are secure and there are no leaks in the line.

Troubleshooting

Problem	Causes	Corrective Actions
Multi-Steam discharges water inside the duct or AHU	• Steam supply line is not insulated. • Steam supply line is not properly drained or sloped. • The Multi-Steam condensate drain is blocked or drain line is not properly sloped. • The Multi-Steam is not properly pitched. • Steam or condensate is leaking from the gasket on the Multi-Steam collapsible.	• Insulate the steam supply line. • Install steam trap to remove the condensate from the steam supply line. • Slope the steam supply line properly as per instruction. • Verify the condensate drain line. • Pitch the Multi-Steam as per instructions in Fig. Figure 113 and Figure 114 • Replace the gasket (p/n SP 6867).

VAV Box Output

In the Heating state, the VAV Output is turned OFF to indicate that hot air instead of the normal cool air is being supplied to the VAV boxes. The VAV boxes are driven to their Heating Position when hot air is provided based on either the normally open or normally closed contacts of the VAV output. The VFD will continue to be controlled to maintain the desired duct static pressure. This output is also OFF when the unit is in the Startup or Recirculation states. If this output is in the Heat (OFF) position when the unit enters the Fan Only state or Minimum DAT Control state, the output remains OFF for an adjustable Post Heat Time (while the unit VFDs are driven to minimum speed) or until the VFD gets to its minimum speed if the Post Heat Time is set greater than 0. The Post Heat Timer can be adjusted via the keypad/display Timer Setting menu in the Extended Menus.

During unoccupied operation, the VAV Box Output is in the Cool (ON) position unless airflow is detected. When airflow is detected, it switches to the Heat (OFF) position.

Entering Fan Temperature Sensor

The entering fan temperature (EFT) sensor and an associated “Lo Airflow Problem” alarm are provided on VAV units with MicroTech 4 control and gas or electric heat. The EFT sensor is located in the supply fan section of the unit at the supply air funnel.

Heat is disabled whenever the airflow is detected to be too low for safe heating operation. This condition is indicated when the supply air temperature exceeds the mixed air temperature by more than 60°F (16°C).

NOTE: This value is not always 60°F. It depends on whether the unit is gas or electric heat and on the burner/baffling arrangement on gas heat units.

In this case, a “Lo Airflow Problem” alarm is generated and heat is not enabled until the alarm is manually cleared. Refer to the operation manual for information on clearing alarms (OM 1288).

Duct High Pressure Limit

The duct high pressure limit control (DHL) is provided on all VAV units. The DHL protects the duct work, the terminal boxes, and the unit from over pressurization, which could be caused by, for example, tripped fire dampers or control failure. The DHL control is factory set to open when the discharge plenum pressure rises to 5.0" wc.

If the DHL switch opens, digital input DI5 on the Main Control Board de-energizes. The MicroTech 4 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 (OM 1288).

Variable Frequency Drive Operation

Refer to the vendor instructions supplied with the unit.

Convenience Receptacle/Section Lights

A Ground Fault Circuit Interrupter (GFCI) convenience receptacle is provided in the main control box. Both unit-powered and field-powered versions are offered.

Optional lights are available for certain sections in the unit. Each light includes a switch and convenience receptacle and is powered by the external 115V power supply connected to TB7.

Propeller Exhaust Fan Option

Economizer units may include propeller exhaust or centrifugal return fan options. This section covers maintenance and operating instructions for the propeller exhaust option.

Centrifugal return fan construction, maintenance and operation is similar to supply fans and covered in other sections of this manual.

Figure 142: Fan Rotation

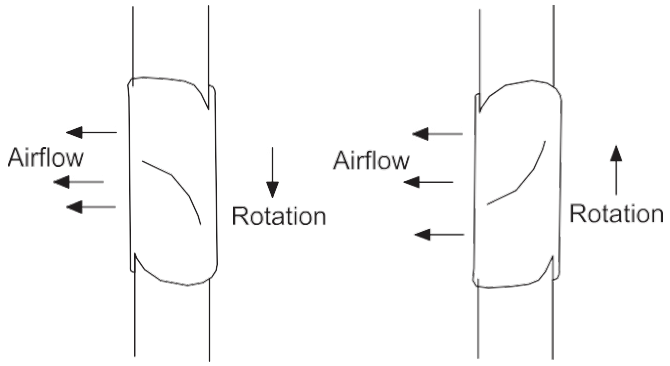
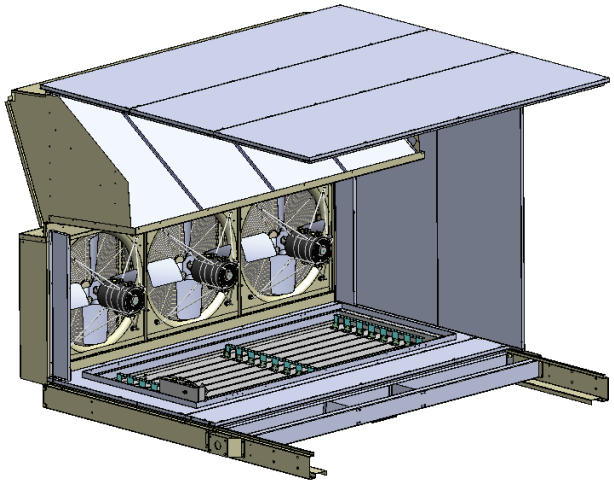


Figure 143: Three Fans with Bottom Return



Fan Prestarting Checks

Check all fasteners and set screws for tightness. This is especially important for bearing set screws.

The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Rotation should be in the same direction as the rotation decal affixed to the unit or as shown in Figure 142 on page 77. For three-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads.

Fan Maintenance

Once the fan is put into operation, set up a periodic maintenance program to preserve the reliability and performance of the fan. Items to include in this program are:

- Bearings
- Fasteners
- Setscrews
- Lubrication
- Removal of Dust/Dirt

Damper Counterbalance Adjustment

The following instructions should be followed when attempting to maximize the counterbalance effect on the dampers. Be aware that when the balance setting is highly sensitive, friction wear and contamination will have an adverse effect to the operation of the damper. The sensitivity of the counterbalance should only be set to meet the application requirements. The damper must be mounted square and plumb and operate freely before any weight adjustments are performed.

Ultraviolet Lights Option

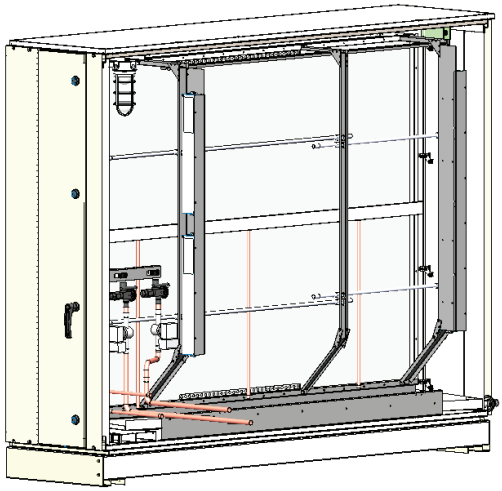
When this option is employed, ultraviolet C light bathes the moist surfaces on the coil and drain pan, killing most microorganisms that can grow there.

Typically, ultraviolet lights are installed on the leaving side of the cooling coils in the unit. Each light module is mounted on a vertical rail and is removable for convenient bulb replacement.

UV Light Power Disconnect switches (one per door) are factory installed on every door that allows a direct line of sight to the UV lamps when opened. These switches are designed to prevent UV exposure when cabinet doors are opened and must not be disabled.

A viewing window near the UV lights allows viewing to determine if the lights are energized. The viewing windows use specially designed glass that blocks harmful UV light.

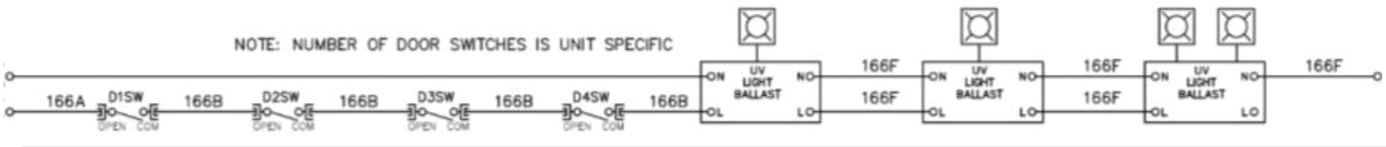
Figure 144: Typical Ultraviolet Light Installation



Ultraviolet Light Operation

The Ultraviolet (UV) Lights are powered by the main 115V transformer and therefore will normally be on whenever the unit is powered on. There are door switches that are installed on some doors with access to UV radiation. These doors must be closed for the UV lights to operate. If any one of these doors are opened, the UV lights will lose power and turn off. When entering the space where there may be UV light, ensure the UV lights are off by removing power from the unit by turning off the main power disconnect(s). Refer to Figure 145 for UV Light control schematic. Always refer to the Unit Specific Electrical Schematics for information regarding the number of door switches present.

Figure 145: Typical Ultraviolet Light Wiring Schematic



Convenience Receptacle/Section Lights

A Ground Fault Circuit Interrupter (GFCI) convenience receptacle is provided in the main control box on all units. The receptacle can either be field powered or unit powered. If it is field powered, a field wired 120V circuit must be provided. Refer to the Field Power Wiring section for more details. If the receptacle is unit powered, then no additional field wired 120V circuit is required for it function.

If the optional service lights were included, the light switch will be located near the GFCI receptacle. The lights are always powered by the same source as the GFCI; either unit powered or Field powered depending on the GFCI option selected.

Check, Test and Start Procedures

DANGER

LOCKOUT/TAGOUT all power sources before servicing this equipment. More than one disconnect may be required to de-energize unit.

Electric shock and moving components such as, fans, dampers, energy recovery devices can cause serious injury, death and property damage.

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 the all relevant manuals before operating or servicing.

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

All units complete an end-of-line operation test at the factory to promote proper operation in the field. Nevertheless, 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, or complete the “Rooftop Equipment Warranty Registration Form” on page 158 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.

Servicing High Voltage Control Panel Components

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to servicing the unit. Hazardous voltage may cause serious injury, death, and property damage. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

Disconnect all electric power to the unit when servicing control panel components. Unless power is disconnected to the unit, the components remain energized. Always inspect units for multiple disconnects to ensure all power is removed from the control panel and its components before servicing.

Before Start-up

1. Verify that the unit is completely and properly installed with ductwork connected.
2. Verify that all construction debris is removed, and that the filters are clean.
3. Verify that all electrical work is complete and properly terminated.
4. Verify that all electrical connections in the unit control panel and compressor terminal box are tight, and that the proper voltage is connected.
5. Verify all nameplate electrical data is compatible with the power supply.
6. Verify the phase voltage imbalance is no greater than +/- 4%.
7. Verify that gas piping is complete and leak tight.
8. Verify that the shutoff cock is installed ahead of the furnace, and that all air has been bled from the gas lines.
9. Manually rotate all fans and verify that they rotate freely.
10. Verify all fasteners on the fan assemblies are still tight.
11. Verify that the evaporator condensate drain trap is installed and that the drain pan is level.
12. If unit is curb mounted, verify that the curb is properly flashed to prevent water leakage.
13. Before attempting to operate the unit, review the control layout description to become familiar with the control locations.
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. Verify that the crankcase heaters are operating. These should operate for at least 24 hours before starting the compressors.
16. Determine which optional controls are included with the unit.

NOTE: If desired, you can significantly reduce all MicroTech 4 internal control timers by the changing the entry under keypad menu Main Menu\Commission Unit\ Timer Settings\Startup,Recirculate = (from 180s to 60s min where 60s is the number of seconds you want the unit to operate with fast timers).

Initial Manual Mode Start-Up

Initial Start-up should be performed in manual control mode before proceeding to the cooling/heating start up.

Power Up

1. Close the unit disconnect switch. With the control system switch in the OFF position, power should be available only to the control circuit transformer (T1) and the compressor crankcase heaters.
2. Turn the Switch to ON. Power should now be supplied to the control panel, and the LEDs on MCB1 should follow the normal startup sequence.

Supply Fan Start-up

1. Verify all duct and unit mounted isolation dampers are open.
2. Place the unit into Manual Control Mode through the keypad menu **Main Menu\Manual Control\Manual Ctrl = Manual**
3. Activate the Fan through the keypad menu **Main Menu\ Manual Control\Supply Fan = On**; Set **SAF Cap Cmd = 40%**
    a. Check Fan rotation for proper rotational direction
4. Speed the fan Up through the keypad menu **Main Menu\ Manual Control\SAF Cap Cmd = 100%**
    a. Check the manual motor protectors or that the circuit breakers have not tripped.
    b. Check the phase monitor.
5. Verify the DHL safety, if included, is opening at a pressure compatible with duct working pressure limits.

NOTE: Supply and return or exhaust fans should be adjusted for proper airflow during air balancing.

See “Air Balancing” on page 83

OA Damper Start-up

1. Check whether the outdoor air is suitable for free cooling by displaying the keypad menu **Main Menu\Manual Control\OA Damper Position=30%.**
    a. Verify that the OA damper position moved and the Return air damper (if present) also moved.
    b. Leave OA damper Open for next step

Return/Exhaust Fan Start-up

1. Verify all duct and unit mounted isolation dampers are open.
2. Activate the Fan through the keypad menu **Main Menu\ Manual Control\Ret/Exh Fan = On**;Set **Ret/Exh Fan Cmd = 40%**
    a. Check Fan rotation for proper rotational direction
3. Speed the fan Up through the keypad menu **Main Menu\ Manual Control\Set Ret/Exh Fan Cap Cmd = 100%**
    a. Check the manual motor protectors or that the circuit breakers have not tripped.
    b. Check the phase monitor.
4. Verify the DHL safety, if included, is opening at a pressure compatible with duct working pressure limits.

NOTE: Supply and return or exhaust fans should be adjusted for proper airflow during air balancing.

See "Air Balancing" on page 83

Leaving Manual Control when complete through the keypad menu **Main Menu\Manual Control\Manual Ctrl = Normal**

Cooling/Heating Start up

Supply Fan Start-up

1. Verify all duct and unit mounted isolation dampers are open.
2. Place the unit into Fan Only through the keypad menu. **Main Menu\Quick Menu\Ctrl Mode= FanOnly**
    a. The fan will activate.
    b. Check the manual motor protectors or that the circuit breakers have not tripped.
    c. Check the phase monitor.
3. Verify the DHL safety, if included, is opening at a pressure compatible with duct working pressure limits.

NOTE: Supply and return or exhaust fans should be adjusted for proper airflow during air balancing.

See "Air Balancing" on page 83

Economizer/OA Damper Start-up

1. Check whether the outdoor air is suitable for free cooling by displaying the keypad menu **Main Menu\ ViewStatus\Economizer\FreeClgStatus=Avai** or **Unavaill** verify that the enthalpy changeover control is working properly. You may want to take temperature and humidity measurements.
2. At the keypad, set the cooling setpoint low enough so that the controller will call for cooling. Adjust the value in **Commission Unit\CoolingSet-Up\Occ Clg Spt** below the temperature shown as Control Temp in the same menu. In addition, on DAC units, adjust the value in **Commission Unit\CoolingSet-Up\DAT Clg Spt** below the temperature shown in Disch Air in the same menu.
3. Place the unit into cooling mode through the keypad menu **Quick Menu\Ctrl Mode = Cool Only**.
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. Look at menu **ViewStatus\Economizer\Min OA Pos**. Change this entry to another value. Verify that the dampers move to the new minimum position setpoint.
5. If the unit is equipped with comparative enthalpy sensors, no adjustment is necessary. MicroTech 4 compares the energy required to cool and dehumidify the outside air vs the return air and decides which is less.

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.

Fixed Speed Compressor Startup

⚠ CAUTION

Low ambient temperature can cause compressor damage. Do not attempt to start up and check the refrigeration system when the outdoor air temperature is below 50°F unless the unit is specially equipped for low ambient operation.

⚠ NOTICE

Venting refrigerant to atmosphere is not allowed per federal and state laws and local regulations and codes.

Make certain the supply and return fans are operational and prepare for compressor operation.

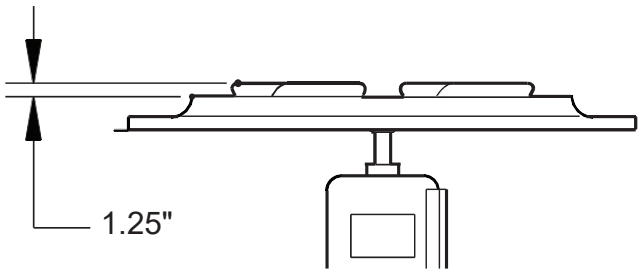
If the unit contains optional compressor isolation valves, Verify that valves are open. These are ball valves that can be opened with a quarter turn.

Verify that the unit has not lost its refrigerant charge. Check the compressor oil level before startup. The oil level should be at or slightly above the center of the sight glass.

Verify that the crankcase heaters are energized. These should operate for at least 24 hours before starting the compressors.

Verify that the condenser fan blades are positioned properly and that the screws are tight (Figure 146). The fan blade must be correctly positioned within its orifice for proper airflow across the condenser coils.

Figure 146: Condenser Fan Blade Positioning



Scroll Compressor Rotational Direction

Scroll compressors only compress in one rotational direction. Three-phase compressors can rotate in either direction depending upon phasing of the power to L1, L2, and L3.

Since there is a 50/50 chance of connecting power to cause rotation in the reverse direction. Use a phase rotation meter to confirm phasing is clockwise. If the compressor is rotating properly when energized, the suction pressure will decrease and the discharge pressure will increase. If the compressor is rotating in reverse, the sound level is louder and current draw is reduced substantially. After several minutes of operation rotating in the incorrect direction, the compressor's motor protector may trip. Tripping will not damage the compressor as long as it does not continue to repeat this cycle.

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

Perform the following procedure on all units:

1. At the keypad, The cooling set point value in **Commission Unit\Cooling Set-Up\Occ Clg Spt** will need to be adjusted below the Control Temp shown in the same menu. In addition, on DAC units, adjust the value in **Commission Unit\CoolingSet-Up\DAT Clg Spt** below the temperature shown in Disch Air in the same menu
2. Place the unit into cooling mode through the keypad menu **Quick Menu\Ctrl Mode = Cool Only.**
3. Verify that the low ambient compressor lockout temperature setpoint, **Main Menu\Commission Unit\ Cooling Setup\Clg Lo OAT Lk** is set below the current outside air temperature (OA Temp) is shown in the same menu.

NOTE: Do not attempt to operate the compressors if the outdoor air is below 50°F. See the caution statement under "Compressor Startup".

4. Note that if the unit has an economizer and the outdoor air enthalpy is low, the economizer must fully open before the controller will energize mechanical cooling.
5. When the outdoor air damper has fully opened and the time delay has expired, the liquid line solenoid and the compressor should start.
    a. Verify that there is a call for cooling by checking the keypad menu **Quick Menu\Unit State =**. This should be in Cooling.
    b. Check the keypad to ensure the compressors have been enabled. **Main Menu\ViewStatus\Unit Status/ Settings\Clg Status =.** The compressors will only run if this reads (Enabled).
6. Verify that compressor #1 starts. If the compressor motor hums but does not run, verify that it is getting three-phase power.

7. The compressor should operate continuously while there is a call for cooling. If the compressor cycles on its low pressure switch, due the following:
    a. Verify that the circuit is not low on refrigerant.
    b. Check for low supply airflow.
    c. Check for clogged filters.
    d. Check for restricted ductwork.
    e. Check for very low temperature return air entering the unit.
    f. Verify that the liquid line components, expansion valve, and distributor tubes are feeding the evaporator coil.
    g. Verify that all air handling section panels are closed.
    h. Verify that the liquid line solenoid valves are completely open (energized).
8. If the refrigeration circuit has multiple compressors, verify that the compressors stage properly. As the circuit load increases the second compressor (if available) will be energized.
9. Verify that the condenser fans are cycling (ON/OFF) and rotating properly (blowing air upward). When a compressor starts, at least one condenser fan should also start. MT4 should control the remaining condenser fans based on ambient air conditions. Refer to the unit wiring diagrams for control wiring.
10. After 15 minutes of run time, check the oil level in the compressor sightglass (if available). If low oil or heavy foaming is observed, it is possible that liquid refrigerant is returning to the compressor. Check the suction superheat It should be between 10°F (5.6°C) and 14°F (7.8°C).
11. Place the unit into the “Fan Only” mode through the keypad menu **Main Menu\Quick Menu\Ctrl Mode = fan only**.
12. Check refrigerant circuit #2 by repeating steps 2 through 9.
13. Check the compressor oil level again. If oil level is low, consult Technical Support before adding oil.
14. Verify that the condenser refrigerant subcooling for each refrigeration circuit at full capacity is between as shown in Table 15

Table 15: Expected Subcooling for Compressor Startup

Outdoor Air Temp. (F)	Subcooling (F)
75-80	7-10
81-90	10-12
91-95	12-15
95-105	15-20

Expansion Valve Superheat Adjustment (Thermal Expansion Valve)

Thermal Expansion Valve on Fixed Speed Compressor Circuits

It is very important that the expansion valve superheat setting be adjusted to be between 10°F (5.6°C) and 14°F (7.8°C).

Insufficient superheat will cause liquid refrigerant flood back to the compressor which may result in slugging. Excessive superheat will reduce system capacity and shorten compressor life.

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

Electronic Expansion Valve on Variable Speed Compressor Circuits

The electronic expansion valve superheat setting is preset from the factory and does not require any field adjustment.

Checking Superheat

Following are recommendations for checking superheat:

1. Close the unit section doors. Operating the unit with its doors open will affect the expansion valve and system operation considerably.
2. For units with one expansion valve per circuit, check the pressure and temperature at the compressor suction valve.

NOTE: If low oil level is accompanied by heavy foaming visible in the oil sight glass, it is possible that excess liquid refrigerant is returning to the compressor. Check the suction superheat and adjust the expansion valve for 10°F (5.6°C) and 14°F (7.8°C) of superheat. If proper superheat is obtained, sight glass foaming is not a concern.

Heating System Startup

General

1. At the keypad, set the heating setpoints high enough so that the controller calls for heating. Adjust the value in **Main Menu\ Commission Unit\Heating Set-Up\Occ Htg Spt =** above the Control Temp shown in the same menu. In addition, on DAC units, adjust the DAT heating value in Main Menu\Commission Unit\Heating Set-Up\ DAT Htg Spt above the discharge temperature shown as Disch Temp in the same menu.
2. Place the unit into heating mode through the keypad menu **Main Menu\quick Menu\Ctrl Mode = Heat Only**.
3. Verify that the high ambient heat lockout temperature setpoint, **Main Menu\Commission Unit\Heating Setup\ Htg Hi OAT Lk** is set above the current outside air temperature (OA Temp) is shown in the same menu.

Hot Water and Steam Heat

The Hot Water or Steam valve actuator should open the valve. The hot water or steam valve is open when the valve stem is up. If the unit loses power, the spring in the actuator should drive the valve wide open.

Electric and Gas heat

Electric and gas heaters are addressed later in this manual.

Air Balancing

⚠ DANGER

Moving Machinery hazard. Moving components such as, fans, dampers, energy recovery devices can cause serious 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.

⚠ WARNING

Rotating parts can cause serious injury or death. Replace all fan guards that are temporarily removed for service.

Air balancing should be performed by a qualified air balancing technician.

The following should be performed as part of the air balancing procedure:

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. For VAV units that have fan tracking control, adjust the supply/return fan balance by using the MicroTech 4 controller's built-in, automatic capability.

When all start-up procedures are completed, set the controls and program the MicroTech 4 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. **Main Menu\Commission Unit\HtgClgChgovr Set-Up\ Ctrl Temp Scr = RAT**, **Space**, **OAT**, **None** based on application needs. Refer to OM-1288 for recommendations
    b. **Main Menu\Commission Unit\CoolingSet-Up\Occ Clg Spt** & **DAT Clg Spt**.
    c. **Main Menu\Commissioning Unit\Heating Set-Up\Occ Htg Spt** & **DAT Htg Spt.**
2. Set the low ambient compressor lockout setpoint as required in menu, **Main Menu\Commission Unit\Cooling Setup\Clg Lo Oat Lk =**. Do not set it below 50°F (10°C) unless the unit is equipped for low ambient operation.
3. Set the high ambient heat lockout temperature setpoint, **Main Menu\Commission Unit\Heating Setup\Htg Hi OAT Lk** as required.
4. Set the alarm limits as required in **Main Menu\ Commission Unit\Alarm Configurations\Alarm Limits**.
5. Set the compressor lead/lag function as desired using keypad menu **Main Menu\Advanced Menus\Cooling Setup\Lead Circuit** and **Main Menu\Advanced Menus\ Cooling Setup\Load Method = Lead Load** or **Cross Load**

⚠ CAUTION

If the unit has hot gas bypass on circuit #1 only, lead circuit must always be circuit #1 and Load method set to Lead Load.

6. Set the duct static pressure control parameters as required in keypad menu **Main Menu\Quick Menu\ SAF DSP Spt =___ in.**; **RAF DSP Spt=___ in.**; **BldgSP Spt=___ in.** based on application and unit configuration.
7. Set the RF/EF Control Parameters based on the application
    a. If RF/EF Control = Tracking, then set the fan tracking parameters as required in keypad menu. **Main Menu\ Commission Unit\RF/EF Setup\ Sup Fan Max, RF @ SF Max, Sup Fan Min, RF @ SF Min.**
    b. If **Main Menu\ Commission Unit\RF/EF Setup\ RF/EF Ctrl = BSP**, Set the building static pressure control parameters as required in keypad menu location **Main Menu\Quick Menu\BldgSP Spt=___ in.** based application and unit configuration.
    c. If **Main Menu\ Commission Unit\RF/EF Setup RF/EF Ctrl = DSP**, Set the building static pressure control parameters as required in keypad menu **Main Menu\ Commission Unit\RF/EF Setup \RAF DSP Spt=.** Based application and unit configuration

NOTE: This configuration is only available with a modulating Exhaust air Damper.

    d. **Main Menu\ Commission Unit\RF/EF Setup\ RF/EF Ctrl = OAD**, then set the fan tracking parameters as required in keypad menu. **Main Menu\ Commission Unit\RF/EF Setup\ ExhOn OA Pos=%, ExhMax OAPos =%**
    e. For details on commissioning RFEF Ctrl = CAV, Flow, Sped/Net, or Flow Diff, refer to OM-1288
8. Set the Outside air damper and economizer control parameters as required in keypad menu **Main Menu\ Commission Unit\OA Damper Set-Up**
    a. Set the Vent Limit = % open required at 100% SAF full ventilation
    b. Set the loFlo Vent Limit OAD % at minimum SAF speed, full ventilation
    c. If the unit is performance DCV (Demand Control Ventilation), Set the DCV limit for the minimum OAD position during DCV at 100% SAF Flow. Set CO2 Reset = PPM@DCVLmt = lower threshold of CO2 ppm allowed and PPM@VentLmt = Upper threshold of CO2 ppm allowed.

9. Set the control timers as required in keypad menu **Main Menu\Commission Unit\Timer Settings.**
    a. Set the date and time in keypad menu **Setup/ Service\Time/Date\.**
    b. Set the operating schedule as required using keypad menus. **Main Menu\ViewStatus\Date/ Time and Date/Time/Schedules.**

NOTE: When used with a Building Automation System, these settings may need to be kept at the default of no schedule:

Maintaining Control Parameter Records

Daikin Applied recommends that the MicroTech 4 controller's setpoints and parameters be recorded and saved for future reference. If the Microprocessor Control Board (MCB) requires replacement, this record facilitates entering the unit's proper data. The following tables display all the setpoints, monitoring points, and program variables offered by MicroTech 4 plus the keypad road map used to find each parameter.

A number of menus and menu items that appear on the unit keypad/display are conditional and may not apply to a specific unit, depending on the unit software configuration. The unit software configuration is defined by a "Software Configuration Code" shown on a label located near the keypad/display. The Software Configuration Code also can be displayed via the six menu items in the Config Code menu on the unit keypad/ display.

NOTE: Keep a record of any changes made to any of these items.

Using the Keypad/Display

The keypad/display consists of a 5-line by 22 character display, three keys and a "push and roll" navigation wheel. There is an Alarm Button, Menu (Home) Button, and a Back Button. The wheel is used to navigate between lines on a screen (page) and to increase and decrease changeable values when editing. Pushing the wheel acts as an Enter Button.

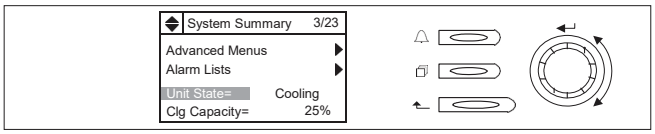
The first line on each page includes the page title and the line number to which the cursor is currently "pointing". The line numbers are X/Y to indicate line number X of a total of Y lines for that page. The left most position of the title line includes an "up" arrow to indicate there are pages "above" the currently displayed items, a "down" arrow to indicate there are pages "below" the currently displayed items or an "up/down" arrow to indicate there are pages "above and below" the currently displayed page.

Each line on a page can contain status only information or include changeable data fields. When a line contains status only information and the cursor is on that line all but the value field of that line is highlighted meaning the text is white with a black box around it. When the line contains a changeable value and the cursor is at that line, the entire line is highlighted. Each line on a page may also be defined as a "jump" line, meaning pushing the navigation wheel will cause a "jump" to a new page. An arrow is displayed to the far right of the line to indicate it is a "jump" line and the entire line is highlighted when the cursor is on that line.

The keypad/display Information is organized into five main menus or menus groups; Alarm Lists Menu, System Summary Menu, Standard Menus, Extended Menus and Advanced Menus.

NOTE: Only menus and items that are applicable to the specific unit configuration are displayed.

Figure 147: Keypad Controls



The Alarm Lists Menu includes active alarm and alarm log information. The System Summary Menu includes status information indicating the current operating condition of the unit. Standard Menus include basic menus and items required to setup the unit for general operation. These include such things are control mode, occupancy mode and heating and cooling setpoints. Extended Menus include more advanced items for "tuning" unit operation such as PI loop parameters and time delays. Advanced Menus include the most advanced items such as "unit configuration" parameters and service related parameters. These generally do not need changing or accessing unless there is a fundamental change to or a problem with the unit operation.

Passwords

When the keypad/display is first accessed, the Home Key is pressed, the Back Key is pressed multiple times, or if the keypad/display has been idle for the Password Timeout timer (default 10 minutes), the display will show a "main" page where the user can enter a password or continue without entering a password.

Various menu functions are accessible or inaccessible, depending on the access level of the user, and the password they enter, if any. There are four access levels, including no password, Level 2, Level 4, and Level 6, with Level 2 having the highest level of access. Without entering a password, the user has access only to basic status menu items. Entering the Level 6 password (5321) allows access to the Alarm Lists Menu, Quick Menu, and the View Status Unit Menus group. Entering the Level 4 password (2526) allows similar access as Level 6 with the addition of the Commission Unit Menu, Manual Control, and Service Menu groups. Entering the Level 2 password (6363) allows similar access as Level 4 with

the addition of the Unit Configuration Menu. To access the advanced menu, you need to enter a level 2 password and set the enable advanced menu flag to Yes in the service menu.

Continuing without entering one of these three levels allows access only to the Alarm Lists Menu and the System Summary Menu.

NOTE: Alarms can be acknowledged without entering a password.

The password field initially has a value **** where each * represents an adjustable field. These values can be changed by entering the Edit Mode.

Entering an invalid password has the same effect as continuing without entering a password.

Once a valid password has been entered, the controller allows further changes and access without requiring the user to enter a password until either the password timer expires or a different password is entered. The default value for this password timer is 10 minutes. It is changeable from 3 to 30 minutes via the Timer Settings menu in the Extended Menus.

