

Installation and Maintenance Manual

IM 980-9

Group: **Fan Coil**

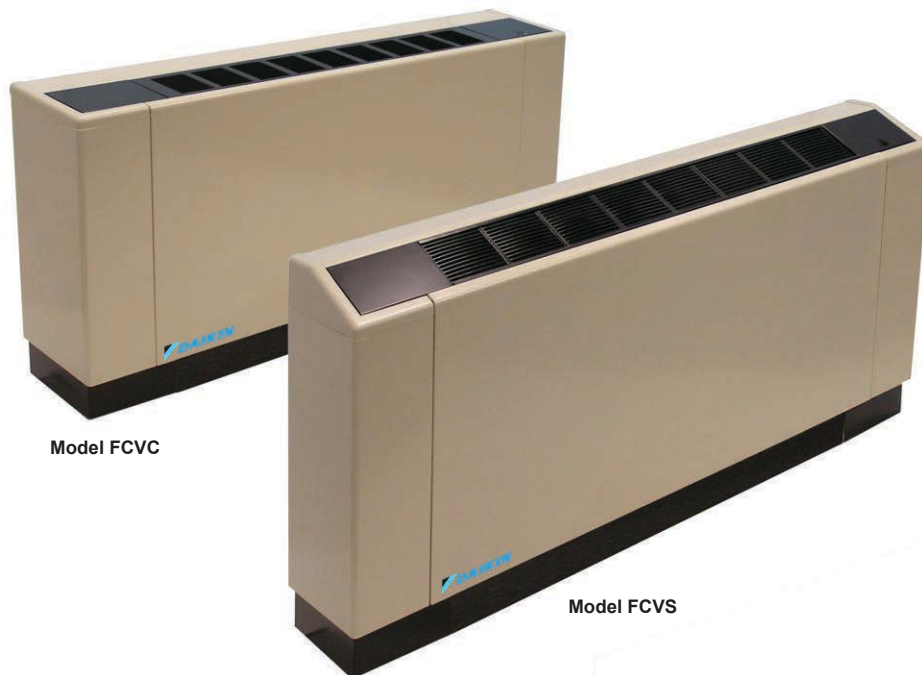
Part Number: **IM980-9**

Date: **November 2022**

ThinLine Vertical Fan Coil

FCVC, FCVH, FCVS, FCWC, FHVC, FHVH, FHVS, FHWC

200 to 1200 cfm



| | | | |
|---|-----------|---------------------------------------|------------|
| General Information | 3 | Wiring Diagrams | 29 |
| Receiving and Storage | 4 | Model Number Description | 32 |
| Pre-Installation | 4 | Addendum—IM 1021 | 37 |
| Fresh Air Box Openings | 5 | Addendum—IM 1023 | 39 |
| Duct Connections | 5 | Addendum—IM 1024 | 41 |
| Safety | 6 | Addendum—IM 1028 | 43 |
| Installation | 7 | Addendum—IM 1121 | 45 |
| Uncrating and Inspecting the Unit | 7 | Addendum—IM 1014 | 47 |
| Mounting Unit to Wall | 7 | Addendum—IM 1089 | 51 |
| Water Piping Connections | 8 | Addendum—IM 1015 | 55 |
| Electrical Connections | 13 | Addendum—IM 1016 | 57 |
| Thermostat and Controls | 14 | Addendum—IM 1017 | 61 |
| Initial Startup | 15 | Addendum—IM 846 | 65 |
| Operation and Maintenance | 17 | Addendum—IM 831 | 75 |
| Controls | 17 | Addendum—IM 763 | 77 |
| Accessories | 19 | Addendum—OM 1111 | 79 |
| General Maintenance | 21 | Addendum—ED 19059 | 111 |
| Physical Data | 23 | | |
| Unit Data | 23 | | |
| Unit Dimensions | 24 | | |
| Factory-Installed Valve and Piping Packages | 28 | | |

Thinline Vertical Fan Coils are intended for use in single zone applications. They are available in sizes from 200 to 1200 cfm. Figure 2 describes the main features of these units and can be referred to for component placement. These units are available in two-pipe configurations with one hydronic coil, with or without electric heat. They are also available in four-pipe configurations with one primary coil and a secondary reheat or preheat coil. A variety of factory-built piping packages are available, either factory or field-installed.

Units are available with a variety of thermostat and fan speed control options, which can be mounted on the unit or shipped loose for mounting in the controlled space.

Options include:

- Four-position fan switch (OFF/LO/MED/HI).
- Manual thermostat with ON/OFF valve control.
- Digital thermostat with a variety of control options, including fan control, ON/OFF or modulating valve control and automatic changeover from heating to cooling on two-pipe systems.
- Low-voltage interface board for connecting a unit to controls provided by others. The controls interface option includes a 24 volt AC transformer and interface terminal strips.
- No Controls, with terminal block connections to the unit's fan motor wiring harness.

Figure 1: Nomenclature

(see Table 2 on page 23 for complete model number description)

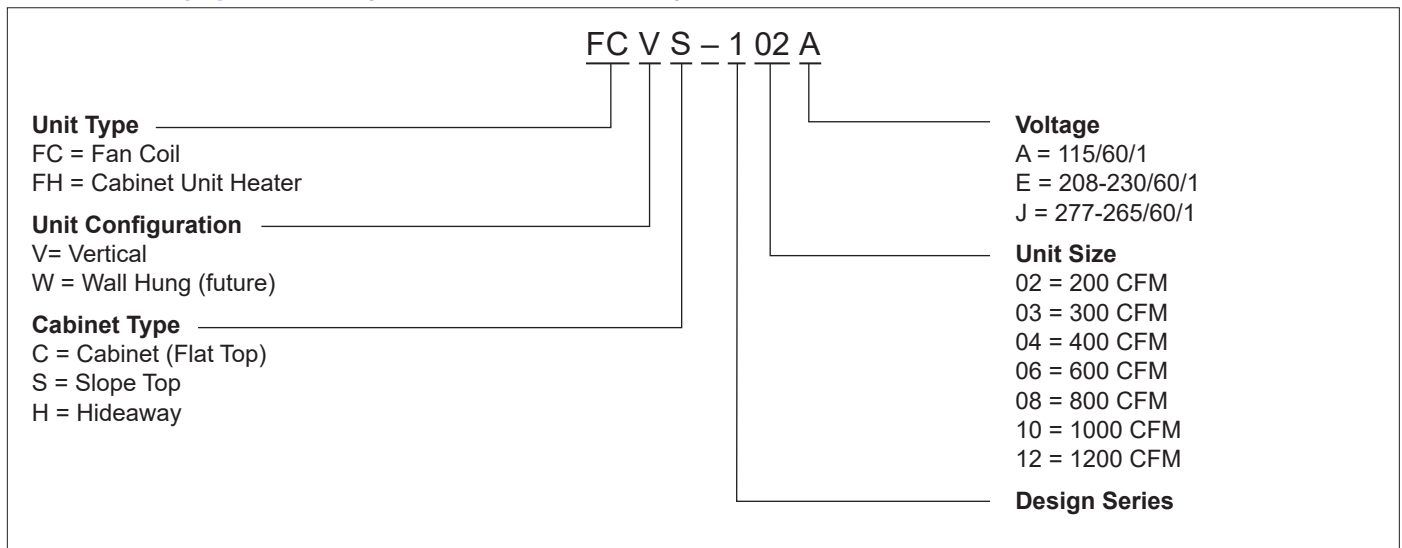
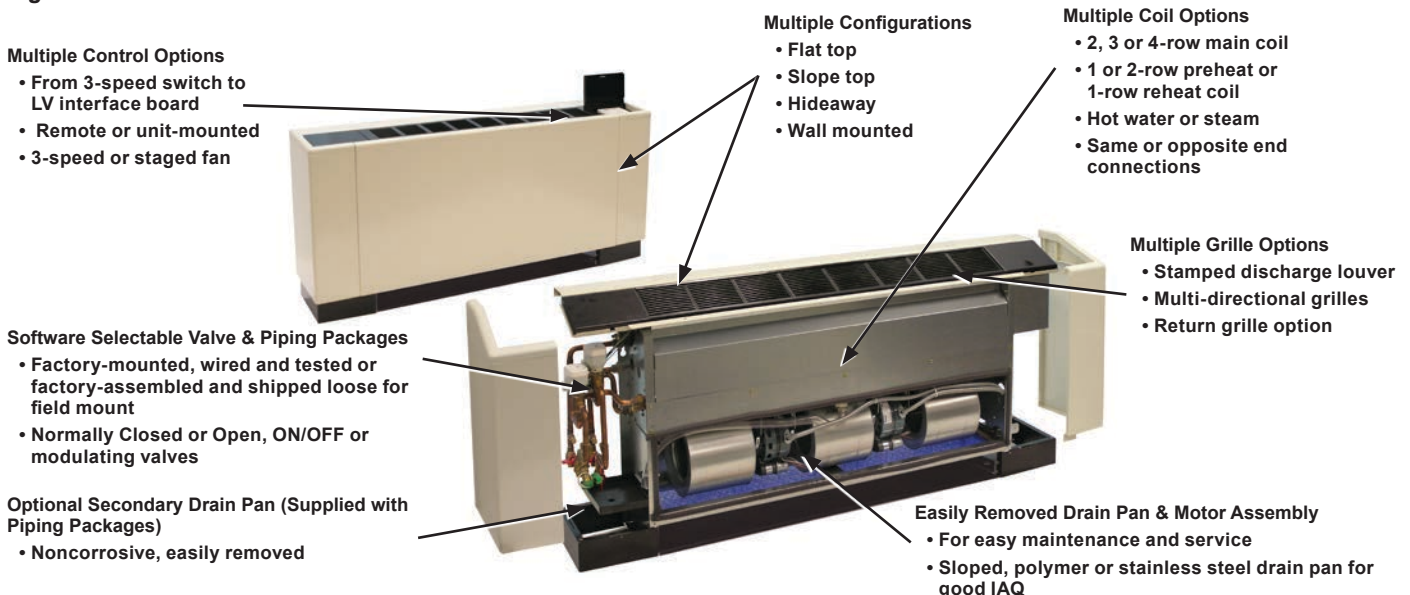


Figure 2: Unit Features



Receiving and Storage

Upon receipt of the equipment, check carton for visible damage. Make a notation on the shipper's delivery ticket before signing. If there is any evidence of rough handling, immediately open the cartons to check for concealed damage. If any damage is found, notify the carrier within 48 hours to establish your claim and request their inspection and a report. The Warranty Claims Department should then be contacted.

Do not stand or transport the machines on end. For storing, each carton is marked with "up" arrows.

Temporary storage at the job site must be indoor, completely sheltered from rain, snow, etc. High or low temperatures naturally associated with weather patterns will not harm the units. Excessively high temperatures, 140°F (60°C) and higher, may deteriorate certain plastic materials and cause permanent damage

IMPORTANT

This product was carefully packed and thoroughly inspected before leaving the factory. Responsibility for its safe delivery was assumed by the carrier upon acceptance of the shipment. Claims for loss or damage sustained in transit must therefore be made upon the carrier as follows:

VISIBLE LOSS OR DAMAGE

Any external evidence of loss or damage must be noted on the freight bill or carrier's receipt, and signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusal to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

CONCEALED LOSS OR DAMAGE

Concealed loss or damage means loss or damage which does not become apparent until the product has been unpacked. The contents may be damaged in transit due to rough handling even though the carton may not show external damages. When the damage is discovered upon unpacking, make a written request for inspection by the carrier's agent within fifteen (15) days of the delivery date and file a claim with the carrier.

Pre-Installation

Before beginning installation, please read this publication in its entirety. Directions given in this bulletin for right and left sides or coil hand assume a position facing the front of the unit.

1. To prevent damage, do not operate this equipment for supplementary heating and cooling during the construction period. Doing so will void the warranty.
2. Inspect the carton for any specific tagging numbers indicated by the factory per a request from the installing contractor. At this time the voltage, phase and capacity should be checked against the plans.
3. Check the packing list and unit identification/tagging numbers against the plans to verify that the unit is being installed in the correct location. The unit data plate is attached to the deck plate on the front of the fan coil (see [Figure 3](#)). Remove the front panel on cabinet units to access it. The panel contains specific information on standard components as listed in [Figure 1](#) and in [Table 6 on page 34](#).
4. Before installation, check the available dimensions where the unit is to be installed against the dimensions of the unit.
5. Note the location and routing of water piping, condensate drain piping, and electrical wiring. The locations of these items are clearly marked on submittal drawings.
6. An installing contractor may find it beneficial to confer with piping, sheet metal, and electrical foremen before installing any unit.

NOTE: Check the unit data plate for correct voltage with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.

7. The unit is not designed to be free-standing. Install it against a wall or other flat surface that meets fire and electrical codes requirements for heating and cooling devices.
8. After installation, cover the unit with the shipping carton or other appropriate material for protection during finishing of the building. This is critical while spraying fireproofing material on bar joists, sandblasting, spray painting and plastering. Damage to the unit due to a failure to protect it during finishing of the building is not covered by the warranty.

Figure 3: Data Plate Location



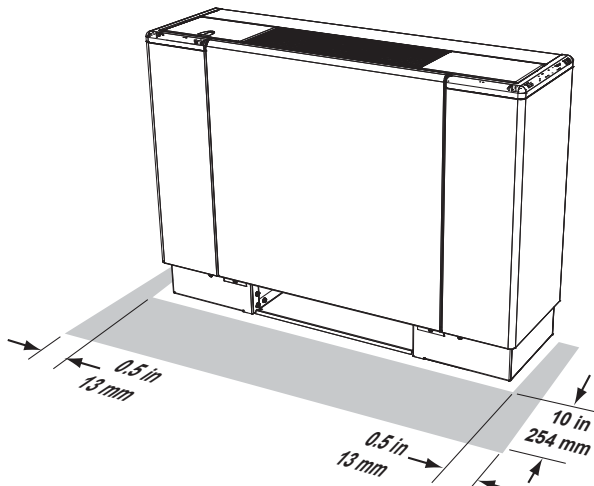
Fresh Air Box Openings

ThinLine Vertical Fan Coils can be installed with an optional fresh air box that is designed to let in outside air while preventing water (such as rain) from getting into the unit itself. If used, prior to unit installation, confirm that the exterior wall opening and the wall box are ready and installed in accordance with the job plans.

Recommended Maintenance Clearance

Cabinet units have removable front and side panels for easy access to components for service and maintenance. The fan assembly and main drain pan are easily removable from the front for cleaning. See [Accessing/removing the main drain pan and motor assembly on page 22](#) for more information. Figure 4 shows recommended maintenance clearances: 0.5 inches (13 mm) on either side and 10 inches (254 mm) in front. Units are referred to as either right-hand or left-hand depending upon the piping connection. Hand is designated by facing the front of the unit (airflow discharges from the front or top). Unless it is a special-order unit, the control panel is always on the end opposite the cooling coil pipe connections.

Figure 4: Recommended maintenance clearance



Duct Connections

Air ducts, when used with hideaway units, should be installed in accordance with local and national codes, including National Fire Protection Association standards for the Installation of Air Conditioning and Ventilating Systems and the National Fire Protection Association standards for the Installation of Air Conditioning and Ventilation Systems other than Residence Type.

A one-inch duct collar is provided on units with a ducted return and/or discharge to attach ductwork. Daikin recommends using galvanized sheet metal ductwork. Slide the sheetmetal duct over the duct collar flange of the unit, seal the joint and fasten with sheetmetal screws. Note: Do not run screws through the removable front panel on hideaway units.

Ductwork Recommendations

Follow the general recommendations listed below when installing the ductwork for the unit.

1. Discharge ductwork should run in a straight line, unchanged in size or direction, for a minimum distance of three fan diameters from the unit (approximately 20 inches).
2. Avoid making sharp turns when making duct turns and transitions. Use proportional splits, turning vanes, and air scoops when necessary.
3. When possible, construct and orient supply ductwork turns in the same direction as the fan rotation.

Safety

Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing and soldering operations. Have a fire extinguisher available. Follow all warnings and cautions in these instructions and attached to the unit. Consult applicable local building codes and National Electrical Codes (NEC) for special requirements.

Recognize safety information. When you see a safety symbol on the unit or in these instructions, be alert to the potential for personal injury. Understand the meanings of the words DANGER, WARNING, and CAUTION. DANGER identifies the most serious hazards that will result in death or severe personal injury; WARNING means the hazards can result in death or severe personal injury; CAUTION identifies unsafe practices that can result in personal injury or product and property damage. Improper installation, adjustment, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may result in personal injury or property damage. This product must be installed only by personnel with the training, experience, skills, and applicable licensing that makes him/her "a qualified professional HVACR installer."

DANGER

Disconnect all electrical power before servicing unit. Electrical shock will cause severe injury or death.

WARNING

Hazardous Voltage!

Use copper conductors only. Unit terminals are not designed to accept other types of conductors. Failure to do so may cause damage to the equipment.

WARNING

Personal injury hazard. Wear protective gloves to avoid possible cuts and abrasions from exposed edges. Avoid contact with sharp edges.

CAUTION

Cleaning agents may cause serious damage to internal components, such as aluminum coils and electronic controls, etc. Do not operate fan coil while building maintenance cleaning agents are in use.

Uncrating and Inspecting the Unit

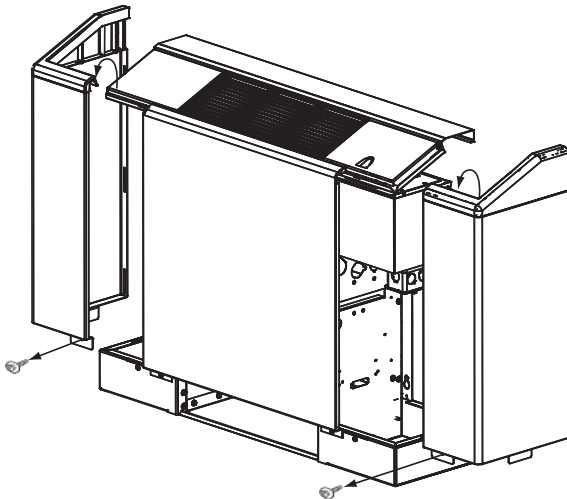
1. Carefully remove the packaging, remaining alert to any signs of shipping damage. Be careful not to discard components that may be included with the packaging.
2. If the unit is damaged, file a claim with the carrier. Notify the local Daikin representative immediately.
3. You may want to retain some or all of the packaging to provide jobsite unit location information and temporary protection for the fan coil after installation. Be sure to dispose of plastic packaging and protective cardboard properly, in accordance with local recycling rules and guidelines.
4. Touch up painted panels if necessary. If panels need paint, sanding is not necessary. However, clean the surface of any oil, grease, or dirt residue so the paint will adhere. Purchase factory approved touch up paint from your Daikin representative or Daikin Factory Service.



WARNING

Plastic packaging is a suffocation hazard, dispose of properly. Keep away from children.

Figure 5: Cabinet Side Panel Removal



Mounting Unit to Wall



WARNING

Installation and maintenance are to be performed by qualified personnel who are familiar with local codes and Regulations, and experienced with this type of equipment.



CAUTION

Personal injury hazard. Wear protective gloves to avoid possible cuts and abrasions from exposed edges. Avoid contact with sharp edges.



CAUTION

It is critical that the unit is level to avoid condensate accumulation in the drain pan. This is especially important when using a stainless steel drain pan which does not have a sloped bottom.

1. Consult job blueprints for unit location.
2. Clean area where unit is to be installed, removing all construction dirt and debris. Remove any mouldings at the floor or wall.
3. Remove the unit from the shipping carton and plastic covering. Save the carton and plastic to use as a protective cover after the installation is complete.
4. On cabinet units, remove the screws shown in [Figure 5](#) that secure the right and left cabinet corner panels to the subbase. For ease of installation, you may also remove the center panel. Lift the panels up and out.

NOTE: Set the unit panels aside where they will not be damaged. Take care not to bend the mounting tabs on the bottom of the panels.

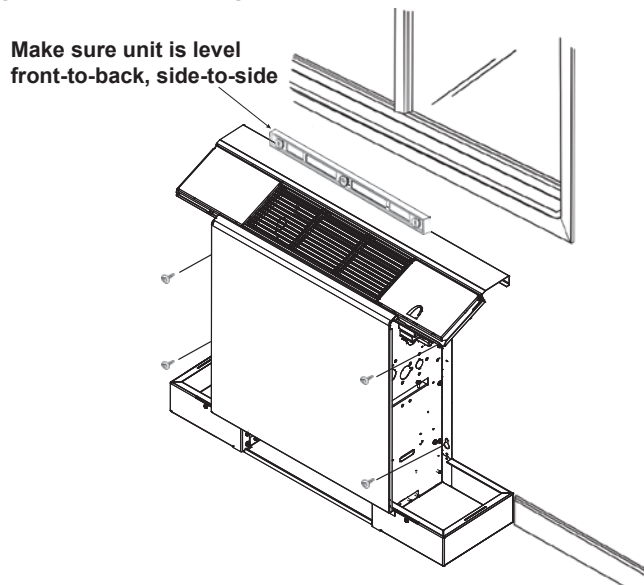
5. STOP! If an outside air damper kit is to be installed, install it now. See [Fresh Air Damper on page 19](#) and the IM included with the damper for more information.
6. Position the chassis/subbase against the wall where the unit is to be installed. Make sure that the area under the unit is free of combustible materials such as carpet. For cabinet units, the wall must act to close off the back of the unit.
7. For hideaway units, if you are using Daikin's decorative wallplate, use blocks or other suitable material to raise the unit off the floor a minimum of 1.5 inches (38 mm).
8. Make sure electrical and piping connections are in the proper location within the end compartments. The control box is in the end compartment opposite the main coil piping connections. Power to the unit is hooked up through the junction box/disconnect box located under the control box. See [Figure 30 on page 24](#) through [Figure 33 on page 27](#) for location information.

9. Use a level to check that the unit is level both front to back and side to side (see [Figure 6](#)). Adjust the unit as needed using the optional leveling legs or shims.
10. The chassis has a series of slots on the back flange to mount the assembly to the wall. Transfer a mark with a marker or pencil to the wall at the mounting hole locations.
11. Insert fasteners through the mounting holes in the chassis and secure the unit to the wall. Do not over-tighten fasteners. It is the installing contractor's responsibility to select the correct fasteners for each unit to meet local codes. At location(s) where no stud is present, secure with a Toggle bolt or equivalent.

NOTE: Use a minimum of two fasteners on each side to secure the unit (field supplied).

12. On cabinet units, reinstall the side/quarter panels in reverse order as performed in step 4.
13. If you raised the unit off the floor in step 7, remove the block or other material supporting the bottom of the unit. Make sure the unit is securely fastened to and supported by the wall mounts.
14. Cut out one side and the bottom of the shipping carton, leaving the top and three sides to place over the unit for protection during construction.

Figure 6: Unit Mounting



Water Piping Connections

General Guidelines

1. Piping can be steel, copper or PVC, but must comply with local codes.
2. Proper ventilation is required for soldering. When soldering, use a quenching cloth to protect fan coil components from overheating damage—melting insulation, also damage to valves, wiring, electronics, sensors, etc. See [Figure 7](#). When Daikin provides valve packages with unions, o-rings are included. When soldering near unions, remove the o-rings before heating.

Figure 7: Protect Components From Overheating



3. If sealant compound is not provided for flexible hose fittings, apply Teflon tape to the connections to help prevent leaks.
4. Ensure proper insulation of supply and return piping. Proper insulation prevents loss of fan coil capacity, overheating of end compartments, and/or moisture dripping.
5. The piping to and from the unit must be protected from outside air and freeze conditions. It must be suitably insulated for condensation and for heat loss or gain. Penetrations entering the unit end compartments must be fitted/sealed for unit integrity.
6. Exterior condensate may be an issue if field piping does not have a control valve. Review the supply and return header locations in the dimensions drawing beginning on [page 24](#). If using a field-assembled piping package, allow sufficient room to install the secondary drain pan. Piping for chilled water should not extend over the edges of the secondary condensate drain pan.

7. Supply and return shutoff valves are recommended at each unit. The return valve is used for balancing and should have a "memory stop" so that it can always be closed off, but can only be re-opened to the proper position for the flow required.
8. Primary coils are factory-equipped with vents for venting the system, but secondary coils (preheat or reheat) are not. If the unit is not equipped with a factory-built piping packages, which include a vent; a vent must be added. See step 1.
9. Be sure to install control valves on the correct fan coil. Indiscriminate mixing of valves in the field can result in valves improperly sized for the desired flow rate, which can result in poor operation and coil freezeups.
10. Install control valves so there is at least 2" (51 mm) minimum clearance to remove the actuator from the valve body.
11. Do not connect a unit to the supply and return piping until the water system has been cleaned and flushed completely. After this is done, the initial connection should have all valves wide open in preparation for water system flushing again.
12. Condensate piping can be steel, copper, or PVC. A means of disconnection must be furnished to facilitate fan section removal.
13. No point of the drain system may be above the drain pan of the unit.
14. Automatic flow control devices must not be installed prior to system cleaning and flushing.
15. Check local code for any requirement for electrical fittings.

Connecting to a Factory-Installed Valve and Piping Package

To view connection locations for factory-installed valve & piping packages, see [Figure 34 on page 28](#). Before installing supply and return lines to a factory piping package, review the following items.

- All piping connections are 5/8" O.D.S. (1/2" nominal) female copper connections.
- Supply and return piping should not interfere with the secondary drain pan or condensate line.
- The installer must provide adequate piping system filtration and water treatment.
- Daikin Deluxe and Enhanced piping packages include a strainer which prevents debris from entering the coil. Clean the strainer regularly.
- Set end valves to the fully open position to prevent damage to the valve seat during brazing.
- Remove the secondary drain pan, if in place, to prevent exposure to dripping solder or excessive temperatures.
- Solder water piping connections to supply and return end connections. Avoid overheating factory soldered joints to prevent the possibility of leakage.
- Insulate fan coil piping to secondary drain pan connections and any cold water piping that is not above the secondary drain pan.

Field-Installed Valve and Piping

Review [General Information](#) before beginning. Then carry out the following steps to install valves and piping.

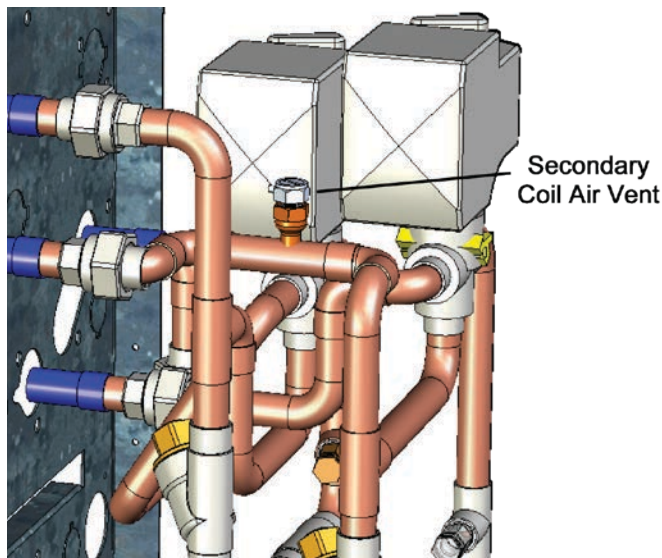
CAUTION

Venting is required on the return piping for secondary preheater reheat coils. It is included on factory-built piping packages, but must be added by the installing contractor for field-installed piping. See [Figure 9](#).

WARNING

Avoid overheating when soldering field connections to the coil to prevent leakage, overheating of the copper tubes, and melting of valves, factory-soldered joints or component gasketing. A quenching cloth is recommended. See [Figure 7](#).

Figure 8: Secondary Coil Air Vent

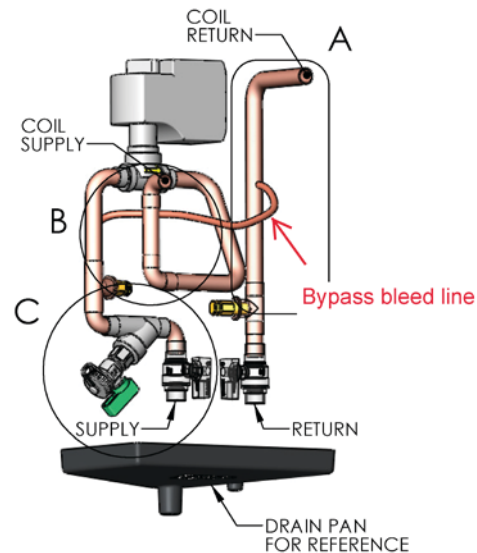


1. For units equipped with a secondary coil make sure that an air vent is included in the return line piping (see [Figure 9](#)). Primary coils are factory-equipped with vents for venting the system, but secondary coils (preheat or reheat) are not.
2. Remove the secondary drain pan, if in place, to prevent exposure to dripping solder or excessive temperatures.

NOTE: Factory-installed valve and piping packages include the secondary drain pan. For other arrangements, the secondary drain pan must be ordered separately.

3. Push the main drain pan condensate hose back inside the end plate to prevent it from getting burned when making sweat connections. Be sure to pull the hoses back through and route to the secondary drain pan when the end panel has cooled.
4. Slide ½" copper tubing or connection couplings (installer provided) onto the coil connections. Solder the joint using a good-quality, lead-free solder to provide a watertight connection.
5. After connections are complete, insulate all piping to the coil connections as necessary to prevent condensate from dripping outside of the secondary drain pan.
6. Install the secondary drain pan.

Figure 9: Bypass Bleed Line



NOTE: A bypass bleed line is installed on all factory provided fan coil valve packages with a 2-way control valve to prevent stagnation of water near the changeover switch (aqua-stat) or changeover sensor (10K pipe sensor). The bleed line allows 3 – 4 gpm of flow to bypass the coil which is necessary for the proper function of the automatic changeover system. All valve packages, cooling and heating, with a 2-way control valve automatically include the bypass bleed line. If the bleed line is unwanted, it may be crimped by the installing contractor to prevent bypass flow.

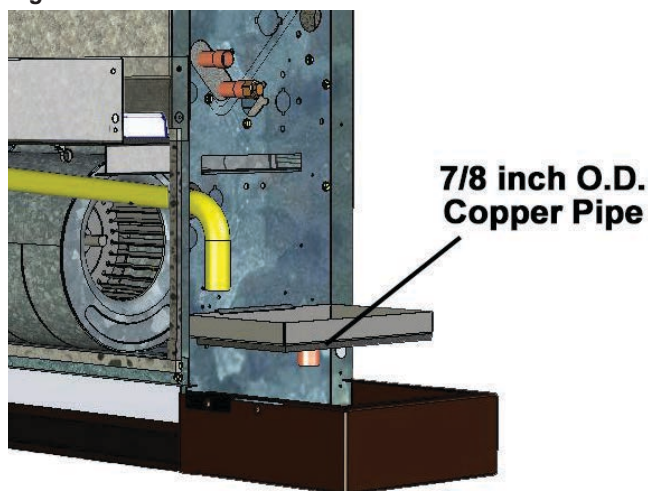
Shutoff/Balancing Valve

Each fan coil should at least be equipped with shutoff valves on both the supply and return lines for easy serviceability and removal if it becomes necessary. We suggest using a combination shutoff/balancing valve between the main supply line and the fan coil unit. These could be furnished by a 3rd-party as part of a field-installed valve & piping package. The balancing valve installed on the return line is used to adjust the water flow to provide the best performance.

Condensate Drain Connection

1. Connect a copper or plastic pipe to the 7/8 inch pipe on the secondary drain pan. This should be a mechanical connection that allows easy removal of the secondary drain pan when servicing the piping end pocket.
2. Slide the drain pipe over the drain pan nipple and tighten the collar on the pipe with a hose clamp (installer supplied). A drain line pitch of one inch per ten feet of drain line run must be maintained to provide adequate condensate drainage.
3. The drain line should be supported to prevent undue stress on the secondary drain pan. Make sure the drain line is free of kinks and obstructions and the secondary drain pan is level.
4. The installer is responsible for adequately insulating field piping. See [External Insulating Requirements on page 12](#) for more information.

Figure 10: Condensate Drain Connection

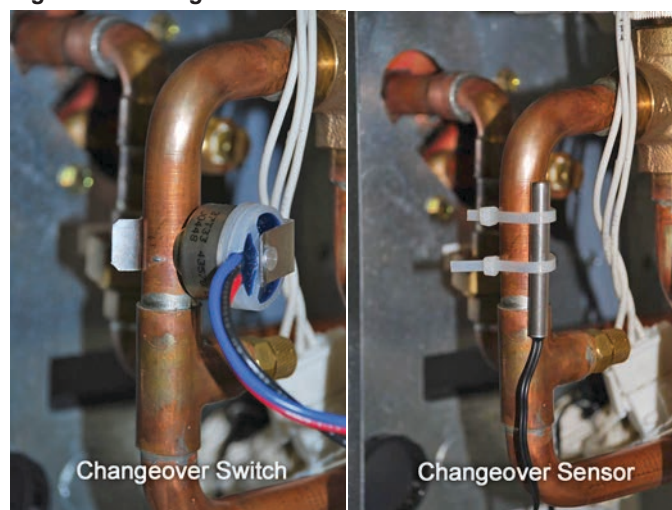


Automatic Changeover Sensor

Two-pipe changeover units require an automatic changeover switch or pipe sensor that determines heating or cooling mode based on the supply water temperature. A switch is provided with a unit-mounted analog thermostat on a two-pipe system. A sensor is provided with any digital control on a two-pipe system. On units with a factory-installed valve & piping package, the factory straps the changeover switch or sensor to the piping supply water pipe. See [Figure 11](#).

For a two-pipe system with intermediate electric heat, a second changeover switch or sensor is required.

Figure 11: Changeover switch & sensor attachment



If the unit does not have a factory-installed valve & piping package, the changeover switch or sensor can be ordered for field installation. The installer should attach the sensor or auto-changeover switch parallel to and in direct contact with the supply water pipe.

NOTE: The installer is responsible to ensure the changeover sensor is installed in a location that can sense active water temperature. Otherwise, the unit may fail to sense the correct operating mode and disable temperature control.

When using field-supplied three-way valves, install the changeover sensor upstream of the valve on the supply water pipe. When using field-supplied two-way control valves, install the changeover sensor in a location that will detect active water temperature. The unit must always be able to sense the correct system water temperature, regardless of the control valve position.

NOTE: The maximum length of the automatic changeover wire cannot exceed ten feet from the control panel to the sensor. If the wire extends beyond the unit chassis, use shielded conductors to eliminate radio frequency interference (RFI).

Steam Piping Connections

CAUTION

Coil Damage!

In all steam coil installations, the condensate return connections must be at the low point of the coil to ensure condensate flows freely from the coil at all times. Failure to do so may cause physical coil damage from water hammer, unequal thermal stresses, freeze-up and/or corrosion.

Make piping connections to the steam coil per job requirements. (Daikin does not supply steam piping connections.) Install a 1/2", 15-degree swing check vacuum breaker in the unused condensate return trapping as close as possible to the coil. The following procedures are recommended:

1. Vent the vacuum breaker line to atmosphere or connect it into the return main at the discharge side of the steam trap.
2. Pitch all steam supply and return mains down a minimum of one inch per ten feet in the direction of flow.
3. Do not drain the steam mains or takeoff through the coils. Drain the mains ahead of the coils through a steam trap to the return line.
4. Overhead returns require one psig of pressure at the steam trap discharge for each two-feet elevation to ensure continuous condensate removal.
5. Proper steam trap selection and installation is necessary for satisfactory coil performance and service life. For installation, use the following steps:
 - a. Position the steam trap discharge at least 12 inches below the condensate return connection. This provides sufficient hydrostatic head pressure to overcome trap losses and ensure complete condensate removal.
 - b. Daikin recommends using flat and thermostatic traps because of gravity drain and continuous discharge operation.
 - c. Use float and thermostatic traps with atmospheric-pressure gravity condensate return, with automatic controls or where the possibility of low pressure supply steam exists.
 - d. Always install strainers as close as possible to the trap inlet side.

Two-Pipe Systems with Electric Heat

The electric heating coil is designed to be the total source of heat for the unit. If used for auxiliary intermediate season heating, additional control is required. A second switch or pipe sensor is required. Contact your Daikin representative for more information.

To protect the electric heat elements, an automatic and manual electric heat switch disengages the electric heat to prevent overheating. For information on resetting the manual switch. [See Electric Heat Over-Temp Reset Button on page 20.](#)

External Insulating Requirements

Insulate and vapor-seal surfaces that are colder than the surrounding air dew point to prevent unplanned condensation. Daikin recommends field-insulation in the following areas to prevent potential condensate problems:

- Supply and return water piping connections
- Condensate drain lines and connections
- Fresh air intake duct connections
- Discharge duct connections
- Wall boxes

Electrical Connections



DANGER

Hazardous Voltage!

The installer must determine and follow all applicable codes and regulations. This equipment presents hazards of electricity, rotating parts, sharp edges, heat and weight. Failure to read and follow instructions can result in property damage, severe personal injury or death.

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

Standard Electrical Connection

Field electrical power connections are made in the electrical junction box, which is mounted to the control box on the side of the chassis opposite the primary coil piping connections. See [Figure 12](#). If the unit is equipped with an optional disconnect switch, it is located in this junction box.

Units with an electric heat option that has the same voltage as the unit can bring the power conductors into this same junction box. Units with electric heat that has a different voltage should have the electric heat conductors brought through one of the knockouts on the control box. See [Figure 12](#).

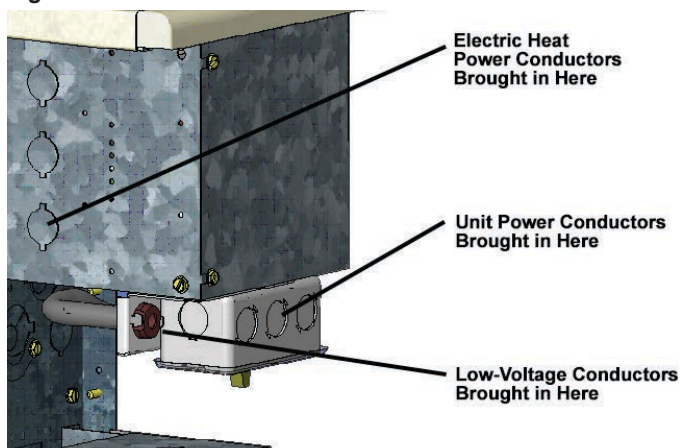
Low voltage wires should be brought into the conduit located next to the field electrical power junction box. See [Figure 12](#).

If electrical wiring or conduit comes through the floor, all wires or conduit should be sealed at this point. It will prevent any condensation or water leakage that may occur due to lack of preventive maintenance.

NOTE: Wiring coming through the wall should be sealed to stop cold air infiltration through the wall cavity, which could affect unit thermostat operation. Wiring coming through the floor should be sealed to prevent condensation or water leakage from reaching live wires.

Install a strain relief and pass the wires through the strain relief into the junction box. Make the connections and reinstall the junction box cover.

Figure 12: Electrical Power Connections



Electrical Data

The wiring diagram for the unit is provided within the Installation Manual in a pouch inside of the corner panel on cabinet units. It is attached to the front cover of the unit on hideaway units. Be sure the available power is the same voltage and phase as that shown on the unit data plate. See [Figure 3](#) for the location of the data plate.

Line and low voltage wiring must be done in accordance with local codes or the [National Electrical Code](#), whichever is applicable.

Apply correct line voltage to the unit. Power wires to the unit must be sized correctly. Branch circuit overcurrent protection must be provided per local codes. See the data plate for correct ratings.

All 208-230V single-phase units are factory wired for 230 volt operation. For 208 V operation the L1 wire connection to the unit transformer (found in the main control box) must be changed. The L1 wire must be disconnected from the 230 V (orange) wire and connected to the 208 V (red) wire. The 230 V wire must then be capped off with a wire nut or male terminal as appropriate. Please refer to the unit wiring diagram.

Operating Voltages

Operating voltages are as follows (+/- 10%).

- 115/60/1
- 208-230/60/1
- 265-277/60/1

NOTE: Voltages listed are to show voltage range. However, units operating with overvoltage and undervoltage for extended periods of time will experience premature component failure.

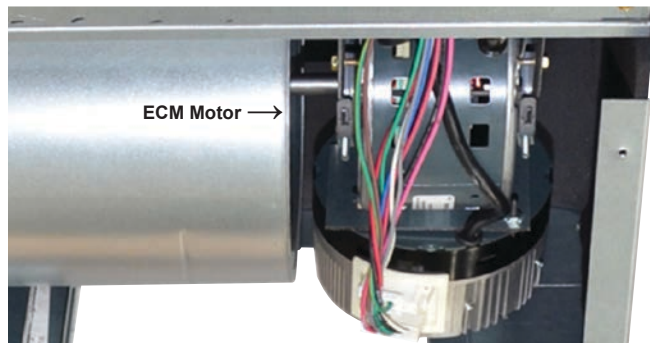
ECM Blower

If the unit is equipped with an ECM blower, additional steps may be required during the air balancing process. The ECM blower is controlled by a control board. Three taps are provided with an ECM blower: high, medium and low.

The unit has been factory configured to produce PSC equivalent airflow on high speed, with medium speed at 80% and low speed at 60% of full volume. If these settings are acceptable, then no further configuring is necessary.

Constant CFM, reduced amps and field-adjustable EC motors are available in all sizes of ThinLine products. An EC motor allows for selectable CFM performance depending on the operating mode.

Figure 13: ECM Blower



EC Motor Pin Out Locations

Figure 15 and Figure 16 show the pin locations for both connectors. The suggested mating connector part numbers for the power and signal inputs are shown in .

Figure 14: Connectors

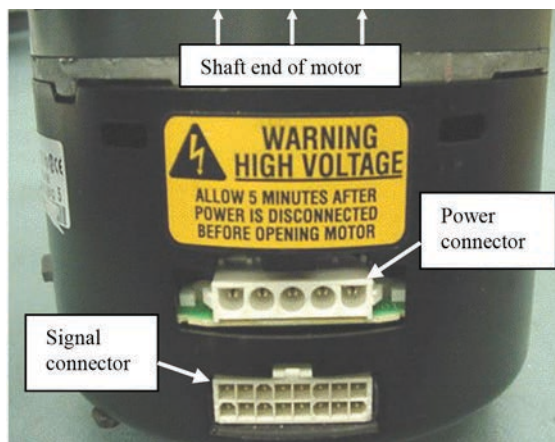
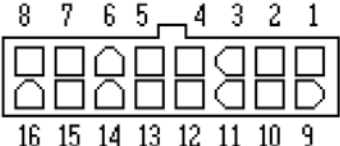


Figure 15: Power Connector

| Power Connector | |
|-----------------|---------------------------|
| | |
| Pin | Description |
| 1 | JUMPER PIN 1 TO PIN 2 FOR |
| 2 | 120 VAC LINE INPUT ONLY |
| 3 | CHASSIS GROUND |
| 4 | AC LINE |
| 5 | AC LINE |

Figure 16: Signal Connector

| | | | |
|------------------|---|-------------|-------------------|
| Signal Connector |  | | |
| | Pin | Description | |
| 1 | C1 - Common | 9 | O |
| 2 | W/W1 – High Speed | 10 | BK/PWM |
| 3 | C2 - Common | 11 | HEAT |
| 4 | DELAY | 12 | R- 24V |
| 5 | COOL | 13 | EM/W2- Super High |
| 6 | Y1 – Low Speed | 14 | Y/Y2 – Super Low |
| 7 | ADJUST | 15 | G – Medium Speed |
| 8 | OUT- | 16 | OUT+ |

Thermostat and Controls

⚠ DANGER

READ THE INSTRUCTIONS INCLUDED WITH THE THERMOSTAT/CONTROL CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE IT.

Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/ OR PROPERTY DAMAGE.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Use only wiring with insulation rated for full thermostat operating voltage. Use copper wire only. Insulate or wirenut all un-used leads. Any wiring, including the remote probe, may carry the full operating voltage of the thermostat.

To avoid potential fire and/ or explosion do not use in potentially flammable or explosive atmospheres.

Retain the installation instructions for future reference. You must review your application and national and local codes to ensure that your installation will be functional and safe. After wiring and installation are complete, energize the system and check the operation. Adjust the thermostat as necessary to complete at least one cycle. Be sure the thermostat and all other equipment are functioning correctly.

