Installation and Maintenance Manual IM 915-11

Group: **Applied Air Systems**
Part Number: **IM 915**
Date: **April 2020**

Vision® Air Handler – Extended Sizes

Sizes 107—169

Vision air handlers are not designed to be weather resistant. Do not install them outdoors.

The system design and installation must follow accepted industry practice as described in the ASHRAE Handbook, the National Electric Code, and other applicable standards. This equipment must be installed in accordance with regulations of authorities having jurisdiction and all applicable codes.

Installation and maintenance must be performed by qualified personnel familiar with applicable codes and regulations and experienced with this type of equipment. Sheet metal parts, self-tapping screws, clips, and other comparable items inherently have sharp edges. The installer and maintenance personnel should exercise caution.

⚠ CAUTION

Sharp edges and coil surfaces are a potential injury hazard. Avoid contact.

Receiving and Handling

Inspection

- Carefully check items against the bills of lading to verify all crates and cartons have been received. Carefully inspect all units for shipping damage. Report damage immediately to the carrier and file a claim.

Packaging

- All shipping wrap material, including stretch and shrink wrap, must be removed upon unit arrival. This wrapping is for transit protection only. Units are not to be stored with wrapping material left on, as white rust will develop if any moisture is present.
- Field-installed components will ship on separate skid(s).
- Hardware (screws, bolts, etc.) for assembling sections are supplied in a bag attached to each section. All necessary gasketing is applied in the factory for section-to-section mounting. NOTE: A special #30 Torx bit is required for assembly.

Identification

- Every shipping section includes a nameplate identifying the customer tagging information, unit serial number, unit order number, and the shipping section position for installation.

Handling

- Vision air handler units are constructed of painted or galvanized steel and are inspected thoroughly before leaving the factory. Take care during installation to prevent damage to units. Do not stand or walk on top of units.
- Air handler bases are designed with the necessary number of lifting points for safe installation. All lifting locations must be used. See Rigging.
- Take special care when handling blower sections. All fans are dynamically balanced before leaving the factory. Rough handling can cause misalignment or a damaged bearings or shaft. Carefully inspect fans and shaft before unit installation to verify this has not happened.
- Handle the zone damper of the multi-zone units with special care. Zone dampers are set and inspected before leaving the factory but should be checked on arrival to the job to verify the bell arm and connecting rod set screws did not become loose in shipment.

Nomenclature

CAH 169 G D A C

Model
CAH = Custom modular air handler
CAC = Custom modular component

Nominal unit size
(cataloged size—nominal square foot of coil)
107, 124, 141, 160, 169

Vintage of Daikin air handling unit

Unit type/coil position
B = Blow-through cooling coil location
D = Draw-through cooling coil location
H = Heating only
V = Vent only
M = Multizone

Motor location
A = Motor along side of fan housing
C = Motor downstream of ECM fan
D = Motor downstream of belt-drive plenum fan
F = Motor on inline fan
G = Motor downstream of direct-drive plenum fan
H = Motor downstream of direct-drive plenum fan in fan array
T = Motor behind twin fan housing

Unit cross section
C = Standard unit cross section
M = Custom size cross section

Unit Storage

- Skyline units may be stored outdoors. Follow the below instructions to ensure proper storage. Any damage to the unit resulting from improper storage will not be covered by Daikin Applied.
- Ensure no moisture, debris, or minerals are on the unit prior to storage, as these can cause cause permanent damage to the cabinet and components.
- Store units in a clean, dry environment on a level surface. Ensure units are on a dry surface or raised off the ground to protect components from any standing water; ensure adequate support is used to prevent the unit or section base from sagging, if raised.
- All openings, including dampers and bottom openings, must be covered to protect from rain, snow, dust, and animals. Do not use plastic tarps to cover the unit, as condensation can form on the air handler resulting in corrosion or stains. Use only canvas tarps to ensure the inside of the unit remains clean, dry, and ventilated. Do not allow coverings to trap moisture on surfaces.
- All tarps should be inspected frequently to ensure the integrity of the tarp is maintained and to prevent damage to the unit by the elements. Any damage to the tarp should be repaired immediately.
- It is recommended that the unit interior be inspected daily to observe whether condensation is occurring and if temporary or routine ventilation of the interior is needed to control condensation. Units should be inspected at different times of the day to ensure varying weather conditions are not causing condensate to occur.
- All shipping wrap material, including stretch and shrink wrap, must be removed upon unit arrival. Units are not to be stored with wrapping material left on, as white rust will develop if any moisture is present.
- A field-supplied desiccant bag may be hung in the interior of the unit to minimize corrosion in humid storage environments.
- Do not stack sections or store anything on top of units.
- Isolate unit from shock and vibration.
- Do not clean galvanized steel surfaces with oil dissolving chemicals. This may remove the protective coating and accelerate corrosion.
- Pack fan and motor bearings (unless motor bearings are sealed) with compatible grease while the fan shaft is stationary. After grease has been installed, rotate shaft a minimum of 10 rotations.
- Once a month, rotate shaft a minimum of 10 revolutions. Ensure the stopped position is different than the original position.
- Coat shafts with lubricant as needed to prevent corrosion.
- Inspect all doors and openings once a month to ensure they are closed and properly sealed.
- Loosen belt tension on belt-driven fans, if storing for more than two (2) months.

Belt driven fans:

- Reduce belt tension by at least 50% or remove the belts. Remove belts if they will be subjected to temperatures exceeding 85° F to avoid deterioration.
- Remove belt guard when adjusting belts
- Reduce belt tension prior to removing or installing belts. Removing or installing tensioned belts may cause personal injury and damage to the sheaves, belts, bearings or shafts.
- Adjustable sheaves should be opened as wide as possible and the adjustment threads lubricated so they do not corrode. Be careful not to put lubricant on the belt running surface

Prior to start up:

- Set screws on bearings, fan wheels, and sheaves need to be checked for proper torque. Also check bolt torque for any taper lock hubs either on the wheel or sheaves.
- Check sheaves for corrosion. Significant corrosion can cause belt or sheave failure.
- Purge old grease from fan bearings while rotating the shaft to distribute the new grease evenly and prevent bearing seal failure.
- Correctly align and tension belts. See General Rules of Tensioning on page 58.

Service Clearances

In addition to providing adequate space around the unit for piping coils and drains, access to at least one side of the unit is always required to allow for regular service and routine maintenance, which includes filter replacement, drain pan inspection and cleaning, fan bearing lubrication, and belt adjustment. Provide sufficient space—at least equal to the length of the coil—on the side of the unit for shaft removal and coil removal. Space, at least equal to the length of the side coil, is required for coil removal. Space, at least equal to the fin height, is required for top coil removal. See Figure 1 for servicing space requirements.

For routine maintenance purposes, access is normally obtained through the access doors or by removing panels. Fan and filter sections are always provided with a service door on one side of the unit. If requested, doors can be provided on both sides of the unit. Optional service doors are available for most section types and are provided based on customer request.

If component replacement is required, the top panel also can be removed. If necessary, the unit can be disassembled. Maintain at least 54" of clearance in front of electrical power devices (starters, VFDs, disconnect switches and combination devices). Electrical power devices that are mounted on the side of the unit typically are up to 12" deep. See Figure 2. Fan sections with multiple fans have motor control boxes up to 16" deep when supplied with VFDs.

Figure 1: Servicing Space Requirements

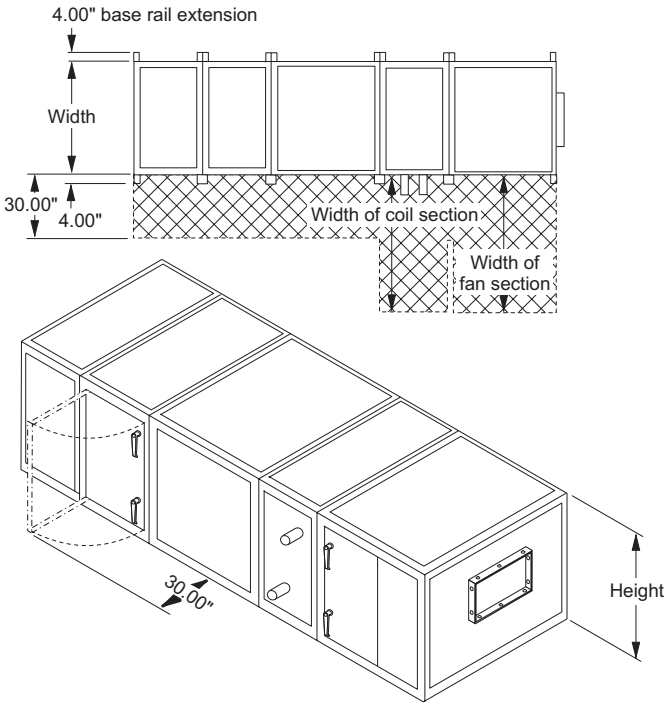
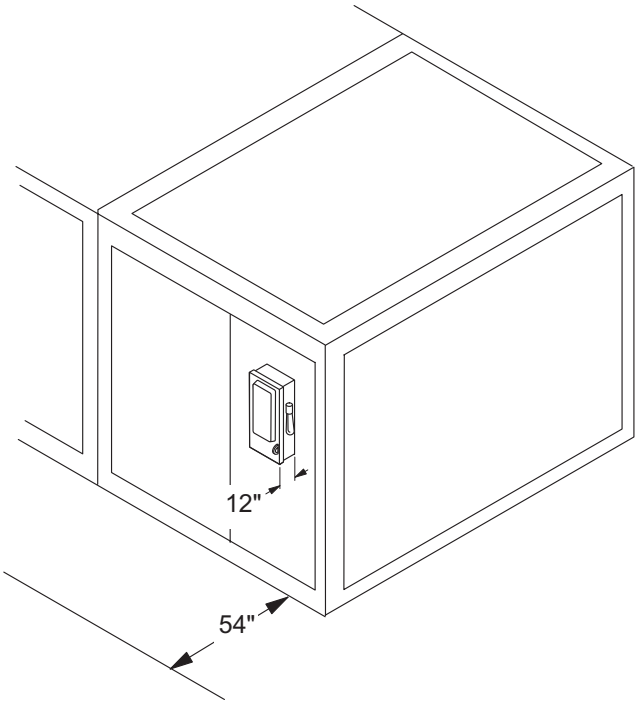


Figure 2: Service Clearance for Electrical Power Devices



Rigging

⚠ DANGER

CRUSH HAZARD. Never approach, reach under, or go under lifted unit. The load can shift and crush you resulting in injury or death.

⚠ DANGER

ACCIDENT HAZARD. Do not forklift. Rig the unit only from lifting points. Verify unit is secure before lift. Failure to comply could result in personal injury or death.

Extended size Vision air handlers ship as separate sections, completely assembled, or in modules of assembled sections.

The unit must be rigged as it ships from the factory. Do not rig units after assembly. Each section ships with a factory installed base rail and must be lifted via the retractable (or removable for ship sections less than 49") lifting brackets provided on each section (see Figure 3).

To prevent damage to the unit cabinetry, use spreader bars. Position spreader bars to prevent cables from rubbing the frame or panels. Before hoisting into position, test lift for stability and balance. Avoid twisting or uneven lifting of the unit.

A fan array or coil section might have a tall, thin aspect ratio. The center of balance on these sections can be high and make the section prone to tipping during the lift. Care should be taken when lifting units with a tall, thin aspect ratio.

Rigging Instructions

⚠ DANGER

DO NOT LIFT FROM 2" HOLES AT ENDS OF UNIT. Failure to comply may result in personal injury or death.

Use proper sized shackles and hooks for rigging the unit. Rig the unit according to the instructions listed below and connect to lifting points as shown in Figure 3.

1. The unit must be rigged as it ships from the factory. Do not rig units after assembly. The 2" holes at the end of the unit are for tie down purposes only. Do not lift from these points. See lifting points in “Figure A” and “Figure B” (Figure 3).
2. The spreader bar length must be equal to (or no greater than a foot longer than) the shortest dimension (width or length) of the unit. Install the spreader bar parallel to the shortest dimension.
3. On narrow sections, the lifting brackets will already be exposed. For wide sections, the lifting brackets need to be extended. To do this, cut the wire-tie which is holding the bracket and retaining pin. Pull the bracket until the retaining pin hole is exposed. Slide the retaining pin into the hole and secure it with the provided spring clip and washers. See details in “Figure B” (Figure 3).
4. Fasten four separate cables to each of the four lifting brackets extending from the middle of the section. Use long enough cables so that the angle between the cables and the ground is a minimum of 60º.
5. To attach rigging equipment, the large lifting bracket bolt may need to be removed. Clevises or rigging hooks can be used by attaching them around the provided bolt. Examples of proper connections are shown in “Figure C” (Figure 3).
6. Before hoisting into position, test lift for stability and balance. Adjust cable lengths to avoid uneven lifting of unit.

Figure 3: Units on Base Rails

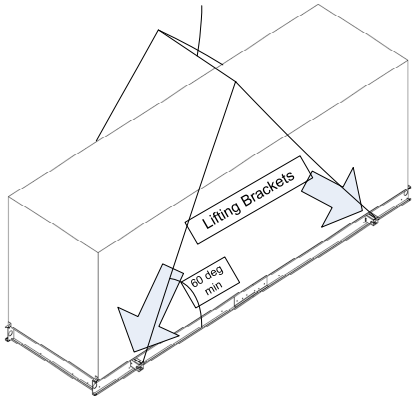


Figure A

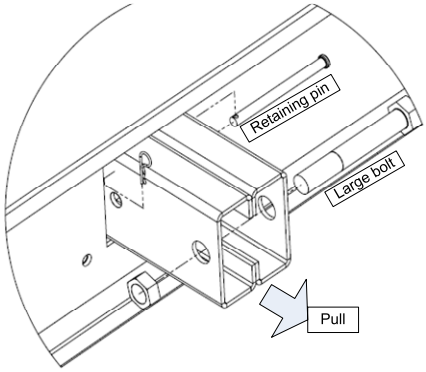


Figure B

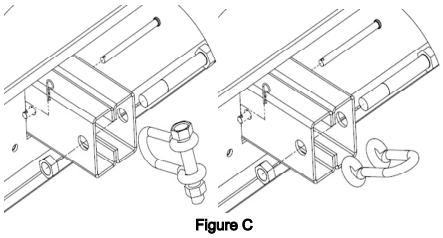


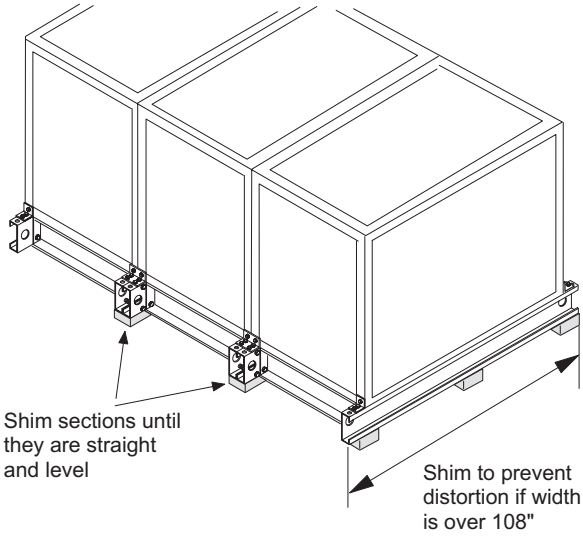
Figure C

Unit Leveling

Place the equipment on a flat and level surface. Where the surface irregularities could cause the equipment to distort, use a shim so the base of the unit follows a straight line. Uneven or distorted sections cause misfit or binding of the doors, panels, and improper draining of drain pans.

Units over 108" wide must rest on a flat surface for the entire width of the base rails, or must be shimmed at one or more points along the length of the rails to prevent distortion or sagging of the support rails (Figure 4).

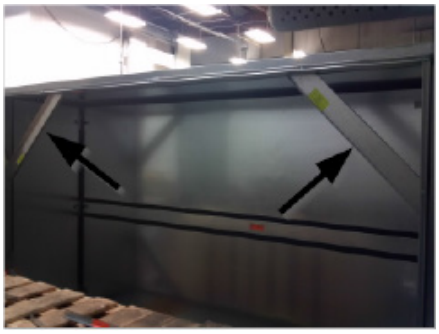
Figure 4: Leveling the Unit



Assembling Sections

Extended size units ship as separate shipping sections for field assembly. Shipping sections are provided with a connection splice joint attached to the cabinet which seals against the gasket of the frame channel on the adjoining shipping section. The splice joint provides an air seal between two sections once they are assembled together. Some unit configurations require multiple splice joints on the same face or on opposing faces of a single section. Confirm correct placement and orientation of unit sections and splice joints based on included unit drawings. Align all splice joints to seat into the mating gasket to provide an air seal. Note: Some sections are shipped with shipping braces.These need to be removed before connecting the shipping sections. (Figure 5)

Figure 5: Shipping Braces



Horizontal Airflow Section Mounting

1. Rig the section into position and line shipping sections up in the direction of airflow. Each section is clearly marked as to the order of assembly.
2. As the sections are set in place, the holding pins must be removed from the retractable/removable lifting brackets. Once the pins are removed, the retractable lifting brackets can be easily tucked into the base rail and/or the removable lifting brackets can be removed, allowing the mating section to seat firmly against the adjoining section.
3. Pull sections together to fasten. Use a furniture clamp (or straps) and a ratchet to help pull the sections together securely at the top and bottom.
4. The unit has a factory-installed base rail. Fasten the base rails together using the 3/8"-16 × 5" bolts located in the splice kit provided with the unit.
    a. To fasten two shipping sections together, four bolts are needed (two on each side of the unit). The bolts run from one base rail into the other and are fastened with a nut. Complete each bottom/top section before attaching additional sections.
5. Once the sections are positioned together, additional section-to-section straps must be secured.
    a. Remove the flat head Torx 30 fastener located in each of the top channel corners (on the mating edges in the channel piece).
    b. Mount the joining strap (shorter strap found in the splice kit, see Figure 6), over the two coned holes in the channels and refasten the flat head Torx 30 fasteners through the joining plate.
6. Locate and remove the panel screws on each side of the air handler top panel, as close to the center of each panel (of each half) as possible. Secure the mounting straps (longer strap found in the splice kit) as shown in Figure 7.

6. For certain high pressure, low leakage units, use the provided section joining plates to fasten sections together. Space them as shown in Figure 6. Using the provided ¼"-14 × 1" self tapping screws, drill screw the joining plates into the frame channel on each section, keeping unit sections tight together. Follow instruction drawing included in the assembly kit.

Figure 6: Horizontal Joining Sections

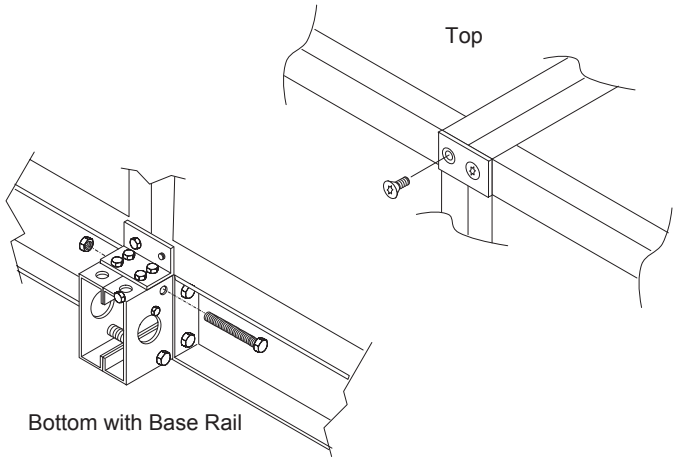


Figure 7: Frame Channel Stiffener Plates (High Pressure, Low Leakage Units Only)

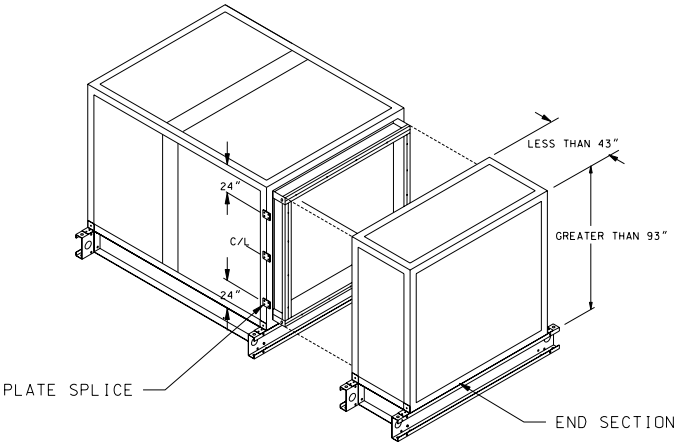
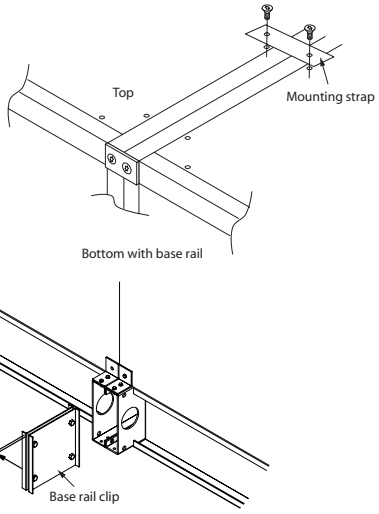


Figure 8: Horizontal Joining Sections (Base Rail)

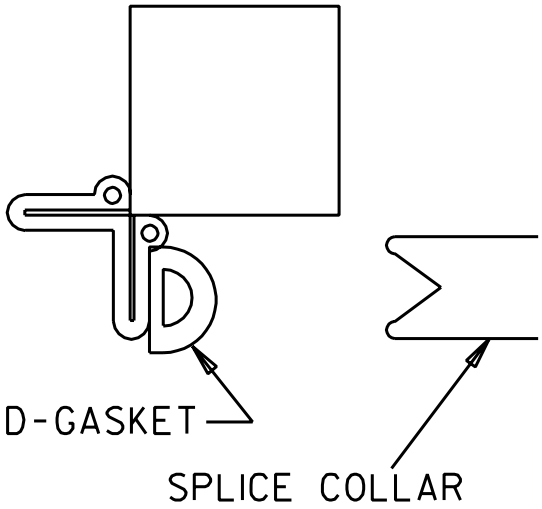


For positive pressure sections (sections located after the supply fan), a base rail join piece needs to be installed to provide a good seal in the bottom of the air handler.

1. Adjust the base rail clip bolts to fit over the adjoining base rail flanges (loose enough for the piece to slide and yet tight enough to provide a good seal). See Figure 7.
2. Push the clip with a long narrow board or broom handle (something half the width of the unit) to the center of the air handler. handler top panel, as close to the center of each panel (of each half) as possible. Secure the mounting straps (longer strap found in the splice kit) as shown in Figure 9.

For high pressure, low leakage units, ensure that the D-gasket is attached to the entering air side frame channel (Figure 7). If it has dislodged during shipping, restore to original location.

Figure 9: D-Gasket Placement Detail (High Pressure, Low Leakage Units only)

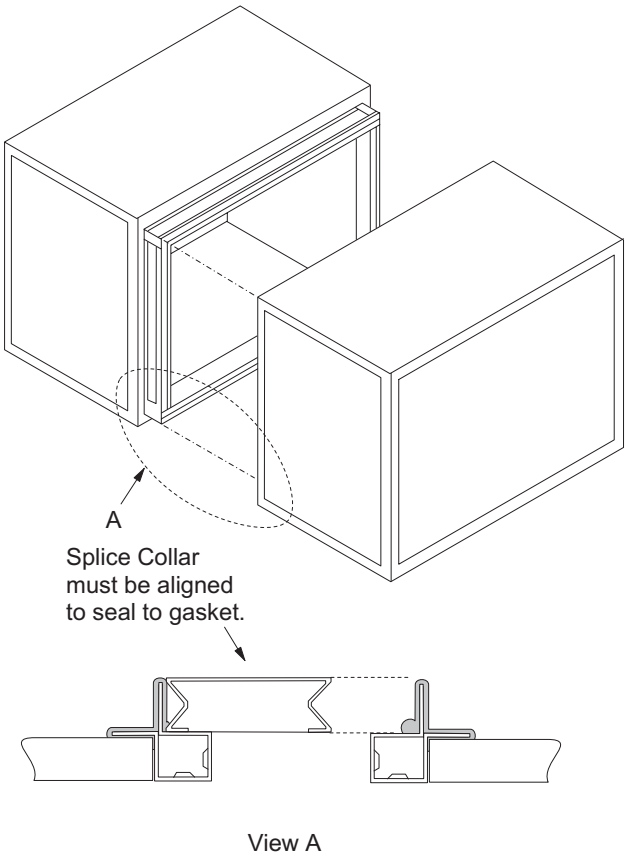


Internal Section-to-Section Mounting

If desired, shipping sections can be fastened together internally. To fasten internally, run field-provided #10 sheet metal screws or drill screws (4" long maximum) through the interior frame channel of one unit into the splice joint of the neighboring section.

A section-to-section splice joint provided seals against the frame channel on the entering-air side of the adjoining section. Align the splice joint to seat into the mating gasket to provide an air seal. If the splice joint was bent during shipping or

Figure 10: Internal Fastening

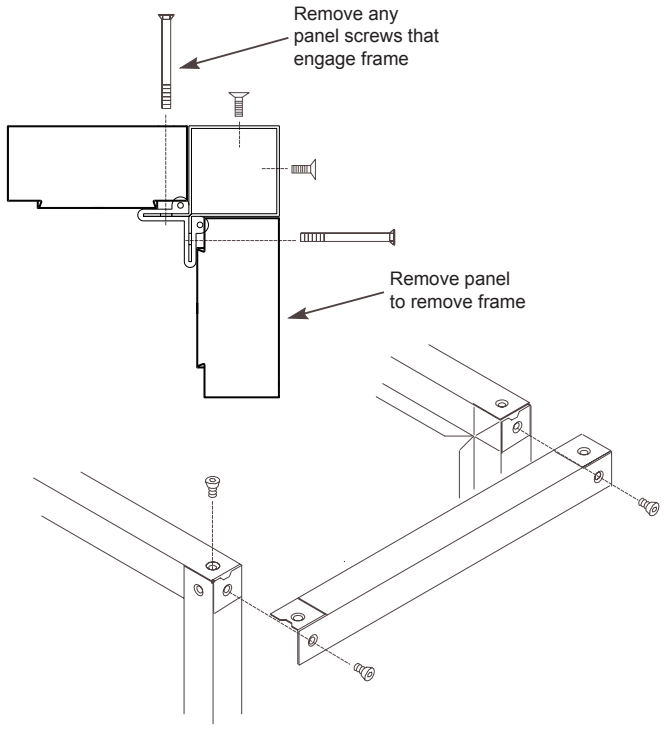


Panels, Frame Channels, and Doors

Panel Removal

To remove a side or top panel, remove the flat head Torx 30 fasteners along the sides of the panel. Lift off the panel after removing all fasteners.