Figure 148: Password Main Page

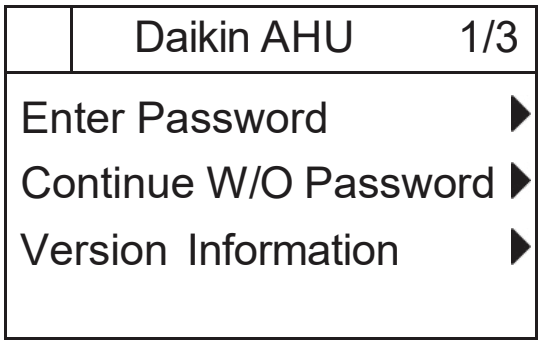
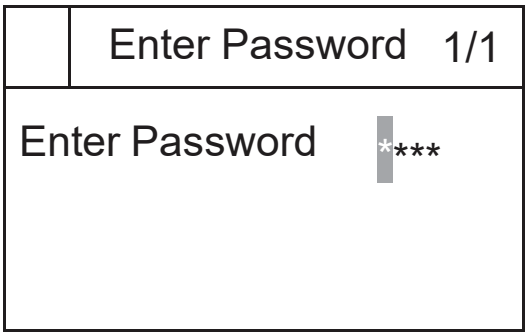


Figure 149: Password Entry Page



Navigation Mode

In the Navigation Mode, when a line on a page contains no editable fields all but the value field of that line is highlighted meaning the text is white with a black box around it. When the line contains an editable value field the entire line is inverted when the cursor is pointing to that line.

When the navigation wheel is turned clockwise, the cursor moves to the next line (down) on the page. When the wheel is turned counter-clockwise the cursor moves to the previous line (up) on the page. The faster the wheel is turned the faster the cursor moves.

When the Back Button is pressed the display reverts back to the previously displayed page. If the Back button is repeated pressed the display continues to revert one page back along the current navigation path until the “main menu” is reached.

When the Menu (Home) Button is pressed the display reverts to the “main page.”

When the Alarm Button is depressed, the Alarm Lists menu is displayed.

Edit Mode

The Editing Mode is entered by pressing the navigation wheel while the cursor is pointing to a line containing an editable field. Once in the edit mode pressing the wheel again causes the editable field to be highlighted. Turning the wheel clockwise while the editable field is highlighted causes the value to be increased. Turning the wheel counter-clockwise while the editable field is highlighted causes the value to be decreased.

The faster the wheel is turned the faster the value is increased or decreased. Pressing the wheel again cause the new value to be saved and the keypad/display to leave the edit mode and return to the navigation mode.

Smoke and Fire Protection

⚠ DANGER

The potential risk of smoke, fire, or fumes entering the unit can result in serious injury, death, and property damage

Daikin Applied optionally offers factory installed outdoor air, return air, and exhaust air dampers as well as smoke detectors in the supply and return air openings, complete with wiring and control. These components often are used in the building's smoke, fume, and fire protection systems. However, due to the wide variation in building design and ambient operating conditions into which our units are applied, we do not represent or warrant that our products will be fit and sufficient for smoke, fume, and fire control purposes. The owner and a fully qualified building designer are responsible for meeting all local and NFPA building code requirements with respect to smoke, fume, and fire control.

Smoke Detectors

Field installed smoke detectors in the return air ductwork or the supply air ductwork can be coordinated with the unit's operation through the unit controller's binary input. This input is wired to TB2 and the supply air smoke detector can be wired between terminals 103 and 104 and the return air smoke detector can be wired between terminals 104 and 105. The T2 transformer supplies 24VAC across each of these terminals and a dry set of contacts can be wired to these terminals respectively.

Factory installed smoke detectors have similar wiring and the control sequence is as follows:

When smoke is detected by either sensor, the normally closed sensor contacts open. This removes power from binary input on the main control board.

The MicroTech 4 controller responds by shutting down the unit. The controller is placed in the Alarm Off state and cannot be restarted until the alarm is manually cleared. Refer to the operation manual supplied with the unit for information on clearing alarms.

The smoke detectors must be reset manually once they have been tripped. Power must be cycled to the smoke detector to reset.

Ventilation Override Control

An Optional ventilation override control feature provides three contact inputs pre-wired in the unit control panel for override control in the event of an emergency. They are all designated on a field wired terminal strip in the low voltage control panel.

Sequences - the ventilation control feature allows for one of the following sequences to be performed.

NOTE: For all Sequences the Emergency OFF contact should be open.

1. **Ventilate:** When the digital input for Ventilate is active, the Outdoor air damper is opened to 100%.
2. **Pressurization:** When Pressurization is active, the Outdoor air damper is opened to 100%, and the Supply Fan Ramps to Vent Capacity. SAF Vent Capacity is adjustable in the MicroTech 4 under **Main Menu\ Advanced Menus\SAF Set-Up\SAFVentCap**
3. **Purge:** When Purge is active, the return damper is held shut and the Exhaust fan ramps to Vent Capacity. RFEF Vent Capacity is adjustable in the MicroTech 4 under **Main Menu\Advanced Menus\RFEF Set-Up\RFEFVentCap**

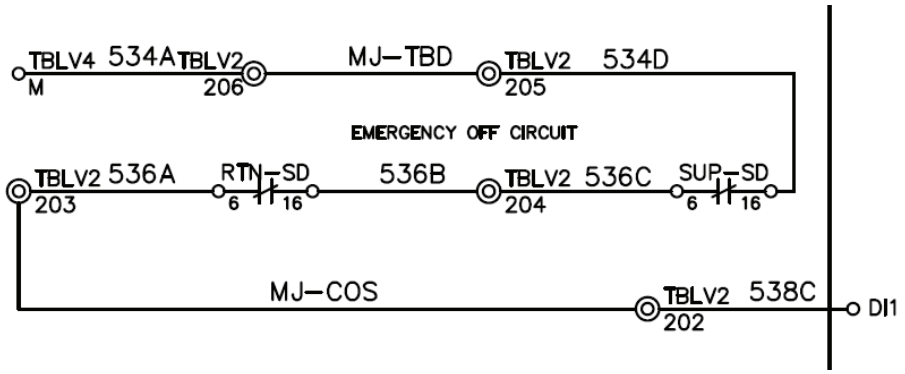
Emergency Shutdown

The terminals 205 & 206 on TB2 can be used for any field supplied component that requires a unit emergency shutdown. When these terminals are used, the factory installed jumper must be removed.

Freeze Protection

An optional freezestat is available on units with MicroTech 4 control that have hot water, chilled water, or steam heating coils. The sensing element is located on the downstream side of the heating coil in the heating section of the unit. If the freezestat detects a freezing condition and closes, the MicroTech 4 controller takes different actions, depending on whether the fans are ON or OFF. The freezestat is an auto reset type of control; however, the controller alarm that it causes is manually reset if the fan is on and auto reset if the fan is OFF.

Figure 150: Smoke Detector Schematic



MicroTech® 4 Remote User Interface

In addition to the unit-mounted user interface provided with MicroTech 4 controls, Daikin Applied rooftop systems can be equipped with a remote user interface that handles up to eight units per interface. The remote user interface provides convenient access to unit diagnostics and control adjustments, without having to access your roof or mechanical rooms located on each floor.

Each remote user interface offers the same functionality as its unit-mounted counterpart, including:

- Push-and-roll navigation wheel with an 8-line by 30 character display format.
- Digital display of messages in English language.
- All operating conditions, system alarms, control parameters and schedules are monitored.

Features

- Can be wired up to 700 meters from units for flexibility in placing each remote user interface within your building.
- Unit and remote user interfaces are both active.

Figure 151: Remote User Interface

MicroTech 4 Field Installed Sensors

The MicroTech 4 unit controller can be connected to a variety of field installed sensors.

- Space Sensor with tenant override – Daikin Applied PN: 113117701
- DDC Space Sensor with Setpoint Adjust and Tenant Override – Daikin Applied PN: 910143408
- Combo DDC Temp and Humidity Sensor with Setpoint Adj and Tnt Ovrd – Daikin Applied PN: 910191961
- Communicating Network Space Sensors – Daikin Applied PN: 910279216 and 910278050
- Space Humidity Sensor – Daikin Applied PN: 910202119
- Wall Mounted CO2 Sensor – Daikin Applied PN: 107287012
- Duct Mounted CO2 Sensor – Daikin Applied PN: 910111672

Space Temperature Sensors

The Rebel Applied MicroTech 4 works with 10kohm Type 2 thermistors and can support up to 3 sensors. These sensors can drive cooling and heating based on the highest, lowest, or average space sensor reading.

DDC Space Sensors

The Rebel Applied MicroTech 4 works with 10kohm Type 2 thermistors and can support up to 3 sensors. These sensors can drive cooling and heating based on the highest, lowest, or average space sensor reading. A Combo sensor version provides Temperature and humidity.

NOTE: Only one sensor can drive the Setpoint adjustment.

Figure 152: Daikin Applied Space Sensor

Communicating Network Space Sensors

The MicroTech 4 unit controller can be connected to a Network of the 3 space sensors as either a temperature sensor only or a temperature, Humidity and CO_2 combo sensor. Each Sensor comes with a backlit LCD screen to show current space conditions, allow setpoint adjustment and communicate commands.

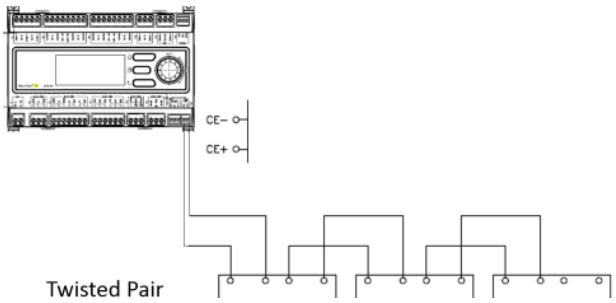
- Network Temperature Sensor – Part Number 910279216
- Network Combo Temeprature Sensor – Part Number 910278050

Figure 153: Network Space Sensor

The MicroTech 4 can support up to 3 Network (QMX) sensors wired to the Process Bus terminals with a Daisy Chain Twisted pair. Refer to OM 1288 for MicroTech 4 configuration and set-up instructions

NOTE: The sensor is available in English units only and does not show SI units.

Figure 154: QMX Sensor

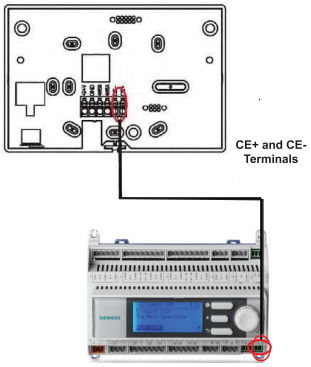


Refer to OM 1288 for MicroTech 4 configuration and set-up instruction

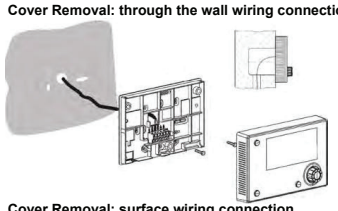
NOTE: The sensor is available in English units and does not show SI units.

Figure 155: Specifications and Connections

Interface	
Process Bus	Up to eight interfaces per remote
Bus Connection	CE+, CE– not interchangeable
Terminal	2-screw connector
Max. Length	700 meters
Cable Type	Twisted pair cable, 0.5 ... 2.5 mm^2
Display	
LCD Type	FSTN
Dimensions	5.7(w) × 3.8(h) × 1.5(d) inches [114 × 96 × 38] mm
Resolution	Dot-matrix 96 × 208 pixels
Backlight	Blue or white, user configurable
Environmental Conditions	
Operation	IEC 721-3-3
Temperature	-40°C to 70°C
Restriction LCD	-20° to 60°
Humidity	<90% r.h. (no condensation)
Air Pressure	Min. 700hPa, corresponding to max. 3,000 (m) above sea level



Cover Removal: through the wall wiring connection



Cover Removal: surface wiring connection

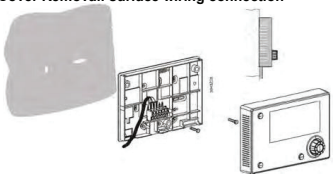
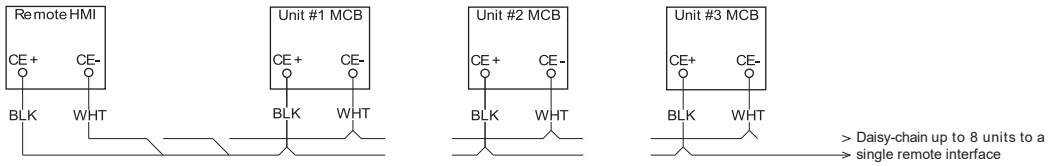


Figure 156: Process Bus Wiring Connections



Keypad and Display Menu Structure

The following is a description of the MicroTech 4 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. Refer to OM 1288 for more details.

Figure 157: Keypad/Display Menu Structure

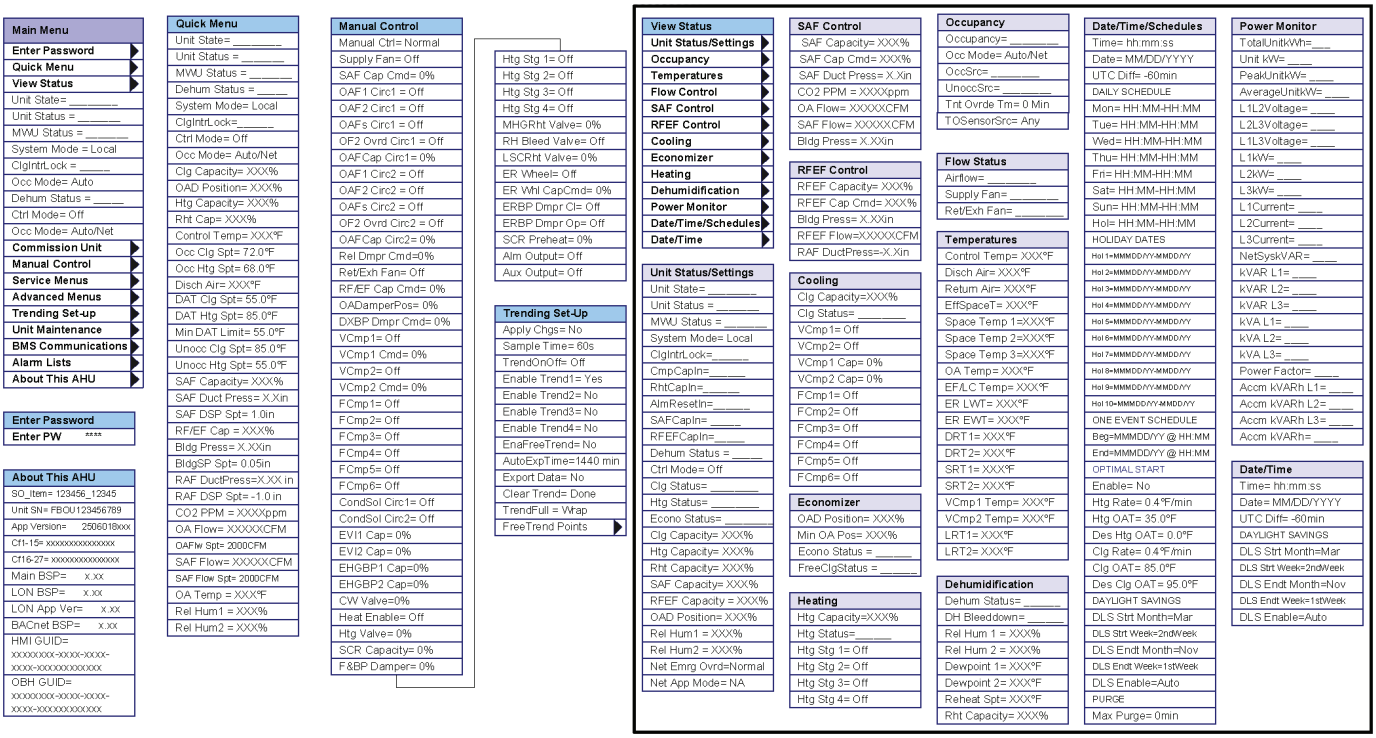


Figure 158: Keypad/Display Menu Structure (continued)

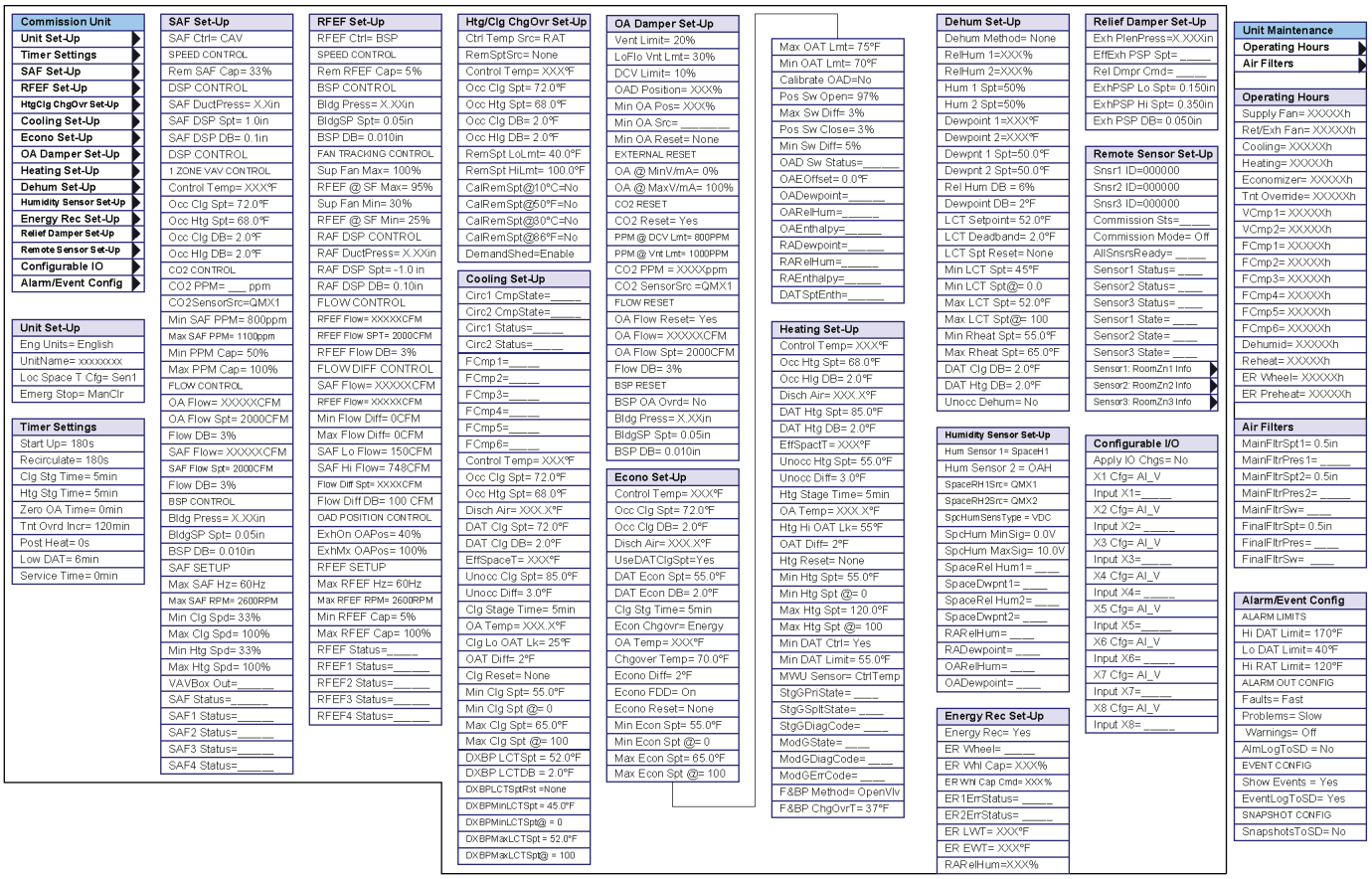
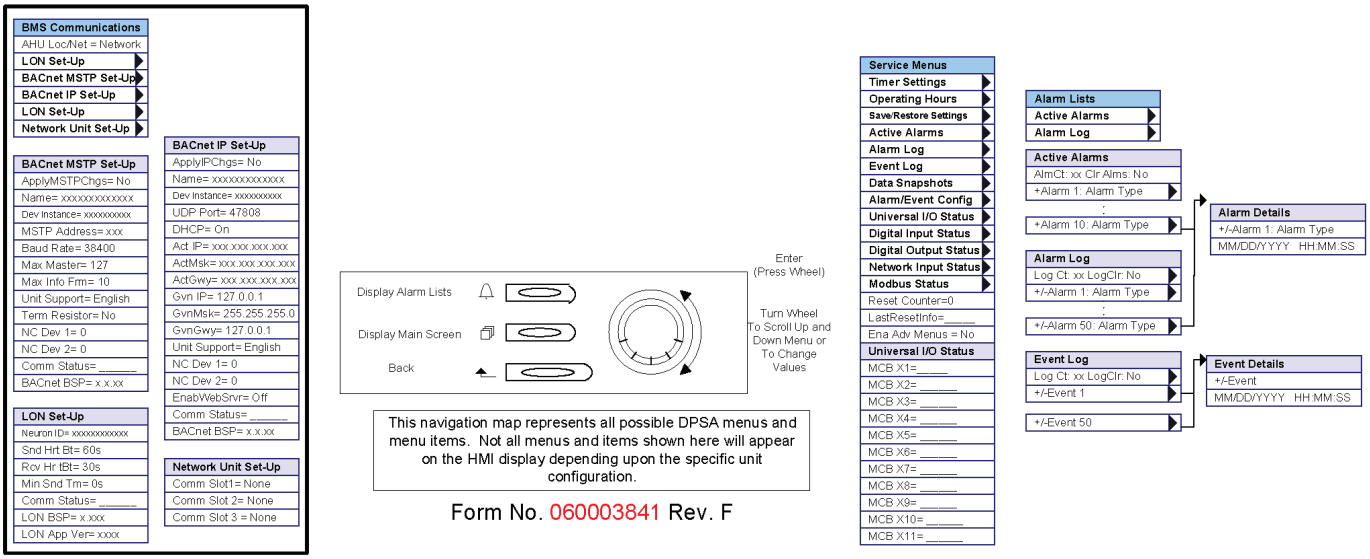
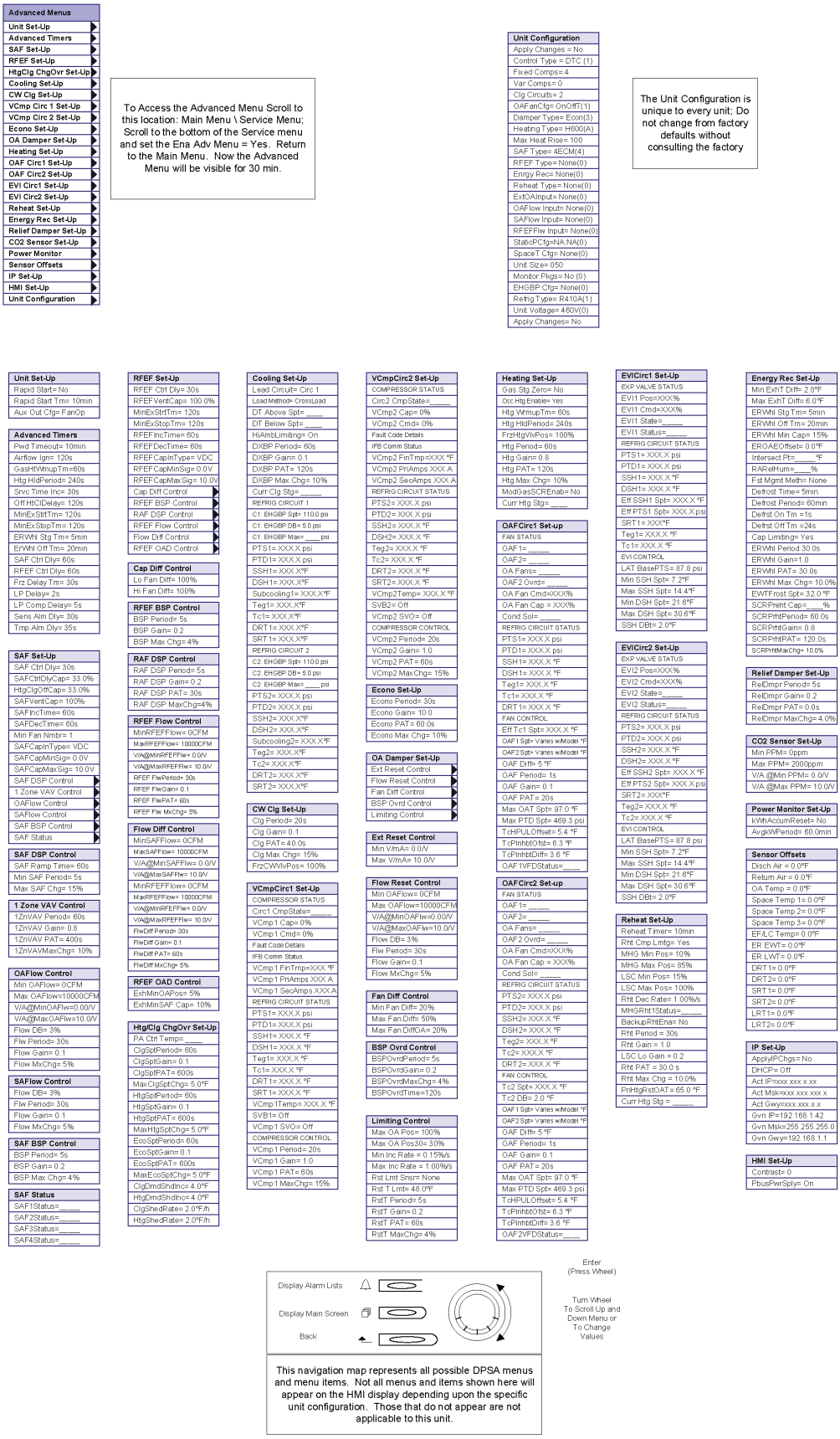


Figure 159: Keypad/Display Menu Structure (continued)



Form No. 060003841 Rev. F

Figure 160: Keypad/Display Advanced Menu Structure



Unit Maintenance

Servicing Control Panel Components

⚠ WARNING

LOCKOUT/TAGOUT all power sources before servicing this equipment. More than one disconnect may be required to de-energize unit. Moving machinery such as fans, dampers and energy recovery devices may cause injury, death, and property damage

⚠ WARNING

Exercise caution when servicing the unit. Sharp edges are inherent to sheet metal parts, screws, clips and similar items. Wear appropriate PPE such as eye protection, gloves, protective clothing, foot wear, etc. to prevent personal injury, severe personal injury, or death..

⚠ CAUTION

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

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to servicing the unit. Hazardous voltage may cause serious injury or death.

Disconnect all electric power to the unit when servicing control panel components Always inspect the unit for multiple disconnects to ensure all power is removed from the control panel and its components. More than one disconnect may be required to de-energize the unit.

Example Wiring Diagram

Figure 161: Typical Rebel Applied Wiring Diagram

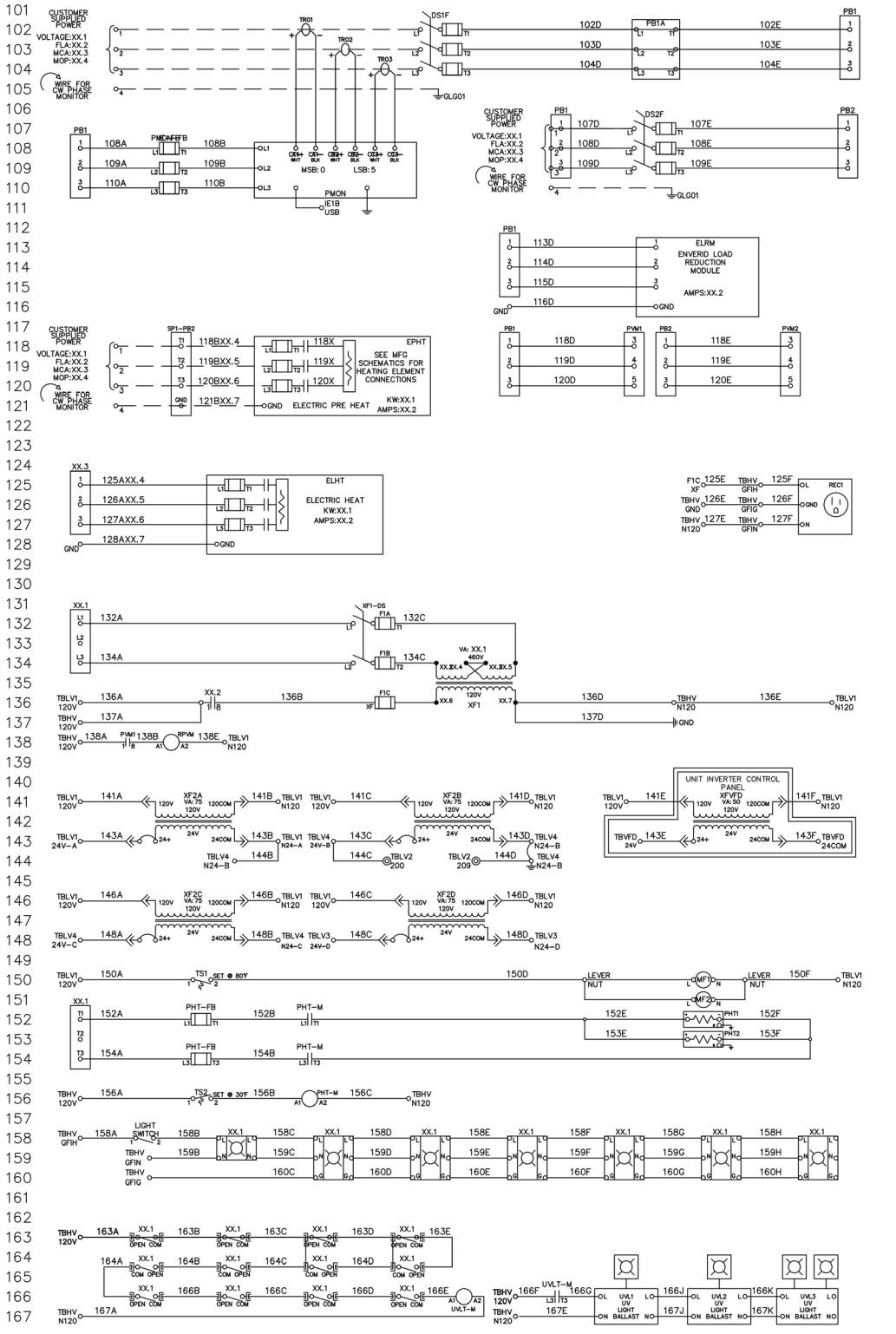


Figure 162: Typical Rebel Applied Wiring Diagram (continued)

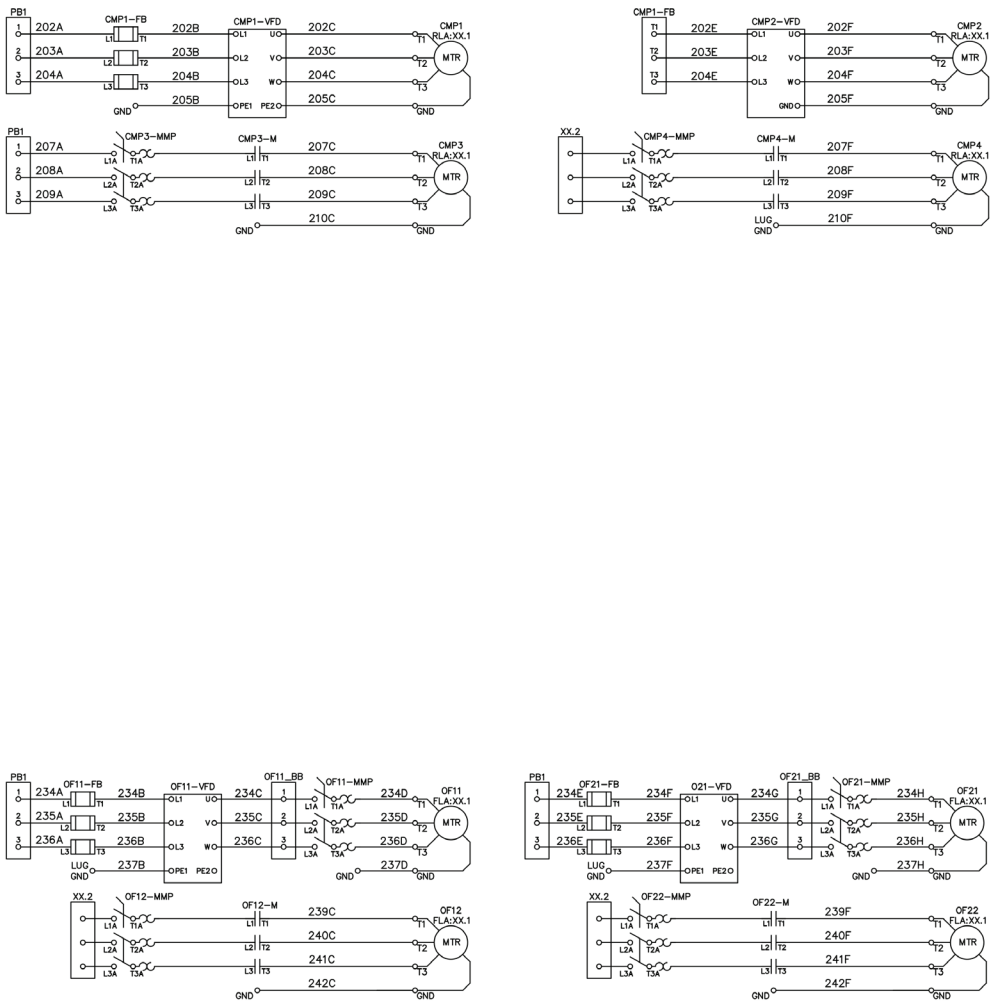


Figure 163: Typical Rebel Applied Wiring Diagram (continued)