Initial Startup

Cleaning & Flushing the Water System

IMPORTANT

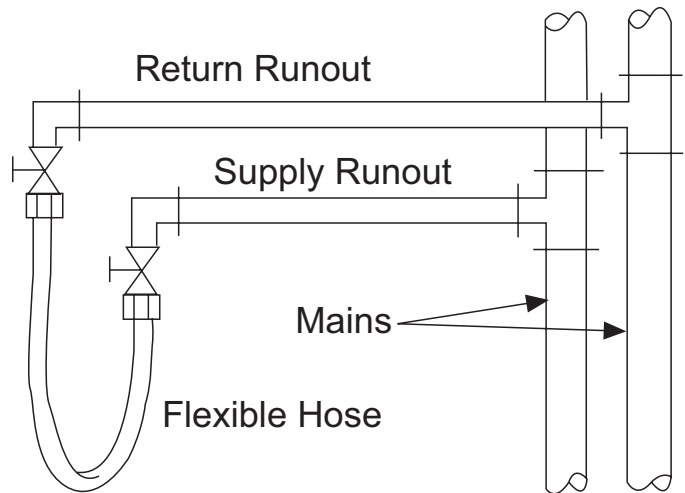
It is Daikin's policy not to make recommendations on water treatment. It is the responsibility of the user to check that the water supply to the units is free of contaminants or corrosive agents, chemicals or minerals. The general contractor or owner should contact a local water treatment company regarding water treatment. A fouled water system will lead to premature component failure.

CAUTION

Units must be checked for water leaks upon initial water system startup. Water leaks may be a result of mishandling or damage during shipping. Failure by the installing contractor to check for leaks upon start-up of the water system could result in property damage

1. Prior to first operation of any unit, clean and flush the water circulating system of all construction dirt and debris.
2. If units are equipped with water shutoff valves, either electric or pressure operated, connect the supply and return runouts together at each unit location. This will prevent the introduction of dirt into the unit. See Figure 13.
3. Fill the system at the city water makeup connection with all air vents open. After filling, close all air vents.
4. Start the main circulator with the pressure reducing valve open.
5. Check vents in sequence to bleed off any trapped air, ensuring circulation through all components of the system.
6. While circulating water, check and repair any leaks in the unit and surrounding piping.
7. Drains at the low st point(s) in the system should be opened for initi ush and blow-down, making sure city water fill valves are set to make up water at the same rate.
8. Check the pressure gauge at pump suction and manually adjust the makeup to hold the same positive steady pressure both before and after opening the drain valves.
9. Flush should continue for at least two hours or longer until the drain water is clean and clear.
10. Shut off the circulator pump and open all drains and vents to completely drain down the system.
11. Short-circuited supply and return run outs should now be connected to the unit supply and return connections. Do not use sealers at the swivel flare connections of hoses.
12. Refill the system with clean water.
13. Test the water using litmus paper for acidity, and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5).
14. Antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Do not use automotive grade antifreeze. Antifreeze will have an effect on the performance of the unit.
15. Once the system has been filled with clean water and antifreeze (if used), precautions should be taken to protect the system from contamination.

Figure 17: Connections for Flushing System Piping



Operating Limits

This equipment is designed for indoor installation only. Sheltered locations such as attics, garages, etc., generally will not provide sufficient protection against extremes in temperature and/or humidity, and equipment performance, reliability, and service life may be adversely affected.

Venting Hydronic Coils

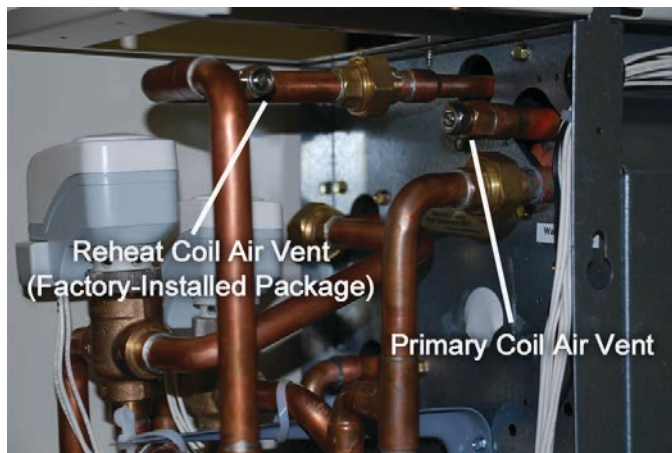
Hydronic coils require a vent, either manual or automatic, to release air from the unit. Primary coils on all ThinLine fan coils come standard with a coil air vent. It is located on the piping side of the unit, above the coil connections. See [Figure 18](#).

Secondary coils on ThinLine units are not equipped with an air vent, but one is included on all factory-supplied valve and piping packages. It is located on the pipe closest to the outlet coil connection. See [Figure 18](#).

Perform the following steps to vent both primary and secondary coils after installing the unit.

1. Pressurize the building piping system with water and vent any trapped air at system vents.
2. For units with manual air vents, back the set screw out to expel air from the unit and then re-tighten the set screw.
3. Automatic air vents should require no adjustment for the coil to vent. However, if the coil does not vent immediately, unscrew the outer portion of the fitting to expel air from the port. If debris has become trapped in the vent, completely remove the outer portion of the fitting and clean.

Figure 18: Coil Air Vents



Controls

Manual 4-Position Fan Switch



Several styles of the four-position fan switch (OFF, High, Med, Low) are available for unit-mount, remote- or wall-mount. The remote-mount option operates on low-voltage or line-voltage power and can be provided with a factory-

mounted, low-voltage interface board, which contains (3) 24-volt relays with line-voltage contactors and terminal connections. The transformer is factory-installed and wired. The unit-mounted option operates on line voltage.

Sequence of operation

- **OFF:** Fan is turned OFF.
- **High, Medium, Low:** Fan runs continuously at the selected speed.

Analog Electronic Thermostat, Unit-Mounted

The unit-mounted analog electronic thermostat option combines the three-position fan switch with an analog thermostat for room temperature control. It is compatible with two pipe or four pipe fan coils and is available with automatic (MTB-155) or manual (MTA-155) changeover.



Sequence of operation

Fan Switch

- **OFF:** Fan is turned OFF. Thermostat is OFF. The ON/OFF motorized control valve, when supplied, is closed.
- **High, Medium, Low:** Fan runs continuously at the selected speed.

Thermostat

- Cycles the valve(s) open or closed on demand based on occupant-desired level.

Changeover:

- **Manual:** The user selects whether the thermostat operates in heating or cooling mode. In heating mode the valve opens when the room temperature is below the set point. In cooling the valve opens when the room temperature is above the set point. A factory installed aquastat prevents valve operation if heating is selected when pipes contain chilled water or if cooling is selected when pipes contain hot water.
- **Automatic:** The thermostat automatically selects heating or cooling mode based on the temperature of the water in the pipes. A factory installed aquastat operates the valve in heating mode when the pipes contain hot water or cooling mode when pipes contain chilled water.

MT155 Thermostat, Wall-Mounted



The MT155 series thermostat provides ON-OFF control for low-voltage or line-voltage valves and fan motors. It is remote- mounted. Options include manual or automatic changeover, two or four pipe fan coil control, with or without three speed control continuous fan

operation. This thermostat can be field-mounted on any vertical ThinLine fan coil unit equipped with a low voltage interface board, refer to Daikin publication [IM 1089](#).

This thermostat is capable of continuous fan operation and ON-OFF, normally closed valve control. The thermostat cycles the valves ON and OFF with demand. The fan runs continuously at the manually selected fan speed. When the system switch is in the OFF position, the fan is OFF and the valve is closed.

Digital Thermostats, Unit- and Wall-Mounted

Daikin offers a broad range of unit-mounted and remote, wall-mounted digital thermostats with the capability to control ON-OFF, 3-wire floating and proportional modulating actuator, and Normally-Closed or Normally-Open valves. See [Table 1](#). For more information, refer to the Daikin publication [ED 18513-1](#) and Installation Manuals for the specific thermostat (also see [IM 980-1](#)).



MT158 and MT168 Thermostat-Controllers with Digital Display

Series MT158 and MT168 microprocessor-based thermostat controllers combine a proportional integral (PI) control algorithm with adaptive logic. They can be unit-mounted or remote-wall mounted.



Heating and cooling outputs for the MTB158 are individually configurable for three-wire floating point, ON/OFF normally open, or ON/OFF normally closed control valves.

Heating and cooling outputs for the MT168 provide 0-10 Vdc or 4-20 mA. An integrated, three-speed fan control switch is line-voltage capable to allow direct connection to the fan motors. A manual or automatic changeover is provided with remote setback capability from a time clock or facility management system. Features include a Fahrenheit or Celsius digital display and built-in purge cycling which assists the controller to determine if the system is supplying hot water or chilled water.

Standard control features constant fan operation with cycled or modulating valve operation. The fan runs continuously at the manually selected fan speed (High, Medium or Low). The controller modulates or cycles the valve with demand.

T170 and T180 Wall Mounted Thermostats



Daikin offers four different wall mounted Digital Heating/ Cooling Thermostats with constant fan or Fan cycled, ON/OFF normally closed Valve Control. The non-programmable TA170 and TB170 and the seven day, four event programmable TA180 and TB180.

The TA170 and TA180 are configured for user selected fan speed control. The TB170 and TB180 are configured for staged fan speed control where the thermostat selects high, medium, or low based on the room temperature and set point differential. All four provide automatic and manual changeover, adjustable dead band, one two or three speed fan control, adjustable setback, condensate overflow alarm and on-off normally closed damper control. All can be used with line or low control voltage. The thermostat interface contains buttons for use in navigation to accompanying menus/screens and for performing specific operations. Detailed installation instructions and modes of operation can be found in [IM 1152](#).

Table 1: Thermostat Summary Table

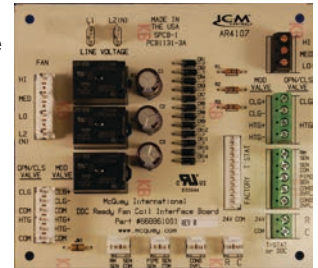
| Thermostat Type | Model | Mounting | Software Tabs |
|---|---------|-----------------|-------------------------------------|
| On/Off Switch with 3-speed Fan Switch with Hi/Med/Lo Settings and Switched Auxiliary Connection | MTE-155 | Unit or Remote* | Control Type or Accessories |
| 2-Pole Dead-Band Auto-Changeover Thermostat with Manual ON-OFF System Switch and Manual 3-Speed Fan Switch, ON/OFF Valve Control | MTB-155 | Unit or Remote* | Analog Control Type or Accessories |
| Thermostat with Manual Heat-OFF-Cool System Switch and Manual 3-speed Fan Switch, ON/OFF Valve Control | MTA-155 | Unit or Remote* | Analog Control Type or Accessories |
| Digital Thermostat 24 vac/120-277 vac with 3-speed Fan Control (Continuous or Fan Cycle) | MTA-170 | Remote | Accessories |
| Digital Thermostat with 7-Day Programmable, 24 vac/120-277 vac with 3-speed Fan Control (Continuous or Fan Cycle) | MTA-180 | Remote | Accessories |
| Digital Thermostat 24 vac/120-277 vac with Staged Fan (Continuous or Fan Cycle) | MTB-170 | Remote | Accessories |
| Digital Thermostat with 7-Day Programmable, 24 vac/120-277 vac with Staged Fan (Continuous or Fan Cycle) | MTB-180 | Remote | Accessories |
| Digital Thermostat with Dead Band Auto-Changeover for Heating/Cooling, ON/OFF or 3-wire Floating Valve Control and 3-speed Fan Switch | MTB-158 | Unit or Remote* | Digital Control Type or Accessories |
| Digital Thermostat with Dead Band Auto-Changeover for Heating/Cooling, ON/OFF, and Manual 3-speed Fan Switch | MTA-158 | Unit or Remote* | Digital Control Type or Accessories |
| Digital Thermostat with Auto-Changeover, Dead-Band, 0-10 vDC Proportional Modulating Valve Control. | MTB-168 | Unit or Remote* | Digital Control Type or Accessories |
| Digital Thermostat with Auto-Changeover, Dead-Band, 0-10 vDC Proportional Modulating Valve Control, and Manual 3-speed Fan Switch | MTA-168 | Unit or Remote* | Digital Control Type or Accessories |

*Can be field-mounted on units with Low Voltage Interface Boards, refer to [IM 1089](#)

NOTE: (†)To select a thermostat with a manual switch (MTA-155), simply click on the “Manual” option in the Changeover selection box in Daikin Tools software. If no factory valves are provided, the default choice for this thermostat type will be an Autoswitch (MTB-155).

Low Voltage Interface Board

The Low-Voltage, Interface Board (LV board) is used with any remote (wall-mounted) Daikin thermostat. It can also be used with a BAS (Building Automation System) control where low voltage is needed to operate a fan coil.



The LV interface board includes:

- Three 24-volt relays with line voltage contactors to operate fan motor speeds
- A factory wired and installed transformer
- Terminal connections for interfacing to:
- An optional wall-mounted thermostat
- Low-voltage actuators for heating and cooling valves
- A return air sensor
- A pipe temperature sensor for changeover from heating to cooling on two-pipe systems
- An optional condensate overflow switch

Customer-Supplied Controls

Your Daikin representative can work with engineers and/or contractors to factory install and wire other manufacturers' DDC controllers in one of the end pockets of the fan coil. Contact your local Daikin representative for assistance with your specific project.

Accessories

Fresh Air Damper

The fresh air damper may be factory-installed or field-installed. The damper kit provides up to 25% outside air to the fan coil. It consists of an intake with damper blade and insect screen. The damper may be manually controlled through the return air opening or with an optional field-installed damper motor. For detailed installation information, refer to IM 1023 of the Addendum.

Operation

To open the damper, reach under the unit and pull the damper handle toward you. To close, push the damper away from you. See Figure 19.

If the damper is difficult to open or moves too freely, you can adjust the tension by tightening or loosening the nuts on its pivot axis. See Figure 20.

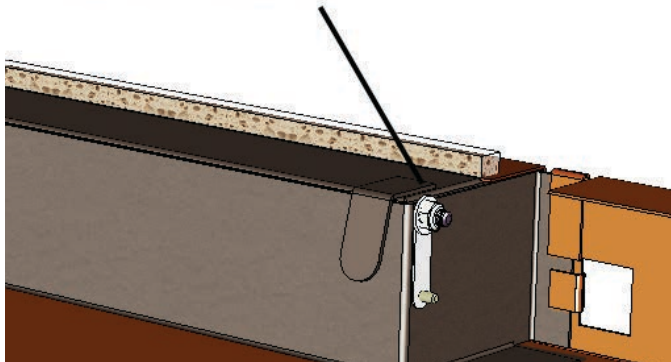
Figure 19: Opening and Closing the Damper



To Open Damper, Reach Under the Unit and Pull the Damper Handle Towards You

Figure 20: Adjusting Damper Tension

To Adjust Damper Position, Loosen or Tighten Nuts on Each End of Damper Axis



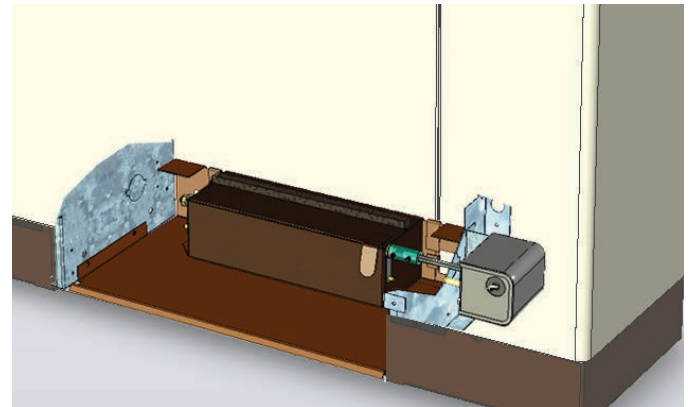
Cold Weather Operation

Unit heaters may experience erratic operation during cold ambient conditions with the outside air damper in the open position.

Fresh Air Damper Motor Kit (Low Voltage)

This damper motor kit is for field installation with the fresh air damper kit. The damper kit must be ordered separately. For detailed installation instructions, refer to IM 1028 of the Addendum. Under most control schemes, the damper motor is set up to open the damper automatically whenever the unit fan is in operation.

Figure 21: Damper Motor Kit Installed in Unit



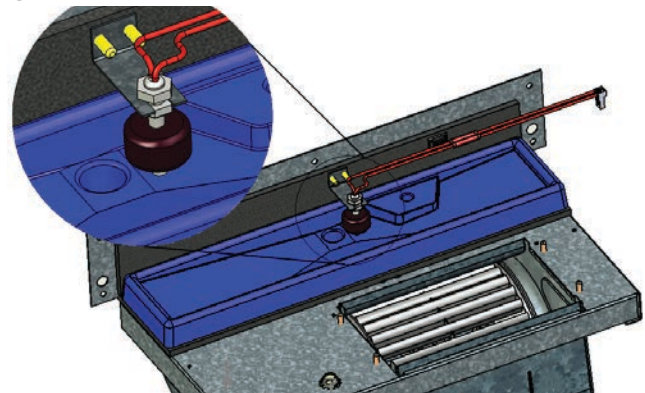
Condensate Overflow Detection Device

The condensate overflow detection device is a factory-installed option on fan coils. This device has a condensate overflow float with dry contacts and is connected to the LV interface board or other controllers. See Figure 22.

If you suspect it is not working properly, check to be sure that the float is installed straight up with the proper elevation. See [Accessing/removing the main drain pan and motor assembly on page 22](#) for instructions on removing the main drain pan to access the device.

The condensate overflow switch needs to be wired to the proper controller (T170 for example) to shut off the fan if water is present in the drain pan.

Figure 22: Condensate Overflow Switch Installation



Leveling Legs Option

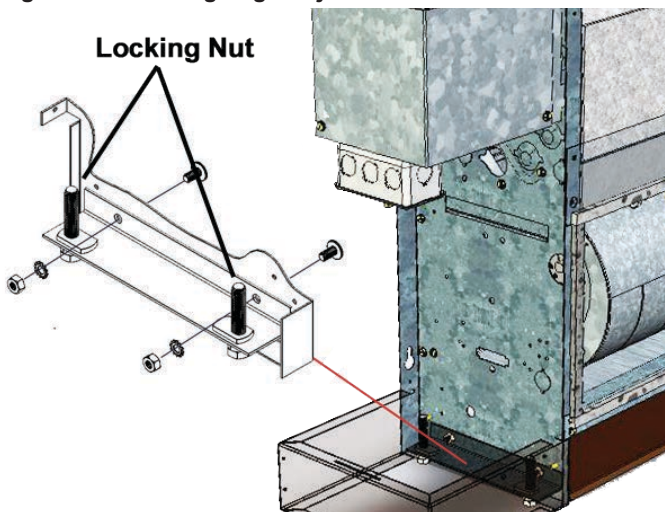
Field or factory-installed kits are available with 0" to 1" adjustment for positive leveling of floor-mounted units.

Height Adjustment

To adjust the height of a leveling leg:

1. Loosen the locking nut on the leveling leg bolt with a 9/16-inch wrench.
2. Turn the leveling leg bolt clockwise to lower the unit or counterclockwise to raise it.
3. When you are finished adjusting the height, hold the leveling leg bolt in place and draw the locking nut up tight against the mounting bracket.

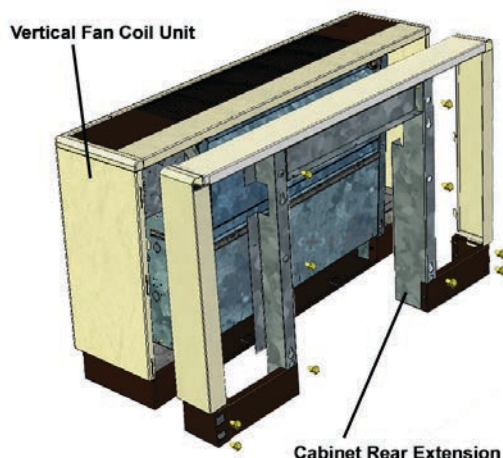
Figure 23: Leveling Legs Adjustment



Cabinet Rear Extension Kit

The field-installed cabinet rear extension option may be utilized to place the fan coil farther out from the wall than the standard cabinet. Refer to IM 1024 of the Addendum for more details.

Figure 24: Cabinet Rear Extension Kit



Electric Heat Over-Temp Reset Button



Personal Injury Hazard.

Power supply can cause electrical shock. Always disconnect power to unit before servicing.

The electric heat options comes with two over-temperature switches. The first resets automatically when the over-temperature condition no longer exists. The second, backup switch must be reset manually.

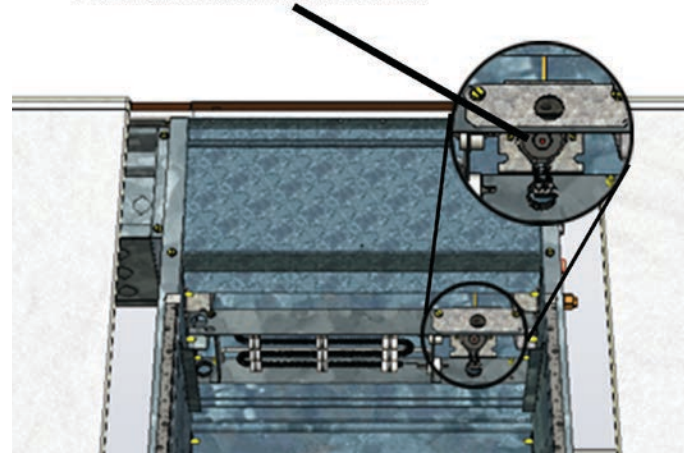
NOTE: The need to reset the manual switch may indicate that there are improperly functioning system components. If the switch trips again, contact Daikin Factory Service for help in diagnosing the cause.

To reset the manual switch, carry out the following steps:

1. Disconnect all power to the unit. Verify the power has been disconnected.
2. Remove the main drain pan and motor assembly from the unit. See [Accessing/removing the main drain pan and motor assembly on page 22](#).
3. Access and push in the red reset button. See [Figure 25](#).
4. Reinstall the drain pan and motor assembly.
5. Reconnect the power

Figure 25: Electric Heat Over-Temp Reset Button Location

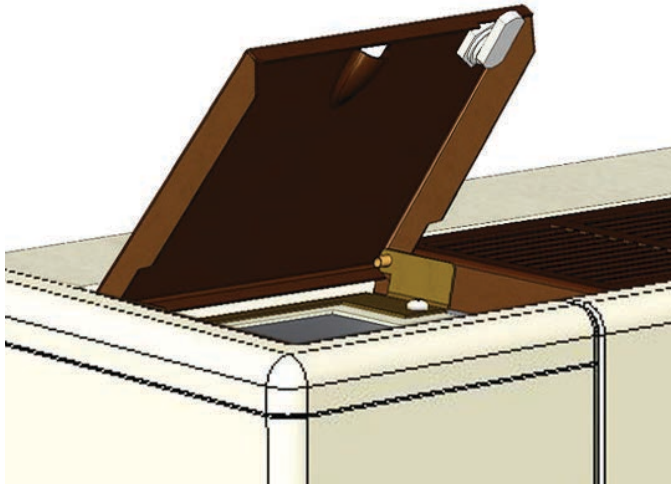
Push the Red Reset Button



Key-lock Access Door Kit

The key-lock access door kit (see [Figure 26](#)) can be installed on ThinLine cabinet units to prevent access to unit controls. For detailed installation information, refer to [IM 1021](#) of the Addendum.

Figure 26: Key-Lock Access Door Kit



General Maintenance

Normal maintenance on all units is generally limited to filter changes and cleaning the condensate drain pans. Units are provided with permanently lubricated motors and require no oiling.

Record performance measurements of volts, amps, and water temperature differences (both heating and cooling). A comparison of logged data with start-up and other annual data is useful as an indicator of general equipment condition.

Filter Changes

Filter changes are required at regular intervals. The time period between changes will depend upon the project requirements. Some applications, such as motels, produce a lot of lint from carpeting and linen changes, and will require more frequent filter changes. Check filters at 60-day intervals for the first year until experience is acquired. If light cannot be seen through the filter when held up to sunlight or a bright light, it should be changed. A more critical standard may be desirable.

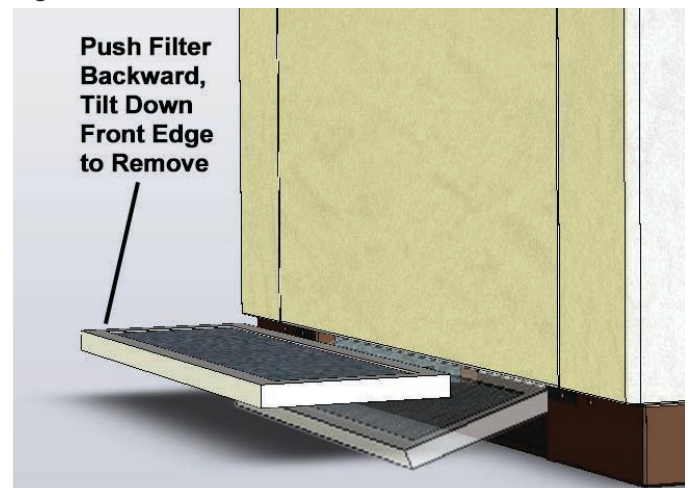
Filters may be removed without removing any panels. See [Figure 27](#). However, if the unit is equipped with a return air grille, this must first be removed to access the filter. To remove the filter:

1. Slide your hands under the front opening on the bottom of the unit and feel for the filter above.
2. Slide your fingers along the bottom of the filter until they reach the rear paperboard edge.
3. Push the paperboard edge backward about a half-inch until the front edge of the filter drops down.
4. Remove the filter from under the unit.

To install a new filter:

1. Slide the filter under the unit and tilt its rear edge upward and into the pocket at the rear of the filter housing.
2. Push the front edge of the filter backward until it clears the front lip on the filter housing, then push it up and into place.

Figure 27: Filter Removal



Condensate Drain Pans

The main and secondary condensate drain pans should be checked annually and cleaned and flushed as required. See [Figure 28](#).

Accessing the secondary drain pan

To access the secondary drain pan, remove the corner panel from the side of the unit where the main piping connections are made (this is opposite the side where the control access panel is located on units with unit-mounted controls. See [Figure 5](#) on [page 7](#) for a description of how to remove it.

Accessing/removing the main drain pan and motor assembly

The main drain pan is housed in the top of the unit's fan deck. Both the fan deck and the main condensate drain pan are easily removed for access and cleaning as follows.

1. Disconnect electrical power to the unit.
2. Remove the two screws that attach the center panel of the unit to the base (see [Figure 5](#)).
3. Lift the center panel upward and off the unit.
4. Pull the main condensate drain line out of the side of the chassis where it flows into the secondary drain pan.
5. Disconnect the fan motor wiring harness by removing the plug where it attaches to the connector on the side of the chassis. See [Figure 29](#).

NOTE: Push the tabs inward on the sides of the plug to free it from the connector base.

6. Remove the screws that attach the fan deck to the unit chassis. See [Figure 28](#)
7. Firmly grasp the fan deck, then slide it towards you and out of the unit.
8. The main condensate drain pan sits atop the fan deck and is now easily accessed for cleaning.
9. To reinstall, follow these steps in reverse order.

Figure 28: Drain Pan Locations

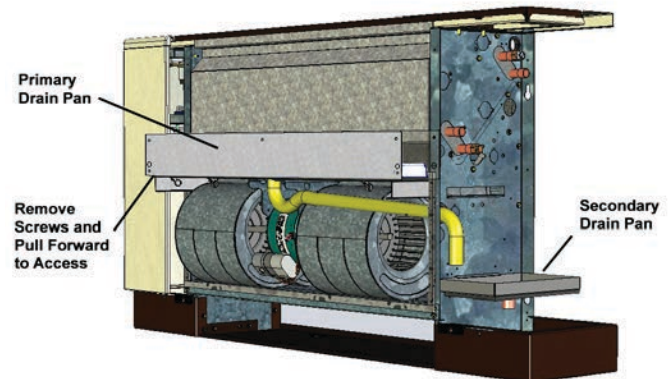
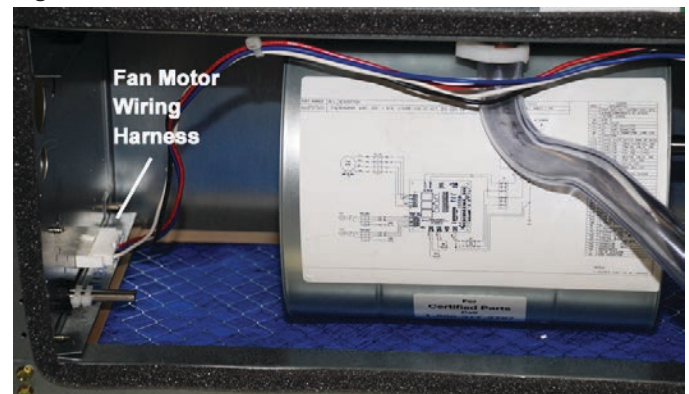


Figure 29: Motor Connector Location



Unit Data

Table 2: Unit Data

| Unit Size | 02 | 03 | 04 | 06 | 08 | 10 | 12 |
|--|--------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Primary Coil | | | | | | | |
| Face Area, ft² (cm²) | 0.74 (685) | 1.08 (1004) | 1.43 (1323) | 2.11 (1962) | 2.46 (2281) | 3.14 (2917) | 3.83 (3559) |
| Fins/inch (cm) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) |
| Coil Connection | 1/2" Nominal copper female (5/8" OD) | | | | | | |
| Coil Dimensions | | | | | | | |
| 2-Row L × D × H, in (cm) | 11.8 × 1.7 × 9 (30.0×4.4×22.9) | 17.3 × 1.7 × 9 (43.9×4.4×22.9) | 22.8 × 1.7 × 9 (57.9×4.4×22.9) | 33.8 × 1.7 × 9 (85.9×4.4×22.9) | 39.3× 1.7 × 9 (99.8×4.4×22.9) | 50.2 × 1.7 × 9 (127.6×4.4×22.9) | 61.3 × 1.7 × 9 (155.7×4.4×22.9) |
| 3-Row L × D × H, in (cm) | 11.8 × 2.6 × 9 (30×6.6×22.9) | 17.3 × 2.6 × 9 (43.9×6.6×22.9) | 22.8 × 2.6 × 9 (57.9×6.6×22.9) | 33.8 × 2.6 × 9 (85.9×6.6×22.9) | 39.3 × 2.6 × 9 (99.8×6.6×22.9) | 50.2 × 2.6 × 9 (127.6×6.6×22.9) | 61.3 × 2.6 × 9 (155.7×6.6×22.9) |
| 4-Row L × D × H, in (cm) | 11.8 × 3.5 × 9 (30.0×8.8×22.9) | 17.3 × 3.5 × 9 (43.9×8.8×22.9) | 22.8 × 3.5 × 9 (57.9×8.8×22.9) | 33.8 × 3.5 × 9 (85.9×8.8×22.9) | 39.3 × 3.5 × 9 (99.8×8.8×22.9) | 50.2 × 3.5 × 9 (127.6×8.8×22.9) | 61.3 × 3.5 × 9 (155.7×8.8×22.9) |
| Coil Volume, Gal (Liters) | | | | | | | |
| 2-Row | 0.15 (0.6) | 0.19 (0.7) | 0.24 (0.9) | 0.32 (1.2) | 0.37 (1.4) | 0.46 (1.7) | 0.55 (2.1) |
| 3-Row | 0.20 (0.7) | 0.26 (1.0) | 0.32 (1.2) | 0.45 (1.7) | 0.52 (2.0) | 0.64 (2.4) | 0.77 (2.9) |
| 4-Row | 0.26 (1.0) | 0.34 (1.3) | 0.43 (1.6) | 0.61 (2.3) | 0.70 (2.6) | 0.87 (3.3) | 1.05 (4.0) |
| Reheat Coil Data: 1-Row, Hot Water or Steam | | | | | | | |
| Face Area, ft² (cm²) | 0.49 (456) | 0.72 (669) | 0.95 (882) | 1.41 (1308) | 1.64 (1521) | 2.09 (1944) | 2.55 (2372) |
| Fins/inch (cm) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) |
| Coil Connection | 1/2" Nominal copper female (5/8" OD) | | | | | | |
| L × D × H, in (cm) | 11.8 × 0.9 × 6 (30.0×2.2×15.2) | 17.3 × 0.9 × 6 (43.9×2.2×15.2) | 22.8 × 0.9 × 6 (57.9×2.2×15.2) | 33.8 × 0.9 × 6 (85.9×2.2×15.2) | 39.3 × 0.9 × 6 (99.8×2.2×15.2) | 50.2 × 0.9 × 6 (127.6×2.2×15.2) | 61.3 × 0.9 × 6 (155.7×2.2×15.2) |
| Volume, Gal (Liters) | 0.04 (0.1) | 0.05 (0.2) | 0.07 (0.3) | 0.10 (0.4) | 0.11 (0.4) | 0.14 (0.5) | 0.17 (0.7) |
| Preheat Coil Data, 2-Row, Hot Water or Steam | | | | | | | |
| Face Area, ft² (cm²) | 0.49 (456) | 0.72 (669) | 0.95 (882) | 1.41 (1308) | 1.64 (1521) | 2.09 (1944) | 2.55 (2372) |
| Fins/inch (cm) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) | 12 (4.7) |
| Coil Connection | 1/2" Nominal copper female (5/8" OD) | | | | | | |
| L × D × H, in. (cm) | 11.8 × 1.7 × 6 (30.0×4.4×15.2) | 17.3 × 1.7 × 6 (43.9×4.4×15.2) | 22.8 × 1.7 × 6 (57.9×4.4×15.2) | 33.8 × 1.7 × 6 (85.9×4.4×15.2) | 39.3 × 1.7 × 6 (99.8×4.4×15.2) | 50.2 × 1.7 × 6 (127.6×4.4×15.2) | 61.3 × 1.7 × 6 (155.7×4.4×15.2) |
| Volume, Gal (Liters) | 0.08 (0.3) | 0.10 (0.4) | 0.13 (0.5) | 0.19 (0.7) | 0.22 (0.8) | 0.29 (1.1) | 0.35 (1.3) |
| Fan/Motor Data | | | | | | | |
| Fan Quantity | 1 | 1 | 2 | 2 | 3 | 4 | 4 |
| Size, Dia. × W in (cm) | 6.26 × 6.3 (15.9 × 16) | 7.95 × 6.3 (20 × 16) | 6.26 × 6.3 (15.9 × 16) | 7.95 × 6.3 (20 × 16) | 6.26 × 6.3 (15.9 × 16) | 6.26 × 6.3 (15.9 × 16) | 7.95 × 6.3 (20 × 16) |
| Motor Quantity | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| Filter Data | | | | | | | |
| Part Number | 668332901 | 668332902 | 668332903 | 668332907 | 668332905 | 668332906 | 668332904 |
| 1" (25.4 cm) Media | TA only | TA only | TA only | TA only | TA only | TA only | TA only |
| Quantity | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| L × D × H, in. (cm) | 16 × 8.75 × 1 (40.6 × 22 × 2.5) | 21.5 × 8.75 × 1 (54.6 × 22 × 2.5) | 27 × 8.75 × 1 (68.5 × 22 × 2.5) | 38 × 8.75 × 1 (96.5 × 22 × 2.5) | 21.7 × 8.75 × 1 (56.1 × 22 × 2.5) | 27.2 × 8.75 × 1 (69.0 × 22 × 2.5) | 32.7 × 8.75 × 1 (83.1 × 22 × 2.5) |

Shipping Weights

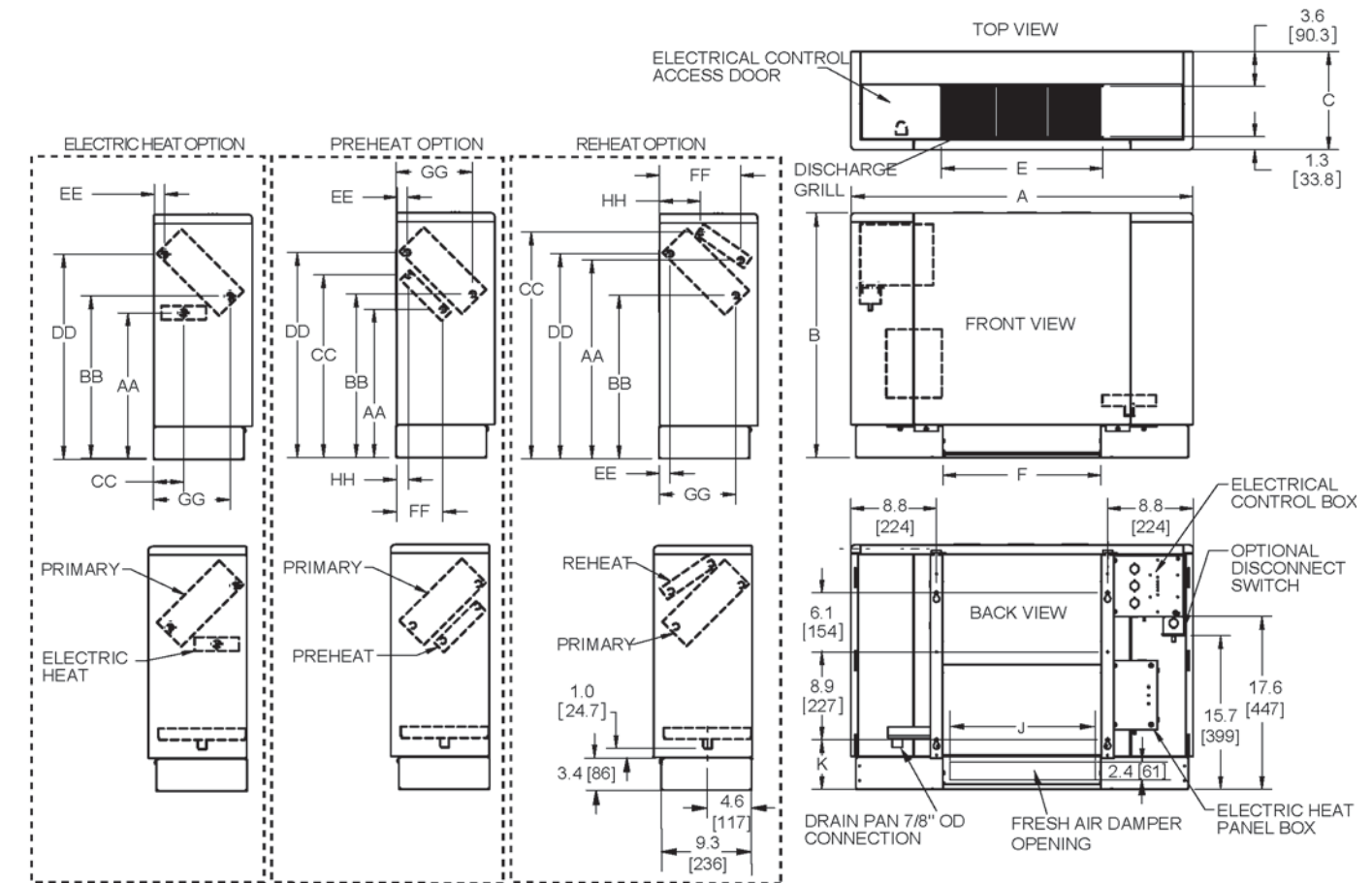
Table 3: Approximate Shipping Weights - lbs (kg)*

| Unit Type | Unit Size | | | | | | |
|-----------|-----------|---------|----------|----------|----------|----------|----------|
| | S02 | S03 | S04 | S06 | S08 | S10 | S12 |
| FCVC,FCVS | 84 (38) | 95 (43) | 108 (49) | 131 (60) | 152 (69) | 177 (80) | 202 (92) |
| FCVH | 55 (25) | 63 (29) | 74 (34) | 91 (41) | 110 (50) | 129 (59) | 149 (68) |

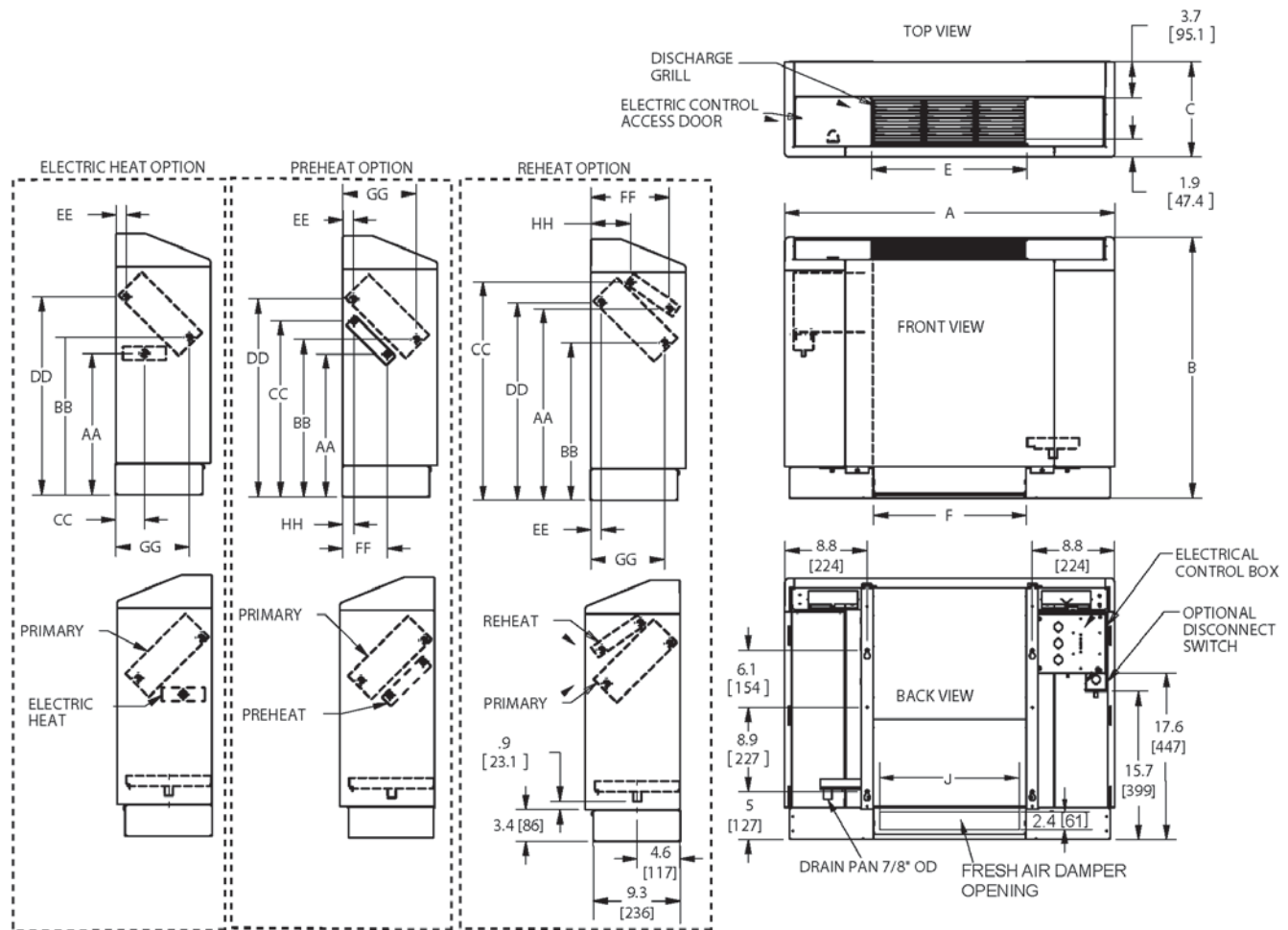
Note: *Approximate shipping weights do not include valve packages, hot water coils, electric heaters or other options.