Figure 11: Removing Panel Screws



Frame Channel Removal

Top frame channels that run the length of the unit can be removed to allow access to both the side and top of the unit. To remove the frame channel, first remove the side panel(s). Once the side panel is off, remove the flat head Torx 30 fasteners in the corner of the frame channels and pull the frame channel out the side. Remove any panel screws that are within 1" of the of the frame, since they are engaged into the gasketed flange of the frame. See Figure 10.

Fan Section Doors

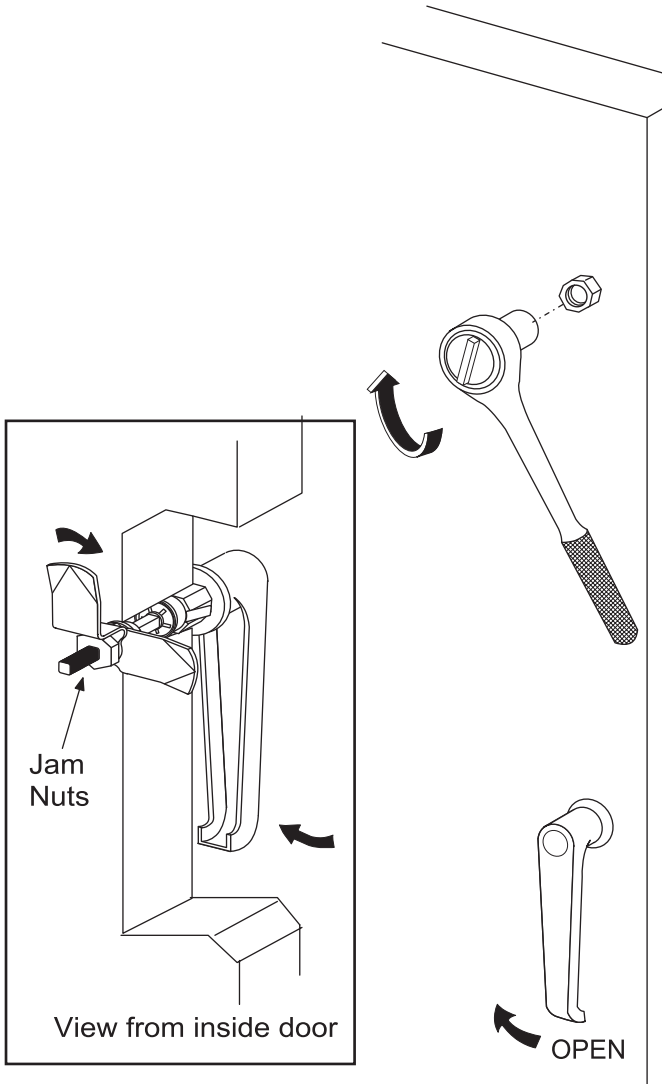
⚠ CAUTION

Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

NOTE: Opening fan section doors requires using a 17 mm socket wrench (Figure 11), which satisfies ANSI standards and other codes that require the “use of tools” to access compartments containing moving parts or electrical wiring.

1. Insert 17 mm socket and rotate 1/4 turn clockwise as shown in Figure 11. If the handle is on the left side of the door, rotate 1/4 turn counterclockwise.
2. Rotate the door handle 1/4 turn clockwise and then 1/4 turn counterclockwise to release any internal pressure or vacuum and open the door. If the handle is on the left side of the door, rotate the door handle 1/4 turn counterclockwise and then 1/4 turn clockwise.
3. To prevent air leakage, tighten the door panels by adjusting the jam nuts.

Figure 12: Opening Fan Section Door



Injected-Foam Insulated Panels

⚠ CAUTION

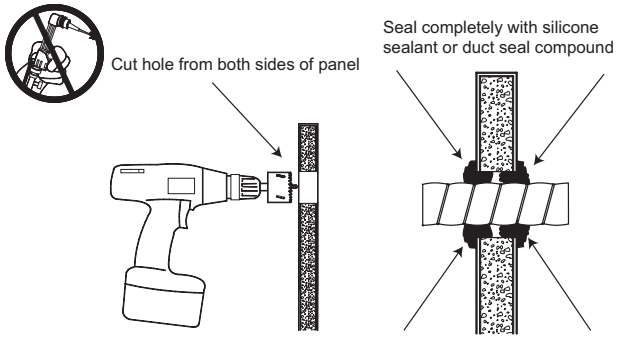
Flame and smoke can cause equipment damage, severe personal injury, or death. Before operating unit, seal all piping and wiring holes on both inner and outer panels with an industrial grade silicone sealant or duct seal compound. **Do not use a cutting torch or expose panel to fire.** Panel damage can occur.

Vision air handlers are furnished with double-wall, injected foam insulated panels. Foam panels are stronger, more rigid, and lighter than panels with fiberglass insulation. The insulation R-value is improved to 13. However, foam insulation can burn when exposed to flame or other ignition sources and release toxic fumes. Use caution when cutting and sealing all field-cut openings in these panels.

Panel Cutting Procedure

1. Determine the number and location of holes required for electrical conduit, piping, and control wiring as follows:
   - Check that adequate space is available inside the unit for conduit or pipe routing.
   - Do not locate holes in a panel that provides access to key maintenance components such as filters and fan assemblies.
   - Do not locate where the conduit or piping blocks airflow or obstructs hinged access doors.
2. Once a proper location is determined, drill a small pilot hole completely through the panel. Use a sharp hole saw or a saber saw and cut from each side of the panel.
3. Seal the double-wall panel on each side with an industrial/ commercial grade silicone sealant or duct seal compound. It is extremely important to seal each panel hole or penetration securely so that it is airtight, watertight, and so that there is NO EXPOSED FOAM INSULATION. .

Figure 13: Cutting/Sealing Injected-Foam Insulated panels



Prop 65—Substances in fuel or from fuel combustion can cause personal injury or death, and are known to the State of California to cause cancer, birth defects or other reproductive harm.

Field Mounting Junction Boxes and Other Components

⚠ CAUTION

Do not use self-tapping drill screws. They will not tighten nor secure properly and panel damage can occur.

For field mounting 4" × 4" or smaller junction boxes to the standard panel exterior, use a minimum quantity of four, 3/16" diameter pop rivets.

If larger, heavier components require mounting on unit panels, use through-bolts with flat washers through both outer and inner panels. To maintain panel integrity, seal both ends with an industrial/commercial grade silicone sealant or duct seal compound.

For field mounting junction boxes with conduit, always seal conduit with electrical conduit sealant.

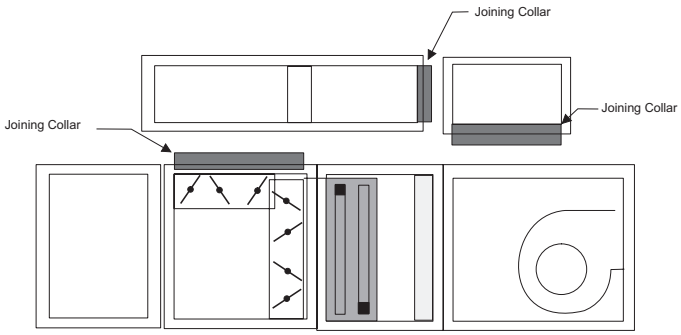
The unit frame channel is another excellent location for securing heavier components. Self-tapping screws are not acceptable; use through-bolts with flat washers and seal. Check that the location permits the full operation of all access doors and panels and does not interfere with other vital components.

External Face and Bypass Duct Assembly

When extended size units are ordered with external face and bypass, the bypass duct ships separately and must be attached to the unit in the field. The joining of the bypass duct assembly to the unit must be done after the unit is assembled. The field assembly of the bypass duct to the unit requires the following steps (also refer to Figure 13):

1. Position the unit shipping sections together and assemble in the equipment room.
2. After the unit is assembled, lift the duct into position over the unit. Joining collars are shipped factory assembled to the unit and duct. There is a joining collar located in the top of the bypass opening and in the leaving air side of the bypass duct. These joining collars are used to provide air seals. Line up the duct with the top openings in the unit.
3. Place the duct assembly that has the joining collar on the bottom, onto the top of the unit. Once it is in place, position the other duct assembly. Use caution and fit the splice collar into the first duct assembly, and then lower the other end into the bypass opening.
4. Once the duct is positioned correctly, fasten the duct pieces together with the joining collar provided. To do this, remove the fasteners located in the corners of the duct assemblies, place the collar over the holes in the corners, and then replace the fasteners. See Figure 5 on page 8.

Figure 14: Assembly of Bypass Duct to Unit



HEPA Holding Frame, Filter, and Prefilter Installation

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 15: Leg Extensions and Latches without Prefilters

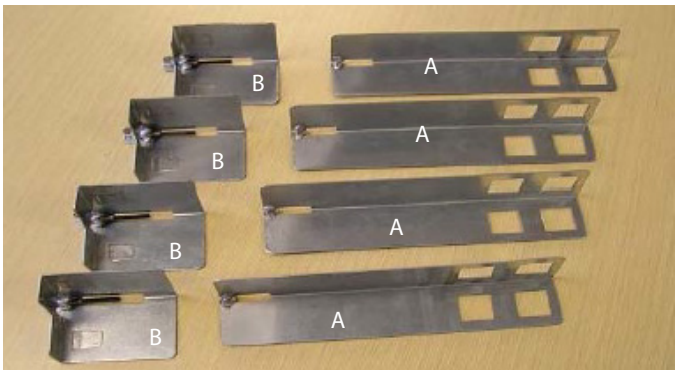


Figure 16: Leg Extensions and Latches with Prefilters

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 16, then pull back on the leg extension locking it into place (Figure 17).

Repeat Step 1 with each of the 4 corners. The frame with leg extensions should look like Figure 18.

Figure 17: Place Leg Extension over the Frame Tabs

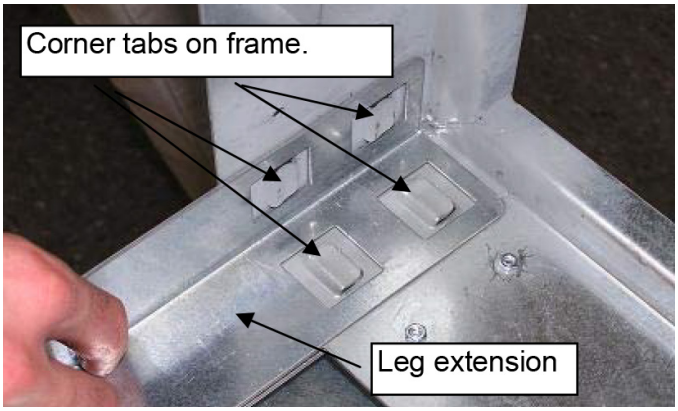
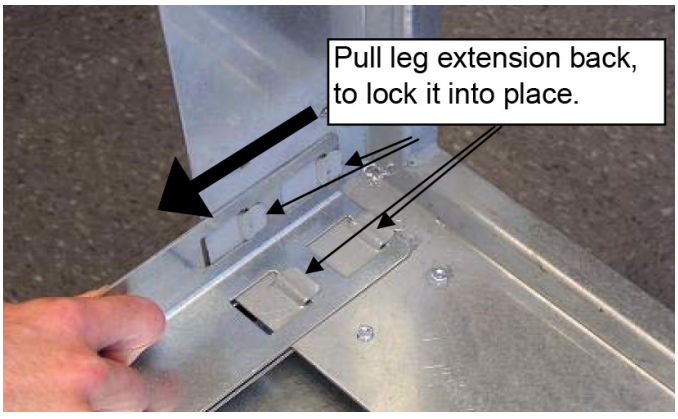


Figure 18: Pull Back to Lock the Leg Extension into Place

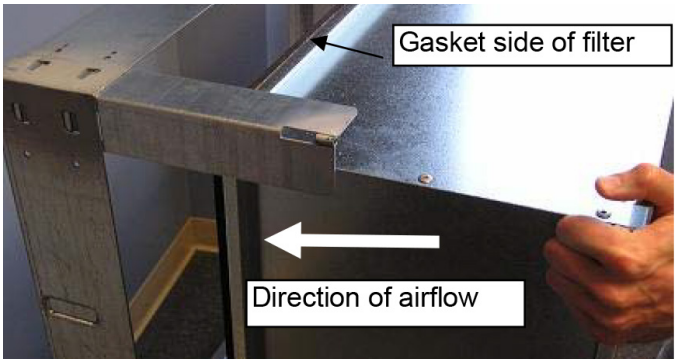


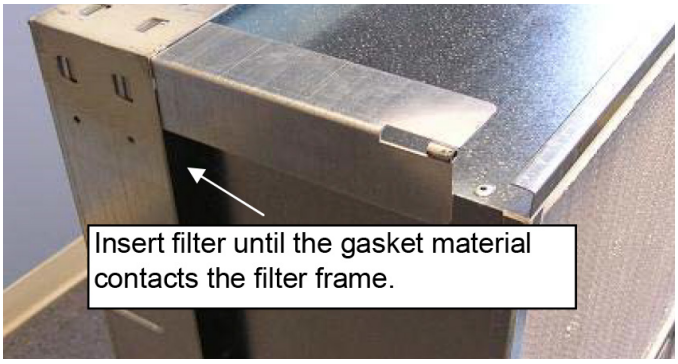
STEP 2: Insert the HEPA filter into the HEPA Holding Frame. The HEPA should be installed with the gasket side of the filter facing the frame. Insert the filter as far into the frame as possible, so that the gasket material is contacting the frame. See Figure 19.

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 20).

Figure 19: Frame with Leg Extensions Installed

Figure 20: Insert HEPA Filter into Frame, until the Gasket Comes in Contact with the Holding Frame





STEP 3: Place a latch so that it overlaps the leg extension, as shown in Figure 21. 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 22. Repeat this step with all 4 corners.

Figure 21: Filter Placed Inside of Frame

Figure 22: Latch Overlapping Leg Extension

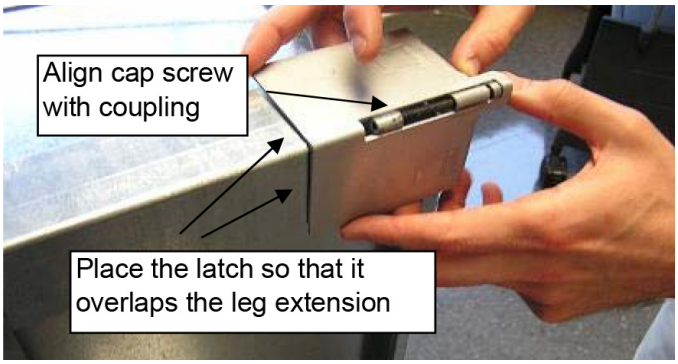
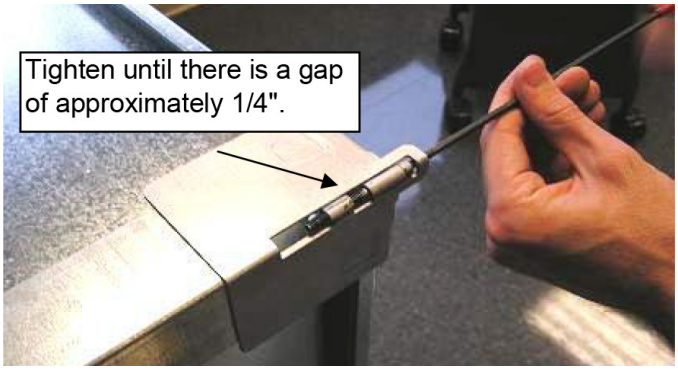


Figure 23: Tighten Cap Screw to 1/4" of the Coupling



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 23.

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 24: Tighten until Latch and Coupling Meet

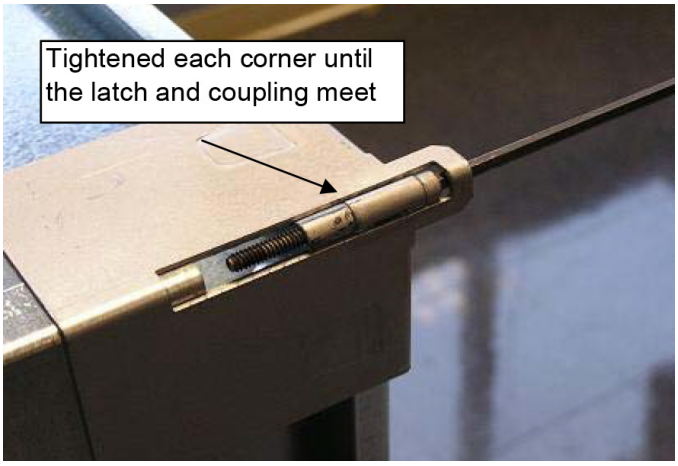


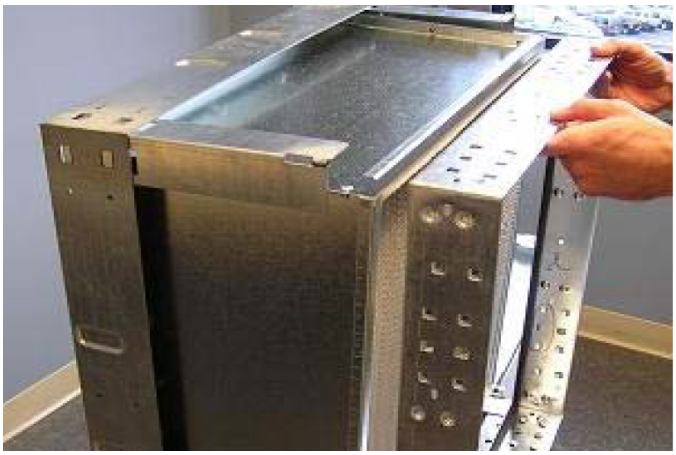
Figure 25: Properly Installed Filter Inside of the Frame

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 25.

Figure 26: 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 26.

Tighten the cap screw until there is an approximately 1/4” gap between the latch and the leg extension coupling as shown in Figure 27. Repeat this step with all 4 corners.

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 28.

Figure 27: Latch Positioning for Prefilter Frame

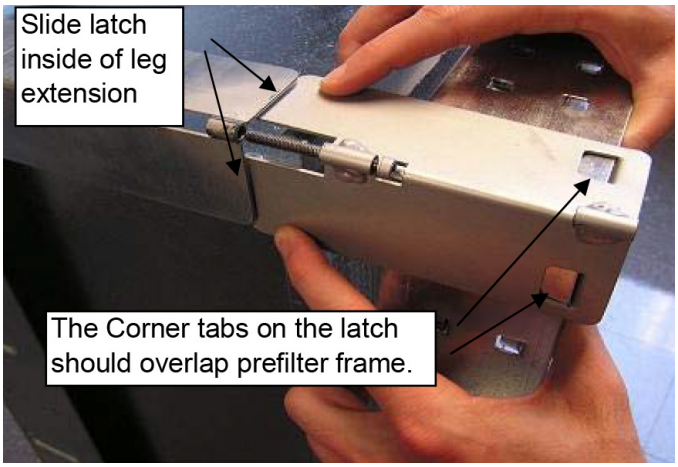


Figure 28: Tighten Cap Screw to 1/4" of the Coupling

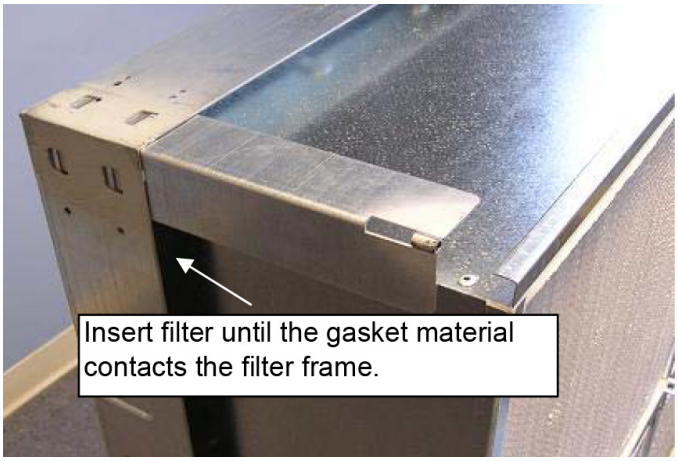
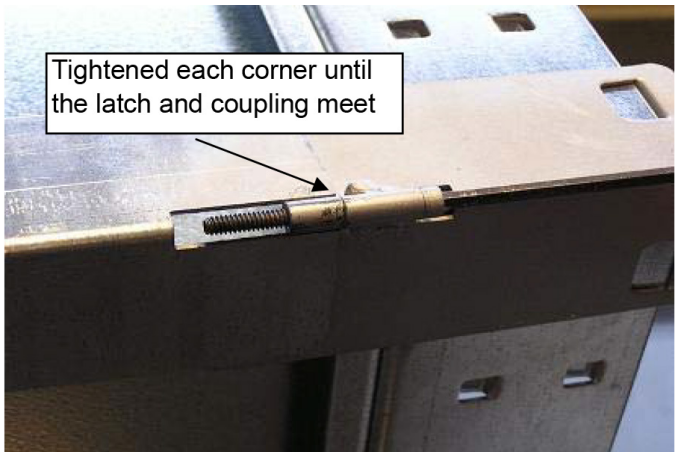


Figure 29: Tighten until Latch and Coupling Meet



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

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

Figure 30: Properly Installed HEPA Filter

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

Repeat with all remaining prefilters and frames.

Figure 31: Installation of Prefilter into Frame

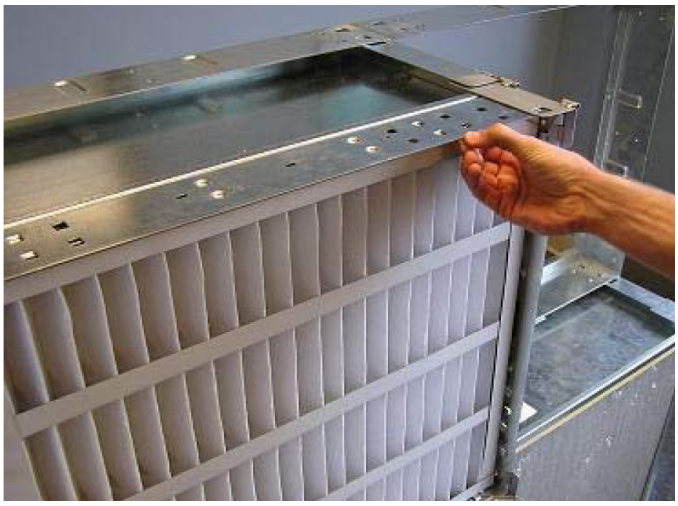
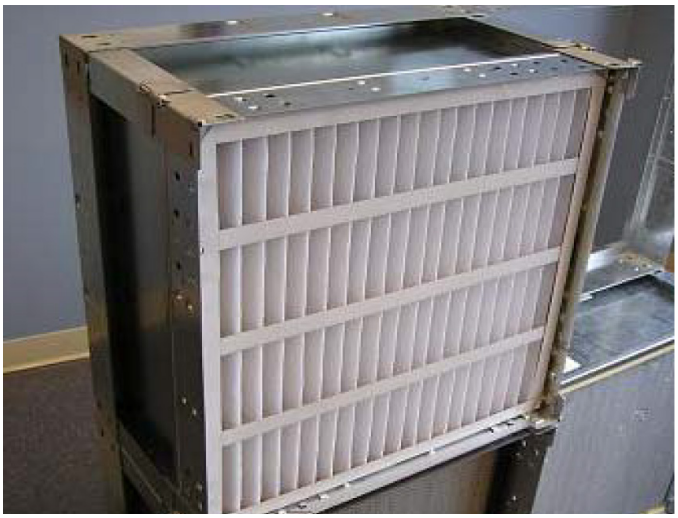


Figure 32: Completed Assembly



Mounting Actuators

⚠ CAUTION

Maximum damper rotation is 70°. Maximum shaft torque is 205 inches/pound. Greater rotation or torque can cause equipment damage.

The installing contractor is responsible for the mounting of all field-installed actuators. No provisions are made for the location of these actuators due to the number of options and arrangements available and the variety of specific applications. Typically, actuators are mounted inside the cabinet. Provide proper support for the actuator to avoid excessive stress in the cabinet, linkage, or damper shafts.

Fresh air and return air dampers can be linked together for each half and driven from the same actuator if the dampers are the same size. If the dampers are different sizes, they must be driven by separate actuators and controlled appropriately. Exhaust dampers are always driven by a separate actuators.

A typical rotary electric actuator can handle up to 40 sq. ft. of damper. For pneumatic actuators, allow 5 in-lb per square foot of damper area.

Face and/or Bypass Damper Torque Requirements

The dampers are not linked and require multiple actuators - four for the face dampers and two for the bypass dampers. A damper shaft extension is provided. Normally, the shaft extension is located on the drive side of the unit, but it can be moved to the other side.

Face and bypass dampers have a torque requirement of 10 in-lbs per square foot of damper face area.

Isolation Dampers for Multiple Fans

Optional isolation dampers can be provided on multiple fans to prevent backflow through a fan that is turned off for service. These isolation dampers are not intended to be used to control flow through the fan. The isolation damper for a fan that is going to be started must be positioned in the full open position before the fan is started. Do not start a fan with the damper located at the inlet with the damper fully or partially closed. This can cause airflow, vibration, and sound problems that can lead to failure.

Isolation dampers can be provided with actuators that are mounted in the airstream. Actuator sizing for the isolation dampers should be based on 9 in-lb per square foot of damper.

Piping and Coils

When designing and installing piping:

- Follow applicable piping design, sizing, and installation information in ASHRAE handbooks.
- Observe all local codes and industry standards.
- Do not apply undue stress at the connection to coil headers; always use a backup pipe wrench.
- Support pipework independently of the coils.

Water Cooling Coils

- Water supply, water return, drain, and vent connections extend through the end panel of the coil section. All connections are labeled on the end panel.
- Water supply and water return connections are typically male NPT iron pipe.
- When installing couplings, do not apply undue stress to the connection extending through unit panel. Use a backup pipe wrench to avoid breaking the weld between coil connection and header.
- Follow recommendations of the control manufacturer regarding types, sizing, and installation of controls.

Direct Expansion Coils

- The coil distributor and suction connection extend through the end panel of the coil section.
- Check nozzle in distributor for proper tonnage.
- When a field supplied thermostatic expansion valve is used, it is located outside the unit and connected directly to the distributor. Do not apply heat to the body of the expansion valve.
- The thermostatic expansion valve must be of the external equalizer tube type. Connect the 1/4-inch diameter external equalizer tube provided on the coil to connection on expansion valve.
- Use care when piping the system to see that all joints are tight and all lines are dry and free of foreign material. For typical refrigerant piping, see condensing unit product manual.

Steam Coils

Piping

(see Figure 32 on page 19)

- All steam coils in units are pitched toward return connection.
- Steam supply and steam return connections typically are male NPT iron pipe and are labeled on the end panel of coil section. Connections extend through the coil section end panel.
- When installing couplings, do not apply undue stress to the connection extending through unit panel. Use a backup pipe wrench to avoid breaking the weld between coil connection and header.
- Support piping independently of coils and provide adequate piping flexibility. Stresses resulting from expansion of closely coupled piping can cause serious damage.
- 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.