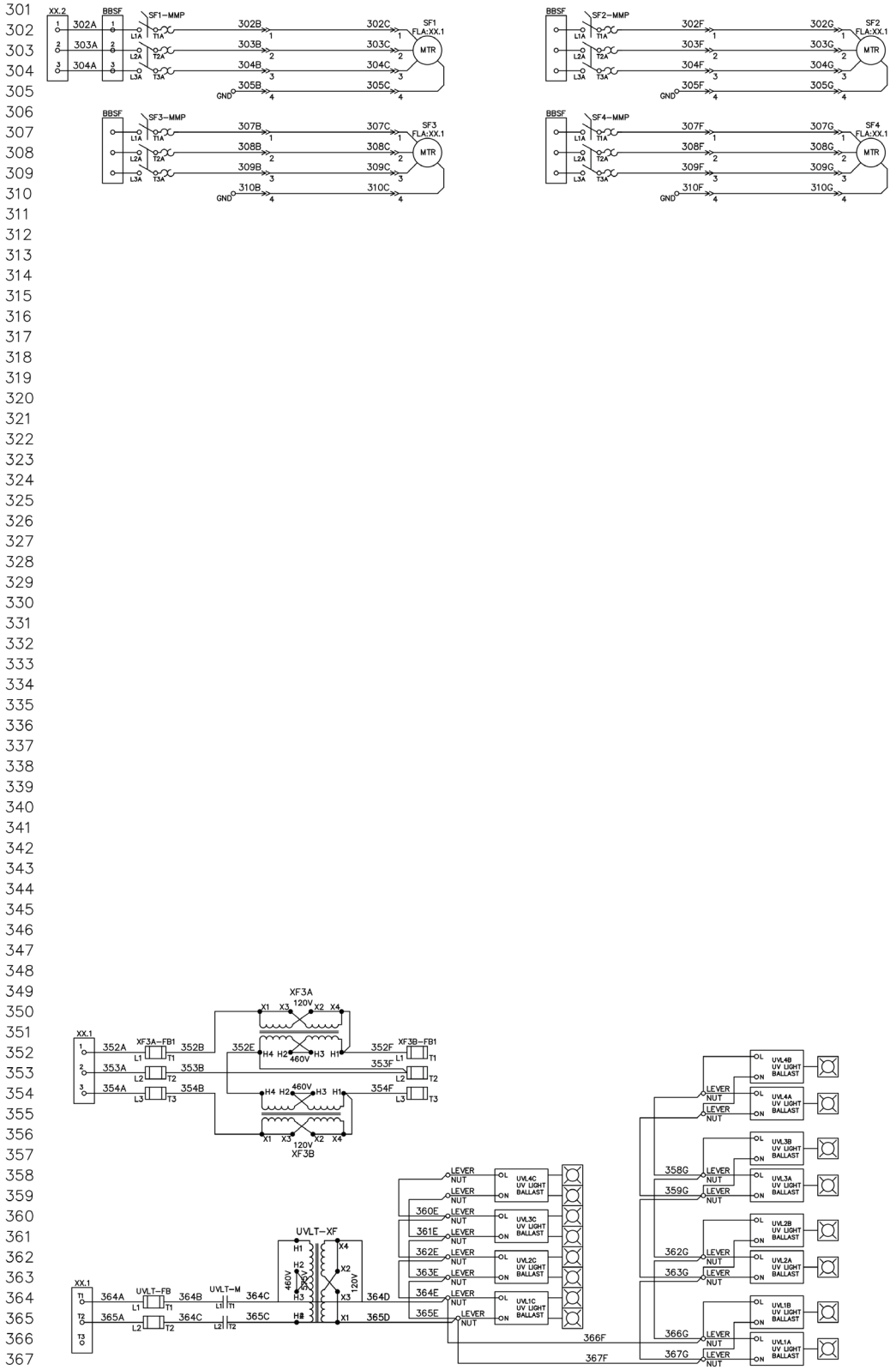
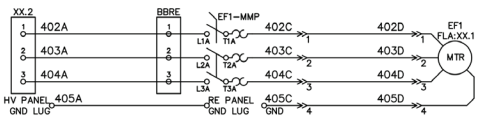
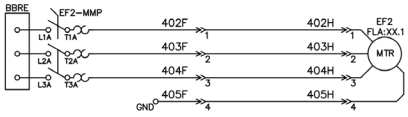


Figure 164: Typical Rebel Applied Wiring Diagram (continued)





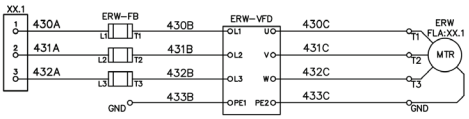


Figure 165: Typical Rebel Applied Wiring Diagram (continued)

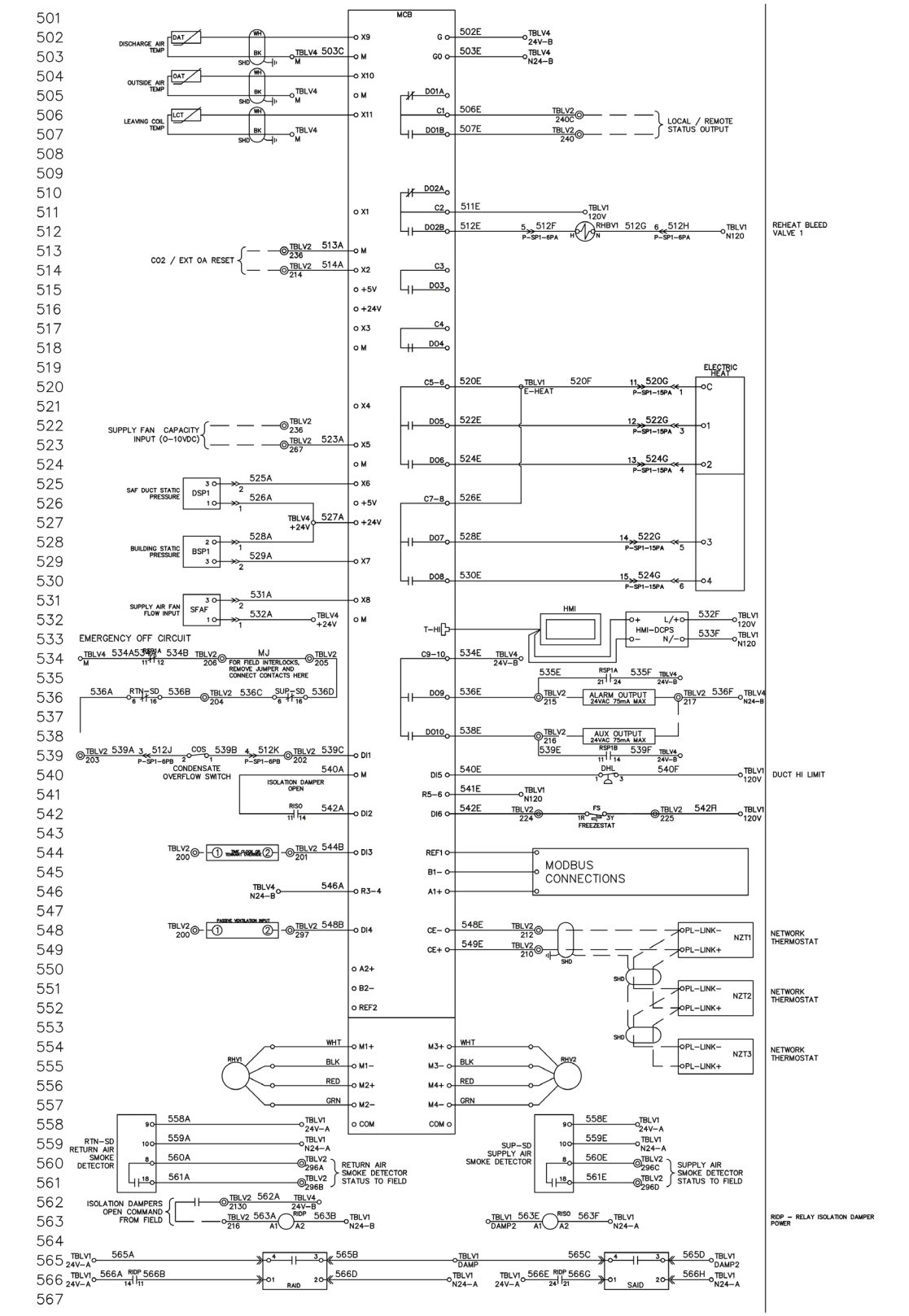


Figure 166: Typical Rebel Applied Wiring Diagram (continued)

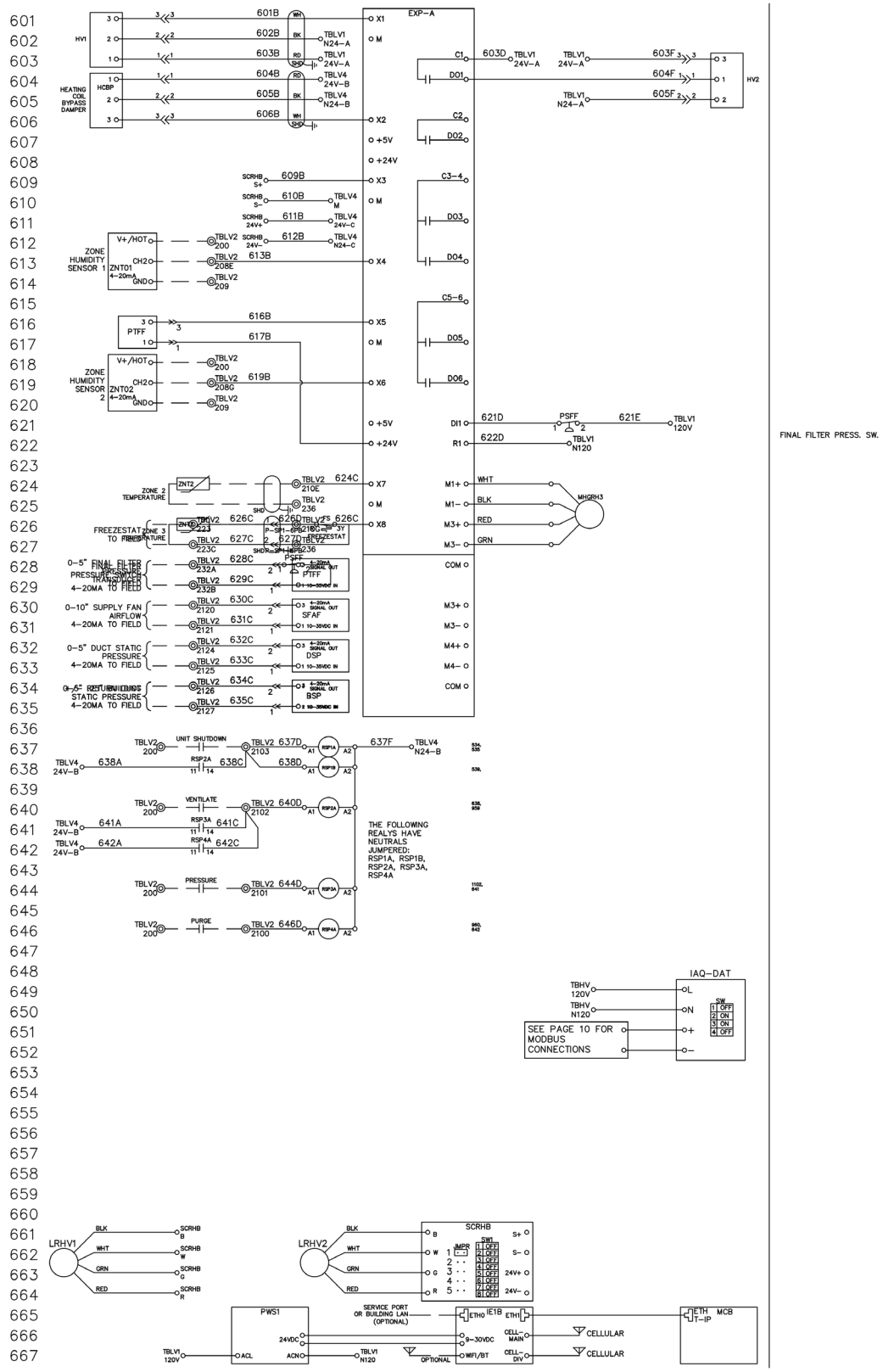


Figure 167: Typical Rebel Applied Wiring Diagram (continued)

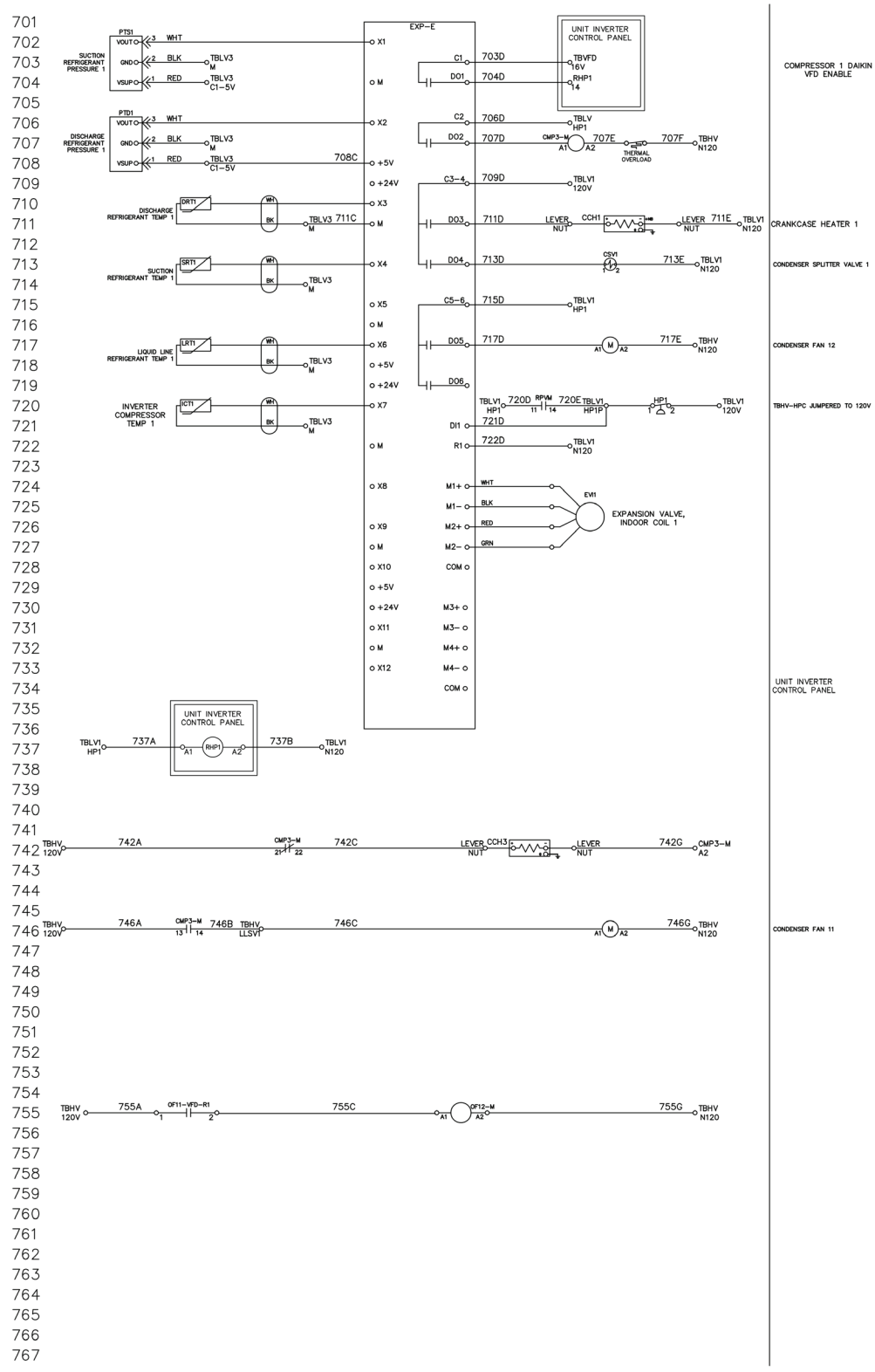


Figure 168: Typical Rebel Applied Wiring Diagram (continued)

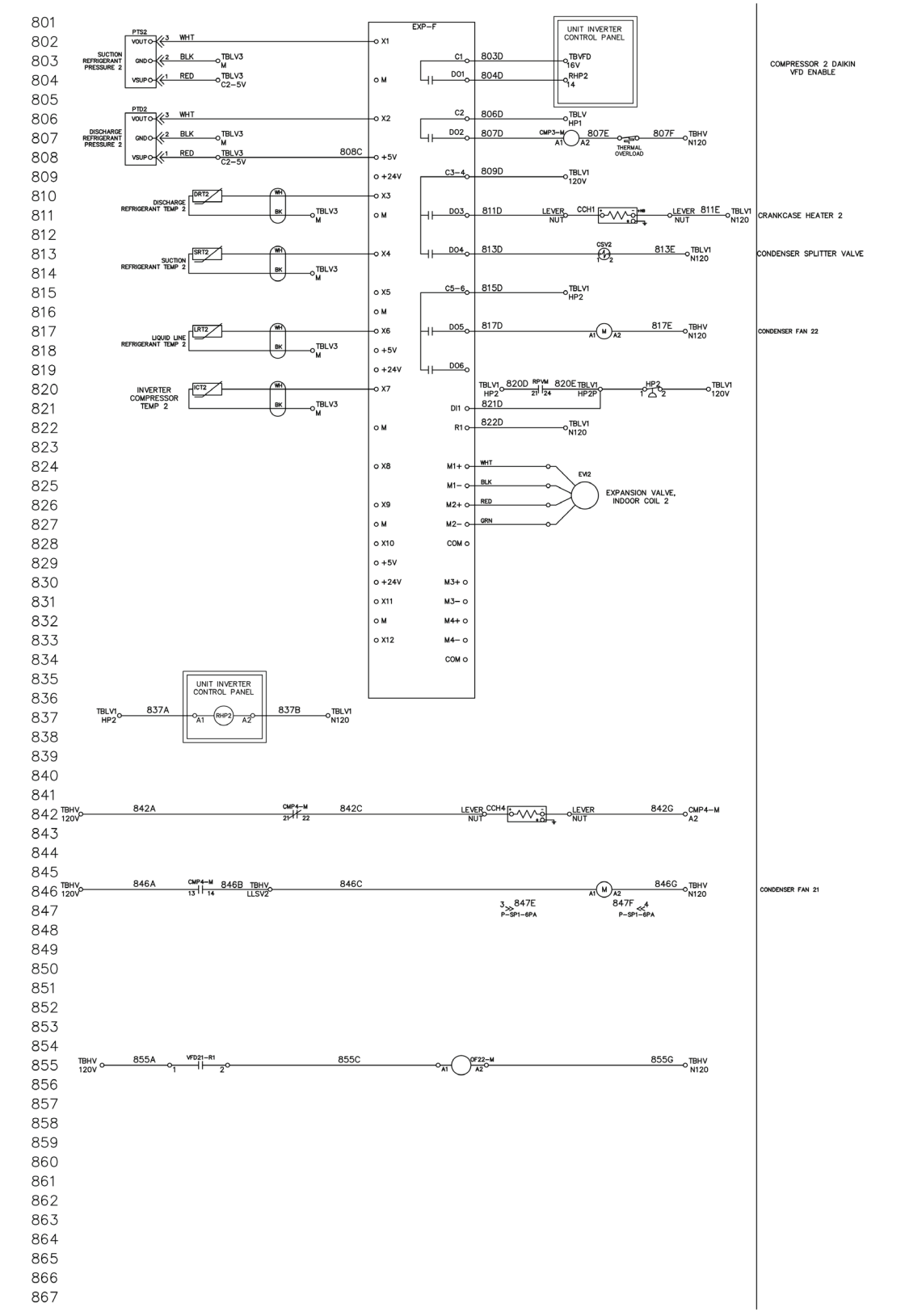


Figure 169: Typical Rebel Applied Wiring Diagram (continued)

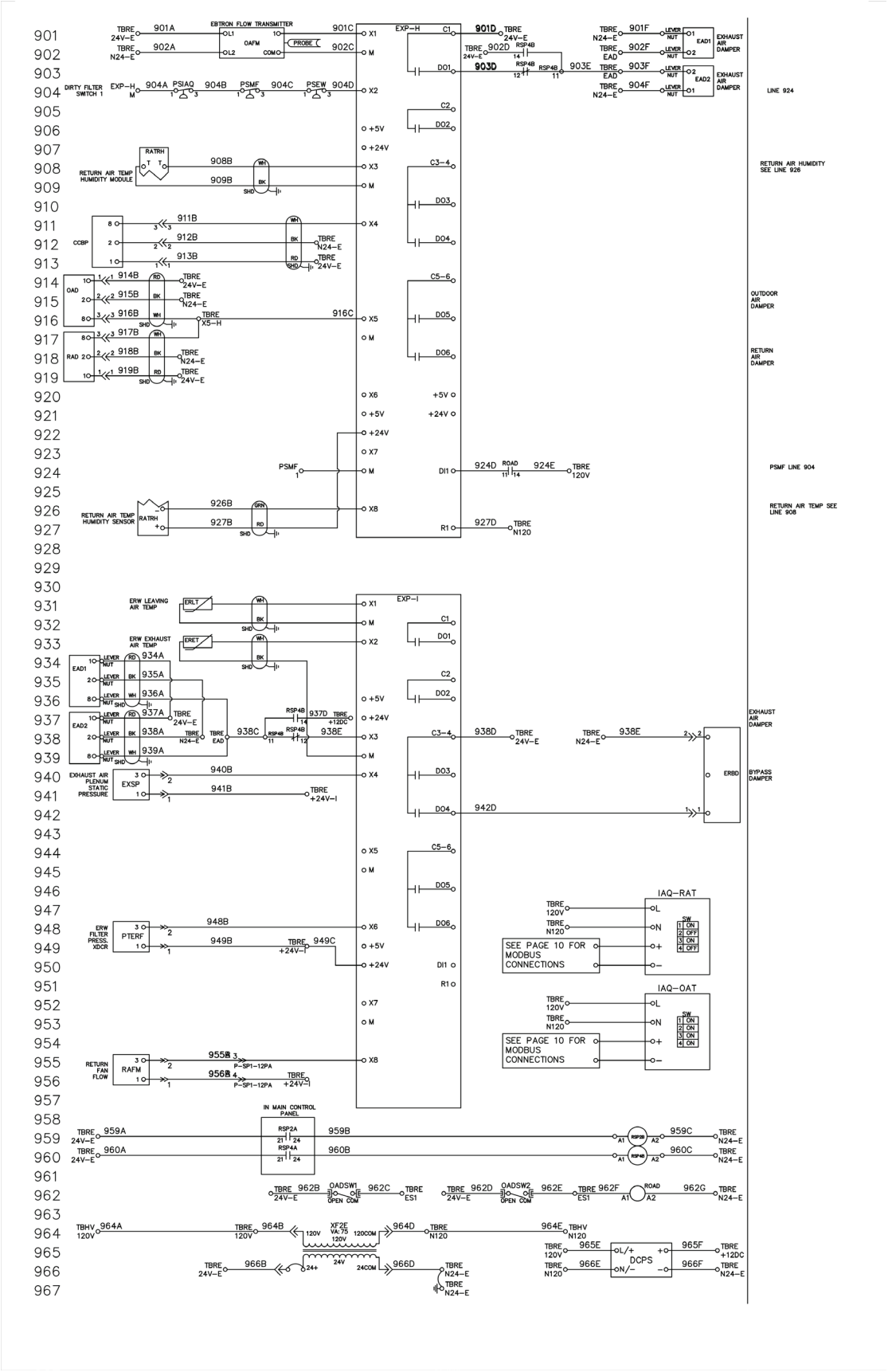
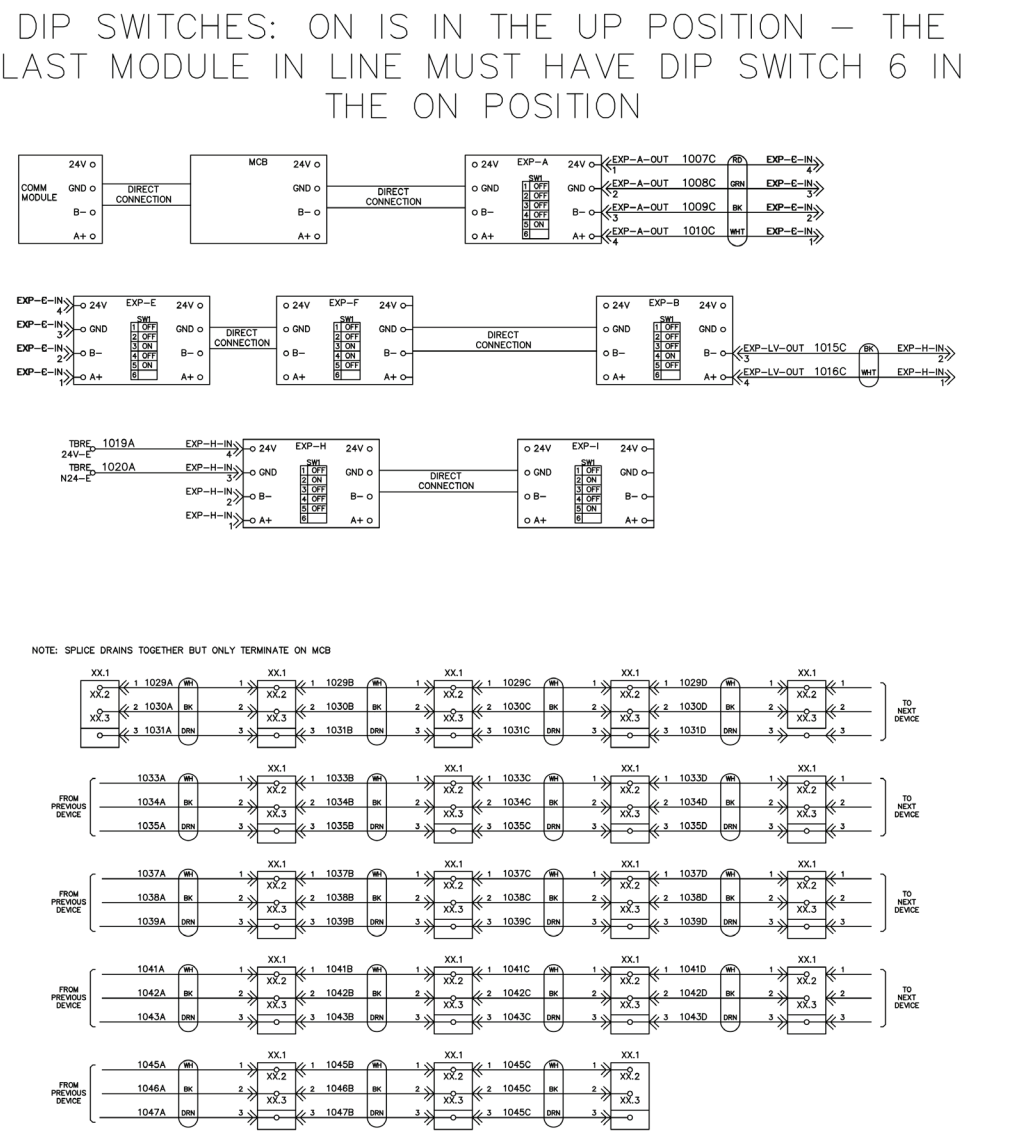


Figure 170: Typical Rebel Applied Wiring Diagram (continued)



MODBUS DEVICE ADDRESSES

XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4
XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4
XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4
XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4
XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4	XX.5 : XX.4

Figure 171: Typical Rebel Applied Wiring Diagram (continued)

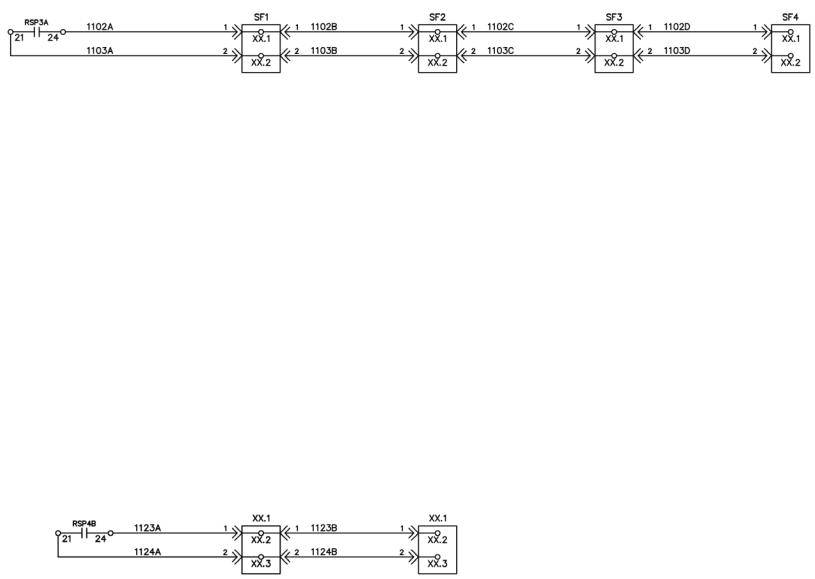


Figure 172: Typical Rebel Applied Wiring Diagram (continued)