Unit Dimensions

Figure 30: Dimensions: Flat Top Fan Coils

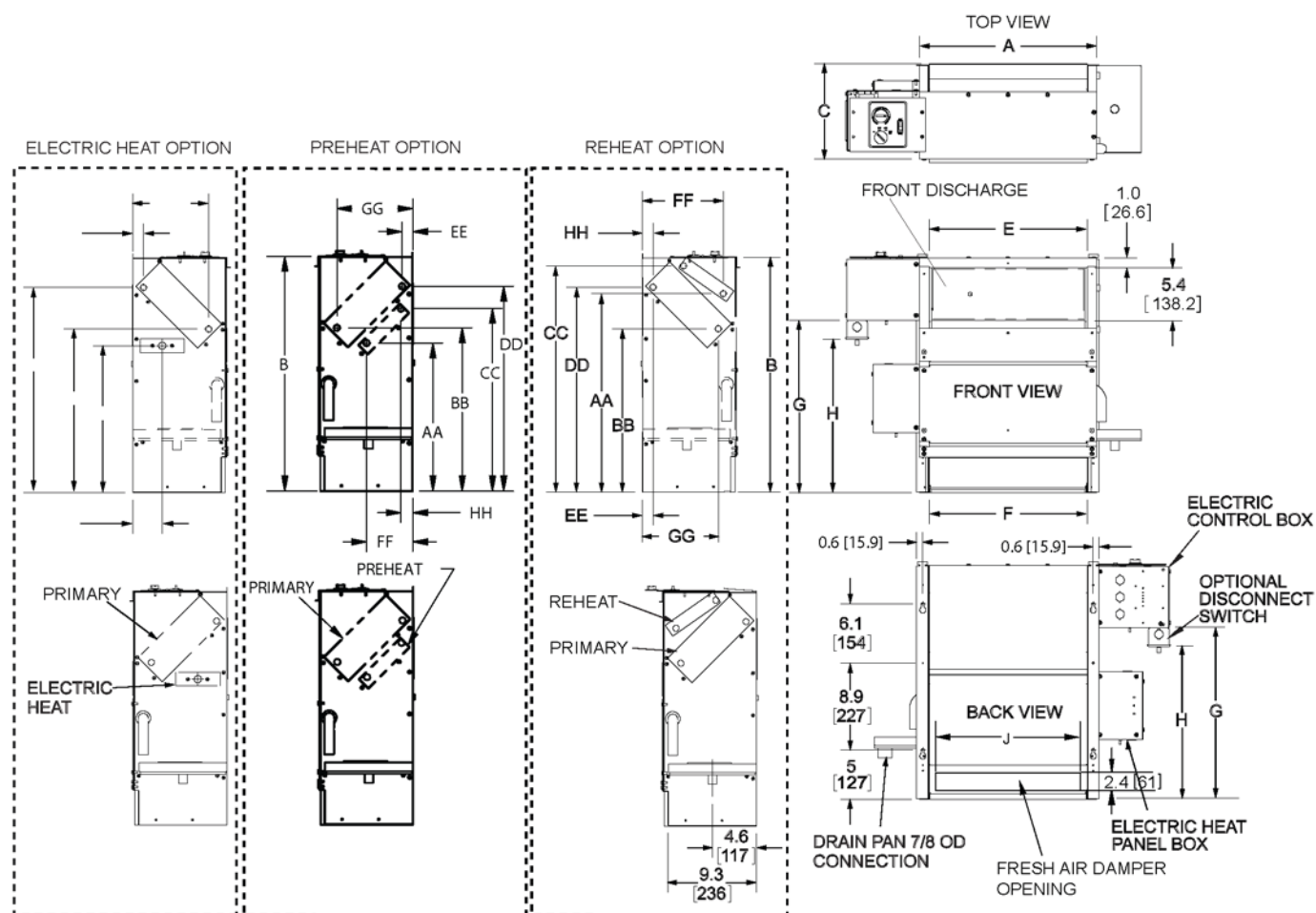


| Dimension inch (mm) | | S02 | S03 | S04 | S06 | S08 | S10 | S12 |
|-----------------------------|----|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Unit Width | A | 35.0 (889) | 40.5 (1029) | 46.0 (1168) | 57.0 (1448) | 62.5 (1588) | 73.5 (1867) | 84.5 (2146) |
| Unit Height | B | 25.0 (635) | 25.0 (635) | 25.0 (635) | 25.0 (635) | 25.0 (635) | 25.0 (635) | 25.0 (635) |
| Unit Depth | C | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) |
| Discharge Grille - Width | E | 16.3 (414) | 21.8 (554) | 27.3 (693) | 38.3 (973) | 43.8 (1113) | 54.8 (1392) | 65.8 (1671) |
| Return Air Opening - Width | F | 16.2 (411) | 21.7 (551) | 27.2 (691) | 38.2 (970) | 43.7 (1110) | 54.7 (1389) | 65.7 (1669) |
| Electric Heat Connection | AA | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) |
| | CC | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) |
| Primary Coil - Water Return | DD | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) |
| | EE | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) |
| Primary Coil - Water Supply | BB | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) |
| | GG | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) |
| Preheat Coil - Water Return | CC | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) |
| | HH | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) |
| Preheat Coil - Water Supply | AA | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) |
| | FF | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) |
| Reheat Coil - Water Return | CC | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) |
| | HH | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) |
| Reheat Coil - Water Supply | AA | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) |
| | FF | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) |

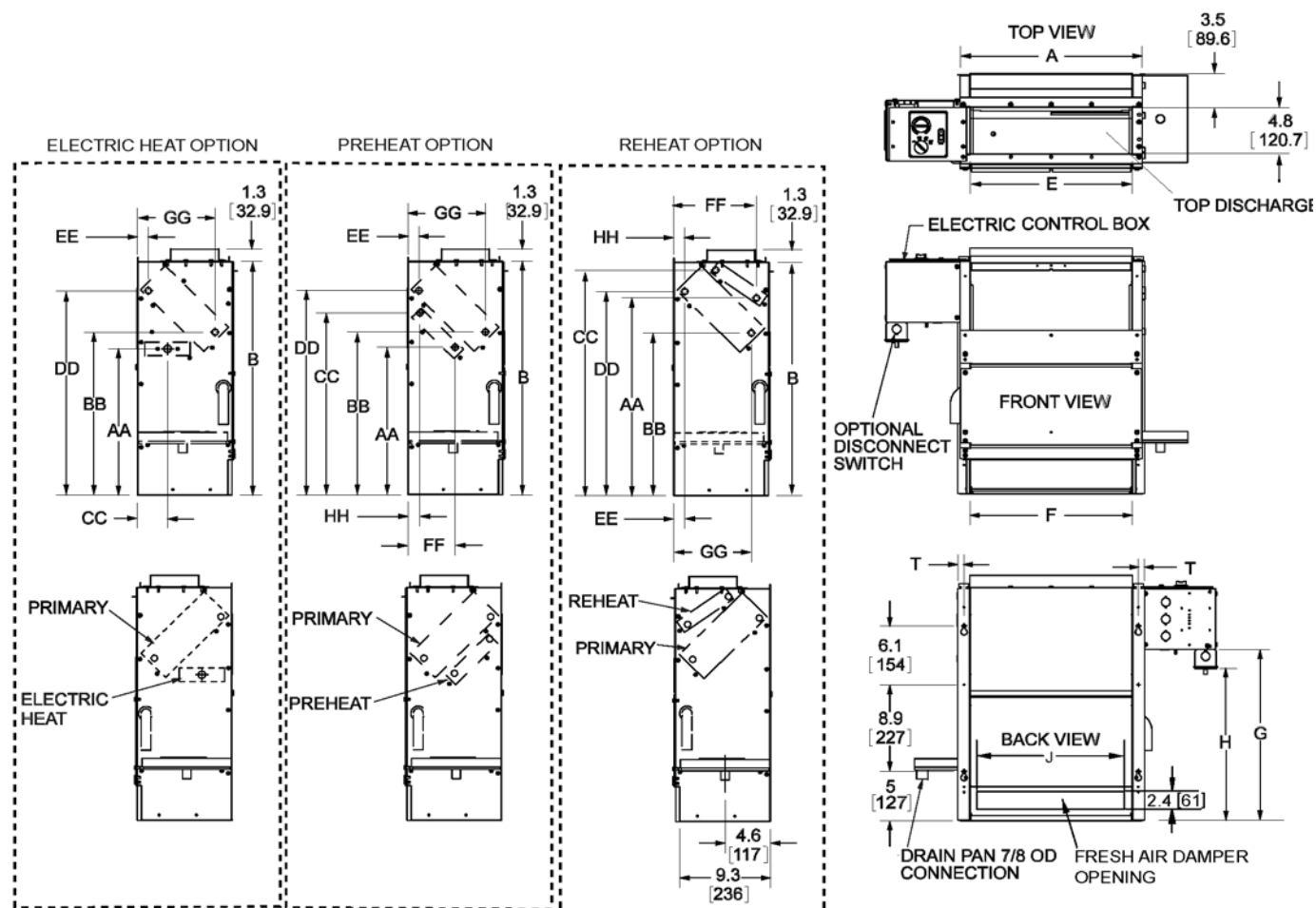
Figure 31: Dimensions: Slope Top Fan Coils


| Dimension inch (mm) | | S02 | S03 | S04 | S06 | S08 | S10 | S12 |
|-----------------------------|----|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Unit Width | A | 35.0 (889) | 40.5 (1029) | 46.0 (1168) | 57.0 (1448) | 62.5 (1588) | 73.5 (1867) | 84.5 (2146) |
| Unit Height | B | 27.6 (701) | 27.6 (701) | 27.6 (701) | 27.6 (701) | 27.6 (701) | 27.6 (701) | 27.6 (701) |
| Unit Depth | C | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) | 10.0 (254) |
| Discharge Grille - Width | E | 16.3 (414) | 21.8 (554) | 27.3 (693) | 38.3 (973) | 43.8 (1113) | 54.8 (1392) | 65.8 (1671) |
| Return Air Opening - Width | F | 16.2 (411) | 21.7 (551) | 27.2 (691) | 38.2 (970) | 43.7 (1110) | 54.7 (1389) | 65.7 (1669) |
| Electric Heat Connection | AA | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) |
| | CC | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) |
| Primary Coil - Water Return | DD | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) |
| | EE | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) |
| Primary Coil - Water Supply | BB | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) |
| | GG | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) |
| Preheat Coil - Water Return | CC | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) |
| | HH | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) |
| Preheat Coil - Water Supply | AA | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) |
| | FF | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) |
| Reheat Coil - Water Return | CC | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) |
| | HH | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) |
| Reheat Coil - Water Supply | AA | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) |
| | FF | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) |

Figure 32: Dimensions: Hideaway, Front-Discharge Fan Coils



| Dimension inch (mm) | | S02 | S03 | S04 | S06 | S08 | S10 | S12 |
|-----------------------------|----|------------|------------|------------|-------------|-------------|-------------|-------------|
| Unit Width | A | 18.8 (475) | 24.3 (617) | 29.8 (757) | 40.8 (1036) | 46.3 (1176) | 57.3 (1455) | 68.3 (1735) |
| Unit Height | B | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) |
| Unit Depth | C | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) |
| Discharge Grille - Width | E | 16.3 (414) | 21.8 (554) | 27.3 (693) | 38.3 (973) | 43.8 (1113) | 54.8 (1392) | 65.8 (1671) |
| Return Air Opening - Width | F | 16.2 (411) | 21.7 (551) | 27.2 (691) | 38.2 (970) | 43.7 (1110) | 54.7 (1389) | 65.7 (1669) |
| Control Box to Floor | G | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) |
| Disconnect Switch to Floor | H | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) |
| Electric Heat Connection | AA | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) |
| | CC | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) |
| Primary Coil - Water Return | DD | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) |
| | EE | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) |
| Primary Coil - Water Supply | BB | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) |
| | GG | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) |
| Preheat Coil - Water Return | CC | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) |
| | HH | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) |
| Preheat Coil - Water Supply | AA | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) |
| | FF | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) |
| Reheat Coil - Water Return | CC | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) |
| | HH | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) |
| Reheat Coil - Water Supply | AA | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) |
| | FF | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) |

Figure 33: Dimensions: Hideaway, Top-Discharge Fan Coils


| Dimension inch (mm) | | S02 | S03 | S04 | S06 | S08 | S10 | S12 |
|-----------------------------|----|------------|------------|------------|-------------|-------------|-------------|-------------|
| Unit Width | A | 18.8 (475) | 24.3 (617) | 29.8 (757) | 40.8 (1036) | 46.3 (1176) | 57.3 (1455) | 68.3 (1735) |
| Unit Height | B | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) | 24.0 (610) |
| Unit Depth | C | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) | 9.6 (243) |
| Discharge Grille - Width | E | 16.3 (414) | 21.8 (554) | 27.3 (693) | 38.3 (973) | 43.8 (1113) | 54.8 (1392) | 65.8 (1671) |
| Return Air Opening - Width | F | 16.2 (411) | 21.7 (551) | 27.2 (691) | 38.2 (970) | 43.7 (1110) | 54.7 (1389) | 65.7 (1669) |
| Control Box to Floor | G | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) | 17.6 (447) |
| Disconnect Switch to Floor | H | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) | 15.7 (399) |
| Electric Heat Connection | AA | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) | 15.1 (384) |
| | CC | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) | 3.0 (76) |
| Primary Coil - Water Return | DD | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) | 21 (533) |
| | EE | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) | 1.1 (28) |
| Primary Coil - Water Supply | BB | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) | 16.7 (424) |
| | GG | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) | 7.8 (198) |
| Preheat Coil - Water Return | CC | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) | 18.7 (475) |
| | HH | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) | 1.2 (30) |
| Preheat Coil - Water Supply | AA | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) | 15 (381) |
| | FF | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) | 4.7 (119) |
| Reheat Coil - Water Return | CC | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) | 23.2 (589) |
| | HH | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) | 4.2 (107) |
| Reheat Coil - Water Supply | AA | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) | 20.3 (516) |
| | FF | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) | 8.3 (211) |

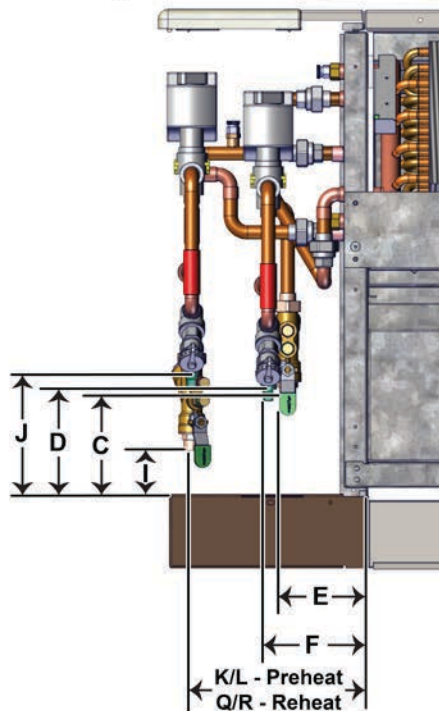
Factory-Installed Valve and Piping Packages

NOTE: Deluxe valve packages are shown. All valve packages, regardless of components included, have the similar hookup locations. Left hand connections are shown here. Right hand connection distances are the same. Distances to connections are from the

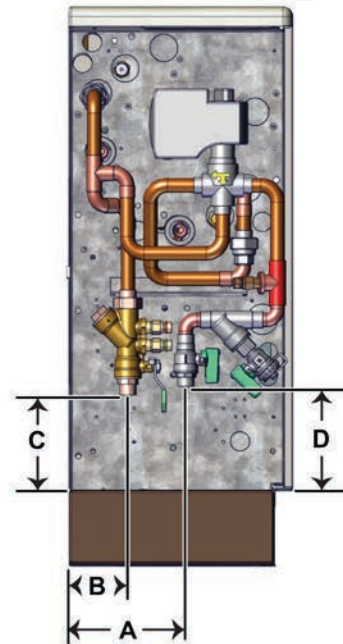
chassis-side panel (visible panel face on the end), back of the unit, and top of lateral/end sub-bases (which has 3.1" of height, not considering height extensions). Dimensions may vary slightly from given values.

Figure 34: Hook

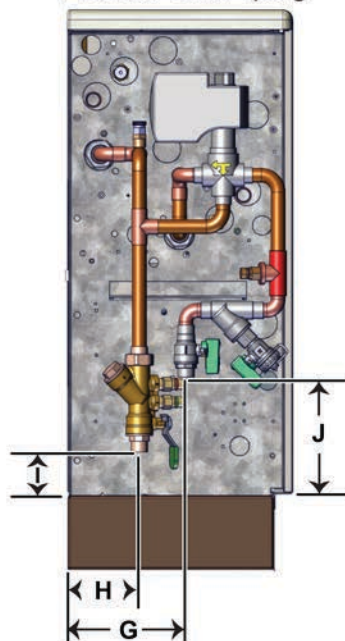
Front View - Left Hand
Primary and Secondary Coil Piping



End View - Left Hand
Primary Coil Piping



End View - Left Hand
Preheat Coil Piping



End View - Left Hand
Reheat Coil Piping

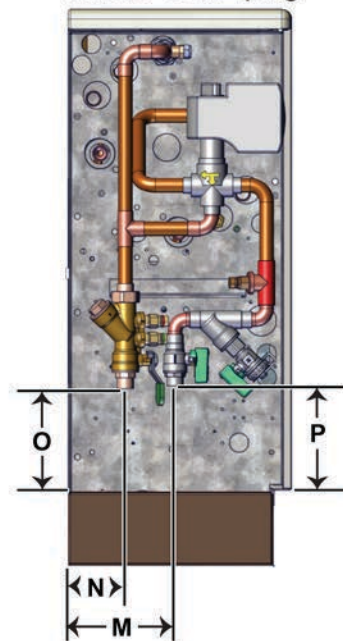


Figure 35: Hook Up Locations: 4-Pipe Arrangement with Opposite-End Preheat

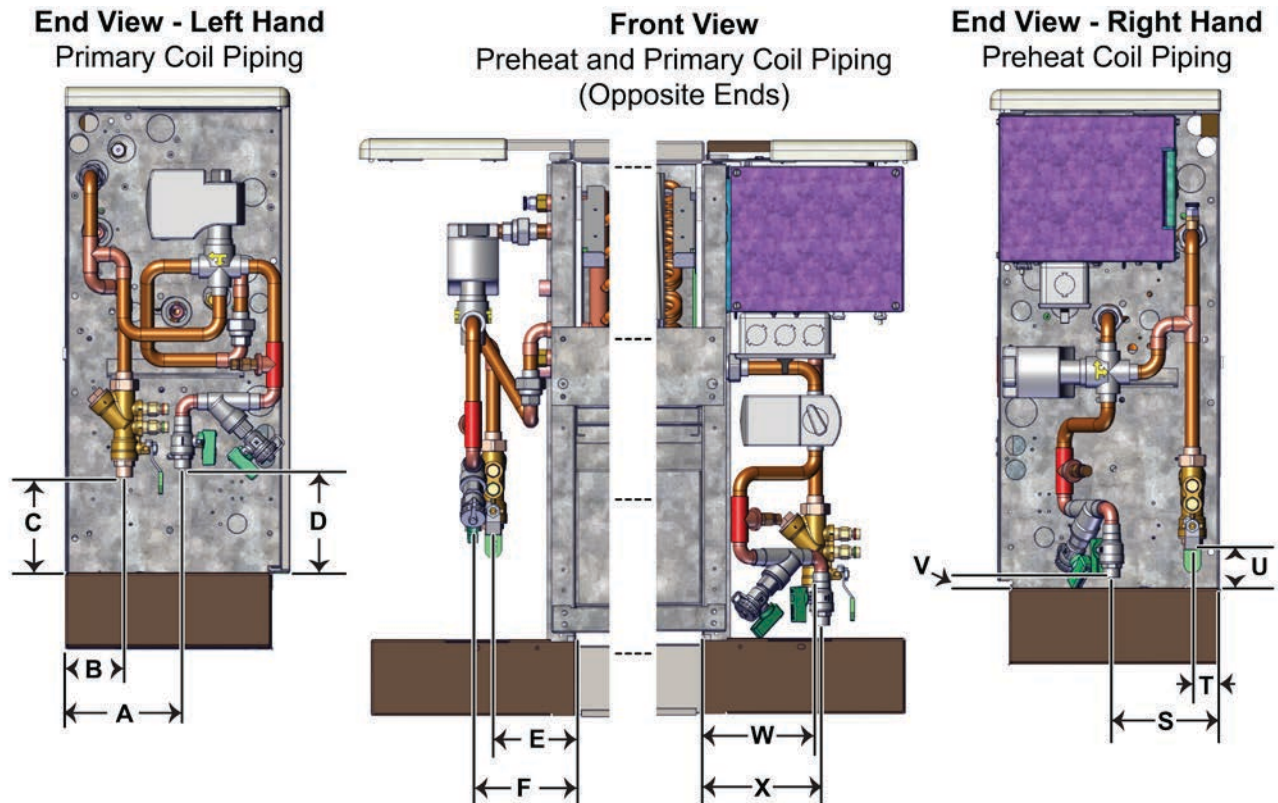


Figure 36: Hook Up Locations: 2-Pipe Arrangement

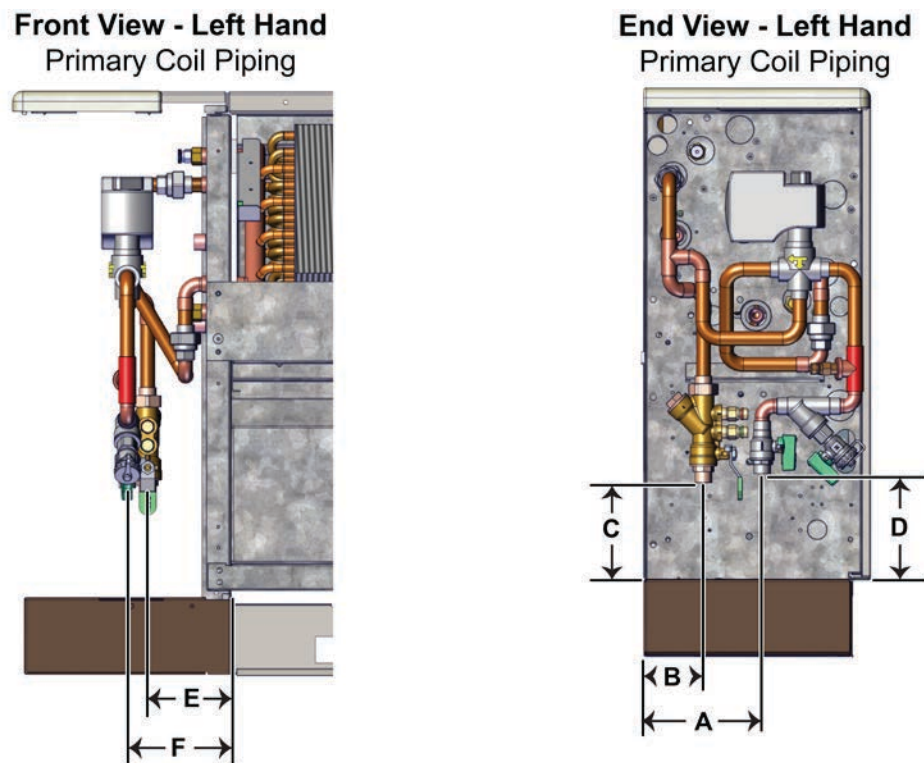


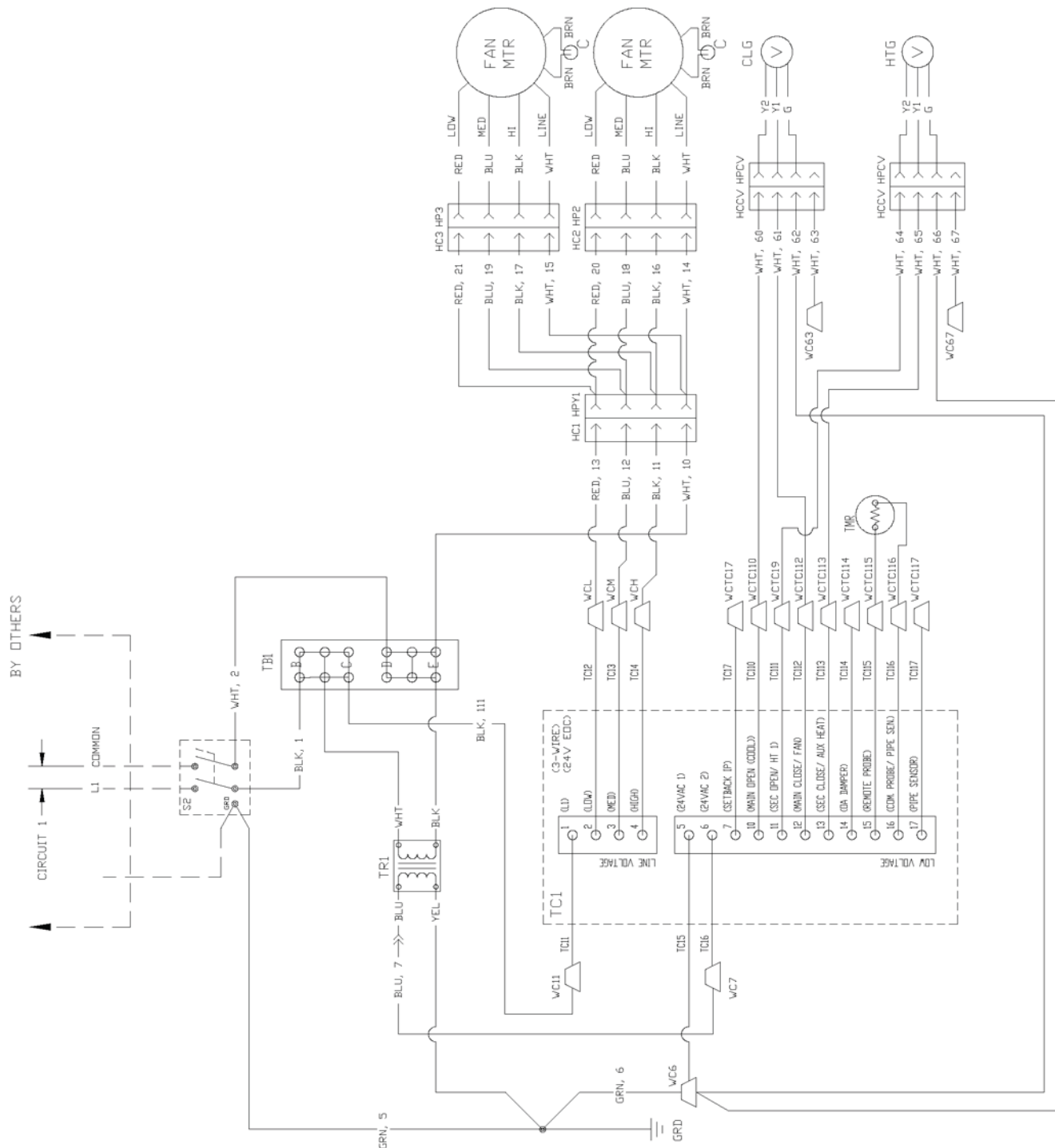
Table 4: Hook Up Location Dimensions as referenced in Figure 34, Figure 35, and Figure 36

| Style | Primary | | Preheat | | | Reheat | | | Preheat (Opposite End) | | |
|------------|------------|-----|---------|-----|---|--------|-----|---|------------------------|-----|-----|
| | Dimensions | | | | | | | | | | |
| | B | F | H | K | L | N | Q | R | S | T | V |
| All Styles | 2.7 | 4.4 | 3.4 | 7.8 | | 2.5 | 7.3 | | 4.9 | 1.4 | 0.3 |

Table 5: Hook Up Location Dimensions as referenced in Figure 34, Figure 35, and Figure 36

| | Unions | Style | Primary | | | | Preheat | | | | Preheat (Opposite End) | | | Reheat | | |
|-------------|------------------------|---------------------------------------|------------|---------------|---------------|-----|---------|---------------|---------------|---------------|------------------------|-----|-----|---------------|---------------|--|
| | | | Dimensions | | | | | | | | | | | | | |
| | | | A | C (Return) | D (Supply) | E | G | I (Return) | J (Supply) | U (Return) | W | X | M | O (Return) | P (Supply) | |
| 2 and 3-Way | With or Without Unions | Deluxe and Enhanced Packages | 5.3 | - | - | - | - | - | - | - | - | - | 4.8 | - | - | |
| | | Premium and Basic Packages | 5.7 | - | - | - | 5.8 | - | - | - | - | - | 5.2 | - | - | |
| | Only With Unions | Deluxe Packages | - | - | - | - | - | - | - | - | 6.4 | 3.8 | - | - | - | |
| 2-Way | With or Without Unions | All 2-Way Packages | - | 4.8 | - | 3.8 | - | 2.1 | 5.1 | 0.9 | - | - | - | 4.1 | 4.8 | |
| | | Deluxe and Enhanced Packages | - | - | 5.4 | - | 5.5 | - | - | - | - | - | - | - | - | |
| | | Premium and Basic Packages | - | - | 4.7 | - | - | - | - | - | - | - | - | - | - | |
| | Only Without Unions | All 2-Way Packages | - | - | - | - | - | - | - | - | 6.4 | 6.5 | - | - | - | |
| | Only With Unions | Deluxe and Premium Packages | - | - | - | - | - | - | - | - | 4.5 | - | - | - | - | |
| | | Premium Packages | - | - | - | - | - | - | - | - | - | 3.5 | - | - | - | |
| | | Basica and Enhanced Packages | - | - | - | - | - | - | - | - | 6.4 | 6.5 | - | - | - | |
| 3-Way | With or Without Unions | All 3-Way Packages | - | 4.4 | 4.8 | 3.6 | - | - | 5.2 | - | - | - | - | 4.9 | 5.0 | |
| | | Deluxe and Enhanced Packages | - | - | - | - | 5.4 | - | - | - | - | - | - | - | - | |
| | | Deluxe and Premium Packages | - | - | - | - | - | 1.8 | - | 1.4 | - | - | - | - | - | |
| | | Basic and Enhanced Packages | - | - | - | - | - | 3.6 | - | 0.9 | - | - | - | - | - | |
| | Only With Unions | All 3-Way Packages | - | - | - | - | - | - | - | - | - | 4.5 | - | - | - | |
| | Only Without Unions | All 3-Way Packages | - | - | - | - | - | - | - | - | - | 6.5 | - | - | - | |
| | | Deluxe Packages | - | - | - | - | - | - | - | - | 6.4 | - | - | - | - | |
| | | Premium, Basic, and Enhanced Packages | - | - | - | - | - | - | - | - | 4.5 | - | - | - | - | |

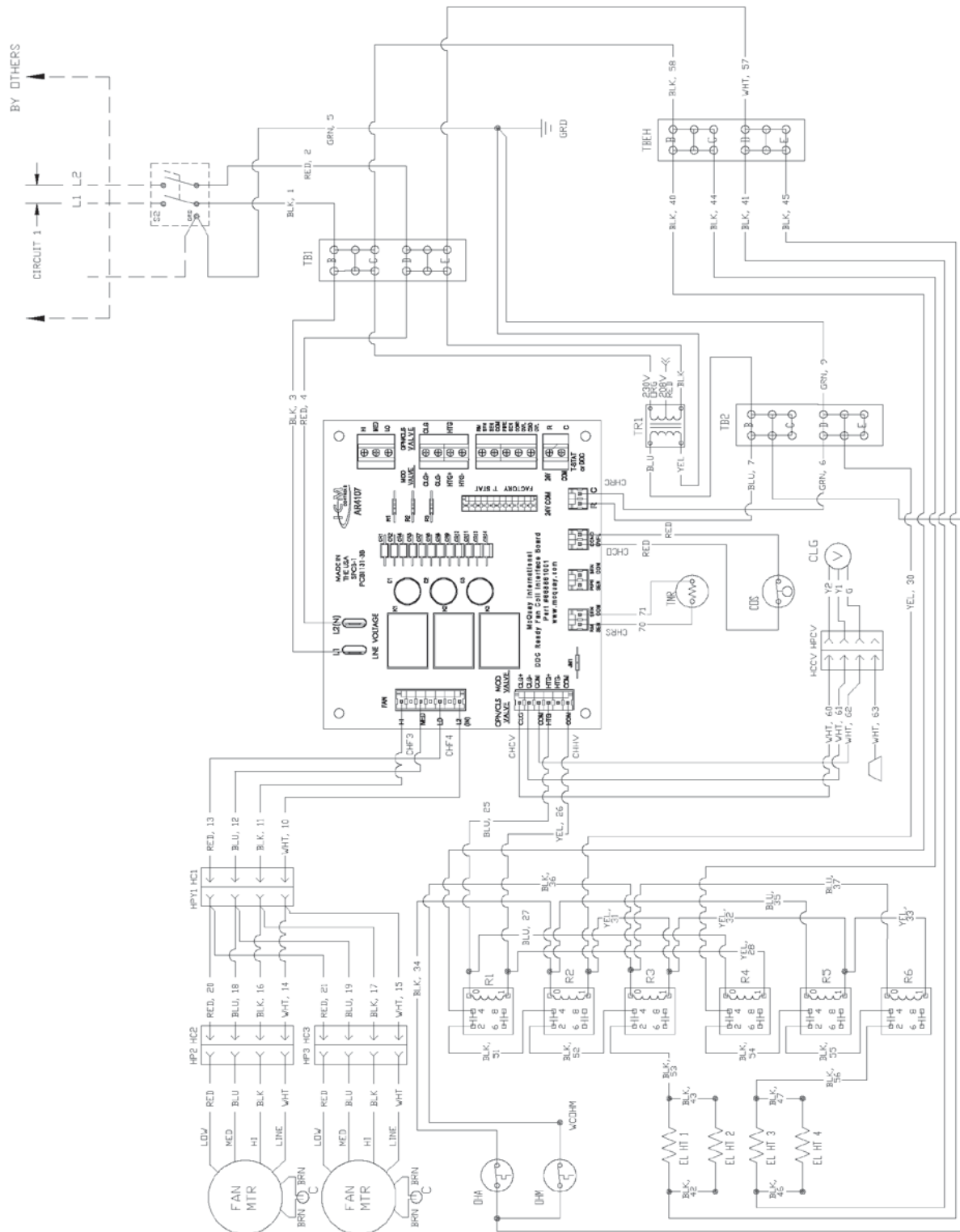
Figure 37: Fan Coil Wiring Diagram - Typical with Solid-State Thermostat



NOTE: All field installed conductors should have an insulation rating of 300 volts or greater.

IM 980-9 • VERTICAL FAN COIL

Figure 39: Fan Coil Wiring Diagram - Typical with Electric Heat and Low-Voltage Interface Board



NOTE: All field installed conductors should have an insulation rating of 300 volts or greater.

Table 6: Model Number Description: Fields 1 - 21

| Field | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|-------|----|----|---|----|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| Code | FC | VC | 1 | 02 | A | A | G | M | Y | YY | W | 3 | 12 | R | F | T | YY | 12 | Y | Y | N |

- | | |
|--|---|
| <p>1. Unit Type</p> <ul style="list-style-type: none"> • FC = fan coil • FH = cabinet unit heater <p>2. Product Identifier</p> <ul style="list-style-type: none"> • VC = vertical cabinet, flat top • VH = vertical hideaway • VS = vertical cabinet, slope top • WC = wall-hung cabinet <p>3. Design Series</p> <ul style="list-style-type: none"> • 1 = Design 1 <p>4. Unit Size - nominal capacity</p> <ul style="list-style-type: none"> • 02 = 200 cfm • 03 = 300 cfm • 04 = 400 cfm • 06 = 600 cfm • 08 = 800 cfm • 10 = 1000 cfm • 12 = 1200 cfm • 14 = 1400 cfm <p>5. Volts/Hertz/Phase</p> <ul style="list-style-type: none"> • A = 115/60/1 • E = 208-230/60/1 • J = 265-277/60/1 <p>6. Coil fin type</p> <ul style="list-style-type: none"> • A = aluminum <p>7. Coil casing material</p> <ul style="list-style-type: none"> • G = galvanized <p>8. Coil air vent</p> <ul style="list-style-type: none"> • M = manual • A = auto <p>9. Coil coating</p> <ul style="list-style-type: none"> • Y = none <p>10. Not currently used</p> <ul style="list-style-type: none"> • YY = none <p>11. Primary Coil Type</p> <ul style="list-style-type: none"> • C = chilled water only • W = CW/HW 2-pipe • H = hot water only • S = steam | <p>12. Primary Coil Rows</p> <ul style="list-style-type: none"> • 2 = 2 row • 3 = 3 row • 4 = 4 row <p>13. Primary Coil Fins Per Inch</p> <ul style="list-style-type: none"> • 12 = 12 fins per inch <p>14. Primary Coil Connection Hand</p> <ul style="list-style-type: none"> • L = left hand • R = right hand <p>15. Primary Coil Piping Package</p> <ul style="list-style-type: none"> • F = factor installed • L = shipped loose • Y = none <p>16. Primary Coil Connection Type</p> <ul style="list-style-type: none"> • S = sweated • T = threaded • N = none <p>17. Preheat Coil Type</p> <ul style="list-style-type: none"> • E1 = electric single stage • W1 = 1-row water • W2 = 2-row water • S1 = 1-row steam • S2 = 2-row steam • YY = none <p>18. Preheat Coil Fins Per Inch</p> <ul style="list-style-type: none"> • 12 = 12 fins per inch <p>19. Preheat Coil Connection Hand</p> <ul style="list-style-type: none"> • L = left hand • R = right hand • Y = none <p>20. Preheat Coil Piping Package</p> <ul style="list-style-type: none"> • F = factor installed • L = shipped loose • Y = none <p>21. Preheat Coil Connection Type</p> <ul style="list-style-type: none"> • S = sweated • T = threaded • N = none |
|--|---|

Table 7: Model Number Description: Fields 21 - 41

| Field | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
|-------|----|----|----|----|----|----|----|-----|----|----|-----|----|----|----|----|----|----|----|----|----|
| Code | YY | W1 | 12 | R | F | T | Y | 000 | Y | P | PSC | S | 3 | Q | Y | MR | Y | D | Y | R |

22. Not currently used

- YY = none

23. Reheat Coil Type

- W1 = 1-row water
- S1 = 1-row steam
- YY = none

24. Reheat Coil Fins Per Inch

- 12 = 12 fins per inch

25. Reheat Coil Connection Hand

- L = left hand
- R = right hand
- Y = none

26. Reheat Coil Piping Package

- F = factor installed
- L = shipped loose
- Y = none

27. Reheat Coil Connection Type

- S = sweated
- T = threaded
- N = none

28. Electric Heat Power Supply

- A = 115-60-1
- E = 208-230/60/1
- J = 277-265/60/1
- Y = None

29. Electric Heat Wattage

- 005 = 0.5 kW Electric Heat
- 010 = 1.0 kW Electric Heat
- 015 = 1.5 kW Electric Heat
- 020 = 2.0 kW Electric Heat
- 025 = 2.5 kW Electric Heat
- 030 = 3.0 kW Electric Heat
- 040 = 4.0 kW Electric Heat
- 050 = 5.0 kW Electric Heat
- 060 = 6.0 kW Electric Heat
- 000 = None

30. Not currently used

- YY = none

31. Drain Pan Material

- P = plastic, non-corrosive
- S = stainless steel

32. Blower Motor Type

- PSC = PSC motor
- XXX = special

33. Discharge Conditions

- S = standard static

34. Motor Speed

- 3 = 3 speed

35. Motor Connections

- Q = quick connect

36. Not currently used

- YY = none

37. Fresh Air Damper

- MR = manual rear
- 2R = automatic, 2-position, rear
- ER = automatic, economizer
- XX = special
- YY = none

38. Not currently used

- YYY = none

39. Unit Disconnect Switch

- D = toggle disconnect switch
- X = special
- Y = none

40. Future Control Function

- Y = none

41. Control Type

- A = analog
- D = digital
- R = DDC Ready
- X = Special
- Y = None

Table 8: Model Number Description: Fields 43-59

| Field | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 |
|-------|----|----|----|----|-----|----|------|------|------|----|----|----|----|----|----|
| Code | Y | Y | Y | RL | MOR | Y | 3MOU | YYYY | 3MOU | Y | Y | C | Y | Y | Y |

42. Network Communication Card

- Y = none

43. Changeover Type

- Y = none
- A = auto
- M = manual
- U = user selectable

44. Programmability

- Y = none

45. Setpoint Adjustment

- YY = none
- UL = unit-mounted, +/- 3 degrees
- UF = unit-mounted, full range
- RL = remote-mounted, +/- 3 degrees
- RF = remote-mounted, full range

46. Fan Speed Control

- YYY = None
- MOU = manual, on/off, unit-mounted
- MOR = manual, on/off, remote-mounted
- MAU = manual, low/med/high, unit-mounted
- MAR = manual, low/med/high, remote-mounted
- MPU = manual, off/proportional, unit-mounted
- MPR = manual, off/proportional, remote-mounted
- SOU = SCR, on/off, unit-mounted
- SOR = SCR, on/off, remote-mounted
- SAU = SCR, low/med/high, unit-mounted
- SAR = SCR, low/med/high, remote-mounted
- SPU = SCR, off/proportional, unit-mounted
- SPR = SCR, off/proportional, remote-mounted

47. Timed Override

- Y = none

48. Valve - Primary Coil

- See Table 4

49. Valve - Preheat Coil

- See Table 4

50. Valve - Reheat Coil

- See Table 4

51. Future Control Function

- Y = None

52. Low Temperature Protection

- Y = None
- X = special

53. Condensate Overflow Protection

- C = condensate overflow protection
- Y = None
- X = special

54. Discharge Air Thermistor

- Y = None
- X = special

55. Smoke Input Sensor

- Y = None
- X = special

56. Occ / Vacant Control Input

- Y = None
- X = special

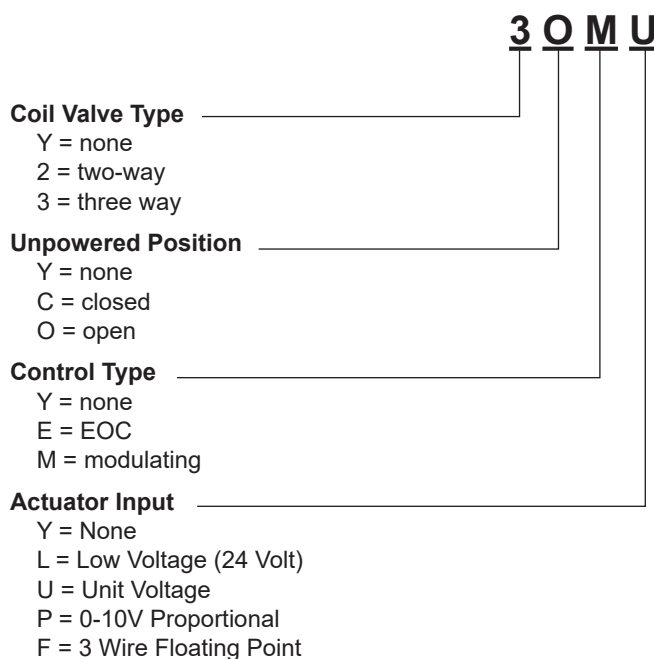
Table 9: Model Number Detail: Coil Valve Fields 49, 50, 51


Table 10: Model Number Description: Fields 57 - 72

| Field | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|
| Code | Y | Y | Y | Y | S | 18 | P | I | 00 | S | 00 | 00 | 30F | TA | FR | 1 |

57. Filter Status Sensor

- Y = None
- X = special

58. Fan Status Sensor

- Y = None
- X = special

59. Future Control Function

- Y = None

60. Future Control Function

- Y = None

61. Cabinet Style

- S = Standard
- T = Tamperproof
- Y = None

62. Cabinet Gauge

- 16 = 16 Gauge
- 18 = 18 Gauge
- YY = None
- XX = Special

63. Cabinet Coating Type

- B = Powder Coat
- Y = None

64. Color- Cabinet

- I = Antique Ivory
- W = Off White
- G = Soft Gray
- C = Cupola White
- P = putty Beige
- Y = None
- X = Special

65. Cabinet Depth Extension

- 00 = None
- 04 = 4 Inch Extended Depth
- 08 = 08 inch Extended Depth

66. Unit Lineup Position

- S = Standalone

67. Left Hand End Pocket Extension

- 00 = None
- 04 = 4 Inch Extended Length
- 08 = 8 inch Extended Length

68. Right Hand End Pocket Extension

- 00 = None
- 04 = 4 Inch Extended Length
- 08 = 8 inch Extended Length

69. Subbase

- 30F = 3" subbase with leveling feet
- 30Y = 3" subbase without leveling feet
- XXF = special with leveling feet
- XXY = special without leveling feet
- YYY = none

70. Discharge Air - Outlet

- TA = top discharge with stamped louver grille
- TB = top discharge with multi-directional grille
- TY = top discharge with no grille
- TD: top discharge with duct collar
- FD = front discharge with duct collar
- FY = front discharge with no duct collar
- BD = bottom discharge with duct collar
- BY = bottom discharge with no duct collar
- XX = special

71. Return Air Inlet

- FR = front inlet with open return
- FS = front inlet with stamped louver
- FT = front inlet with toe space
- TR = top inlet with open return
- TS = top inlet with stamped louver
- BR = bottom inlet with open return
- BS = bottom inlet with stamped louver
- BT = bottom inlet with toe space
- XX = special

72. Filter

- 1 = 1" Throwaway Filter
- 3 = 1" Throwaway + (1) Extra

Table 11: Model Number Description: Fields 73 - 78

| Field | 73 | 74 | 75 | 76 | 77 | 78 |
|-------|-----|----|----|----|----|----|
| Code | YYY | Y | A | S | Y | 1 |

73. Special Options

- YYY = none

74. Reserved for future use

- Y = none

75. Agency Listing

- A = ETL, CETL, ARI
- R = ETL, CSA
- X = special
- Y = none

76. Packaging

- S = Standard
- T = palletized based on tagging and by floor

77. Extended Warranty

- Y = none (standard warranty)
- 1 = 1 year Extended component warranty (30 month from shipment or 24 month from installation)
- 2 = 2 year Extended component warranty (42 month from shipment or 36 month from installation)
- 3 = 3 year Extended component warranty (54 month from shipment or 48 month from installation)
- 4 = 4 year Extended component warranty (66 month from shipment or 60 month from installation)
- X = special

78. Product Style

- 1 = Style 1



Installation and Maintenance Manual

IM 1021

Group: **Applied Air Systems**

Part Number: **668115705**

Date: **October 2013**

ThinLine Vertical Fan Coil

Key-Lock Access Door

The key-lock access door kit can be installed on ThinLine cabinet units to prevent access to unit controls. It is installed as follows.