Coils

- Install vacuum breakers on all application to prevent retaining condensate in the coil. Generally, the vacuum breaker is connected between the coil inlet and the return main. The vacuum breaker should be open to the atmosphere, and the trap design should allow venting of large quantities of air.
- Do not drip supply mains through the coil.
- Do not attempt to lift condensate when using modulating or ON/OFF control.

Traps

- Size traps in accordance with the manufacturers' recommendations. Make sure that the required pressure differential is always available. Do not undersize.
- Use float and thermostatic or bucket traps for low pressure steam. On high pressure steam, use bucket traps. Use thermostatic traps only for air venting.
- Use bucket traps for ON/OFF control only.
- Locate traps at least 12 inches below the coil return connection.
- Multiple coil installation:
- Individually trap each coil or group of coils that is controlled individually trapped.
- Coils in series—use separate traps for each coil, or bank of coils.
- Coils in parallel—a single trap can be used, but an individual trap for each coil is preferred.
- Do not attempt to lift condensate when using modulating or ON/OFF control.
- With coils arranged for series airflow, use a separate control on each bank or coil in the direction of airflow.

Valves

- Do not use modulating steam valves on high pressure systems.
- Properly size modulating valves. Do not undersize.
- Freezing conditions (entering air temperatures below 35°F).
  - Daikin strongly recommends 5JA, 8JA, 5RA and 8RA coils.
  - Supply 5 psi steam to coils at all times.
- Do not use modulating valves. Provide control by face and bypass dampers:
  - Consider using two or three coils in series with two position steam control valves on the coil or coils that handle 35°F or colder air. Use a modulating valve on the downstream coil to provide the desired degree of control.
  - Thoroughly mix fresh air and return air before it enters the coil. Also, to obtain true air mixture temperatures, properly locate temperature control elements.
  - For additional protection against freeze-up, install the trap sufficiently below the coil to provide an adequate hydrostatic head to remove condensate during an interruption in the steam pressure. Estimate three feet for each 1 psi of trap differential required.
  - On startup, admit steam to coil ten minutes before admitting outdoor air.
  - Close fresh air dampers if steam supply pressure falls below the minimum specified.

Pipe Chases

Follow these guidelines when routing field supplied internal piping through the bottom of a unit.

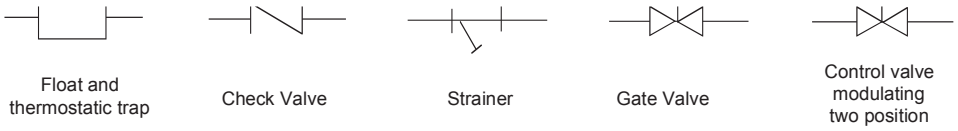
- Determine what style base and options were selected:
  - Was an uninsulated sheet metal pipe chase cover selected?
- Determine the number and location of holes required for piping as follows:
  - Check that adequate space is available inside the unit for pipe routing.
  - Hole(s) must be located fully within panels or sheet metal opening covers. Do not run pipes through 4” wide intermediate panels or on the very edge of the panel.
  - Do not place holes in a location that impedes access to key maintenance components such as filters and fan assemblies.
  - Do not place holes in a location where the pipe will block airflow or obstruct hinged access doors.
- Once a proper location is determined:
  - If no pipe chase cover is present:
    a. Drill a small pilot hole completely through the bottom cabinet panel, then using a sharp hole saw or saber saw, cut the desired final hole size and smooth the edges of the cut. or saber saw, cut the desired final hole size and smooth the edges of the cut.
  - If a pipe chase cover is present:
    a. Remove the pipe chase cover.
    b. Drill a small pilot hole completely through the pipe chase cover, then using a sharp hole saw or saber saw, cut the desired final hole size and smooth the edges of the cut.
  - After installation of the piping, seal the hole(s) in the bottom cabinet panel or pipe chase cover.
    a. Seal the holes to divert any moisture away from the opening and prevent moisture leakage through the holes.
    b. Recommended sealing options include: flashing material, caulk, spray foam, cork tape, industrial or commercial grade silicone sealant, duct seal compound, or other similar sealing material.
    c. Pipe chase covers are not guaranteed to be airtight or watertight, but the pipe chase cover may be sealed in a similar manner to the other penetrations of the pipe chase cover if desired.

NOTE: The installer is responsible for ensuring the penetrations are fully sealed.

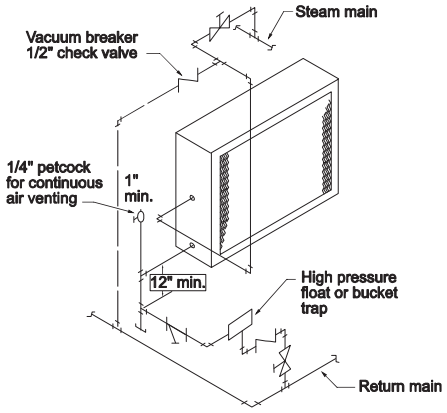
NOTE: Do not support piping off of the unit, or coil connections.

NOTE: It is extremely important to seal each hole or penetration securely so that they are airtight and watertight.

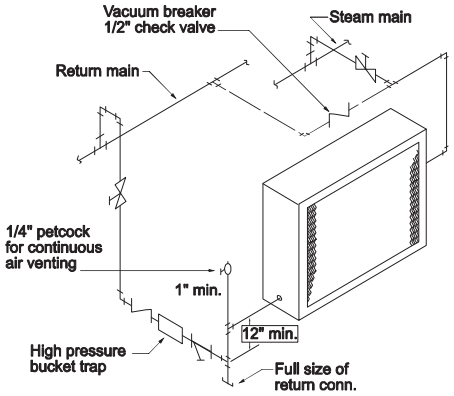
Figure 33: Piping Arrangements



High Pressure (over 25 psi)

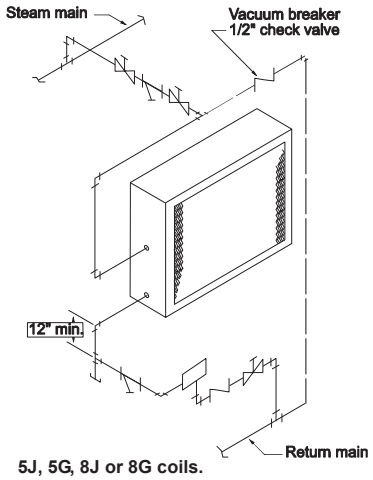


5GA or 8GA coils. Note that the addition of a vacuum breaker to permit the coil to drain during shutdown.

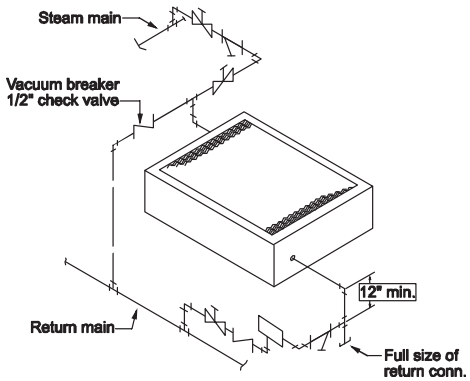


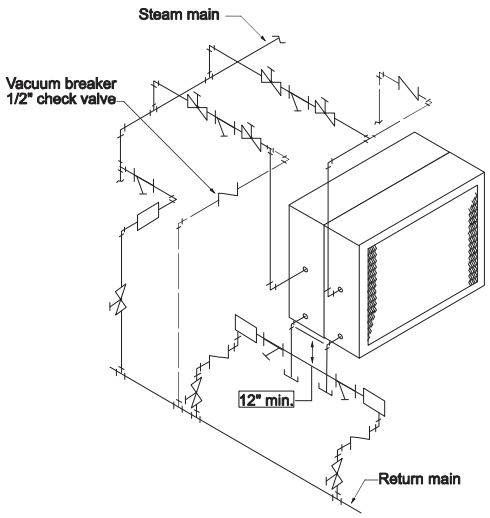
5TA, 8TA, or 5HA coils. Condensate is lifted to overhead return main

Low Pressure (to 25 psi)

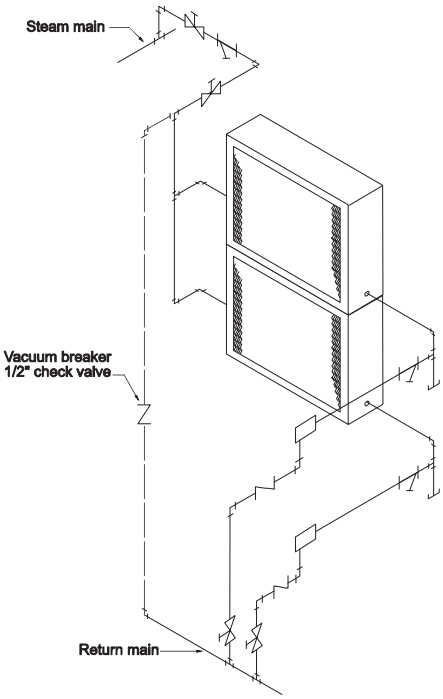


5J, 5G, 8J or 8G coils.





5JA or 8JA coil. Installed in series. Note that each coil must have a separate control valve and trap.



5RA, 8RA, or 5SA coils. Banked two high, individual trapping of each coil as shown is preferred.

Water Heating Coils

⚠ CAUTION

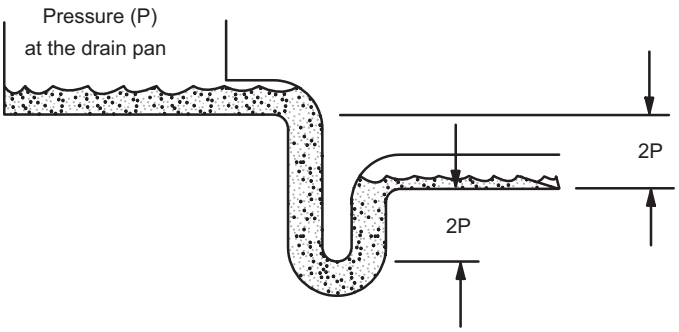
Improper installation, use, or maintenance of water heating coils can cause equipment damage. Read and follow instructions carefully.

- Water supply and water return connections extend through the end panel of the coil section. All connections are labeled on the end panel.
- Water supply and water return connections are male NPT iron pipe.
- When installing couplings, do not apply undue stress to the connection extending through unit panel. Use a backup pipe wrench to avoid breaking the weld between the coil connection and header.
- Follow recommendations of the control manufacturer regarding types, sizes, and installation of controls.
- Do not use hot water coils with entering air below 40°F.
- If fresh air and return air are to be heated by a hot water coil, carefully design the system to provide thorough mixing before air enters the coil.
- To prepare coils for winter operation, see See Removing and Replacing Components on page 60.

Drain Pan Traps

Run drain lines and traps full size from the drain pan connection. Install drain pan trap to allow condensate to drain freely. On both blow-through and draw-through units, the trap depth and the distance between the trap outlet and the drain pan outlet must be twice the static pressure in the drain pan section under normal operation so the trap remains sealed. See Figure 33.

Figure 34: Allow Adequate Distance Between Trap Outlet and Drain Pan Outlet



Internal Fan Isolation Assembly Adjustment

⚠ IMPORTANT

Fan assemblies with internal isolation are locked down for shipment. The assembly is secured at four location. On units with internally isolated fan and motor assemblies, the assemblies are secured for shipment. Make sure all shipping brackets are removed before installation and while there is access to both sides of the unit.

Before Operating the Unit:

Remove the shipping brackets and tie-down bolts (see Figure 34 and Figure 35) and discard. The shipping brackets located on the opposite drive side of the unit are difficult to access from the drive side of the unit. Either remove them before the unit is assembled, or remove the panel on the opposite drive side to gain access.

Figure 35: Removing Shipping Brackets

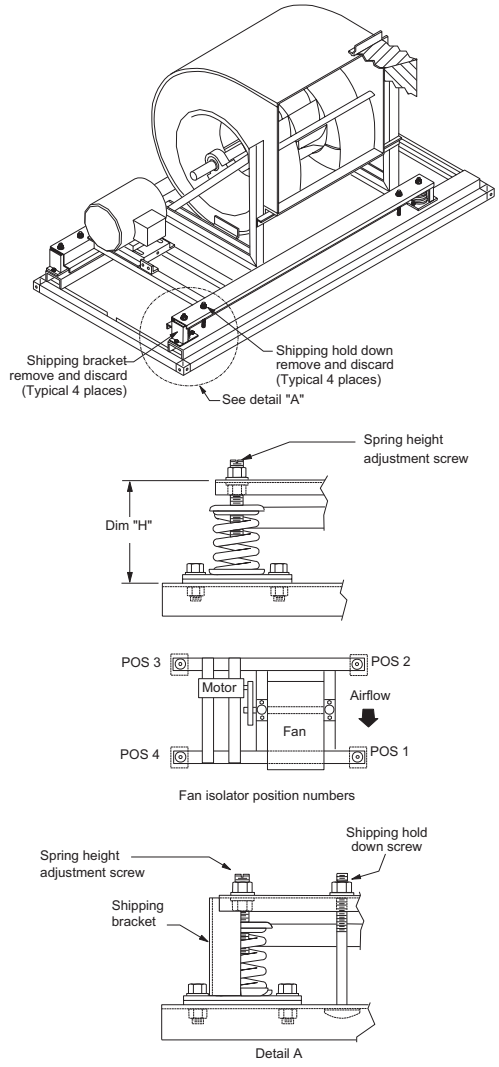
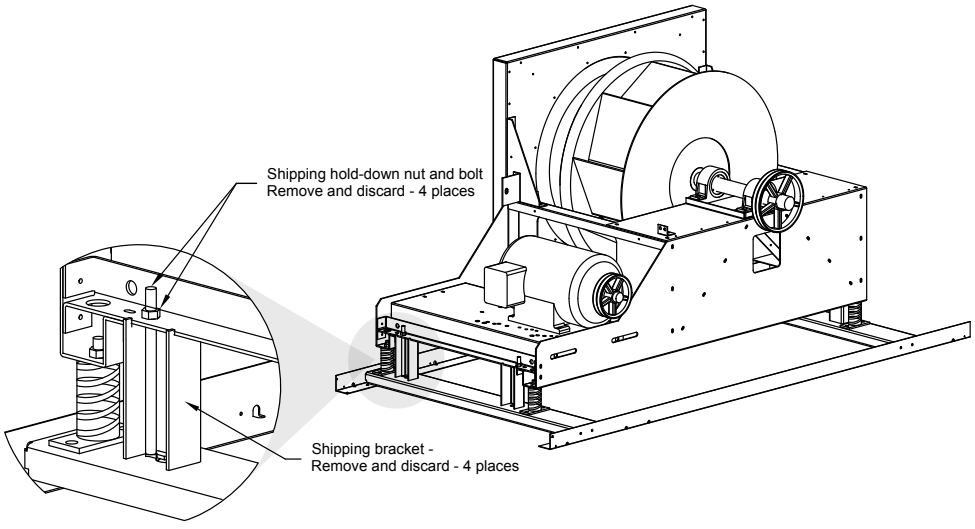


Figure 36: Class II Belt-Drive Fan Shipping Bracket



Spring Mount Assembly (Class 1 & 2)

The spring isolators under the four corners of the fan and motor assembly are factory adjusted while the fan was not running. See Table 1 through Table 4 below.

Table 1: Spring Mount Adjustments (Refer to Figure 36)

Spring mount adjustment at rest		
Isolator position	Top or bottom horz. H (in.)	Upblast H (in.)
1	6.00	6.50
2	6.50	6.50
3	6.50	6.50
4	6.00	6.50

Table 2: Class II Belt-Drive Plenum Fan Spring Height

Fan Size	Operating Height (in.)
18–36	4.0
40–60	6.75

Table 3: Class III Plenum Fan Spring Height

Cabinet Width	Operating Height (in.)
Width < 108"	4.0
Width >= 108"	6.75

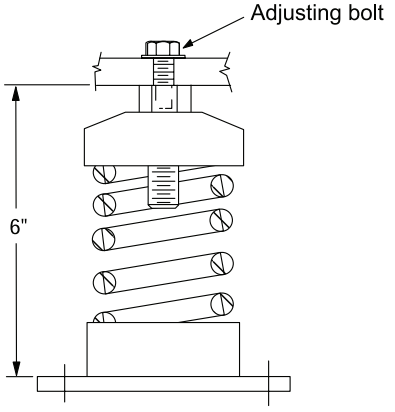
Table 4: Class II Direct-Drive Plenum Fan Spring Height

Fan Size	Operating Height (in.)
18–36	4.0
40–44	6.75

With the unit operating at normal cfm and static pressure, all the isolators should be at the same height opening. If adjustments are required, loosen the 1/2" cap screw on top of the isolator and turn the adjusting bolt to lower or raise the fan and motor base. Retighten the cap screw when adjustments are completed.

The isolators should be at equal height during fan operation. Center the fan outlet in the outlet panel opening. If adjustment is required, loosen the cap screw on top of the isolator assembly. Turn the adjustment nut below the fan frame to lower or raise the fan motor and frame assembly. Retighten the cap screw on top of the isolator assembly. See Figure 36.

Figure 37: Adjusting Spring Mount Assembly (Class 1 & 2)

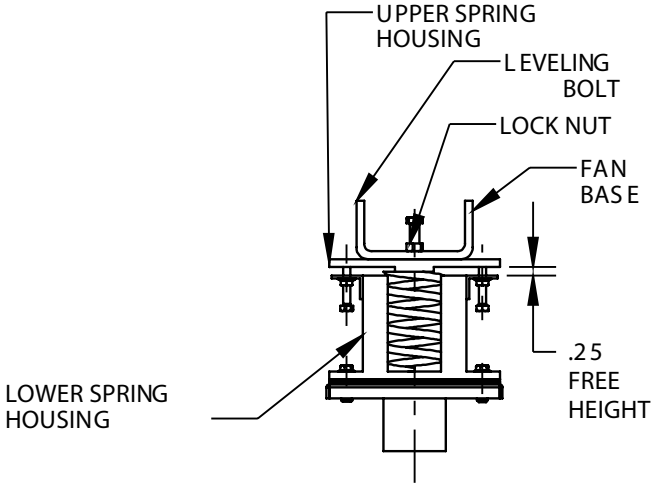


Spring Mount Assembly (Class 3)

Before operation, Class 3 isolators should be adjusted as follows:

1. Loosen the locknut on each of the four spring mount assemblies
2. Adjust each the four leveling bolts in order to level the fan assembly. The gap between each upper and lower spring housing should be approximately 1/4".
3. After all four springs are adjusted, tighten the locknut located on each leveling bolt.
4. Turn the adjustable vertical restraint nuts until finger tight.

Figure 38: Adjusting Spring Mount Assembly (Class 3)



Wiring

⚠ DANGER

Capacitor Hazardous Voltage! Failure to disconnect power and discharge capacitors before servicing will result in serious injury or death.

Disconnect all electric power (including remote disconnects) before servicing. Perform lockout/tagout procedures to ensure that power can not be energized. For variable frequency drives, or other energy storing components that have been furnished and mounted by either Daikin, or by others, refer to the specific manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify capacitors have been discharged using an appropriate voltmeter.

⚠ DANGER

- This equipment is not suitable for use in high impedance grounding or neutral systems.
- Connect only to low impedance, solidly grounded electrical supply systems.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

Use copper conductors only! Failure to use copper conductors can result in equipment damage.

- Electrical service to each fan must correspond to the rated voltage on the motor or electrical panel nameplate and conform to the National Electric Code and local restrictions.
- Connect each fan section metal frame to the building electrical ground.
- A door electrical interlock is not provided as standard.
- Thermal motor protection is external to the unit. Unless the unit is provided with a variable frequency drive (VFD) or a unit mounted starter, thermal protection and a disconnect switch provision per electric codes are provided by others.
- When the unit is factory provided with a disconnect switch, starter or a variable frequency drive (VFD), the components are mounted on the outside of the unit cabinet. Factory wiring is provided from the device to the unit internal motor.
- All electrical components must be grounded to the building central ground. Suitable ground wires and/or (bonding) lugs are provided for all motors, disconnect switches, starters, and variable frequency drives. Provide dedicated ground (bonding) copper conductors in accordance with local and national codes.
- For units provided with a motor only or with an external junction box, wire connections are made with suitable wire nuts or connectors for the gauge wires provided.
- For units provided with a disconnect switch or starter, field wiring will be terminated to lugs. Wire size and lug torque requirements are shown on the unit electrical schematic provided in the component print pocket. All power supply wire connections must be torqued as shown.
- When the unit is provided with a VFD only, refer to the VFD manual for wire size and torque requirements. For instances where multiple motors are being driven by a single VFD, be sure to set up the VFD and size the wiring according to the power requirements of all motors that are being driven by that VFD.
- When not being serviced, close and secure electrical panel doors to prevent ingress of moisture and airborne contaminants.

Control Wiring

- Access to the VFD is through the fan cabinet access door for single fans. Provide shielded cable only as described in the provided VFD manual. Route wire through the panel (Figure 12 on page 10) so that it does not interfere with other components or access doors. Do not drill through drip pans or drain pans. Refer to the provided VFD installation manual for detailed control wiring instructions.
- For multiple fans in parallel, the VFD(s) are mounted inside of the electrical enclosure, which is mounted on the exterior of the fan section. When multiple fan sections are provided with multiple VFDs, they must be set up so that the fans always start simultaneously and are set to ramp up and down together. Do not attempt to run fans in parallel at different speeds as this can result in uneven airflow that can cause performance, sound, and vibration problems that can lead to failure. Provided that the fan is capable of running fast enough, the motor is sized appropriately, and the VFD can be sped up within its rated continuous output, VFDs may be operated up to a maximum recommended frequency of 90 Hertz for 1800 RPM and slower motors. Motors that are 3600 RPM may be operated up to a maximum speed of 4000 RPM or 66.7 Hertz provided the fan is rated that high. Operation above 4000 RPM can damage motor bearings and is not recommended.

Wiring Penetrations

- Seal any panel penetrations for wiring or conduit per the panel cutting procedure instructions within this document
- Seal any other wiring or conduit penetrations in accordance with NEC, relevant codes, and in order to maintain the enclosure rating, only use fittings that are approved to keep the particular rating of the individual enclosure being penetrated per relevant code or standard tables. Seal wireway openings tight enough to prevent air movement between sections and control enclosures

Startup Checks

⚠ WARNING

Rotating fan. Can cause severe injury or death. Before servicing fans, lockout and tag out power.

⚠ WARNING

Fire/electric shock hazard. Can cause property damage, personal injury or death. Wire fan power supply and ground motor frame in accordance with local electric codes.

⚠ WARNING

Fan motor requires overload protection. Failure to provide motor overload protection can result in fire, property damage, electric shock, person l injury, or death. Connect motor to an overload protective de ce rated in compliance with local electric codes.

⚠ CAUTION

Do not overheat fan motor. High air temperatures in the fan section can cause the fa motor to burnout. On draw-through air handlers or air handlers with the fan section down the air stream from the heating section, the discharge air temperature of the heating section must not exceed 104°F (40°C)

⚠ CAUTION

Equipment damage to loose fasteners represents improper start-up d equipment abuse. It is not covered by the warranty.

When performing startup and service, always follow safety precautions. Only trained, experienced personnel should perform these functions.

Before Starting the Unit:

Before entering fan section, make sure that fan electrical power source is disconnected and locked in the OFF position.

1. Check that the unit is completely and properly installed with ductwork connected.
2. Check that construction debris is removed/filters are clean.
3. Check that all electrical work is complete and properly terminated.
4. Check that all electrical connections are tight and that the proper voltage is connected. Phase imbalance must not exceed 2%.
5. Do not grease ball bearings on the fan shaft and motor before startup. They are pre-lubricated.
6. Check tightness of setscrews in bearings and fan wheel(s). If retightening is needed, position the fan wheel(s) per Table 5 on page 25 through Table 10 on page 27. Torque set screws per Table 11 and Table 12 on page 27.
7. Check alignment of fan and motor sheaves and belt tension. Adjust if necessary. Check tightness of sheave setscrews and/or capscrews. See Figure 68 on page 58.
8. Leak test the thermal system to verify connections are tight.
9. Check that the condensate drain is trapped.
10. Rotate the shaft by hand to be sure it is free.
11. If multiple fans are supplied with a block off plate and it is installed on one of the fans, make sure to only start the fans without the block off plate. Do not start any fan that has the block off plate installed on it.
12. If multiple fans are supplied with isolation dampers, make sure the isolation dampers are fully open before starting the fans.

VFD Setup

Fans ordered with VFDs that were factory installed are setup and tested prior to shipment. Prior to starting the fan(s), double check the VFD settings according to the recommendations in the VFD manual.

Once the correct VFD settings are verified, the fans should be run through a sweep of the full range of operating speeds that are expected to check for any vibration issues. If any areas of concern are located, it is recommended to lock out those frequencies using the VFD (see lock out frequencies or skip frequencies in the VFD manual). This will ensure that the fans will never operate continuously at those points, but will rather pass through them to get to the desired points of operation.

Fan Startup

Start and run fan. See Figure 42 for proper fan rotation. Observe the rotation. If the fan operates backward, reverse two legs of the three-phase supply power.

NOTE: Variable pitch fan drives usually are provided for operation in the mid-speed adjustment range. However, the drives usually ship with the adjustment opened up for minimum fan speed. Adjust the drives for the proper airflow. See Fan Drive Adjustments on page 57.

After the First 48 Hours of Operation:

1 Disconnect and lock electrical power source.

2 Check tightness of all bearing, wheel, and sheave setscrews (or capscrews). See Table 12.

3 Recheck belt tension and adjust if necessary, retaining sheave alignment. Belts tensioned sufficiently to slip one to two seconds at startup will perform satisfactorily, extending life and reducing vibration.

Fan Wheel Alignment

Figure 39: Wheel-to-Inlet Funnel Relationship—Airfoil TypeFan Wheels (Housed)

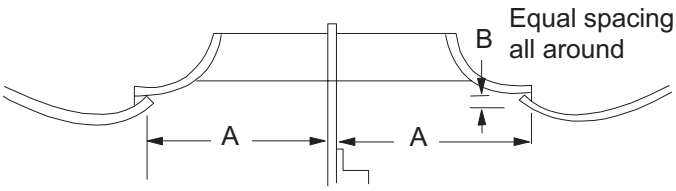


Table 5: Wheel-to-Inlet Funnel Relationship—Airfoil Type

Diameter (in.)	A in. (mm)	B in. (mm)
20.00	7.19 (183)	0.31 (7.87)
22.25	7.69 (195)	0.33 (8.38)
24.50	8.56 (217)	0.31 (7.87)
27.00	9.47 (241)	0.63 (16.0)
30.00	10.47 (266)	0.39 (9.91)
33.00	11.75 (298)	0.38 (9.65)
36.50	12.78 (325)	0.38 (9.65)
40.25	14.31 (363)	0.5 (12.7)
44.50	15.65 (398)	0.56 (14.22)
49.00	17.44 (443)	0.61 (15.49)

Note: 1. To obtain rated air performance, dimensional relationship must be held.
Note: 2. To obtain dimension A, loosen setscrews in wheel hub(s), shifting wheel(s) axially as needed, retightening setscrews.
Note: 3. To obtain dimension B, loosen screw and washer fasteners around periphery of funnel(s), shifting funnel radially as required, re-torquing fasteners.