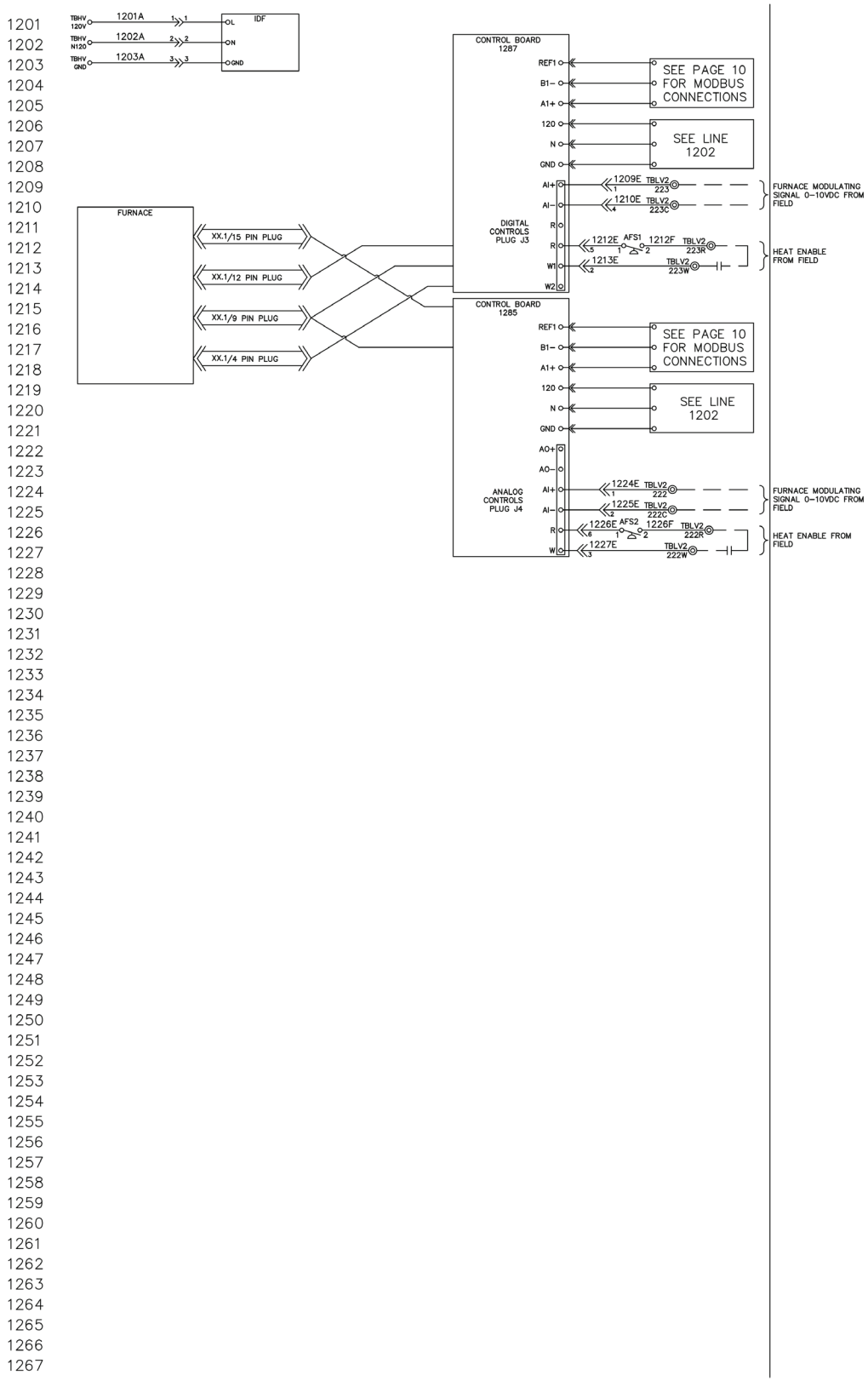


Figure 173: Typical Rebel Applied Wiring Diagram (continued)

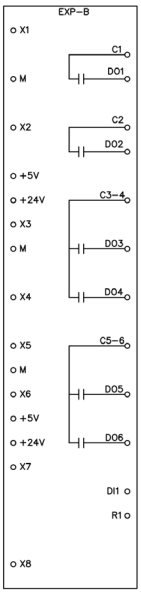
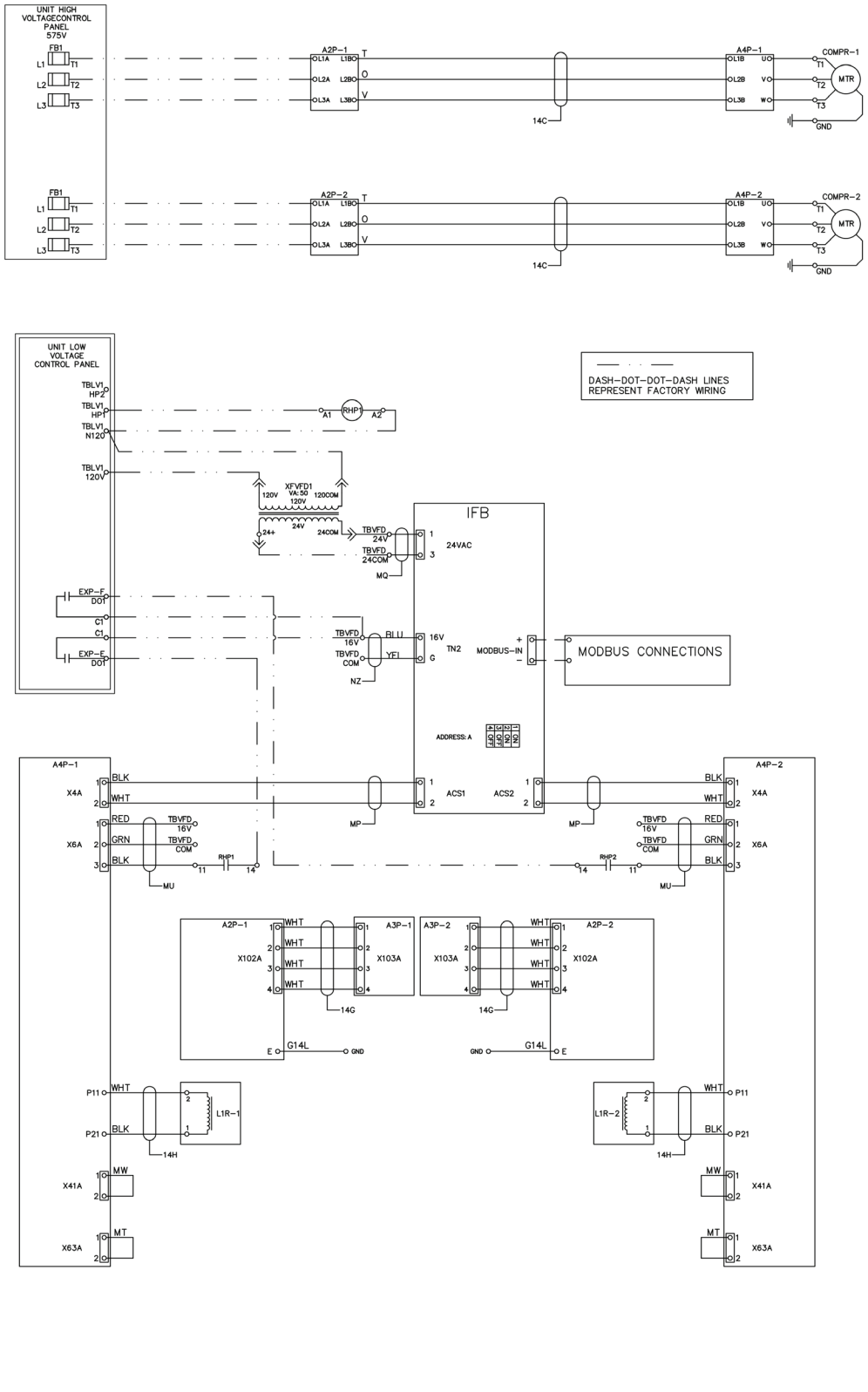


Figure 174: Typical Rebel Applied Wiring Diagram (continued)



Planned Maintenance

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

- Tighten all belts, wire connections, and setscrews.
- Clean the evaporator and condenser coils mechanically or with cold water, if necessary. Usually any fouling is only matted on the entering air face of the coil and can be removed by brushing.
- Check each circuit's refrigerant sightglass when the circuit is operating under steady-state, full load conditions. The sightglass should then be full and clear. If it is not, check for refrigerant leaks.

NOTE: A partially full sight glass is not uncommon at part load conditions.

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

Unit Storage

Location

The Daikin Applied Rooftop Packaged System Unit is an outdoor unit. However, the 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. The condenser fins are particularly vulnerable to damage by even light contact with objects.
- Make sure all doors are securely closed.
- If isolation dampers are provided, verify that they are properly installed and fully closed to prevent the entry of animals and debris through the supply and return air openings.
- Units without isolation dampers should be fitted with covers over the supply and return air openings.

Preparation

Supply (and Return) Fans

1. Turn the supply and return fan manual motor protectors (MMP) to the OFF position.
2. Once every two weeks, rotate the fan and motor shafts. Mark the shaft positions first to make sure they stop in a different position.
3. Depending on local climatic conditions, condensate may collect on components inside the unit. To prevent surface rust and discoloration, spray all bare metal parts with a rust preventive compound, and consider adding a desiccant inside of the cabinet and control panel. Pay close attention to fan shafts, bearings, and bearing supports,

Cabinet Sections

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

Cooling Circuits

The steps below are necessary only if the unit has been started.

1. Turn the compressor manual motor protectors (MMP) to the OFF position.
2. Close the discharge and liquid line refrigerant service valves on each circuit.
3. Tag the valves as a warning for the technician who restarts the units.

Gas Furnace

LOCKOUT/TAGOUT all power sources If the unit is equipped with a gas furnace and close the gas shutoff valve.

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.
3. The location and wattage of the heat source is dependent on local environmental conditions.
4. Check the control compartment every two weeks to check that the heat source is functional and is adequate for current conditions.

Restart

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

Gas Furnace

For information on maintenance of the gas furnace, refer to "Daikin Applied Tubular Gas Heater Series" on page 119

On Daikin Applied equipment that includes the extended 2nd -5th year compressor warranty option, the replacement compressor must be ordered through an authorized Daikin Applied Parts dealer.

Daikin Applied Electric Heater Modules

⚠ DANGER

Hazardous electrical situation which will result in death or serious injury if not avoided. LOCKOUT/TAGOUT all power sources prior to servicing the unit. More than one disconnect may be required to de-energize the unit.

⚠ WARNING

Electrical shock can cause severe personal injury or death. Control panel must be serviced by trained and qualified technicians.

⚠ WARNING

Electrical shock can cause severe personal injury or death. All protective deadfront panels must be reinstalled and secured when power wiring is complete.

⚠ WARNING

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

⚠ WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause personal injury or death. Read carefully and understand this installation and maintenance manual thoroughly before installing or servicing this equipment.

Electric Heater General Information

The 23rd through the 26th digits in the DPSA rooftop model number will be used to define the DPSA Main electric heater when the unit is furnished with a factory installed electric heater.

Example: DPSA - - - - - - - - - - - - - - - - - EEDS would be a 40kW electric heater with modulating control.

The DPSA electric heaters are available with stage or modulating heat output. The heaters are designed for outdoor non-residential installations only.

If unit is equipped with energy recovery wheel (ERW), the 43rd digit in the DPSA rooftop model number will be used to define the ERW pre heater.

Example: DPSA - - - - - - - - - - - - - - - - - C would be a 10kW electric heater with SCR.

The DPSA ERW electric heaters are only available with modulating heat output. The heaters are designed for outdoor non-residential installations only.

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

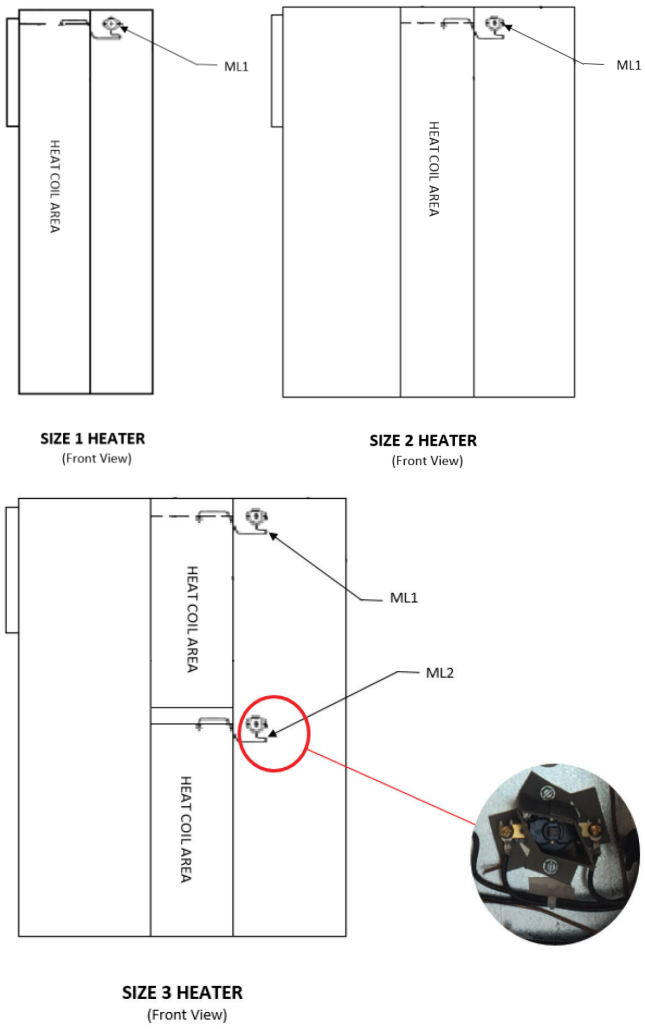
The high limit temperature switches are configured as automatic resetting for the primary protection switch(es) and manual resetting for the backup protection switch(es). See

Table 16 for main electric heat or Table 17 for ERW electric heater. The primary protection switch(es) open the control circuit and shuts the heater down when the temperature reaches the high limit set point; the circuit closes again when the temperature falls below dead band and then allows the heater to run. The backup protection switch(es) open the control circuit and shuts the heater down when the temperature exceeds the set point. The switch(es) requires manual resetting to resume electric heat operation. The Temperature High Limit backup switches may be found by de-energizing the unit, removing the dead-front, and locating the switches as per Figure 175 on page 109.

Table 16: Main Electric Heat Switch Identification

Size	Voltage	KW	Amps	High Temperature Limit Primary Switch (Qty.)	High Temperature Limit Backup Switch (Qty.)
1	208	10 – 15	28 – 42	2	1
	240	10 – 15	24 – 36	2	1
	480	10 – 15	12 – 18	2	1
	600	10 – 15	10 – 15	2	1
2	240	20 – 139	48 – 335	2	1
	480	20 – 140	24 – 168	2	1
	600	25 – 125	24 – 120	2	1
3	240	159	383	2	2
	480	159 – 239	192 – 288	2	2
	600	149 – 249	144 – 240	2	2

Figure 175: Backup Manual Switch Location

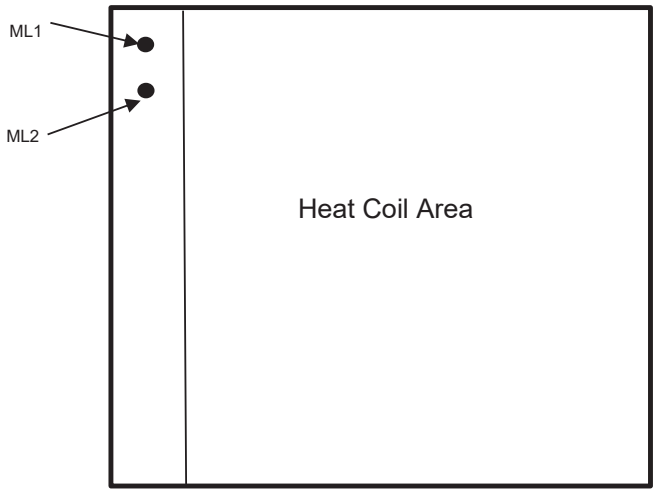


NOTE: It is not recommended to use the auxiliary electric heat as a reheat source for space control.

Table 17: ERW Electric Heat Switch Identification

Voltage	KW	Amps	High Temperature Limit Primary Switch (Qty.)	High Temperature Limit Backup Switch (Qty.)
208	10 – 45	28 – 124	3	2
240	10 – 55	25 – 138	3	2
480	10 – 60	13 – 75	3	2
600	10 – 60	10 – 61	3	2

Figure 176: Backup Manual Switch Location



ERW Pre Heater
Note: Manual Limits accessible through mist eliminators

Installation

The DPSA main electric heater and ERW pre-heater are factory installed and wired. Field supplied power wiring to be in accordance with NEC and any existing local codes by trained qualified installation and service personnel.

Startup

Manual Mode

1. Turn main power ON to the cabinet and electric preheat.
2. Set the process supply fan to deliver at least the minimum required air flow via MicroTech 4. See cabinet electric heat data plate for flow rate.
3. Enable electric heater control via MicroTech 4.
4. Input temperature control value via MicroTech 4 and observe discharge air temperature is responding as expected.

Automatic Mode:

1. Turn power ON to the cabinet and electric preheat.
2. Set MicroTech 4 to desired control parameters.

Operation

To operate electric heater, make sure all associated control equipment is on, energize main supply disconnect, and set controlling thermostat above ambient temperature. This heater is equipped with automatic and manual reset temperature limiting controls. If it fails to operate, make sure manual resets are operative by pushing reset buttons as discussed above.

Maintenance

Check all electrical connections, including field and factory-made connections, for tightness at least once per year or operating season. Any filters in the airstream must be kept clean so that adequate airflow is maintained.

Table 18: Troubleshooting-Main Electric Heat or ERW Electric heat

Problem	Cause	Remedy
No Heat	Main power OFF	Turn main power disconnect switch on
	Fan not activated	Check to see if fan unit is on and if auxiliary contact on fan motor starter is closed. Check all field wiring for continuity or possible short circuits. Check wiring diagram on inside of cover of heater or panelboards for interlocks and remote control equipment to make sure it is all working
	Manual thermal cutout tripped	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
	Automatic thermal cutout tripped	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
	Fuses blown	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
Low Output	Heating element burned out	Check for burned out elements by disconnecting power wiring to the elements and connecting a reliable ohmmeter to the element terminals Element resistance (R) should be: R = E2/(1.06xW) ± 5% Where E = voltage across element; W = Number of kW x 1000/Number of elements
	Low line voltage	Check nameplate voltage is equal to line voltage
	Cycling on automatic thermal cutout	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
	Fuses blown	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
Overheating	Control system	Check to see if fan is ON Check all field wiring for continuity or possible short circuits Check wiring diagram to make sure interlocks and remote control equipment are working
	Not enough airflow	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
	Uneven or partially blocked airflow	Check for obstructions to airflow through the heater. (Outdoor Air Damper Open, Mist Eliminators Clean, Filters Clean, etc) Check that heater has at least the minimum amount of airflow Check all manual thermal cutout(s) reset button(s) - reset as required Check all fuses - replace as required
	High line voltage	Check nameplate voltage is equal to line voltage
Terminals Overheating	Loose connections	Check for obvious signs of terminal and wiring overheating Tighten and repair as required| All terminals should be checked and tightened once a year or at the start of every heating season
	Improperly sized wire	All incoming wiring should be sized in accordance with NEC Article 424
	High voltage	Check nameplate voltage is equal to line voltage
Contactor Hum or Chatter	Low control voltage	Check nameplate voltage is equal to line voltage Check control voltage, it should not be less than 90% of the contactor coil voltage
	Dirt on armature of holding coil	Clean contactor armature with low air pressure and a stiff brush
	Defective contactor	Replace contactor

Electric Heater Step Controller

The S5 Series step controller is a microcomputer-based stage controller designed to provide low cost precise control for multi-stage applications. Common applications are HVAC duct heaters, industrial process air heaters and circulation heaters.

- Low voltage 24 VAC microcomputer-based stage controller
- Capable of controlling 24 VAC loads
- 5 stage controller with a pulsed 10 VDC vernier stage rated at 100 mA.
- Up to 10 stages of control when using a slave unit

Stage Sequencing

The S5 Series step controller operates in a linear control mode. The first stage ON will be the last stage OFF (LIFO).
For example: 1,2,3,4,5 ON then 5,4,3,2,1 OFF.

Vernier Operation

The S5 Series step controller supports a 10 VDC pulsed vernier stage to operate a slave SCR/SSR controller. This will result in more precise control than is otherwise possible with a standard on-off step controller. The slave SCR/SSR power controller provides proportional control (0-100% load) between the switching of the step controller stages:

Figure 177: Sequence Control without Vernier

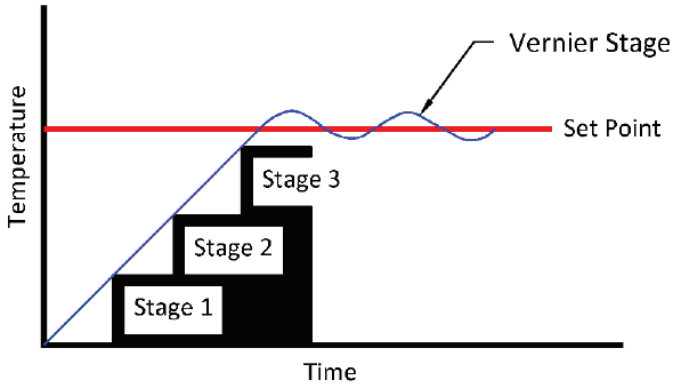
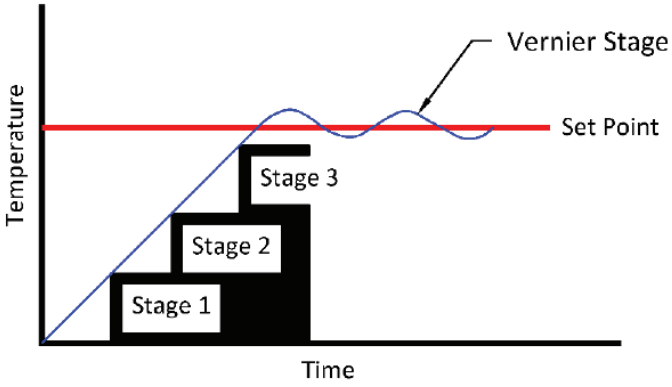


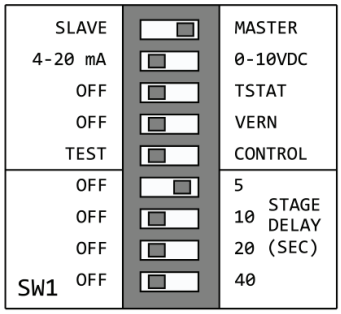
Figure 178: Sequence Control without Vernier



Set-Up

Figure 179: Step Controller Set-Up Instructions

OPERATIONAL SETTINGS:



CAUTION:

- Disconnect all power before changing any controller settings.
- For a master/slave application:
  - Connect the Vernier output to the master step controller.
  - All settings except switch 1 (ie. Master / Slave) on the slave controller are disabled and control is determined by the settings on the master.
  - Wire the control signal to the master unit only.

Switch	OFF	ON	Description
1	Slave	Master	Set control to operate as a slave or a master. All switches must be in the 'OFF' position for slave operation.
2	4-20 mA	0-10 VDC	Set control for operation with a 4-20 mA or a 0-10 VDC input signal.
3	Off	TSTAT	Set switch to 'TSTAT' when using a 3-wire thermostat with a 0-10VDC input signal.
4	OFF	VERN	Set to 'VERN' when utilizing the vernier control functionality of terminals S1(+) & S2(-).
5	TEST	CONTROL	Set control functionality to test mode or control mode. See section titled 'FUNCTIONAL TEST DESCRIPTION' for description of test sequence.

DELAY SETTINGS (Seconds):

Seconds	Switches 6 - 9			
	5	10	20	40
1	Off	Off	Off	Off
5	On	Off	Off	Off
10	Off	On	Off	Off
15	On	On	Off	Off
20	Off	Off	On	Off
25	On	Off	On	Off
30	Off	On	On	Off
35	On	Off	On	Off
40	Off	Off	Off	On
45	On	Off	Off	On
50	Off	On	Off	On
55	On	On	Off	On
60	Off	Off	On	On
65	On	Off	On	On
70	Off	On	On	On
75	On	On	On	On

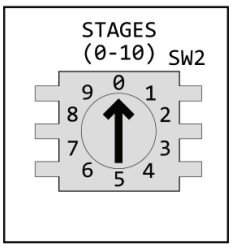
INPUT SIGNAL TOLERANCES:

Nominal	Low Range Limit	High Range Limit
4-20 mA	3	21.0
0-10 VDC	0	10.5
TStat VDC	0	10.5

Input signals above or below the Range Limits will result in an error indication. The controller will continue to operate, but an error light will indicate the out of range condition. See the section 'TROUBLESHOOTING' for error indication light definitions.

Tolerance of +10% / -5% on range limit indications.

STAGE CONFIGURATION:



The STAGE dial is used to configure the proper number of stages.

Set the stages to a value between 1 and 10 on the master controller.

When a slave controller is used, always set the stages on the master controller to a value greater than 5.

Step Controller Troubleshooting

Figure 180: Step Controller Troubleshooting Instructions

FUNCTIONAL TEST DESCRIPTION:

CAUTION:

- Disconnect all power before changing any controller settings.

The functional test mode can be used to verify board operation, stage settings and input signal. This mode will bypass both the inter-stage delay settings and input signal in order to sequence the stages according to the current status of the STAGE settings. The test sequence will also validate the input signal.

The board is configured for the functional test mode by setting switch 5 to 'TEST'. When the board is powered on in the functional test mode, the following sequence of events will take place:

1. The following LEDs will illuminate on power up and remain on during the cycling up and down of the stages:

LED			Master Unit	Slave Unit
Description	Number	Color		
Power	LED 1	Red	On	On
Error	LED 2	Yellow	On	Off
Run	LED 3	Green	On	On
Fault	LED 4	Yellow	On	Off
DC Power	LED 10	Red	On	On
Vernier	LED 11	Green	On	Off
Slave	LED 12	Green	On	On

2. The stage LED lights will cycle on and then off in a linear fashion (first on, last off) according the number of stages currently set. Both the inter-stage delay settings and input signal are bypassed during this test.

3. After the stage cycling is complete, the controller will perform a test to verify the input signal. All lights except the DC Power (LED 10) will turn off and one of the following lights will blink to conclude the functional test:

LED			Description of input test result if LED is illuminated
Description	Number	Color	
Power	LED 1	Red	Reversed polarity (mA or VDC)
Error	LED 2	Yellow	No input signal detected or signal detected is out of range *
Run	LED 3	Green	No issues. Valid input signal detected.

* Tolerance of +10% / -5% on range limit indications.

4. After test is complete, power down controller and set switch 5 back to 'Control'. The controller is ready to put into service. If the light sequence shown is not as expected based on the current setup parameters, please verify settings and contact factory for assistance.

Electric Heater Wiring Diagrams

Figure 181: 10kW – 240kW (Stage Control)

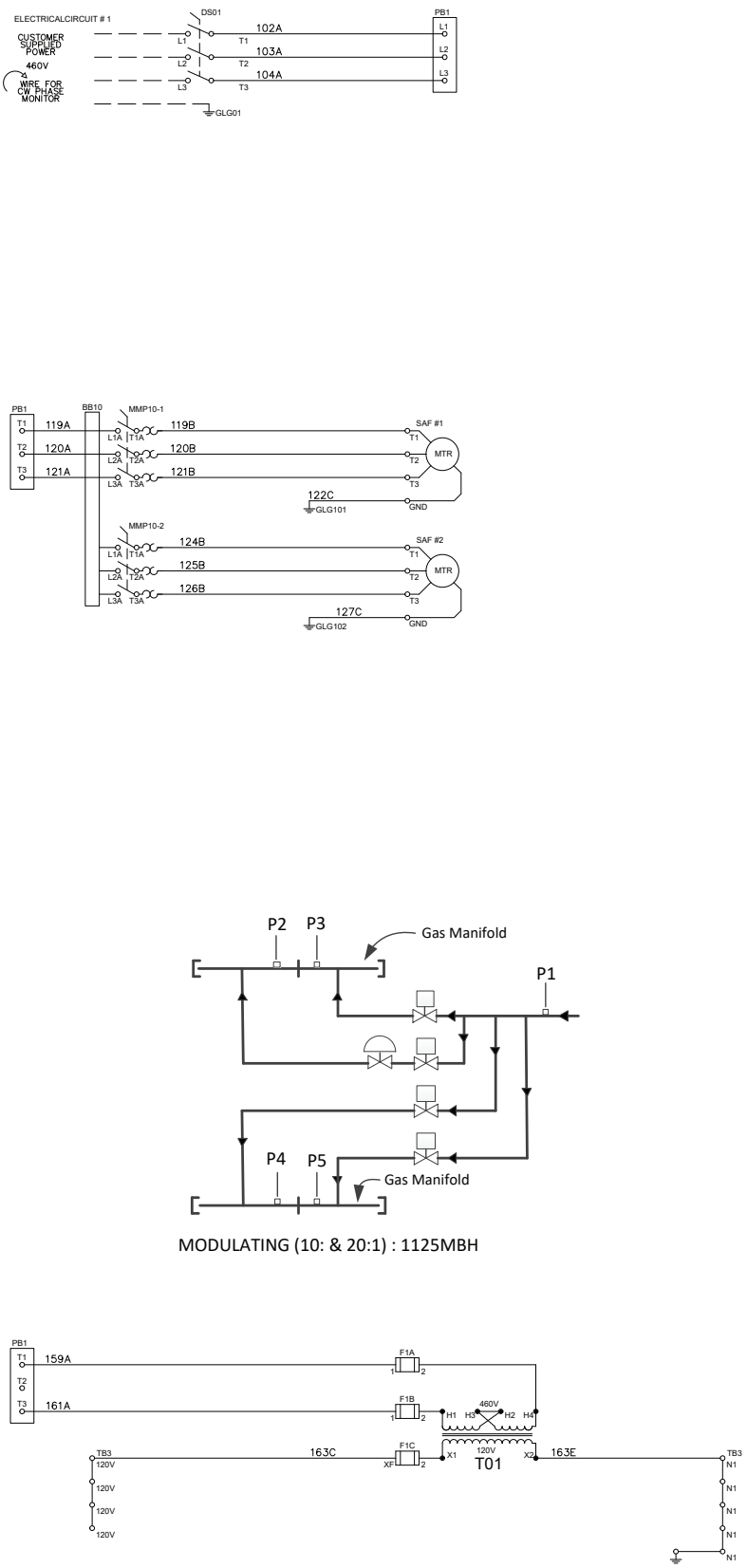


Figure 182: 100kW – 250kW (Step Control)

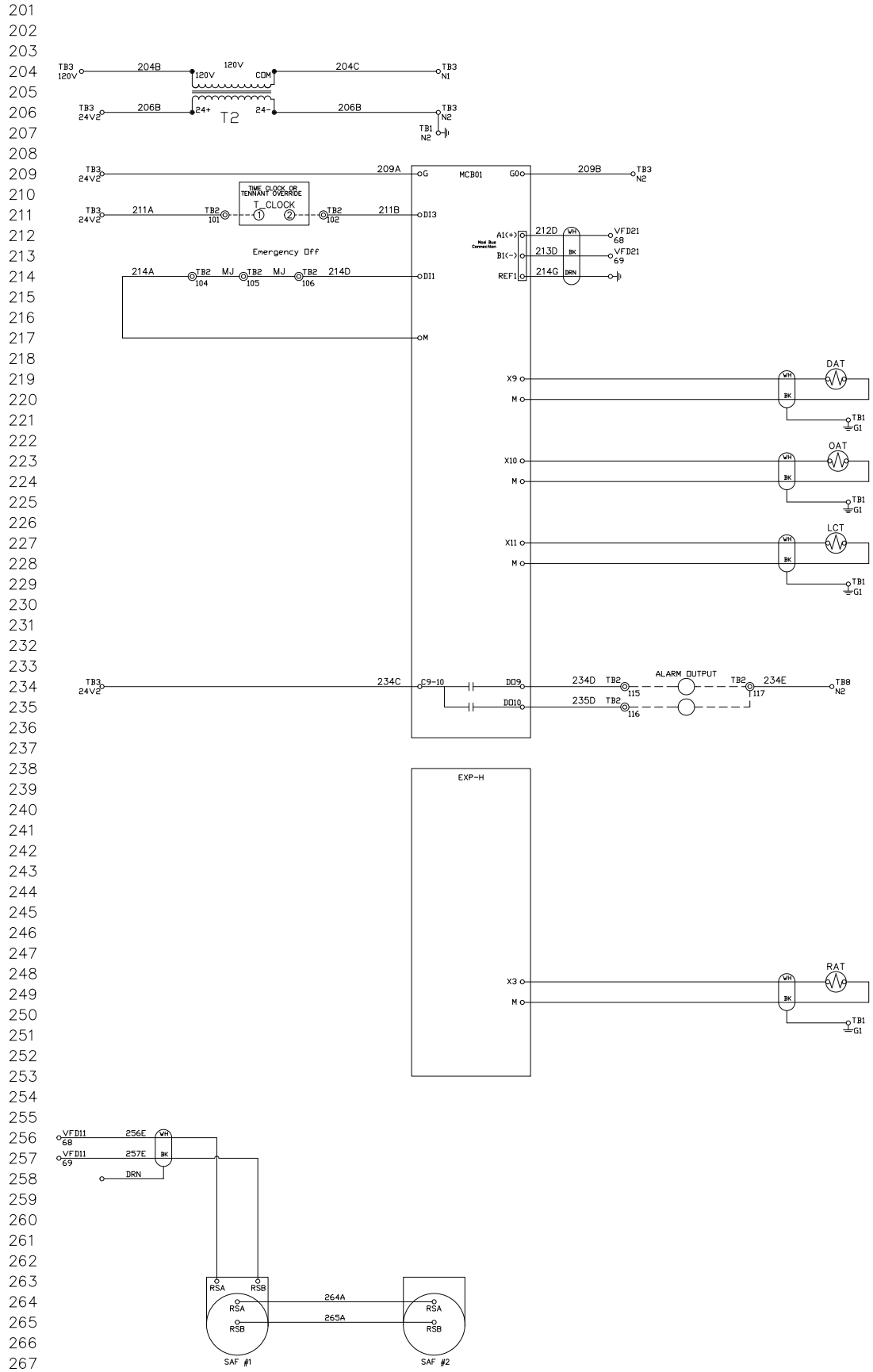


Figure 183: 10kW – 50kW (Full SCR Control)