1. Locate all components and remove from carton.
Kit includes:
 - Tamper-proof control door
 - 2 hinge pins
 - Locking mechanism
 - Locking mechanism keys
2. Open the control door on the fan coil. Then unscrew the two attaching screws and remove the door from the unit. See Figure 1. Save screws for reattachment!
3. Remove the hinge pins from the old control door by either re-rounding the flattened pin ends with a needle-nose pliers or drilling out the pins with a 5/32" drill bit. Then separate the door from the hinge bracket.
4. Attach the locking mechanism to the tamper-proof control door. See Figure 3.
5. Attach the new tamperproof control door to the hinge bracket using new hinge pins. See Figure 3. Secure the hinge pins to the bracket by pinching protruding ends with a needle-nose pliers.
6. Install the new door and locking mechanism on the unit using the screws removed in Step 2.

Figure 1: Remove Control Door From Unit

Unscrew attaching screws and remove control door from unit.

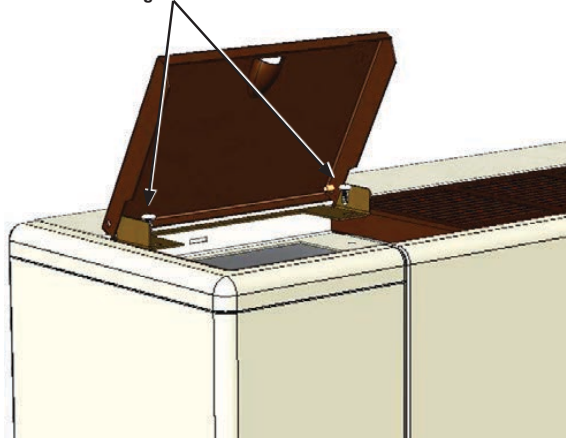




Figure 2: Remove Old Door from Bracket

Remove hinge pins from old control door and separate door from hinge bracket.

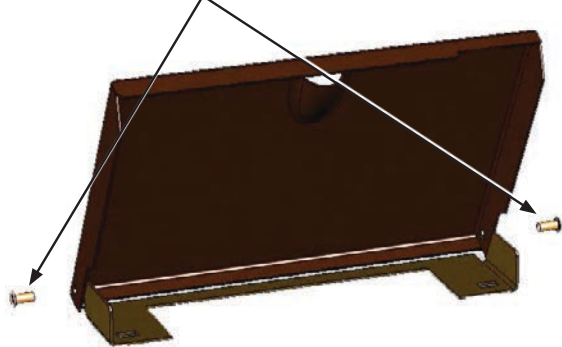


Figure 4: Attach Bracket to New Door

Attach tamperproof control door to hinge bracket with new hinge pins.

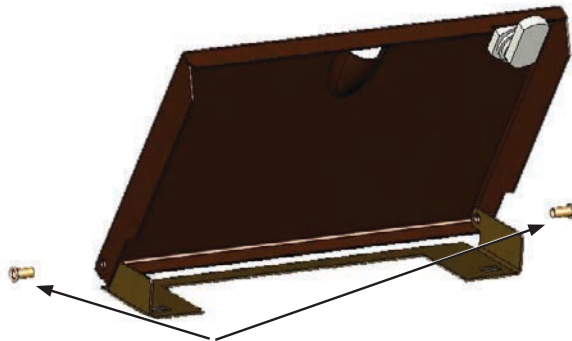


Figure 3: Attach Locking Mechanism to New Door

Attach locking mechanism to tamperproof control door.

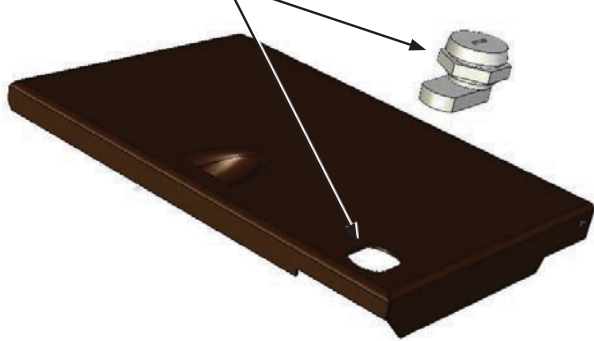
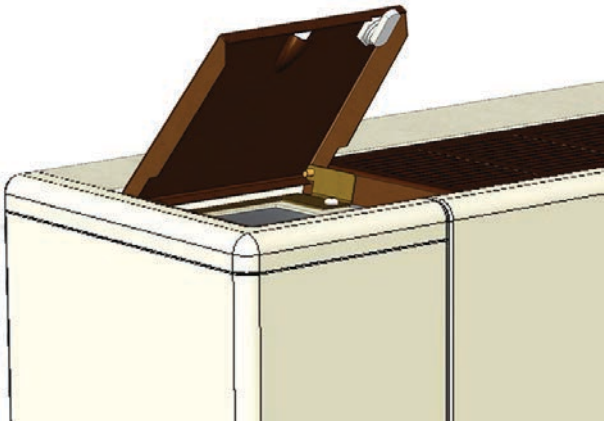


Figure 5: Finished Installation





Installation and Maintenance Manual

IM 1023

Group: **Applied Air Systems**

Part Number: **668115702**

Date: **January 2014**

ThinLine™ Vertical Fan Coil

Fresh Air Damper Kit

The fresh air damper kit provides up to 25% outside air to the fan coil. It consists of an intake with damper blade and insect screen. The damper may be manually controlled through the return air opening or with an optional field-installed damper motor.

Installation Instructions

CAUTION

Sharp metal edges are potential injury hazards. Wear protective gloves.

1. Locate components and remove from carton. Kit includes:
 - Damper box
 - Screen
2. Place the screen against the opening in the back of the unit base. See Figure 1.
3. Slide the damper box in place against the screen, matching the dimples on the bottom of the damper box to the slots on the unit base (see Figure 2).
4. To secure the damper to the unit, bend the tabs in the unit base pan against the left and right edges of the damper (see Figure 3).

Figure 1: Place Screen Against Opening in Unit Base

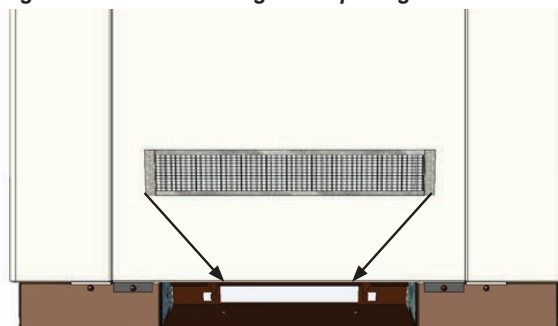


Figure 2: Slide the Damper Against the Screen

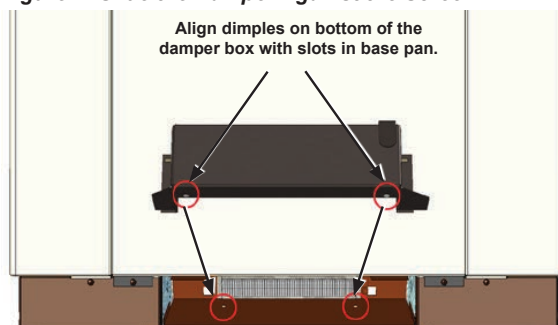
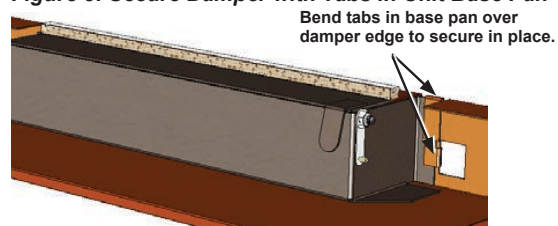


Figure 3: Secure Damper with Tabs in Unit Base Pan





Operation

To open the damper, reach under the unit and pull the damper handle toward you. To close, push the damper away from you. See Figure 4.

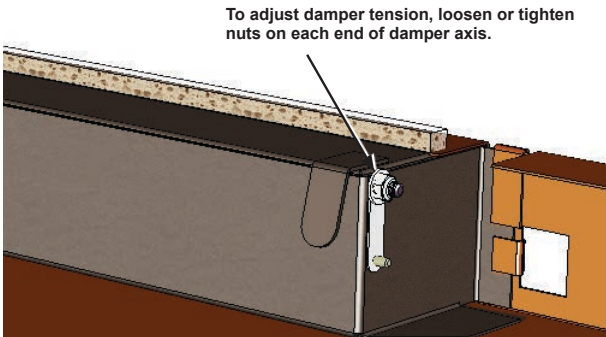
Figure 4: Opening and Closing the Damper



To open damper, reach under the unit and pull the damper handle toward you.

If the damper is difficult to open or moves too freely, you can adjust the tension by tightening or loosening the nuts on its pivot axis. See Figure 5.

Figure 5: Adjusting Damper Tension



To adjust damper tension, loosen or tighten nuts on each end of damper axis.

Cold Weather Operation

Fan coils may experience erratic operation during cold ambient conditions with the outside air damper in the open position.

⚠ IMPORTANT

It is the responsibility of the contractor to ensure that factory-installed gasketing matches up with the wall opening, or that additional material is used, to provide a positive seal and prevent infiltration of ambient conditions.



Installation and Maintenance Manual

IM 1024

Group: **Applied Air Systems**

Part Number: **910102148**

Date: **January 2014**

Vertical Fan Coils and Unit Heaters

Cabinet Rear Extension Kit

The field-installed cabinet rear extension option may be Installation Instructions utilized to place the fan coil farther out from the wall than the standard unit allows.

NOTE: This option is not designed to be an air duct or outside air plenum.

NOTICE

Installation and maintenance are to be performed only by qualified personnel who are familiar with and in compliance with state, local and national codes and regulations, and experienced with this type of equipment.

Installation Instructions

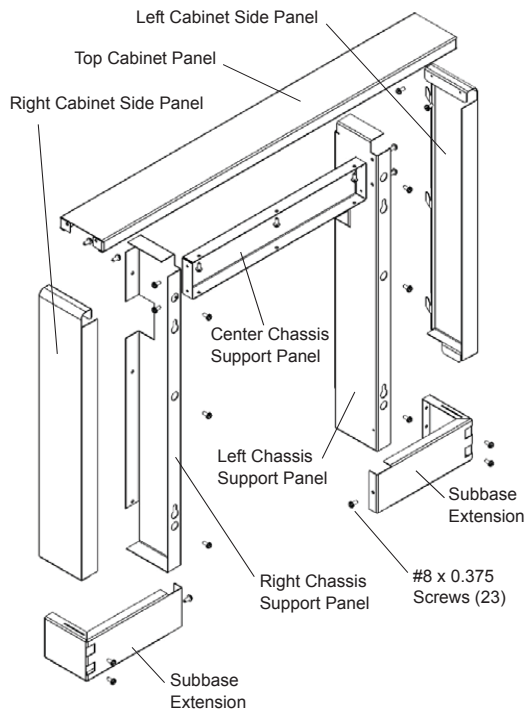
DANGER

Electrical shock will cause severe injury or death. Disconnect all electrical power before servicing unit.

WARNING

Wear protective gloves to avoid possible cuts and abrasions from exposed edges. Avoid contact with sharp edges.

Figure 1: Kit Components



1. Locate all components and remove from carton. See Figure 1. Kit includes:
 - Package of 23 screws - #8 x 0.375
 - Left and Right Chassis Support Panels
 - Center Chassis Support Panel
 - Top Cabinet Panel
 - Left and Right Cabinet Side Panels
 - 2 Subbase Extensions
2. Attach Center Chassis Support Panel to Right and Left Chassis Support Panels using 4 screws. See Figure 2.
3. Attach Subbase Extensions to the Right and Left Chassis Support Panels using 1 screw in each. See Figure 2.
4. Attach the Top Cabinet Panel to the Right and Left Cabinet Side Panels using 4 screws (2 on each side). See Figure 3.
5. Lower the Cabinet Assembly from step 4 onto the Chassis Support Assembly from step 3 (see Figure 4). Note that the tabs on the Cabinet Side Panels are inserted into the slots in the Subbase Extensions.

6. Use 3 screws to fasten the Top Cabinet Panel to the Center Chassis Support Panel.
7. Attach extension to fan coil unit as follows (see Figure 5):
 - a. Attach the Subbase Extensions to the left and right subbases on the unit using 4 screws.
 - b. Attach the Left and Right Chassis Support Panels to the left and right coil panels on the fan coil unit using 6 screws.

Some common applications for the rear cabinet extension include:

- Allow additional depth for appearance of unit.
- Allow additional clearance for cross-over piping and connections.
- Extend the discharge grille past drapery or wall hangings.
- Cover floor covering terminations in remodeling projects.
- Allow for piping entry through the side panels of the unit.

Figure 2: Chassis & Subbase Assembly

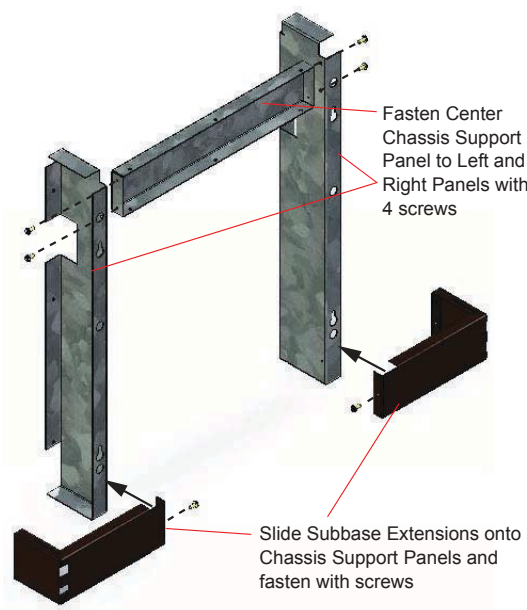


Figure 3: Cabinet Panel Assembly

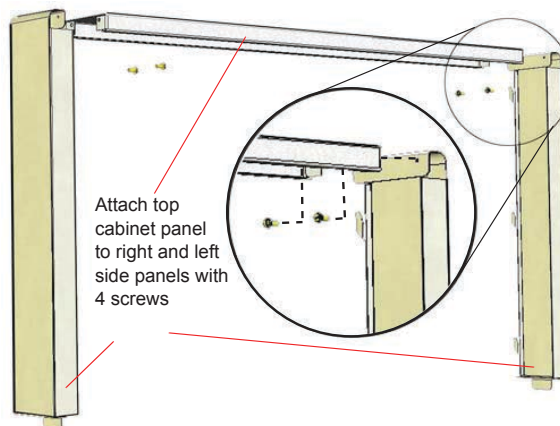


Figure 4: Attach Cabinet Assembly To Chassis Assembly

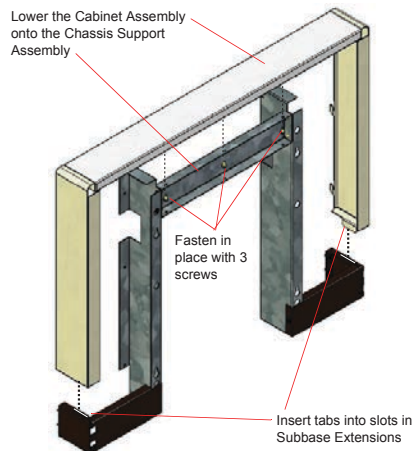
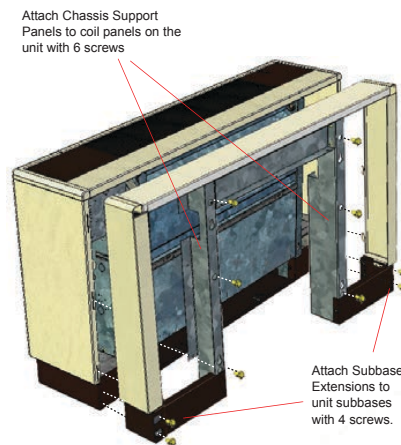


Figure 5: Attach Extension To Unit





Installation and Maintenance Manual

IM 1028

Group: **Applied Air Systems**

Part Number: **910103368**

Date: **October 2013**

ThinLine™ Vertical Fan Coil Unit

Fresh Air Damper Motor Kit

This damper motor kit is set up for field installation with the corresponding fresh air damper kit for ThinLine 3G fan coils. The damper kit must be ordered separately. The damper motor is always mounted on the same end as the unit control box. The unit control box is always mounted on the opposite side of the primary coil connections. (Example: For right-hand units use left-hand damper motor kit.) Inspect the contents for shipping damage and the correct items. See Figure 1 for a list of kit components.

Installation Instructions

CAUTION

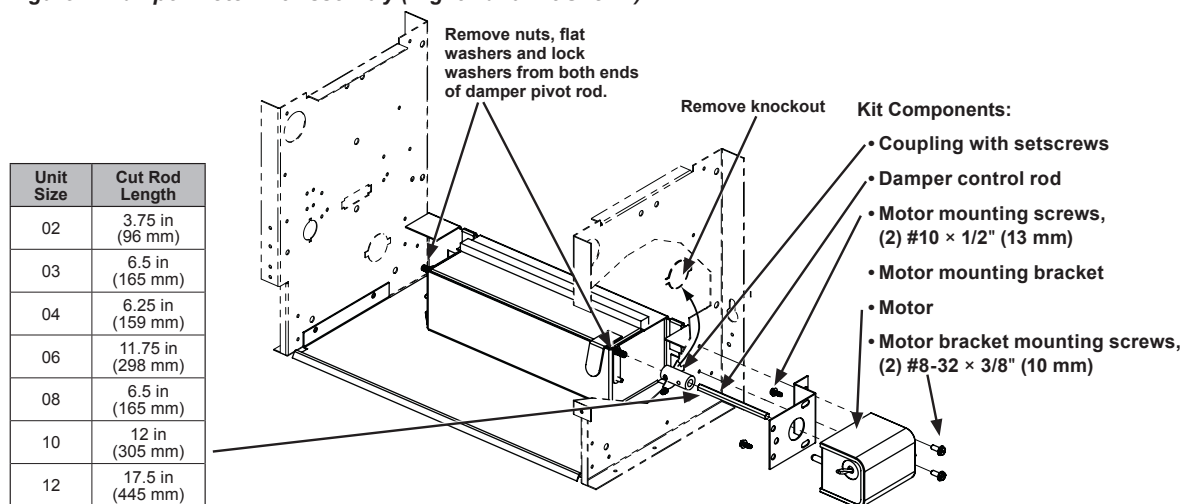
Installation and maintenance are to be performed only by qualified personnel who are familiar with and in compliance with state, local and national codes and regulations, and experienced with this type of equipment.

CAUTION

Sharp edges! Metal edges are potential injury hazards. Wear protective gloves.

1. Before installing the fresh air damper kit, remove the nuts and washers from each end of the damper pivot rod. See Figure 1.
2. Install the fresh air damper kit according to the instructions provided in IM 1023.
3. Locate all damper motor kit components and remove from carton. See Figure 1 for a component list.

Figure 1: Damper Motor Kit Assembly (Right Hand Kit Shown)





4. Install the coupling on the end of the damper pivot rod closest to the unit control box. With the damper blade in the closed (up) position, secure the coupling by tightening the setscrew with the setscrew facing the front of the unit.

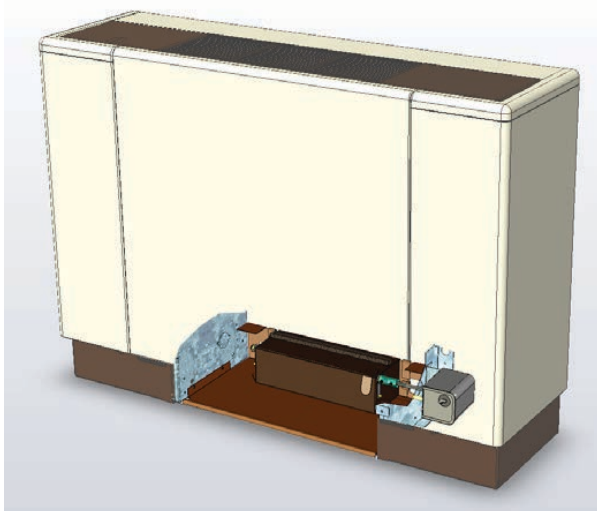
NOTE: Note: Suggestion: flatten the threads of the damper pivot rod where it contacts the setscrew to prevent the setscrew from slipping.

5. Attach the damper motor to the mounting bracket with two #8-32 × 3/8" screws.
6. Remove the end pocket cabinet panel from the control box side of the fan coil (remove attaching screw from tab on the bottom front of the panel and lift off panel).
7. Remove the knockout in the fan coil chassis that provides access for attaching the motor control rod to the damper. See Figure 1.
8. Cut the damper control rod to the proper length according to the chart in Figure 1.
9. Slide the damper control rod through the knockout hole and into the coupling you installed in Step 4. Do not tighten set screw!
10. Position the damper motor so that the motor control rod fits into the motor coupling (do not tighten set screw) and secure the motor bracket to the chassis using the #10 × 1/2" sheet metal screws.

NOTE: This is for preliminary positioning of the control rod.

11. Now position the rod so that the set screws on both the damper coupling and the motor coupling will grip the rod firmly. Mark the rod on the motor end.
12. Remove or back out the motor bracket until you are able to tighten the 1/8" Allen set screw on the motor coupling, then secure the motor coupling according to your previous mark.
13. Slide the rod back into the damper coupling and secure the motor bracket to the end panel, making sure the rod is centered in the knockout hole.
14. The damper rod should be positioned according to the earlier alignment. Tighten the setscrew on the coupling with the damper in the closed position. This requires holding the damper in the closed position while marking the proper angle.
15. Manually open the damper blade on the fresh air intake box and let the spring return on the damper motor close the damper blade. If necessary, loosen the setscrew on the coupling and adjust the damper blade until the spring will close the damper blade, then retighten the setscrew.
16. The 24 VAC air damper actuator contains 2 yellow wires. One wire connects to the air damper control's 24 VAC power wire. The other wire connects to neutral. Power consumption = 10 VA.

Figure 2: Damper Motor Kit Installed in Unit





Installation and Maintenance Manual

IM 1121

Group: **Applied Air Systems**

Part Number: **910118016**

Date: **January 2014**

ThinLine™ Hideaway Unit

Discharge Conversion Kit

Safety Information

WARNING

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is responsibility of the installer to determine and follow the applicable codes. This equipment is to be installed only by an experienced installation company which employs trained personnel.

WARNING

Rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

WARNING

To avoid electrical shock, personal injury or death:

1. Installer must be qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and damage to equipment.

Introduction

There may be instances when the airflow discharge direction needs to be changed. The appropriate conversion kits are available from Daikin for field installation. Contact your Daikin sales representative for details.

Table 1: Discharge Conversion Kits

| Unit Size | Part Number | Quantity |
|-----------|-------------|----------|
| 02 | 910113221 | 1 |
| 03 | 910113222 | 1 |
| 04 | 910113223 | 1 |
| 06 | 910113224 | 1 |
| 08 | 910113225 | 1 |
| 10 | 910112579 | 1 |
| 12 | 910113226 | 1 |

Procedure

Top discharge to front discharge

- 1 Remove the discharge duct collar from the top of the unit by removing the screws (see Figure 1). Save all screws for future use.
- 2 Remove the screws holding the fan deck to the front block-off plate and slide the fan deck part-way out.
- 3 Remove the front block-off plate by removing the mounting screws located on either side of the chassis (see Figure 1).
- 4 Attach the top block-off plate to the top of the unit replacing the discharge duct collar using the retained screws (see Figure 2).
- 5 Attach the short front panel to the front of the chassis as shown. Secure the short panel with four of the retained screws, two on either side (see Figure 2).



Figure 1: Removing the Discharge Duct Collar and Front Block-off Plate

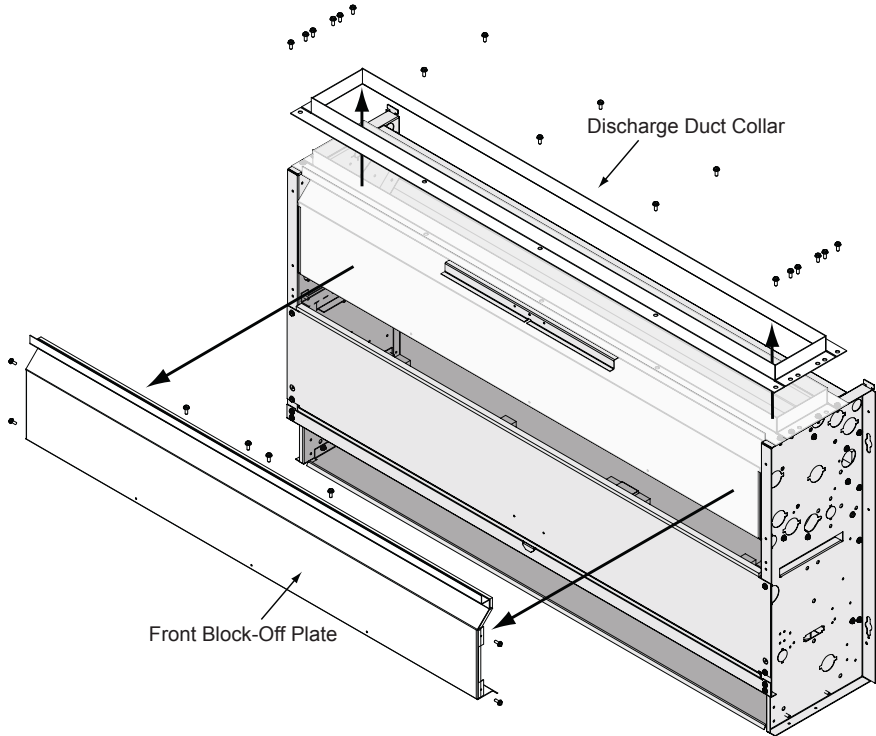
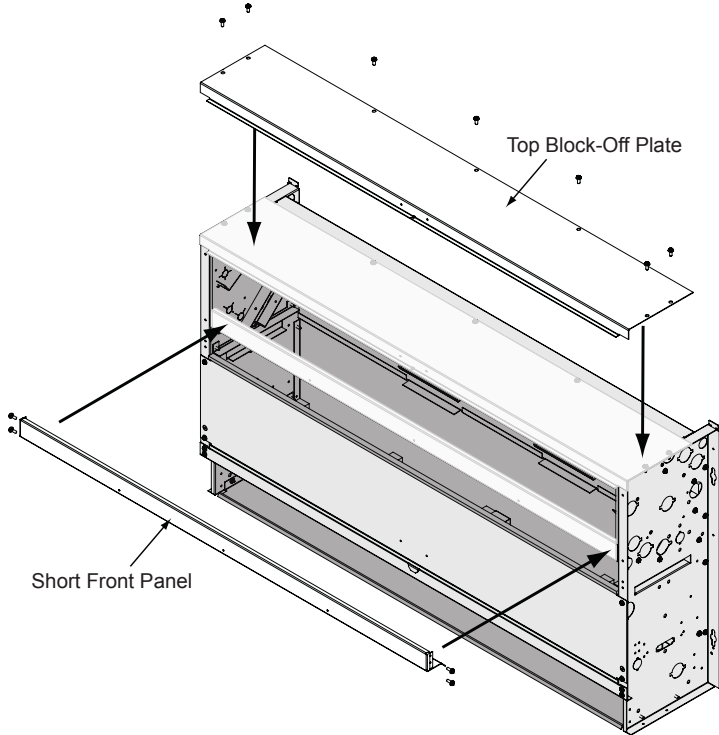


Figure 2: Attaching the Top Block-Off Plate and Short Front Panel





Installation and Maintenance Manual

IM 1014

Group: **Applied Air Systems**

Part Number: **910102989**

Date: **October 2013**

MT 155 Thermostat

Installation

DANGER

READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS THERMOSTAT.

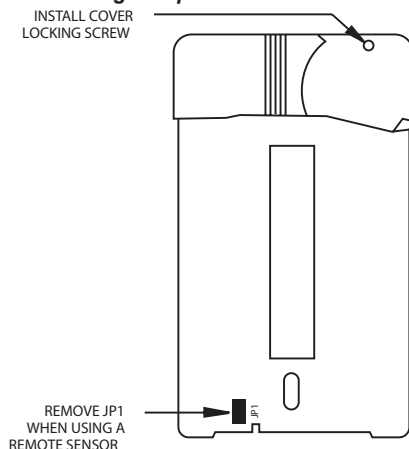
Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/ OR PROPERTY DAMAGE.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Use only wiring with insulation rated for full thermostat operating voltage. Use copper wire only. Insulate or wirenut all unused leads. Any wiring, including the remote probe, may carry the full operating voltage of the thermostat.

To avoid potential fire and/ or explosion do not use in potentially flammable or explosive atmospheres. Retain these instructions for future reference. You must review your application and national and local codes to ensure that your installation will be functional and safe.

1. Install the thermostat with the two furnished mounting screws to a standard 2" x 4" electrical box, 4-11/16" x 2 1/8" square device box with a 2" x 4" adapter ring or to a 4" x 4" box with accessory adapter plate.
2. For wall installations, mount the thermostat on an inside wall approximately 5 feet above the floor. The location should provide circulation at average room temperature. Avoid direct sunlight or sources of hot or cold air in the room or wall.
3. Remove the knob and then the cover. Mount thermostat base assembly to the outlet box using the screws provided, tighten the screws evenly but do not over tighten. Make wiring connections as noted.
4. To use a remote sensor, remove jumper JP-1 to disable local sensing. See Figure 1. Failure to remove JP-1 when using a remote sensor will cause improper operation of the thermostat. Some units do not have remote sensing capability. See Application Notes.
5. Reinstall the cover assembly. Install cover locking screw provided. Reinstall the knob.
6. Checkout: After wiring and installation are complete, energize the system and check the operation. Adjust the thermostat as necessary to complete at least one cycle. Be sure the thermostat and all other equipment are functioning correctly.

Figure 1: Removing Jumper JP-1





Thermostat Operation

Temperature Range: 50°F - 90°F (10°C - 32°C)

TA155: A HEAT-OFF-COOL system switch manually selects heating or cooling mode. In the HEAT position, only the heat output cycles with demand. In the COOL position, only the cool output cycles with demand. In the OFF position, heating and cooling outputs are off. Units with a two position system switch or without a system switch must use a load transfer switch when both heating and cooling outputs are used. This prevents control failure and equipment damage caused by direct cycling between loads.

TB155: An ON-OFF system switch enables auto-changeover of heating and cooling modes. In the ON position the thermostat activates heating or cooling outputs dependant upon the relationship between set point and ambient temperature. Heat on to cool on dead band is 4°F. In the OFF position, heating and cooling outputs are off. Units without a system switch cycle between heating and cooling with a 4°F dead band.

FAN: Some units have a switch for manual selection of fan speed. On these units fan operation is either internally wired for fan continuous operation or is dependant upon connection to the fan supply input. When internally wired for fan continuous operation, the fan will be off when the system switch is off. When dependant upon external connections the fan may not be off with the system switch in the off position. The fan supply input is switched to fan speed outputs (HI - MED - LO).

SWITCHED POWER: L1 power is switched to this output any time the system switch is out of the OFF position.

Ratings

Table 1: Fan and system switches

| Voltage Rating | Inductive | | Resistive Amps | Pilot Duty | Thermostatic Switching |
|----------------|-----------|------|----------------|------------|------------------------|
| | FLA | LRA | | | |
| 24 VAC | N.A. | N.A. | N.A. | 24 VA | 10 VA |
| 120 | 5.8 | 34.8 | 6.0 | 125 VA | 20 VA |
| 240 | 2.9 | 17.4 | 5.0 | 125 VA | 20 VA |
| 277 | 2.4 | 14.4 | 4.2 | 125 VA | 20 VA |

Table 2: Wire Lead Colors (if applicable)

| Wire Color | Purpose |
|--------------------------|----------------|
| White with Orange Stripe | Fan High |
| White with Red Stripe | Fan Med. |
| White with Brown Stripe | Fan Low |
| Red | Heat |
| Blue | Cool |
| Black | L1 |
| Yellow | L2 or Neutral |
| Orange | Switched Power |
| Violet | Fan Supply |
| Brown | Remote Probe |
| Brown | Remote Probe |

Application Notes

1. To use a remote sensor, remove jumper JP-1 to disable local sensing. See Figure 1. Failure to remove JP-1 when using a remote sensor will cause improper operation of the thermostat. Some units do not have remote sensing capability.
2. Units with remote sensing capability have a four-position terminal block at TB1. If TB1 is two position the unit is local sensing only.
3. Remote probe wiring should be located away from any electrical motors or power wiring
4. Some units are internally wired for permanent fan continuous operation.
5. On units with a Fan Supply input, the operation of the fan is determined by wiring connection. For fan continuous, jumper the Fan Supply input (TB2-5) to the Switched Power output (TB3-3).
6. For fan cycling operation with a call for heat or cool, a fan relay must be used.
7. Observe electrical ratings. Thermostatic outputs are pilot duty only.



Wiring Diagrams

Figure 2: Units with remote sensing capability

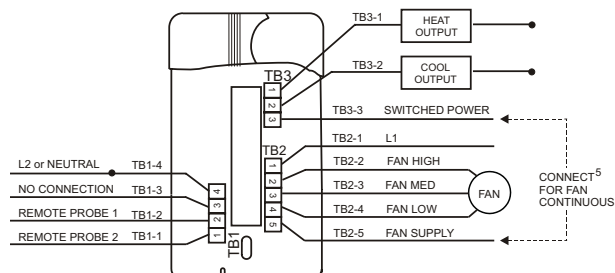


Figure 3: Units with switches used for local sensing only

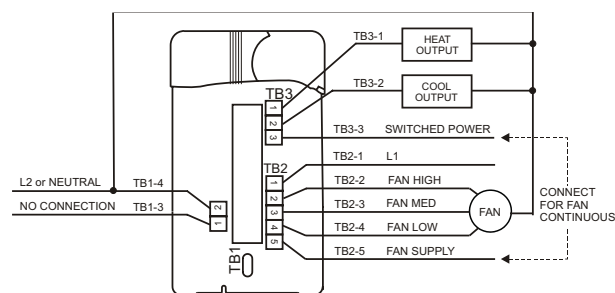


Figure 4: Units with no switches with local/remote sensing capability

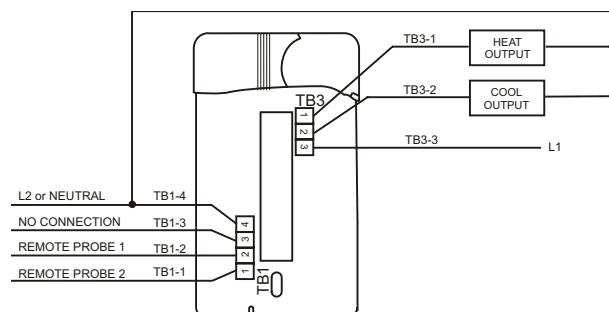
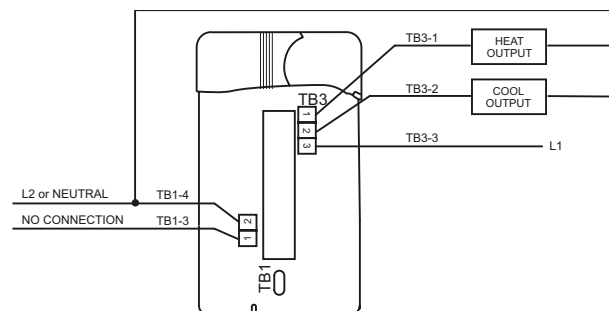


Figure 5: Units with no switches used for local sensing only





Installation and Maintenance Manual

IM 1089

Group: **Applied Air Systems**

Part Number: **IM 1089**

Date: **October 2013**

MT 155 A/B Thermostat Field Installation

24V Valve Packages on ThinLine™ Vertical Fan Coil Units with Factory-Installed Low Voltage Interface Board

General

DANGER

READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS THERMOSTAT.

Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/ OR PROPERTY DAMAGE.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Use only wiring with insulation rated for full thermostat operating voltage. Use copper wire only. Insulate or wire-nut all unused leads. Any wiring, including the remote probe, may carry the full operating voltage of the thermostat. To avoid potential fire and/ or explosion do not use in potentially flammable or explosive atmospheres. Retain these instructions for future reference. You must review your application and national and local codes to ensure that your installation will be functional and safe.

CAUTION

Care should be used to avoid electrostatic discharge to the microprocessor.

This unit has configuration dip switches and jumpers. You may need to reconfigure the thermostat for your application.

Installation

Two-pipe system (Cooling or Heating)

To field wire a T*155 thermostat (either as wall-mounted or unit-mounted) and field-install valve package for a 2-pipe system the following accessories are required:

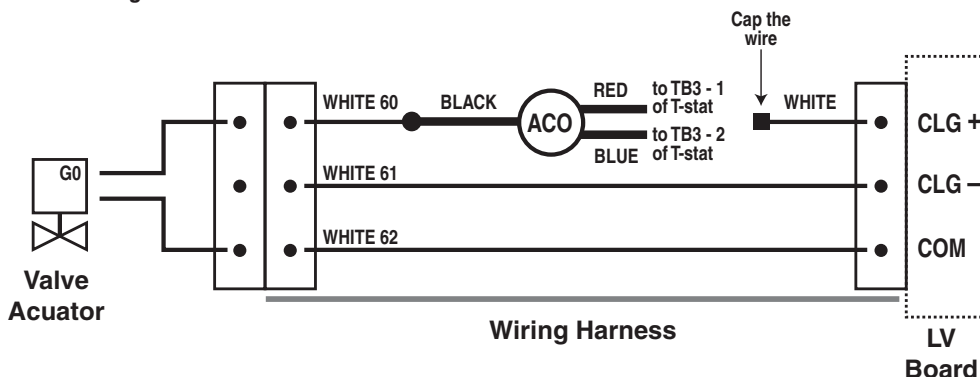
- Single-Pole Double-Throw Automatic Changeover Switch (SPDT ACO Kit P/N 039398600)
- Thermostat TA155 (kit) – PN 107345302 or Thermostat TB155 (kit) – PN 107345304
- 10K Return Air Sensor - PN 107345501

Step 1: Installing NC (Normally Closed) valve packages

- Solder the appropriate inlet and outlet pipe connections from the valve package to the coil connections. Refer to Figures 1, 2, 3 and 4.
- Snap-on the SPDT ACO Switch on the supply side of the valve package (SPDT ACO Kit P/N 039398600 to be ordered as field-installed option)
- Cut white wire 60 of the wiring harness leading from the Low Voltage Interface Board terminal connection (see Fig. 1) prior to attaching the quick-connect connector of the On-Off valve actuator to the interface board (Fig. 3). The white wire lead going to the actuator will be connected to terminal No. 1 of the ACO switch (see Fig. 5):
 - Terminal No. 1: black wire - to be connected to the valve side (G terminal) with white wire of the terminal strip
 - Terminal No. 2: red wire – to be connected to the red wire (TB3-1) of the thermostat
 - Terminal No. 3: blue wire – to be connected to the blue wire (TB3-2) of the thermostat



Figure 1: Automatic changeover connection between the valve actuator and the interface board



Step 2: Provide power to thermostat

- Connect a wire from thermostat terminal TB1- 4 (L2 Neutral) to the common terminal on Low Voltage Interface Board (terminal C) Refer to Figures 2 and 4.
- Connect a wire from thermostat terminal TB2- 1 (24VAC) to the 24 V terminal connection R.
- Connect fan speed wires from the thermostat to appropriate Low Voltage Interface Board terminals:
- Connect a wire from thermostat terminal TB2- 2 (High fan speed) to the HI terminal
- Connect a wire from thermostat terminal TB2- 3 (Med fan speed) to the Med terminal
- Connect a wire from thermostat terminal TB2- 24 (Low fan speed) to the Low terminal
- Remove Jumper JP1 to allow the remote mounted 10K Return Air Sensor to operate.
- Mount the 10K Return Air Sensor (PN 107345501) above the filter through the knockout provided Note: (1) If a fan coil unit is to be used for heating or cooling only, the SPDT ACO Switch (SPDT ACO Kit P/N 039398600) is not required. For such applications just follow Step 2.

Figure 2: Low Voltage Interface Board shown with all additional support options

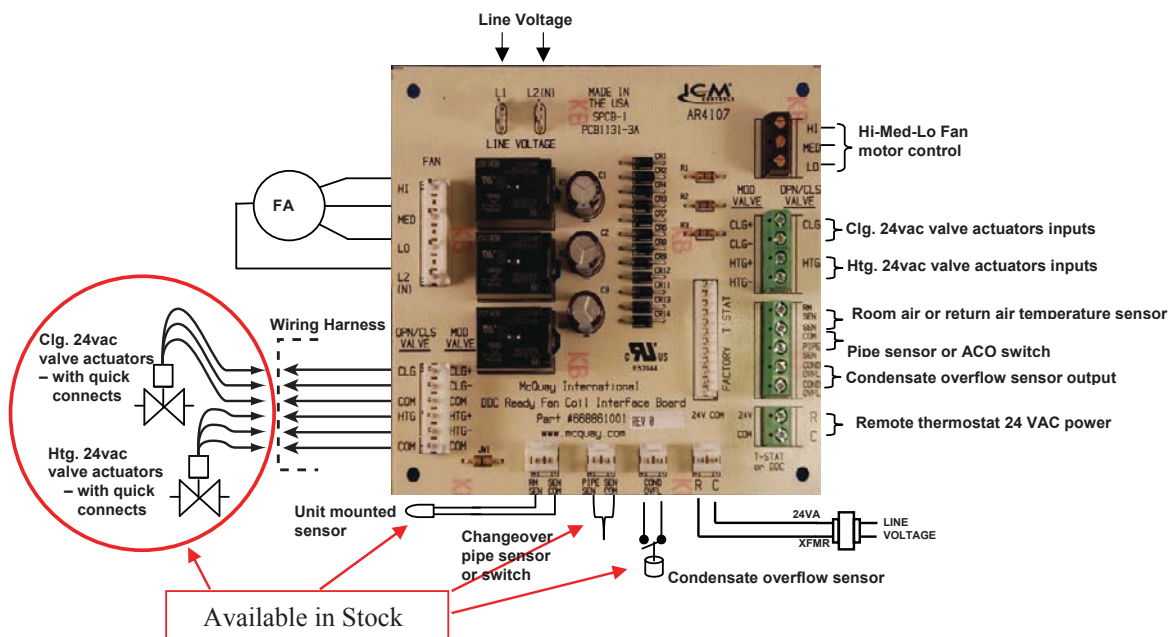




Figure 3: Factory-installed and wired Low Voltage Interface Board (Wiring Diagram)

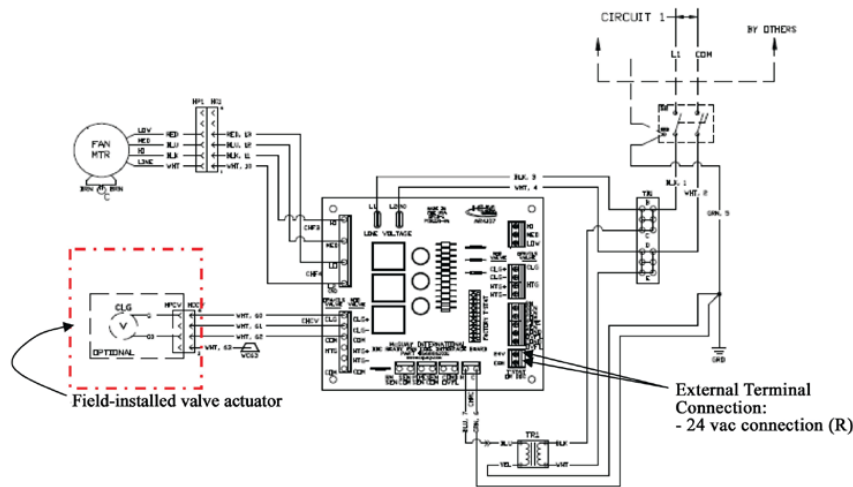


Figure 4: Thermostat TB155 autochangeover to be used with ON-OFF 24V valve packages, SPDT ACO and unit-mounted Low Voltage Interface Board

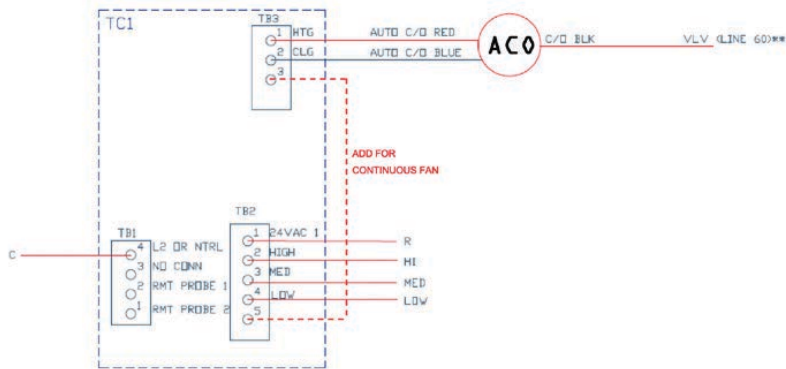
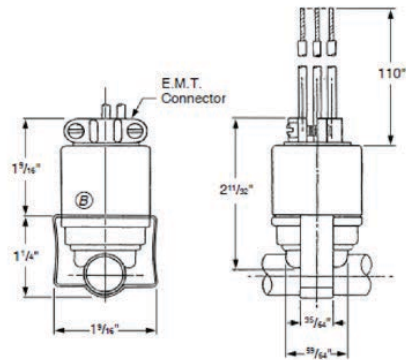


Figure 5: Automatic changeover switch (SPDT ACO Kit P/N 039398600)



Terminal No. 1 Black 60455 (Common)
Terminal No. 2 Red 60456 (N.O.) – Heating
Terminal No. 3 Blue 60457 (N.C.) – Cooling



Four-pipe system (Cooling and Heating)

Two piping packages will be required for CW and HW coils. The following accessories needed for field-installed thermostat model T*155 (unit-mounted or wall-mounted):

- Thermostat TA155 (kit) – PN 107345302 or Thermostat TB155 (kit) – PN 107345304
- 10K Return Air Sensor - PN 107345501 for unit-mounted applications only (for wall-mounted applications the sensor is imbedded with the thermostat)

Step 1: Installing valve packages

- Solder the appropriate inlet and outlet CW pipe connections from the valve package to the coil connections.
- Solder the appropriate inlet and outlet HW pipe connections from the valve package to the coil connections.
- Snap-on the Quick-connects of the valve actuators to the appropriate terminals of the Low Voltage Interface Board as per Fig. 2.