Figure 40: Wheel-to-Inlet Funnel Relationship—Forward Curved Type Fan Wheels

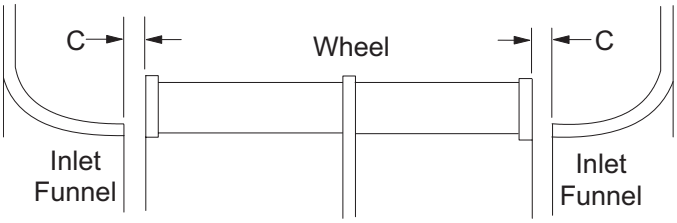


Table 6: Wheel-to-Inlet Funnel Relationship—Forward Curved Type Fan Wheels

Diameter (in.)	C in. (mm)
20 (Class 1 & 2)	0.24 (6.10)
22.38 (Class 1 & 2)	0.41 (10.41)
25 (Class 1 & 2)	0.47 (11.94)
27.62 (Class 1 & 2)	0.47 (11.94)
30 (Class 1 & 2)	0.47 (11.94)
33 (Class 1 & 2)	0.50 (12.70)
36 (Class 1 & 2)	0.75 (19.05)

Note: 1. To obtain rated air performance, dimensional relationship must beheld.
— Adjust dimension C by loosening wheel hub setscrews, shifting wheel(s) axially as needed, and retightening setscrews.

Figure 41: Wheel-to-Inlet Funnel Relationship—18 to 36 Belt-Drive Plenum Fans

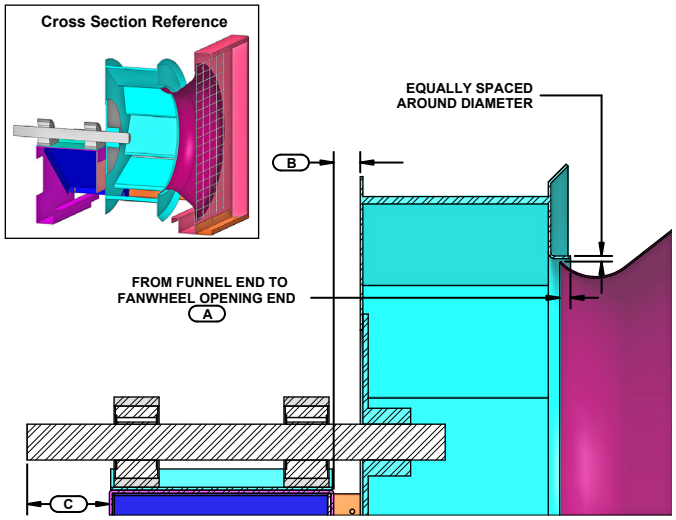


Table 7: Wheel-to-Inlet Funnel Relationship—18 to 36 Belt-Drive Plenum Fan

Wheel-Funnel Parameters			
Size	**A**	**B**	**C**
18	0.38	0.86	3.88
20	0.42	1.11	3.88
22	0.45	1.11	3.88
24	0.51	1.11	3.88
27	0.55	1.36	4.5
30	0.62	1.36	4.5
33	0.55	1.5	5.0
36	0.63	1.5	5.0

Figure 42: Wheel-to-Inlet Funnel Relationship—40 to 60 Belt-Drive Plenum Fans

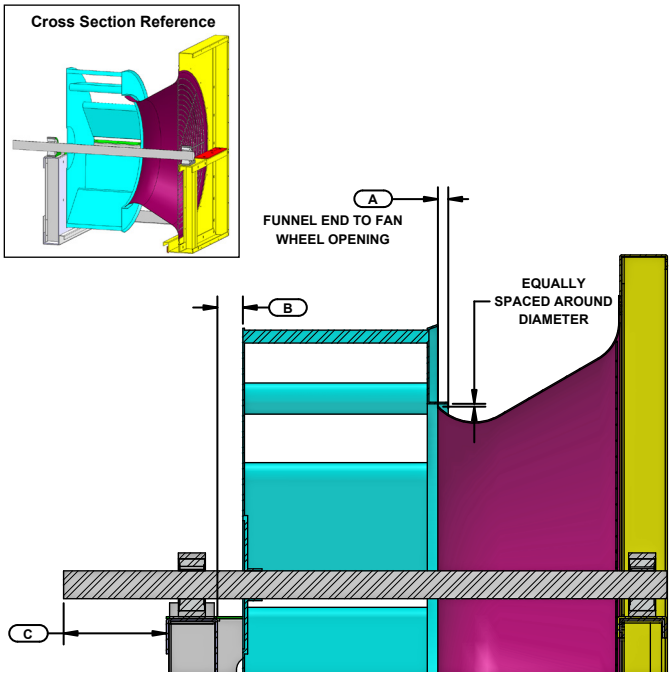


Table 8: Wheel-to-Inlet Funnel Relationship—40 to 60 Belt-Drive Plenum Fan

Wheel-Funnel Parameters			
Size	**A**	**B**	**C**
40	0.82	2.00	4.88
44	0.91	2.25	5.50
49	1.00	2.50	5.50
54	1.10	2.50	5.50
60	1.23	3.00	5.50

Figure 43: Fan Wheel Rotation

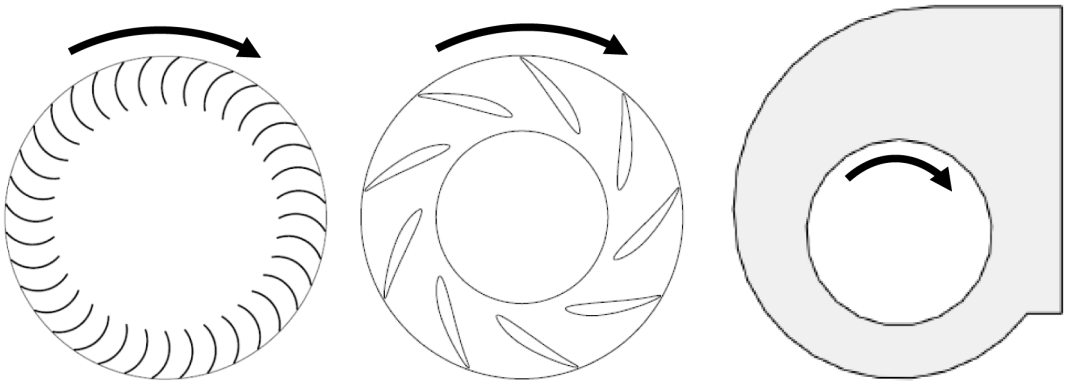


Table 9: Wheel to Inlet Funnel Relationship—Direct-Drive Class II Fans

Fan Size	Overlap (in.)
18	0.38
20	0.41
22	0.45
24	0.50
27	0.55
30	0.61
33	0.67
36	0.75
40	0.82
44	0.91

Table 10: Wheel to Inlet Funnel Relationship—Direct Drive Class III Fans

Fan Size	Overlap (in.)
18	0.31
20	0.38
22	0.44
24	0.50
27	0.55
30	0.62
33	0.75
36	0.81
40	0.88
44	0.94
49	1.0
54	1.06
60	1.12

Table 11: Setscrew Torque Specifications—Class II Plenum Fans Only

Fan Size	Setscrew Size	Torque (ft.-lb)	
		Aluminum	Steel
18	3/8	19.2	N/A
20	3/8	19.2	N/A
22	3/8	19.2	N/A
24	3/8	19.2	N/A
27	3/8	19.2	22
30	1/2	41.7	55
33	1/2	41.7	55
36	1/2	41.7	55
40	1/2	41.7	55
44	1/2	41.7	55
49	1/2	41.7	55
54	1/2	41.7	55
60	3/4	115	150

Table 12: Bearing Collar and Wheel Hub Set Screw Torque (all fans except Class II plenum fans)

Set Screw Diameter (in)	Minimum torque ft/lbs (kg/m)
1/16	5.5 (0.76)
1/4	10.5 (1.45)
3/8	19.0 (2.63)
7/16	29.0 (4.01)
1/2	42.0 (5.81)
5/8	92.0 (12.72)

Daikin Fan Array

⚠ WARNING

Closing the damper on an operational fan could send the fan into surge that could produce fans stall, excessive vibration, unit damage, or personnel injury.

The Daikin Fan Array is available with optional, factory mounted VFDs. See OM manuals OM 1190 and 1191 for details on the Daikin supplied VFD.

Care should be taken when programing and synchronizing the drives in the Daikin Fan Array such that all fans turn at the same speed. Fans running at unequal speeds can produce vibration and could stall a fan. Definition of fan numbering is given in Figure 43.

The Daikin Fan Array is standard with a manual block off plate. The unit will ship with one block off plate that will come installed on fan 1A. This block off plate is to be removed before unit operation and stored outside of the air tunnel. In the event of a lost fan motor, the block off plate is installed on the non-functional fan to prevent air re-circulation. This is designed to be a temporary measure unit this fan and/or motor is replaced. After fan and/or motor replacement the block off plate is to be removed and stored outside of the air tunnel.

The Daikin Fan Array has an optional gravity actuated block off damper. These dampers are equipped with counter weights.

The Daikin Fan Array has an optional actuated block off damper. These dampers are designed to prevent air recirculation in the event of a lost fan. Care should be taken that the damper actuator only be given a close signal if the fan is not operational (motor burnout for example).

The Daikin Fan Array can be equipped with a fan blank off plate. See Figure 44 with a block off plate mounted to fan 3C. If the unit is ordered with the manual block off plate, it will be installed to fan 1A. This plate has to be removed before start up.

Figure 44: Daikin Fan Array Configuration

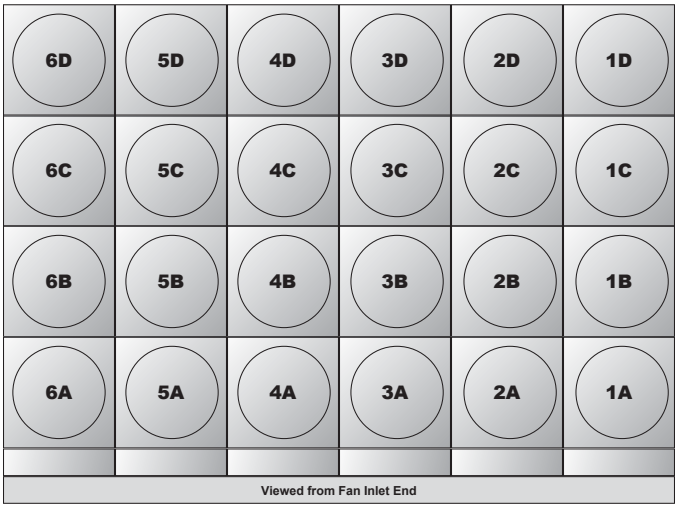
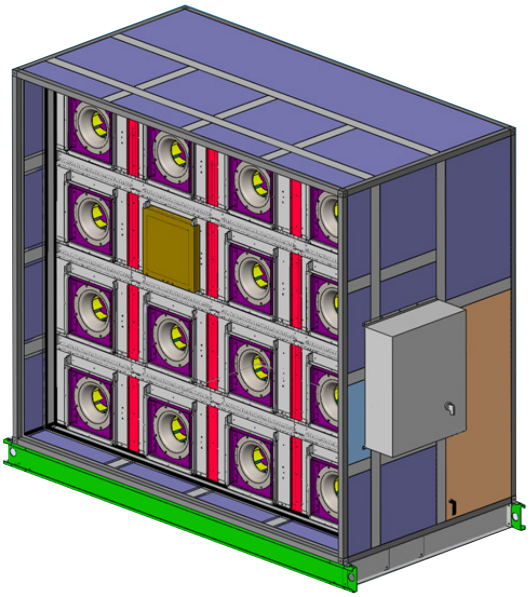


Figure 45: Fan Array with Block Off Plate



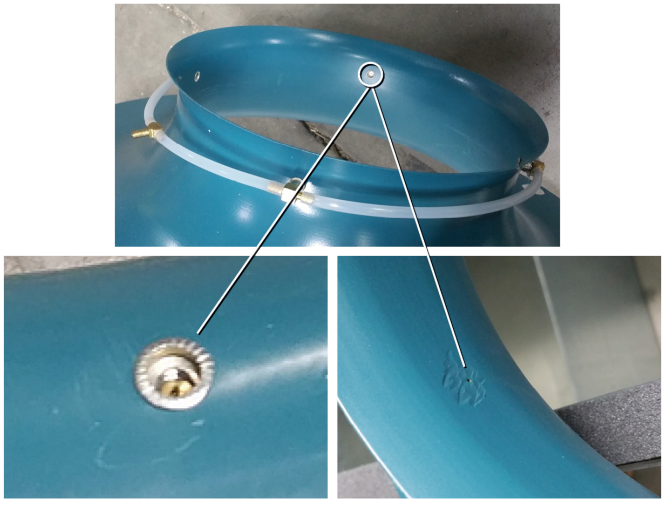
Optional Piezometer Ring Airflow Measurement Device

Piezometer rings are available as an option on direct drive plenum fans to measure airflow though the fan. The device consists of a piezometer ring mounted in the throat of the funnel and a static pressure tap mounted near the inlet of the funnel. The pressure drop is measured from the tap located near the inlet of the funnel to the piezometer ring in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer ring is connected to the low-pressure side.

See the equations and factors required to calculate flow using the piezometer ring.

NOTE: There are two manufacturer options for the piezometer ring. Care should be taken to ensure that the appropriate coefficients are used, otherwise airflow measurement may be incorrect. Reference Figure 45 to determine which piezometer ring you have.

Figure 46: Determining the Manufacturer



Daikin Applied Piezo Ring | TCF Piezo Ring

Non-Standard Density Method

The following equation is used to measure the flow for non-standard density:

$ACFM = C1 \times A \times \sqrt{(\Delta P/\rho)}$

where: A = Inlet funnel throat area (square feet) - from Table 14 and Table 16

ΔP = The differential in static pressure from the piezometer ring and the inlet pressure tap (inches w.g.)

ρ = Air density (pounds mass/cubic foot)

C1 = Value from Table 13 and Table 15

Standard Density Method

The equation can be simplified by assuming standard density and assuming funnel dimensions match the drawing dimensions. Table 14 and Table 16 show the factor (F) for each fan size and type. The equation then becomes the following:

For standard air (ρ = 0.075 lb/ft3):

$ACFM = F \times \sqrt{(\Delta P)}$

where: F = factor from Table 14 and Table 16

ΔP = The differential in static pressure from the piezometer ring and the front pressure tap (inches w.g.)

Table 13: DDPL Factors For Free and Ducted Inlet — Non Standard Density Method, TCF Piezo Ring

Product	C1 Free Inlet	C1 Ducted Inlet
DDPL Size 11-16	753.06	794.06
DDPL Size 18-44	692.03	740.14

Table 14: DDPL Factors For Free and Ducted Inlet — Standard Density Method, TCF Piezo Ring

DDPL Size	Free Inlet F	Ducted Inlet F	Area A
11 and 12	944.92	996.36	0.344
15	1206.40	1272.08	0.439
16	1518.58	1601.26	0.552
18	1821.92	1948.58	0.721
20	2185.80	2337.76	0.865
22	2713.93	2902.60	1.074
24	3285.02	3513.39	1.300
27	3997.61	4275.53	1.582
30	4945.21	5289.01	1.957
33	5968.62	6383.56	2.362
36	7290.21	7797.03	2.885
40	8869.55	9486.16	3.510
44	10827.92	11580.68	4.285

Table 15: DDPL Factors for Free and Ducted Inlet – Non-Standard Density Method, Daikin Piezo Ring

DDPL Size	C1 Free Inlet	C1 Ducted Inlet
12	783.66	792.43
15	767.48	763.62
16	732.77	757.40
18	612.29	619.65
20	653.83	652.65
22	674.42	673.16
24	679.53	681.34
27	656.57	660.15
30	691.07	692.12
33	675.26	677.89
36	675.83	676.67
40	699.51	694.22
44	681.07	681.01

Table 16: DDPL Factors for Free and Ducted Inlet – Standard Density Method, Daikin Piezo Ring

DDPL Size	Free Inlet F	Ducted Inlet F	Area A
12	1004.66	1016.46	0.344
15	1261.99	1260.20	0.439
16	1526.96	1572.35	0.552
18	1675.69	1672.77	0.721
20	2117.33	2110.61	0.865
22	2710.75	2693.35	1.074
24	3312.67	3319.41	1.300
27	3901.60	3929.94	1.582
30	5017.64	5033.71	1.957
33	5942.72	5979.46	2.362
36	7274.52	7316.07	2.885
40	9179.91	9089.14	3.513
44	10891.71	10880.24	4.285

Optional Transducer for Piezometer Rings

A transducer is available for Piezometer rings. Factory mounting locations for the fan transducer is shown in Figure 46 for direct-drive plenum fans. Figure 47 shows the installation for fan array. Wiring for the transducer is field-supplied and installed.

Figure 47: Direct-drive Plenum Fan Installation

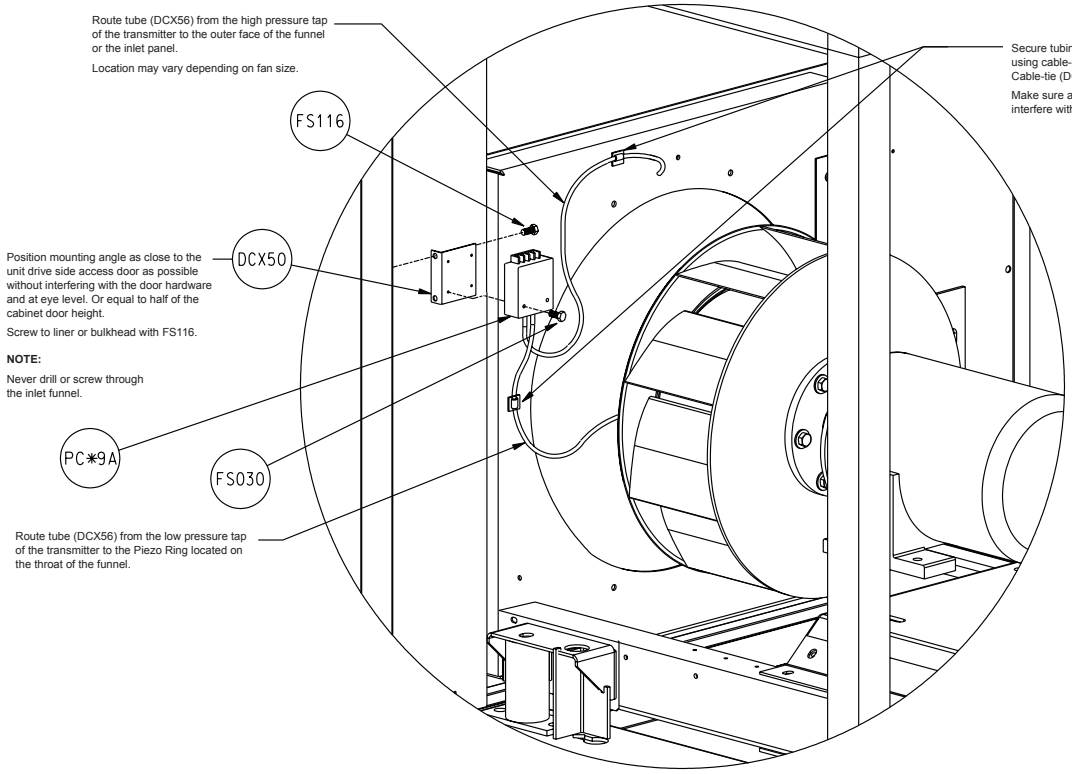
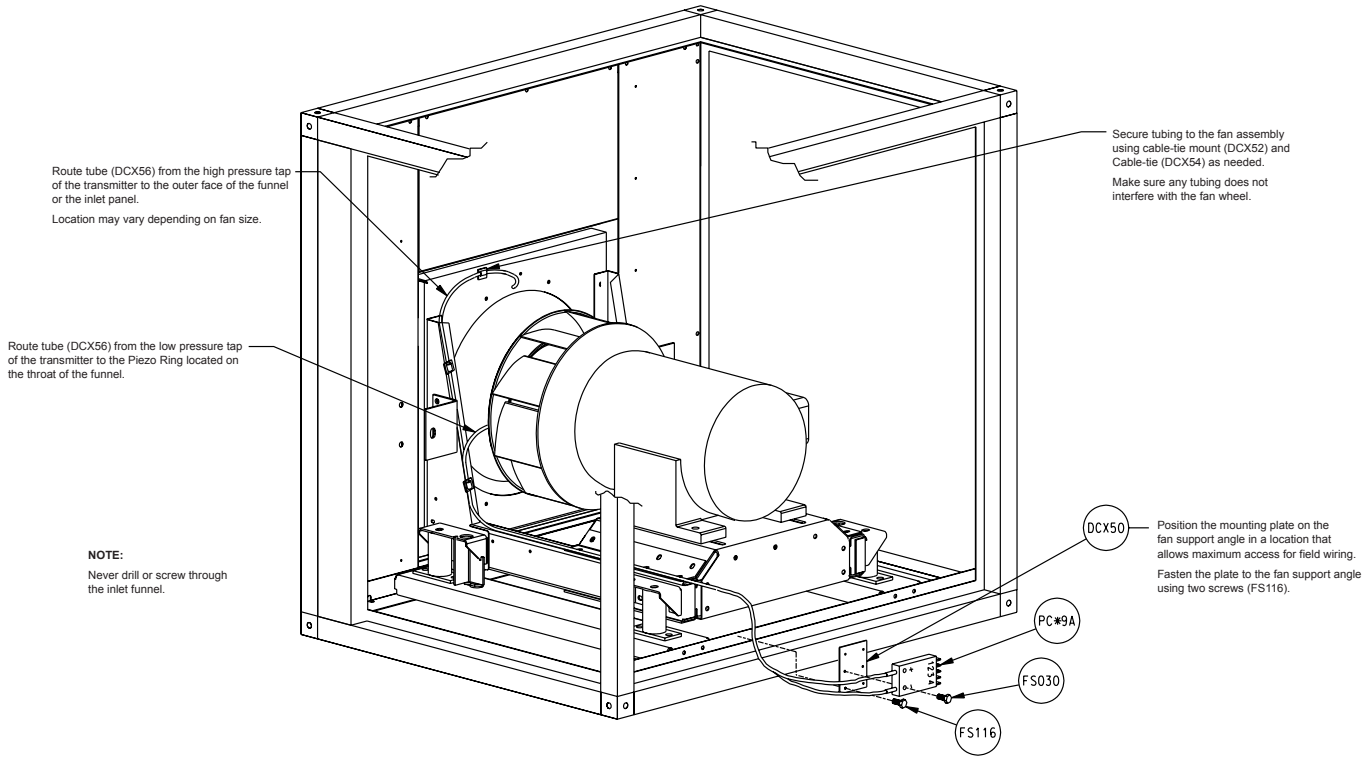


Figure 48: Fan Array Installation



Daikin EC Fan Array

The Daikin EC Fan Array is made of an impeller, EC motor, and inverter. It is installed as an assembly, and in the event of failure, the entire assembly must be replaced. Bearings are permanently sealed and lubricated, so no periodic greasing is necessary.

A minimum 24” access section is recommended downstream of the ECM fan array section to gain access to the fans. If an access section is not selected downstream of the fan array, there will be very limited access to the fans for service/replacement.

The entire array is controlled via a 0-10V signal. Control signal is wired to points 3 and 4 on the Daikin low voltage terminal strip seen in Figure 50. There are two other points for the EC Fan Array: fan array enable and disable are points 1 and 2, and fan array fault are points 5 and 6. For old wiring motors, if any fan in the fan array faults, there is a contact closure between 5 and 6. For new wiring motors, if the fan array faults, the contact connection between 5 and 6 will open. See Figure 57 for determining old wiring vs motor new wiring.

NOTE: To DISABLE the array, connect points 1 and 2 together. The array defaults to ENABLE with nothing connected to points 1 and 2.

The Daikin EC Fan Array has an optional gravity actuated block off damper. These dampers are equipped with counter weights.

The EC Fan Array has an option for a block off plate that can be ordered as a parts kit from the Daikin Parts group. A minimum 24” access section is recommended upstream of the ECM fan array section to install block-off plate.

Remote Mounted Panel

The control panel can be ordered for remote mounting. For remote mounted panels, the control wiring for the individual fans will be provided; however, the control wiring to connect the final fan to the control panel and all of the power wiring must be field-provided. If control panel is too heavy to be mounted on unit then it will be shipped separately and must be remote mounted.

30 foot long high voltage harnesses may be ordered through the Daikin Parts Group using part number 910232406. One high voltage harness is required per fan.

If wiring harnesses are not purchased through Daikin, follow the below instructions to install the wiring.

1. High Voltage Power Wiring:
    a. Remove the plate on the back of each fan.
    b. Remove the provided high voltage plug and wiring shown in Figure 49.
    c. Cut, strip, and connect 14-gauge wiring directly to each motor terminal shown in Figure 49, paying attention to the correct phasing. Reference the wiring diagram in Figure 55.
    d. Cut, strip, and connect the other end of the wiring to the Manual Motor Protector (MMP) in the control panel, paying attention to phasing. Reference the wiring diagram in Figure 55.

NOTE: Figure 49 shows a single fan control box. There will be 1 MMP per fan in the array to connect each fan to.

2. Low Voltage Control Wiring:
    a. 22-gauge Cat5 wiring, a standard 6-circuit female Molex plug (39-01-2061), and six Molex crimp terminals (39-00-0040) are required (Figure 51). The finished harness will have a plug on one end and stripped wire on the other end.
    b. Attach the wiring to the Molex crimp terminal and insert into the Molex plug. See Figure 52 for correct crimp terminal locations; reference Figure 54, 58, 59 for wiring numbers (out of ECM01). Connect to the male plug that is on the last fan in the array.
    c. Insert the stripped wire end into the terminals in the control panel, following the wiring diagram shown in Figure 54, 58, 59. Terminals are shown in Figure 49.