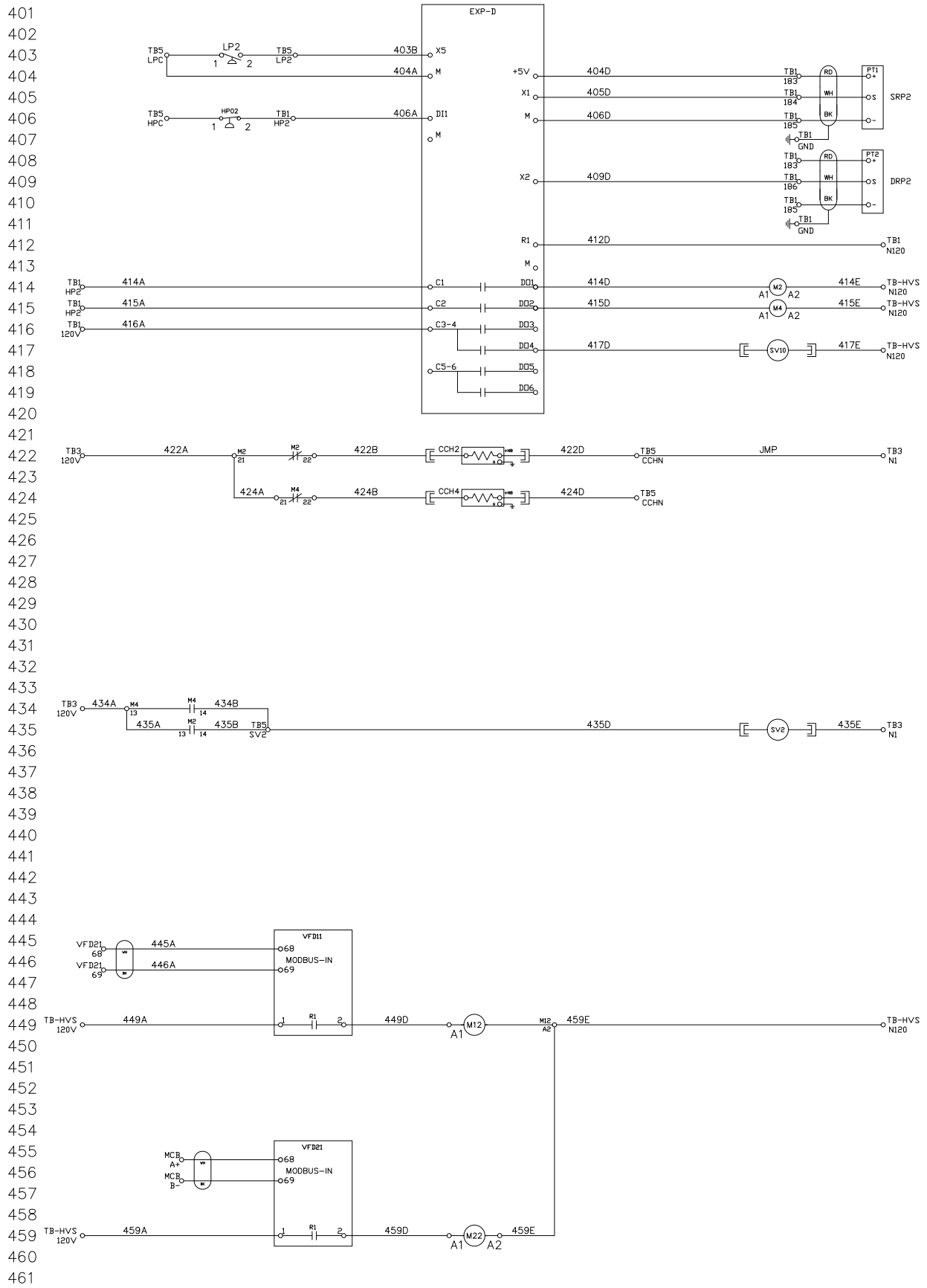
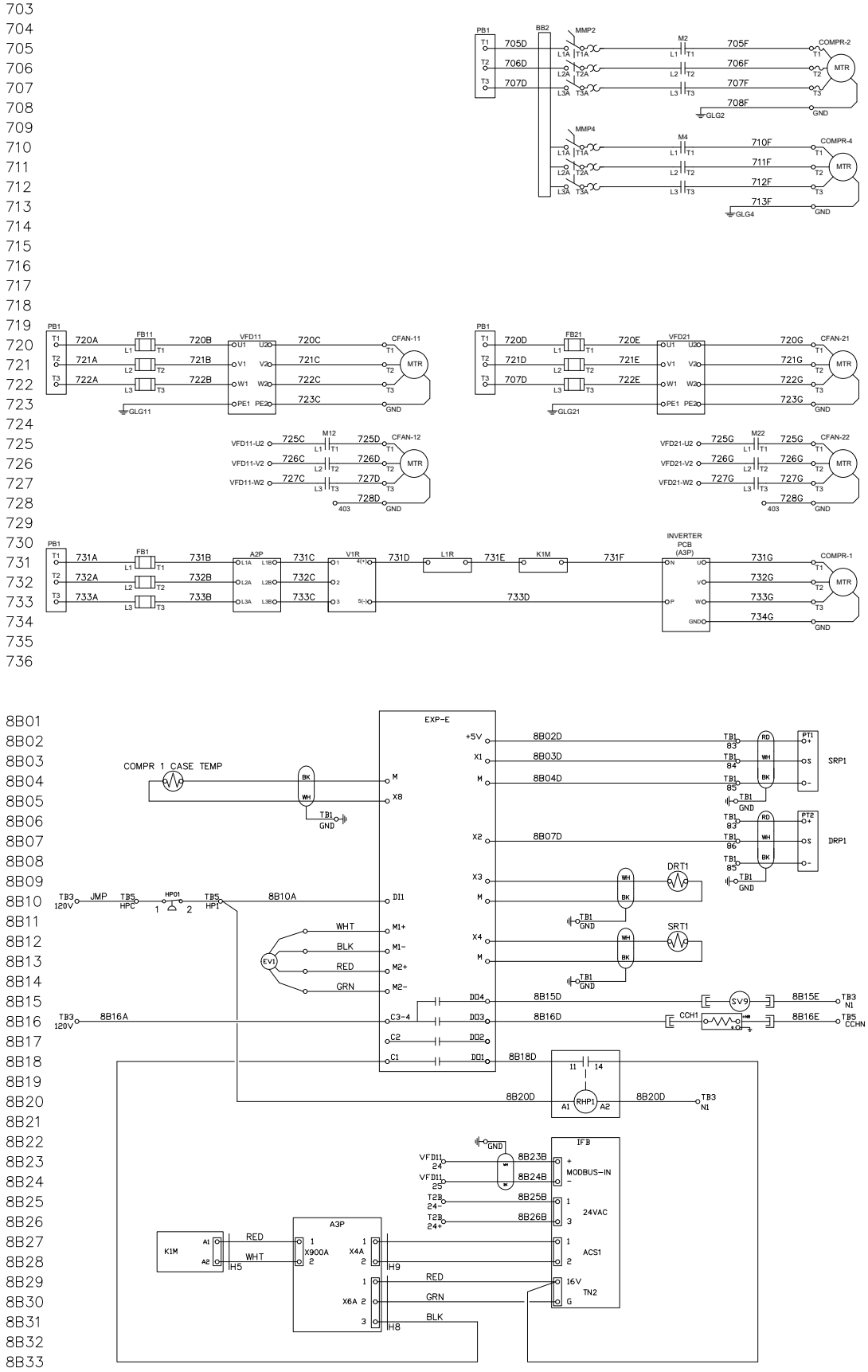


Figure 184: 40kW – 250kW (SCR Vernier Control)



Daikin Applied Tubular Gas Heater Series

Packaged Gas Heater Module

ANSI Z83.8/CSA 2.6

⚠ WARNING

Risque D'Incedie ou D`Explosion

Le non respect des mises en garde pourrait entrainer des blessures graves, la mort ou des pertes materielles. Prendre soin de lire et de comprendre les instructions d'installation, de fonctionement et d'entretien contenues dans ce guide. Une installatoin, un reglage, une modification, une reparation ou un entretien inapproprie peut entrainer des blessures graves, la mort ou des pertes materielles.

- Ne pas entreposer ni utiliser d'essence ou autre vapeurs ou liquides inflammables a proximite de cet appareil ou de tout autre appareil.
- **QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ**

• Ne tentez pas d'alumer un appareil.
• Ne touchez pas a un interupteur; n'utilisez pas de telephone dan l'edifice ou vous trouvez.
• Sortez de l'edifice immediatement.
• Appelez immediatement le fournisseurde gas a partir d'un telephone a l'exterieur de l'edifice. Suivez les instructions du fournisseur de gaz.
• Si vous ne pouvez joindre le fournisseur de gaz, appelez les pompiers.

- L'installation et les reparations doivent etre confiees a un installateur qualifie ou au fournisseur de gaz.

⚠ WARNING

Fire or Explosion Hazard

LOCKOUT/TAGOUT all power sources prior to installing the gas furnace. Failure to follow warnings exactly could result in serious injury, death, or property damage. Be sure to read and understand the installation, operation, and service instructions within this manual. Improper installation, adjustments, alterations, 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 vacinity of this appliance.
- **What to do if you smell gas**

• Do not try to light any product that is fueled by or contains an open flame.
• Do not touch any electrical switch.
• Do not use any telephone in the building.
• Leave the building immediately.
• Imediately call the gas supplier from a remote telephone and follow the gas supplier's instructions.
• If you cannot reach the gas supplier, call the loca fire department or 911.

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

ⓘ NOTICE

HM series modules are a recognized furnace component design certified by Intertek® Testing Services (ETL). For outdoor installation only. Suitable for both indoor and outdoor installation. Must be installed downstream of supply air fans.

⚠ WARNING

Ensure gas furnace flues do not discharge near the fresh air intake of any other equipment or building opening.

ⓘ NOTICE

The unit should be installed so that the fresh air has unimpeded access to the louvered furnace fresh air intake.

⚠ WARNING

Unit 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 and will void all warranty coverage by the manufacturer. Questions regarding specific contaminants should be referred to your local gas utility.

General Gas Furnace Information

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.

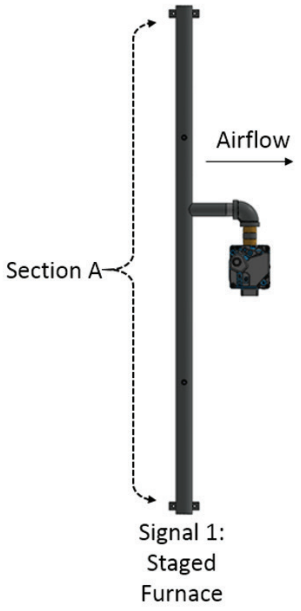
The Rating Plate/Name Plate has been permanently attached to the furnace assembly. It contains information including gas type, maximum and minimum input rating, manifold pressure, maximum and minimum inlet gas pressure, maximum and minimum airflow requirements, output capacity and electrical rating for 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. Louvred openings for combustion air have been provided in the furnace(s) access door. The air opening provides unrestricted combustion air to the burners and sized such that a minimum free area is maintained. The minimum free area is defined as 1 in^2 (625 mm^2) 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 before the outlet air exceeds 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 heat exchanger temperatures to 1330 °F (721°C).

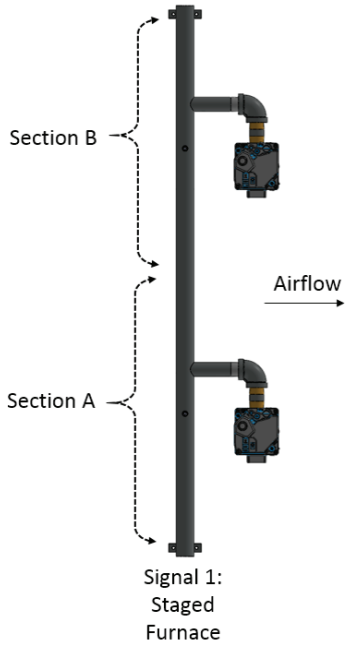
Gas Furnace Sequence of Operation

Figure 185: MQ108MV 200 MBH, 2 Stage; 5:1



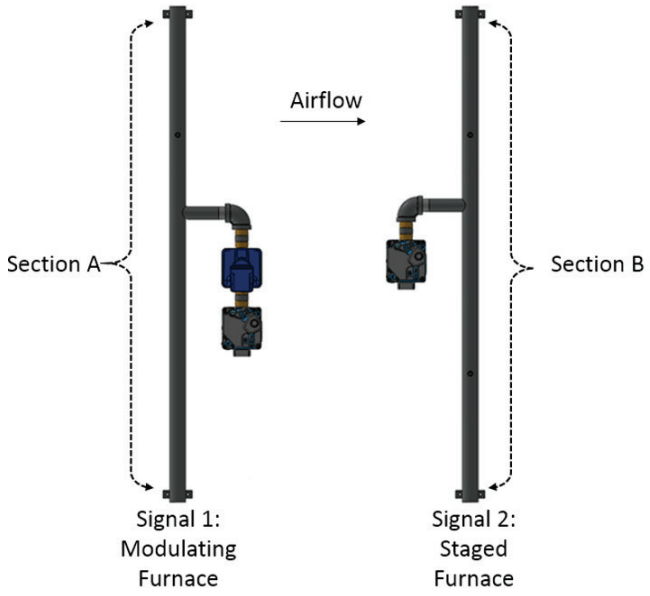
Daikin Applied MQ108MV furnaces are configured as a single manifold as shown in Figure 185. One furnace control board is supplied with this furnace model. The VB1285 control board controls the modulating Section A of the furnace manifold. The VB1285 board requires a 0-10VDC signal as well as a permissive dry contact. These connections can be made in Terminal Block 2 (TB-2). Furnace controls must sequenced in ascending voltage signal to produce full turn down.

Figure 186: MQ108SP 400 MBH, 2 Stage; 10:1; 100:1
600 MBH, 4 Stage; 10:1; 100:1



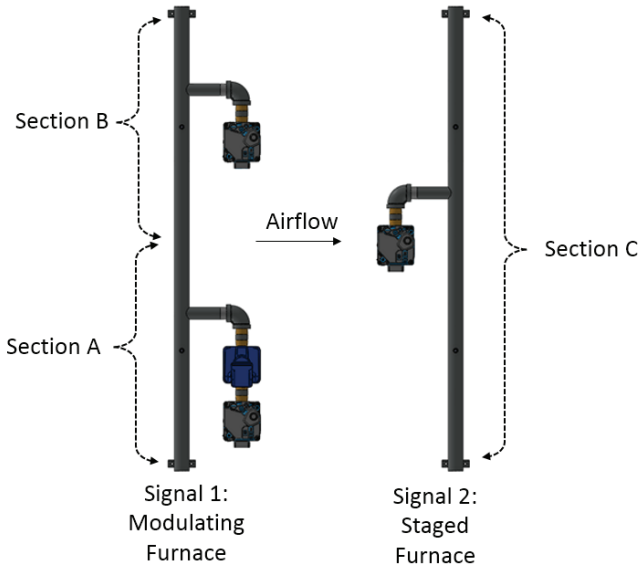
Daikin Applied MQ108SP furnaces are split into two manifold sections, partioned as shown in Figure 186. One furnace control board is supplied with this furnace model. The VB1285 control board controls the modulating Section A as well as the staged section B of the furnace manifold. The VB1285 board requires a 0-10VDC signal as well as a permissive dry contact. These connections can be made in Terminal Block 2 (TB-2). Furnace controls must sequenced in acending voltage signal to produce full turn down.

Figure 187: MQ616SP 800 MBH, 10:1



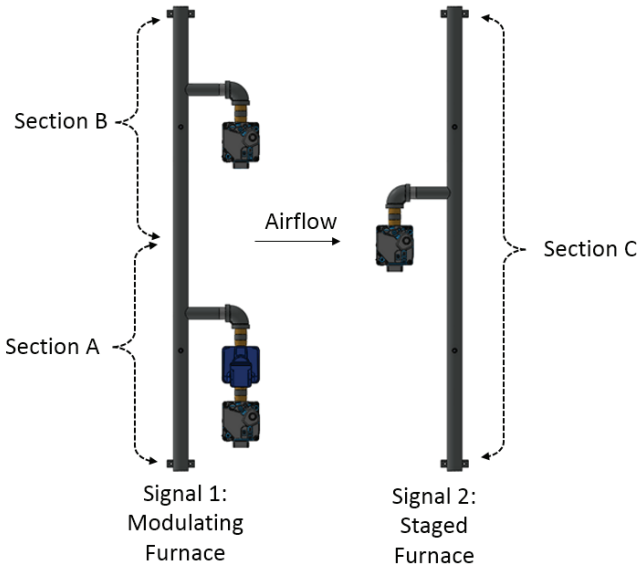
Daikin Applied MQ616SP furnaces are split into two manifold sections, partioned as shown in Figure 187. One furnace control board is supplied with this furnace model. The VB1285 control board controls the modulating Section A as well as the staged section B of the furnace manifold. The VB1285 board requires a 0-10VDC signal as well as a permissive dry contact. These connections can be made in Terminal Block 2 (TB-2). Furnace controls must sequenced in acending voltage signal to produce full turn down.

Figure 188: MQ616SP 800 MBH, 20:1



Daikin Applied MQ616SP furnaces are split into three manifold sections, partioned as shown in Figure 188. Two furnace control boards are supplied with these furnace models. The VB1285 control board controls the modulating Section A as well as the staged section B of the furnace manifold. The VB1287 control board controls the staged section C. Both the VB1285 board and the VB1287 require a distinct 0-10VDC signal as well as a distinct permissive dry contact. These connections can be made in Terminal Block 2 (TB-2) .Furnace controls must be operated in tandem to produce the full turn down.

Figure 189: MQ624SP 1125 MBH, 10:1, 20:1



Daikin Applied MQ624SP furnaces are split into four manifold sections, partioned as shown in Figure 189. Two furnace control boards are supplied with this furnace model. The VB1285 control board controls the modulating Section A as well as the staged section B of the furnace manifold. The VB1287 control board controls the staged sections C and D. Both the VB1285 board and the VB1287 require a distinct 0-10VDC signal as well as a distinct permissive dry contact. These connections can be made in Terminal Block 2 (TB-2) .Furnace controls must be operated in tandem to produce the full turn down.

Electric Furnace Sequence of Operation

The electric heater should be activated as the first source of heat and modulate to maintain the heating discharge air temperature setpoint (for heating) or the cooling discharge air temperature setpoint setpoint (for minimum discharge air temperatures). If the electric heater reaches 100% capacity and cannot meet the discharge air setpoint, the electric heater is shut off and the gas furnace is brought on at minimum fire. The electric heater continues to run at 100% until the furnace command has been given for 60 seconds. If the gas furnace reaches minimum fire for a heating stage timer and over shoots the heating discharge air temperature setpoint, the gas furnace is shut off and the electric heater is activated and modulated to maintain the discharge air temperature setpoint.

Figure 190: Electric (Signal 1) 200 MBH, 100:1

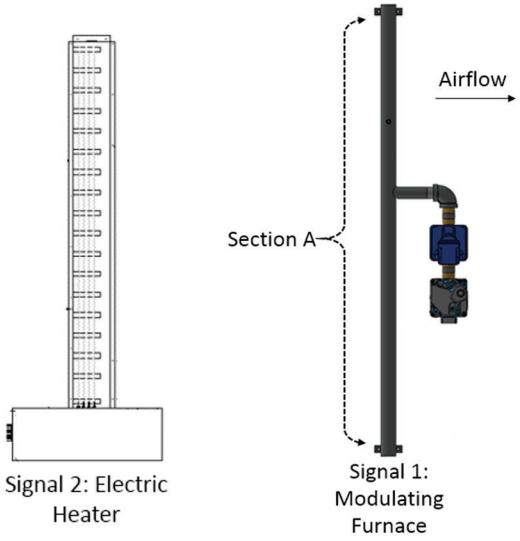


Figure 191: Electric (Signal 2) 200 MBH, 100:1

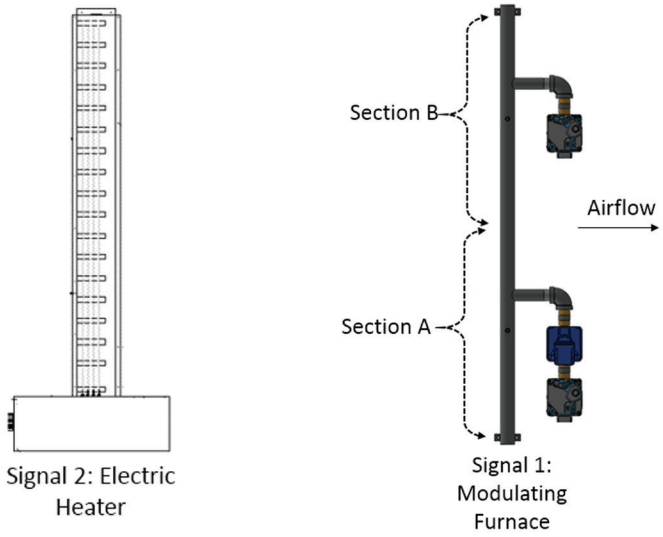


Figure 192: Electric 800 MBH, 100:1

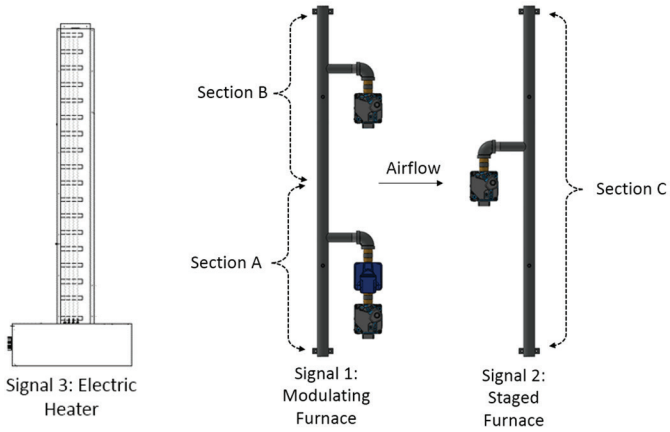
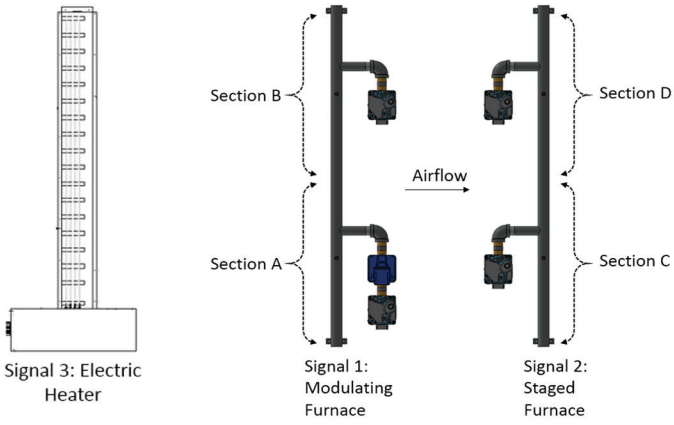


Figure 193: Electric 1125 MBH, 100:1



Refrigeration Only Controls (ROC)

The furnace control when the unit is equipped with Refrigeration Only Control (ROC) requires the field provided controller to send a 0-10V signal to the factory provided boards. Refer to the provided wiring diagrams on the unit for specific configurations.

The table below indicates where to land control signals for the various control boards depending on the configuration of the unit.

Notes:

- It is the responsibility of the field provided controls system to prove airflow prior to operating the heating section. A fan delay timer needs to be implemented for gas furnace units. A two minute delay from when the furnace is signaled off is when the fans can stop operating.
- Gas safety valve feeding the modulating gas valve is set to 4.5” with modulating section at high fire.
- Field provided controller must monitor the temperature rise across the unit to ensure actual temperature rise does not exceed the submittal selected maximum temp rise.

Table 19: Control Board Landing

		1285 board				1287 board				SCR (100:1 turndown)	
	Input	0-10v signal		R-W		0-10v signal		R-W		0-10v Signal	
NG	200*	222	222C	222R	222W	223	223C	223R	223W	222A**	222B**
	400*	222	222C	222R	222W	223	223C	223R	223W	222A**	222B**
	600*	222	222C	222R	222W	223	223C	223R	223W	222A**	222B**
	800***	222	222C	222R	222W	223	223C	223R	223W	222A**	222B**
	1125***	222	222C	222R	222W	223	223C	223R	223W	222A**	222B**
LP	200*	222	222C	222R	222W	223	223C	223R	223W		
	400*	222	222C	222R	222W	223	223C	223R	223W		
	600*	222	222C	222R	222W	223	223C	223R	223W		
	800***	222	222C	222R	222W	223	223C	223R	223W		
	1125***	222	222C	222R	222W	223	223C	223R	223W		

* These inputs will only have 1x VB1285 OR 1x VB1287

** SCR will only be used with VB1285

*** These inputs will have 1x VB1285 AND 1x VB1287

ROC Analog Staging

Table 20: 200 MBH Analog Staging Information

200 MBH			
2 stage		5:1 turn down	
VDC signal	Total Input (BTUH)	VDC signal	Total Input (BTUH)
4	110000	2.00	40000
9.5	200000	2.94	60000
		3.88	80000
		4.83	100000
		5.77	120000
		6.67	140000
		7.62	160000
		8.56	180000
		9.50	200000

Table 21: 400 MBH Analog Staging Information

400 MBH								
2 stage			5:1 turn down			10:1 turndown		
VDC signal	Total Input (BTUH)	Section	VDC signal	Total Input (BTUH)	Section	VDC Signal	Total Input (BTUH)	Section
4	200000	A	2.00	80000	A	2.00	40000	A
9.5	400000	B	2.94	120000		2.41	60000	
			3.88	160000		2.83	80000	
			4.83	200000		3.24	100000	
			5.77	240000		3.66	120000	
			6.67	280000		4.07	140000	
			7.62	320000		4.49	160000	
			8.56	360000		4.90	180000	
			9.50	400000		5.32	200000	
						6.18	240000	B
						6.60	260000	
						7.01	280000	
						7.43	300000	
						7.84	320000	
						8.26	340000	
						8.67	360000	
						9.09	380000	
						9.50	400000	

Table 22: 600 MBH Analog Staging Information

600 MBH								
4 stage			**5:1 turn down**			**10:1 turndown**		
VDC signal	Total Input (BTUH)	Section	VDC signal	Total Input (BTUH)	Section	VDC Signal	Total Input (BTUH)	Section
3.0	165000	A - Low	2.00	120000	A	2.00	60000	A
4.0	330000	A - Low, B - Low	2.41	142500		2.41	90000	
6.0	465000	A - High, B - Low	2.83	165000		2.83	120000	
9.5	600000	A - High, B - High	3.24	187500		3.24	150000	
			3.66	210000		3.66	180000	
			4.07	232500		4.07	210000	
			4.49	255000		4.49	240000	
			4.90	277500		4.90	270000	
			5.32	300000		5.32	300000	
			6.18	360000	A,B	6.18	360000	A,B
			6.60	390000		6.60	390000	
			7.01	420000		7.01	420000	
			7.43	450000		7.43	450000	
			7.84	480000		7.84	480000	
			8.26	510000		8.26	510000	
			8.67	540000		8.67	540000	
			9.09	570000		9.09	570000	
			9.50	600000		9.50	600000	

Table 23: 800 MBH Analog Staging Information

800 MBH							
10:1 turn down				20:1 turndown			
VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section	VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section
0	2.00	80000	A	0	2.00	40000	A
0	2.41	123038		0	2.41	61519	
0	2.83	166175		0	2.83	83088	
0	3.24	209313		0	3.24	104656	
0	3.66	252450		0	3.66	126225	
0	4.07	295588		0	4.07	147794	
0	4.49	338725		0	4.49	169363	
0	4.90	381863		0	4.90	190931	
0	5.32	425000		0	5.32	212500	
9.5	6.18	454900	A,B	0	6.18	252450	A,B
	6.60	498038		0	6.60	274019	
	7.01	541175		0	7.01	295588	
	7.43	584313		0	7.43	317156	
	7.84	627450		0	7.84	338725	
	8.26	670588		0	8.26	360294	
	8.67	713725		0	8.67	381863	
	9.09	756863		0	9.09	403431	
	9.50	800000		0	9.50	425000	
				9.5	2.00	414950	A,C
					2.41	436518.75	
					2.83	458087.5	
					3.24	479656.25	
					3.70	501225	
					4.11	522793.75	
					4.53	544362.5	
					4.94	565931.25	
					5.35	587500	
					6.15	627450	A,B,C
					6.56	649018.75	
					6.97	670587.5	
					7.39	692156.25	
					7.80	713725	
					8.26	735293.75	
					8.67	756862.5	
					9.09	778431.25	
					9.50	800000	

Table 24: 1125 MBH Analog Staging Information

1125 MBH							
10:1 turn down				20:1 turndown			
VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section	VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section
0	2.00	112500	A	0	2.00	56250	A
0	2.41	134047		0	2.41	85244	
0	2.83	155969		0	2.83	114138	
0	3.24	177891		0	3.24	143031	
0	3.66	199813		0	3.66	171925	
0	4.07	221734		0	4.07	200819	
0	4.49	243656		0	4.49	229713	
0	4.90	265578		0	4.90	258606	
0	5.32	287500		0	5.32	287500	
0	6.18	399625	A,B	0	6.18	343850	A,B
0	6.60	421547		0	6.60	372744	
0	7.01	443469		0	7.01	401638	
0	7.43	465391		0	7.43	430531	
0	7.84	487313		0	7.84	459425	
0	8.26	509234		0	8.26	488319	
0	8.67	531156		0	8.67	517213	
0	9.09	553078		0	9.09	546106	
0	9.50	575000		0	9.50	575000	
6	6.18	674625	A,B,C	6	6.18	618850	A,B,C
	6.60	696547			6.60	647744	
	7.01	718469			7.01	676638	
	7.43	740391			7.43	705531	
	7.84	762313			7.84	734425	
	8.26	784234			8.26	763319	
	8.67	806156			8.67	792213	
	9.09	828078			9.09	821106	
	9.50	850000			9.50	850000	
9.5	6.18	949625	A,B,C,D	9.5	6.18	893850	A,B,C,D
	6.60	971547			6.60	922744	
	7.01	993469			7.01	951638	
	7.43	1015391			7.43	980531	
	7.84	1037313			7.84	1009425	
	8.26	1059234			8.26	1038319	
	8.67	1081156			8.67	1067213	
	9.09	1103078			9.09	1096106	
	9.50	1125000			9.50	1125000	

ROC SCR Gas Staging

Table 25: 200 MBH SCR Gas Staging Information

200 MBH				
100:1 turn down				
Electric Heater VDC Input Signal	VB1285 VDC Input Signal	Sections Active	Electric Heat Output (kW)	Gas Heater Input (BTUH)
1	0	Electric Heater	0	0
2			1.1	
3			2.2	
4			3.3	
5			4.4	
6			5.6	
7			6.7	
8			7.8	
9			8.9	
10			10.0	
0	2.00	A	0	40000
	2.94			60000
	3.88			80000
	4.83			100000
	5.77			120000
	6.67			140000
	7.62			160000
	8.56			180000
	9.50			200000