Step 2: Provide power to thermostat

- Connect a wire from thermostat terminal TB1- 4 (L2 Neutral) to the common terminal on the interface board (terminal C) Refer to Figure 2 and 4.
- Connect a wire from thermostat terminal TB2- 1 (24VAC) to the 24 V terminal connection R.
- Connect fan speed wires from the thermostat to the appropriate Low Voltage Interface Board terminals:
- Connect a wire from thermostat terminal TB2- 2 (High fan speed) to the HI terminal
- Connect a wire from thermostat terminal TB2- 3 (Med fan speed) to the Med terminal
- Connect a wire from thermostat terminal TB2- 24 (Low fan speed) to the Low terminal
- Remove Jumper JP1 to allow the remote mounted the 10K Return Air Sensor to operate.
- Mount the 10K Return Air Sensor (PN 107345501) above the filter through the knockout provided

NOTE: (2) For thermostats supplied by others refer to the manufacturer's installation literature and use this manual as a guideline only.




Installation and Maintenance Manual

IM 1015

Group: **Applied Air Systems**
Part Number: **910102990**
Date: **October 2013**

MTA 158 Microprocessor Thermostat ON/OFF Controller

Installation

 **DANGER**


READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS THERMOSTAT.

Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/ OR PROPERTY DAMAGE.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Use only wiring with insulation rated for full thermostat operating voltage. Use copper wire only. Insulate or wirenut all unused leads. Any wiring, including the remote probe, may carry the full operating voltage of the thermostat.

To avoid potential fire and/ or explosion do not use in potentially flammable or explosive atmospheres.

Retain these instructions for future reference. You must review your application and national and local codes to ensure that your installation will be functional and safe.

 **CAUTION**

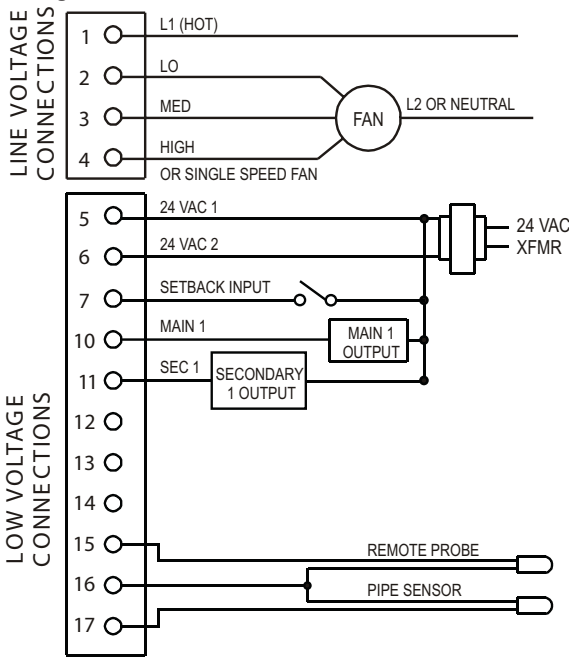
Care should be used to avoid electrostatic discharge to the microprocessor.

This unit has configuration jumpers. You may need to reconfigure this thermostat for your application.

1. Install the thermostat with the two furnished mounting screws to a standard 4-11/16" x 2-1/8" square device box with a 2" x 4" adapter ring.
2. For wall installations, mount the thermostat on an inside wall approximately 5 feet above the floor. The location should provide circulation at average room temperature. Avoid direct sunlight or sources of hot or cold air in the room or wall.

3. Remove the cover. Mount thermostat base assembly to the outlet box using the screws provided, tighten the screws evenly but do not over tighten. Connect wires as shown in the appropriate wiring diagram for your thermostat style.
4. To use a remote sensor on units with local sensing capability, remove jumper JP-1 to disable local sensing. Failure to remove JP-1 will cause improper operation of the thermostat.

Figure 1: Wiring Diagram for ON/OFF Output Configuration



**Table 1: MTA 158 Operation***

| Output | OFF with Demand | ON with Demand |
|------------------------------|---|--|
| Main 1 (Terminal 10) | ON at temperature demand | ON at temperature demand |
| Main 2 (Terminal 12) | NA | NA |
| Secondary (Terminal 11) | Summer: OFF with heat demand Winter: Disabled | Summer: ON with heat demand Summer: Disabled |
| Secondary 2 (Terminal 13) | NA | NA |

Note: * Operation determined by configuration. See Dip Switch Configuration Table.

- Remove the LCD plastic protective film. Reinstall the cover assembly. Install the cover locking screw provided in the hole at the left side of the control enclosure to complete the installation.
- Checkout: After wiring and installation are complete, energize the system and check the operation. Adjust the thermostat as necessary to complete at least one cycle. Be sure the thermostat and all other equipment are functioning correctly.

Thermostat Operation

These thermostats are designed to control ON-OFF, N.O. and N.C. valves, relays and Erie® three wire floating valves. These units may include a fan switch with one or more fan speed selections.

Mode Button Operation

OFF: All thermostat outputs are off, fan is still operational if connected to manual fan speed switch.

AUTO: The thermostat automatically selects heating or cooling mode depending on the set point and room temperature. The appropriate HEAT or COOL indicator is enabled in addition to AUTO. A 3°F dead-band is provided to prevent short cycling between heating and cooling modes. After change-over the control points automatically shift so that the heating off-point or the cooling off-point equals the setpoint temperature.

COOL: The thermostat operates as a cooling-only thermostat. by pressing the UP and DOWN arrows simultaneously. The heating outputs are disabled.

HEAT: The thermostat operates as a heating-only thermostat. The cooling outputs are disabled.

If constructed without a mode button, the thermostat operates in Auto mode, subject to configuration of the 2/4 pipe jumper and pipe sensor input.

Fan Speed Switch Operation

Fan speed is determined by manual selection from fan switch OFF to HIGH, MEDIUM and/ or LOW. In units with the Cycling Fan Option (demand output), the Fan operation (CYCLING vs. CONTINUOUS) is determined by application connections. In OFF position all outputs are off and display blank.

Up/ Down Arrow Operation

A first touch of either arrow will display the set point (a single set point is employed for both heating and cooling). Continued pressure on either arrow will scroll the set point to new values. After three seconds with no pressure on either arrow, the selected set point becomes effective and the display of the room temperature resumes.

Setback Operation

Connection of the Setback Input to 24 VAC 1 will force the control into unoccupied mode (see wiring diagram). Pressing an arrow key or the mode button on the thermostat cover will disable the setback input for one hour.

Pipe Sensor Operation

If cold water is detected, the system will operate in summer mode and the Main output will be cooling. If hot water is detected, the system will operate in winter mode, the Main output will be heating and First Stage Secondary Output will be disabled. In the case of an ambiguous reading, neither hot nor cold, the thermostat will initiate a purge cycle.

Ratings

Table 2: Fan and system switches

| Voltage Rating | Inductive | | Resistive Amps | Pilot Duty | Thermostatic Switching |
|----------------|-----------|------|----------------|------------|------------------------|
| | FLA | LRA | | | |
| 24 VAC | N.A. | N.A. | N.A. | 24 VA | 10 VA |
| 120 VAC | 5.8 | 34.8 | 6.0 | 125 VA | NA |
| 240 VAC | 2.9 | 17.4 | 5.0 | 125 VA | NA |
| 277 VAC | 2.4 | 14.4 | 4.2 | 125 VA | NA |

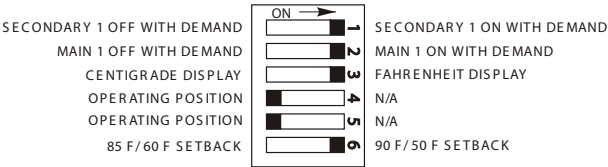


Service Menu

Access: Press UP ▲ and DOWN ▼ arrows for 5 seconds.
Menu Selection: Select 1 to 5 by pressing the mode button or by pressing the UP ▲ and DOWN ▼ arrows simultaneously.
Adjust Value: Use UP ▲ or DOWN ▼ arrow.

| Item # | Function | Range | Default |
|--------|-----------------------------|---|----------|
| 1 | Zone Temp Offset | -5.1°F to 5.1°F | 0°F |
| 2 | Valve Stroke Time | 30 sec. to 5 min. | 120 sec. |
| 3 | Fan Delay to OFF | 0 to 10 minutes | 0 sec. |
| 4 | Compressor Minimum OFF Time | 30 sec. to 10 min. | 120 sec. |
| 5 | Purge Cycle | 0 = Time Based 1 = Temperature Based | 1 |

Figure 2: Dipswitch Configuration



Example: This dip switch is configured for on with demand, °F Display, ON-OFF Operation And 90/50°F Setback.

NOTE: Thermostat power must be cycled for changes in dip switch configuration to take effect.

Figure 3: Circuit Board Jumpers

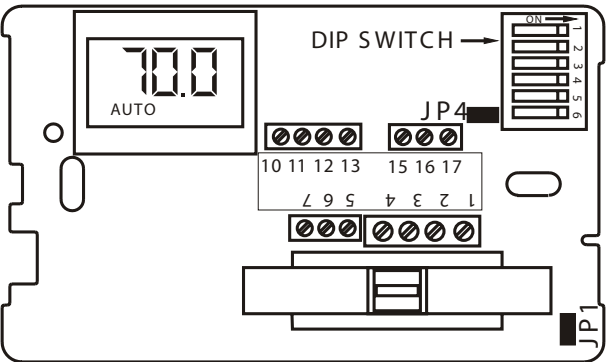


Table 3: Circuit Board Jumper Configuration

| Jumper Designation | Jumper Installed ON | Jumper Removed |
|--------------------|---------------------|----------------|
| JP1 | Local Sensing | Remote Sensing |
| JP4 | 2 Pipe System* | 4 Pipe System |

Application Notes

- 1. When no pipe sensor is used the main output controls cooling and the secondary output controls heating.
- 2. The pipe sensor should be mounted on the main coil input for water system operation and in the main duct system for forced air operation.
- 3. The set point and operating mode will be retained on a loss of power.
- 4. When using either a remote probe or pipe sensor, run wiring away from any electrical motors or power wiring.

Power-Up Operating Sequence

Upon application of power, an MTA158 will go directly to normal operation.



Installation and Maintenance Manual

IM 1016-2

Group: **Applied Air Systems**

Part Number: **910231057**

Date: **July 2018**

MTB 158 Microprocessor Thermostat

ON/OFF and 3-Wire Controller

DANGER

READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS THERMOSTAT.

Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/ OR PROPERTY DAMAGE.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Use only wiring with insulation rated for full thermostat operating voltage. Use copper wire only. Insulate or wirenut all unused leads. Any wiring, including the remote probe, may carry the full operating voltage of the thermostat.

To avoid potential fire and/ or explosion do not use in potentially flammable or explosive atmospheres.

Retain these instructions for future reference. You must review your application and national and local codes to ensure that your installation will be functional and safe.

CAUTION

Care should be used to avoid electrostatic discharge to the microprocessor.

This unit has configuration jumpers. You may need to reconfigure this thermostat for your application.

Installation

1. Install the thermostat with the two furnished mounting screws to a standard 4-11/16" × 2-1/8" square device box with a 2" × 4" adapter ring.
2. For wall installations, mount the thermostat on an inside wall approximately 5 feet above the floor. The location should provide circulation at average room temperature. Avoid direct sunlight or sources of hot or cold air in the room or wall.
3. Remove the cover. Mount thermostat base assembly to the outlet box using the screws provided, tighten the screws evenly but do not over tighten. Connect wires as shown in the appropriate wiring diagram for your thermostat style.
4. To use a remote sensor on units with local sensing capability, remove jumper JP-1 to disable local sensing. Failure to remove JP-1 will cause improper operation of the thermostat.
5. Remove the LCD plastic protective film. Reinstall the cover assembly. Install the cover locking screw provided in the hole at the left side of the control enclosure to complete the installation.
6. Checkout: After wiring and installation are complete, energize the system and check the operation. Adjust the thermostat as necessary to complete at least one cycle. Be sure the thermostat and all other equipment are functioning correctly.



Figure 1: Wiring Diagram for 3-Wire Valve Configuration

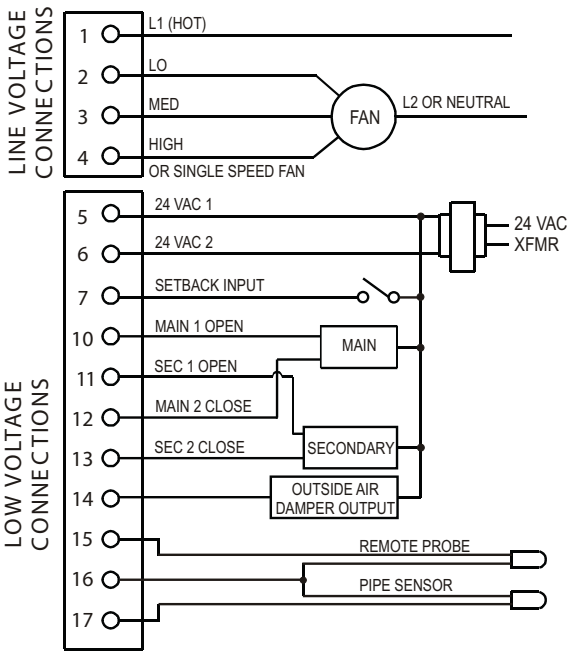


Figure 2: Wiring Diagram for ON/OFF Ouput Configuration

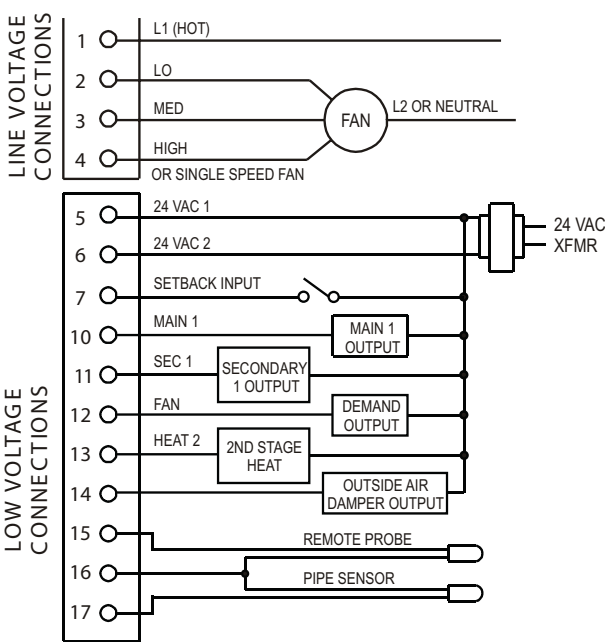


Table 1: Ratings

| Voltage Rating | Fan and system switches | | | | Thermostatic Switching (Pilot Duty) |
|----------------|-------------------------|------|-----------|------------|-------------------------------------|
| | Inductive | | Resistive | Pilot Duty | |
| | FLA | LRA | Amps | | |
| 24 VAC | N.A. | N.A. | N.A. | 24 VA | 10 VA |
| 120 VAC | 5.8 | 34.8 | 6.0 | 125 VA | NA |
| 240 VAC | 2.9 | 17.4 | 5.0 | 125 VA | NA |
| 277 VAC | 2.4 | 14.4 | 4.2 | 125 VA | NA |

Thermostat Operation

These thermostats are designed to control ON-OFF, N.O. and N.C. valves, relays and three-wire floating valves. These units may include a fan switch with one or more fan speed selections.

Table 2: Main and Secondary Output Operation*

| Output | 3-Wire Floating | OFF with Demand | ON with Demand |
|---------------------------|-------------------------------|--|---|
| Main 1 (Terminal 10) | Powers main valve open | ON at temp demand | ON at temp demand |
| Main 2 (Terminal 12) | Powers main valve closed | Cycles ON with demand | Cycles ON with demand |
| Secondary (Terminal 11) | Powers secondary valve open | Summer: OFF with heat demand Winter: Disabled | Summer: ON with heat demand Winter: Disabled |
| Secondary 2 (Terminal 13) | Powers secondary valve closed | ON at second stage heating demand | ON at second stage heating demand |

Note: * Operation determined by configuration. See Dip Switch Configuration Table.

Mode Button Operation

OFF: All thermostat outputs are off, fan is still operational if connected to manual fan speed switch.

AUTO: The thermostat automatically selects heating or cooling mode depending on the set point and room temperature. The appropriate HEAT or COOL indicator is enabled in addition to AUTO. A 3°F dead-band is provided to prevent short cycling between heating and cooling modes.

After change-over the control points automatically shift so that the heating OFF-point or the cooling OFF-point equals the set point temperature.

COOL: The thermostat operates as a cooling-only thermostat. The heating outputs are disabled.

HEAT: The thermostat operates as a heating-only thermostat. The cooling outputs are disabled.

If constructed without a mode button, the thermostat operates in Auto mode, subject to configuration of the 2/4 pipe jumper and pipe sensor input.



Fan Speed Switch Operation

Fan speed is determined by manual selection from fan switch OFF to HIGH, MEDIUM and/ or LOW. In units with the Cycling Fan Option (demand output), the Fan operation (CYCLING vs. CONTINUOUS) is determined by application connections. In OFF position all outputs are off and display blank.

Up/ Down Arrow Operation

A first touch of either arrow will display the set point (a single set point is employed for both heating and cooling). Continued pressure on either arrow will scroll the set point to new values. After three seconds with no pressure on either arrow, the selected set point becomes effective and the display of the room temperature resumes.

Setback Operation

Connection of the Setback Input to 24 VAC 1 will force the control into unoccupied mode (see wiring diagram). Pressing an arrow key or the mode button on the thermostat cover will disable the setback input for one hour.

Pipe Sensor Operation

If cold water is detected, the system will operate in summer mode and the Main output will be cooling. If hot water is detected, the system will operate in winter mode, the Main output will be heating and First Stage Secondary Output will be disabled. In the case of an ambiguous reading, neither hot nor cold, the thermostat will initiate a purge cycle.

Three Wire Floating Valve Operation

Open and Close outputs are used to position the valve. Stroke time is factory set at two minutes. Outputs are off after reaching full on or off position. Valves are periodically reset for accuracy.

Outside Air Damper Operation

This output is ON any time the control is turned ON.

Application Notes

1. When no pipe sensor is used the main output controls cooling and the secondary output controls heating.
2. The pipe sensor should be mounted on the main coil input for water system operation and in the main duct system for forced air operation.
3. The set point and operating mode will be retained on a loss of power.
4. When using either a remote probe or pipe sensor, run wiring away from any electrical motors or power wiring.

Service Menu

Access: Press UP▲ and DOWN▼ arrows for 5 seconds.

Menu Selection: Select 1 to 5 by pressing the mode button or by pressing the UP▲ and DOWN▼ arrows simultaneously.

Adjust Value: Use UP▲ or DOWN▼ arrow.

Table 3: Service Menu Functions

| Item # | Function | Range | Default |
|--------|-----------------------------|---|----------|
| 1 | Zone Temp Offset | -5.1°F to 5.1°F | 0°F |
| 2 | Valve Stroke Time | 30 sec. to 5 min. | 120 sec. |
| 3 | Fan Delay to OFF | 0 to 10 min. | 0 sec. |
| 4 | Compressor Minimum OFF Time | 30 sec. to 10 min. | 120 Sec. |
| 5 | Purge Cycle | 0 = Time Based 1 = Temperature Based | 1 |

Figure 3: Circuit Board Jumpers

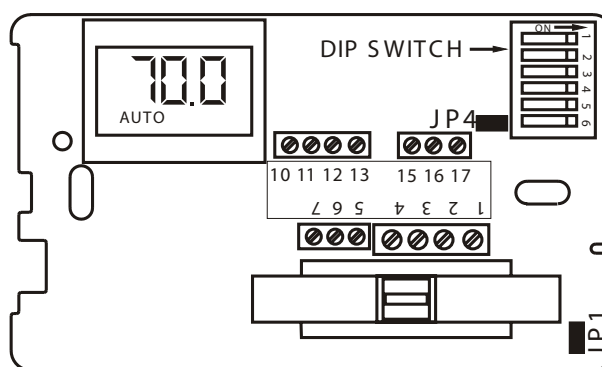
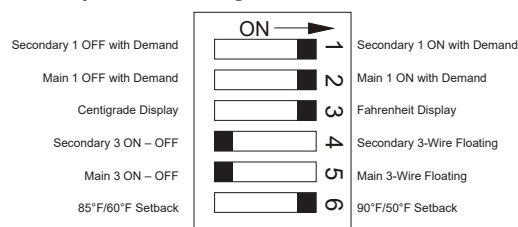


Figure 4: Dip Switch Configuration



Example: This dip switch is configured for ON with demand, °F display. ON-OFF operation and 90°F/50°F setback.

NOTE: Thermostat power must be cycled for changes in the dip switch configuration to take effect.

Table 4: Circuit Board Jumper Configuration

| Jumper Designation | Jumper Installed ON | Jumper Removed |
|--------------------|---------------------|----------------|
| JP1 | Local Sensing | Remote Sensing |
| JP4 | 2 Pipe System* | 4 Pipe System |

Power-Up Operating Sequence

Upon application of power, an MTA158 will go directly to normal operation.

Addendum Material



Installation and Maintenance Manual

IM 1017-1

Group: **Applied Air Systems**

Part Number: **910102992**

Date: **January 2017**

MT 168 0-10 VDC/4-20mA Thermostat

Installation

DANGER

READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS THERMOSTAT.

Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/ OR PROPERTY DAMAGE.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Use only wiring with insulation rated for full thermostat operating voltage. Use copper wire only. Insulate or wire-nut all un-used leads. Any wiring, including the remote probe, may carry the full operating voltage of the thermostat.

To avoid potential fire and/ or explosion do not use in potentially flammable or explosive atmospheres.

Retain these instructions for future reference. You must review your application and national and local codes to ensure that your installation will be functional and safe.

CAUTION

Care should be used to avoid electrostatic discharge to the microprocessor.

This unit has configuration dip switches and jumpers. You may need to reconfigure the thermostat for your application.

1. Install the thermostat with the two furnished mounting screws to a standard 4-1/16" × 2-1/8" square device box with a 2" × 4" adapter ring.
2. For wall installations, mount the thermostat on an inside wall approximately 5 feet above the floor. The location should provide circulation at average room temperature. Avoid direct sunlight or sources of hot or cold air in the room or wall.
3. Remove the cover. Mount thermostat base assembly to the outlet box using screws provided. Tighten the screws evenly but do not overtighten. Connect wires per wiring diagram.
4. To use a remote sensor on units with local sensing capability, remove jumper JP-1 to disable local sensing. Failure to remove JP-1 will cause improper operation of thermostat.
5. Connecting a jumper between terminals 16 and 17 will disable the secondary output and change the main output to heat mode.
6. Connection of a 24 VAC set-back signal will force the control into unoccupied mode (see diagram). Pressing an arrow key or the mode buttons on the thermostat cover will disable the setback input for one hour.
7. Remove the LCD plastic protective film to complete the installation. Reinstall the cover assembly. Install cover locking screw provided.
8. Checkout: After wiring and installation are complete, energize the system and check the operation. Adjust the thermostat as necessary to complete at least one cycle. Be sure the thermostat and all other equipment are functioning correctly.



Figure 1: Mounting

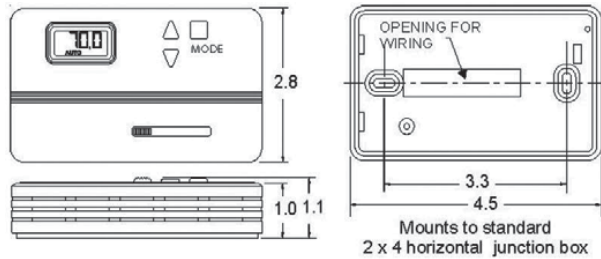
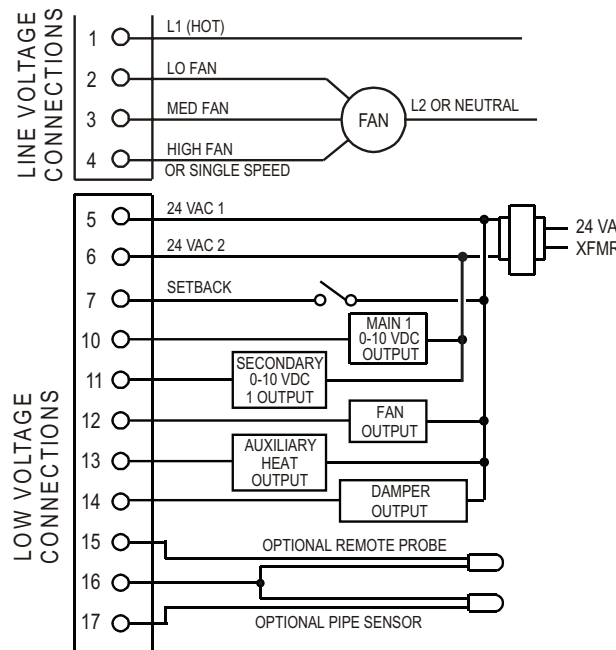


Figure 2: Typical Wiring*



NOTE: Note: * Specific models may have fewer connections.

Electrical Ratings

Table 1: Fan switch (terminals 1-4) line voltage connections

| Voltage Rating | Inductive | | Resistive Amps | Pilot Duty | Thermostatic Switching |
|----------------|-----------|------|----------------|------------|------------------------|
| | FLA | LRA | | | |
| 24 VAC | N.A. | N.A. | N.A. | 24 VA | 10 VA |
| 120 VAC | 5.8 | 34.8 | 6.0 | 125 VA | NA |
| 240 VAC | 2.9 | 17.4 | 5.0 | 125 VA | NA |
| 277 VAC | 2.4 | 14.4 | 4.2 | 125 VA | NA |

Application Notes

1. When no changeover pipe sensor is used, the main output controls cooling and the secondary output controls heating.
2. The fan output, terminal 12, is energized whenever there is a demand for heating or cooling. This output can be connected to a relay that can be used to provide fan cycling to terminal 1.
3. The changeover pipe sensor should be mounted on the main coil input for water system operation and in the main duct system for forced air operation.
4. The set point and operating mode will be retained on a loss of power.
5. When using either a remote probe or pipe sensor, run wiring away from any electrical motors or power wiring.
6. The auxiliary heat output supplies a 24 VAC signal with call for heat. This output is shipped configured for staged heat.
7. The thermostat is shipped with all dip switches in the "ON" (closed) position.
8. The damper output is ON when mode is AUTO, HEAT or COOL. Damper is OFF in set back.

Thermostat Operation

These thermostats are designed to control 0-10 VDC/4-0 mA valves. These units may include a fan switch with one or more fan speed selections.

Mode Button Operation

OFF: All thermostat outputs are off, fan is still operational if connected to a manual fan switch.

AUTO: The thermostat automatically selects heating or cooling mode depending upon the relationship of the setpoint and the room temperature. The appropriate HEAT or COOL indicator is enabled in addition to AUTO. A 3°F dead band is provided to prevent short cycling between heating and cooling modes. After changeover, the control points automatically shift so that the heating OFF-point equals the set point temperature or the cooling OFF-point equals the set point temperature.

COOL: The thermostat operates as a cooling only thermostat. The heating outputs are disabled.

HEAT: The thermostat operates as a heating-only thermostat. The cooling outputs are disabled.



Fan Speed Switch Operation

Fan speed is determined by manual selection from fan switch OFF to HIGH, MEDIUM and/or LOW. In the OFF position, all outputs are off and the display is blank.

Up/Down Arrow Operation

A first touch of either arrow will display the setpoint (a single set point is employed for both heating and cooling). Continued pressure on either arrow will scroll the setpoint to new values. After three consecutive seconds on either arrow, the selected setpoint becomes effective and the display of the room temperature resumes.

Configuration

Table 2: Circuit Board Jumper Configuration

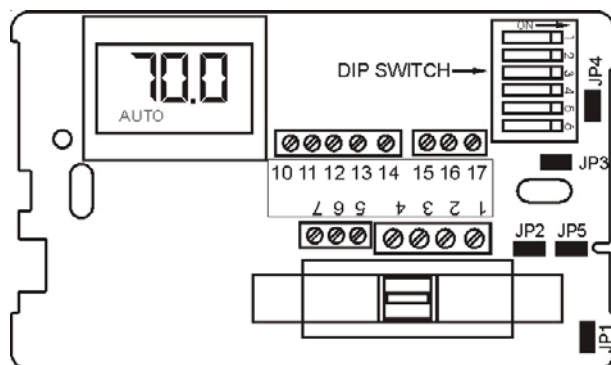
| Jumper | Closed ON* | Open OFF |
|--------|---------------------------|--------------------------|
| JP1 | Local Sensing | Remote Sensing |
| JP2 | 2 Pipe System | 4 Pipe System |
| JP3 | Factory Use Only | |
| JP4 | 0-10 VOC Main Output | 4-20 mA Main Output |
| JP5 | 0-10 VOC Secondary Output | 4-20 mA Secondary Output |

Table 3: Dip Switch Configuration

| Switch | Closed ON* | Open OFF |
|--------|---|--|
| 1 | Not Use | Not Used |
| 2 | Staged Heat 3°F Diff. (Term. 13) | Aux. Heat No Diff. (Term. 13) |
| 3 | °F Display | °C Display |
| 4 | Main & Sec. Outputs 0-10 VOC (Term. 10 & 11) requires JP4 & JP5 | Main & Sec. Outputs 4-20 mA (Term. 10 & 11) Remove JP4 & JP5 |
| 5 | Operating Position | Not Used |
| 6 | Setback= 90°F & 50°F | Setback = 85°F & 60°F |

Note: * On is with the dip switch handle to the right. See diagram.

Figure 3: Circuit Board



Service Menu:

Access: Press UP▲ and DOWN▼ arrows for 5 seconds.

Menu Selection: Select 1 to 5 by pressing the mode button or by pressing the UP▲ and DOWN▼ arrows simultaneously.

Adjust Value: Use UP▲ or DOWN▼ arrow.

Table 4: Service Functions

| Item # | Function | Range | Default |
|--------|-----------------------------|---|----------|
| 1 | Zone Temp Offset | -5.1 °F to 5.1 °F | °0 F |
| 2 | Valve Stroke Time | 30 sec. to 5 min. | 120 sec. |
| 3 | Fan Delay to OFF | 2 to 10 min. | 120 sec. |
| 4 | Compressor Minimum OFF Time | 30 sec. to 10 min. | 120 sec. |
| 5 | Purge Cycle | 0 = time based 1 = temperature based | 1 |

Addendum Material



Installation and Maintenance Manual

IM 846

Group: **Applied Air Systems**

Part Number: **910102993**

Date: **October 2013**

T170 Thermostat

24 VAC/120–277 VAC

3-Speed Fan Control (Continuous or Cycling) or Staged Fan Control



WARNING

BEFORE ATTEMPTING TO INSTALL, OPERATE, OR SERVICE THIS THERMOSTAT, CAREFULLY READ THESE INSTRUCTIONS.

Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

To avoid potential fire and/or explosion, do not use in potentially flammable or explosive atmospheres.

Retain these instructions for future reference. This product, when installed, is part of an engineered system whose specifications and performance characteristics are not designed or controlled by Daikin. You must review your application and national and local codes to assure that your installation is functional and safe.

DANGER

Hazardous voltage. To avoid electrical shock or damage to equipment, disconnect power before installing or servicing.

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



Installation

Thermostat Model and Part Number

Daikin offers two different thermostats depending on the fan speed control used (Table 1).

Table 1: Thermostat model and part numbers

| Model Number | Part Number | Fan Speed Control |
|--------------|-------------|---------------------|
| TA170-001 | 107345335 | 3-Speed Fan Control |
| TB170-001 | 107345336 | Staged Fan |

Note – For a list of thermostat features, refer to ED 3611.

Optional Occupancy Detection Sensors/Kits

In addition to the T170 thermostat, Daikin offers optional occupancy detection sensors that can be ordered and used in conjunction with the thermostat. When ordering, use the associated kit number(s)

Table 2: Occupancy sensor model and kit numbers

| Model Number | Kit Number |
|--------------|------------|
| SA200-001 | 6677877211 |
| SB200-001 | 6677877311 |
| SD200-001 | 6677877411 |
| SB200-002 | 6677877511 |

Mounting and Wiring the Thermostat

CAUTION

Before applying power, the voltage selection switch must be in the appropriate position. Failure to select the correct voltage can cause thermostat malfunction or permanently damage the thermostat.

CAUTION

To use a remote sensor on units with local sensing capability, remove jumper JP1 to disable local sensing. Failure to remove JP1 can cause improper operation of the thermostat with a remote probe installed.

CAUTION

Use copper wire only. Insulate or wire nut all unused leads. Avoid electrostatic discharge to the thermostat. Failure to do so can cause thermostat malfunction or permanently damage the thermostat.

DANGER

Hazardous voltage. Combined load current is not to exceed 20 amps. Mount only to a grounded metallic box. Low voltage wiring is Class 2. To avoid electrical shock or damage to equipment, disconnect power before installing or servicing. Failure to follow these instructions will result in death or serious injury.

The thermostat base mounts to a field provided 4" × 4" outlet box with a 2" × 4" mud ring (Figure 1). The thermostat cover assembly mounts to the thermostat base.

1. Disconnect power before installing or servicing.
2. Run line voltage wiring (and low voltage wiring if applicable) into the field provided outlet box and mud ring (Figure 1).
3. Locate all connections within the mud ring/connection box and wire nut all unused wires.
4. Remove the thermostat cover assembly from its base to gain access to the circuit board (Figure 2).
5. On the circuit board, set the voltage selection switch (Figure 2) to the appropriate voltage for the application
 - 24 V = 24 VAC
 - 110–277 V = 120, 240, or 277 VAC.

NOTE: The circuit board is shipped with the voltage selection switch in the 110-227 V position. For 24 VAC use, the switch must be in the 24 V position.

6. The circuit board is also equipped with configuration jumpers (JP1, JP3, and JP4 in Figure 2). Depending on the application, it may be necessary to reconfigure the following jumpers:
 - **JP4:** 2/4 Pipe Sensor Jumper - This jumper selects between 2-pipe (jumper ON) and 4-pipe (jumper OFF) operation (Fan Operation).
 - **JP3:** Door/Window Switch Jumper - This jumper is shipped normally open. Placement of a jumper allows for occupancy detection and door/window switch only operation (Optional Occupancy Detection Equipment Operation).
 - **JP1:** Removal of this jumper allows the sensor to be located in a remote location.
7. Connect the color coded thermostat wires (Figure 3) to the line voltage wires located in the mud ring/connection box and secure the connections with wire nuts.
8. Install the thermostat base to the mud ring/outlet box using two furnished mounting screws. Tighten the screws evenly but do not over tighten.

NOTE: An output ratings chart (Table 3) is located on the inside of the base.

9. With the base now secured, verify that the circuit board is firmly snapped into the cover and is not dislodged.
10. Install the cover assembly to the base, pressing firmly to engage the cover locking snaps.



Figure 1: Mounting the thermostat

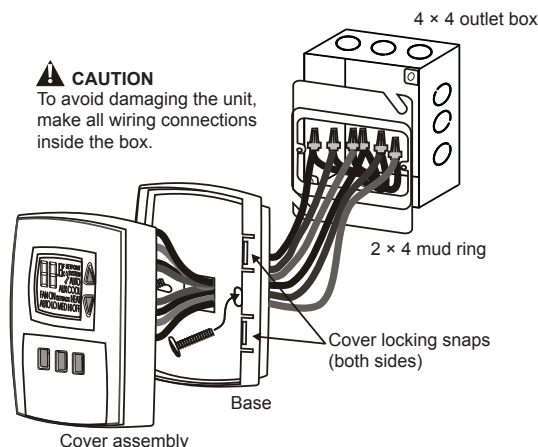


Figure 2: Circuit board

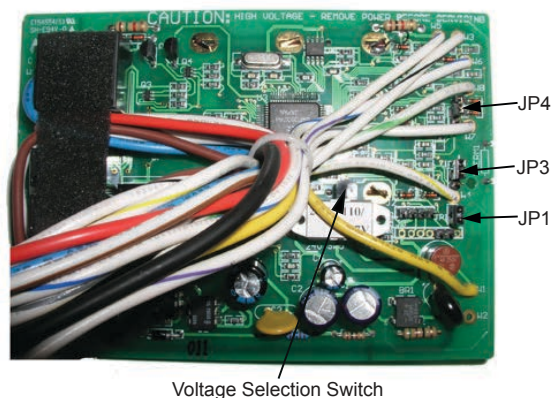


Figure 3: Wiring diagram

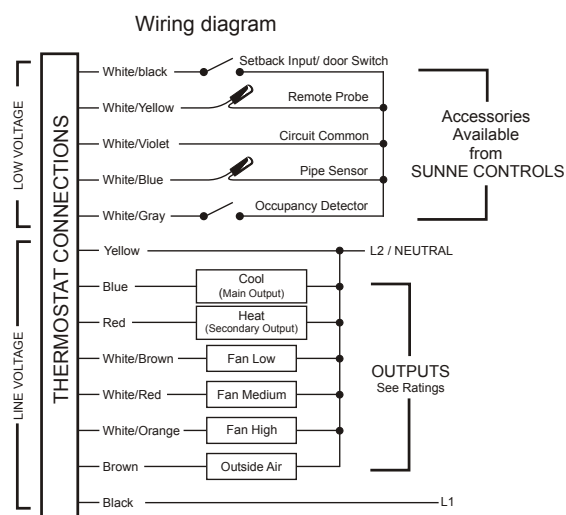


Table 3: Output ratings

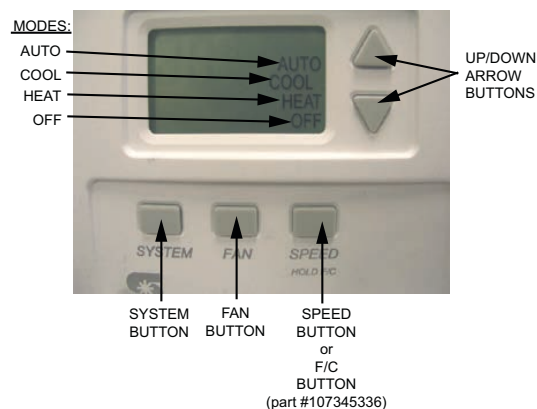
| Voltage | Inductive | | Resistive Amps | Pilot Duty | HP |
|---------|-----------|------|----------------|------------|-----|
| | FLA | LRA | | | |
| 24 VAC | NA | NA | NA | 24 VA | NA |
| 120 VAC | 5.8 | 34.8 | 6.0 | 125 VA | 1/4 |
| 240 VAC | 2.9 | 17.4 | 5.0 | 125 VA | 1/4 |
| 277 VAC | 2.4 | 14.4 | 4.2 | 125 VA | 1/4 |

Operation

Thermostat Button Operation

The thermostat interface (Figure 4) contains buttons for use in navigating to accompanying menus/screens and for performing specific operations. These buttons and operations are described below.

Figure 4: Thermostat interface (model #TA170-001 shown)



System Button Operation

The System button (Figure 4) contains and displays the following modes of operation:

OFF—All thermostat outputs are off. The fan is still operational if FAN ON is selected.

AUTO—The thermostat automatically selects heating or cooling mode depending on the set point and room temperature. If demand exists, the appropriate HEAT or COOL icon illuminates. A 3°F dead band is provided to prevent short cycling between heating and cooling modes. After changeover, the control point automatically shifts so that the control OFF point equals the set point temperature.

COOL—The thermostat operates as a cooling only thermostat.

HEAT—The thermostat operates as a heating only thermostat.



Up/Down Arrow Button Operation

4. Use the Up ▲ and Down ▼ arrow buttons (Figure 4) to increase or decrease the temperature.

Fan Button Operation

Use the Fan button (Figure 4) to control operation of the fan. In the ON position, the fan output operates continuously. In the AUTO position, the output cycles with demand. In the OFF position, all outputs are off.

NOTE: Model #TB170-001 (part #107345336) has staged fan control.

Speed Button Operation (TA170-001)

The fan Speed button (Figure 4) for model #TA170-001 (part #107345335) is determined by manually selecting HI, MED, or LO. Press and hold the Speed button for five seconds to toggle the displayed temperature from Fahrenheit to Celsius.

F/C Button Operation (TB170-001)

Model #TB170-001 (part #107345336) is configured for staged fan control and therefore utilizes a F/C button (Figure 4) instead of a Speed button. When pressed, the F/C button toggles between Fahrenheit and Celsius.

Verifying Thermostat Operation

To verify thermostat operation after mounting and wiring it, perform the following:

1. Energize the system.
2. Set the fan to ON.
3. Select each fan speed, if available, to verify operation.
4. Set the system button to AUTO or other available selection.
5. Using the UP ▲ arrow, adjust the temperature to more than 5°F above ambient temperature to cycle on heating.
6. Using the DOWN ▼ arrow, adjust the temperature to more than 5°F below ambient temperature to cycle on cooling.

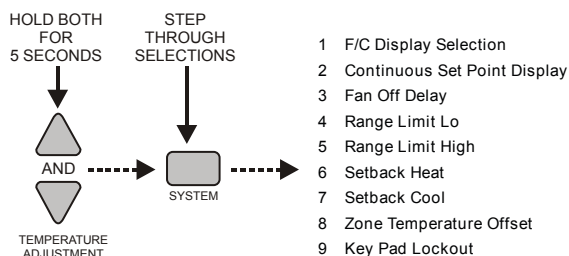
Thermostat Menu Functions

The thermostat menu contains nine functions which can be accessed using controls on the thermostat. Accessing the menu functions and details of each function are described below.

Menu Function Access

1. Press and hold the UP and DOWN arrow buttons (Figure 5) for five seconds.
2. The current display clears and the number “1” appears.
3. Press the SYSTEM button to scroll to the next item number.
4. Use the UP and DOWN buttons to make changes within the selected number.

Figure 5: Thermostat menu



1. **F/C (Fahrenheit/Celsius) display selection:** When this function is selected, the F and C icons appear and the selected icon flashes. To toggle between F or C, press the up or down arrow button.
2. **Continuous set point display:** When this function is selected, the F or C icon, current digits, and the set point icon appear. If the Continuous set point display is enabled, the set point icon flashes. To toggle between continuous display of set point and display of zone temperature, press the up or down arrow button.
3. **FAN OFF delay:** When this function is selected, the FAN, OFF, and digits appear. The digits represent the number of seconds the fan stays on after the heating and cooling outputs are turned off. To increase or decrease the value from 0–255 seconds, press the up or down arrow button.
4. **Range limit low:** When this function is selected, the current minimum range setting, the SET POINT icon and the LO icon appear. To increase or decrease the value, press the up or down arrow button.
5. **Range limit high:** When this function is selected, the current maximum temperature range adjustment, SET POINT icon, and LO icon appear. To increase or decrease the value, press the up or down arrow button.