Figure 49: Fan - High Voltage Wiring

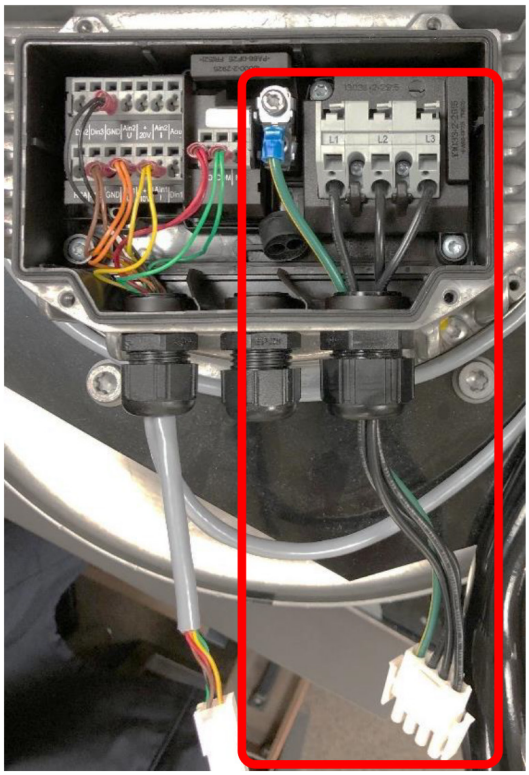


Figure 50: Single Fan Control Panel - High Voltage Wiring (in red); Low Voltage Wiring (in blue)

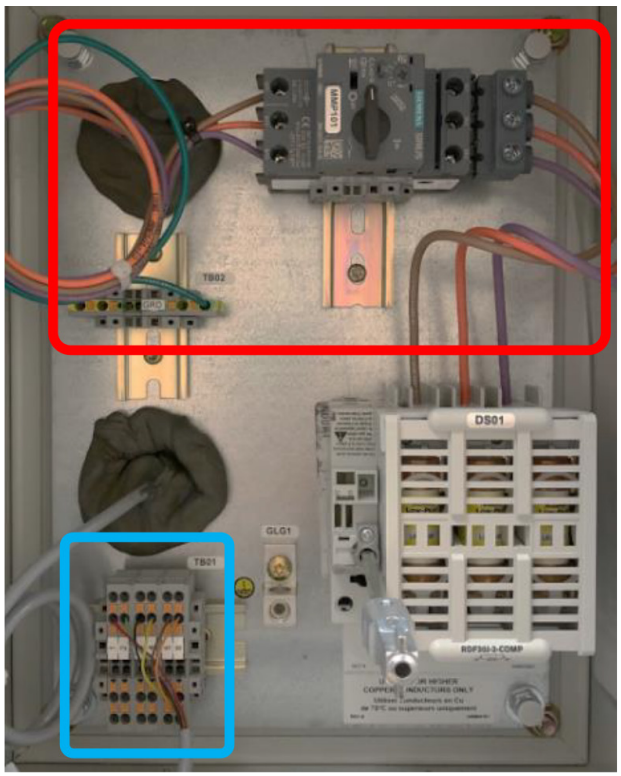


Figure 51: Required Molex Plug and Crimp Terminals

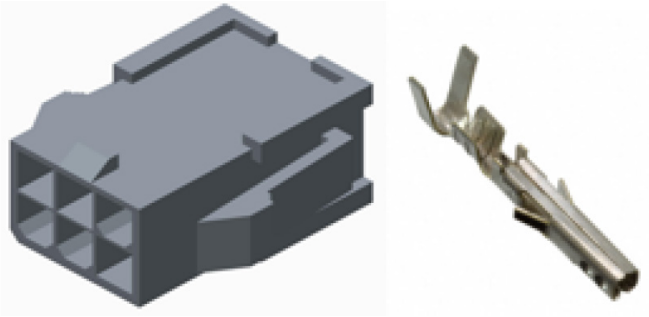


Figure 52: Molex Plug Crimp Terminal Locations

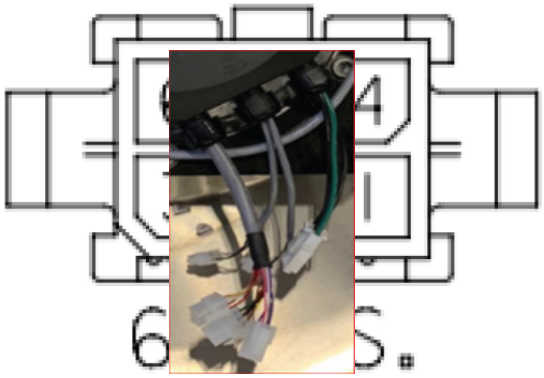


Figure 53: EC Fan Array

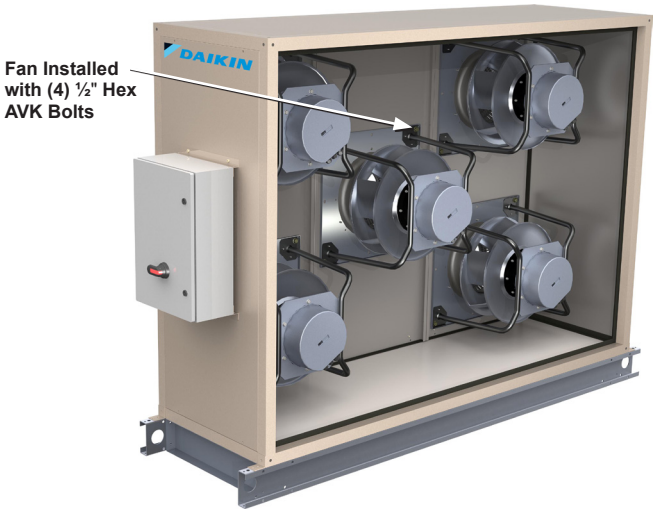


Figure 54: Control Signal (Gen2 Motor New Wiring)

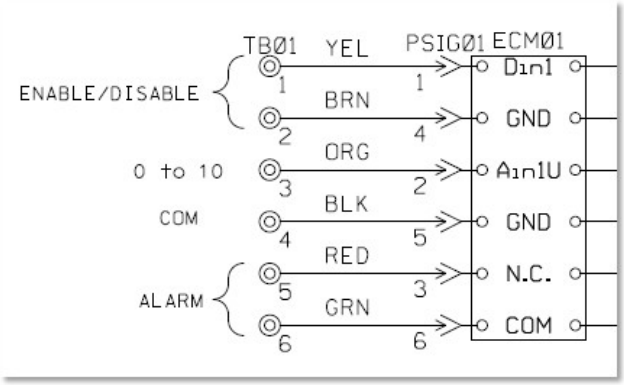


Figure 55: High Voltage Wiring

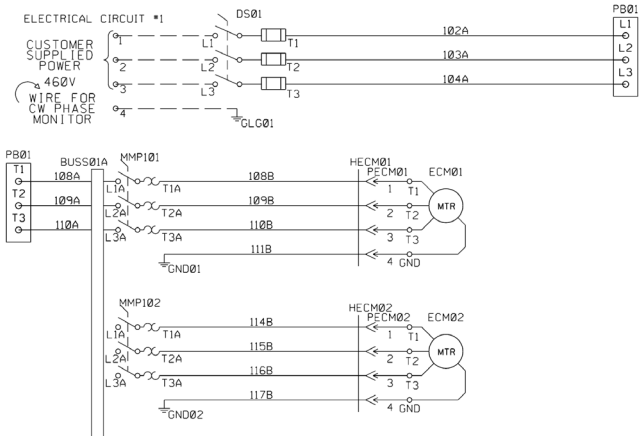


Figure 56: Gen 2 (left) and Gen 3 (right)

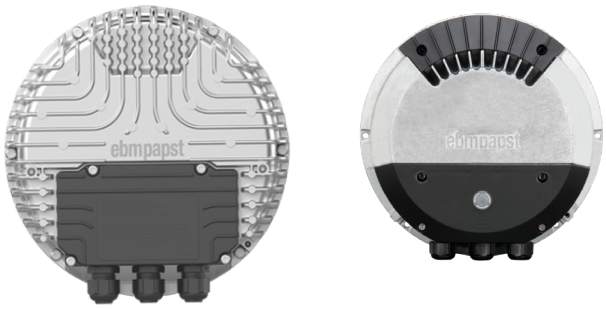


Figure 57: Old Wiring vs. New Motor Wiring

Figure 58: Control Signal (Gen3 Motor New Wiring)

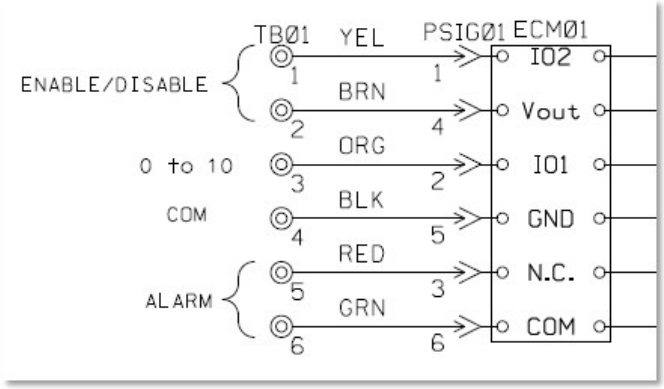


Figure 59: Control Signal (Old Motor Wiring)

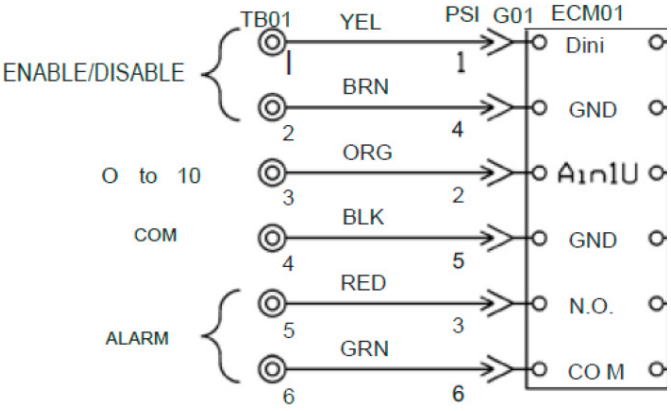
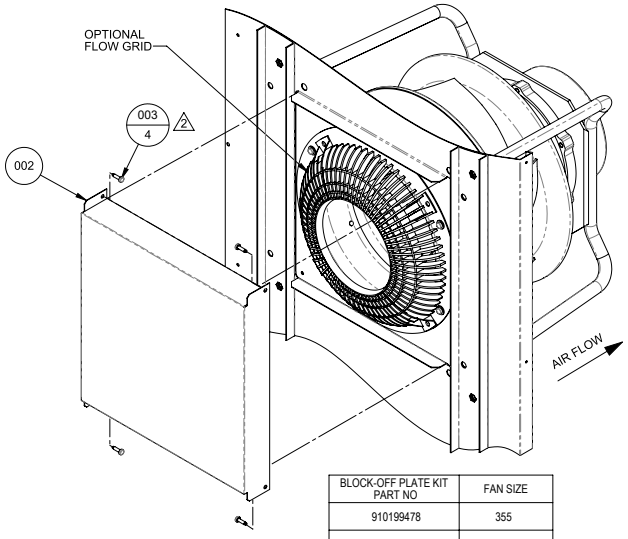


Figure 60: Block-Off Plate Installation



BLOCK-OFF PLATE KIT PART NO	FAN SIZE
910199478	355
910199479	450
910311272	560
910311272	630
910311273	630

NOTES:
1) INSTALL BACK-DRAFT PANEL AS SHOWN OVER NON-FUNCTIONING FAN
2) SECURE USING (4) SELF DRILL/TAPPING SCREWS

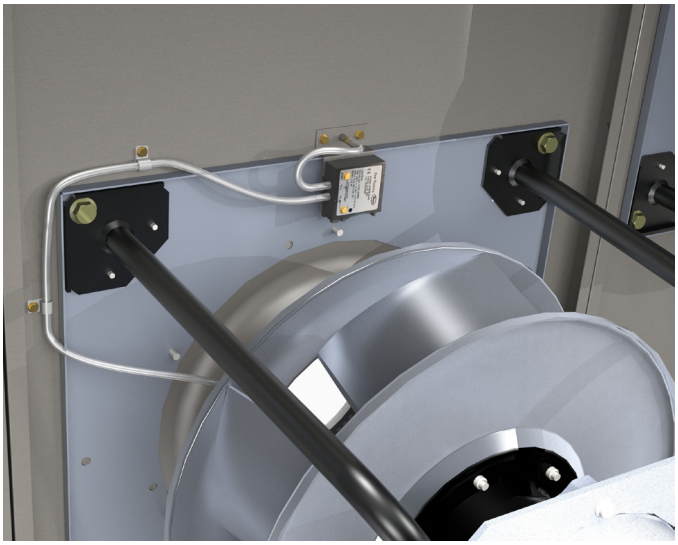
Optional Piezometer Point Airflow Measurement Device

A Piezometer point is an option with EC fans to measure airflow through the fan. The device consists of a piezometer point mounted in the throat of the funnel and a static pressure tap mounted near the inlet of the funnel. The pressure drop is measured from the tap located near the inlet of the funnel to the piezometer point in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer point is connected to the low-pressure side.

A transducer is always factory supplied when the Piezometer Option is selected with an EC Fan. Figure 57 shows the installation for EC fans.

See the equations and factors required to calculate flow using the piezometer point:

Figure 61: Piezometer Transducer



Non-Standard Density Method

The following equation is used to measure the flow for non-standard density:

$ACFM = C1 \times A \times \sqrt{(\Delta P/\rho)}$

where: A = Inlet funnel throat area (square feet) - from Table 18

ΔP = The differential in static pressure from the piezometer ring and the inlet pressure tap (inches w.g.)

ρ = Air density (pounds mass/cubic foot)

C1 = Value from Table 17

Standard Density Method

The equation can be simplified by assuming standard density and assuming funnel dimensions match the drawing dimensions. Table 17 shows the factor (F) for each fan size and type. The equation then becomes the following:

For standard air (ρ = 0.075 lb/ft3):

$ACFM = F \times \sqrt{(\Delta P)}$

where: F = factor from Table 18

ΔP = The differential in static pressure from the piezometer ring and the front pressure tap (inches w.g.)

Table 17: ECM Factors for Free and Ducted Inlet — Non-Standard Density Method

ECM Size	C1 Free Inlet	C1 Ducted Inlet
355	774.47	774.47
450	783.31	783.31

Table 18: ECM Factors for Free and Ducted Inlet — Standard Density Method

ECM Size	Free Inlet F	Ducted Inlet F	Area A
355	1372.74	1372.74	0.485
450	2226.07	2226.07	0.778

Operating Limits

Do not exceed the operating limits in the following tables. A fan wheel operated beyond the rpm and temperature limits shown can suffer permanent distortion or fracture. The resulting unbalance can cause severe unit vibration.

Table 19: Physical Data—Forward Curved and Airfoil Fans, Unit Sizes 107 to 169

Forward curved fans – in. (mm)										
Diameter Class I	20 (508)	22.38 (568)	25 (635)	27.62 (702)	30.25 (768)	33 (838)	36 (914)	—	—	—
Maximum rpm	1010	930	790	690	650	600	560	—	—	—
Shaft and bearing diameter	1.438 (37)	1.438 (37)	1.688 (43)	1.688 (43)	1.688 (43)	2.188 (56)	2.188 (56)	—	—	—
Outlet area – sq ft (sq m)	4.2 (0.39)	5.1 (0.474)	6.71 (0.623)	8.07 (0.75)	9.3 (0.864)	12.05 (1.119)	12.8 (1.189)	—	—	—
Diameter Class II	20 (508)	22.38 (568)	25 (635)	27.62 (702)	30.25 (768)	33 (838)	36 (914)	—	—	—
Maximum rpm	1281	1178	1011	910	835	763	715	—	—	—
Shaft and bearing diameter	1.688 (43)	2.188 (56)	2.438 (62)	2.438 (62)	2.688 (68)	2.688 (68)	2.688 (68)	—	—	—
Outlet area – sq ft (sq m)	4.2 (0.39)	5.1 (0.474)	6.71 (0.623)	8.07 (0.750)	9.3 (0.864)	12.05 (1.119)	12.8 (1.189)	—	—	—
Airfoil fans – in. (mm)										
Diameter Class I	20 (508)	22.25 (565)	24.5 (622)	27 (686)	30 (762)	33 (838)	36.5 (927)	40.25 (1022)	44.5 (1130)	49.0 (1244)
Maximum rpm	2077	1875	1691	1479	1328	1209	1073	972	884	805
Shaft and bearing diameter	1.688 (43)	1.938 (49)	2.188 (56)	2.188 (56)	2.438 (62)	2.438 (62)	2.438 (62)	2.938 (75)	3.188 (81)	3.438 (87)
Outlet area – sq ft (sq m)	4.14 (0.385)	5.12 (0.476)	6.21 (0.577)	7.54 (0.7)	9.31 (0.865)	11.27 (1.047)	13.79 (1.281)	16.77 (1.558)	20.5 (1.905)	24.9 (2.313)
Diameter Class II	20 (508)	22.25 (565)	24.5 (622)	27 (686)	30 (762)	33 (838)	36.5 (927)	40.25 (1022)	44.5 (1130)	49.0 (1244)
Maximum rpm	2703	2413	2199	1928	1730	1579	1401	1264	1146	1040
Shaft and bearing diameter	2.188 (56)	2.188 (56)	2.438 (62)	2.438 (62)	2.688 (68)	2.938 (75)	2.938 (75)	3.438 (87)	3.938 (100)	3.938 (100)
Outlet area – sq ft (sq m)	4.14 (0.385)	5.12 (0.476)	6.21 (0.577)	7.54 (0.7)	9.31 (0.865)	11.27 (1.047)	13.79 (1.281)	16.77 (1.558)	20.5 (1.905)	24.9 (2.313)
Diameter Class III	—	—	—	—	—	—	36.5 (927)	40.25 (1022)	44.5 (1130)	49.0 (1244)
Maximum rpm	—	—	—	—	—	—	1758	1586	1421	1308
Shaft and bearing diameter	—	—	—	—	—	—	3.438 (87)	3.438 (87)	3.438 (87)	3.938 (100)
Outlet area – sq ft (sq m)	—	—	—	—	—	—	13.8 (1.281)	16.8 (1.558)	20.5 (1.905)	24.9 (2.313)

Table 20: Operating Limits—Belt-Drive Plenum Fans

Size	18	20	22	24	27	30	33	36	40	44	49	54	60
Max RPM Class II	2930	2674	2403	2183	1860	1783	1620	1465	1329	1202	1091	986	891
Max RPM Class III	3735	3409	3065	2780	2423	2182	1984	1759	1598	1447	1314	1178	1071

Table 21: Operating Limits—Direct-Drive Plenum Fans

Size	18	20	22	24	27	30	33	36	40	44	49	54	60
Max RPM Class II	3650	2674	2403	2183	1981	1783	1620	1465	1329	1202	—	—	—
Max RPM Class III	3735	3409	3065	2780	2423	2182	1984	1759	1598	1447	1314	1178	1071

Fan Vibration Levels

Each unit as shipped is trim balanced to operate smoothly. To provide satisfactory operation after shipping and installation, use the accepted industry guidelines for field balancing fans. See Table 22.

Table 22: Vibration Levels

Fan speed (rpm)	Vibration
800 or less	5 mils maximum displacement
801 or greater	0.20 in/sec. maximum velocity

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

Vibration Causes

1. Wheel imbalance
    a. Dirt or debris on wheel blades
    b. Loose set screws in wheel hub or bearing-to-shaft
    c. Wheel distorted from overspeed
2. Bent shaft
3. Drive faulty
    a. Variable pitch sheaves—Axial and radial runout of flanges; uneven groove spacing; out of balance. Also similar faults in driven sheave.
    b. Bad V-belts; lumpy, or mismatched; belt tension too tight or too loose.
4. Bad bearings, loose bearing hold-down bolts
5. Motor imbalance
6. Fan section not supported evenly on foundation

Indirect Fired Tube Heater

⚠ DANGER

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury, death, or property damage
- Be sure to read and understand the installation, operation, and service instructions in this manual
- Improper installation, adjustment alteration, service, or maintenance can cause serious injury, death, or property damage
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or other appliances

WHAT TO DO IF YOU SMELL GAS:

— Do not try to light any appliance

— Do not touch any electrical switch; do not use any phone in the building

— Leave the building immediately

— Immediately call your gas supplier, follow the gas supplier's instructions

— If you cannot reach your gas supplier, call the Fire Department

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

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

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

Warranty Exclusion

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

Gas Piping

⚠ WARNING

All field gas piping must be pressure/leak tested prior to operation. NEVER use an open flame to check for leaks. Use a soap solution or other leak detecting solution.

Gas pressure to appliance controls must never exceed 13.5" w.c. (½ psi)

Installation of piping must conform with local building codes and ordinances, or in the absence of local codes with ANSI Z223.1 the National Fuel Gas Code. In Canada, installation must be in accordance with CAN/CGA –B149.1 for Natural gas and B149.2 for propane units. A gas regulator servicing multiple units must have the proper pipe size and internal orifice for the total input of all heating units serviced by that regulator. A field supplied sediment trap and shut off valve is to be provided at the Daikin unit.

The gas furnace gas piping was leak tested prior to shipping. However, during shipping and installation connections may have loosened. Check for leaks using a soap solution and correct any leaks before placing furnace in operation.

Minimum Gas Pressure

Individual duct furnaces require a minimum gas pressure noted in Table 23

Table 23: Minimum Gas Pressure

Individual Furnace Size	Natural Gas	Propane Gas
50,000 to 400,000 BTUH	5.0" w.c.	11.0" w.c.
<400,000 BTUH	6.0" w.c.	12.0" w.c.

The Daikin furnace modules have a maximum inlet pressure of 13.5" w.c. Installer is responsible for supplying a pressure regulator if required.

Airflow Requirements

When variable air moving (2 stage or variable frequency drive) is provided by others the allowable minimum cfm to the duct furnace is 2/3 (67%) of the listed minimum CFM for the furnace model when applied as follows:

1. The unit has two stage or modulating gas controls.
2. The air handling unit is equipped with a discharge air controller.
3. The system does not include a room thermostat.

Systems utilizing variable air volume to maintain the desired building pressure require separate control of the heating unit input to insure that the maximum temperature rise of the duct furnace is not exceeded. Consult the factory for assistance with system control design in these applications.

Ventilation and Flue Pipe Requirements

⚠ WARNING

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

⚠ WARNING

Units equipped with gas heating must not be operated in an atmosphere contaminated with chemicals which will corrode the unit such as hydrocarbons, clorine, cleaning solvents, refrigerants, swimming pool exhaust, etc. Exposure to these components 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 constitues product abuse and will void all warranty coverage by the manufacturer. Questions regarding specific cantaminates should be referred to your local gas utility.

Standard Efficiency Models

Indoor installations require combustion air to be drawn from the surrounding space. The furnace vestibule will have openings in the panel door to all the furnace(s) to have access to the combustion air. Installer is responsible for unit location inside the building that ensures an adequate amount of combustion air. Combustion process requires approximately 15 cu.ft. of air for every cu.ft. of gas burned. An opening to ambient might be necessary to ensure adequate combustion air. Provide an opening of one square inch of free area per 1000 BTU of input rating.

For Indoor Category I or III installations, Daikin provides a point of connection for installation of vent pipe to the outdoors. This connection should be suitable for connection to round vent pipe.

Round vent pipe must be sized in accordance with Table 24 based on the input rating of the duct furnace.

Figure 62: Vent Pipe Connection

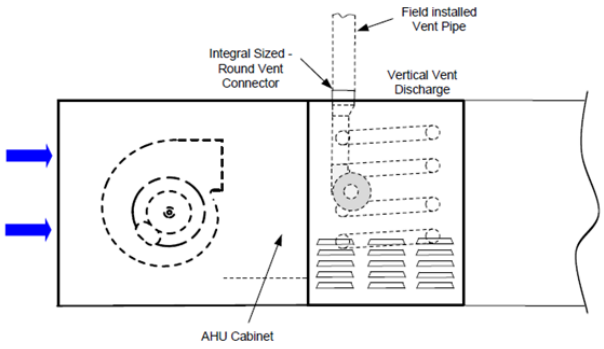


Table 24: Vent Pipe Sizing

Input Rating	Vent Pipe Diameter
75-149	5 in (126 mm)
150-400	6 in (152 mm)
401-600	7 in (178 mm)

Vent systems must be sized and installed in accordance with ANSI Z223.1 (NFPA 54), Chapters 7 and 10 in the United States or CAN/CGA-B149 in Canada.

The Daikin unit can be ordered with the optional separated combustion feature. Vent and combustion air pipes must terminate in the same pressure zone. The maximum vent length is the equivalent length of pipe including any elbows and fittings. Combustion air pipe should be approximately the same length as the vent pipe and should not exceed 30 ft. in length. The vent and combustion air piping must be properly supported. Horizontal vent sections must be installed with an upward pitch of not less than ¼ in/ft. (21 mm/m) and securely supported every 3 ft.

Proper venting of the heating units is the responsibility of the installer.

High Efficiency Models

All unit installations must be in accordance with the National Fuel Gas Code ANSI Z223.1 (NFPA 54) in the United States and Can/CGA-B149 Installation Code in Canada, and all other applicable local codes and ordinances. These requirements include but are not limited to:

- Furnace Location and clearances
- Circulating airflow and ductwork
- Combustion air supply to the heating equipment
- Venting of the products of combustion (flue gases)
- Gas supply, piping and connections

Indoor installation requires venting to get the products of combustion out of the building. When locating the vents, use Table 25 below for minimum distances.

Table 25: Vent Outlet Clearances

Structure	Min clearance to vent outlet
Combustion air inlet of another appliance	6 ft. (1.8m)
Forced air inlet within 10ft	3 ft (0.9m) above
Door or Window	4 ft (1.2m) below 4 ft (1.2m) horizontally 1 ft (0.3m) above
Gas or electric meter	US 4 ft (1.2m) horizontally Canada 6 ft (1.8m)
Gas regulator	3 ft (0.9m) horizontally
Adjacent public walkways	7 ft (2.1m) above

The Daikin unit can be ordered with the optional separated combustion feature. Vent and combustion air pipes must terminate in the same pressure zone. The maximum vent length is the equivalent length of pipe including any elbows and fittings. Combustion air pipe should be approximately the same length as the vent pipe and should not exceed 30 ft. in length. The vent and combustion air piping must be properly supported. Horizontal vent sections must be installed with an upward pitch of not less than ¼ in/ft. (21 mm/m) and securely supported every 3 ft. Vent and combustion pipe sizes are given in Table 26.

Table 26: Vent and Combustion Pipe Sizes

Model Size	Input (Btuh)	Flue Exhaust - Diameter (in.)	Air Intake - Diameter (in.)	Maximum Ventilation Equivalent Length (ft.)
EF250	275,000	5	5	30
EF400	450,000	6	6	30
EF550	600,000	8	8	30
EF750	835,000	10	10	30
EF900	1,000,000	10	10	30
EF1000	1,120,000	10	10	30
EF1250	1,400,000	12	12	30
EF1500	1,650,000	12	12	30

Condensate Drain Lines

⚠ WARNING

Failure to connect condensate drains can result in accumulation of condensate during heater operation and result in hazardous operation and can damage the heat exchanger.

⚠ WARNING

Failure to connect and properly install candensate drains can result in water flow into the building causing structural damage, injury, and death.

⚠ WARNING

For outdoor installations, the condensate drain line must be routed through a heated space. DO NOT DRAIN ON THE ROOF. Failure to properly connect condensate drains can result in significant amounts of ice buildup, causing structural damage, injury, and death.