Propane Gas Staging

Table 26: 200 MBH Propane Gas Staging Information

200 MBH			
2 stage		5:1 turn down	
VDC signal	Total Input (BTUH)	VDC signal	Total Input (BTUH)
4	110000	2.00	40000
9.5	200000	2.94	60000
		3.88	80000
		4.83	100000
		5.77	120000
		6.67	140000
		7.62	160000
		8.56	180000
		9.50	200000

Table 27: 400 MBH Propane Gas Staging Information

400 MBH								
2 stage			5:1 turn down			10:1 turn down		
VDC signal	Total Input (BTUH)	Section	VDC signal	Total Input (BTUH)	Section	VDC signal	Total Input (BTUH)	Section
4	200000	A	2.00	80000	A	2.00	40000	A
9.5	400000	B	2.94	120000		2.41	60000	
			3.88	160000		2.83	80000	
			4.83	200000		3.24	100000	
			5.77	240000		3.66	120000	
			6.67	280000		4.07	140000	
			7.62	320000		4.49	160000	
			8.56	360000		4.90	180000	
			9.50	400000		5.32	200000	
						6.18	240000	A,B
						6.60	260000	
						7.01	280000	
						7.43	300000	
						7.84	320000	
						8.26	340000	
						8.67	360000	
						9.09	380000	
						9.50	400000	

Table 28: 600 MBH Propane Gas Staging Information

600 MBH								
4 stage			**5:1 turn down**			**10:1 turn down**		
VDC signal	Total Input (BTUH)	Section	VDC signal	Total Input (BTUH)	Section	VDC signal	Total Input (BTUH)	Section
3.0	165,000	A - Low	2.00	120000	A	2.00	60000	A
4.0	300,000	A - Low, B - Low	2.41	142500		2.41	90000	
6.0	165000	A - High, B - Low	2.83	165000		2.83	120000	
9.5	300000	A - High, B - High	3.24	187500		3.24	150000	
			3.66	210000		3.66	180000	
			4.07	232500		4.07	210000	
			4.49	255000		4.49	240000	
			4.90	277500		4.90	270000	
			5.32	300000		5.32	300000	
			6.18	360000	A,B	6.18	360000	A,B
			6.60	390000		6.60	390000	
			7.01	420000		7.01	420000	
			7.43	450000		7.43	450000	
			7.84	480000		7.84	480000	
			8.26	510000		8.26	510000	
			8.67	540000		8.67	540000	
			9.09	570000		9.09	570000	
			9.50	600000		9.50	600000	

Table 29: 800 MBH Propane Gas Staging Information

800 MBH							
10:1 turn down				20:1 turn down			
VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section	VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section
0	2.00	133333	A	0	2.00	66667	A
0	2.41	168406		0	2.41	84947	
0	2.83	205063		0	2.83	103169	
0	3.24	241719		0	3.24	121391	
0	3.66	278375		0	3.66	139613	
0	4.07	315031		0	4.07	157834	
0	4.49	351688		0	4.49	176056	
0	4.90	388344		0	4.90	194278	
0	5.32	425000		0	5.32	212500	
0	6.18	506750	A,B	0	6.18	279225	A,B
9.5	6.60	543406		0	6.60	297447	
	7.01	580063		0	7.01	315669	
	7.43	616719		0	7.43	333891	
	7.84	653375		0	7.84	352113	
	8.26	690031		0	8.26	370334	
	8.67	726688		0	8.67	388556	
	9.09	763344		0	9.09	406778	
	9.50	800000		0	9.50	425000	
				9.5	2.00	441725	A,C
					2.41	459947	
					2.83	478169	
					3.24	496391	
					3.70	514613	
					4.11	532834	
					4.53	551056	
					4.94	569278	
					5.35	587500	
					6.15	654225	A,B,C
					6.56	672447	
					6.97	690669	
					7.39	708891	
					7.80	727113	
					8.26	745334	
					8.67	763556	
					9.09	781778	
					9.50	800000	

Table 30: 1125 MBH Propane Gas Staging Information

1125 MBH							
10:1 turn down				20:1 turn down			
VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section	VB1287 VDC Input Signal	VB1285 VDC Input Signal	Total Input (BTUH)	Section
0	2.00	187500	A	0	2.00	56250	A
0	2.41	199227		0	2.41	85244	
0	2.83	210945		0	2.83	114138	
0	3.24	222662		0	3.24	143031	
0	3.66	234380		0	3.66	171925	
0	4.07	246097		0	4.07	200819	
0	4.49	257815		0	4.49	229713	
0	4.90	269532		0	4.90	258606	
0	5.32	281250		0	5.32	287500	
0	6.18	468759	A,B	0	6.18	343850	A,B
0	6.60	480477		0	6.60	372744	
0	7.01	492195		0	7.01	401638	
0	7.43	503912		0	7.43	430531	
0	7.84	515630		0	7.84	459425	
0	8.26	527347		0	8.26	488319	
0	8.67	539065		0	8.67	517213	
0	9.09	550782		0	9.09	546106	
0	9.50	562500		0	9.50	575000	
6	6.18	750009	A,B,C	6	6.18	618850	A,B,C
	6.60	761727			6.60	647744	
	7.01	773445			7.01	676638	
	7.43	785162			7.43	705531	
	7.84	796880			7.84	734425	
	8.26	808597			8.26	763319	
	8.67	820315			8.67	792213	
	9.09	832032			9.09	821106	
	9.50	843750			9.50	850000	
9.5	6.18	1031259	A,B,C,D	9.5	6.18	893850	A,B,C,D
	6.60	1042977			6.60	922744	
	7.01	1054695			7.01	951638	
	7.43	1066412			7.43	980531	
	7.84	1078130			7.84	1009425	
	8.26	1089847			8.26	1038319	
	8.67	1101565			8.67	1067213	
	9.09	1113282			9.09	1096106	
	9.50	1125000			9.50	1125000	

Unit Location and Clearances

While the cabinet location is normally selected by the architect, builder, or installer, before installation ensure that the following requirements are met before final installation:

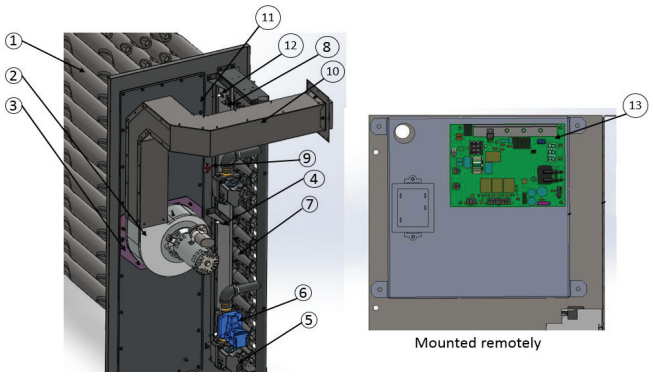
1. Do not install unit where it may be exposed to potentially explosive or flammable vapors.
2. Do not install unit in areas where corrosive vapors (such as chlorinated, halogenated, or acidic) are present in the atmosphere or can be mixed with combustion air entering furnace.
3. Cabinet location must provide access to all doors and panels and allow adjustment and service of the furnace.
4. Cabinet location must provide an adequate, unimpeded supply of fresh air for combustion.
5. Flue discharge should be at least 120 inches away from any opening or other equipment through which combustion products could enter the building
6. Clearance from combustibles to be no less than as listed below:
    a. Furnace access side 18 in (914 mm)
    b. All other sides 6 in (152 mm)
    c. Flue to any combustible surface 18 in (914 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.

If the 23rd digit in the model number is a “G”, the rooftop unit was furnished with a factory installed natural gas furnace (Example: DPSA.....GG3KE). If the 23rd digit in the model number is a “P”, the rooftop unit was furnished with a factory installed propane furnace. The Rebel Applied commercial rooftop units are available in a variety of furnace capacity and turndown configurations. Reference the DPSA Gas Furnace Capacity Data section below for configuration-specific information. DPSA packaged gas heat rooftop units are designed for outdoor non-residential installations only. Furnaces to be supplied configured for natural gas OR LP only.

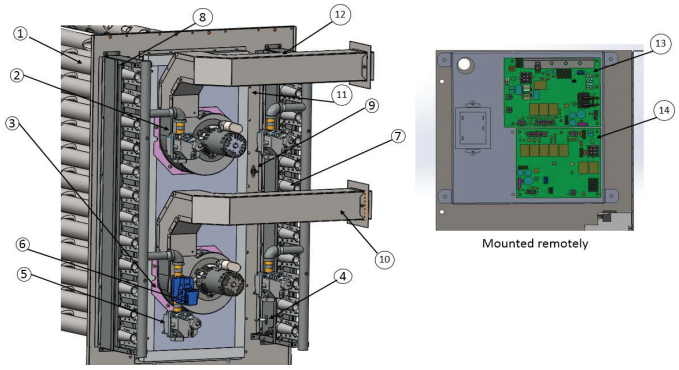
DPSA gas heat furnaces consist of a 439 stainless steel tubular heat exchanger, in-shot burner manifold with gas valve, induced combustion blower, gas heat DDC control module, and all operational safeties. The safety switches include a high-limit temperature switch, a combustion blower proof of airflow, and the flame roll-out switch (see Figure 194 and Figure 195) .

Figure 194: Typical Gas Heat Section Assembly and Component Identification for Single Flue Furnaces (10:1 600 MBH model shown)



Item	Description	Item	Description
1	Heat Exchanger	8	Rollout switch
2	Inducer blower	9	High limit switch
3	Inducer orifice plate	10	Flue
4	Igniter	11	Pressure switch
5	Gas safety valve	12	Flame sensor
6	Modulating valve	13	Control board
7	In-shot burner	14	Transformer

Figure 195: Typical Gas Heat Section Assembly and Component Identification for Double Flue Furnaces (10:1 1125 MBH model shown)



Item	Description	Item	Description
1	Heat Exchanger	10	Flue
2	Inducer blower	11	Pressure switch
3	Inducer orifice plate	12	Flame sensor
4	Igniter	13	VB 1285 modulating control board
5	Gas safety valve	14	VB1287 staged control board
6	Modulating valve	15	Transformer
7	In-shot burner	16	High Temp limit interlock relay
8	Rollout switch	17	On/off solenoid valve (not pictured)*
9	High limit switch		

*On/off solenoid valve only present in 800 MBH 10:1 or 6:1 furnaces

DPSA Gas Furnace Capacity Data

Table 31: DPSA Natural Gas Furnace Capacity Table

Fuel	Heat Size MBH (KW)	Efficiency (%)	Supply Press. min-max IN WC (kPa)	Max Out Temp °F (°C)	Control	Rated Input Low/ High MBH (KW)	Rated Output MBH (KW)	Temp Rise °F (°C)	Min Airflow CFM (M3/HR)
Natural Gas	200 (58.6)	81	7-14 (1.7-3.5)	120 (49)	2 Stage	110/200 (32.2/58.6)	162 (47.5)	25 (14)	5972 (10147)
					5:1 Modulation	40/200 (11.7/58.6)			
	400 (117.2)	81	7-14 (1.7-3.5)	120 (49)	2 Stage	220/400 (64.5/117.2)	324 (95)	50 (28)	5972 (10147)
					5:1 Modulation	80/400 (23.4/117.2)			
					10:1 Modulation	40/400 (11.7/117.2)			
	600 (175.8)	81	7-14 (1.7-3.5)	120 (49)	2 Stage	300/600 (87.9/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
					4 Stage	165/600 (48.4/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
					5:1 Modulation	120/600 (35.2/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
					10:1 Modulation	60/600 (17.6/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
	800 (234.5)	81	7-14 (1.7-3.5)	120 (49)	10:1 Modulation	80/800 (23.4/234.5)	648 (189.9)	60 (33)	9954 (16912)
								100 (56)	5972 (10147)
					20:1 Modulation	40/800 (11.7/234.50	648 (189.9)	60 (33)	9954 (16912)
								100 (56)	5972 (10147)
	1125 (329.7)	81	7-14 (1.7-3.5)	120 (49)	10:1 Modulation	112/1125 (32.8/329.7)	911 (267.1)	60 (33)	13998 (23782)
								100 (56)	8399 (14269)
					20:1 Modulation	56/1125 (16.4/329.7)	911 (267.1)	60 (33)	13998 (23782)
								100 (56)	8399 (14269)

Table 32: DPSA LP Gas Furnace Capacities Capacity Table

Fuel	"Heat Size MBH (KW)"	Efficiency (%)	"Supply Press. min-max IN WC (kPa)"	"Max Out Temp °F (°C)"	Control	"Rated Input Low/ High MBH (KW)"	"Rated Output MBH (KW)"	"Temp Rise °F (°C)"	Min. Airflow CFM (m3/hr)
LP Gas	200MBH (58.6)	81	11-14 (2.7-3.5)	120 (49)	2 Stage	110/200 (32.2/58.6)	162 (47.5)	25 (14)	5972 (10,147)
					5:1 Modulation	40/200 (11.7/58.6)			
	400MBH (117.2)	81	11-14 (2.7-3.5)	120 (49)	2 Stage	220/400 (64.5/117.2)	324 (95)	50 (28)	5972 (10147)
					5:1 Modulation	80/400 (23.4/117.2)			
					10:1 Modulation	40/400 (11.7/117.2)			
	600MBH (175.8)	81	11-14 (2.7-3.5)	120 (49)	2 Stage	300/600 (87.9/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
					4 Stage	165/600 (48.4/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
					5:1 Modulation	120/600 (35.2/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
					10:1 Modulation	60/600 (17.6/175.8)	486 (142.4)	50 (28)	8959 (15221)
								70 (39)	6399 (10872)
	800MBH (234.5)	81	11-14 (2.7-3.5)	120 (49)	6:1 Modulation	133/800 (39.0/234.5)	648 (189.9)	60 (33)	9954 (16912)
								100 (56)	5972 (10147)
					12:1 Modulation	67/800 (19.6/234.5)	648 (189.9)	60 (33)	9954 (16912)
								100 (56)	5972 (10147)
	1125MBH (329.7)	81	11-14 (2.7-3.5)	120 (49)	6:1 Modulation	188/1125 (55.1/329.7)	911 (267.1)	60 (33)	13998 (23782)
								100 (56)	8399 (14269)
					12:1 Modulation	94/1125 (27.5/329.7)	911 (267.1)	60 (33)	13998 (23782)
								100 (56)	8399 (14269)

Ventilation and Flue Pipe Requirements

⚠ CAUTION

Prevent snow levels from blocking airflow into the furnace vestibule and combustion air inlet. Ensure snow does not accumulate and interfere with the operation of electronics within the vestibule.

⚠ 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. Failure to connect gas lines to proper connection points may result in injury, death, and property damage. Install the gas piping in accordance with local codes and regulations of the installing 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 edition.

⚠ CAUTION

Sharp edges on sheet metal, fasteners, clips and similar items may cause personal injury. Exercise caution when installing or servicing the unit and wear appropriate personal protective equipment (PPE), such as eye protection, gloves. protective clothing, footwear, etc.

⚠ DANGER

Keep hands and tools away to prevent electrical shock. Failure to adhere to this warning can result in serious injury or death. LOCKOUT/TAGOUT all power sources prior to starting the spark ignitor and ignition controller.

⚠ WARNING

Fire or Explosion Hazard

Failure to follow warnings exactly could result in serious injury, death, or property damage. Be sure to read and understand the installation, operation, and service instructions within this manual. Improper installation, adjustments, alterations, 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 appliance
- — **What to do if you smell gas**

- Do not try to light any product that is fueled by or contains an open flame
- Do not touch any electrical switch
- Do not use any telephone in the building
- Leave the building immediately
- Immediately call the gas supplier from a remote telephone and follow the gas supplier's instructions
- If you cannot reach the gas supplier, call the loca fire department or 911
  - — Installation and service must be performed by a qualified installer, service agency, or gas supplier

⚠ WARNING

Risque D'Incedie ou D`Explosion

Le non respect des mises en garde pourrait entrainer des blessures graves, la mort ou des pertes materielles. Prendre soin de lire et de comprendre les instructions d'installation, de fonctionement et d'entretien contenues dans ce guide. Une installatoin, un reglage, une modification, une reparation ou un entretien inapproprie peut entrainer des blessures graves, la mort ou des pertes materielles.

- — Ne pas entreposer ni utiliser d'essence ou autre vapeurs ou liquides inflammables a proximite de cet appareil ou de tout autre appareil.
- — **QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ**

- Ne tentez pas d'alumer un appareil.
- Ne touchez pas a un interupteur; n'utilisez pas de telephone dan l'edifice ou vous trouvez.
- Sortez de l'edifice immediatement.
- Appelez immediatement le fournisseurde gas a partir d'un telephone a l'exterieur de l'edifice. Suivez les instructions du fournisseur de gaz.
- Si vous ne pouvez joindre le fournisseur de gaz, appelez les pompiers.
  - — L'installation et les reparations doivent etre confiees a un installateiur qualifie ou au fournisseur de gaz.

The Rebel Applied rooftop unit is equipped with a louvered furnace access door to supply adequate combustion air. The unit includes a factory supplied flue assembly and requires no additional field supplied parts such as a chimney, flue pipe, Breidert cap, draft inducer, etc.

Installation

1. Inspect the gas furnace module upon arrival for any damage that may have occurred during shipping.
2. Locate rating plate and verify that the furnace fuel supply and power requirements are met at the point of installation.

Electrical Requirements

All electrical equipment must be grounded and wired in accordance with the National Electric Code (ANSI/NFPA 70) in the US and the Canadian Electric Code (CSA C22.1) in Canada as well as any codes of the local jurisdiction in which the equipment is installed. If any original wire supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 90°C / 194°F and VW-1 flammability classification requirement.

Flue Installation

Flue assemblies are shipped secured to the interior of the supply fan section. Remove flues from shipping straps by removing the bolts securing the strap to the upstream side of the furnace vestibule. Straps may be discarded while strap hardware should be reinstalled in their respective holes. Return to the furnace section and remove flue blank off plates. Retain

hardware and use to mount flues to flue openings.

Gas Piping Requirements

Gas Pressure Requirements

Inlet gas pressure must be maintained at 7.0” wc for Natural Gas and 11.0” wc for Propane. Maximum inlet pressure must not exceed 13.0” wc to prevent damage to the gas valve.

Gas piping must be sized and routed to provide the minimum required pressure when the burner is operating at maximum input. Consult your local utility on any questions on gas pressure available, allowable pipe pressure drops, and local piping requirements. Table 33, Table 34, and Table 35 provided for sizing reference.

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

Remove all burrs and obstructions from pipe. A drip leg must be installed in the vertical line before each burner such that it will not freeze. All pipe threads must have a pipe dope which is resistant to the action of LP gas .

After installation, pressurize the piping as required and test all joints for tightness with a rich soap solution or UL 913 combustible gas leak detector. Any bubbling is considered a leak and must be eliminated.

Table 34: Conversion for Specific Gravities other than 0.60

Natural Gas	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	**Multiplier**
1.10	0.740
Propane	**Multiplier**
1.55	0.622
Butane	**Multiplier**
2.00	0.547

Table 35: Conversion for Pressure Drop other than 0.3”

Inches W.C. Pressure Drop	Multiplier	Inches W.C. Pressure Drop	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

Table 33: Natural Gas Pipe Flow Capacity* (CFH)

Gas Capacity in CFH									
Pipe Size-inches (Ips)									
Pipe Length (ft)	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

*Assuming Pressure Drop of 0.3" Wc & Specific Gravity of 0.60

Field Gas Piping

⚠ CAUTION

Use a stabilizing wrench when installing field gas piping in order to prevent damage to the factory supplied manifold assembly.

⚠ DANGER

Testing for gas leaks with an open flame 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

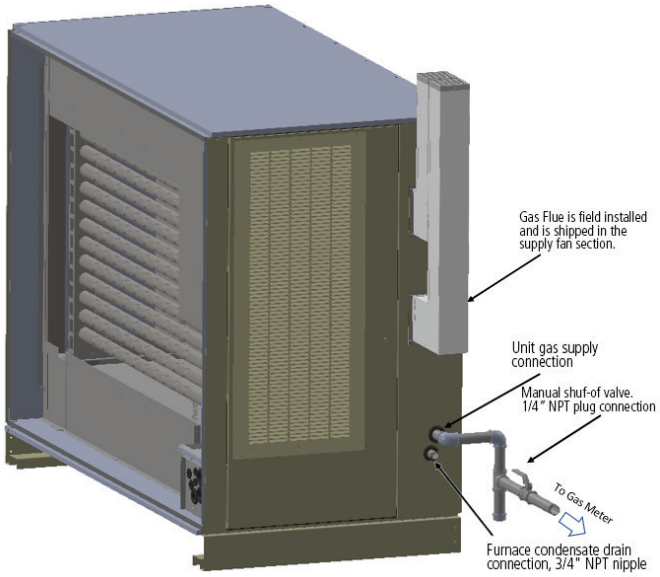
Overheating or failure of the gas supply to shut off can cause equipment damage, severe personal injury, or death. Turn off the manual gas valve to the appliance before shutting off the electrical supply.

⚠ WARNING

Gas Explosion Hazard

Do not attempt to connect gas lines to the condensate drain nipple. Open furnace vestibule and positively identify the proper gas manifold connection point. Failure to connect gas lines to the proper gas manifold connection point may result in serious injury or death.

Figure 196: DPSA Gas Furnace Field Connection Detail



1.

1. Follow all applicable NFPA and local code requirements for gas supply piping to the unit. Ensure pipe routing does not interfere with downstream access doors and general unit accessibility. Suggested routing and items shown in Figure 196. Note that two nipples connections are provided at the furnace section. The upper pipe nipple is the fuel gas supply connection and is sized based on unit input capacity. See Table 36. The lower, ¾" NPT nipple is connected to the vestibule condensate drain pan. Only connect gas to the unit gas supply connection point.
2. Field piping to be installed and supported such that it does not generate any load on the factory supplied gas train.
3. The appliance must be isolated from the gas supply system by closing off the manual shut off valve of the gas supply piping system during any pressure testing less than 0.5 psi (3.5 kpa).
4. 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).
5. Regulator to be sized for the maximum total Btu input required for the furnace.

Table 36: DPSA Gas Furnace Fuel Pipe Sizing

Furnace Capacity	Gas Pipe Size
200MBH, 400MBH, 600MBH	1.25" NPT
800MBH, 1125MBH	1.5" NPT

Altitude Conversion

⚠ WARNING

This unit is equipped at the factory for use with either natural gas or propane, as specified on the furnace data plate. Conversion requires a special kit supplied by Daikin Applied Parts. Failure to use the proper conversion kit can cause a fire, carbon monoxide poisoning, or explosion which may result in personal injury, property damage, or death.

⚠ WARNING

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

For elevations up to 2000 feet, rating plate input ratings apply.

For high altitudes (elevations over 2000 ft) contact Daikin Applied Parts .

NOTE: If the fuel source has been derated for altitude by the local utility provider, then a conversion kit is not required

See tables below for part numbers. Contact local gas supplier to confirm gas heating value has been devalued for applicable elevations.

Table 37: Furnace Identifications for Altitude

Elevation in feet	Part Number
200 MBH	
2000–2999	MQ095
3000–3999	MQ095
4000–4999	MQ095-01
5000–5999	MQ095-02
6000–6999	MQ095-03
400 MBH	
2000–2999	MQ095
3000–3999	MQ095
4000–4999	MQ095-01
5000–5999	MQ095-02
6000–6999	MQ095-03
600 MBH	
2000–2999	MQ096
3000–3999	MQ096
4000–4999	MQ096-01
5000–5999	MQ096-02
6000–6999	MQ096-03
800 MBH	
2000–2999	MQ096
3000–3999	MQ096
4000–4999	MQ096-01
5000–5999	MQ096-02
6000–6999	MQ096-03
1125 MBH	
2000–2999	MQ097
3000–3999	MQ097
4000–4999	MQ097-01
5000–5999	MQ097-02
6000–6999	MQ097-03

Gas Conversion

Field gas conversion kits can be obtained through Daikin Applied Parts and Services for converting a furnace, or furnaces, to an alternate fuel. The conversion to be performed by only trained experienced and qualified personnel who are knowledgeable of all pertinent codes and regulations.

Table 38: Furnace Natural Gas to LP Gas Conversion Kit

Natural Gas to LP Gas Conversion	
Furnace Size in MBH (KW)	**Part Number**
Staged	
200 (58.6)	MQ099
400 (117.2)	MQ099
600 (175.8)	MQ099-01
Modulating	
200 (58.6)	MQ099-02
400 5:1 (117.2)	MQ099-03
400 10:1 (117.2)	MQ099-04
600 5:1 (175.8)	MQ099-05
600 10:1 (175.8)	MQ099-06
800 10:1 (234.5)	MQ099-07
800 20:1 (234.5)	MQ099-08
1125 10:1 (329.7)	MQ099-09
1125 20:! (329.7)	MQ099-10

Table 39: Furnace LP Gas to Natural Gas Conversion Kit

LP Gas to Natural Gas Conversion	
Furnace Size in MBH (KW)	**Part Number**
Staged	
200 (58.6)	MQ098
400 (117.2)	MQ098
600 (175.8)	MQ098-01
Modulating	
200 (58.6)	MQ098-02
400 5:1 (117.2)	MQ098-03
400 10:1 (117.2)	MQ098-04
600 5:1 (175.8)	MQ098-05
600 10:1 (175.8)	MQ098-06
800 6:1 (234.5)	MQ098-07
800 12:1 (234.5)	MQ098-08
1125 6:1 (329.7)	MQ098-09
1125 12:1 (329.7)	MQ098-10

Condensate Management

NOTICE

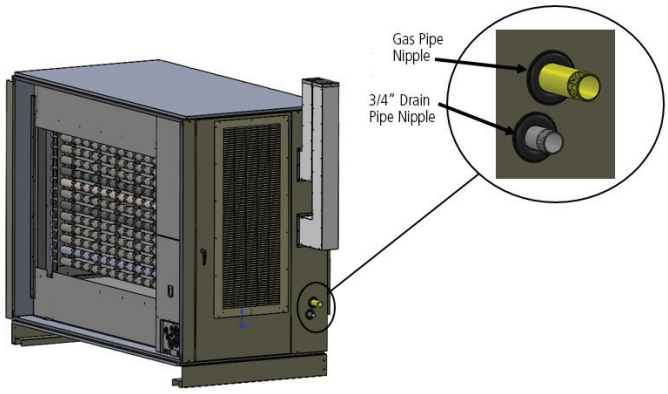
Furnace condensate is acidic and may discolor roofing materials. It is the responsibility of the end user or contractor to determine if the condensate will damage roofing material. If applicable codes or regulations require, the condensate must be or routed to a field supplied and installed drain system.

CAUTION

Condensate may freeze if it is not properly piped to a drain or provided with some form of heat protection. Frozen drain lines may cause accumulation of condensate inside the heat exchanger which may result in damage to the rooftop equipment and the facility.

All units are equipped with a 3/4" NPT stainless steel condensate drain pipe projecting from the vestibule side of the furnace section, below the fuel gas inlet. Note that the condensate drain pipe nipple is the lower of the two pipe nipples, reference Figure 197. Drainage of condensate directly onto the roof may be acceptable in some jurisdictions; it is the responsibility of the end user or contractor to determine if the condensate will damage roofing material. If applicable local codes or regulations require, condensate must be routed to a field supplied and installed drain system.

Figure 197: Condensate Drain Field Connection Detail



Operations

WARNING

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

WARNING

Testing for gas leaks with an open flame 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.

CAUTION

Hot surface hazard. If the furnace has been operating prior to service, allow chimney flue, gas heat exchanger, and combustion manifold to cool before servicing. Failure to allow hot surfaces to cool may result in personal injury..

Start-Up Responsibility

The start-up organization is responsible for determining that the furnace, as installed and 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 38 on page 140 and Table 39). On variable air volume systems it must be determined that the furnace will not be operated if or when system airflow is reduced below the specified minimum airflow.
2. It must be established that the gas supply is within the proper pressure range (refer to Table 38 on page 140 and Table 39).

Start-up and service of this equipment must be performed by trained and qualified technicians. It is highly recommended that the initial start-up and future service be performed by Daikin Applied 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. Ensure that all required equipment and instruments are available for startup.

Preliminary Start-Up

1. Close gas main.
2. Check the combustion inducer fan wheel for binding, rubbing, or loose setscrews.
3. Confirm supply voltage.
4. Purge the gas lines.
5. Leak check. Using a rich soap-water mixture and a brush, check the gas lines for leaks. Correct all leaks before starting furnace.

Operating Procedures

Burner and Gas Manifold Pressure Adjustment

⚠ WARNING

Fire or Explosion Hazard

LOCKOUT/TAGOUT all power sources prior to installing the gas furnace. Failure to follow warnings exactly could result in serious injury, death, or property damage. Be sure to read and understand the installation, operation, and service instructions within this manual. Improper installation, adjustments, alterations, 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 appliance.
- — **What to do if you smell gas**

- Do not try to light any product that is fueled by or contains an open flame.
- Do not touch any electrical switch.
- Do not use any telephone in the building.
- Leave the building immediately.
- Immediately call the gas supplier from a remote telephone and follow the gas supplier's instructions.
- If you cannot reach the gas supplier, call the local fire department or 911.
  - — Installation and service must be performed by a qualified installer, service agency, or gas supplier.

⚠ WARNING

Risque D'Incedie ou D`Explosion

Le non respect des mises en garde pourrait entrainer des blessures graves, la mort ou des pertes materielles. Prendre soin de lire et de comprendre les instructions d'installation, de fonctionement et d'entretien contenues dans ce guide. Une installatoin, un reglage, une modification, une reparation ou un entretien inapproprie peut entrainer des blessures graves, la mort ou des pertes materielles.

- — Ne pas entreposer ni utiliser d'essence ou autre vapeurs ou liquides inflammables a proximite de cet appareil ou de tout autre appareil.
- — **QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ**

- Ne tentez pas d'alumer un appareil.
- Ne touchez pas a un interupteur; n'utilisez pas de telephone dan l'edifice ou vous trouvez.
- Sortez de l'edifice immediatement.
- Appelez immediatement le fournisseurde gas a partir d'un telephone a l'exterieur de l'edifice. Suivez les instructions du fournisseur de gaz.
- Si vous ne pouvez joindre le fournisseur de gaz, appelez les pompiers.
  - — L'installation et les reparations doivent etre confiees a un installateur qualifie ou au fournisseur de gaz.

⚠ WARNING

Replace and/or tighten all plugs removed or loosened when adjusting gas pressure. Leak test the fittings using a commercially available soap solution made specifically for the detection of leaks to checl all connections. Failure to follow this warning could result in an explosion, fire, severe personal injury, death, or property damage.

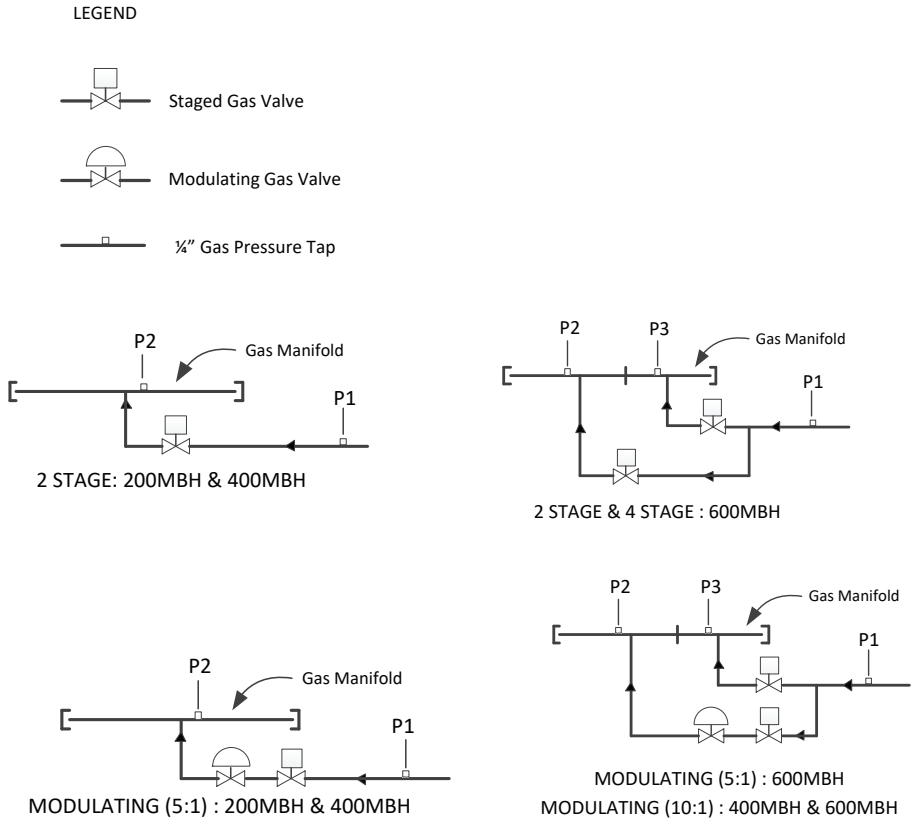
⚠ WARNING

Never test for gas leaks with an open flame. Testing with an open flame can cause 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.