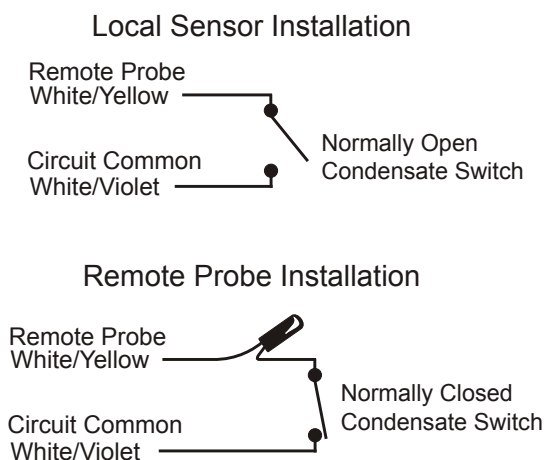
6. **Set back heat:** When this function is selected, the current temperature range adjustment, the SET BACK icon, and the HEAT icon appear. To increase or decrease the value, press the up or down arrow button.
7. **Set back cool:** When this function is selected, the current Cool setback value, the SET BACK icon, and the COOL icon appear. To increase or decrease the value, press the up or down arrow button.
8. **Zone temperature offset:** When this function is selected, the numeric ones and tenths (0.0) appear with a leading minus sign. To increase or decrease the value $\pm 9^{\circ}\text{F}$, press the up or down arrow button. Increments are made in 1°F and 0.5°C .
9. **Keypad lockout:** When this function is selected, the ON and OFF icons appear. The enabled icon flashes. OFF is the default. ON disables the keypad except for entry into the service menu. To increase or decrease the value, press the up or down arrow button.

NOTE: In the event of a power failure, these values are stored and can be recalled.

Condensate Overflow Interrupt

The remote probe input can be used with a condensate overflow switch (CO), either in conjunction with a remote probe (normally closed CO switch, [Figure 6](#)), or with local sensing (normally open CO switch, [Figure 6](#)). When the condensate switch activates, the thermostat displays a service wrench icon and disables all outputs.

Figure 6: Local and remote probe installation



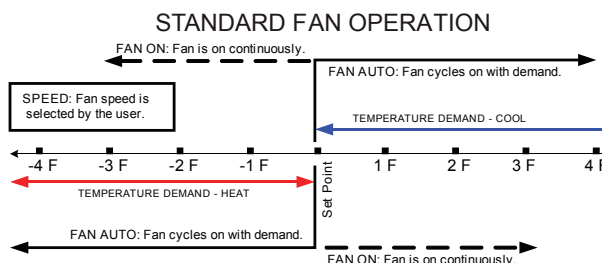
Fan Operation

The thermostat may be factory configured for standard or staged fan operation.

Standard Fan Configuration (TA170-001)

Units with standard fan operation ([Figure 7](#)) have a selectable fan Speed button.

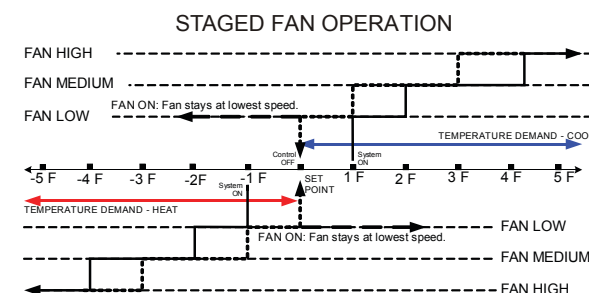
Figure 7: Standard fan operation



Staged Fan Configuration (TB170-001)

Factory configuration is available for staged fan operation ([Figure 8](#)) to provide occupant comfort while using the most effective fan speed.

Figure 8: Staged fan operation



Controlled Off Factory Configuration

A factory configuration may be provided for minimum heating and cooling requirements. Using this configuration, the HEAT and COOL outputs are automatically cycled on at the heat setback limit. Your thermostat may not have this feature.



Fan Coil Operation

Fan Coil operation is either a 2-pipe or 4-pipe configuration which is determined by jumper selection JP4 ([Mounting and Wiring the Thermostat](#)).

2-Pipe Operation

In this configuration, the thermostat permanently disables the secondary output and disables the fan from cycling in an invalid mode. The main output configuration is dependent on the pipe sensor input. With a pipe sensor connected, the thermostat automatically selects heating or cooling depending on the sensed water temperature. If the pipe sensor input is open (unconnected), the main output only cools. If the pipe sensor input is shorted, the main output only heats. Normal thermostat default is for 4-pipe operation. For 2-pipe operation, install a jumper on JP4.

4-Pipe Operation

In this configuration, both the main output (COOL) and the secondary output (HEAT) are available. These both cycle ON depending on the mode of the thermostat. With a pipe sensor connected, the thermostat automatically changes the main output to heat and disables the secondary output if the main coil water is hot. For 4-pipe operation, the JP4 jumper is removed.

Pipe Sensor Operation

A pipe sensor can be connected when the thermostat is configured for either 2-pipe or 4-pipe configuration. The pipe sensor is used to determine the water temperature in the main coil, which should be connected to the primary output.

Pipe sensor input—use a 10K Remote Probe or a standard ON-OFF Aquastat for summer/winter changeover.

Purge Cycle

With a pipe sensor connected, the thermostat initiates a purge cycle if the sensed water temperature is ambiguous (not adequately hot or cold). The sequence for purge cycle operation is as follows:

1. The thermostat has a call for heat or cooling.

NOTE: If at any time the call goes away, the thermostat stops the purge cycle.

2. The thermostat checks the pipe sensor to verify water temperature.
3. If the water temperature is beyond 15°F of the set point, normal HVAC control occurs.
4. If the water temperature is not beyond 15°F of the set point, the thermostat checks to see if the water temperature is above 80°F or below 60°F.

If yes, normal HVAC control occurs.

If no, the thermostat opens the main output (COOL) for three minutes.

5. After the three minute purge cycle occurs, the thermostat checks to see if the water temperature is more than 15°F from the set point, or above 80°F, or below 60°F.

If yes, normal HVAC operation occurs.

If no, the valve is left open and the thermostat continues to search for a valid reading.

NOTE: If at any time the demand goes away, the thermostat will stop the purge cycle.

Table 4 shows output operation, depending on the sensed water temperature.

Table 4: Output operation

| 2-Pipe/4-Pipe Selection | Water Temperature | Output Operation | |
|-------------------------|-------------------|---|------------------|
| | | Main Output | Secondary Output |
| 2-pipe JP4 ON | Cold | Cooling only The fan does not cycle ON with a heat demand. | Disabled |
| | Hot | Heating only The fan does not cycle ON with a cool demand. | Disabled |
| 4-pipe JP4 OFF | Cold | Cooling | Heating |
| | Hot | Heating only The fan does not cycle ON with a cool demand. | Disabled |

Setback Operation

In this configuration, the low level switch input normally is open. To enable setback operation, the JP3 jumper is removed ([Mounting and Wiring the Thermostat](#)). The input will close and the thermostat heating and cooling setback limits can then be used as temperature control points. Fan operation in setback is cycled with demand. Press any thermostat key to override setback for one hour. Setback overrides any user setting except if the control is turned to OFF.



Optional Occupancy Detection Equipment Operation

The T170 thermostat can be used with optional S200 series occupancy detection equipment. Purchasing and installing this equipment to compliment the thermostat adds energy savings by setting back HVAC operation during occupied and unoccupied times. Optional detection equipment configurations and operation are described below.

SB200-001 Occupancy Sensor

The SB200-001 occupancy sensor ([Figure 9](#)) serves as an occupancy sensor for automatic control of a guest room HVAC system. It incorporates an innovative dual delay processor which allows the sensor to verify the nature of occupancies, and is capable of eliminating unnecessary actuations of the HVAC device due to unintentional passages or short time occupancies. The sensor may also serve as a slave sensor ([Figure 11](#)).

The sensor switch is open in occupied mode and closed in unoccupied mode. An optional door and/or window switch ([Figure 9](#)) is open when the door/window is open and is closed when the door/window is closed.

NOTE: To use this configuration, a jumper must be installed to JP3 to allow occupancy input.

An optional door and/or window switch ([Figure 9](#)) can be added for use with the SB200-001 sensor.

Operation

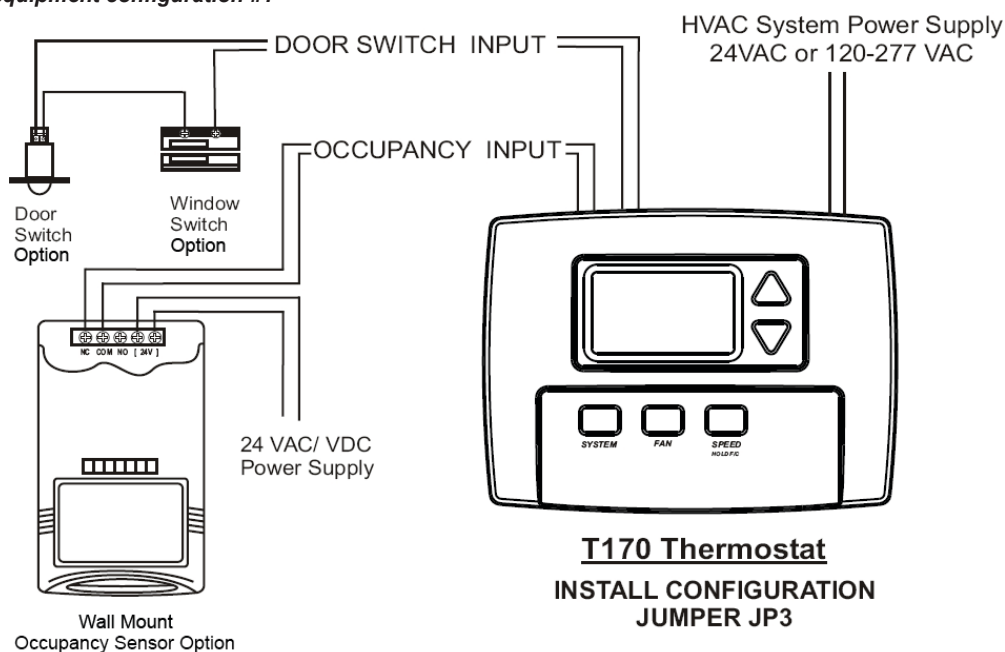
In an occupied mode, the thermostat operates normally and looks for a door open signal. When the door opens, the thermostat waits for a door close signal. If the door is open for more than two minutes, the thermostat turns the HVAC system outputs to OFF. During this two minute period, if any button is pressed on the keypad, the time delay is extended to ten minutes. The time delay can only be extended once. Once the HVAC outputs transition to OFF, a door closure is required to re-enable the outputs. When the door closes, the thermostat starts a two minute timer and tries to detect occupancy. If the timer expires and no occupancy is detected, the thermostat transitions to an unoccupied state. If occupancy is detected while the timer is running, the thermostat will remain in the occupied mode.

In an unoccupied mode, the thermostat sets heating and cooling set points to setback values as determined by factory or user settings. The fan is automatically set to cycle with demand. The thermostat continually monitors the occupancy sensor and will enter into occupied mode if occupancy is detected.

If the installation is only using a door/window switch, the thermostat will disable the HVAC outputs if this output is open for longer than two minutes.

To enable door/window switch only operation, install a jumper to JP3 ([Mounting and Wiring the Thermostat](#)) and the occupancy input must be shorted to circuit common.

Figure 9: Optional equipment configuration #1





SD200-001 Occupancy Sensor

The SD200-001 occupancy sensor (Figure 10) serves as a master sensor for a guest room HVAC management system. The sensor provides HVAC operation according to occupancy status, as well as door/window switch monitoring, selectable high/low temperature setback, form-C output, slave sensor connectivity, and a five minute door open HVAC shut-off.

NOTE: To use this configuration, the jumper to JP3 is removed to allow setback input.

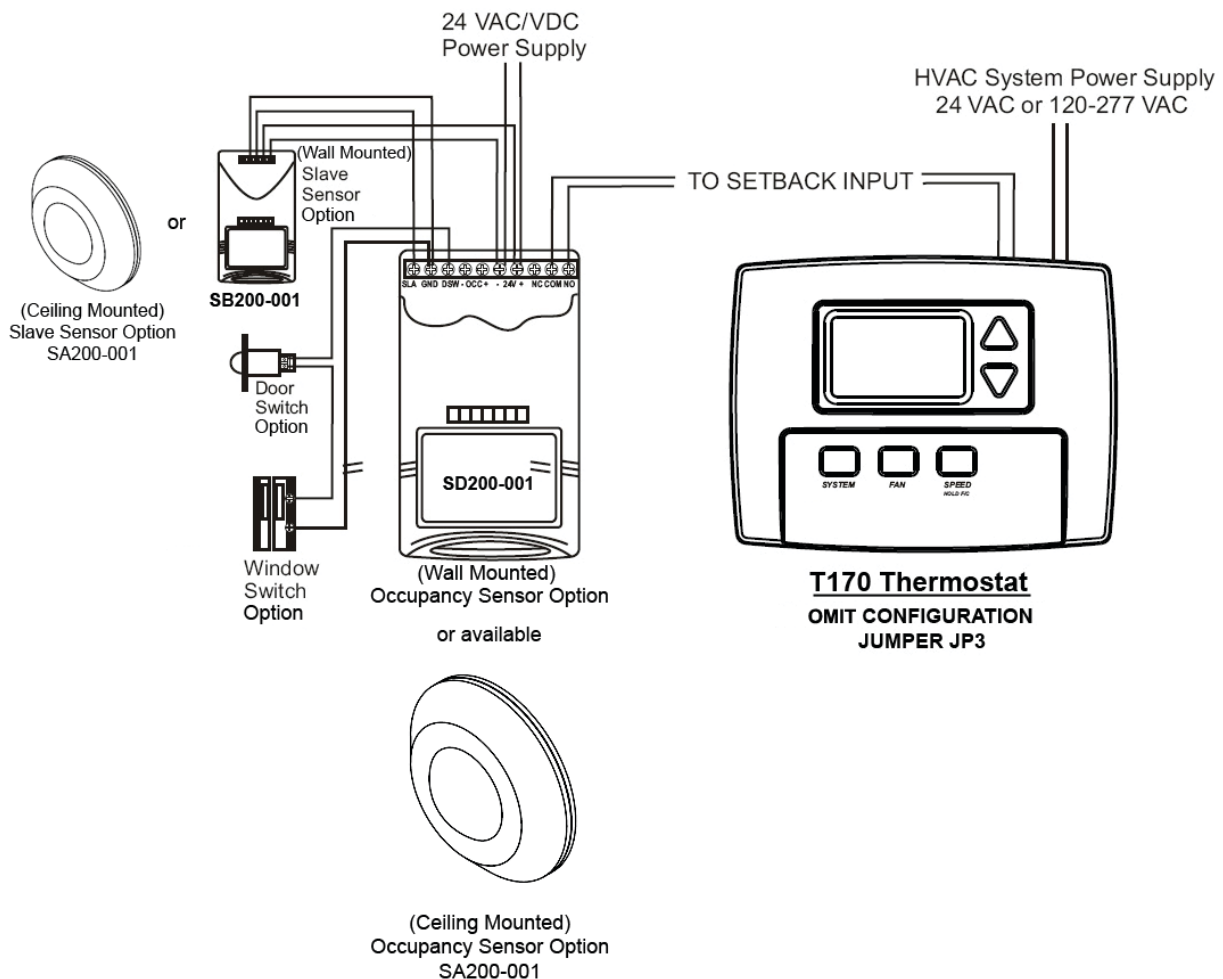
An optional door and/or window switch (Figure 10) and slave sensor can be added for use with the SD200-001 sensor.

Operation

In an occupied mode, the SD200-001 occupancy sensor (Figure 10) and door switch use advanced microprocessor logic to determine occupancy. A door open signal will initiate occupancy status detection. If the sensor determines that a room is occupied, it will allow normal HVAC control. The sensor will wait for another door open signal before determining occupancy again.

In an unoccupied mode, the sensor continually monitors the room. Any occupancy detection will set the operation to occupied mode.

Figure 10: Optional equipment configuration #2





SD200-002 Occupancy Sensor

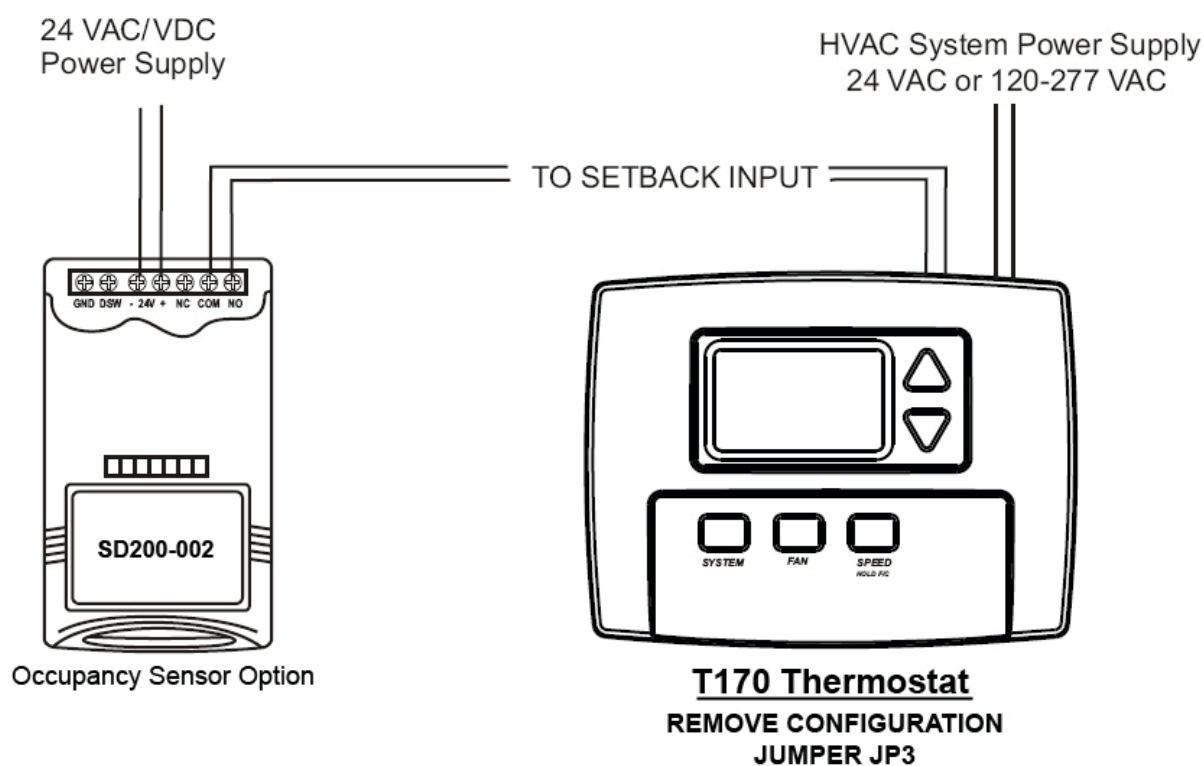
The SD200-002 occupancy sensor serves as a stand alone master sensor for a guest room HVAC management system. The sensor provides HVAC operation according to occupancy status, as well as selectable high/low temperature setback, form-C output, and a five minute door open HVAC shut-off. This system provides basic room setback and is ideal for control of HVAC in commercial spaces.

NOTE: To use this configuration, the jumper to JP3 is removed to allow setback input.

Operation

With each occupancy detection, an OFF delay is started and can be set to delay for up to 30 minutes.

Figure 11: Optional equipment configuration #3



Addendum Material



Installation and Maintenance Manual

IM 831

Group: **Applied Air Systems**

Part Number: **667757200**

Date: **October 2013**

Fan Coil Thermostat Conversion Kit to Eliminate 3-speed Switch Capability

Safety Information

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes. This equipment is to be installed only by an experienced installation company which employs trained personnel.

WARNING

Rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

WARNING

To avoid electrical shock, personal injury or death:

1. Installer must be qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and damage to equipment.

Introduction

This thermostat conversion **kit number 107345245** converts a fan coil unit thermostat to a thermostat without a 3-speed switch. The thermostat kit includes a cover that does NOT have an opening for the 3-speed control switch. The following is the proper procedure to convert the thermostat.

Procedure

CAUTION

If the FAN Switch remains in the left-most (Off) position the thermostat will NOT function properly.

1. Carry out this procedure before mounting the thermostat or applying power to it. If the thermostat is already mounted, turn off all power to it before proceeding.
2. Slide the FAN switch on the front of the thermostat to the setting at which you want the motor to run all the time.
3. Remove the cover from the thermostat by gently prying with behind the left hand edge of the cover with a small screwdriver, then pulling it off as shown in Figures 1 and 2.

NOTE: Once you exchange thermostat covers, the user can no longer change this setting.

4. Adjust the dip switch and jumpers to your desired configuration (see thermostat installation manual).
5. Pull off the fan slide switch cap (Figure 3). Note: Be careful not to change the position of the switch you set in Step 2.
6. Place the new thermostat cover that does not have the 3-speed switch opening on the thermostat (Figure 4).



Figure 1: Opening the Thermostat Cover

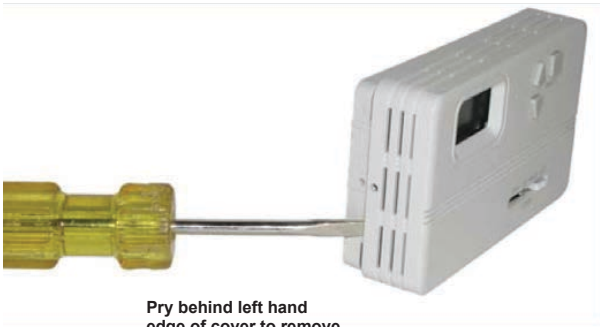


Figure 3: Remove Plastic Fan Slide Switch Cap

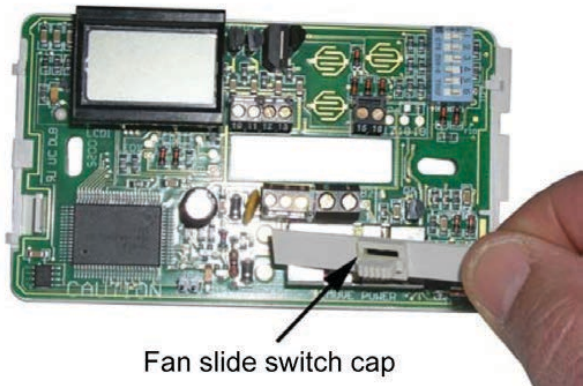
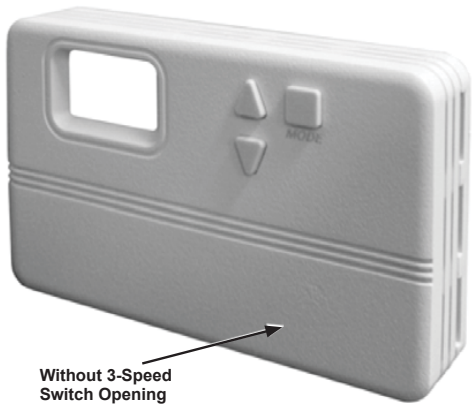


Figure 2: Accessing The Components



Figure 4: New Thermostat Cover





Installation and Maintenance Manual

IM 763

Group: **Applied Air Systems**

Part Number: **106333101**

Date: **October 2013**

Automatic Changeover Switch for Automatic Seasonal Changeover on Two-pipe Systems

WARNING

Installation and maintenance are to be performed only by qualified personnel who are familiar with and in compliance with state, local and national codes and regulations, and experienced with this type of equipment.

CAUTION

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

These line voltage changeover switches are designed to switch a thermostat from heating to cooling based on a change in supply water temperature. The switches can be mounted on 5/8" or 7/8" O.D. copper tube or iron pipe.

Both models are easily mounted to the supply piping with a simple spring clip included with the thermostat.

Models

The 039398600 model (Fig. 1) has 110 in. leads and is the standard changeover switch. The 06361801 model (Fig. 2) has the same operating characteristics and includes 18 in. conduit and connector.

Both models are snap acting, SPDT switches.

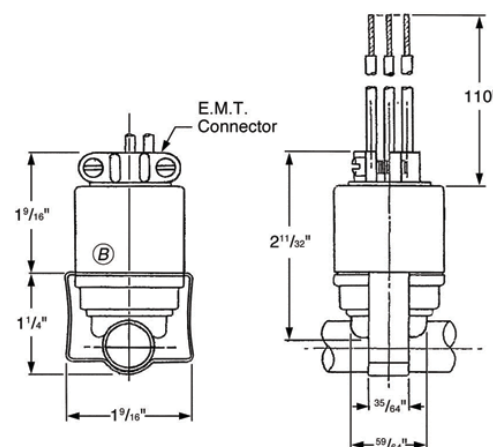
Terminal No. 1 has a black wire and is the common (C) connected to valve (valve cycle) or to the yellow wire of the speed switch (fan cycle).

Terminal No. 2 has a red wire and is normally open (N.O.). Connected to the heating (red) wire of the thermostat.

Terminal No. 3 has a blue wire and is normally closed (N.C.). Connected to the cooling (blue) wire of the thermostat.

At approximately 65°F, plus or minus 6°F, terminals 1 and 3 are closed and terminals 1 and 2 are open. At 95°F, plus or minus 6°F, terminals 1 and 2 are closed and terminals 1 and 3 are open.

**Figure 1: Automatic Changeover Switch
(Kit P/N 039398600)**



Terminal No. 1 Black 60455 (Common)
Terminal No. 2 Red 60456 (N.O.) – Heating
Terminal No. 3 Blue 60457 (N.C.) – Cooling

Type 14TC33

Open Temp Term. 1 and 3, 95°F ± 6°

Close Temp Term. 1 and 3, 65°F ± 6°

U.L. File – E29653

U.L. Guide – SDFY2

Volts – 120

Amps – 25



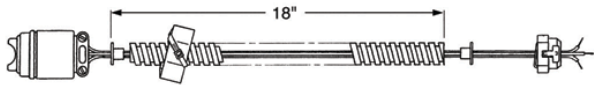
Specifications

Table 26: Electrical Rating

| Model | Voltage | FLA | LRA | Restive |
|--------------------------------------|---|--------|---------|---------|
| 039398600 061361801 | 24 – 240 | 15 – 5 | 90 – 30 | 25 |
| Changeover Range: | 65°F to 95°F (18°C to 35°C) | | | |
| Maximum Operating Temperature Limits | 220°F Fluid Temperature @ 125°F Ambient (104°C Fluid Temperature @ 52°C Ambient) | | | |
| Agency Approval | UL Listed, CSA Approved | | | |

The specifications above are nominal and conform to generally acceptable industry standards. Daikin is not responsible for damages resulting from misapplication or misuse of its products.

Figure 2: Automatic Changeover Switch
(Kit P/N 061361801)





Operation and Maintenance Manual

OM 1111-2

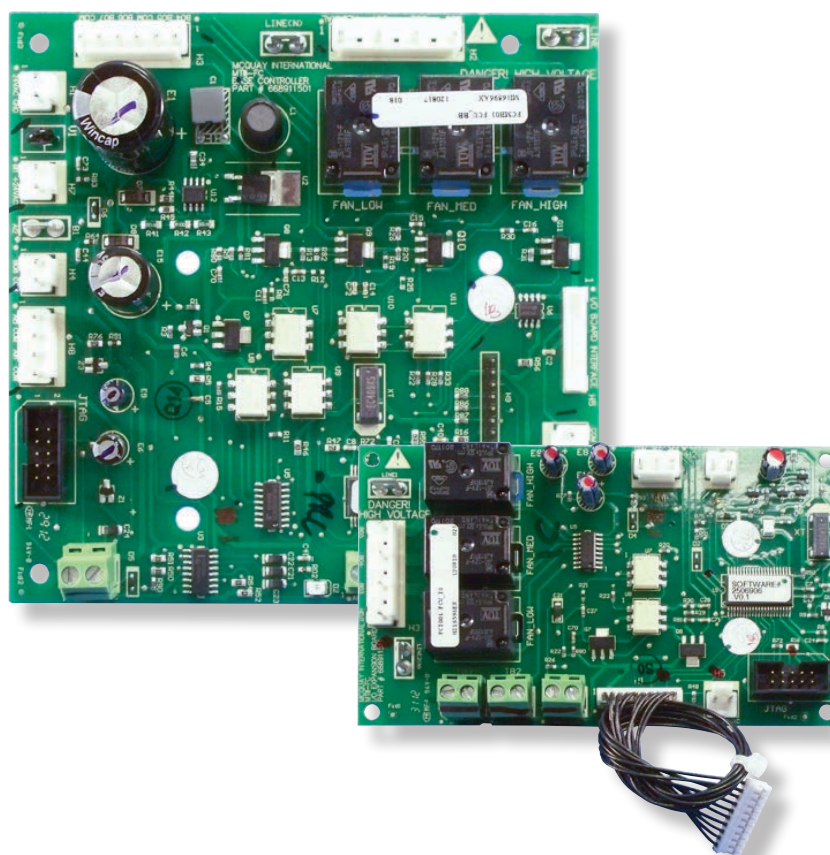
Group: **Applied Air Systems**

Part Number: **OM 1111**

Date: **October 2015**

MicroTech® Unit Controller with I/O Expansion Module for Fan Coils

Models FCHH / FCHC / FCHR and
Cabinet Unit Heaters, Models FHHH / FHHH / FHHR





| | | | |
|--|-----------|--|-----------|
| Introduction | 3 | Miscellaneous Control Definitions | 21 |
| General Use and Information | 3 | Appendix A | 23 |
| MicroTech Baseboard | 4 | Replacing a MicroTech Circuit Board | 23 |
| Control Inputs | 4 | Appendix B | 24 |
| Control Outputs | 5 | MicroTech Unit Controller with an optional LONWORKS® Communication Module | 24 |
| I/O Expansion Module | 6 | Appendix C | 25 |
| Control Boards Terminals and Connectors | | MicroTech Unit Controller with an optional BACnet Communication Module | 25 |
| Descriptions | 8 | Appendix D | 26 |
| Fan Coil/Cabinet Unit Heater Unit Control | 13 | Typical Wiring Diagrams | 26 |
| Fan Coil/Cabinet Unit Heater Control | | | |
| Output Tables | 13 | | |
| Operating Modes | 15 | | |
| Alarms | 20 | | |

This Operation Manual covers the MicroTech® Unit Controller for the Daikin ThinLine Fan Coils. For information on LONWORKS® or BACnet® communication modules and other ancillary components, see:

- [IM 1012](#) — MicroTech III Fan Coil LONWORKS Communication Module.
- [IM 1013](#) — MicroTech III Fan Coil Unit Controller BACnet MS/TP Communication Module.
- [IM 933](#) — LONWORKS Plug-In Software for use with MicroTech III Unit Controller - LONWORKS Communication Module.
- [IM 1171](#) — Digitally Adjustable Display Sensor Installation and Maintenance Manual
- [OM 1095](#) — MicroTech III The Downloading And Configuration Procedure
- [ED 15135](#) — MicroTech III Fan Coil Unit Controller Protocol Information

For information on ThinLine Fan Coils and Cabinet Unit Heaters see

- [Catalog 724](#) — ThinLine Horizontal Fan Coils (Type FCHC, FCHH, and FCHR)
- [Catalog 725](#) — ThinLine Horizontal Cabinet Unit Heaters (Type FHHC, FH HH, and FHHR)
- [IM 1152](#) — Installation Manual Daikin ThinLine Horizontal Fan Coils and Cabinet Unit Heaters (Type FC and FH Horizontal Design).

General Use and Information

The MicroTech unit controller is a fan coil/cabinet unit heater control platform used to control the fan coil/unit heater in all modes of operation, including economizers, control valves, and all components used to control conditioned space temperature. By adding a communication module, (LONWORKS or BACnet) network integration is possible. The controller can be used with wall sensor control only.

No outside power sources may be used to operate MicroTech controller. All units must be properly grounded per local code requirements. See the Installation Manual [IM 1152](#) for specific power requirements.

Control Inputs

The baseboard accepts the following analog and binary control inputs:

1. Room Temp and Tenant Override Analog
2. Local Setpoint Adjust Analog
3. Fan Mode/Speed Switch Analog
4. Entering Water Temperature (EWT) Analog
5. Discharge Air Temperature (DAT) Analog
6. Heat/Cool/Auto Mode Switch Analog
7. Freeze Fault Detection. Binary
8. Occupancy Sensor Binary
9. Condensate Overflow Binary

Input Description

Room or Return Air Temp & Tenant Override

Analog input may be used to measure Room or Return Air temperature using a 10k NTC thermistor. The same analog input is used to sense the position of the timed override switch when a room sensor is applied. This sensor is mandatory in the Fan Coil/Cabinet Unit Heater units unless the input value is provided through network communications.

Condensate Overflow

Analog input may be used to detect the presence of water in condensate pan. While the input is analog (microOhms), the result of the algorithm is binary (dry or wet). If the value is below 2.5 microOhms, the pan is dry. If the value is above 2.5 microOhms, the pan is wet. Ultimately the pan is considered dry for analog inputs above 1.8 VDC.

Local Setpoint Adjust

Analog input may be used to determine hardwired setpoint position based on a 1.5K Ω potentiometer that is mounted on the room temperature sensor. Setpoint is at its minimum value at 0 Ohms (0.0 VDC), maximum value at 1.5K Ohms (3.0 VDC). Range of input is determined by the setting of an equipment configuration bit. Long range input is limited by Max and Min clamp settings. Either "Short" or "Long" range is selected during the unit order and preset at the Daikin factory. See "nciSoftJumpers" in Table 18 for specification details.

- If "Short Range" is selected, the nvoSetptShift variables are used.
- If "Long Range" is selected, the nvoSetpoint variable is used.

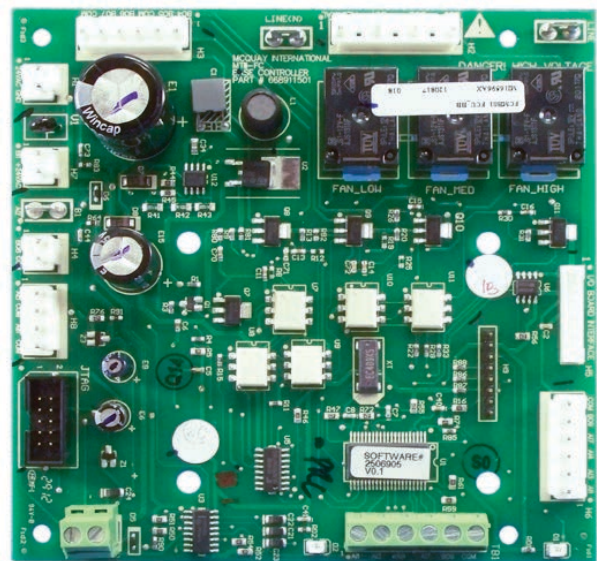
Fan Mode/Speed Switch

Analog input may be used to determine the position of the fan mode and speed switch. Input DC voltages are defined as follows: 0.0v = Auto, 1.0v = High, 2.0v = Medium, 3.0v = Low, 4.0v = Off, 5.0v = Switch is not present.

Entering Water Temperature (EWT)

Analog input may be used to measure temperature of water entering the hydronic coil using a 10k NTC thermistor. The sensor is only required in 2-Pipe Cooling/Heating systems or Heating-only with Supplemental Electric Heat, and is optional elsewhere.

Figure 1: MicroTech Baseboard



Discharge Air Temperature (DAT)

Analog input may be used to measure discharge air temperature sensor using a 10k NTC thermistor.

Heat/Cool/Auto Mode Switch

Analog input may be used to determine the position of the heat/cool/auto mode switch. Input DC voltages are defined as follows: 0.0v = Cool, 1.0v = Auto, 2.5v = Heat, 5.0v = Switch is not present.

Freeze Fault Detection

Binary input may be used to detect the position of a low discharge air temperature freeze fault detection switch. The sensor part of the switch is installed in the air stream. If the contact on the switch is open, the temperature in the air stream is below freezing (alarm active). If the contact on the



switch is closed, the temperature in the air stream is above freezing (alarm inactive). Must use "nciSoftJumpers" to enable or disable this input. See Table 18. Input span is 0.0 to 3.6 VDC, with a threshold of 1.5 VDC.

NOTE: Freezestat sensor should be provided from the factory or field-supplied

Occupancy Sensor

Binary input may be used to detect the position of an occupancy sensor. This could be a motion detector or a time clock. Open sensor contact represents occupied, closed sensor contact represents unoccupied. Network-effective occupancy has priority over position of this input. Input span is 0.7 (unoccupied) to 5.0 VDC (occupied), with a threshold of 2.85 VDC.

NOTE: Note: Occupancy sensor is field-supplied

Control Outputs

The MicroTech baseboard provides the following Binary Outputs:

1. Fan Low Speed
2. Fan Medium Speed
3. Fan High Speed
4. Valve Output #1
5. Valve Output #2
6. Valve Output #3/Electric Heat S1
7. Valve Output #4
8. Fresh (Outside) Air Damper – 2-Position only.
9. Room Sensor Status Output

Output Description

Each binary output is either a relay with normally-open contacts or a triac. A triac is treated like a relay with normally-open contacts. In other words, energizing the triac is like closing a normally-open contact.

Fan Speed Outputs

There are three fan speed outputs on baseboard, and three fan speed outputs on I/O expansion board. The two separate fans operate in unison. In other words – if the low speed output on baseboard is energized, the low speed output on I/O expansion board is also energized, etc. If all three outputs are de-energized, the fan motor is off. Only a single type (low, medium, high) of speed output shall be turned on when fan operation is required.

• Low Speed:

This binary output is used to operate the fan at low speed. If this output is energized, the fan operates at low speed.

• Medium Speed:

This binary output is used to operate the fan at medium speed. If this output is energized, the fan operates at medium speed.

• High Speed:

This binary output is used to operate the fan at high speed. If this output is energized, the fan operates at high speed.

Two-Position Damper Output

Binary output may be used to open a fresh air ventilation damper. If the output is de-energized, the damper is closed. If the output is energized, the damper is open.

Room Sensor Status Output

Binary output may be used to energize and de-energize an indicator located on the room sensor. See Room Sensor Status Output Annunciation Table below.

Status Annunciation Tables

Table 1: Room Sensor Status Output Annunciation Table

| Condition * | Indicator On Time (Sec) | Indicator Off Time (Sec) |
|--|-------------------------|-----------------------------|
| Alarm Active: Specific Alarm Determines Number of Flashes (See Alarms section) | 0.3 | 0.3 (1.3 Between Cycles) |
| Calibration or Network Wink Active | 3.0 | 3.0 |
| Service Test Mode | 0.0 | Continually |
| Unoccupied Mode | 0.5 | 5.5 |
| Standby Mode | 5.5 | 0.5 |
| Occupied, Bypass Mode | Continually | 0.0 |

* Annunciation conditions are listed in order of priority.

Table 2: Baseboard Diagnostic LED Annunciation Table

| Diagnostic LED State | Condition |
|----------------------|---|
| LED #1: On Steady | Normal I/O Expansion Board SPI Communications |
| LED #1: Flashing | Failed I/O Expansion Board SPI Communications |
| LED #2: On Steady | Normal Comm Module SPI Communications |
| LED #2: Flashing | Failed Comm Module SPI Communications |

The I/O Expansion Module is an extension of the main board and provides extra functionality to the MicroTech control system. The MicroTech unit controller in combination with the I/O Expansion Module will be the standard control system for ThinLine Fan Coils and Cabinet Unit Heaters. See [Figure 2](#).

Adding an I/O Expansion Module (with an interconnect cable) to the main controller allows:

- Economizer Control
- Second Fan Motor Control
- Additional control inputs

I/O Expansion Board Inputs & Outputs

I/O expansion Board accepts the following inputs:

1. Outdoor Air Temperature (OAT) – analog
2. Dirty Air Filter – binary¹
3. Emergency Shutdown Detection – binary [Future option]
4. Humidistat – binary [Future option]

¹ Currently Dirty Filter indication uses timer only

Input Description

Outdoor(Fresh) Air Temperature (OAT)

Analog input may be used to measure outdoor air temperature using a 10k NTC thermistor.

Dirty Air Filter

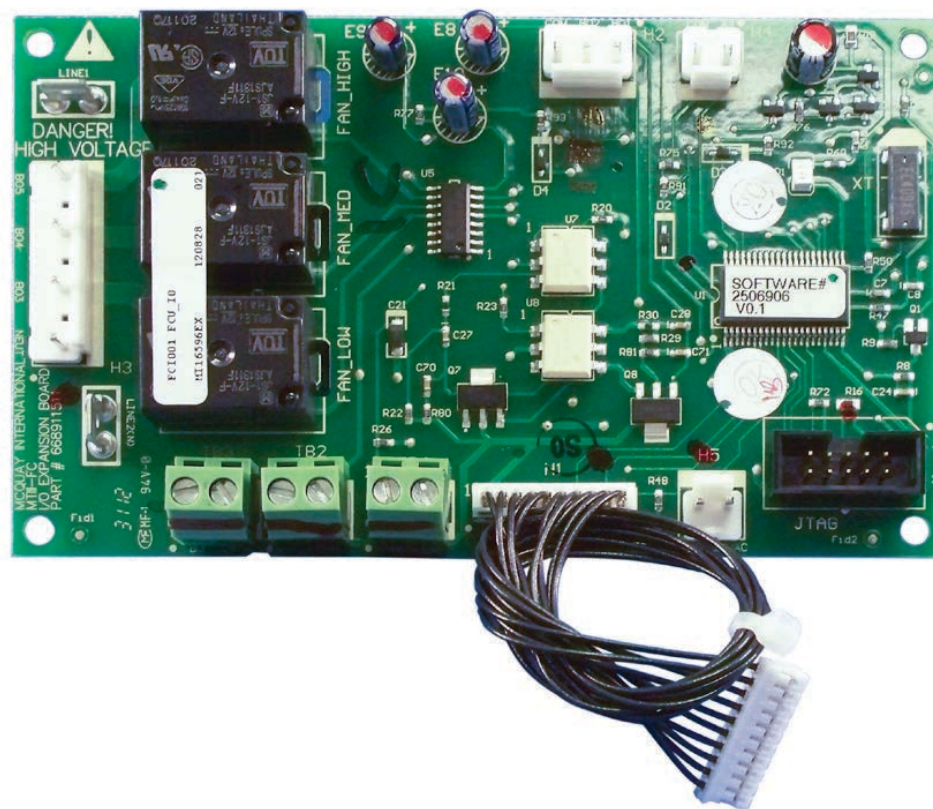
Binary input may be used to detect Dirty Filter² condition. Dirty air filter alarm is active when the input contact opens. Must use “nciSoftJumpers” to enable or disable this input. See [Table 18](#) for details. Input span is 0.0 to 3.6 VDC, with a threshold of 1.5 VDC.

² Currently Dirty Filter input uses timer signal only.

Humidistat [future option]

Binary input may be used to detect humidistat position. Contact closes when dehumidification is required. This feature is only allowed for 4-Pipe Heating & Cooling systems with modulating valves and 2-Pipe Cooling-only systems. Input span is 0.0 to 3.6 VDC, with a threshold of 1.5 VDC.

Figure 2: MicroTech I/O Expansion Module





Output Description

I/O Expansion Board provides the following binary Outputs:

1. Economizer Open
2. Economizer Closed
3. Fan Low Speed
4. Fan Medium Speed
5. Fan High Speed

Economizer Control Outputs

I/O expansion board binary outputs 1 and 2 are may be used for economizer control. Output #1 drives the economizer toward the open position. Output #2 drives the economizer toward the closed position.

Emergency Shutdown [future option]

Binary input may be used to detect an emergency shutdown condition. Shutdown occurs when the input contact opens. Must use “nciSoftJumpers” to enable or disable this input. See [Table 18](#) for details. Input span is 0.0 to 3.6 VDC, with a threshold of 1.5 VDC.

Second Fan Motor Speed Outputs

There are three fan speed outputs on baseboard, and three fan speed outputs on I/O expansion board. The two separate fans operate in unison. In other words – if the low speed output on baseboard is energized, the low speed output on I/O expansion board is also energized, etc. If all three outputs are de-energized, the fan motor is off. Only a single type (low, medium, high) of speed output shall be turned on when fan operation is required.

- **Low Speed:**

This binary output is used to operate the fan at low speed. If this output is energized, the fan operates at low speed.

- **Medium Speed:**

This binary output is used to operate the fan at medium speed. If this output is energized, the fan operates at medium speed.

- **High Speed:**

This binary output is used to operate the fan at high speed. If this output is energized, the fan operates at high speed.