Condensate is produced in furnace sections during heating operation. The furnace has two collector box drain fittings and one vent connector drain connection. Both indoor and outdoor furnaces must have condensate piped to a sanitary sewer for disposal, using ¾" PVC pipe and fittings. Condensate drain piping is provided by others except as noted.

Installation requires individual condensate drain systems for each duct furnace section.

The condensate drain system must include a trap for each furnace for proper system performance. Condensate trap kits are provided with each duct furnace. All joints must be watertight to prevent leakage. Heat exchanger assembly includes a threaded elbow oriented parallel to cabinet base. A male threaded PVC adapter is provided with the furnace to connect to the threaded elbows from the flue collector boxes. PVC materials used for condensate drain pipe and fittings must conform to ASTM D1785 / CSA B137.3.

Outdoor Units

Where condensate drains are located outside a heated space or in a space where temperatures may fall below freezing, the drain line must be protected. Use a 2.5 to 5 watt per foot (0.003 to 0.005 kW per meter) at 115 VAC, 40° F (4.4° C) self-regulating, shielded and waterproof heat tape. Wrap the drain trap and drain line with heat tape and secure with ties. Follow the heat tape manufacturer's installation recommendations.

Disposal of condensate is subject to local codes and ordinances. In some locals the condensate drain system may be connected to a sanitary drain within the building. Some municipalities require that the acidic condensate produced be neutralized before being discharged into the sanitary sewer. A condensate neutralizer kit should be used. Refer to installation instructions provided with the kit. Locate neutralizer where it is readily accessible for inspection and maintenance. When a drain is not readily available, a condensate pump might be needed. Installer is responsible for providing the neutralization kit and condensate pump.

Wiring/Controls

Single Furnace

2-Stage Controls

Sequence

When system is powered up 24 VAC will be applied to the ignition control (IC) terminals 24VAC / GND. The control will reset, perform a self-check routine, initiate full time flame sensing, flash the diagnostic LED for up to four seconds and enter the thermostat scan standby state. Call for Heat

1. Thermostat (controller) closes on call for heat powering terminal T2.
2. 24 VAC is supplied to IC terminal T'stat, provided limit switch is in closed position.
3. The control will check that pressure switch contacts are open (IC terminal APS (PSW) is not powered).
4. The Induced Draft Fan (ID Fan) is then energized at high speed through IC terminal IND.
5. When the Air Switch (APS-1) closes, a 15 second pre-purge period begins.
6. At end of pre-purge period, the spark commences and either 1st stage or both 1st and 2nd stage gas valves (depending on status of call for heat) are energized for the trial for ignition period.
7. If the thermostat (controller) is calling for 1st stage heat only, the 1st stage valve will open (1.0 to 1.4" w.c. manifold pressure on Natural Gas or 2.5 to 3.0" w.c. on Propane Gas). If the thermostat (controller is calling for high heat, both 1st and 2nd stage valves will open (3.3 to 3.5" w.c. manifold pressure on Natural Gas or 9.5 to 10.0" w.c. on Propane Gas).
8. Burners ignite and cross light.
9. When flame is detected by flame sensor the spark is shut-off immediately and gas valve(s) and combustion blower remain energized.
10. During heating operation, the thermostat, pressure switch and main burner flame are constantly monitored to assure proper system operation.
11. If the 2nd stage thermostat (controller) is satisfied, the 2nd stage contact opens, de-energizing the 2nd stage valve. Heater will continue to operate at 1st stage (low fire).
12. When the thermostat (controller) is satisfied and the demand for heat ends, the 1st stage valve is de-energized immediately, the control senses loss of flame and a 30 second post-purge occurs before de-energizing the ID Fan.

Recovery from Lockout

1. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.
2. The ignition control may also be manually reset, by turning the thermostat (controller) down and back up to previous temperature setting or removing power (24V) to IC terminal 24VAC.

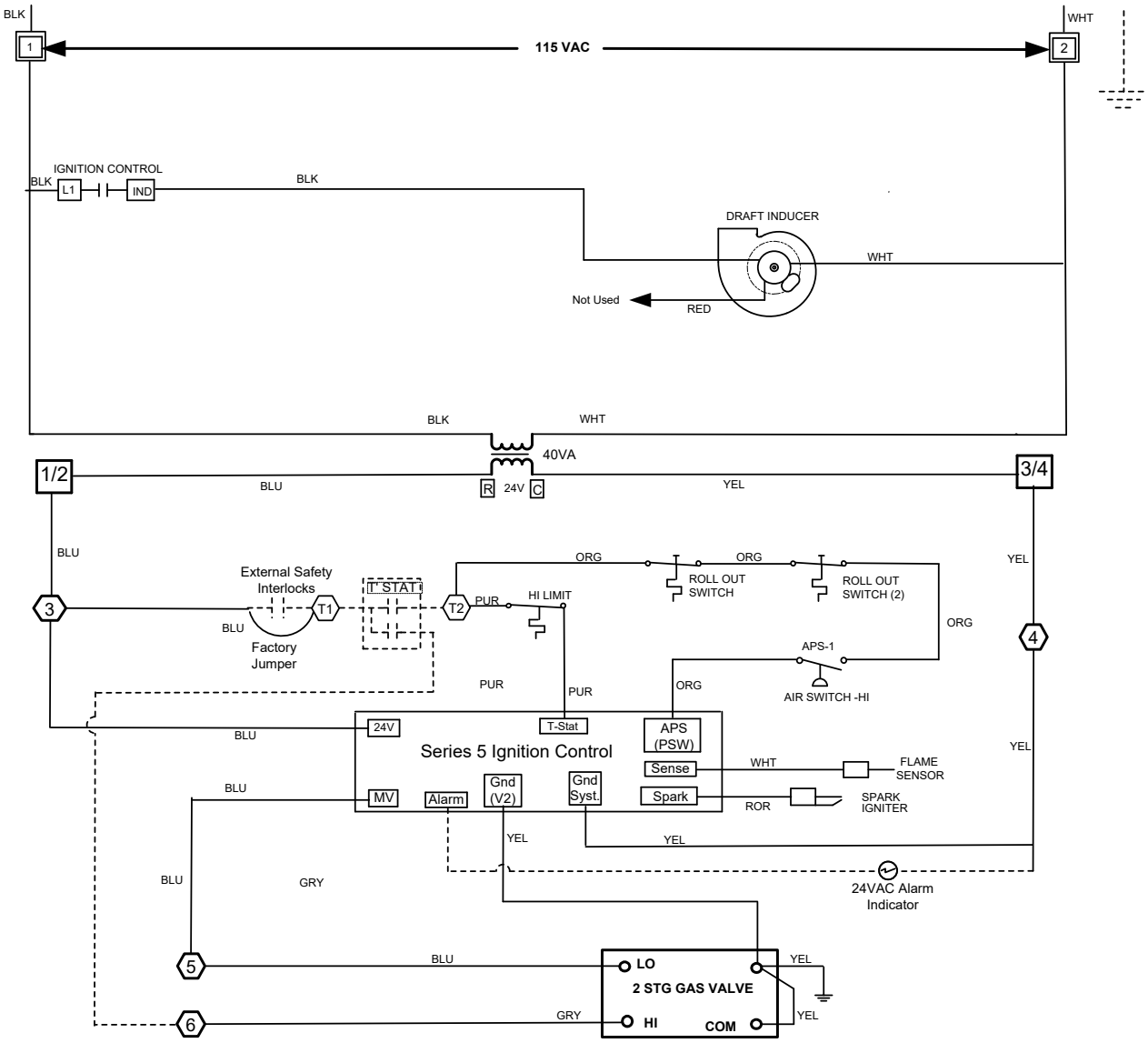
LED Indications, Normal Operation

- Green, ½ sec ON, ½ sec OFF: Pre-purge, Inter-purge, Post-purge
- Green, blinking rapidly: Trial for ignition
- Green, on solid: Flame detected, pilot/main burners ON

ERROR CODES - Red Flashes Error Definition Error Type

- 1 flash, then pause No flame in trial time Lockout
- 2 flashes, then pause Flame sense stuck on Lockout
- 3 flashes, then pause Pilot/Main relay failure Lockout
- 4 flashes, then pause Repetitive flame loss error Lockout
- 5 flashes, then pause Rollout error Lockout
- 6 flashes, then pause APS Airflow error Lockout
- 7 flashes, then pause Internal control error Lockout ON Solid Red Line Voltage/Freq Error Standby

Figure 63: HM/HD Series – SN Control (Staged Control)



CUSTOMER PROVIDED COMPONENT

CUSTOMER / FIELD WIRING

1 INTERNAL TERMINAL CONNECTION

3 EXTERNAL TERMINAL CONNECTION

(2) 2nd ROLLOUT SWITCH ON HORIZONTAL BURNER TRAY ONLY

TIMER RELAY – TR1-090LH15

1/2 TR1 TIMER RELAY TERMINAL CONNECTION

Capable Controls – Series 5 Ignition Control

5:1 Modulating Furnace

Sequence

When system is powered, 24 VAC will be applied to the ignition control (IC) across terminals 24VAC/GND, to the SC40 (Blue LED lit) and to the EXA Valve. The ignition control will reset, perform a self-check routine, initiate full time flame sensing, flash the diagnostic LED for up to four seconds and enter the thermostat scan standby state.

Call for Heat

1. Thermostat (or heat enable) closes (T1/T2) on call for heat.
2. 24 VAC is supplied to IC terminal TSTAT, provided the high limit switch is in closed position.
3. The control will check that pressure switch contacts are open (IC terminal APS (PSW) is not powered).
4. The Induced Draft Fan (ID Fan) is then energized at high speed. SC40 Green (AFS) LED is lit.
5. Air Switch (APS-1 Low) closes initiating a 15 second pre-purge period.
6. At end of pre-purge period, the spark commences and the combination gas valve is energized for a trial for ignition period.
7. The SC40 will output 5 VDC to the EXA modulating control valve regardless of the analog input signal to SC40 terminals T10 & T11.
8. Burners ignite and cross light, operating at the adjusted mid-fire input rate
9. When flame is detected by flame sensor, the spark is shut-off immediately and gas valve and ID Fan remain energized.
10. SC40 is powered (terminal T4) simultaneously (Yellow (SU) LED lit) and begins timing a 30 second warm-up period while maintaining the ID Fan at high speed (Green AFS LED remains lit).
11. When the initial timer in SC40 times out, control will respond to analog input at terminals T10 and T11. Green (Mod) LED is lit.
12. If the controller is providing an analog signal between 0.5 and 5.0 VDC to the SC40 control, relay R1 is energized. RED (R1) LED is lit.
13. The ID Fan will run at low speed and the EXA modulating valve will be powered proportional to the analog input voltage signal and will open or close modulating the gas input between low and mid-fire.
14. If the signal is 5.1 VDC or higher, the SC40 relay R1 is de-energized and ID Fan goes to high speed.
15. Provided the High Air Switch (APS-2) contacts are closed, with analog inputs between 5.1 and 10.0 VDC the EXA Valve will modulate the gas input between mid-fire and high fire.
16. During heating operation, the thermostat, pressure switch and main burner flame are constantly monitored by the IC to assure proper system operation.
17. Operation continues in the High fire mode until the controller input signal to the SC40 control drops to 4.8 VDC. At this point the SC40 R1 relay circuit is energized and switches the ID Fan to low speed operation. Low-fire modulation will continue for analog input voltages from 4.7 VDC.
18. When the thermostat (temperature controller) is satisfied and the demand for heat ends, the heat enable contact opens, power is removed from the T'stat terminal on IC and the combination gas valve is de-energized immediately and a 30 second post-purge occurs (at high speed) before de-energizing the ID Fan.

Ignition and Operational failures during a call for heat result in "lockout" of the ignition control

1. If flame is lost during an operational cycle, the control will respond within 0.8 seconds. The spark will be energized for a trial for ignition period to attempt to relight burners and prove flame sensor. If flame is re-established, normal operation resumes
2. If the burners fail to light or carryover during a trial for ignition, the control will attempt two additional ignition trials. If no flame is present at the flame sensor within 10 seconds, the spark and gas valve will be de-energized. A 15 second inter-purge period begins and the combustion blower continues to run. After the inter-purge period another ignition trial will take place.
3. If burner fails to light or prove the flame sensor following the two additional trials the control will go into lockout. The valve relay in the IC will be de-energized shutting of the gas valve immediately and the induced draft fan following a 30 second post-purge.

Recovery from Lockout

1. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.
2. The ignition control may also be manually reset, removing power (24V) to IC terminal 24VAC for 5 seconds then restoring power.

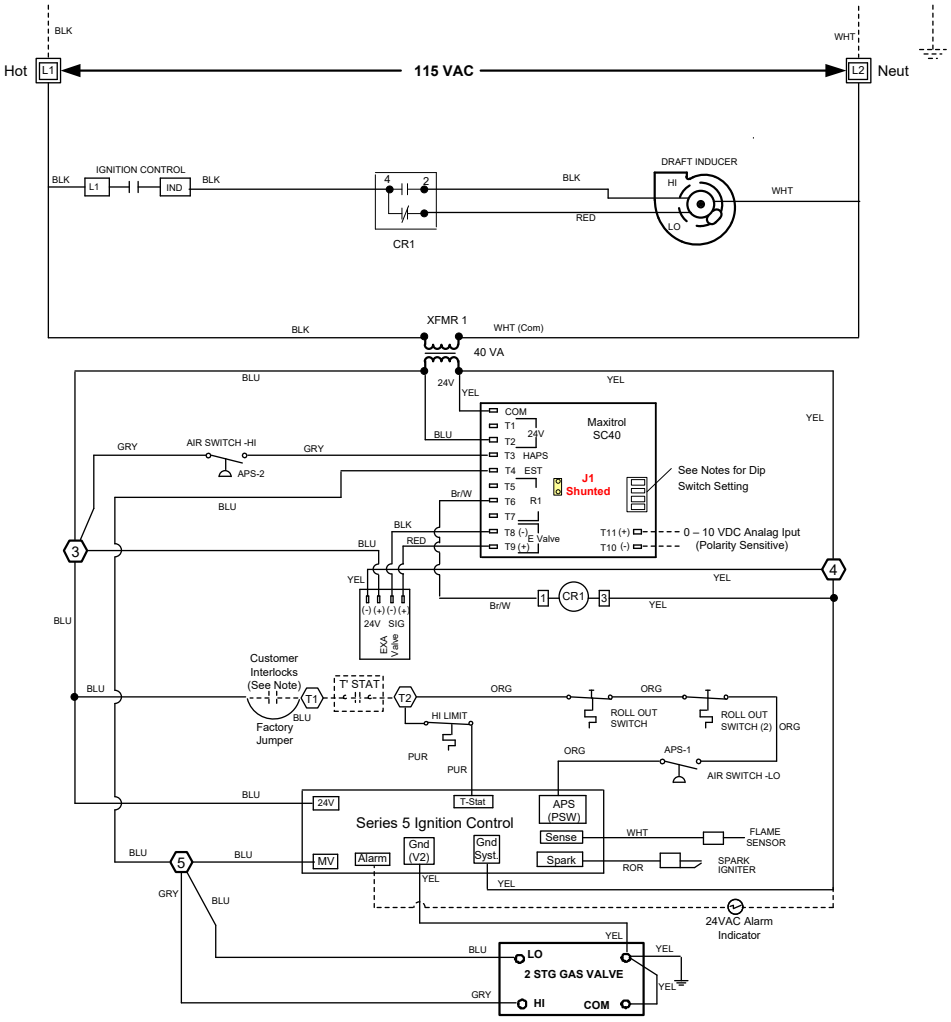
LED Indications, Normal Operation

- Green, ½ sec ON, ½ sec OFF: Pre-purge, Inter-purge, Post-purge
- Green, blinking rapidly: Trial for ignition
- Green, on solid: Flame detected, pilot/main burners on

ERROR CODES - Red Flashes Error Definition Error Type

- 1 flash, then pause - No flame in trial time Lockout
- 2 flashes, then pause - Flame sense stuck on Lockout
- 3 flashes, then pause - Pilot/Main relay failure Lockout
- 4 flashes, then pause - Repetitive flame loss error Lockout
- 5 flashes, then pause - Rollout error Lockout
- 6 flashes, then pause - APS Airflow error Lockout
- 7 flashes, then pause - Internal control error Lockout
- On Solid Red - Line Voltage/Frequency Error Standby

Figure 64: HM/HD Series - MA Control (5:1)



LEGEND:

- CUSTOMER PROVIDED COMPONENT
- CUSTOMER / FIELD WIRING
- INTERNAL TERMINAL CONNECTION
- EXTERNAL TERMINAL CONNECTION
- (2) 2nd ROLLOUT SWITCH ON HORIZONTAL BURNER TRAY ONLY

Notes:

1.) If Customer safety interlocks provided, wire in series from Terminal 3 to T1& remove factory jumper

2.) Dip Switch setting for 0-10VDC Analog

Capable Controls – Series 5 Ignition Control

10:1 Modulating Furnace

Sequence

Standby Mode

1. Heat enable (Thermostat) open (No call for heat)
2. Line Voltage applied to Terminals L1 & L2
3. 24 VAC is applied to Terminals T2 / COM on the SC30-SM2A (Blue LED lit), to both Ignition Controls (IC) across terminals 24VAC/GND.
4. The ignition control (IC) performs a self-check routine, initiates full time flame sensing, flashes the diagnostic LED for up to four seconds and enters the thermostat scan standby state (Green LED blinks ½ second ON / ½ second OFF).

Startup/Operation - Call for Heat

1. On call for heat, Thermostat (or heat enable) closes (Terminals T1/T2 on terminal strip).
2. Provided that the system safety interlocks (circulating airflow switch and auxiliary high limit) and high limit contacts are closed, 24 VAC is supplied to Section A IC terminal T-STAT.
3. Section A ignition control (IC) will check that APS-1 pressure switch contacts are open, [IC terminal APS (PSW) is not powered].
4. Section A IC Blower (IND) relay contacts close, powering the Induced Draft Fan (ID Fan) which operates at high speed.
5. Combustion Air Switch (APS-1 Low) closes powering terminal APS (PSW) initiating a 15 second pre-purge period.
6. At end of pre-purge period, main gas valve and spark igniter are energized to initiate a trial for ignition. Burners ignite.
7. The SC30-SM2A will output 8.5 VDC to the M Series modulating valve for a pre-programmed 30 second warm-up period (Yellow (SU) and Green (AFS) LED's lit) while maintaining the ID Fan at high speed (Green AFS LED remains lit) and heater Section A operates at preset mid-fire input (30% of total heater input).
8. During this warm-up period, the SC30-SM2A ignores the analog input signal to terminals T12/T13.
9. When the initial timer in SC30-SM2A times out, control will respond to analog input at terminals T12 and T13. Green (Mod) LED is lit.
10. If the controller is providing an analog signal between 0.5 and 5.0 VDC to the SC30-SM2A control, only the modulating section (Section A) will operate from 10%-50% of total heater input.
11. For analog inputs from 0.5 to 2.5 VDC, the ID Fan will run at low speed and LED's PWR (Blue), MOD (Green) R1 (Red) are lit. (Note: Green (AFS) LED may be lit if ID Fan pressure is sufficient to close APS-2). The modulating valve will be powered proportional to the analog input voltage signal and modulating gas input from 10 to 30% of total heater input.
12. For analog inputs from 2.6 to 5.0 VDC to SC30-SM2A the ID Fan will run at high speed (APS-2 closed) and LED's PWR (Blue), MOD (Green) and AFS (Green) are lit. The modulating valve will be powered proportional to the analog input voltage signal and will modulate Section A gas input from 30 to 50% of total heater input.
13. For analog inputs between 5.2 – 7.5 VDC, the SC30-SM2A relay R2 is energized closing contacts between T8 & T9, powering T'stat terminal of Section B Ignition Control (IC). Section B, IC ID Fan relay contacts close powering contact APS (PSW) provided APS-3 and Rollout Switch 2 contacts are closed.
14. Following a 15 second time delay, Section B main gas valve(s) and spark igniter are energized to initiate a trial for ignition. Burners ignite. Section B operates at low fire (25% of total heater input) and ID Fan remains in high speed. LED's PWR (Blue), MOD (Green) R2 (Red) and AFS (Green) are lit.
15. For analog inputs less than 7.6 VDC, Modulating Section A input will be reduced proportional to the analog input voltage signal and will modulate gas input from 25 to 50% of total heater input.
16. For analog inputs between 7.7 – 10.0 VDC, the SC30-SM2A relay R3 is energized closing contacts between T10 & T11, powering Section B 2nd stage gas valve. Section B operates at high fire (50% of total heater input) and ID Fan remains in high speed. LED's PWR (Blue), MOD (Green) R2 (Red), R3 (Red) and AFS (Green) are lit.
17. For analog inputs less than 9.9 VDC, Modulating Section A input will be reduced proportional to the analog input voltage signal and will modulate the gas input from 25 to 50% of total heater input.
18. At an analog input 10.0 VDC, both Section A and Section B will operate at maximum input.
19. During heater operation, the thermostat, pressure switches and main burner flame of both sections are constantly monitored by their IC's and SC30-SM2A to assure proper system operation.
20. Section B operation continues to operate at high fire until the analog input signal to the SC30SM2A control drops below 7.4 VDC. At this point the SC30SM-2A R3 relay opens (Red R3 LED OFF). Section B will operate at low fire.
21. Modulation will continue on the modulating Section A for analog input voltages from 7.4 to 4.9 VDC.

22. Section B operation continues until the analog input signal to the SC30SM2A control drops below 4.8 VDC. At this point the SC30SM-2A R2 relay opens (Red R2 LED off). Section B switches off.
23. Modulation will continue on the modulating Section A for analog input voltages from 4.8 down to .0.5 VDC.
24. When the thermostat (temperature controller) is satisfied and the demand for heat ends, the heat enable (thermostat) contact opens, power is removed from the T'stat terminal on Section A IC and the combination gas valve is de-energized immediately and a 30 second post-purge occurs (at high speed) before de-energizing the ID Fan.

Ignition Control Operational Features

Ignition and Operational failures during a call for heat result in "lockout" of the ignition control.

1. If flame is lost during an operational cycle, the ignition control will respond within 0.8 seconds. The spark will be energized for a trial for ignition period to attempt to relight burners and prove flame sensor. If flame is re-established, normal operation resumes
2. If the burners fail to light or carryover during a trial for ignition, the control will attempt two additional ignition trials. If no flame is present at the flame sensor within 10 seconds, the spark and gas valve will be de-energized. A 15 second interpurge period begins and the combustion blower continues to run. After the inter-purge period another ignition trial will take place.
3. If burner fails to light or prove the flame sensor following the two additional trials the control will go into lockout. The valve relay in the IC will be de-energized shutting of the gas valve immediately and the induced draft fan following a 30 second post-purge.

Recovery from Lockout

1. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.
2. The ignition control may also be manually reset, removing power (24V) to IC terminal 24VAC for 5 seconds then restoring power.

Capable Controls Status Indicator LED

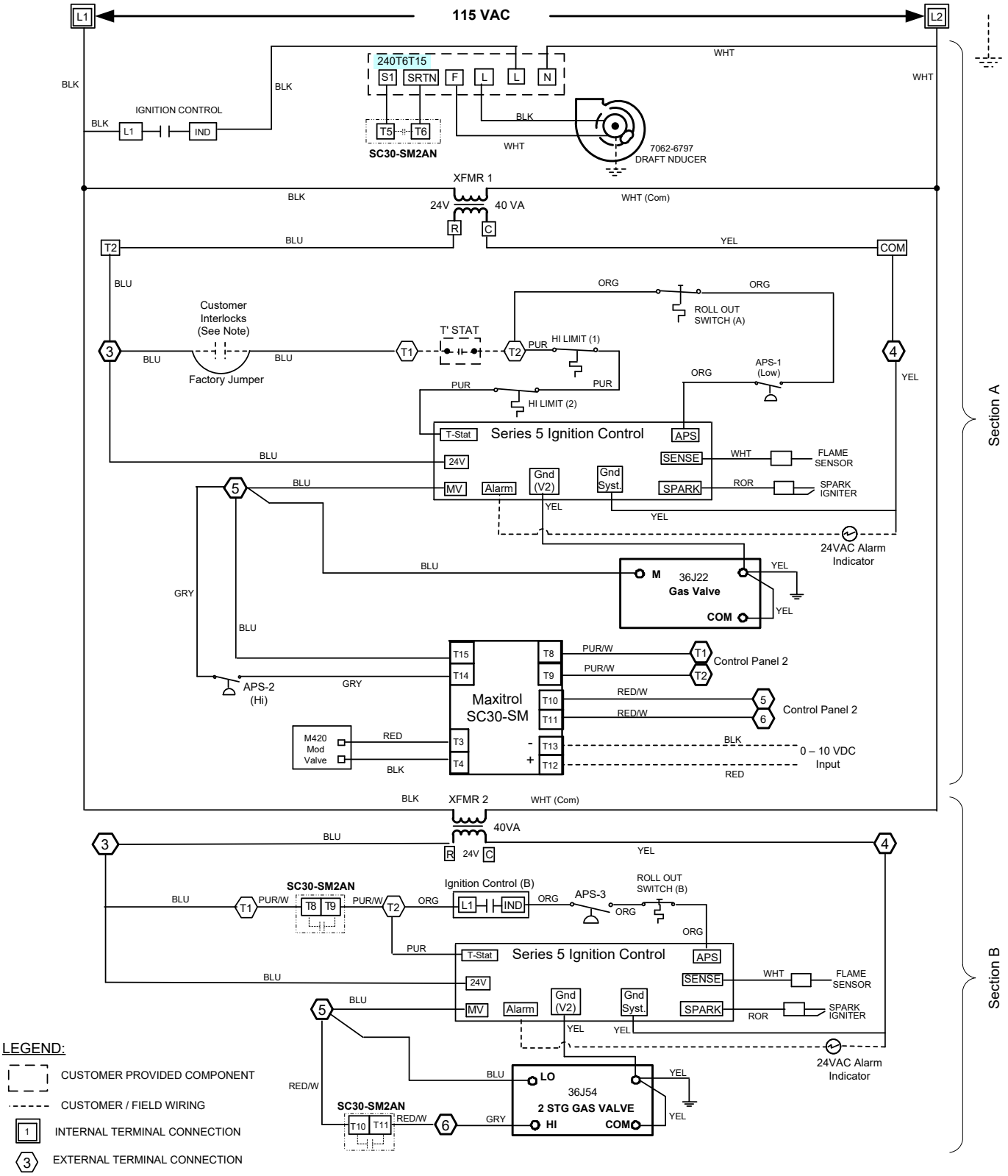
LED Indications, Normal Operation

- Green, ½ sec ON, ½ sec OFF: Pre-purge, Inter-purge, Post-purge
- Green, blinking rapidly: Trial for ignition
- Green, on solid: Flame detected, pilot/main burners ON

ERROR CODES - Red Flashes Error Definition Error Type

- 1 flash, then pause - No flame in trial time Lockout
- 2 flashes, then pause - Flame sense stuck on Lockout
- 3 flashes, then pause - Pilot/Main relay failure Lockout
- 4 flashes, then pause - Repetitive flame loss error Lockout
- 5 flashes, then pause - Rollout error Lockout
- 6 flashes, then pause - APS Airflow error Lockout
- 7 flashes, then pause - Internal control error Lockout ON Solid Red - Line Voltage/Frequency Error Standby

Figure 65: HM/HD Series - MB Control (10:1)



Note: If Customer safety interlocks provided, wire in series from Terminal 3 to T1 & remove factory jumper

Capable Controls – 5 Series Ignition Control

Rack Furnace

HD Rack assemblies employ a Vernier staging modulating control that modulate gas flow up and down to a lead modulating furnace to account for varying heat requirements during operation. Additional slave furnaces have two stage controls which are activated by relays on the staging control to meet higher heating requirements. As slave units are brought on line, the modulating heater gas supply is reduced to meet the system heat demand. Controls are pre-programmed depending on the number of furnaces in the system. The modulating heater is always the top heater.