Rebel Applied gas furnaces are available in a variety of staged and modulating configurations. Reference Table 41 on page 146 to identify the pressure required at the various locations shown in Figure 198 on page 143 based on furnace input capacity and modulation range. Follow the directions in the burner and gas manifold instructions section below based on modulation capacity.

Figure 198: Diagrams for Pressure Measurement Locations

Gas Piping Schematic for HMB 200, 400 & 600MBH Furnaces



Gas Piping Schematic for HMT 800 & 1125MBH Furnaces

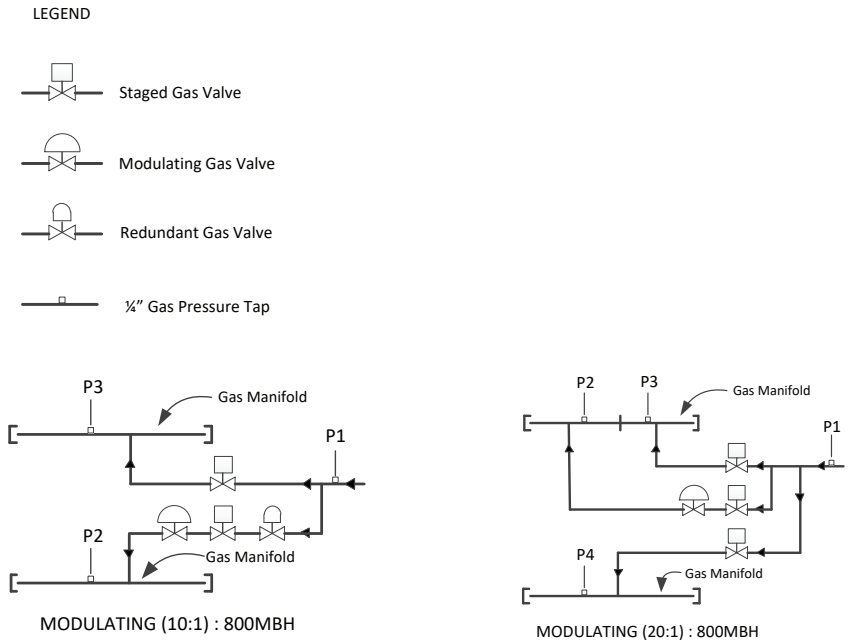


Table 40: Furnace Gas Pressure Itemization

Fuel	Modulation	Heat Input Capacity MBH (kW)	P1 (in.w.c.)	P2 (in. w.c.)		P3		P4	P5
				High	Low	High	Low	High	High
Natural Gas	2-Stage	200 (58.6) 400 (117.2	7 (1.7)	3.5 (0.87)	1.06 (0.26)				
	2-Stage	600 (175.8)	7 (1.7)	3.5 (0.87)		3.5 (0.87)			
	4-Stage	600 (175.8)	7 (1.7)	3.5 (0.87)	1.06 (0.26)	3.5 (0.87)	1.06 (0.26)		
	5:1 Modulation	200 (58.6)	7 (1.7)	3.5 (0.87)	0.19 (0.05)				
		400 (117.2)	7 (1.7)	3.5 (0.87)	0.18 (0.04)				
		600 (175.8)	7 (1.7)	3.5 (0.87)	0.56 (0.14)	3.5 (0.87)			
	10:1 Modulation	400 (117.2)	7 (1.7)	3.5 (0.87)	0.16 (0.04)	3.5 (0.87)			
		600 (175.8)	7 (1.7)	3.5 (0.87)	0.15 (0.04)	3.5 (0.87)			
		800 (234.5)	7 (1.7)	3.85 (0.96)	0.24 (0.06)	3,2 (0.8)			
		1125 (329.7)	7 (1.7)	7 (1.7))	0.56 (0.14)	3.5 (0.87)		3.2 (0.8)	3.2 (0.8)
	20:1 Modulation	800 (234.5)	7 (1.7)	3.85 (0.96)	0.21 (0.05)	3.85 (0.96)		3.2 (0.8)	
		1125 (329.7)	7 (1.7)	3.5 (0.87)	0.56 (0.14)	3.5 (0.87)		3.2 (0.8)	3.2 (0.8)
Propane	2-Stage	200 (58.6) 400 (117.2)	11 (2.74)	10.15 (2.53)	3.07 (0.76)				
		600 (175.8)	11 (2.74)	10.15 (2.53)		10.15 (2.53)			
	4-Stage	600 (175.8)	11 (2.74)	10.15 (2.52)	3.07 (0.76)	10.15 (2.53)	3.07 (0.76)		
	5:1 Modulation	200 (58.6)	11 (2.74)	10.15 (2.52)	0.56 (0.14)				
		400 (117.2)	11 (2.74)	10.15 (2.53)	0.43 (0.11)				
		600 (175.8)	11 (2.74)	10.15 (2.53)	1.62 (0.40)	10.15 (2.53)			
	10:1 Modulation	400 (117.2)	11 (2.74)	10.15 (2.52)	0.43 (0.11)				
		600 (175.8)	11 (2.74)	10.15 (2.52)	1.62 (0.40)	10.15 (2.53)			
	6:1 Modulation	800 (234.5)	12 (3.0)	11.2 (2.79)	1.24 (0.31)	8.75 (2.18)			
		1125 (329.7)	11 (2.74)	10.15 (2.53)	4.51 (1.12)	10.15 (2.53)		8.75 (2.18)	8.75 (2.18)
	12:1 Modulation	800 (234.5)	12 (3.0)	11.2 (2.79)	1.24 (0.31)	11.2 (2.79)		8.75 (2.18)	
		1125 (329.7)	11 (2.74)	10.15 (2.53)	1.13 (0.28)	10.15 (2.53)		8.75 (2.18)	8.75 (2.18)

Figure 199: Staged Gas Safety Control

Figure A.1 – White Rodgers Two Stage Gas Valve

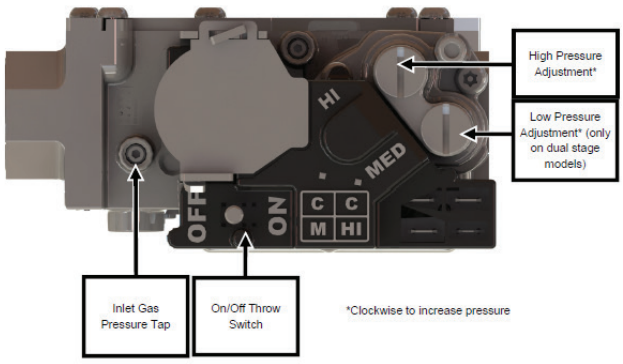
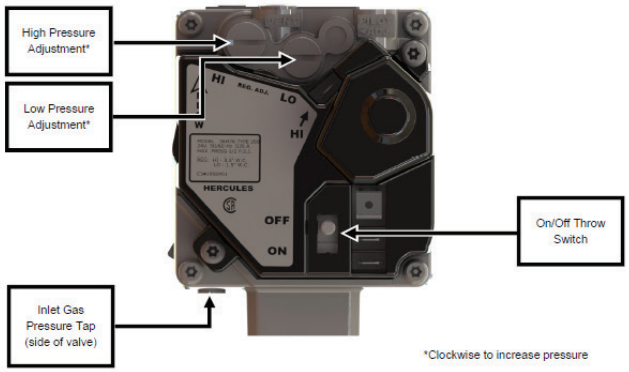


Figure A.2 – White Rodgers Two Stage Gas Valve



Burner and Gas Manifold Pressure Adjustment Instructions

2-Stage Furnaces

1. Read gas pressure P1 at the Inlet Pressure Tap of the two stage valve (Figure 198) and confirm pressure matches the value specified in Table 40 for your unit's capacity and modulation configuration. Adjust upstream pressure reducing gas regulator as required to obtain inlet pressure specified in Table 40.
2. In main cabinet control panel, set Microtech 4 controller to manual mode. Specify high fire operation by setting "Htg Stage 2" menu item to ON. Back at the furnace, read gas pressure P2 on the burner manifold pressure tap. Confirm P2 pressure matches the HIGH value specified in Table 40 for your unit's capacity and modulation configuration. If adjustment is required, adjust the HI regulator on the two stage gas valve (Figure 199)
3. In main cabinet control panel, set MicroTech 4 controller to manual mode. If "Htg Stage 2" menu item is set to ON, turn it OFF. Specify low fire operation by setting "Htg Stage 1" menu item to ON. Back at the furnace, read gas pressure P2 on the burner manifold pressure tap. Confirm P2 pressure matches the LOW value specified in table S for your unit's capacity and modulation configuration. If adjustment is required, adjust the Lo/Med regulator on the two stage gas valve (Figure 199).

4-Stage Furnaces

1. Read gas pressure P1 at the Inlet Pressure Tap of the two stage valve (Figure 198) and confirm pressure matches the value specified in Table 40 for your unit's capacity and modulation configuration. Adjust upstream pressure reducing gas regulator as required to obtain inlet pressure specified in Table 40.
2. In main cabinet control panel, set MicroTech 4 controller to manual mode. Specify high fire operation by setting all "Htg Stage" menu items to ON. Back at the furnace, read gas pressure P2 and P3 on the burner manifold pressure tap. Confirm both P2 and P3 pressures match the HIGH value specified in Table 40 for your unit's capacity and modulation configuration. If adjustment is required, adjust the HI regulator on the relevant two stage gas valve (Figure 199)
3. In main cabinet control panel, set MicroTech 4 controller to manual mode. If any "Htg Stage" menu items are ON, turn them OFF. Specify low fire operation by turning "Htg Stage 1" ON. Back at the furnace, read gas pressure P2 and P3 on the burner manifold pressure taps. Confirm both P2 and P3 pressures match the LOW value specified in Table 40 for your unit's capacity and modulation configuration. If adjustment is required, adjust the Lo/Med regulator on the relevant two stage gas valve (Figure 199).

Modulating Furnaces

1. Read gas pressure P1 at the Inlet Pressure Tap of the two stage valve (Figure 198) and confirm pressure matches the value specified in Table 40 for your unit's capacity and modulation configuration. Adjust upstream pressure reducing gas regulator as required to obtain inlet pressure specified in Table 40.
2. In main cabinet control panel, set MicroTech 4 controller to manual mode. Specify high fire operation by "Htg Valve" menu item to 100%. Continue to specify high fire operation by setting all available "Htg Stage" menu items to ON. Back at the furnace, read the gas pressures specified in Table 40 for your configuration on the burner manifold pressure taps. Confirm each pressure matches the HIGH value specified for each manifold in Table 40 for your unit's capacity and modulation configuration. If adjustment is required, adjust the HI regulator on the relevant staged gas valve (Figure 199).
3. In main cabinet control panel, set MicroTech 4 controller to manual mode. Specify low fire operation by setting all available "Htg Stage" menu items to OFF. Continue to set low fire operation by setting the "Htg Valve" menu item to the applicable value shown in Table 41 below.

At the furnace, read gas pressure P2 on the burner manifold pressure tap. Confirm P2 pressure matches the LOW value specified in Table 40 for your unit's capacity and modulation configuration. If adjustment is required, adjust the Lo/Med regulator on the two stage gas valve (Figure 199). If fine adjustments are required, refer to the "Maxitrol EXA Star Controller" on page 146 documentation.

Table 41: Modulating Furnace Low Fire "Htg Valve" Value

Furnace Capacity	200 MBH (58.6)	400 MBH (117.2)		600 MBH (175.8)		800 MBH (234.5)		1200 MBH (329.7)	
Modulation	**5:1**	**5:1**	**10:1**	**5:1**	**10:1**	**10:1**	**20:1**	**10:1**	**20:1**
Low Fire "Htg Valve" Setting	20%	20%		40%	20%	20%		40%	20%
Modulation	**5:1**	**5:1**	**10:1**	**5:1**	**10:1**	**6:1**	**12:1**	**6:1**	**12:1**
Low Fire "Htg Valve" Setting (LP)	20%	20%		40%	20%	33%		63%	31%

Maxitrol EXA Star Controller

Connections

1. Remove 2 screws holding cover.
2. Connect switched OFF 24V (AC/DC) power source to terminals 3 and 4. Note polarity when using a DC power source or if one leg of an AC transformer secondary is externally grounded or is sharing power with another half-wave device.
3. Set DIP switches to match available control signal.
4. Connect switched OFF control signal to terminals 1 and 2. Observe polarity. Note that the return, or signal ground, must be connected to terminal 2.
5. Switch power and control signal ON.
6. Set valve (see "Valve Setting" in section below).
7. Replace cover.

Valve Setting

The EXA STAR modulating valve series has two (2) buttons and a communication LED for the user interface. The buttons are used to set the valve for high and low fire settings (see Figure 200).

1. High Fire Setting (LED will be solid red)
2. Low Fire Setting (LED will be blinking red)
3. Operating Mode (LED will be OFF)

High Fire Setting - Button #1

To enter high fire setting mode, press and hold button #1 until the LED lights solid red. Release. The valve is now in the high fire setting mode. Buttons #1 and #2 are used to set desired high fire setting.

Press or hold Button #1 to increase gas flow. Each button press equates to the minimum available step size and will increase flow slowly. Holding the button down auto steps and eliminates the need to repeatedly press the button. Use this feature to rapidly increase the flow.

Press or hold Button #2 to decrease gas flow. Each button press equates to the minimum available step size and will decrease flow slowly. Holding the button down auto steps and eliminates the need to repeatedly press the button. Use this feature to rapidly decrease the flow.

To save the high fire setting, simultaneously hold Buttons #1 and #2 until the LED turns OFF.

NOTE: Controls left in any setting mode will default to the current settings and return to normal operating mode after 5 minutes of inactivity.

Low Fire Setting - Button #2

To enter low fire setting mode, press and hold button #2 until the LED light blinks red. Release. The valve is now in the low fire setting mode. Buttons #1 and #2 are used to set the desired low fire setting.

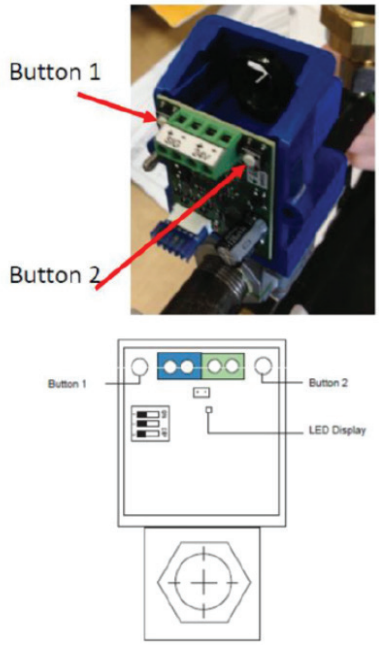
Press or hold Button #2 to decrease gas flow. Each button press equates to the minimum available step size and will decrease flow slowly. Holding the button down auto steps and eliminates the need to repeatedly press the button. Use this feature to rapidly decrease the flow.

Press or hold Button #1 to increase gas flow. Each button press equates to the minimum available step size and will increase flow slowly. Holding the button down auto steps and eliminates the need to repeatedly press the button. Use this feature to rapidly increase the flow.

To save the low fire setting, simultaneously hold Buttons #1 and #2 until the blinking LED turns OFF.

NOTE: Controls left in any setting mode will default to the current settings and return to normal operating mode after 5 minutes of inactivity.

Figure 200: Maxitrol EXA Star LEDs



Service

The furnace DDC controller has diagnostic information for troubleshooting the furnace operation. Reference VB1285 and VB1287 documentation below as applicable.

Maintenance

⚠ WARNING

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

⚠ WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause severe personal injury or death. Read and understand this installation and maintenance manual thoroughly before installing or servicing this equipment.

⚠ WARNING

Electrical shock and moving machinery hazard.

LOCKOUT/TAGOUT all power sources prior to servicing the equipment. Electrical shock can cause injury, death, and property damage. More than one disconnect may be required to de-energize unit. All start-up and service work must performed only by trained, experience technicians familiar with this type of equipment. Read and follow the MicroTech controller manual before operating or servicing. Bond the equipment frame to the building's electrical ground through the grounding terminal or other approved means.

⚠ CAUTION

Hot surface hazard. May cause minor to moderate personal injury. Allow burner assembly and chimney flues to cool before servicing equipment.

⚠ CAUTION

Prevent snow levels from blocking airflow into the furnace vestibule and combustion air inlet. Ensure snow does not accumulate and interfere with the operation of electronics within the vestibule.

Planned maintenance is the best way to avoid unnecessary expense and inconvenience. Inspect the heating system at regular intervals by a trained and experienced service technician. The following service intervals are typical for average situations but should be adjusted per site conditions.

Fuel pressure and control settings should be made only by trained and qualified personnel.

Always replace covers on burner controls and boxes as the electrical contacts. Perform maintenance of controls, gas valves, and other components in accordance with the furnace module instruction manual.

Monthly

Check cabinet air filters and replace if dirty. After heavy snowfall verify that combustion air intakes are not blocked by snow. Periodically check during periods of snow accumulation as drifting may also lead to combustion air intake blockage.

Twice Yearly

1. **Combustion Air:** Check combustion inducer fan for dirt buildup and lint. Check combustion air intake louvers and flue box/vent for accumulation of dirt and debris.
2. **Cleaning:** Inspect and clean flue tubes and combustion chamber. Keep burner vestibule clean. Dirt and debris can result in poor combustion and lower efficiency.

Yearly

1. **Debris:** Check vent terminal screens for blockages and accumulation.
2. **Heater and the Venting System:** Shall be inspected once a year by a qualified service agency.
3. **Gas Train:** Check all valves, piping and connections for leakage with a rich soap solution or UL 913 combustible gas leak detector. Any bubbling is considered a leak and must be eliminated. Inspect and clean flame rod, ignition electrode, and burner manifold.
4. **Condensate Pan and Drain:** Remove any debris that may have accumulated in the drain pain and drain.

VB1285 BPP Split Manifold Modulating Control

Sequence of Operation

1. A call for heat is initiated by the rooftop unit control through a digital Modbus signal. Refrigeration Only control packages may differ.
2. The VB1285 control will then go through a system check to ensure that the high temperature limit and rollout switches are closed, the air pressure switch is open, and the modulating valve is positioned correctly.
3. The control will then enter the pre-purge cycle, where the inducer will run at the programmed purge pressure. During this cycle, the control will look for the air pressure switch to close and open at the correct settings.
4. Once the system check and pre-purge cycles are complete, the control will enter the ignition cycle.
    a. The modulating valve and inducer will go to their “light off” settings.
    b. The DSI ignition module will be energized and the spark ignitor will activate.
    c. The redundant safety valve will open, allowing gas flow.
    d. The burners will ignite and the control will receive a signal from the flame sensor.
    e. The spark ignitor will remain active for the duration of the ignition cycle, regardless of flame status .
5. If flame is not established during the ignition cycle, the control will repeat the pre-purge and ignitions cycles up to three times. After three failed ignition attempts, the board will enter a 1 hour lockout.
6. Once flame has been established, the control will enter a warmup period to ensure flame stabilization and reduce condensation in the heat exchanger.
7. After the warmup period, the control will enter the run cycle. During the run cycle, the burner firing rate and draft inducer pressure are determined based on the heat demand received by the control via a Modbus signal or the analog thermostat.

NOTE: If the control is paired with a split manifold, steps 1 through 6 pertain to the primary burners. Once the control exits the warmup period and the firing rate is dictated by the rooftop control, the control will ignite the secondary burners and modulate the primary burners based on the demand for heat.

8. The run cycle will continue until any of the following conditions are met.
    a. The call for heat is terminated
    b. Any of the safety devices (high limit, air pressure, rollout, etc.) are triggered
    c. The control reaches its maximum run time of 6 hours. If this condition is reached, the control will terminate the run cycle, continue through the proper sequence of operations, and then immediately enter the system check and pre-purge cycles to prepare for reignition.
9. Once the run cycle has terminated, the redundant safety valve will close, the modulating valve will return to its set position, and the draft inducer will ramp up to its “light-off” setting for a 45 second post-purge cycle.
10. After the conclusion of the post-purge, the control will enter the “OFF” state. While safety devices are still monitored, all system outputs are de-energized.

VB1287 BPP 2-Stage and 2-Stage Split Control

Sequence of Operation

1. A call for heat is initiated by the rooftop unit control through a digital Modbus signal. Refrigeration Only control packages may differ.
2. The VB1287 control will then go through a system check to ensure that the high temperature limit and rollout switches are closed, the air pressure switch is open, and the modulating valve is positioned correctly.
3. The control will then enter the pre-purge cycle, where the inducer will run at the programmed purge pressure. During this cycle, the control will look for the air pressure switch to close and open at the correct settings.
4. Once the system check and pre-purge cycles are complete, the control will enter the ignition cycle.
    a. The inducer will go to its “light off” setting (usually high speed).
    b. The DSI ignition module will be energized and the spark ignitor will activate.
    c. The safety valve will open, allowing gas flow.
    d. The burners will ignite and the VB1287 control will receive a signal from the flame sensor.
    e. The spark ignitor will remain active for the duration of the ignition cycle, regardless of flame status.
5. If flame is not established during the ignition cycle, the control will repeat the pre-purge and ignition cycles up to three times. After three failed ignition attempts, the board will enter a 1 hour lockout.
6. Once flame has been established, the control will enter a warmup period to ensure flame stabilization and reduce condensation in the heat exchanger.
7. After the warmup period, the control will enter the run cycle. During the run cycle, the burner firing rate is determined by the heat demand received by the control via a Modbus signal or the analog thermostat. Two firing stages, High or Low, are available.

NOTE: If the control is paired with a split manifold, steps 1 through 6 pertain to the primary burners. Once the control exits the warmup period and the firing rate is dictated by the rooftop control, the control will ignite the secondary burners and step High or Low the primary burners based on the demand for heat.

8. The run cycle will continue until any of the following conditions are met.
    a. The call for heat is terminated .
    b. Any of the safety devices (high limit, air pressure, rollout, etc.) are triggered.
    c. The control reaches its maximum run time of 6 hours. If this condition is reached, the control will terminate the run cycle, continue through the proper sequence of operations, and then immediately enter the system check and pre-purge cycles to prepare for reignition.
9. Once the run cycle has terminated, the redundant safety valve will close, the modulating valve will return to its set position, and the draft inducer will ramp up to its “light-off” setting for a 45 second post-purge cycle.
10. After the conclusion of the post-purge, the control will enter the “OFF” state. All system outputs are de-energized but all safety devices are still monitored.

Furnace Wiring Diagrams

Figure 201: 200 and 400 MBH (2-Stage)

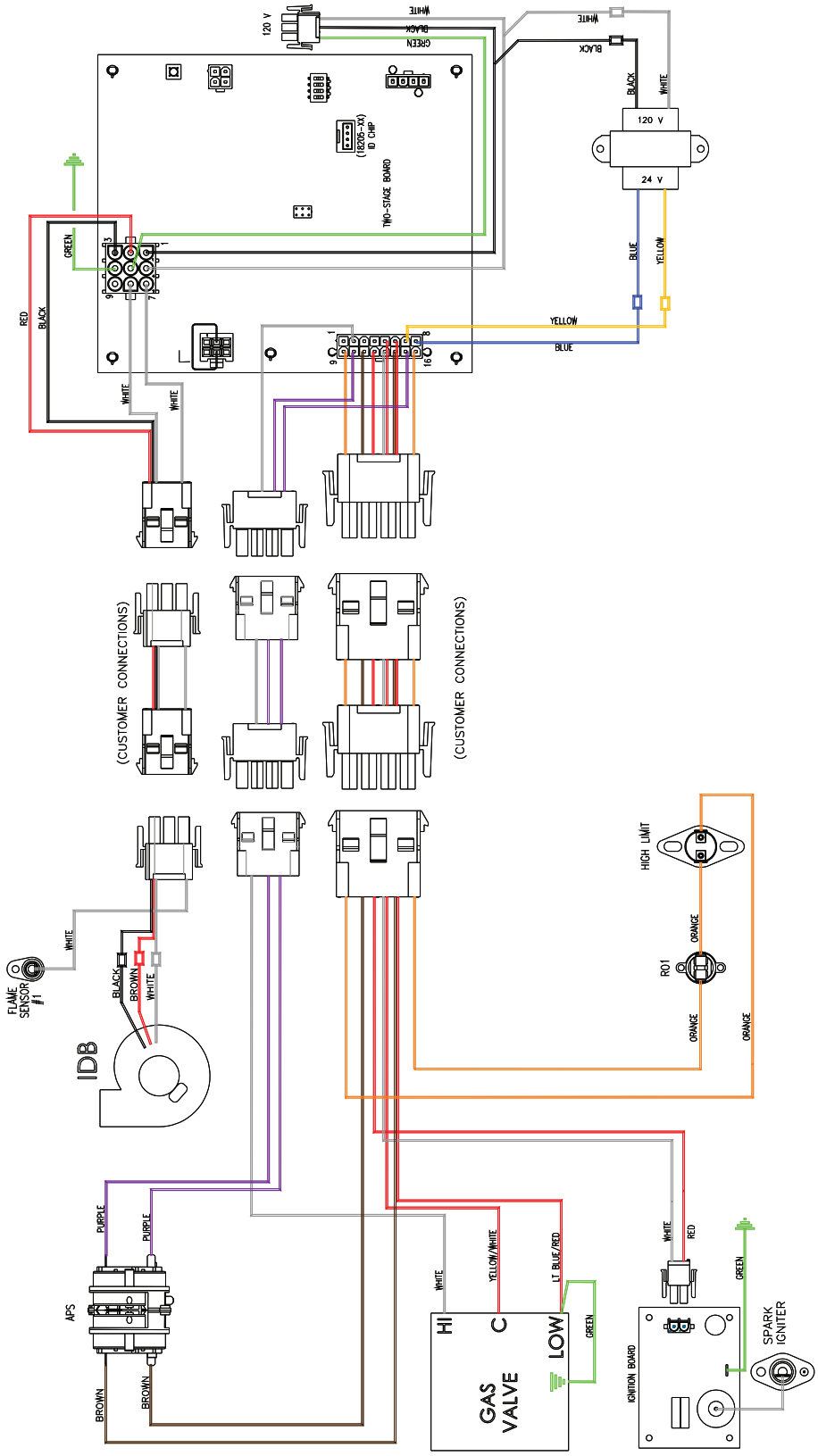


Figure 202: 600 MBH (2-Stage)

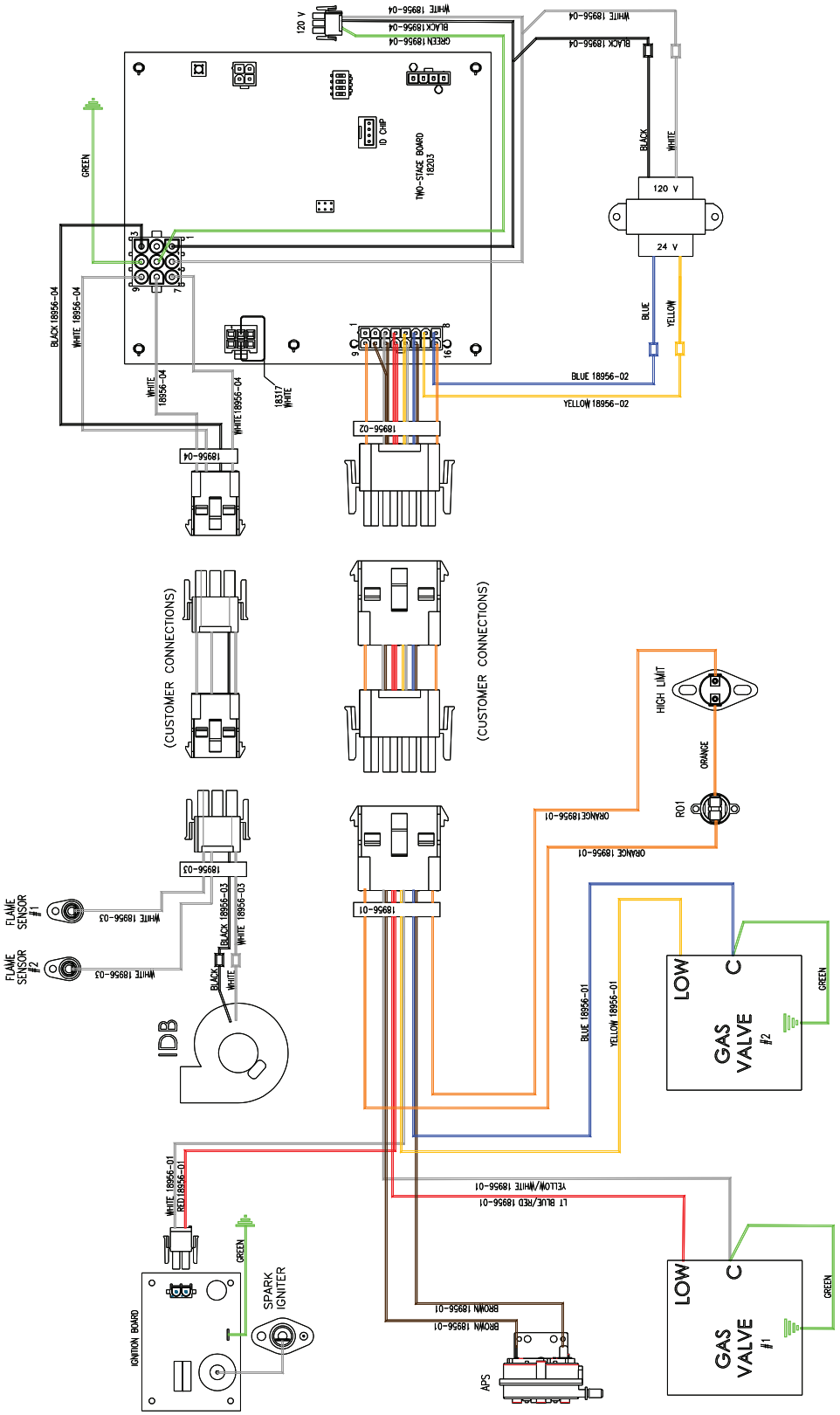


Figure 203: 600 MBH (4-Stage)