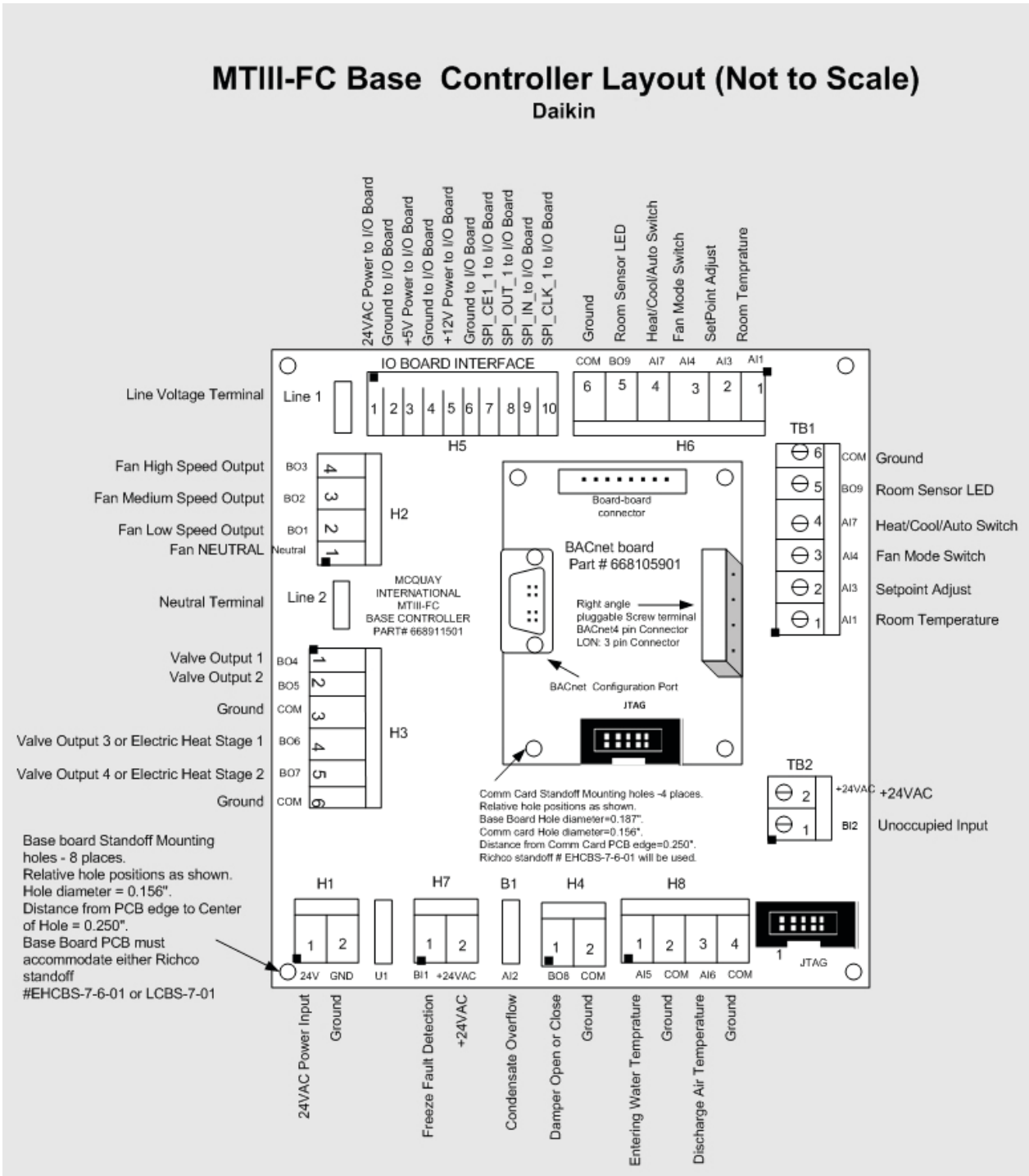
Table 3: I/O Expansion Board Diagnostic LED Annunciation Table

| Condition * | LED On Time (Sec) | LED Off Time (Sec) |
|--|-------------------|--------------------|
| SPI Communications Receive (RX) Fail | 0.5 | 0.5 |
| SPI Communications Transmit (TX) Fail (From Baseboard) | 2.5 | 2.5 |
| Normal SPI Communications | Continually | 0.0 |

* Annunciation conditions are listed in order of priority.



Figure 3: MicroTech Unit Controller & I/O Expansion Module Connectors Descriptions





CONTROL BOARDS TERMINALS AND CONNECTORS DESCRIPTIONS

MicroTech Unit Controller

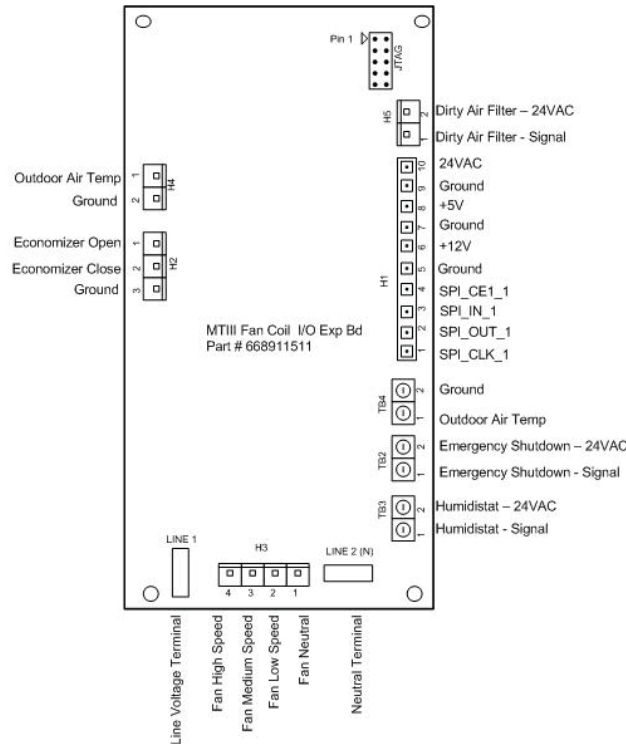
Table 4: MicroTech Unit Controller Terminals & Descriptions

| Baseboard Connector – Terminal # | Silk Screen Label | Description |
|----------------------------------|---------------------|---|
| H1-1 | 24VAC | 24VAC Power Input |
| H1-2 | GND | Ground |
| H2-4 | BO3 | Fan High Speed Output |
| H2-3 | BO2 | Fan Medium Speed Output |
| H2-2 | BO1 | Fan Low Speed Output |
| H2-1 | NEUTRAL | Fan Neutral |
| H3-1 | BO4 | Valve Output 1 |
| H3-2 | BO5 | Valve Output 2 |
| H3-3 | COM | Ground |
| H3-4 | BO6 | Valve Output 3 or Electric Heat Stage 1 |
| H3-5 | BO7 | Valve Output 4 |
| H3-6 | COM | Ground |
| H4-1 | BO8 | Damper Open |
| H4-2 | COM | Ground |
| H5-1 | I/O BOARD INTERFACE | 24VAC Power to I/O Board |
| H5-2 | | Ground to I/O Board |
| H5-3 | | +5V Power to I/O Board |
| H5-4 | | Ground to I/O Board |
| H5-5 | | +12V Power to I/O Board |
| H5-6 | | Ground to I/O Board |
| H5-7 | | SPI_CE1_1 to I/O Board |
| H5-8 | | SPI_OUT_1 to I/O Board |
| H5-9 | | SPI_IN_1 to I/O Board |
| H5-10 | | SPI_CLK_1 to I/O Board |
| H6-1 | AI1 | Room Temperature |
| H6-2 | AI3 | SetPoint Adjust |
| H6-3 | AI4 | Fan Mode Switch |
| H6-4 | AI7 | Heat/Cool/Auto Switch |
| H6-5 | BO9 | Room Sensor LED |
| H6-6 | COM | Ground |
| H7-1 | BI1 | Freeze Fault Detection |
| H7-2 | 24VAC | 24VAC |
| H8-1 | AI5 | Entering Water Temperature |
| H8-2 | COM | Ground |
| H8-3 | AI6 | Discharge Air Temperature |
| H8-4 | COM | Ground |
| B1 | AI2 | Condensate Overflow |
| TB1-1 | AI1 | Room Temperature |
| TB1-2 | AI3 | SetPoint Adjust |
| TB1-3 | AI4 | Fan Mode Switch |
| TB1-4 | AI7 | Heat/Cool/Auto Switch |
| TB1-5 | BO9 | Room Sensor LED |
| TB1-6 | COM | Ground |
| TB2-1 | BI2 | Unoccupied input |
| TB2-2 | 24VAC | 24VAC |
| LINE1 | LINE1 | Line Voltage/ECM Terminal |
| LINE2(N) | LINE2(N) | Neutral Terminal |



Figure 4: MicroTech III Fan Coil I/O Expansion Board Connector Layout (not to scale)

MTIII Fan Coil I/O Expansion Board Connector Layout (Not to Scale)
Daikin



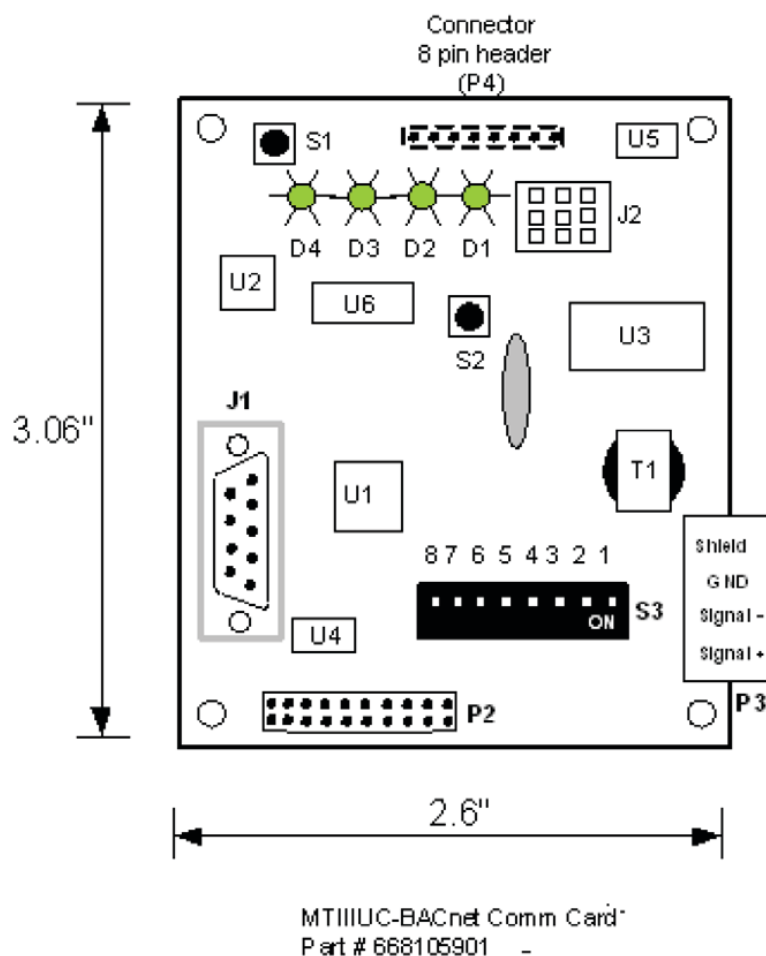
I/O Expansion Module

Table 5: I/O Expansion Module Connectors/Terminals

| IO Exp. Module Connector – Terminal # | Silk Screen Label | Description |
|---------------------------------------|---------------------------|---------------------------|
| H1-1 | UNIT CONTROLLER INTERFACE | SPI_CLK_1 to I/O Board |
| H1-2 | | SPI_OUT_1 to I/O Board |
| H1-3 | | SPI_IN_1 to I/O Board |
| H1-4 | | SPI_CE1_1 to I/O Board |
| H1-5 | | Ground to I/O Board |
| H1-6 | | +12V Power to I/O Board |
| H1-7 | | Ground to I/O Board |
| H1-8 | | +5V Power to I/O Board |
| H1-9 | | Ground to I/O Board |
| H1-10 | | 24VAC Power to I/O Board |
| H2-1 | BO1 | Economizer Open output |
| H2-2 | BO2 | Economizer Closed output |
| H2-3 | COM | Ground |
| H3-4 | BO5 | Fan High Speed |
| H3-3 | BO4 | Fan Medium Speed |
| H3-2 | BO3 | Fan Low Speed |
| H3-1 | NEUTRAL | Fan Neutral |
| H4-1, TB4-1 | AI1 | Outdoor Air Temp |
| H4-2, TB4-2 | COM | Ground |
| TB2-1 | BI1 | Emergency Shutdown signal |
| TB2-2 | 24VAC | Emergency Shutdown 24VAC |
| TB3-1 | BI3 | Humidistat signal |
| TB3-2 | 24VAC | Humidistat 24VAC |
| H5-1 | BI2 | Dirty Air filter signal |
| H5-2 | 24VAC | Dirty Air Filter 24VAC |



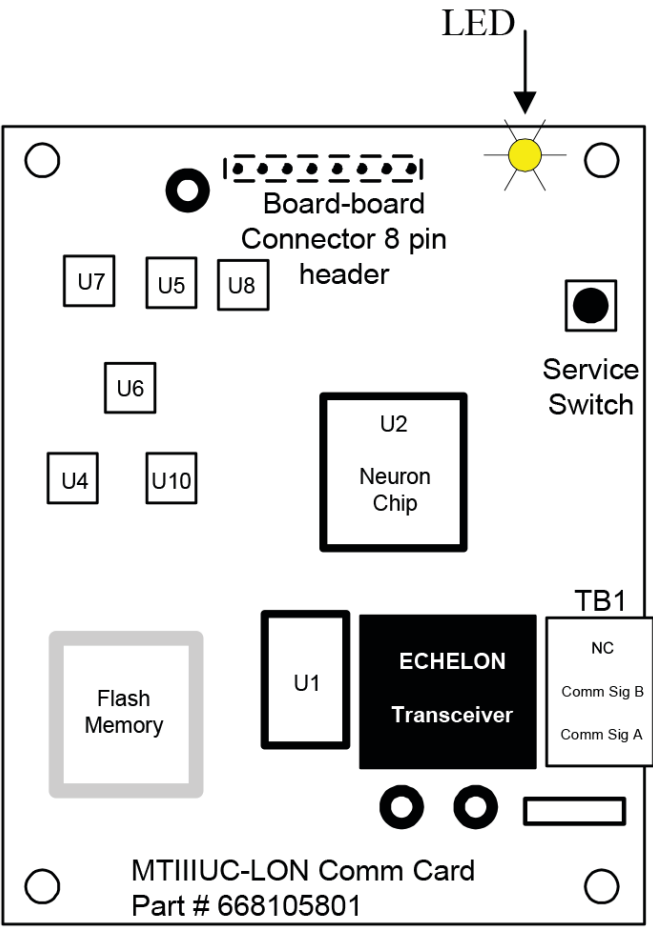
Figure 5: BACnet Communication Module

**BACnet Communication Module****Table 6: BACnet Communication Module Connectors/Terminals**

| BACnet Module Connector – Terminal # | Silk Screen Label | Description |
|--------------------------------------|-------------------|------------------|
| P3 – 1 | P3 | Network Signal + |
| P3 – 2 | | Network Signal – |
| P3 – 3 | | REF |
| P3 – 4 | | Shield |



FIGURE 6: LONWORKS Communication Module



LONWORKS Communication Module

Table 7: LON Communication Module Connectors/Terminals

| LONWORKS Module Connector – Terminal # | Silk Screen Label | Description |
|--|-------------------|------------------|
| TB1 – 1 | TB1 | Network Signal A |
| TB1 – 2 | | Network Signal B |
| TB1 – 3 | | No Connection |



FAN COIL/CABINET UNIT HEATER UNIT CONTROL

The FCU primary operation depends on eight unit states of operation. When power is applied or controller is reset, the unit controller will go through a boot-up sequence, then go to the "Off" unit state. Refer to [Table 8](#) and [Table 9](#) for the state of every fan coil component in the Occupied and Unoccupied (Standby) Modes.

Possible FCU Machine States include:

- Off Alarm
- Off
- Start (Actuator calibration occurs if applicable)
- Fan Only (Fan is enabled, however may not be on)
- Heating
- Economizer
- Cooling (fan coils only)
- Dehumid [future option for Fan coils only: 2-Pipe in Cooling mode or 4-Pipe Modulating Heat & Cool Systems]

Fan Coil/Cabinet Unit Heater Control Output Tables

Table 8: UNOCCUPIED or STANDBY

(Economizer State & Dehumid State [future option] not allowed)

| | Off Alarm | Off | Start | Fan Only | Heating | Economizer | Cooling | Dehumid [future option] |
|---------------|-------------------|---------------------|--------|----------|---------|------------|---------|-------------------------|
| Fan | Off | Off | Off | Off | Highest | N/A | Highest | N/A |
| Cooling Valve | Note ¹ | Closed ² | Closed | Closed | Closed | N/A | Open | N/A |
| Heating Valve | Note ¹ | Closed ² | Closed | Closed | Open | N/A | Closed | N/A |
| Electric Heat | Off | Off | Off | Off | On | N/A | Off | N/A |
| Damper | Closed | Closed | Closed | Closed | Closed | N/A | Closed | N/A |
| Economizer | Closed | Unchanged | Closed | Closed | Closed | N/A | Closed | N/A |

Table 9: OCCUPIED or BYPASS

(Economizer State allowed if enabled by Equipment Configuration)

| | Off Alarm | Off | Start | Fan Only | Heating | Economizer | Cooling | Dehumid [future option] |
|---------------|-------------------|---------------------|--------|------------------------------|------------|------------------------|----------------------------|----------------------------|
| Fan | Off | Off | Off | Controlled | Controlled | Controlled | Controlled | Controlled |
| Cooling Valve | Note ¹ | Closed ² | Closed | Closed | Closed | Closed | Controlled | Open |
| Heating Valve | Note ¹ | Closed ² | Closed | Closed | Controlled | Closed | Closed | Controlled |
| Electric Heat | Off | Off | Off | Off | On | Off | Off | Off |
| Damper | Closed | Closed | Closed | Controlled ³ | Open | Open | Open | Open |
| Economizer | Closed | Unchanged | Closed | Closed, Minimum ⁴ | Minimum | Controlled Min to Open | Open, Minimum ⁵ | Open, Minimum ⁵ |

¹ Dependant on specific alarm, see "Alarm: Control & Reset Table".

² Two position valves closed, modulating valves are unchanged.

³ Damper open if fan is on, closed if fan is off

⁴ Economizer closed if fan is off, otherwise at minimum position per fan speed

⁵ Economizer open if available to cool, otherwise at min position per fan speed

Table 10: Fixed Timing Parameters Default Values

| Fixed Timing Parameter | Normal |
|--|---------|
| Condensate Overflow Alarm Activation Delay | 60 sec |
| Dehumidification Minimum Off Timer | 180 sec |
| Fan Runtime After Electric Heat Turnoff | 30 sec |
| Fan Speed Change Timer | 0.2 sec |
| Room Temperature Sensor Failure Delay When Analog Input Is Shorted | 4 min |
| Valve & Economizer Calibration Interval | 24 hrs |



Table 11: Configuration Property Default Values

| Configuration Property | Usable Range | Default Value | Description |
|-----------------------------------|-------------------|---------------|--|
| nciBypassTime | 0, 30 to 120 Min | 120 m | Amount of time controller operates in the bypass occupancy mode when the user activates the timed override function. |
| nciSetpoints:Occ_cool | 50 to 95 °F | 75 °F | Occupied operating mode cooling setpoint. |
| nciSetpoints:Stby_cool | 50 to 95 °F | 77 °F | Standby operating mode cooling setpoint. |
| nciSetpoints:Unoc_cool | 50 to 95 °F | 85 °F | Unoccupied operating mode cooling setpoint. |
| nciSetpoints:Occ_heat | 50 to 95 °F | 70 °F | Occupied operating mode heating setpoint. |
| nciSetpoints:Stby_heat | 50 to 95 °F | 66 °F | Standby operating mode heating setpoint. |
| nciSetpoints:Unoc_heat | 50 to 95 °F | 60 °F | Unoccupied operating mode heating setpoint. |
| nciOccDiff | 1 to 5 °F | 1 °F | Differential between the effective on and off setpoints when operating in the occupied mode. |
| nciUnoccDiff | 2 to 10 °F | 2 °F | Differential between the effective on and off setpoints when operating in the unoccupied mode. |
| nciEwtFlowTimer | 60 to 600 Sec | 120 s | Length of time flow is allowed after opening a hydronic valve before sampling the EWT. |
| nciEwtSampleTmr | 0, 20 to 120 Min | 120 m | Length of time between EWT sampling processes. |
| nciFanMinOffTmr | 120 to 1200 Sec | 180 s | Minimum length of time the fan must remain off after it initially turns off. |
| nciFanMinOnTmr | 120 to 1200 Sec | 180 s | Minimum length of time the fan must remain running after it initially turns on. |
| nciFltrChangeHrs | 0, 360 to 4320 Hr | 1440 hr | Length of time the fan operates before a dirty air filter alarm is generated. |
| nciLocSptEnable | Disable, Enable | Enable | Variable to enable or disable the use of the local setpoint adjustment input from the room sensor. |
| nciSptAdjMax | 55 to 95 °F | 95 °F | Long range setpoint adjust input maximum value. |
| nciSptAdjMin | 55 to 95 °F | 55 °F | Long range setpoint adjust input minimum value. |
| Hydronic Heating Control | | | |
| nciHeatEnDiff | 2 to 10 °F | 5 °F | EWT must be warmer than the room temperature at least by this amount for hydronic heating to be allowed in two pipe systems. |
| nciHeatIntStgTmr | 120 to 1200 Sec | 300 s | Inter stage time used between automatic heating capacity fan speed changes. |
| nciHeatKp | 5 to 160 % | 25 % | Hydronic heating valve PI control loop proportional gain setting. |
| nciHeatKi | 0 to 1200 Sec | 20 s | Hydronic heating valve PI control loop integral setting. |
| nciHeatDB | 3 to 100 % | 3 % | Hydronic heating valve actuator positioning deadband. |
| nciHeatVlvStroke | 15 to 600 Sec | 180 s | Hydronic heating valve actuator full travel time. |
| Hydronic Cooling Control | | | |
| nciCoolEnDiff | 2 to 10 °F | 5 °F | EWT must be colder than the room temperature at least by this amount for hydronic cooling to be allowed in two pipe systems. |
| nciCoolIntStgTmr | 120 to 1200 Sec | 300 s | Inter stage time used between automatic cooling capacity fan speed changes. |
| nciCoolKp | 5 to 160 % | 40 % | Hydronic cooling valve PI control loop proportional gain setting. |
| nciCoolKi | 0 to 1200 Sec | 30 s | Hydronic cooling valve PI control loop integral setting. |
| nciCoolDB | 3 to 100 % | 3 % | Hydronic cooling valve actuator positioning deadband. |
| nciCoolVlvStroke | 15 to 600 Sec | 180 s | Hydronic cooling valve actuator full travel time. |
| Economizer Cooling Control | | | |
| nciDaSptKp | 5 to 160 % | 40 % | Discharge air temperature setpoint PI control loop proportional gain setting. |
| nciDaSptKi | 0 to 1200 Sec | 20 s | Discharge air temperature setpoint PI control loop integral setting. |
| nciMaxDaSpt | 50 to 80 °F | 75 °F | Economizer PI control block setpoint maximum value when the discharge air PI control loop output is at 0%. |
| nciMinDaSpt | 50 to 80 °F | 55 °F | Economizer PI control block setpoint minimum value when the discharge air PI control loop output is at 100%. |
| nciEconOaEnDiff | 1 to 12 °F | 2 °F | Outdoor air temperature must be colder than the room temperature at least by this amount for Economizer cooling to be allowed. |
| nciEconOaEnSpt | 40 to 80 °F | 50 °F | Outdoor air temperature must be above this setpoint to allow Economizer cooling. |
| nciEconKp | 5 to 160 % | 90 % | Economizer positioning PI control loop proportional gain setting. |
| nciEconKi | 0 to 1200 Sec | 10 s | Economizer positioning PI control loop integral setting. |
| nciEconDB | 3 to 100 % | 3 % | Economizer actuator positioning deadband setting. |
| nciEconStroke | 15 to 600 Sec | 66 s | Economizer actuator full travel time. |
| nciEconLowMin | 0 to 100 % | 10 % | Economizer minimum position when the fan is operating at low speed. |
| nciEconMedMin | 0 to 100 % | 10 % | Economizer minimum position when the fan is operating at medium speed. |
| nciEconHighMin | 0 to 100 % | 10 % | Economizer minimum position when the fan is operating at high speed. |

Note: Reference the ED15135 protocol information document for more details on configuration properties and other network variables.



Operating Modes

Start-up

The unit will not operate until all the inputs and safety controls are checked for normal conditions.

General Sequences of Operation

Fan Operation

The Table 12 describes fan operation in the various controller modes. Fan operation depends on the occupied/unoccupied status of the controller, the position of the room sensor mounted (or unit mounted) fan speed switch, and the capacity requested from the control algorithm.

Table 12: Fan Mode

| Fan Mode | Occupied | Unoccupied |
|-------------------|---|--|
| Off | Off | Off |
| Low | Low speed, continuous operation | Fan runs on low speed when heating or cooling capacity is required. Fan is off otherwise. |
| Medium | Medium speed, continuous operation | Fan runs on medium speed when heating or cooling capacity is required. Fan is off otherwise. |
| High | High speed, continuous operation | Fan runs on high speed when heating or cooling capacity is required. Fan is off otherwise. |
| Auto – Continuous | Fan runs continuously on low, medium or high depending on capacity required. | Fan runs on high speed when heating or cooling capacity is required. Fan is off otherwise. |
| Auto – Cycling | When no capacity is required, fan is off and damper is closed. When capacity is required, fan runs on low, medium or high depending on capacity required. | Fan runs on high speed when heating or cooling capacity is required. Fan is off otherwise. |

Occupied/Unoccupied Operation

The occupied/unoccupied operation of the unit is either controlled from the occupied/unoccupied binary input or over the communications network. When in the occupied mode, the controller will control to the occupied heating and cooling setpoints. In the unoccupied mode, unoccupied heating and cooling setpoints will be used. Fan operation is as described above. Heating and cooling operation will not be enabled until the fan is running. When the occupied/unoccupied state of the controller is being controlled over the communications interface, the local binary input will be ignored.

Occupied Capacity Control

Occupied Operation

The board will be in Occupied mode if the unoccupied terminal (BI2) is not shorted to ground. Heating and cooling will not operate until the fan is running.

Cooling

If the room temperature is above the Occupied Cooling On Setpoint in the fan Auto Cycling mode, the fan will start before the cooling state is entered. After the fan is on, the cooling valve will open (two position valves) or a proportional-integral control algorithm will modulate the cooling valve open in an attempt to maintain the room temperature.

If the temperature remains above the Occupied Cooling On Setpoint for longer than a cooling stage time when the cooling valve is full open and the fan is on Low speed (auto fan mode), the fan will stage to Medium speed in an attempt to satisfy the load. If the temperature remains above the Occupied Cooling On Setpoint for longer than a cooling stage time when the cooling valve is full open and the fan is on Medium speed (auto fan mode), the fan will stage to High speed in an attempt to satisfy the load.

If the temperature is below the Cooling On Setpoint and the cooling Interstage timer has expired, the fan will stage from High to Medium speed. If the temperature is below the Cooling On Setpoint and the cooling Interstage timer has expired, the fan will stage from Medium to Low speed. If the temperature remains below the Cooling Off Setpoint for longer than the cooling stage time and the fan is at its lowest fan speed, cooling valve will close and the unit will enter the "Fan Only" state. When the Fan Minimum On timer has expired, the fan will turn off if fan cycling is enabled.

Heating

If the room temperature is below the Occupied Heating On Setpoint in the fan auto cycling mode, the fan will start before the heating state is entered. After the fan is on, the heating valve will open (two position valves), the electric heat will be enabled, or a proportional-integral control algorithm will modulate the heating valve open in an attempt to maintain the room temperature.

If the temperature remains below the Occupied Heating On Setpoint for longer than a heating stage time when the heating valve is full open and the fan is on Low speed (auto fan mode), the fan will stage to Medium speed in an attempt to satisfy the load. If the temperature remains below the Occupied Heating On Setpoint for longer than a heating stage time when the heating valve is full open and the fan is on Medium speed (auto fan mode), the fan will stage to High speed in an attempt to satisfy the load.



If the temperature is above the Heating On Setpoint and the heating Interstage timer has expired, the fan will stage from High to Medium speed. If the temperature is above the Heating On setpoint and the heating Interstage timer has expired, the fan will stage from Medium to Low speed. If the temperature remains above the Heating Off Setpoint for longer than the heating stage time and the fan is at its lowest fan speed the heating valve will close, electric heat will shut off, and the unit will enter the Fan Only state. When the Fan Minimum On and the Fan On After Electric Heat timers have expired, the fan will turn off if fan cycling is enabled.

Unoccupied Capacity Control

Cooling

When the room temperature rises above the Unoccupied Cooling On Setpoint, the fan will start in High speed and the cooling valve will fully open in an attempt to maintain room temperature. When the temperature is satisfied (temperature drops below the Unoccupied Cooling On Setpoint minus the unoccupied differential) and the cooling Interstage timer has expired, the valve will first close and then the fan will shut off.

Heating

When the room temperature falls below the Unoccupied Heating On Setpoint, the fan will start in High speed and the heating valve will fully open (or the electric heat will be enabled) in an attempt to maintain room temperature. When the temperature is satisfied (temperature rises above the Unoccupied Heating On Setpoint plus the unoccupied differential) and the heating Interstage timer has expired, the valve will first close, electric heat will shut off and then the fan will shut off.

Dehumidification Operation [future option]

This fan coil state is allowed for: 2-Pipe in Cooling only or 4-Pipe Modulating Heating & Cooling systems; and controller must be in the occupied or bypass mode. Modulating Cooling valve is fully open. Electric heat is off. Fresh Air Damper (if available) is open. Economizer, if available, will be fully open, otherwise at minimum position based on fan speed.

2-Pipe Cooling Only System:

- Fan is on at lowest available speed.
- Heating valve is non-existent.
- Dehumidification is only allowed when the effective space temperature is greater than the effective heating on setpoint, and becomes disabled when space temperature drops below the effective heating on setpoint minus a 2°F fixed differential.

4-Pipe Modulating Heating & Cooling System:

- Fan is on at speed determined by capacity and effective fan mode/speed.
- Heating valve is controlled.

General Operation

Unit status will change to the "Fan Only" state if all of the following conditions exist:

- Dehumidification isn't required or is not available, heating or cooling capacity becomes required.
- The cooling valve has been driven closed.
- The 4-pipe system heating valve has been driven closed.
- Fan is running at the lowest possible speed based on: selected occupancy and fan mode/speed switch setting.

Dehumid State Notes

- For dehumidification availability definition, see "Miscellaneous Control Definitions section".
- When leaving "Dehumid" state, the 180 second fixed "dehumidification minimum off" timer will be started. This prevents returning back to the "Dehumid" state too soon.

Total Electric Heat mode (2-pipe Cooling systems only)

On an initial call for heating:

1. The fan will start at Low speed in "Fan Only" state
2. Unit enters Heating state, electric heat is energized, and heating Interstage timer is started
3. If Heating Interstage Countdown Timer has expired and room temperature is below the Heating On Setpoint, fan speed will be changed from Low to Medium, and Heating Interstage Countdown Timer is started again.
4. If Heating Interstage Countdown Timer has expired and room temperature is below the Heating On Setpoint, fan speed will be changed from Medium to High, and Heating Interstage Countdown Timer is started again.

Once room temperature reaches the Heating On Setpoint the fan will be run at Medium and Low speed with Interstage Countdown Timer started each time the fan speed is changed. When the room setpoint conditions are satisfied, electric heat will be de-energized and the fan will continue to operate at its "fan only" setting when enabled, for continuous fan operation. If fan cycling is enabled, the fan will turn off after 30 seconds once room setpoint conditions are satisfied.



Supplemental (Intermediate) Electric Heat mode [for 2-pipe Cooling/Heating systems only]

On an initial call for heating, the controller will open the water valve for Flow Timer™ to check for appropriate entering water temperature. Once the water valve is 100% open, a 120-second (default setting) flow timer will start and flow allowed. When timer has expired and if water temperature is colder than required for hydronic heating the control valve will fully closed, fan started and electric heater energized. The rest of the operation will run as described in paragraph Total Electric heat above exclusively using electric heat (EWT is not sampled for systems with Total Electric Heat).

Proportional–Integral Control Parameters

Associated with each Proportional-Integral (PI) control loop are three adjustable parameters: Proportional Gain (Kp), Integral Time (Ki), and Deadband (DB). When the fan coil unit (FCU) is properly sized for the space, the factory settings for these parameters will provide the best control action for all the various operating scenarios.

PI Control Algorithm

The PI control algorithm calculates the desired actuator output, and ranges from 0 to 100%.

Definitions:

- Error: Value is calculated one of two ways depending on the PI blocks fixed action type.
Direct Acting Block: Error = (PV – SP)
Reverse Acting Block: Error = (SP – PV)
- Process Variable (PV): Measured analog input reading.
- Sample Time: Scan rate of the PI control blocks, which is an internal fixed value of 10 seconds.
- Sum of Errors: Summation, or total, of all past errors.

Output Formula:

PI Output = (Kp × Error) + ((Sample Time × Sum of Past Errors) / Ki)

If field problems arise, first ensure these parameters are set back to the factory default settings. If adjustment is required, only make small adjustments to one parameter at a time. After each adjustment, induce an instantaneous error into the PI algorithm and allow enough time for the system to stabilize before making any further modifications. If you do not have the means to graph the process variable performance, record the actual measured value and set point for the duration of the test and then plot the results using a spreadsheet to determine the correct action to take.

⚠ CAUTION

Adjusting PI parameters can cause erratic unit operation, and potentially damage the equipment.

PI control parameters must only be adjusted by trained personnel having a complete understanding of how these parameters affect system operation. Generally these parameters do not need to be adjusted from the factory settings.

Proportional Gain

The proportional gain, or proportional action, causes the controlled output to change in proportion to the magnitude of the present error amount. Error is the difference between the sensors present value and the set point. When the Kp setting is too low, the process variable (PV) response will change too slowly. When the Kp setting is too high, the process variable response will excessively overshoot and possibly oscillate around the setpoint (SP). If faster system response is desired increase the proportional gain (Kp) setting. Use caution not to become too aggressive with the proportional gain setting to avoid causing system instability.

Integral Time

The integral time, or integral action, accumulates the error amounts and causes the controlled output to approach the set point over time in an attempt to eliminate any system offset. The smaller the integral (Ki) setting, the more the integral will affect the process under control. When the Ki setting is too low, the process variable (PV) will oscillate around the setpoint. When the Ki setting is too high, the process variable will never reach the setpoint.

Deadband

The deadband parameter serves two main purposes. First deadband prevents the actuator from constantly hunting or overcorrecting, and secondly ensures the actuator physically moves every time a new positioning command is given. Deadband will prevent small output changes from modifying the actuator position. When the deadband configuration property is set to 3%, the PI control output adjustment must exceed plus or minus 1.5%, or the actuator position will not be changed.



PI Control Blocks

The fan coil unit contains four PI control loop blocks. The PI control blocks are defined as follows:

1. Modulating Hydronic Heating Valve
2. Modulating Hydronic Cooling Valve
3. Economizer Discharge Air Temperature (DAT) Setpoint
4. Economizer Position

The following is a brief summary of the fan coil PI control blocks and their associated support functions. Applicable LonWorks network variables are listed first, along with their BACnet equivalent objects. Refer to the ED15135 protocol information document for more details pertaining to the fan coil network variables.

Table 13: PI Control Block #1 – Modulating Hydronic Heating Valve Control

| Inputs / Outputs | Interpretation |
|--|--|
| Polarity Type: Reverse Acting (Not Adjustable) | Error is defined as: (Effective Heat SP minus Room Temp) |
| SP: Effective Heating Setpoint | The desired heating setpoint input. |
| PV: nvoSpaceTemp (AV-22) | Room temperature is used as the process variable input. |
| KP: nciHeatKp (Loop1:Proportional_Constant) | Proportional gain used in the PI control algorithm. |
| KI: nciHeatKi (Loop1:Integral_Constant) | Integral time used in the PI control algorithm. |
| Output: nvoHeatVlvOut (Loop1:Present_Value) | Heating valve position output command. |
| DB: nciHeatDB (AV-29) | Deadband used to determine if the PI output is applied to the heating valve positioning control. |

Table 14: PI Control Block #2 – Modulating Hydronic Cooling Valve Control

| Inputs / Outputs | Interpretation |
|---|--|
| Polarity Type: Direct Acting (Not Adjustable) | Error is defined as: (Room Temp minus Effective Cool SP) |
| SP: Effective Cooling Setpoint | The desired cooling setpoint input. |
| PV: nvoSpaceTemp (AV-22) | Room temperature is used as the process variable input. |
| KP: nciCoolKp (Loop2:Proportional_Constant) | Proportional gain used in the PI control algorithm. |
| KI: nciCoolKi (Loop2:Integral_Constant) | Integral time used in the PI control algorithm. |
| Output: nvoCoolVlvOut (Loop2:Present_Value) | Cooling valve position output command. |
| DB: nciCoolDB (AV-9) | Deadband used to determine if the PI output is applied to the cooling valve positioning control. |

Table 15: PI Control Block #3 – Economizer Discharge Air Setpoint Control

| Inputs / Outputs | Interpretation |
|---|---|
| Polarity Type: Direct Acting (Not Adjustable) | Error is defined as: (Room Temp minus Effective Cool SP) |
| SP: Effective Cooling Setpoint | The desired cooling setpoint input. |
| PV: nvoSpaceTemp (AV-22) | Room temperature is used as the process variable input. |
| KP: nciDASptKp (Loop3:Proportional_Constant) | Proportional gain used in the PI control algorithm. |
| KI: nciDASptKi (Loop3:Integral_Constant) | Integral time used in the PI control algorithm. |
| Output: nvoDASptOut (Loop3:Present_Value) | Economizer position output command. |
| Translator: nciMaxDaSpt (AV-11) | Translated DA temperature SP that is sent to PI block #4 when the PI output is at 0%. |
| Translator: nciMinDaSpt (AV-12) | Translated DA temperature SP that is sent to PI block #4 when the PI output is at 100%. |

Table 16: PI Control Block #4 – Economizer Position Control

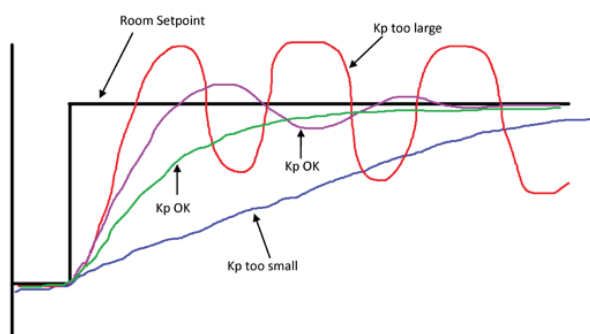
| Inputs / Outputs | Interpretation |
|--|---|
| Polarity Type: Direct Acting (Not Adjustable) | Error is defined as: (DAT minus Discharge Air SP) |
| SP: Discharge Air SP from PI Control Block #3 Output | The desired DAT setpoint input. The PI block #3 output is translated into a discharge air temperature SP value. |
| PV: nvoDischAirTemp (AI-4) | Discharge air temperature is used as the process variable input. |
| KP: nciDASptKp (Loop4:Proportional_Constant) | Proportional gain used in the PI control algorithm. |
| KI: nciDASptKi (Loop4:Integral_Constant) | Integral time used in the PI control algorithm. |
| Output: nvoEconOut (Loop4:Present_Value) | Economizer position output command. |
| DB: nciEconDB (AV-18) | Deadband used to determine if the PI output is applied to the Economizer positioning control. |



Tuning the PI Blocks

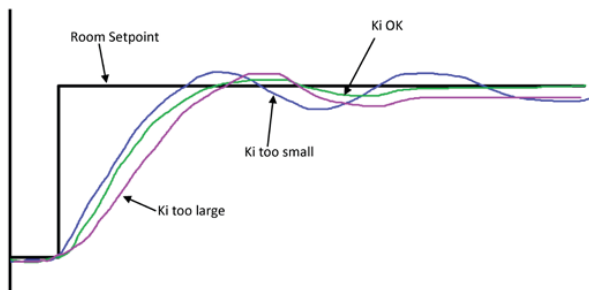
If the temperature control behavior of the FCU is poor, it may be necessary to tune the PI control blocks of the cooling valve, heating valve, or economizer position. When tuning the control blocks, it is highly recommended that you follow the below procedure. Failure to do so may result in increased tuning time, and sub-par performance.

1. Zero out the Ki setting.
2. Choose a starting point for Kp
3. Introduce a step change to the room setpoint.
4. Observe FCU performance and temperature control
5. Adjust Kp based on the following graph:



6. Repeat steps 3-5 until the temperature control matches the acceptable Kp behavior in the above graph. Behavior should be somewhere between the two "Kp OK" system responses detailed above. Please note that there may be an offset error after the Kp value is tuned. This is OK, as the Ki variable will eliminate the offset error.
7. While keeping Kp constant, choose a starting value for Ki
8. Introduce a step change to the room setpoint.
9. Observe FCU performance and temperature control

10. Adjust Ki based on the following graph::



11. Repeat steps 8-10 until the FCU temperature control is acceptable. There should be no offset error and no temperature oscillations when the loops are fully and correctly tuned.

NOTE: The PI blocks controlling the economizer behavior (PI Control Block #3 & PI Control Block #4) are used in a 'cascade' arrangement, meaning the output of block #3 directly affects the behavior and output of block #4. If changes to the behavior of these blocks are needed, then both blocks should be tuned, to avoid negatively affecting the performance by just changing one of the control blocks. Block #4 should be tuned first, followed by block #3. In addition, the PI control for the economizer behavior may be affected by the minimum damper position, or the minimum or maximum setpoint outputs (nciMaxDaSpt (AV-11) and nciMinDaSpt (AV-12)). If erratic temperature control behavior is exhibited, it should be investigated whether the PI block or these other settings are negatively affecting the performance.

Alarm Control Modes

- **Display Only:** Full control is maintained, alarm is for display purposes only.
- **Modified:** Normal unit control is slightly modified by this type of alarm.
- **Shutdown #1:** Fan & electric heat immediately turned off; damper & economizer closed; valves are unchanged.
- **Shutdown #2:** Fan & electric heat immediately turned off; damper & economizer closed; all valve types closed.
- **Shutdown #3:** Fan & electric heat immediately turned off; damper & economizer closed; previous control mode valve type is opened.

Table 17: Alarm Control & Reset Table

| Room Sensor LED Pulses | Alarm Definition | Control Type | Auto Recover | Tenant Override Button Reset | Remote Clear Alarm |
|------------------------|--|------------------------------|------------------|------------------------------|--------------------|
| 2 | Invalid Equipment Configuration | Shutdown #1 | No | No | No |
| 3 | Emergency Shutdown | Shutdown #2 | Yes | No | No |
| 4 | Freeze Fault Detection | Shutdown #3 | No | Yes | Yes |
| 5 | Entering Water Temp Sensor Fail (EWT Sampling Systems) | Shutdown #2 | No | No | Yes |
| 6 | Room Temp Sensor Fail | Shutdown #2 | No | No | Yes |
| 7 | IO Expansion Communications Fail (IO Exp Board Selected) | Shutdown #2 | Yes | No | No |
| 8 | Condensate Overflow (Econ, Cool, & Dehumid Modes Only) (Fixed 60s Delay) | Shutdown #2 | Yes ¹ | No | Yes |
| 9 | Outdoor Air Temp Sensor Fail (Economizer Selected) | Modified: Disable Economizer | No | No | Yes |
| 10 | Discharge Air Temp Sensor Fail (Economizer Selected) | Modified: Disable Economizer | No | No | Yes |
| 11 | Dirty Air Filter (currently based on settable timer) ² | Display Only | No | Yes | Yes |
| 12 | Serial EEPROM Corrupted | Display Only | No | No | No |

¹) Auto recover is subject to intelligent alarm reset

²) Timer is user-adjustable through network. Setting timer to 0 (zero) disables the alarm. Refer to ED 15135 for more details Alarm conditions are listed in order of priority.



Heating Capacity Required

Heating capacity is considered “required” when Effective Space Temperature (nvoSpaceTemp) goes below calculated effective heating on setpoint; then becomes “not required” when the temperature goes above calculated effective heating off setpoint.

Cooling Capacity Required

Cooling capacity is considered “required” when Effective Space Temperature (nvoSpaceTemp) goes above calculated effective cooling on setpoint; then becomes “not required” when the temperature goes below calculated effective cooling off setpoint. Economizer state, if available, has priority over cooling state.

Dehumidification Required

Dehumidification is considered “required” when the humidistat binary input is active, and no heating or cooling capacities are required. Also in 2-Pipe cooling only systems, the effective space temperature (nvoSpaceTemp) must be greater than the effective heating on setpoint for dehumidification to be allowed

Fan Availability

Fan is considered available if all of the following conditions exist:

- Equipment configuration software jumper (nciSoftJumpers) has selected a valid fan speed type.
- Remote application mode (nviApplicMode) is not set to “Off”.
- Local hardwired fan mode/speed switch (nvoFanModeSpdSw) is not set to “Off”.
- The “fan minimum off” timer has expired.