Figure 66: Typical Rack Distribution Wiring

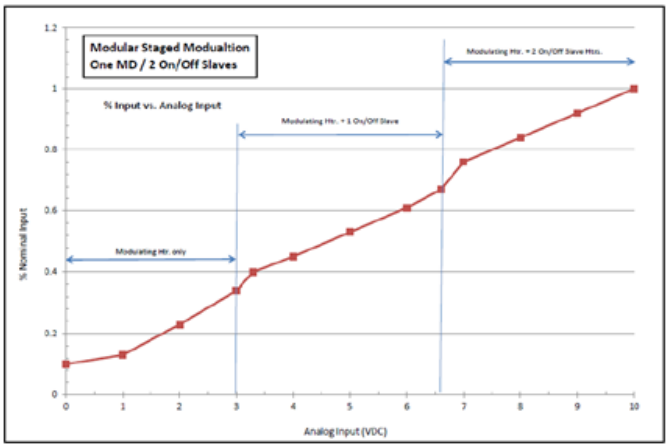


Figure 67: Typical Vernier Control Wiring

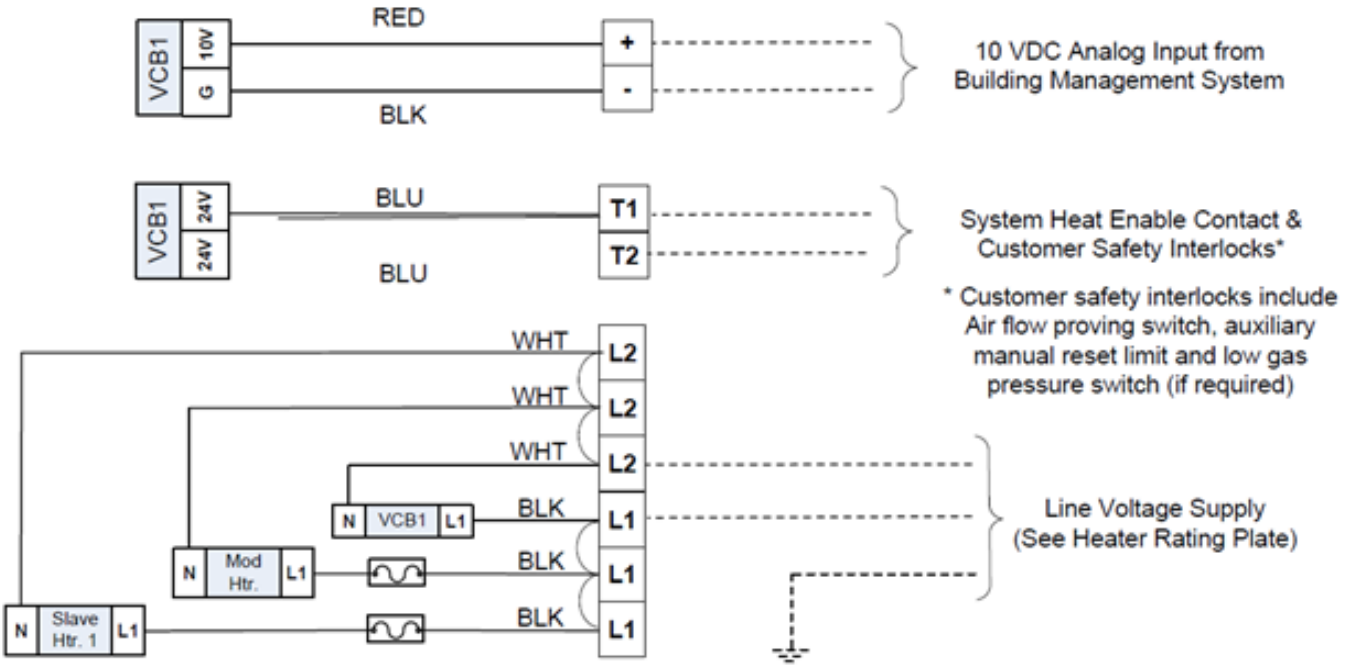


Figure 68: EF (Drum and Tube) High Efficiency Furnace

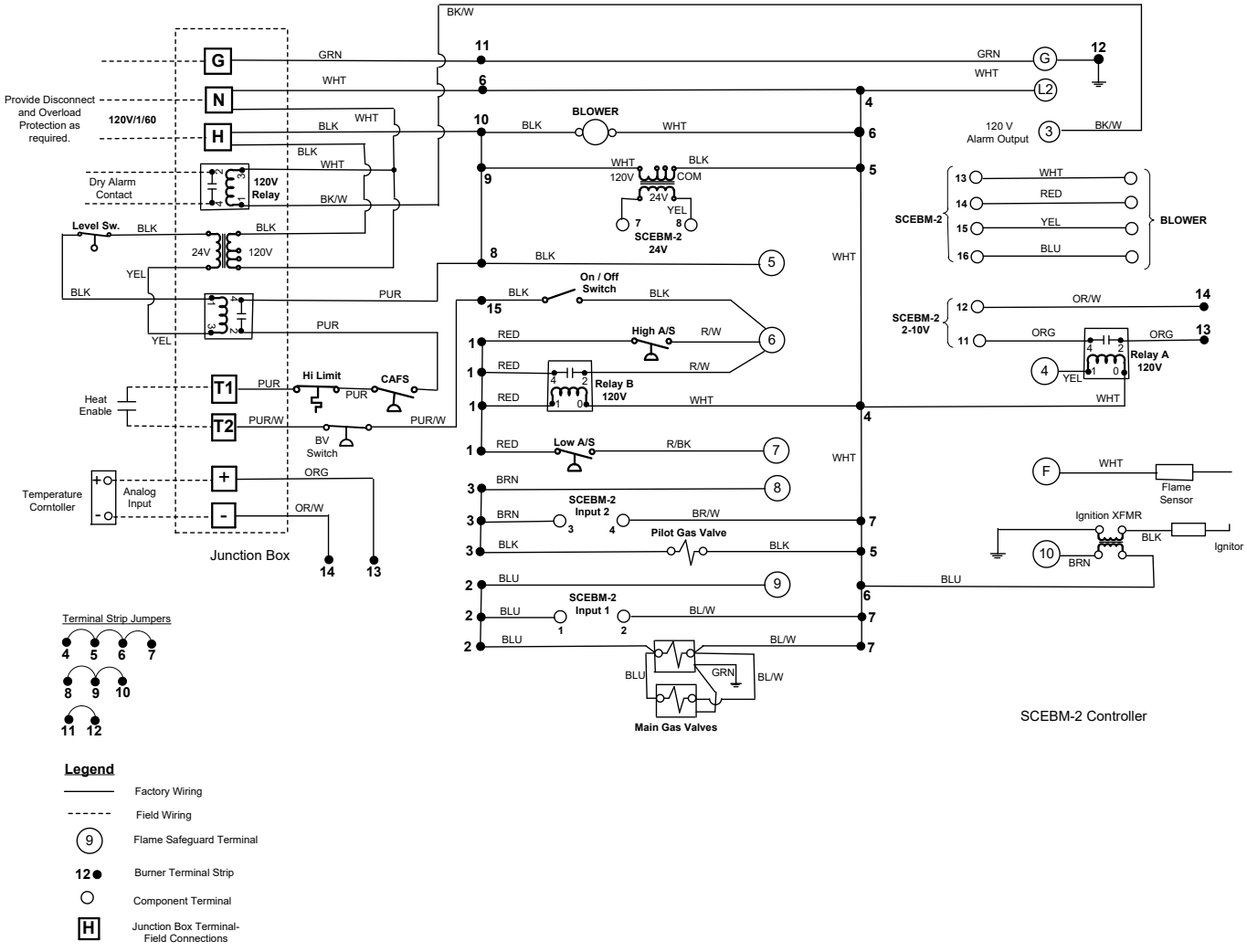
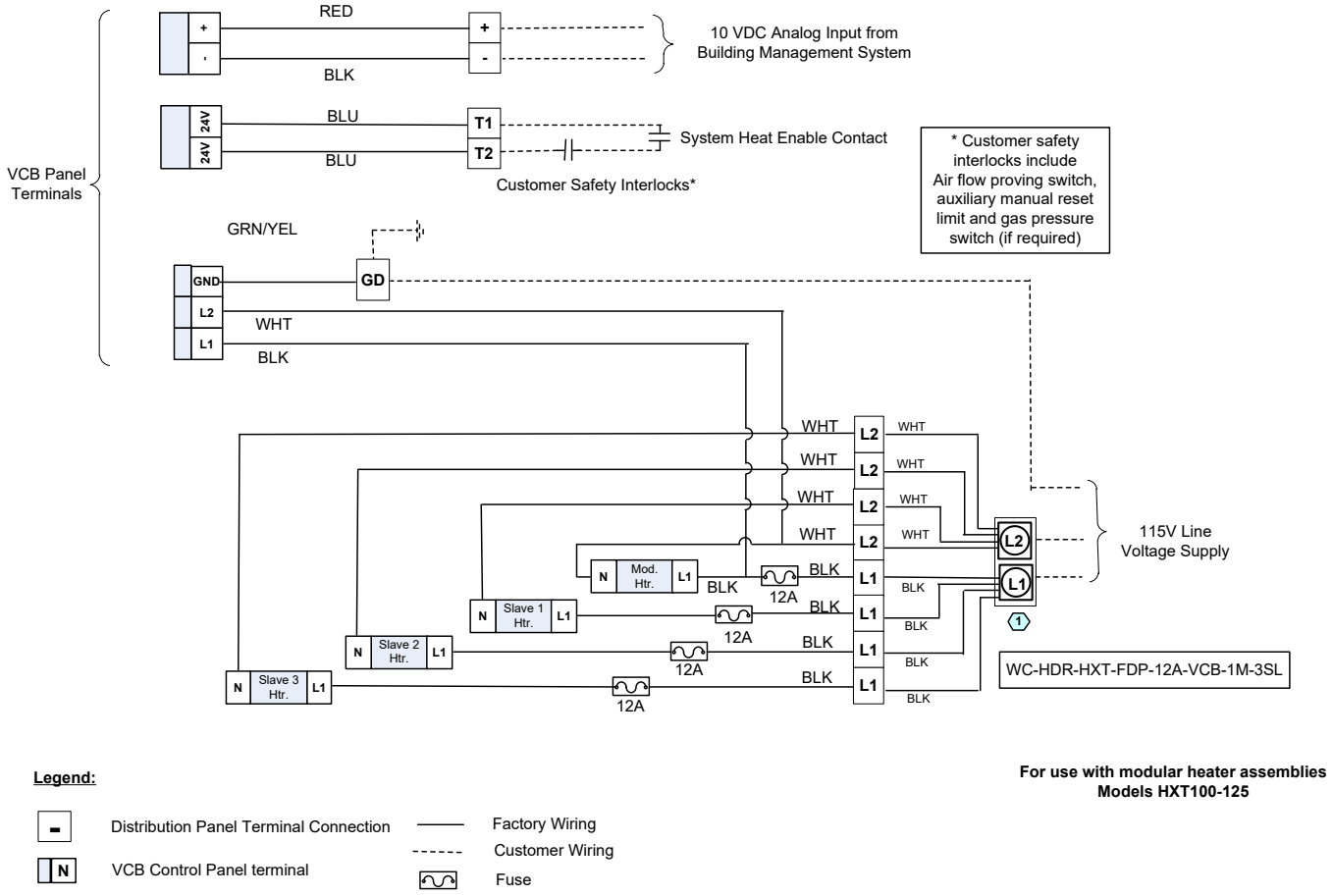


Figure 69: Rack Furnace Wiring Diagram



Direct Fired Heater

⚠ WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

⚠ CAUTION

The use and storage of gasoline or other flammable liquids and vapors in open containers in the vicinity of this appliance is hazardous.

⚠ DANGER

If you smell gas:

1. Open windows.
2. Do Not touch electrical switches.
3. Extinguish any open flames.
4. Immediately call your gas supplier.

⚠ WARNING

Failure to provide proper venting could result in property damage, serious injury, or death.

The unit must have the desiccant reactivation exhaust properly vented to the outside of the building.

An optional direct fired burner consists of the burner, gas train, and a pCO^5 controller. The pCO^5 controller only controls the direct fired gas heater and its safeties. It is not a unit controller.

A manual shut-off and sediment trap (supplied by others) shall be installed on the outside of the unit's gas vestibule to be used as the main shut-off of the unit's gas supply, or as how local codes require the installation of such a valve. A minimum 1/8 inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the unit. All the different gas piping configurations are not shown in this manual because of the many manifold arrangements that are available for various building code and insurance company requirements, and types of gas modulation. Gas piping must comply with "Standards of National Board of Fire Underwriters" and all applicable local codes and insurance company requirements.

Contact the CDI factory for exact gas piping dimensions, if required. Gas pipes are taped off at the factory before shipment. Be sure to run correctly sized gas line to unit (same size or larger than that used on the unit). Install a manual shutoff valve and a reducing regulator if required. A 1/4 inch NPT pressure tap upstream of the unit regulator is recommended.

Installation

The following recommendations are not intended to supplant any requirements of federal, state, or local codes having jurisdiction. This equipment shall be installed and wired in accordance with regulations of the National Boards of Fire Underwriters, National Electric Code, and local governing bodies. In Canada, equipment should be installed in accordance with the applicable provincial regulations. Furthermore this document is not to relinquish the responsibility of the installer from the correct application of the equipment, nor the safe and correct operation of the unit(s) and other systems that may be required or associated with it. When the unit is to be installed in an airplane hangar, install the unit in accordance with the standard for "Aircraft Hangers", ANSI/NFPA 409 and with CAN/CGA B149 Installation Code when in Canada. When the unit is to be installed in a public garage, install the unit in accordance with the Standard for "Parking Structures", ANSI/NFPA 88A or with the Standard for "Repair Garages", ANSI/NFPA 88B and with CAN/CGA B149 Installation Code when in Canada. Before the unit is turned on for the first time. Steps need to be taken to provide adequate pressure relief for the building to avoid over pressurizing the building when the unit is operated at rated capacity. Pressure relief of the building can be accomplished by taking into account, through standard engineering methods, the structure's design infiltration rate; by providing properly sized relief openings; or by interlocking a power exhaust system; or by a combination.

The DF unit must be LEVEL and located so that there is enough clearance for opening the access doors. In addition to allowing room for access door swing, NEC or others may require 42" or more of clearance in front of the electrical panel or vestibule. Refer to the submittal documents for air flow direction through the unit so that it may be positioned to accommodate

Necessary duct work. Also note from the submittal where electrical and gas hookup points are located so that proper connections can be made. Remember to verify position and ability of support beams, pad, or curb to properly support the unit. At a minimum all DF units are to be supported around the perimeter and across any shipping split. Verify that support structure dimensions coincide with the unit. Locate the unit so that air intakes are not too close to any exhaust fan outlets, gasoline storage, or other contaminants that could potentially cause dangerous situations. The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous. The DF series is burning gas directly into the air stream being heated, therefore anything passing across the burner may be combustive. If the DF series unit is used in an explosion proof environment verify that the potentially explosive materials cannot enter the unit intake(s). Prior to locating the unit, authorities that have jurisdiction should be consulted before installations are made.

Burner shut down

1. Shut of main disconnect
2. Close main gas valve.

Restarting the gas heat after short shut down

1. Open manual gas supply valve and check for leaks
2. Turn on main disconnect
3. Follow pCO^5 instructions

Restarting the gas heat after a long shut down

1. Check the unit for general cleanliness. ALL debris, small or large, must be removed
2. Make sure all terminals and connections are checked for tightness
3. Check the supply air outlet for and blower inlets to ensure they are free from any obstructions
4. Check blower(s) to make sure shaft rotates freely and sheaves re-aligned.
5. Check sheaves, blowers, and motor bolts or set screws for tightness
6. Check all damper linkages to ensure they are free to move and no binding will occur
7. Open manual gas supply valve and check for leaks
8. Turn on main disconnect
9. Follow pCO^5 instructions

Air Stream Velocity

⚠ DANGER

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

The use and storage of gasoline or other flammable liquids and vapors in open containers in the vicinity of this appliance is hazardous.

⚠ CAUTION

This heater requires at least 4 cfm outside air per 1000 btu per hour. For details and application limitations, see the manufacturer's instructions.

For your safety, the use and storage of gasoline or other flammable liquids and vapors in open containers in the vicinity of this appliance is hazardous.

Clearance from combutibles: 0" floor, 6" top, and 6" ends.

Standard Burner

Air stream velocity across and through the burner's mixing plates must be kept uniform and within desired limits by use of a silhouette profile plate through which the burner fires.

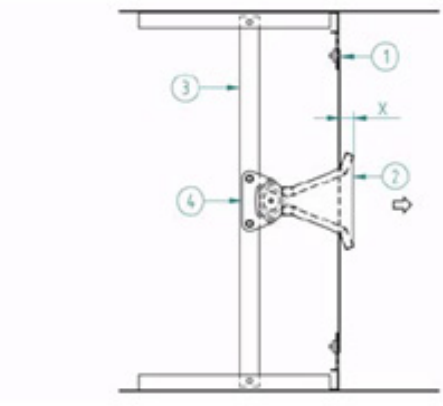
Low NOx Burner

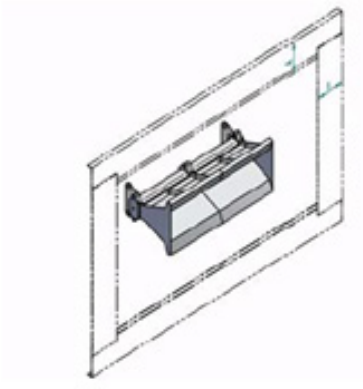
Air stream velocity across and through the burner's mixing plates must be kept uniform and within desired limits by use of a silhouette profile plate through which the burner fires. A 6" (minimum) profile plate should be installed surrounding the interior duct walls at the leading edge of the burner mixing plates.

Figure 70: Silhouette Profile Plate

1) Profile plate
2) Burner front
3) Support
4) Burner mounting bracket

A Minimum 6"
B Minimum 6"
X 1.375"

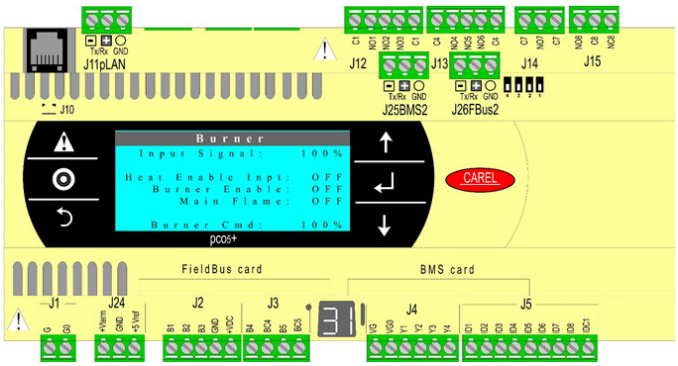




Operation of the Basic pCO5+ Carel Controller

This is the program on a basic Direct Fired unit; Your program may be similar to this one or may be a custom program that will have some different screens and features.

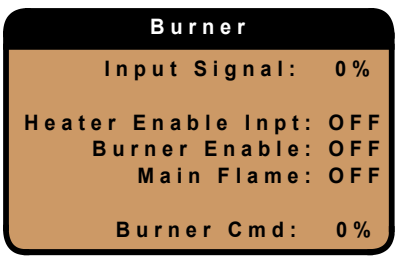
Figure 71: Controller Components



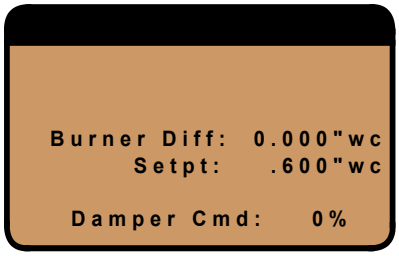
1. When you first power up the controller you will first see this on the screen.

2. Then it will change over to this self-test mode.

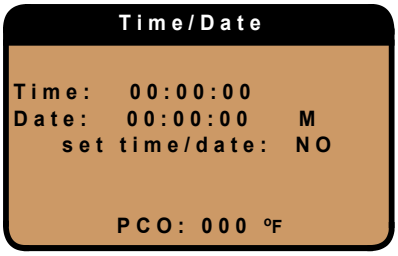
3. After the unit has completed the self-test, it will change to the following screen.



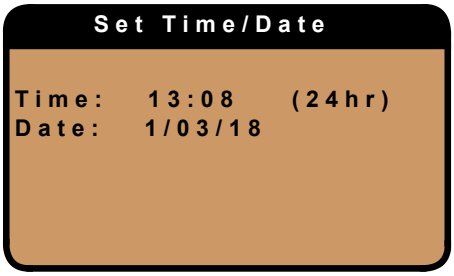
4. The screen above will show if the Input Signal to the Controller, if the Heat Enable Input is ON or OFF, if the Burner is Enabled ON or OFF, if the Main Flame is ON or OFF, and the percent of output to the modulating controller for the burner (example; 10%=1VDC, 50%=5VDC and 100%=10VDC).
5. By using the up ▲ and down ▼ arrow buttons you can scroll through the menu screens on the controller.
6. If you Press the Escape button e at any time on the controller this will take you back to the beginning screen.
7. Press the down ▼ arrow button to get to the next screen on the controller.
8. The screen below will show you what the Differential Pressure is across the burner, the setpoint differential wanted, and the Damper command (example; 10%=1VDC, 50%=5VDC and 100%=10VDC).



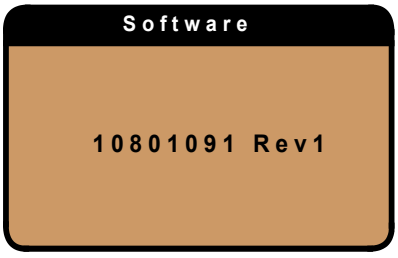
9. If you arrow down ▼ once again it will take you to the screen above showing the actual “Time” and “Date” if not this can be changed by pressing the enter „ button until you get down to the “set time/date” and then press either the up ▲ or down ▼ buttons to change the NO to a YES and press the enter „ button again.



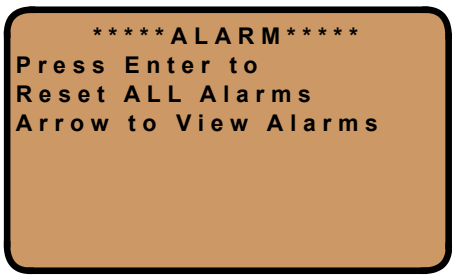
10. This will take you to the screen above that should be and will have the cursor on the hour, use the up ▲ or down ▼ buttons to change this number to the appropriate hour (this is in 24 hour format) example 9PM would be “21”. Next press the enter „ button again to place the cursor on the “Min” number, then use the up ▲ or down ▼ arrow buttons to change this number to the actual minute.



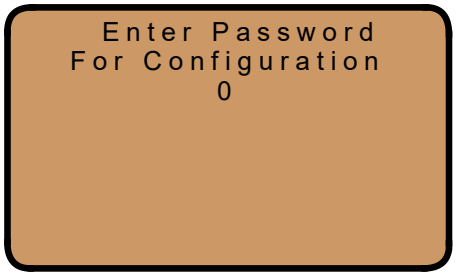
11. Next press the enter „ button again to place the cursor on the “Day” number, then use the up ▲ or down ▼ arrow buttons to change this number to the actual day of the month. Next press the enter „ button again to place the cursor on the “Month” number, then use the up ▲ or down ▼ arrow buttons to change this number to the actual month. Next press the enter „ button again to place the cursor on the “Year” number, then use the up ▲ or down ▼ arrow buttons to change this number to the actual year. Then press the escape e button to exit this screen and it will take you to the top level screen. By using the down ▼ arrow button until you get to the screen showing the time and date to make sure they are changed.
12. If you arrow down ▼ once again it will take you to the screen above right displaying the program part number and rev information.



13. If you arrow down ▼ once again it will take you to back to the first screen (see #3).
14. The Alarm button ⚠ will light up red when the unit is in alarm.
15. To view the alarms;
    a. Push the Alarm Bell button ⚠ and then scroll using the up ▲ and down ▼ arrow buttons to view all the alarms before resetting.
    b. Next, press the Enter button „ if you want to reset all of the alarms before viewing them.
    c. If you press the Enter button „ before pushing the up ▲ and down ▼ arrow buttons to scroll through the alarms you will not know if the unit was down on more than one alarm.
16. To view what Alarms the unit has faulted on press the up ▲ or down ▼ arrow to see what alarm that has caused the unit to shut down. Then press the escape e button to exit this screen and it will take you to the top level screen.



17. If you happen to press the Program button fi you will need to have the Service Password to proceed, or just press the escape e button to exit this screen and it will take you to the top level screen.



18. The Program password is used to enter other parts of the program, like the Service Menu. (This is not recommended for the basic user, only for a qualified trained service technicians)

BACnet Points

Table 27: Analog Variables

BMS Address	Description	Read/Write	Variable name
2	Burner Cmd Signal to burner	R	Burner_cmd
3	command to VAV dampers	R	BurnerDamperCmd
4	Customer Burner Cmd input Signal	R	Burner_cmd_in
13	pco board temp	R	pcoTemp

Table 28: Integer Variables

BMS Address	Description	Direction	Variable name
9	Profile pressure /1000	R	profilePressure
95	Current minute	R	CURRENT_MINUTE
96	Current hour	R	CURRENT_HOUR
97	Current year	R	CURRENT_YEAR
98	Current month	R	CURRENT_MONTH
99	Current day	R	CURRENT_DAY

Table 29: Digital Variables

BMS Address	Description	Direction	Variable name
1	customer's burner enable input	R	Cust_Brnr_Enable_In
2	Main Flame	R	MainFlame
3	burner enabled	R	burner_ena
13	External Fault	R	mExternal_Flt
25	General Alarm	R	gen_alarm
27	used to reset alarms in logic	R/W	USAshr_reset_alarms

Periodic Service and Maintenance

1. Check all moving parts for wear every six months.
2. Check bearing collar, sheave, and wheel hub setscrews, sheave capscrews, and bearing hold-down bolts for tightness every six months.
3. Annually check and snug all electrical connections. Inspect for signs of water damage such as corrosion and repair if necessary. Check ground conductor and connection integrity and correct if needed.