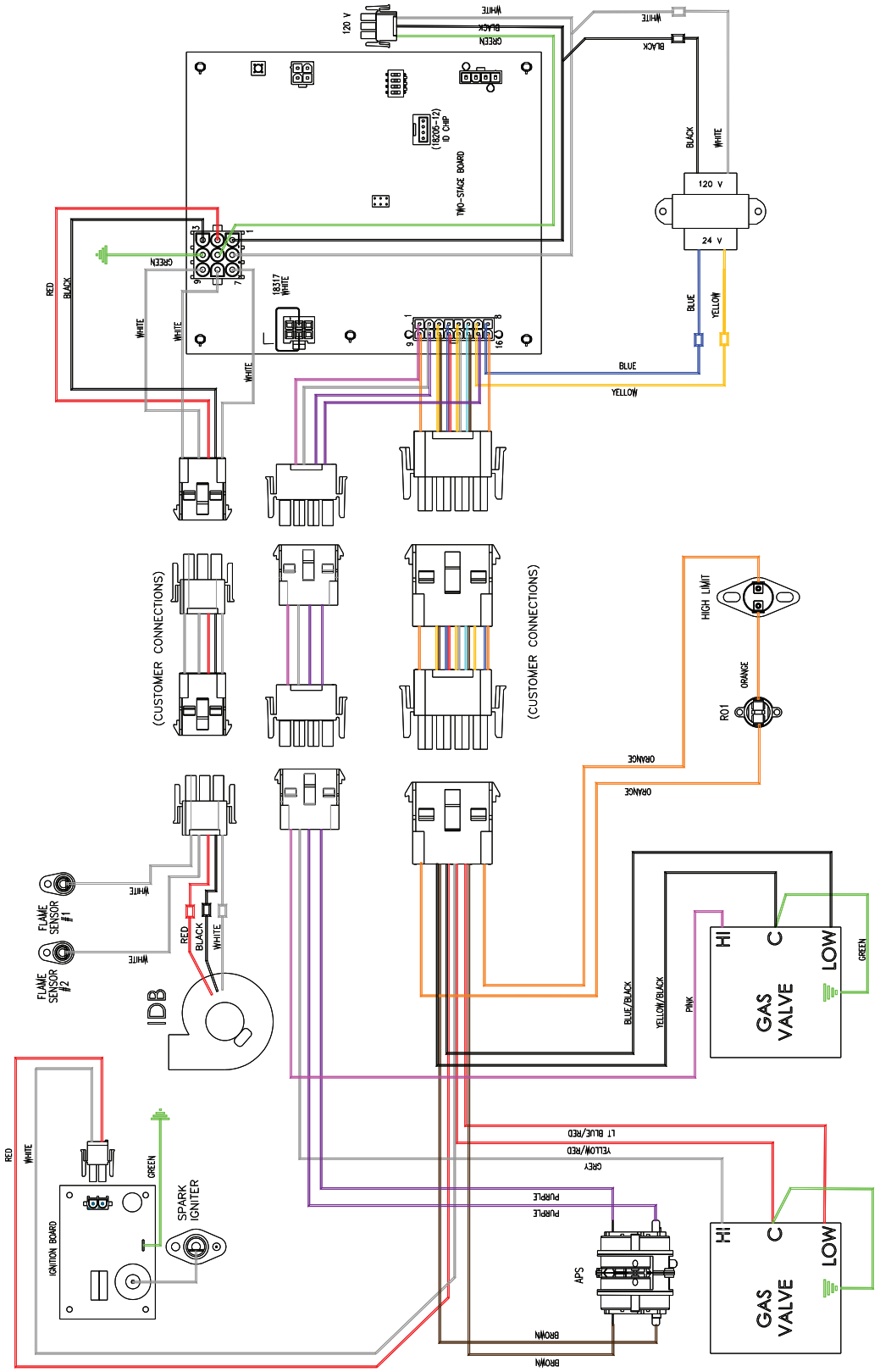


Figure 204: 200 and 400 MBH (5:1 Modulation)

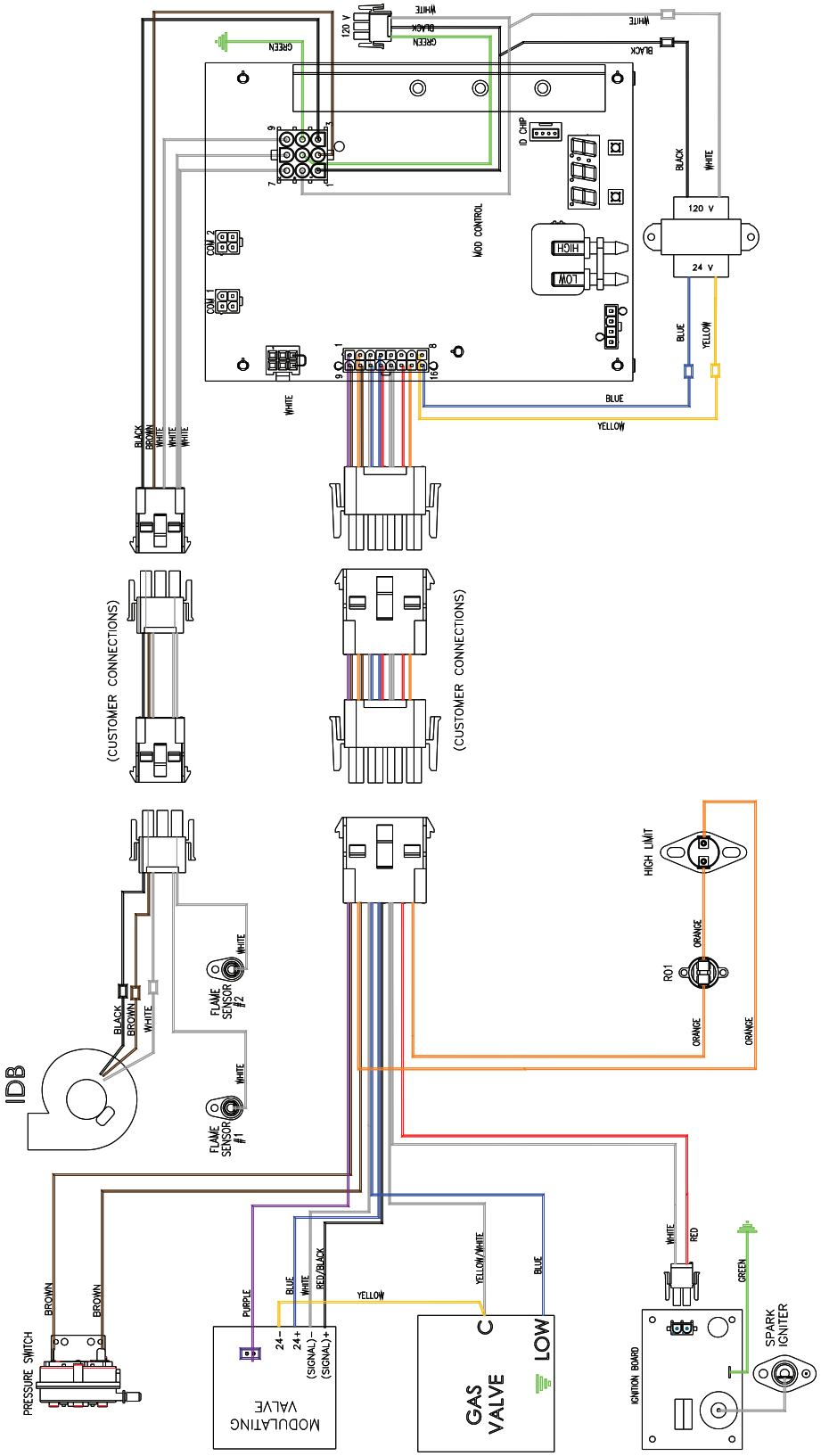


Figure 205: 600 MBH (5:1 Modulation), 400 MBH and 600 MBH (10:1 Modulation)

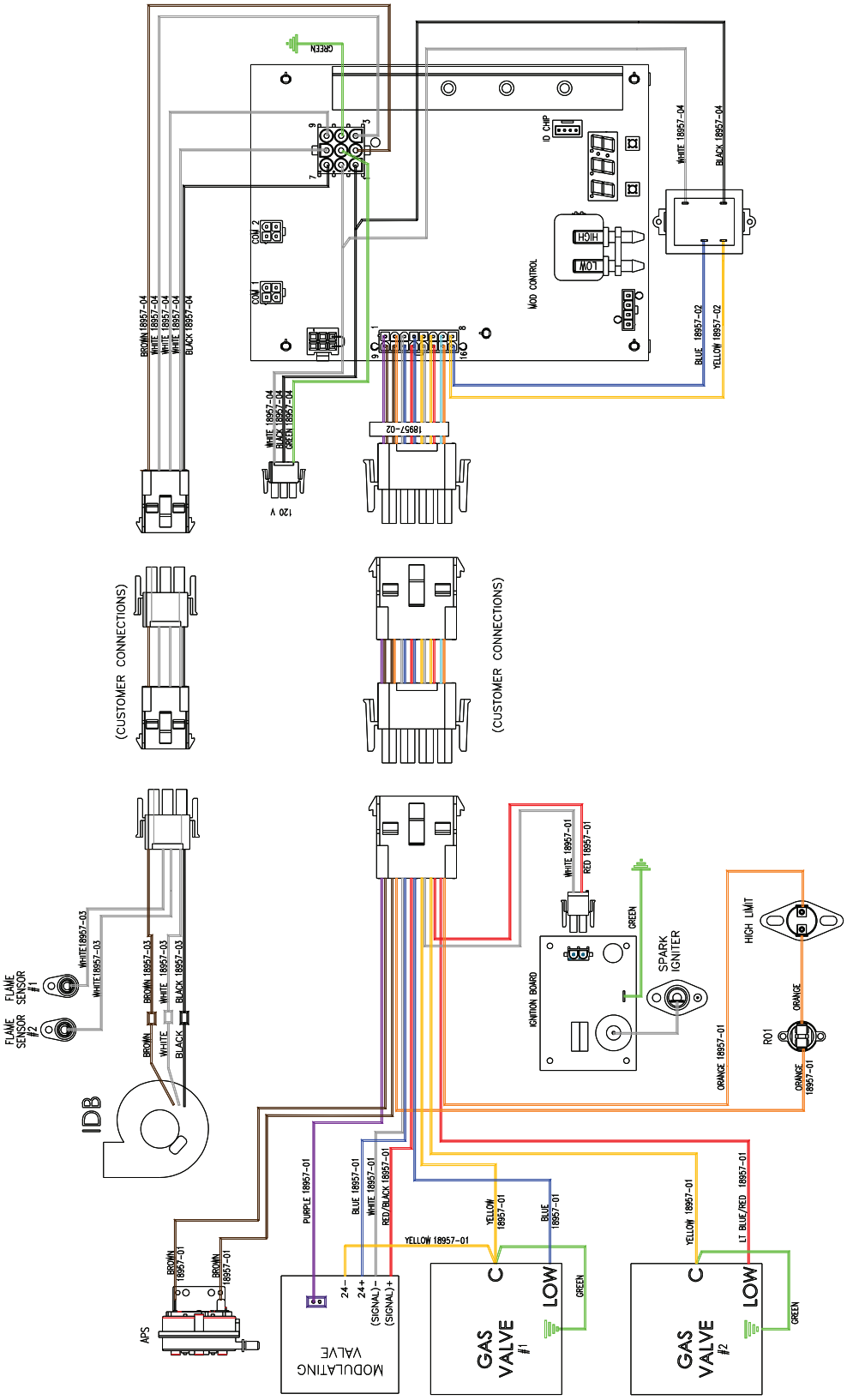


Figure 206: 800 MBH (10:1 and 6:1 Modulation)

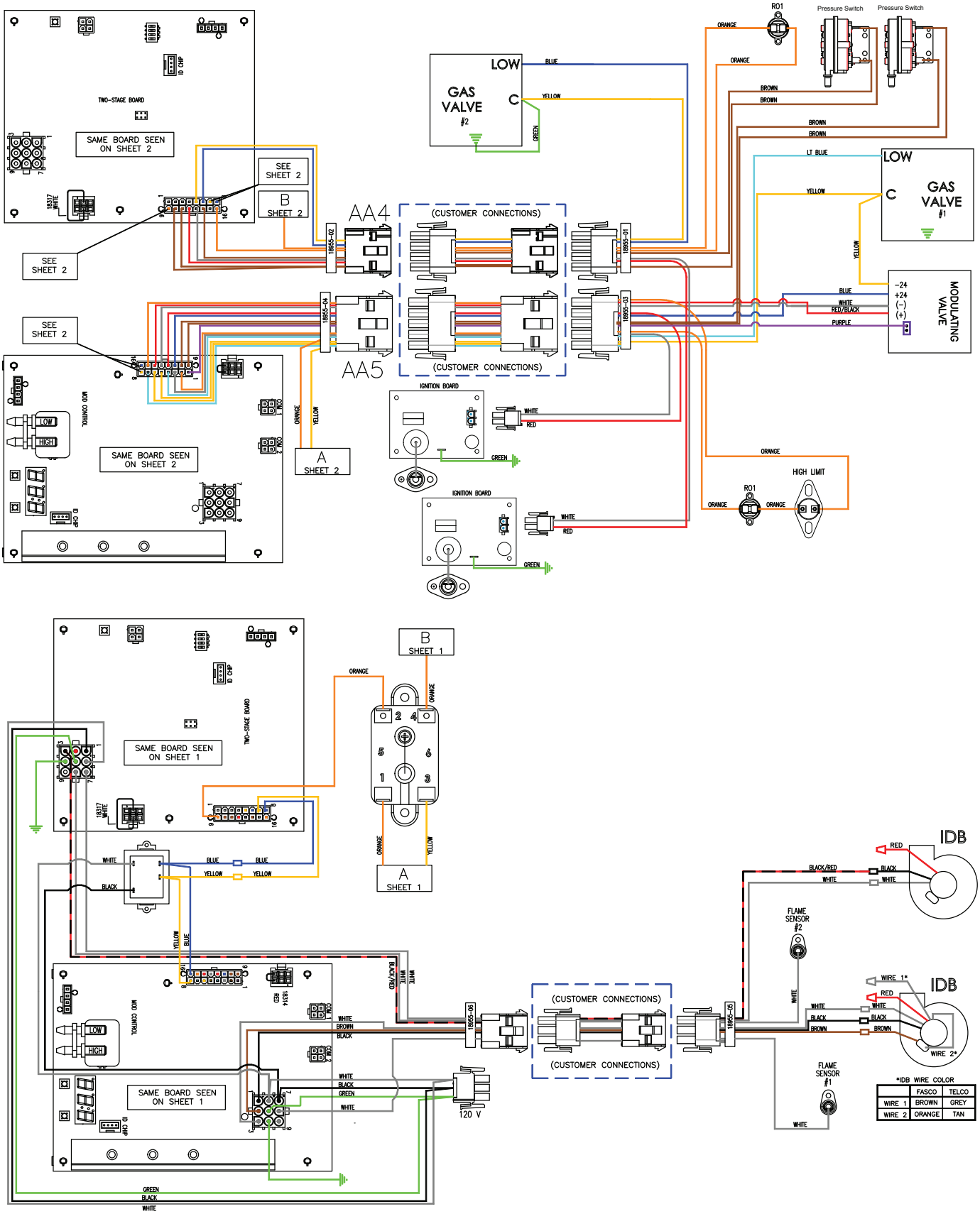


Figure 207: 800 MBH (20:1 and 12:1 Modulation)

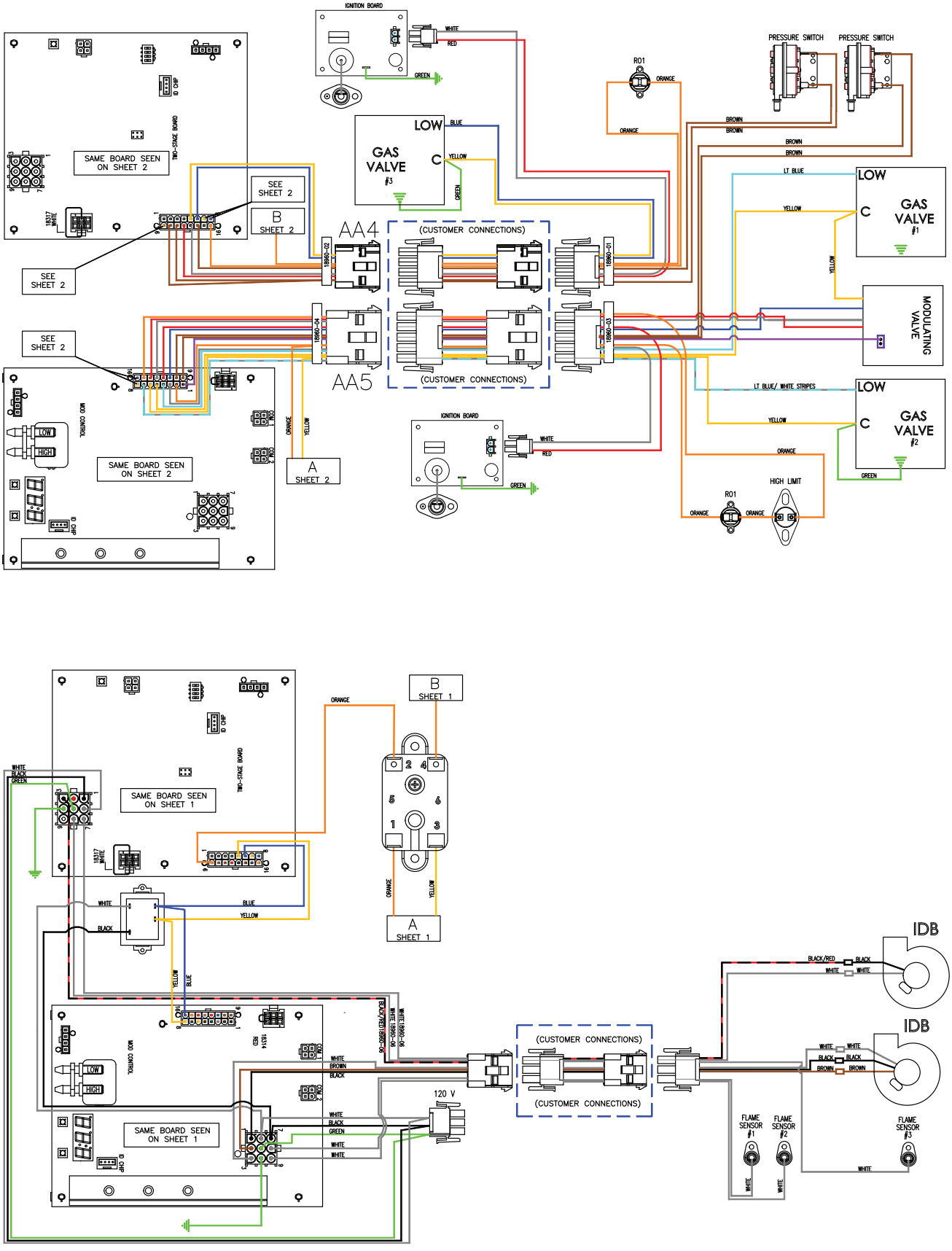
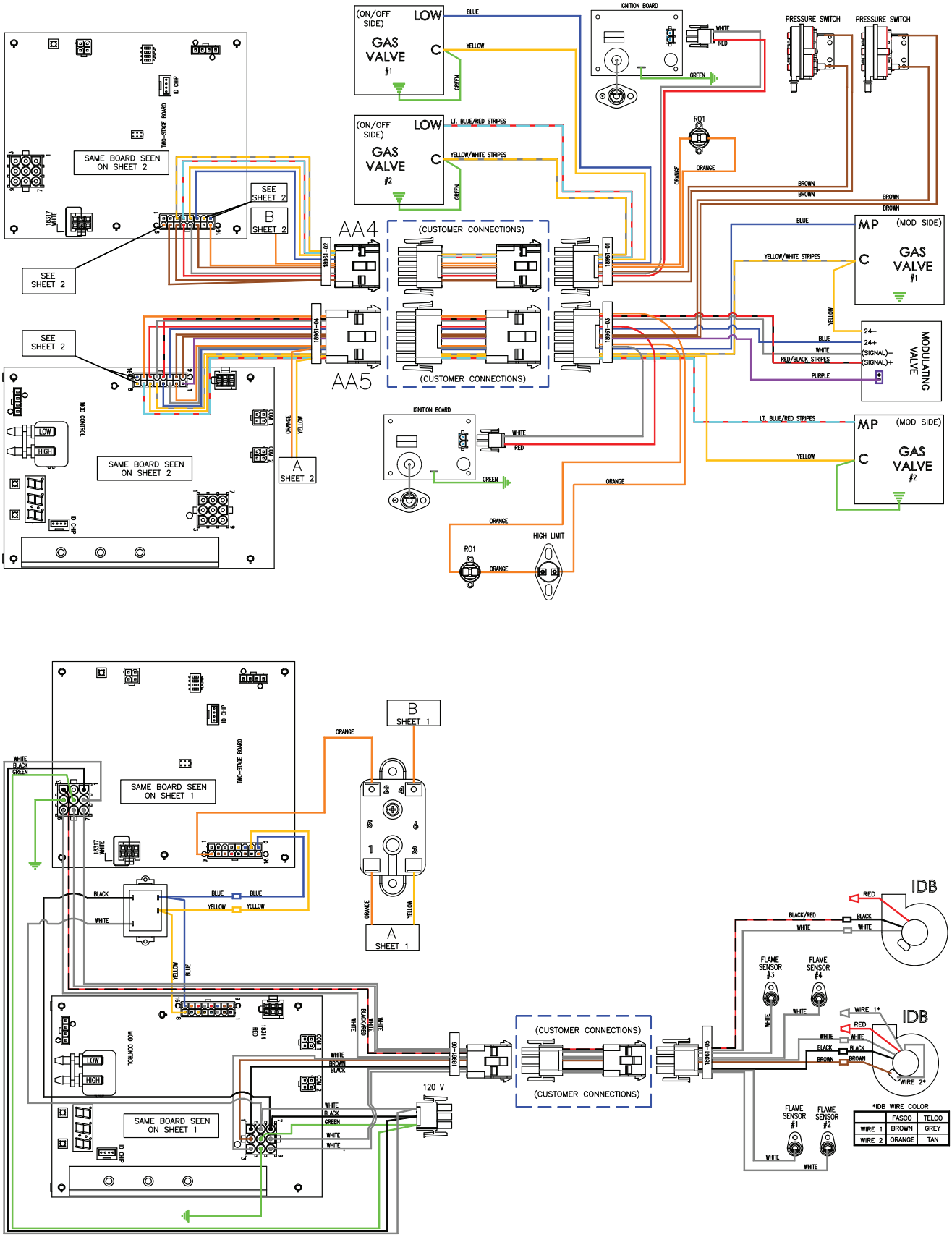


Figure 208: 1125 MBH (10:1 and 6:1 Modulation), 1125 MBH (20:1 and 12:1 Modulation)



Rooftop Equipment Warranty Registration Form

Warranty Exclusion

See Warranty Registration Form 13F-4157, Part 8 – Furnace Check, Test, and Start.

Manifold Pressures

Record Pressures as Applicable. Reference Figure 198 on page 143 and Table 40 on page 144 .

P1: _____ inches w.c. or _____ kPa

P2:_____ inches w.c. or _____ kPa

P3: _____ inches w.c. or _____ kPa

P4: _____ inches w.c. or _____ kPa

P5: _____ inches w.c. or _____ kPa

High Fire (100% Rate) Combustions

Single Flue Furnace

CO2: _____ ppm

CO: _____ ppm

Double Flue Furnace

Outer Flue CO2: _____ ppm Inner Flue CO2:_____ ppm

Outer Flue CO: _____ ppm Inner Flue CO: _____ ppm

In-Warranty Return Material Procedure

Material other than compressors may not be returned except by permission of authorized factory service personnel of Daikin Applied 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 Applied 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.

North America

Daikin Applied (“Company”) warrants to contractor, purchaser and any owner of the product (collectively “Owner”) that Company, at its option, will repair or replace defective parts in the event any product manufactured by Company, including products sold under the brand names Daikin Applied Air Conditioning, AAF

Air Conditioning, AAF HermanNelson and Daikin Applied Service, and used in the United States or Canada, proves defective in material or workmanship within twelve (12) months from initial startup or eighteen (18) months from the date shipped by Company, whichever occurs first. Authorized replaced parts are warranted for the duration of the original warranty. All shipments of such parts will be made FOB factory, freight prepaid and allowed. Company reserves the right to select carrier and method of shipment.

In addition, labor to repair or replace warranty parts is provided during Company normal working hours on products with rotary screw compressors, centrifugal compressors and on absorption chillers. Warranty labor is not provided for any other products.

Company’s liability to Owner under this warranty shall not exceed the lesser of the cost of correcting defects in the products sold or the original purchase price of the products.

PRODUCT STARTUP ON ABSORPTION, CENTRIFUGAL AND SCREW COMPRESSOR PRODUCTS IS MANDATORY and must be performed by Daikin Applied Service or a Company authorized service representative.

It is Owner’s responsibility to complete and return the Registration and Startup Forms accompanying the product to Company within ten (10) days of original startup. If this is not done, the ship date and the startup date will be deemed the same for warranty period determination, and this warranty shall expire twelve (12) months from that date.

Exceptions

1. If free warranty labor is available as set forth above, such free labor does not include diagnostic visits, inspections, travel time and related expenses, or unusual access time or costs required by product location.
2. Refrigerants, fluids, oils and expendable items such as filters are not covered by this warranty.
3. This warranty shall not apply to products or parts which (a) have been opened, disassembled, repaired, or altered by anyone other than Company or its authorized service representative; or (b) have been subjected to misuse, negligence, accidents, damage, or abnormal use or service; or (c) have been operated, installed, or startup has been provided in a manner contrary to Company’s printed instructions, or (d) were manufactured or furnished by others and which are not an integral part of a product manufactured by Company; or (e) have not been fully paid for by Owner.

Assistance

To obtain assistance or information regarding this warranty, please contact your local sales representative or Daikin Applied Service office.

Sole Remedy

THIS WARRANTY CONSTITUTES THE OWNER'S SOLE REMEDY. IT IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR

PURPOSE. IN NO EVENT AND UNDER NO CIRCUMSTANCE SHALL COMPANY BE LIABLE FOR INCIDENTAL, INDIRECT, SPECIAL, CONTINGENT OR CONSEQUENTIAL DAMAGES, WHETHER THE THEORY BE BREACH OF THIS OR ANY OTHER WARRANTY, NEGLIGENCE OR STRICT LIABILITY IN TORT.

No person (including any agent, sales representative, dealer or distributor) has the authority to expand the Company's obligation beyond the terms of this express warranty or to state that the performance of the product is other than that published by Company.

For additional consideration, Company will provide an extended warranty(ies) on certain products or components thereof. The terms of the extended warranty(ies) are shown on a separate extended warranty statement.

Rebel Applied
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 Rebel Applied.

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:** _____

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

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

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

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

Fan Motor 1-4 model number: _____ **Serial number:** _____

Serial number: _____

Serial number: _____

Serial number: _____

Fan Motor 6-10 model number: _____ **Serial number:** _____

Serial number: _____

Serial number: _____

Serial number: _____

13F-41577

DAIKIN

Rebel Applied Equipment Warranty Registration Form

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 and or building 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 each phase to ground | Disconnect 1–G_____V 2–G_____V 3–G_____V

D2. 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

J. Is the supply air temperature sensor installed per the installation manual ? . . . . . ☐ Yes ☐ No ☐ N/A

II. FAN DATA

A. Check rotation of supply fans? . . . . . ☐ Yes ☐ No ☐ N/A

B. Voltage at supply fan motor or VFD: ..... 1–2_____V 2–3_____V 1–3_____V

C. Supply fan motor amp draw(s) per phase : . . . . . SF-1 L1 _____L2 _____L3_____
*Fan array units only . . . . . SF-2 L1 _____L2 _____L3 _____
*If a VFD fan measure amps draw on line side of VFD SF-3 L1 _____L2 _____L3 _____
SF-4 L1 _____L2 _____L3 _____
SF-5 L1 _____L2 _____ L3 _____
SF-6 L1 _____L2 _____ L3_____

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

A. Check rotation of Return/Exhaust fans? . . . . . ☐ Yes ☐ No ☐ N/A

E. Voltage at Return - Exhaust fan motor or VFD: ..... 1–2_____V 2–3_____V 1–3_____V

F. Return - Exhaust fan motor amp draw(s) per phase: . . . . . R/E F-1 L1 _____L2 _____L3_____
*Fan array units only . . . . . R/E F-2 L1 _____L2 _____L3 _____
*If a VFD fan measure amps draw on line side of VFD R/E F-3 L1 _____L2 _____L3 _____
R/E F-4 L1 _____L2 _____L3 _____
R/E F-5 L1 _____L2 _____ L3 _____
R/E F-6 L1 _____L2 _____ L3_____

G. What is the Return - Exhaust fan rpm? ..... _____

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

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

J. Check service menus Modbus com statuses are all OK? . . . . . ☐ Yes ☐ No ☐ N/A

DAIKIN

Rebel Applied Equipment Warranty Registration Form

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

III. START-UP COMPRESSOR OPERATION

A. Do compressors have holding 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): . . . . . _____ _

IV. PERFORMANCE DATA

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

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

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

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

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

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

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

C. Discharge pressure, one compressor: . . . . . Circuit 1_____psig Circuit 2_____psig

D. Suction pressure, one compressor: . . . . . Circuit 1_____psig Circuit 2_____psig

E. EVI percentage , one compressor: . . . . . ☐ N/A Circuit 1_____% Circuit 2_____%

F. Discharge pressure, fully loaded, 2–3 compressors: . . . . . Circuit 1_____psig Circuit 2_____psig

G. Suction pressure, fully loaded, 2–3 compressors: . . . . . Circuit 1_____psig Circuit 2_____psig

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

I. Liquid temperature, fully loaded, 2–3 compressors: . . . . . Circuit 1_____psig Circuit 2_____psig

J. EVI percentage, fully loaded, 2–3 compressors: . . . . . ☐ N/A Circuit 1_____% Circuit 2_____%

L. Suction line temperature: . . . . . Circuit 1_____°F Circuit 2_____°F

M. Superheat: . . . . . Circuit 1_____°F Circuit 2_____°F

N. Subcooling:. . . . . Circuit 1_____°F Circuit 2_____°F

O. Discharge superheat:. . . . . Circuit 1_____°F Circuit 2_____°F

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

Q. Is the liquid line in the line sightglass clean and dry? . . . . . ☐ Yes ☐ No ☐ N/A

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

DAIKIN

Rebel Applied Equipment Warranty Registration Form

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

S. Verify Reheat Valve Operation? . . . . . ☐ Yes ☐ No ☐ N/A

T. Reheat Valve outlet temperaute with Dehum OFF . . . . . Circuit 1_____°F Circuit 2_____°F

U. Reheat Valve outlet temperaute with Dehum ON . . . . . .Circuit 1_____°F Circuit 2_____°F

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

DAIKIN

Rebel Applied Equipment Warranty Registration Form

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

IV. Hot Water Coil

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

V. Chilled 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 ..... 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

B. Electric Furnace .....Model no_____ Serial no. _____

Volts _____ Hertz _____ Phase _____

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

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

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

F. Electric heater voltage across each phase: . . . . . _____L1 _____ L2 _____ L3

G. 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						

H. FLA: L1 _____ L2_____ L3 _____

I. Heat section turns off upon loss of airflow?.. . . . . ☐ Yes ☐ No ☐ N/A

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Rebel Applied Equipment Warranty Registration Form

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

VIII. FURNACE CHECK, TEST, & START

A. Gas Furnace ……Model no_____ Serial no. _____

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

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

D. Flame failure shutoff (seconds): ..... _____

E. Heat section turns off upon loss of airflow?. . . . . Yes ☐ No ☐ N/A ☐

F. Main Gas Valves shut off Operational? . . . . . Yes ☐ No ☐ N/A ☐

G. Gas Heat Performance

Mod gas pressure

Min fire rate (20-1 & 100-1 is 5%, 10-1 is 10%, 5-1 is 20%) ……Manifold pressure___ in w.c CO _____ppm CO2 _____ppm
At 50% …… ……Manifold pressure___ in w.c CO _____ppm CO2 _____ppm
At 100% ……Manifold pressure___ in w.c CO _____ppm CO2 _____ppm
Gas Supply at 100% _____ In Wc

Staged gas manifold pressures

1st stage ……	_____ In wc	CO _____ppm	CO2 _____ppm	Gas Supply pressure _____ In Wc
2nd stage ……	_____ In wc	CO _____ppm	CO2 _____ppm	Gas Supply pressure _____ In Wc
3rd stage ……	_____ In wc	CO _____ppm	CO2 _____ppm	Gas Supply pressure _____ In Wc
4th stage ……	_____ In wc	CO _____ppm	CO2 _____ppm	Gas Supply pressure _____ In Wc

IX. MAINTAINING MICROTECH CONTROL PARAMETER RECORDS

After the unit is checked, tested, and started and the final control parameters are set, Save the final settings by exporting the param.bin and ucf files. Keep these records on file and update them 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 ☐

Daikin Applied Training and Development

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

Warranty

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

Aftermarket Services

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

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

Products manufactured in an ISO Certified Facility.