Bearing Lubrication

⚠ CAUTION

Bearing overheating potential. Can damage the equipment. Do not over-lubricate bearings. Use only a high grade mineral grease with a 200°F safe operating temperature. See below for specific recommended lubricants.

Motor Bearings

Supply and return fans—Supply and return fan motors should have grease added after every 2000 hours of operation. Using the following procedure, re-lubricate the bearings while the motor is warm, but not running. Use one of the greases shown in Table 30.

NOTE: Direct Drive Class II fans that are supplied with TECO motors have double shielded bearings on frame sizes 140T-280T. These bearings are pre-packed with a long life grease and are not re-greaseable. Larger frame size TECO motors are re-greaseable and follow the same lubrication recommendations as all other motors.

1. Remove and clean upper and lower grease plugs.
2. Insert a grease fitting into the upper hole and add clean grease (Table 30) with a low pressure gun.
3. Run the motor for five minutes before replacing the plugs.

NOTE: Specific greasing instructions are located on a tag attached to the motor. If special lubrication instructions are on the motor, they supersede all other instructions.

Table 30: Recommended Lubricants and Amounts for Fan Motor Bearings

Mfr. Grease	NEMA Size	Amount to Add (oz.)
Texaco, Polystar or Polyrex EM (Exxon Mobil) or Rykon Premium #2 or Penzoil Pen 2 Lube	56 to 140	0.08
	140	0.15
	180	0.19
	210	0.30
	250	0.47
	280	0.61
	320	0.76
	360	0.81
	400	1.25
	440	2.12

Fan Shaft Bearings

⚠ CAUTION

For safety, stop rotating equipment. Add one half of the recommended amount shown in Table 32. Start bearing, and run for a few minutes. Stop bearing and add the second half of the recommended amount. A temperature rise, sometimes 30°F (1°C), after re-lubrication is normal. Bearing should operate at temperature less than 200°F (94°C) and should not exceed 225 (107°C) for intermittent operation. For a re-lubrication schedule, see Table 31. For any applications that are not in the ranges of the table, contact Daikin.

⚠ CAUTION

The tables in this section state general lubrication recommendations based on our experience and are intended as suggested or starting points only. For best results, specific applications should be monitored regularly and lubrication intervals and amounts adjusted accordingly.

Any good quality lithium or lithium complex base grease, using mineral oil, conforming to NLGI grade 2 consistency, and an oil viscosity of 455-1135 SUS at 100°F (100-200 cSt at 40°C) may be used for re-lubrication.

Compatibility of grease is critical. Re-lubricatable bearings are supplied with grease fittings or zerks for ease of lubrication with hand or automatic grease guns. Always wipe the fitting and grease nozzle clean.

Table 31: Re-lubrication Intervals

Use NLGI #2 Lithium or Lithium Complex Grease

Speed	Bearing Temperature	Cleanliness	Relub. intervals
100 rpm	Up to 120°F (50°C)	Clean	6 to 12 months
500 rpm	Up to 150°F (65°C)	Clean	2 to 6 months
1000 rpm	Up to 210°F (100°C)	Clean	2 weeks to 2 months
1500 rpm	Over 210°F (100°C) to 250°F (120°C)	Clean	Weekly
Above 1500 rpm	Up to 150°F (65°C)	Dirty/wet	1 week to 1 month
Max catalog rating	Over 150°F (65°C) to 250°F (120°C)	Dirty/wet	Daily to 2 weeks
	Above 250°F (120°C)		Contact Browning

Table 32: Recommended Fan Re-lubrication Grease Charge

Shaft Size – in. (mm)	Oz. (g)
1/2 to 3/4 (20)	0.03 (0.85)
7/8 to 1-3/16 (25-30)	0.10 (2.84)
1-1/4 to 1-1/2 (35-40)	0.15 (4.25)
1-11/16 to 1-15/16 (45-50)	0.20 (5.67)
2 to 2-7/16 (55-60)	0.30 (8.51)
2-1/2 to 2-15/16 (65-70)	0.50 (15.59)
3 to 3-7/16 (75-80)	0.85 (24.10)
3-1/2 to 4 (85-105)	1.50 (42.53)

Fan Drive Adjustments

⚠ WARNING

Before servicing fan lock out and tag out all power to the unit. Fans or belts can cause severe personal injury or death.

⚠ WARNING

Do not open the hinged access door and screw-fastened access panels while the unit is operating. Moving parts and strong suction forces can severe personal injury or death.

⚠ WARNING

Moving belt and fan can cause severe personal injury or death.

During installation and filter maintenance:

- Verify that the belt and fan guards on plenum fan units are always in place.
- Lock and tag out fans to prevent accidental start up.
- Do not enter the filter compartment until the fan is completely stopped.
- Use approved equipment for reaching filters located above normal reach. Do not step on filter frames or unit components.
- Floor surfaces must be dry and free of oil or grease.

Upon completion of the air balance, replace the variable pitched motor sheave with a properly sized, fixed sheave. A matching fixed sheave provides longer belt and bearing life and minimizes vibration. Initially, it is best to have a variable pitched motor sheave for the purpose of air balancing. Once the balance is achieved, fixed sheaves maintain balancing and alignment more effectively. Replace the adjustable sheaves with fixed sheaves.

With the electrical power disconnected, locked and tagged out, measure the diameter of the V-belt outer surface where it passes around the sheave (pitch diameter). Calculate fan speed from the motor nameplate rpm.

$$\text{Fan rpm} = \text{motor rpm} \times \frac{\text{Measured diameter at motor sheave}}{\text{Measured diameter at fan sheave}}$$

Fan Drive Belt Adjustment

General Rules of Tensioning

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

Tension Measurement Procedure

1. Measure the belt span. See Figure 68.
2. Place belt tension checker squarely on one belt at the center of the belt span. Apply force to the checker, perpendicular to the belt span, until the belt deflection equals belt span distance divided by 64. Determine the force applied while in this position.
3. Compare this force to the values in Table 33.

Figure 72: Drive Belt Adjustment

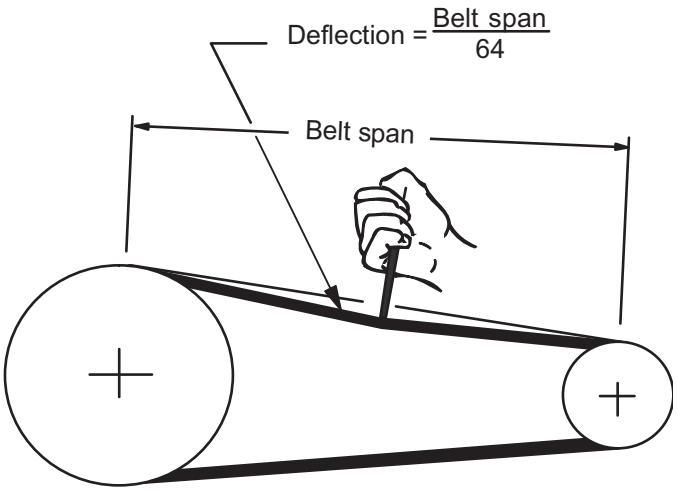


Table 33: Belt Deflection Force (per Browning Specifications)

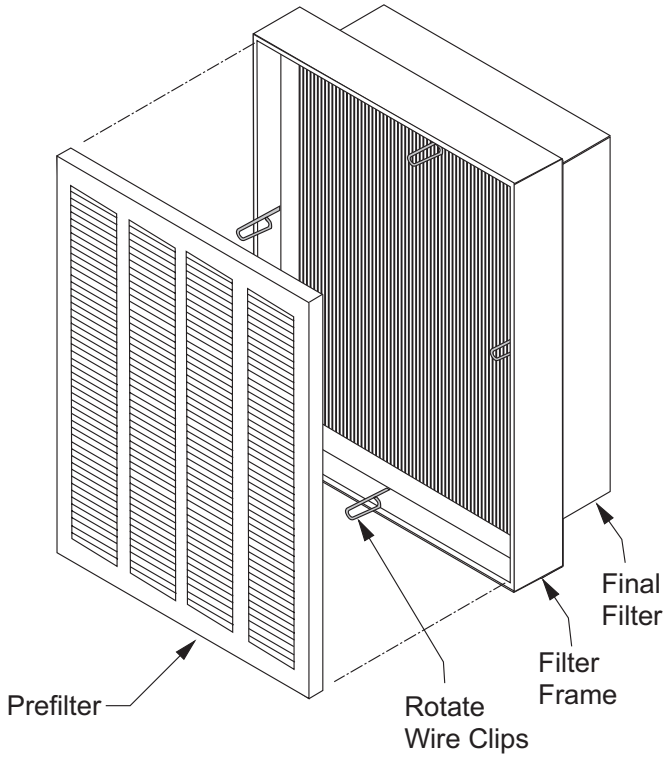
Cross section	Small sheave diameter (in)	Number of belts (deflection force lbs)					
		1		2		3 +	
		min	max	min	max	min	max
A, AX	0.0 to 3.5	3.0	5.0	2.5	4.0	2.0	3.5
	3.6 to 4.4	3.5	5.0	3.0	4.5	2.0	4.0
	4.5 +	4.0	5.5	3.0	5.0	2.5	4.5
B, BX	0.0 to 5.4	5.5	8.0	4.5	7.0	3.5	5.5
	5.5 to 7.6	5.5	8.5	4.5	7.5	3.5	5.5
	7.7 +	6.5	9.0	5.0	8.0	4.0	6.5
5V, 5VX	0.0 to 8.5	7.0	11.0	5.5	9.0	4.0	7.0
	0.6 to 12.0	8.5	13.0	6.5	10.5	5.0	8.0
	12.1 +	10.0	15.0	7.5	11.5	5.5	9.0

Front Load Filter Option

Front loaded filter options require that the filters be removed and replaced from inside the unit.

To remove filters, rotate the wire clips. This releases both the prefilter and the final filter. When installing clean filters, check to verify the filters are fully seated in the frame. See Figure 69.

Figure 73: Frame and Filters with Holding Clips



Filter Gauges

Filter gauges indicate pressure drop for installed filters. If prefilters are present, the gauge will indicate the pressure drop for both pre-and final filters

Table 34 shows the typical filter pressure drop for clean filters at rated air flow. The tables also show a final pressure drop for front loaded filters.

Where a single filter gauge is used, the prefilters can be removed to check the pressure drop of the final filters.

Figure 74: Filter Gauge

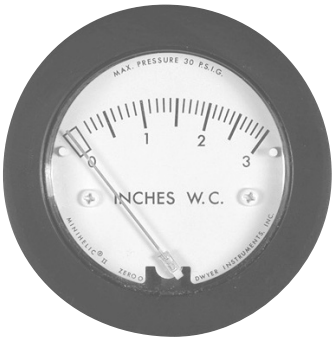


Table 34: Filter Pressure Drops - Flat Panel and High Efficiency Cartridge

Flat Panel Filter																
Face Velocity	5700				PerfectPleatUltra				PerfectPleatHC				PerfectPleatUltra			
	2"–Side MERV 7		2"–Front MERV 7		2"–Side MERV 8		2"–Front MERV 8		4"–Side MERV 7		4"–Front MERV 7		4"–Side MERV 8		4"–Front MERV 8	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.22	1.00	0.27	1.00	0.36	1.00	0.42	1.00	0.20	1.00	0.27	1.00	0.36	1.00	0.47	1.00

Cartridge Filter												
Face Velocity	Varicel SH											
	12"–Side MERV 11		12"–Side MERV 13		12"–Side MERV 14		12"–Front MERV 11		12"–Front MERV 13		12"–Front MERV 14	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.34	1.20	0.49	1.20	0.51	1.20	0.45	1.20	0.65	1.20	0.67	1.20
Face Velocity	Varicel II MH											
	4"–Side MERV 11		4"–Side MERV 14		4"–Side MERV 15		4"–Front MERV 11		4"–Front MERV 14		4"–Front MERV 15	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.38	1.50	0.55	1.50	0.63	1.50	0.46	1.50	0.65	1.50	0.74	1.50
Face Velocity	Varicel V											
	4"–Side MERV 11		4"–Side MERV 14		4"–Side MERV 15		4"–Front MERV 11		4"–Front MERV 14		4"–Front MERV 15	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.24	2.00	0.31	2.00	0.43	2.00	0.43	2.00	0.52	2.00	0.66	2.00

Table 35: Filter Pressure Drops - High Efficiency Bag

Face Velocity	DriPak 2000															
	12"–Side MERV 8		12"–Front MERV 8		15"–Side MERV 8		15"–Front MERV 8		19"–Side MERV 8		19"–Front MERV 8		21"–Side MERV 11		21"–Front MERV 11	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.20	1.00	0.23	1.00	0.18	1.00	0.21	1.00	0.16	1.00	0.20	1.00	0.28	1.00	0.31	1.00
Face Velocity	21"–Side MERV 14		21"–Front MERV 14		21"–Side MERV 15		21"–Front MERV 15		30"–Side MERV 11		30"–Front MERV 11		30"–Side MERV 14		30"–Front MERV 14	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.44	1.00	0.50	1.00	0.64	1.00	0.73	1.00	0.24	1.00	0.27	1.00	0.33	1.00	0.38	1.00
Face Velocity	30"–Side MERV 15		30"–Front MERV 15		36"–Side MERV 11		36"–Front MERV 11		36"–Side MERV 14		36"–Front MERV 14		36"–Side MERV 15		36"–Front MERV 15	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
500 fpm	0.46	1.00	0.52	1.00	0.19	1.00	0.22	1.00	0.27	1.00	0.30	1.00	0.39	1.00	0.45	1.00

Maintaining the Coil

⚠ CAUTION

Sharp fin edges are a potential injury hazard. Avoid contact with them.

1. To obtain maximum performance, the coil must be clean. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Use a chemical coil cleaner on multiple row coils. Read and follow the chemical cleaner's instructions as some cleaners may contain harsh chemicals. Take care not to damage fins while cleaning.
2. Drain pans in any air conditioning unit may have some moisture. Algae, etc., can grow due to airborne spores and bacteria. Periodic cleaning is necessary to prevent this buildup from plugging the drain and causing the drain pan to overflow. Also, keep the drain pans clean to prevent the spread of disease. Cleaning should be performed by qualified personnel.
3. Dirt and lint can clog the condensate drain, especially with dirty filters. Inspect twice a year to help avoid overflow.

Winterizing Water Coils

⚠ WARNING

Mold can cause personal injury. Clean drain pan regularly so mold does not develop.

Coils can freeze due to air stratification or failure of outdoor air dampers and/or preheat controls. Drain all coils as thoroughly as possible and then perform the following:

- Fill each coil independently with an antifreeze solution using a small circulating pump and again thoroughly drain.
- Check freezing point of antifreeze before proceeding to next coil. Due to a small amount of water always remaining in each coil, there is a diluting effect. The small amount of antifreeze solution remaining in the coil must always be sufficient enough to event freeze-up.

NOTE: Carefully read instructions for mixing antifreeze solution used. Some products have a higher freezing point in their natural state when mixed with water. Daikin is not responsible for the freezing of coils.

Removing and Replacing Components

⚠ WARNING

Before removing any component, lock out and tag out all power to the unit. Fans and belts can cause severe personal injury or death.

Removing a Panel

To Remove a Side or Top Panel:

1. Remove the flat head fasteners located along the sides of the panel.
2. Once all fasteners are removed, lift off the panel.

Removing a Frame Channel

Frame channels that run the length of the unit along the top can be removed to allow access to both the side and top of the unit.

To Remove the Frame Channel:

1. First remove any adjoining side and top panel(s).
2. Once the side panel is off, remove the flat head fasteners in the corner of the frame channels.
3. Pull the frame channel out the side.

If any top panel fastens into the frame channel (when the frame channel is 24" or wider in direction of air flow), remove the fasteners in the top panel before pulling out the channel.

Removing the Fan Section

The fan shaft, motor, and any drive components can be removed and replaced through the access door opening. If required, the side panel can be removed for additional access.

If fan replacement is required, the entire fan assembly can be pulled out the side of the cabinet for housed fan assemblies. The fan assembly includes the fan housing, the bearing support, and the fan base.

For plenum fan assemblies, the entire fan cabinet may need to be removed to replace the entire fan assembly depending on the length of the fan section. In some cases, the fan section is not long enough for the assembly to fit out the side of the cabinet. For those cases where it will fit, follow the above steps except the neoprene seal is a D-gasket on the inlet side that needs to be removed for plenum fans. Otherwise, the entire fan cabinet must be removed from the other sections and then the fan assembly can be removed out the discharge side of the cabinet.

Removing the Fan Assembly

1. Remove the side panels and any intermediate supports (follow instructions for side panel removal).
2. Once the panels and any intermediate supports are removed, disconnect the neoprene bulk head seal that is attached to the fan discharge.
3. Remove the four discharge angles that hold the neoprene canvas in place around the discharge opening.
4. Disconnect the fan sled from each of the corner mounts and pull the entire assembly out the side of the unit.
5. After the fan sled is out, loosen the fan bearings and pull out the shaft.
6. Disconnect the fan housing from the fan sled, and bearing support by removing the attaching bolts.
7. Replace the new fan, reconnect the shaft and bearings and put the fan assembly in the cabinet.
8. Replace panels and fasteners.

Removing and Replacing the Coil

The coil can be removed by the side, top, or a combination of both. The size and configuration of the coil affects how the coil can be removed. Single banks of coil are fastened only on the connection side of the unit. Stacked and staggered coils are fastened on both ends of the coil. See the instructions in this section for details to remove each coil type.

Before removing the coil, disconnect all piping. The instructions below assume the coil is mounted in a sectionalized coil section where the frame channel can be removed without affecting other components. If the coil section is unitized with other components, removing the top frame channel requires removing additional panels.

Removing Single Coils

NOTE: Single coils are bolted to the unit on the connection end. The connection end is held in place with a clamp. See Figure 71 and Figure 72.

1. Disconnect all piping and remove the brass plugs for the vents and drains located in the connections.
2. Remove all screws and remove the access panel.
3. Remove the screws holding the coil in place.
4. Lift and pull the coil out the side.

Installing Single Coils

1. Slide the coil through the opening in the coil section onto the bottom coil rests.
2. To prevent any air bypass around the coil, place coils up against the coil bulkheads. See Figure 71 and Figure 72.
3. Once the coil is in place, fasten the coil to the section.
4. Caulk the seams between the coil casings and bulkheads. See Figure 71 and Figure 72.
5. If this is an additional coil being installed and not a replacement, locate the coil supply and return connections dimensionally. Carefully drill holes in the end panels of the unit.
6. Remove the brass plugs for the vents and drains on the connections.
7. Slip the panel over the connections.
8. Replace the brass plugs and panel fasteners.

Figure 75: Single Coil, Top Installation/Removal

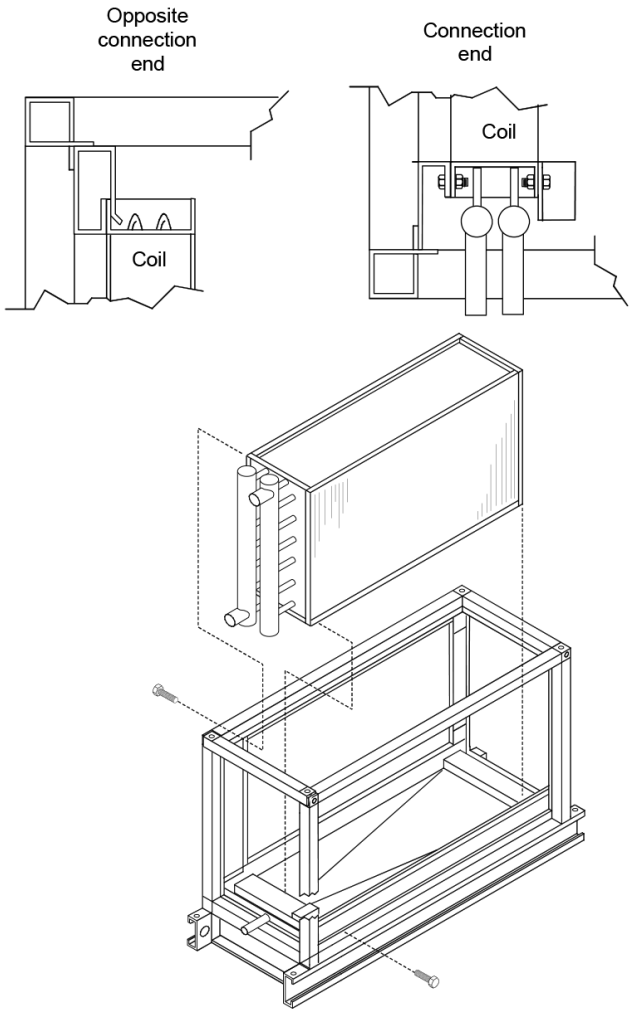
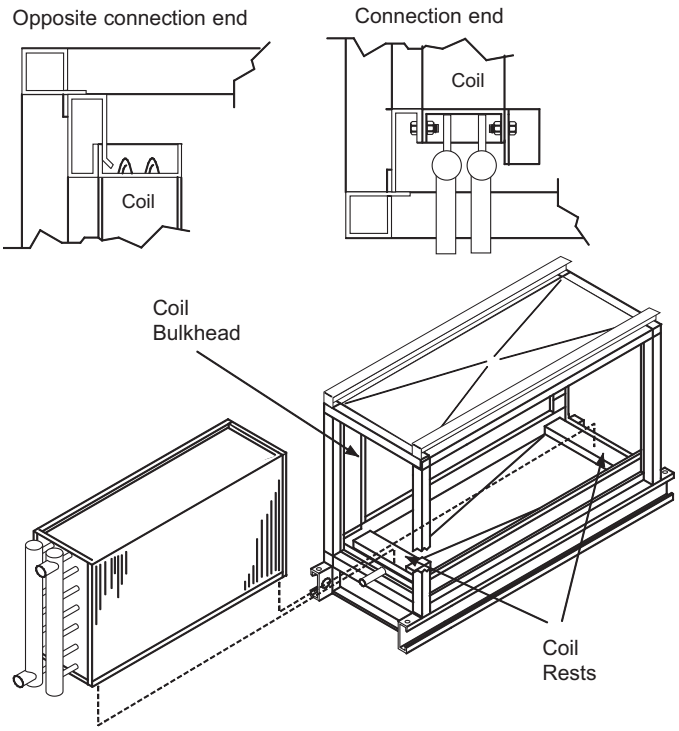


Figure 76: Single Coil, Side Installation/Removal



Removing Stacked Coils

NOTE: Top and bottom stacked coils are held together with steel plate and screws on one side and drain trough and screws on the other side. Remove the plate and trough before removing the coils. The coils cannot be removed attached together.

1. Disconnect all piping and remove the brass plugs for the vents and drains located in the connections.
2. Remove all screws and remove the access panel.
3. Remove the bolts holding the coil in place and then lift and pull out the coil from the side.
4. Remove the steel plate and the drain trough that holds the coil together.
5. Remove the bolts on both ends of the top coil holding it in place and then lift and slide the coil out.
6. Remove the bolts on both ends of the bottom coil holding it in place and then lift and slide the coil out.

Installing Stacked Coils

1. Slide the bottom coil through the opening in the coil section onto the bottom coil rests.
2. Place the coil up against the coil bulkheads to prevent any air bypass around the coil.
3. Once the coil is in place, bolt the coil to the section.
4. Caulk the mounting surface of the steel plate and install the plate on the coils.
5. Caulk the mounting surface of the drain trough and install the drain trough on the coils.
6. Caulk the seams between the coil casings and blockoffs.
7. Connect all piping and install the brass plugs for the vents and drains located in the connections.
8. Install the access panel.

Consult your local Daikin representative for warranty details. Refer to Form 933-430285Y. To find your local Daikin representative, go to www.DaikinApplied.com.

Warranty Return Material Procedure

Defective material may not be returned without permission of authorized factory service personnel of Daikin Applied in Minneapolis, Minnesota, (763) 553-5330. A “Return Goods” tag must be included with the returned material. Enter the required information to expedite handling and prompt issuance of credits. All parts must be returned to the appropriate Daikin facility, designated on the “Return Goods” tag. Transportation charges must be prepaid.

The return of the part does not constitute an order for replacement. Therefore, a purchase order must be entered through the nearest Daikin representative. The order should include part number, model number, and serial number of the unit involved.

Credit will be issued on customer’s purchase order following an inspection of the return part and upon determination that the failure is due to faulty material or workmanship during the warranty period.

Replacement Parts

When writing to Daikin for service or replacement parts, refer to the model number and serial number of the unit stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

Air Handling
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 air handling units with or without heat recovery and roof mounted air handlers.

GENERAL INFORMATION

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

SOI No.: _____

Installation address: _____

City: _____ **State:** _____

Purchasing contractor: _____

City: _____ **State:** _____

Name of person doing start-up: _____

Company name: _____

Address: _____

City/State/Zip: _____

UNIT INFORMATION

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

SF VFD model number: _____ **Serial number:** _____

RF VFD model number: _____ **Serial number:** _____

13F-4153 (07/18)

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

G. Voltage at return fan motor(s): . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V
*Fan array units only . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V

H. Return fan motor amp draw(s) per phase: . . . . . L1 _____ L2 _____ L3 _____
*Fan array units only . . . . . L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____

I. Overload amp setting: . . . . . _____

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

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

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

* If additional fans are on the unit, please add them to the space below.

III. DAMPERS

A. Are blades and seals present? . . . . . ☐ Yes ☐ No ☐ N/A

B. Do damper open smoothly and shut tight? . . . . . ☐ Yes ☐ No ☐ N/A

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

IV. ELECTRIC HEAT

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

Volts _____ Hertz _____ Phase _____

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

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

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

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

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

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

G. FLA: L1 _____ L2_____ L3 _____

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

V. CHILLED WATER COIL

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

B. Drain pan draining OK? . . . . . ☐ Yes ☐ No ☐ N/A

VI. HOT WATER COIL

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

VII. HEAT RECOVERY

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

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

C. Heat wheel VFD: . . . . . .Model # _____ Serial # _____

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

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

VIII. Design Flow calibration

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

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

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

D. Record Level Position after calibration

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

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

IX. GAS BURNER CHECK, TEST, & START

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

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

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

C. Gas Type firing: . . . . . .Single Stage _____ Modulation _____

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

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

F. Is there a circulating tank? . . . . . ☐ Yes ☐ No ☐ N/A

G. Input (CFH): . . . . . _____

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

I. CO_2 (%) . . . . . _____

J. CO_2 (%): . . . . . _____

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

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

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

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

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

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

DAIKIN

AHU Equipment Warranty Registration Form (continued)

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

Q. Airswitch OK? . . . . . ☐ Yes ☐ No ☐ N/A

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

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

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

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 Applied Training and Development

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

Warranty

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

Aftermarket Services

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

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

Products manufactured in an ISO Certified Facility.