Dehumidification Availability

Dehumidification is considered available if all of the following conditions exist:

- Equipment configuration software jumper (nciSoftJumpers) states that a 2-Pipe hydronic cooling only without electric heat; or 4-Pipe hydronic modulating heating and cooling system is selected in the fan coil unit.
- For 2-Pipe Cooling only systems the Effective Space Temperature (nvoSpaceTemp) must be above the Effective Heating On setpoint.
- Remote application mode (nviApplicMode) is set to “Auto”, “Dehumid”, or “Null”.
- Local Heat/Cool/Auto mode switch (nvoHeatCoolAuto) is set to “Auto” or “Cool”.
- I/O expansion board communications is not failed.
- Effective occupancy (nvoEffectOccup) is occupied or bypass mode.
- The fixed “dehumidification minimum off” timer has expired.
- Condensate overflow alarm is not active.

Economizer Availability

Economizer is considered available if all of the following conditions exist:

- Equipment configuration software jumper (nciSoftJumpers) states economizer is present in the fan coil unit.
- Remote application mode (nviApplicMode) is set to “Auto”, “Economy”, or “Null”.
- Local Heat/Cool/Auto mode switch (nvoHeatCoolAuto) is set to “Auto” or “Cool”.
- Effective occupancy (nvoEffectOccup) is occupied or bypass mode.
- Difference between indoor and outdoor air temperature is greater than economizer indoor to outdoor air control enable differential (nciEconIOAEnDiff) setting for ability to cool. Prevents using outdoor air that's too hot.
- Outdoor air temperature is greater than economizer outdoor air temperature control enable (nciEconOAEn) setting. Prevents using outdoor air that's too cold.
- I/O expansion board communications failure alarm is not active.
- Condensate overflow alarm is not active.
- Outdoor air temperature sensor failure alarm is not active.
- Discharge air temperature sensor failure alarm is not active.



Electric Heating Availability

Electric heating is considered available if all of the following conditions exist:

- Equipment configuration software jumper (nciSoftJumpers) states electric heating is selected in the fan coil unit.
- Remote application mode (nviApplicMode) is set to "Auto", "Heat", or "Null".
- Local Heat/Cool/Auto mode switch (nvoHeatCoolAuto) is set to "Auto" or "Heat".

Hydronic Heating Availability

Hydronic heating is considered available if all of the following conditions exist:

- Equipment configuration software jumper (nciSoftJumpers) states hydronic heating is selected in the fan coil unit.
- Remote application mode (nviApplicMode) is set to "Auto", "Heat", or "Null".
- Local Heat/Cool/Auto mode switch (nvoHeatCoolAuto) is set to "Auto" or "Heat".

Hydronic Cooling Availability

Hydronic cooling is considered available if all of the following conditions exist:

- Equipment configuration software jumper (nciSoftJumpers) states hydronic cooling is selected in the fan coil unit.
- Remote application mode (nviApplicMode) is set to "Auto", "Cool", or "Null".
- Local Heat/Cool/Auto mode switch (nvoHeatCoolAuto) is set to "Auto" or "Cool".
- Condensate overflow alarm is not active.

Replacing a MicroTech Circuit Board

WARNING

The MicroTech circuit board incorporates static sensitive de-vices. A static charge from touching the device can damage the electronic components. To help prevent damage during service, use static discharge wrist straps. Static discharge wrist straps are grounded to the fan coil chassis through a 1 MOhm resistor.

Replacement part is shipped from Daikin with correct configuration preset at the factory.

1. Connect grounding wrist strap to unit.
2. Remove faulty board and place on static protected surface.
3. Remove replacement board from static protected bag.

Do not touch circuit board; hold by edges.

4. Holding board in grounded hand, install board in unit.
5. Insert faulty board in empty static bag for return.

NOTE: The new board needs to have correct equipment configuration performed at the factory otherwise it will not operate properly. Contact Daikin factory representative for directions.

Equipment Configuration Settings

Configuration property variable are used to determine the equipment configuration; which are read from the serial EEPROM when the controller initially boots. The FCU control option bits are then initialized based on the "nciSoftJumpers" values read from the serial EEPROM. The controller must be rebooted after modifying the software configuration settings before they will be used in controlling the FCU. Setting is considered: open when bit is zero, and closed when bit is one.

Table 18: Equipment Configuration Setting Options

| Function | Bit/Binary Setting | Model/Feature |
|--|--|--|
| Service Test Mode | Byte 1: b0 | 0 = Normal Operation 1 = Service Test Mode |
| Continuous/Cycling Fan | Byte 1: b1 | 0 = Continuous Fan 1 = Cycling Fan |
| Setpoint Adjust – Temperature Range | Byte 1: b2 | 0 = Short Range (-5 to +5 °F) 1 = Long Range (55 to 95 °F) |
| IO Expansion Board Selection | Byte 1: b3 | 0 = No IO Expansion Board Present 1 = Enable IO Expansion Board |
| Economizer Selection | Byte 1: b4 | 0 = No Economizer Present 1 = Enable Economizer Use |
| N.O./N.C. Two Position Heating Valve | Byte 1: b5 | 0 = Normally Open Heating Valve 1 = Normally Closed Heating Valve |
| N.O./N.C. Two Position Cooling Valve | Byte 1: b6 | 0 = Normally Open Cooling Valve 1 = Normally Closed Cooling Valve |
| Two Position/Modulating Valves | Byte 1: b7 | 0 = Two position Hydronic Valves 1 = Modulating Hydronic Valves |
| Electric Heat Selection | Byte 2: b1=0, b0=0 Byte 2: b1=0, b0=1 Byte 2: b1=1, b0=0 | 00 = No Electric Heating 01 = One Stage Electric Heat 10 = Two Stage Electric Heat (Future) 11 = Not Valid |
| Hydronic Valves Selection | Byte 2: b4=0, b3=0, b2=0 Byte 2: b4=0, b3=0, b2=1 Byte 2: b4=0, b3=1, b2=0 Byte 2: b4=0, b3=1, b2=1 Byte 2: b4=1, b3=0, b2=0 | 000 = No Hydronic Valves 001 = 2-Pipe Heating Only 010 = 2-Pipe Cooling Only 011 = 2-Pipe Heat & Cool Changeover 100 = 4-Pipe Hydronic Heat & Cool |
| Fan Speed Selection | Byte 2: b6=0, b5=0 Byte 2: b6=0, b5=1 Byte 2: b6=1, b5=0 | 00 = 1Speed (Uses: High) 01 = 2Speed (Uses: Low, High) 10 = 3Speed (Uses: Low, Med, High) |
| Freeze Fault Detect Binary Input Selection | Byte 2: b7 | 0 = Disable Binary Input 1 = Enable Binary Input |
| Emergency Shutdown Binary Input Selection | Byte 3: b0 | 0 = Disable Binary Input 1 = Enable Binary Input |
| Dirty Air Filter* Binary Input Selection | Byte 3: b1 | 0 = Disable Binary Input 1 = Enable Binary Input |

*Currently functions based on user-adjustable timer

MicroTech Unit Controller with an optional LONWORKS® Communication Module

For installation and operation information on LONWORKS Communication Module and other ancillary control components, see:

- [IM 1012](#) — MicroTech III Fan Coil LONWORKS Communication Module.
- [IM 933](#) — LONMAKER Integration Plug-in Tool: For use with the MicroTech III Unit Controller.
- [IM 1171](#) — Digitally Adjustable Display Sensor Installation and Maintenance Manual

Each Daikin ThinLine fan coil can be equipped with a LONWORKS communication module that is LONMARK 3.4 certified to meet the LONMARK Space Comfort Control (SCC) profile for fan coils. The controller is microprocessor-based and is designed to communicate over a LONWORKS network with the optional factory or field-installed communication module.



The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the Fan Coil or Cabinet Unit Heater unit. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS to provide network control of the Fan Coil or Cabinet Unit Heater unit.

Figure 7: LONWORKS Communication Module



The MicroTech unit controller with communication module includes a unit-mounted discharge air and entering water temperature sensors. Entering air temperature can be monitored either by selecting either unit-mounted return air temperature or wall-mounted room temperature sensors. Room sensor options includes one with a setpoint adjustment, unit mode, fan speed, and tenant override. See actual sensor to make sure these options are present.

MicroTech Unit Controller with LONWORKS Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors outside air temperature for units with economizer option
- Relays status of all vital unit functions

The MicroTech unit controller with an optional communication module should include:

- Return Air Temperature sensor (RAT) (factory- or field-mounted)
- Discharge Air Temperature sensor (DAT) (factory- or field-mounted)
- Entering Water Temperature sensor (EWT) (factory- or field-mounted)

NOTE: Refer to [IM 956](#) for details to install (RAT) & (DAT)

WARNING

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor with LED status and tenant override button
- Room sensor with LCD display, fan speed selection switch, tenant override button, and $\pm 5^{\circ}\text{F}$ setpoint adjustment
- Room sensor with LCD display, fan speed selection switch, tenant override button, 55° to 95°F setpoint adjustment

MicroTech Unit Controller with an optional BACnet® Communication Module

For installation and operation information on MicroTech unit controller and other ancillary components, see:

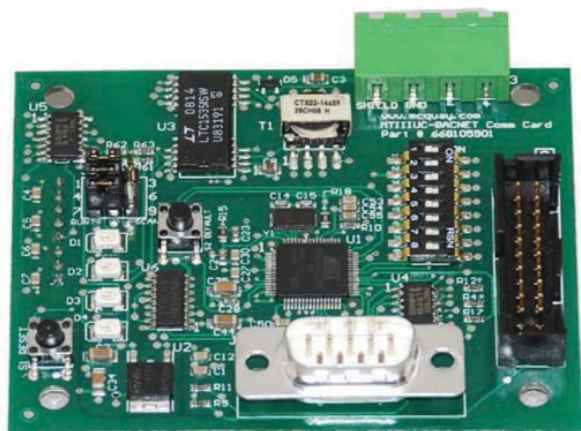
- [IM 1013](#) — MicroTech Fan Coil BACnet Communication Module
- [IM 1171](#) — Digitally Adjustable Display Sensor Installation and Maintenance Manual

Daikin ThinLine fan coils and cabinet unit heaters are available with an optional BACnet MS/TP communication module that is designed to communicate over a BACnet MS/TP communications network to a building automation system (BAS). It can be factory or field-installed.

The module makes operational data and commands available on a communications network using BACnet objects and properties:

- The network cable is a shielded twisted-pair cable
- Network communications run up to 76.8 Kbps
- DIP switches on the controller enable the MS/TP MAC address to be set in the range 0-127
- Four green status LEDs on the communication module indicate communication activity on the MS/TP communication network and with the unit controller

Figure 8: MicroTech BACnet MS/TP Snap-in Communication Module



The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the fan coils and cabinet unit heater unit. Room sensor options include one with a setpoint adjustment, unit mode, fan speed, and tenant override. See actual sensor to make sure these options are present.

The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the fan coils and cabinet unit heater unit.

MicroTech Unit Controller with BACnet MS/TP Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors outside air temperature for units with economizer option
- Relays status of all vital unit functions

The MicroTech unit controller with an optional communication module should include:

- Return Air Temperature sensor (RAT) (factory- or field-mounted)
- Discharge Air Temperature sensor (DAT) (factory- or field-mounted)
- Entering Water Temperature sensor (EWT) (factory- or field-mounted)

NOTE: Refer to [IM 956](#) for details to install (RAT) & (DAT)

⚠ WARNING

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor with LED status and tenant override button
- Room sensor with LCD display, fan speed selection switch, tenant override button, and $\pm 5^{\circ}\text{F}$ setpoint adjustment
- Roomsensor with LCD display, fan speed selection switch, tenant override button, 55° to 95°F setpoint adjustment

Typical Wiring Diagrams

Figure 9: 1 PSC Motor, No Electric Heat, 2 Position Actuators, 2 Position Valves – Page 1

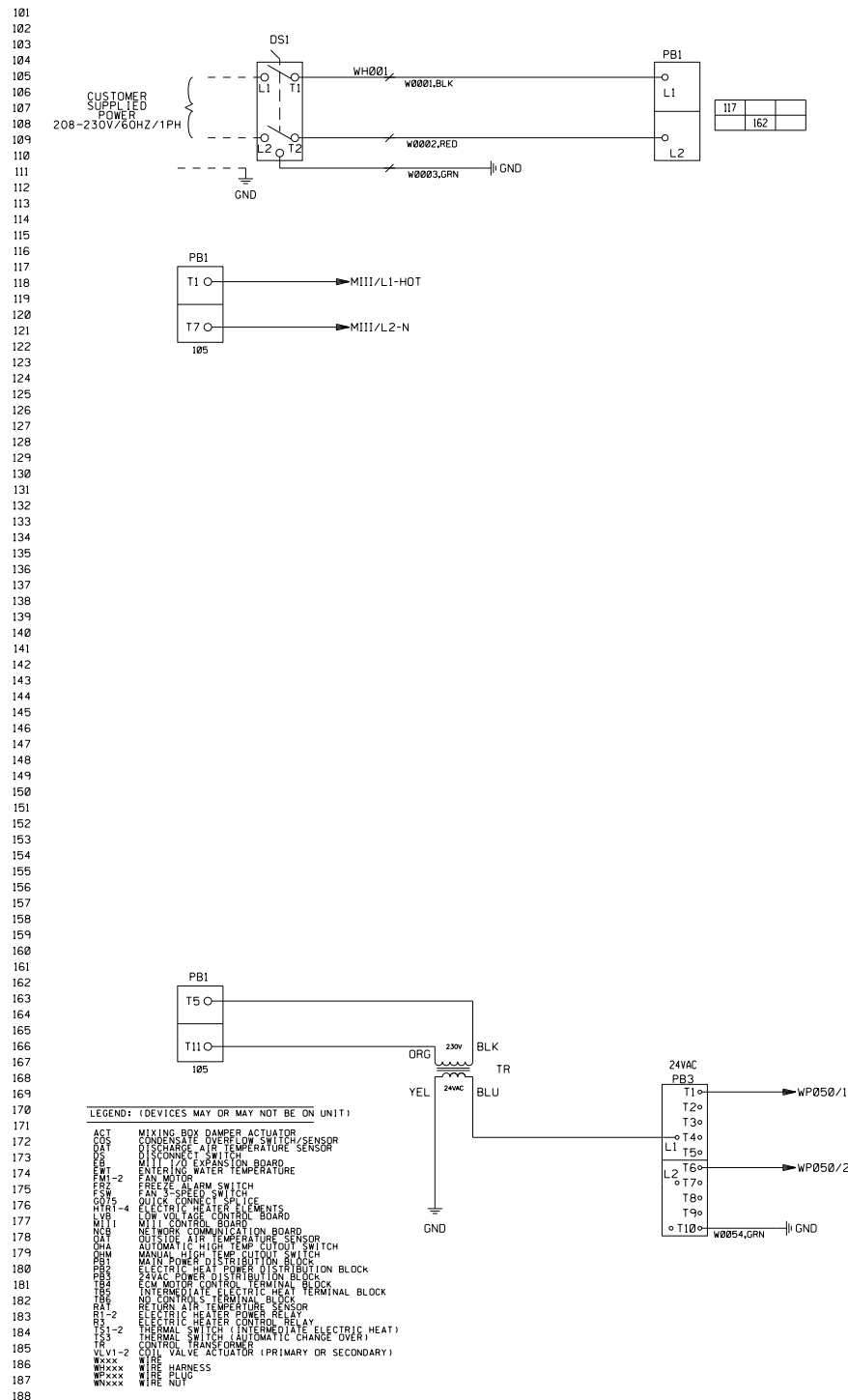


Figure 10: 1 PSC Motor, No Electric Heat, 2 Position Actuators, 2 Position Valves – Page 2

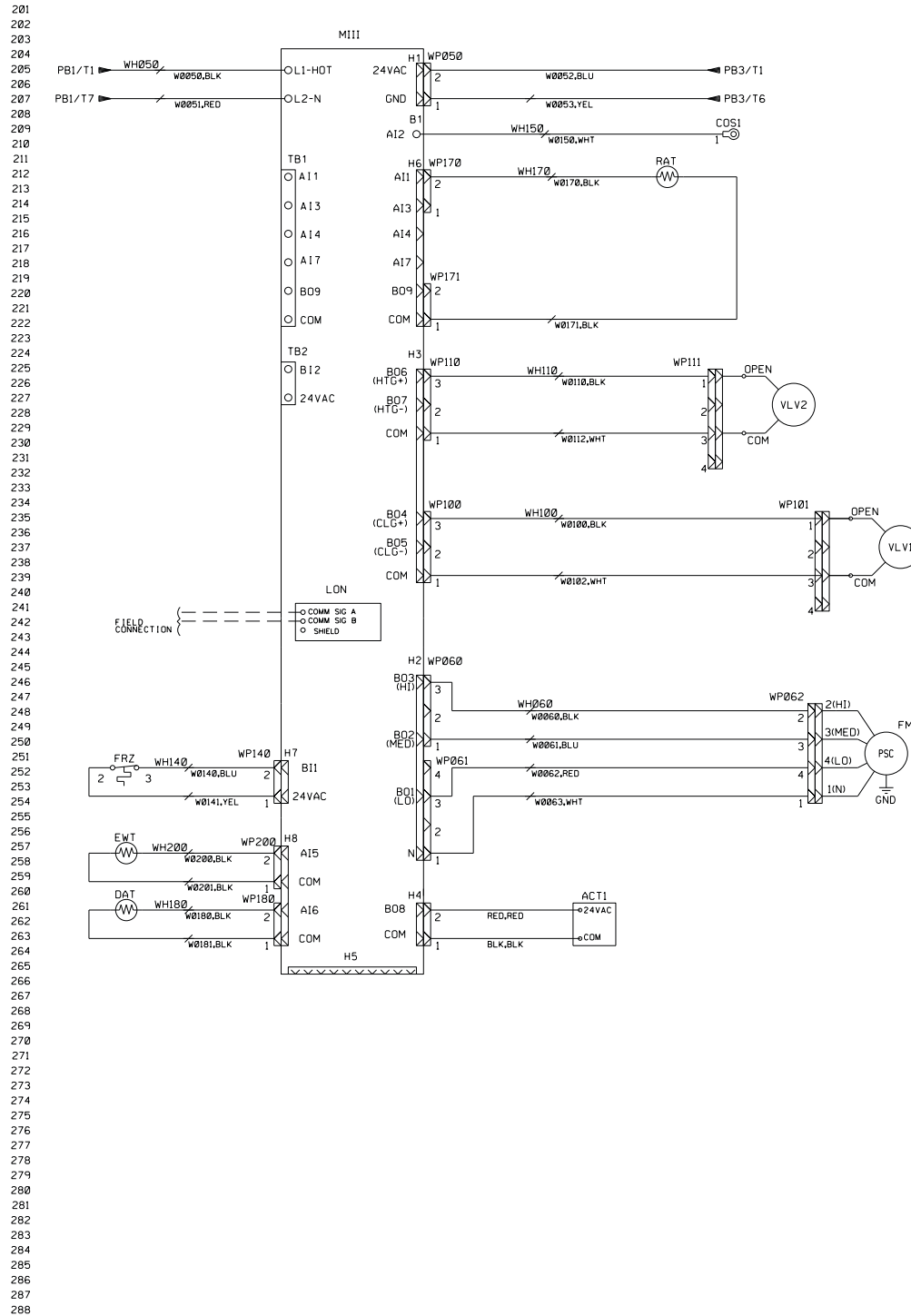


Figure 11: 1 PSC Motor, No Electric Heat, Valve1 FLT, No Return Air Temperature – Page 1

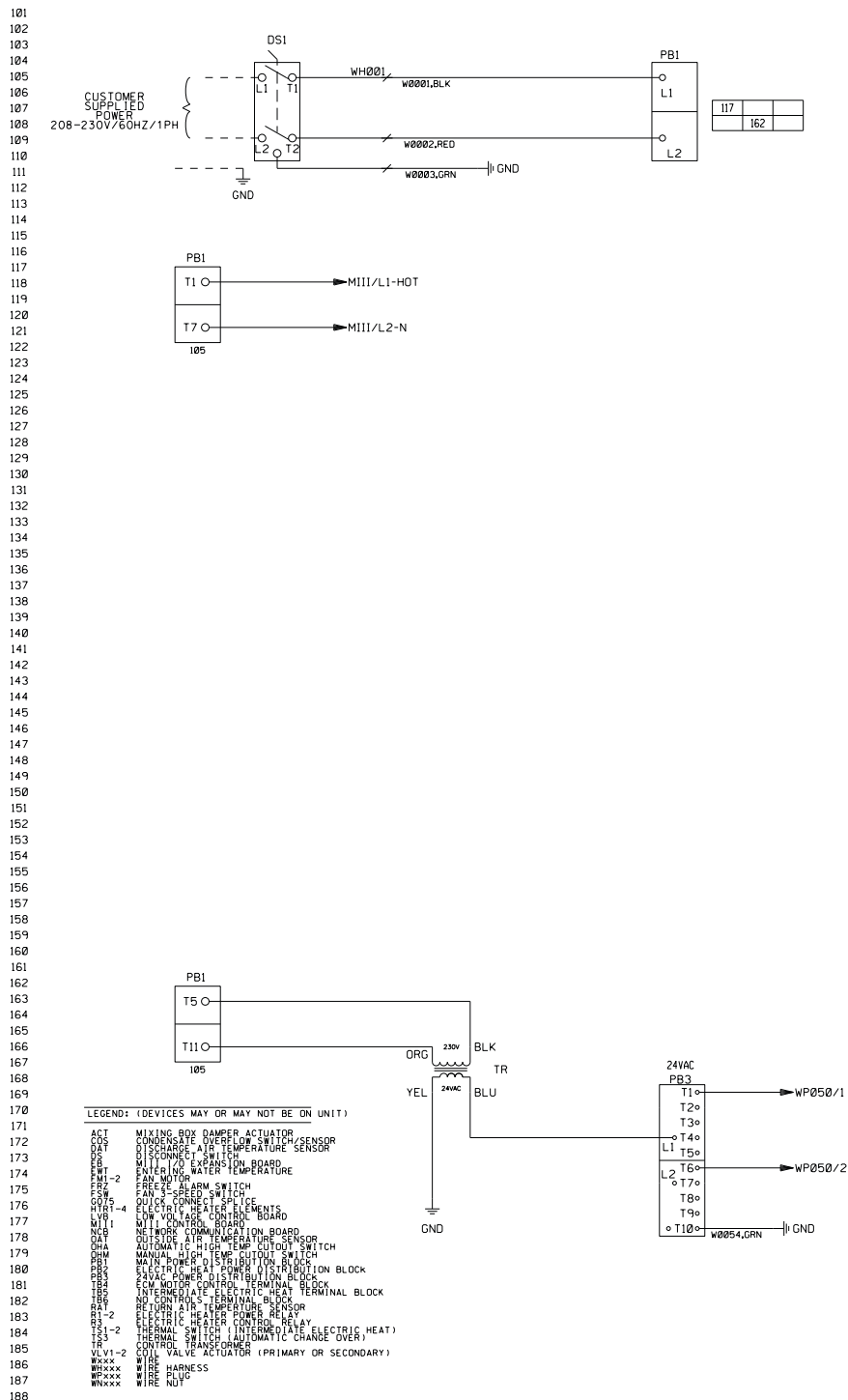


Figure 12: 1 PSC Motor, No Electric Heat, Valve1 FLT, No Return Air Temperature – Page 2

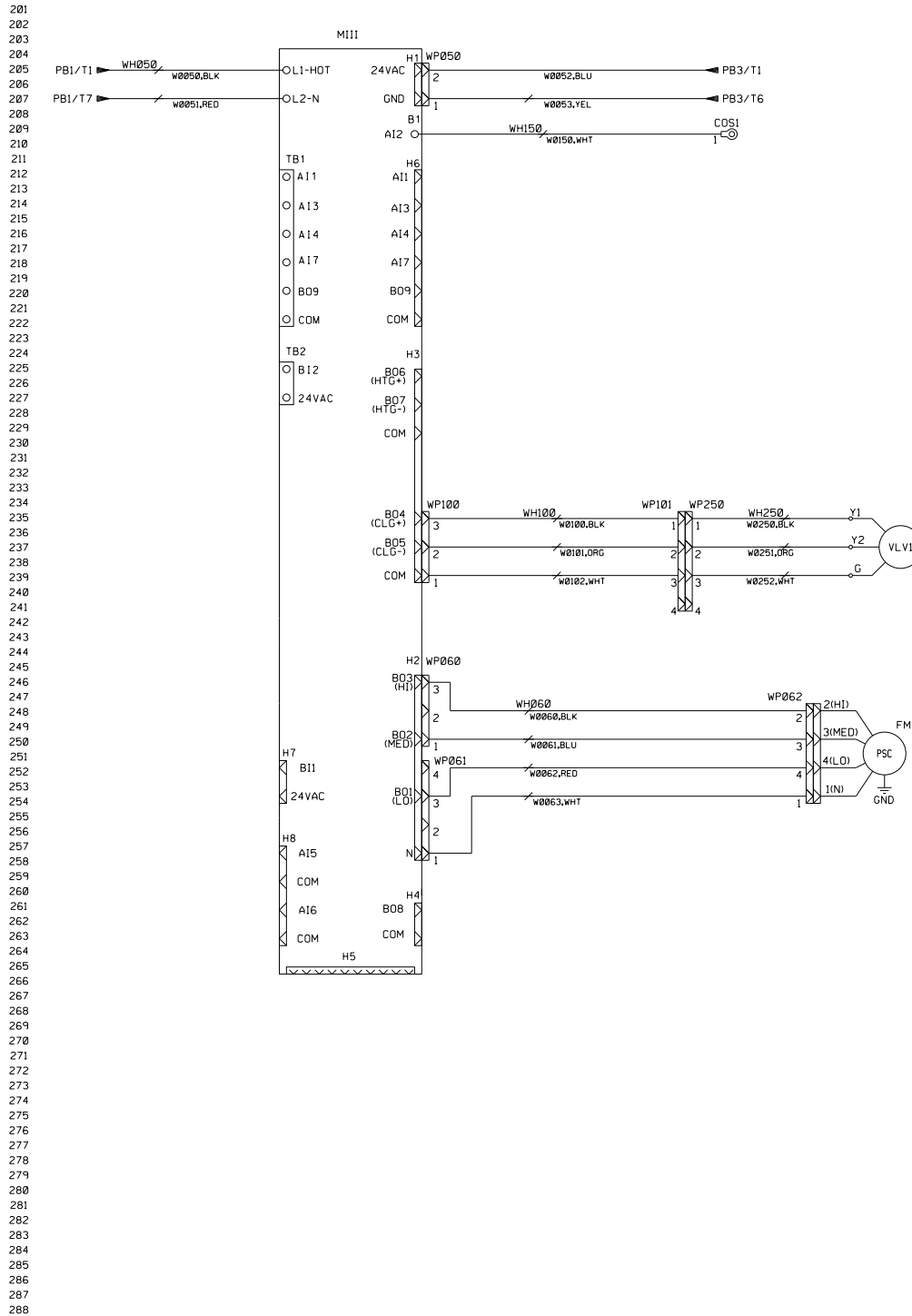
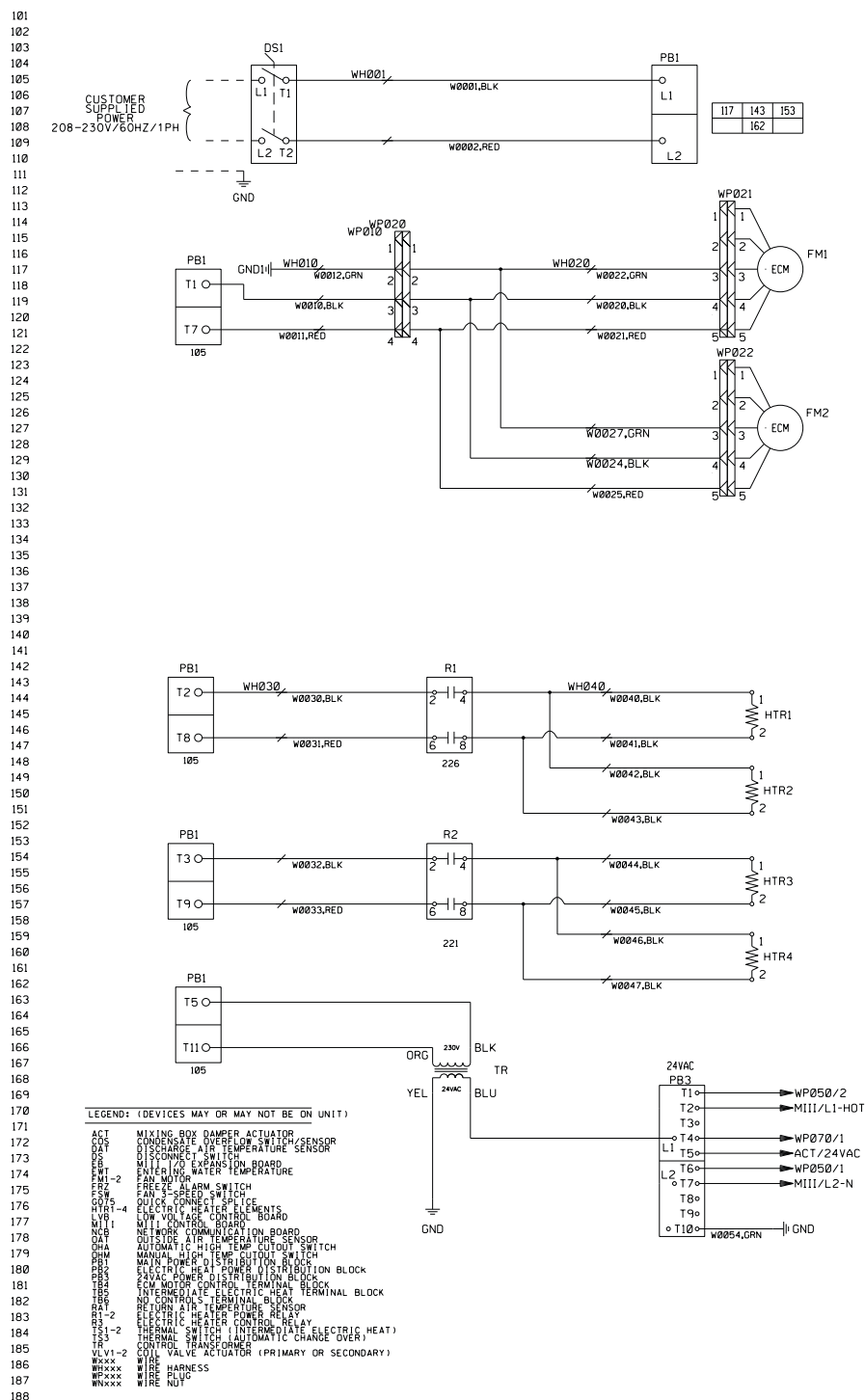
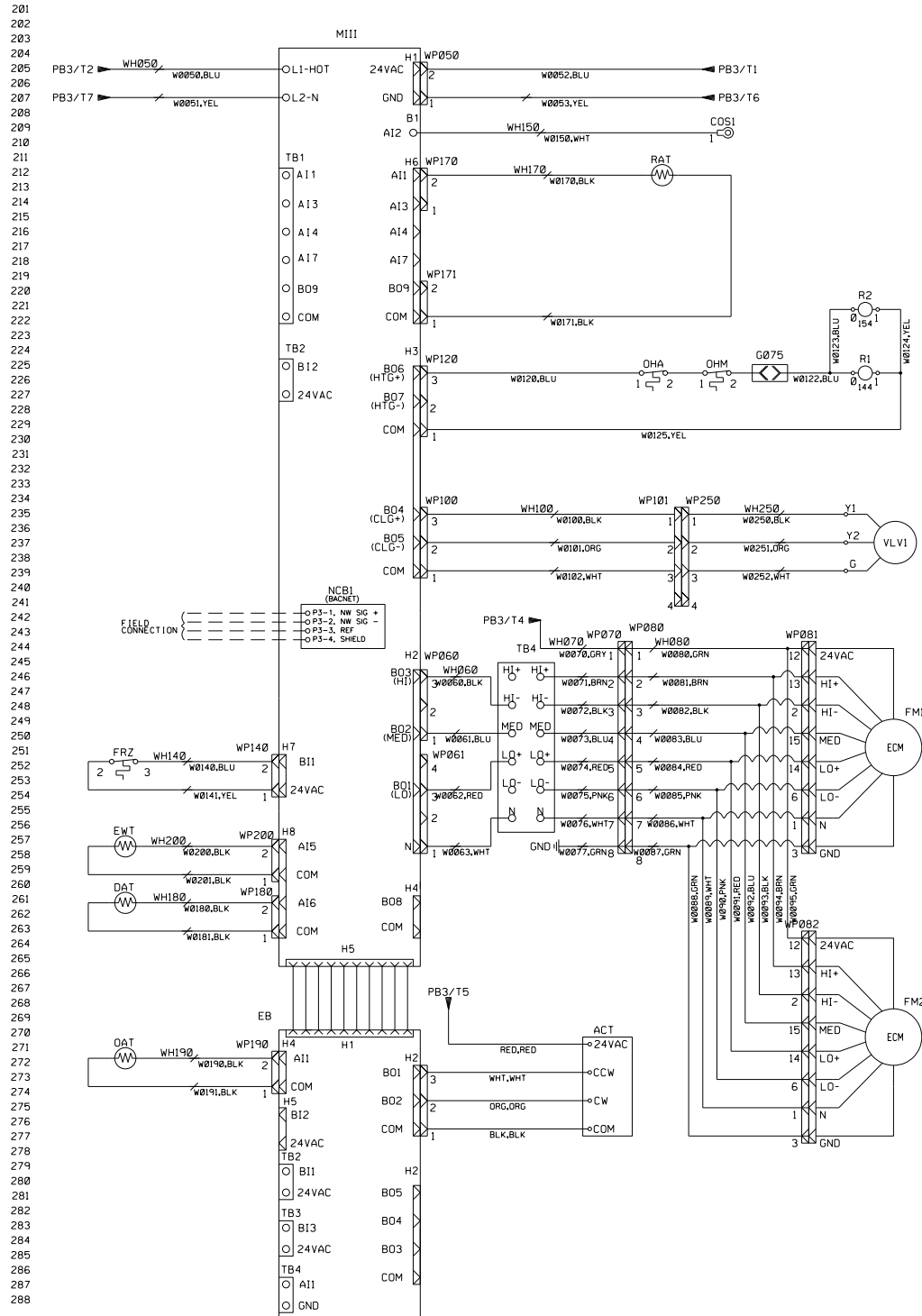


Figure 13: ECM Motor, Electric Heat, 230V, Economizer – Page 1







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Sales and Engineering Data

ED 19059-3

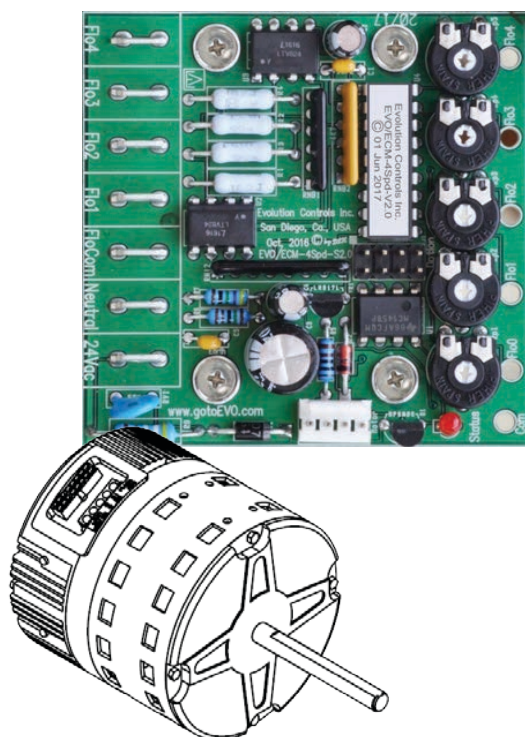
Group: **Applied Air Systems**

Part Number: **ED 19059**

Date: **June 2018**

ThinLine and Large Cap Fan Coils

ECM Speed Adjustment Board (EVO Board)



Overview

The constant CFM ECM when wired to with the ECM speed adjustment board (EVO Board) allows the user the manually adjust the airflow for each of the three fan speeds by turning a dial. Each speed may be adjusted across the full RPM range of the motor and once set the new flow rate will then be maintained by the motor despite changes to the system static pressure. The CFM for each speed setting may be determined by measuring the airflow in the system or by measuring the DC voltage between the adjusted terminal and the reference point on the board. If desired, the motor may be used without speed adjustment by replacing the wire harness from the EVO board with the standard wire harness. In this case the motor will run at the factory programmed flow rates.

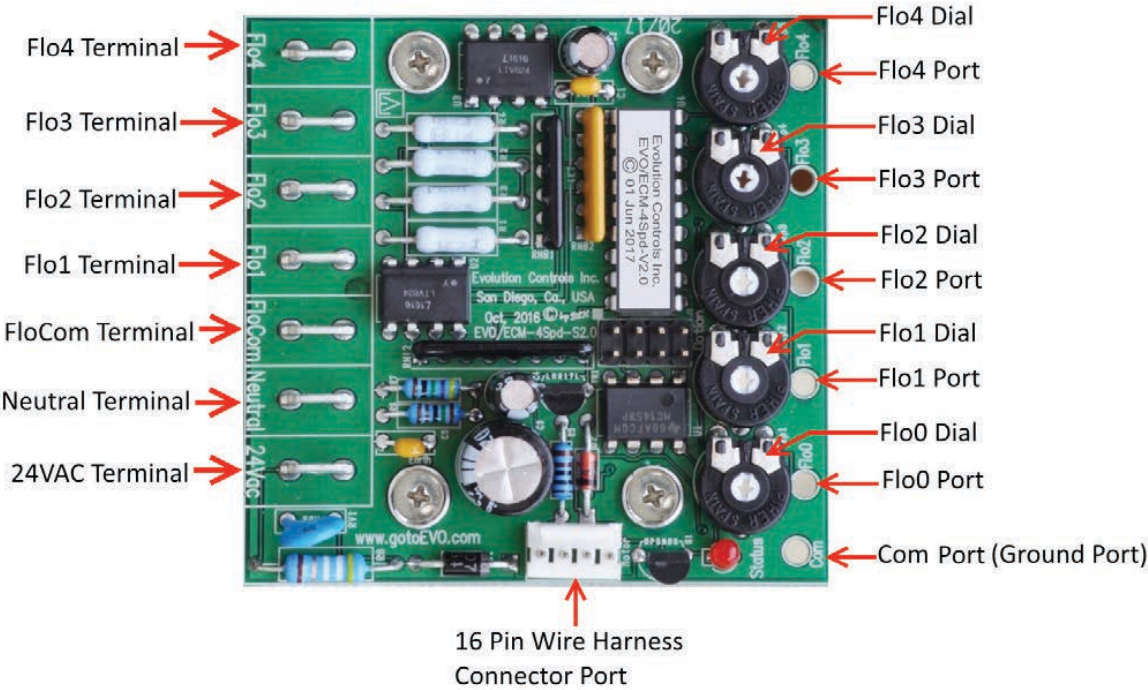
Connecting the Unit to Field Power

Line voltage power wires L1 and Com are connected to S2 as shown. A factory provided step down transformer provides 24VAC power for the ECM control and the EVO board and the factory provided 16 pin wire harness connects the EVO board to the ECM (Figure 7 and Figure 8).

Connecting the Unit to a 24V Thermostat or Controller

The factory provided 24VAC transformer should be used to provide power for the field mounted t-stat by connecting the 24V input to TB2 terminal B and the common to TB2 terminal E. The three t-stat fan speed outputs are connected to the EVO board spade terminals labeled Flo1, Flo2 and Flo3 (Figure 1). When a t-stat fan speed output is energized, the fan will run at the speed set at the corresponding flow dial until the speed output is de-energized.

Figure 1: EVO Board Key Components and Locations



Adjusting Fan Speed

The fan will run at the factory set flow rates when the unit is installed. If different flow rate is required, turn the flow dial (Figure 1) corresponding to the Flo terminal until the desired CFM is achieved or the measured DC reference voltage between the com port and corresponding flo port equals the correct value from Table 2 through Table 13 on page 8.

For example, if terminal Flo1 is on and the Flo1 dial is turned until the Flo1 reference voltage = 2.5, then the motor will run at the CFM that corresponds to 2.5V.

NOTE: The Flo0 dial should always be set at 0V to prevent the fan from running when all speed outputs are OFF.

Bypassing the EVO board

If the EVO board should fail or if it is not needed, the EVO board may be bypassed allowing the ECM to operate at the factory programmed fixed flow rates. To bypass the EVO board unplug the 16 pin EVO board wire harness (Figure 3) from the ECM and the board and remove it from the unit. Locate the standard 16 pin wire harness (included in the unit paper work packet) and plug it into the motor. The individual wires on the other end of the harness connect wire 78 (blue) to terminal C on terminal block TB2 and wire 73 (green) to terminal D on terminal block TB2. Connect the five fan speed wires, 77, 74, 75, 76, and 80 to terminals HI+, HI-, MED, LO+ and LO- respectively on terminal block TB4. Connect the field mounted t-stat 24V+ and common to terminals B and E, respectively, on terminal block TB2. Apply 24V to any of the five speed inputs on TB4 to run motor at that speed

Figure 2: Typical EVO Board Wiring for a Single Motor Large Cap Unit

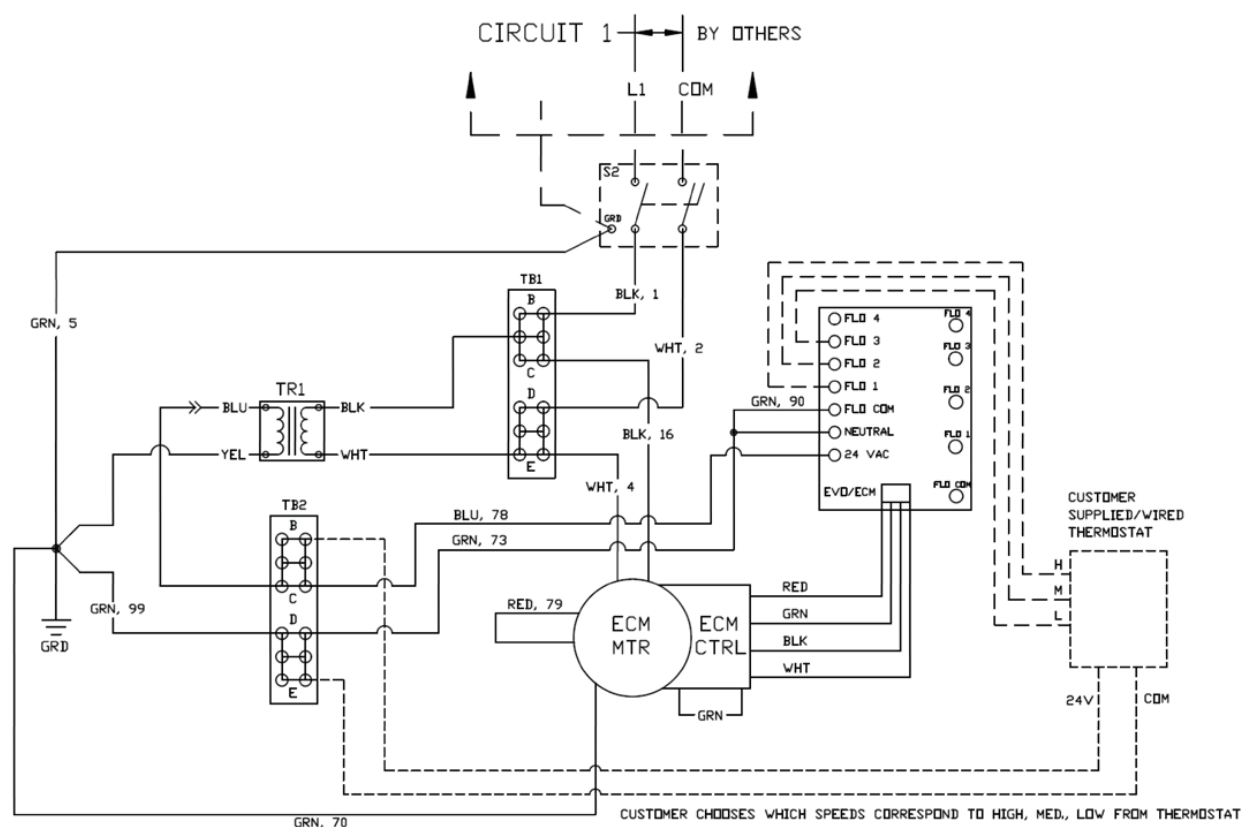


Figure 3: Single Motor EVO Board Bypass Wiring Detail for Large Cap Unit

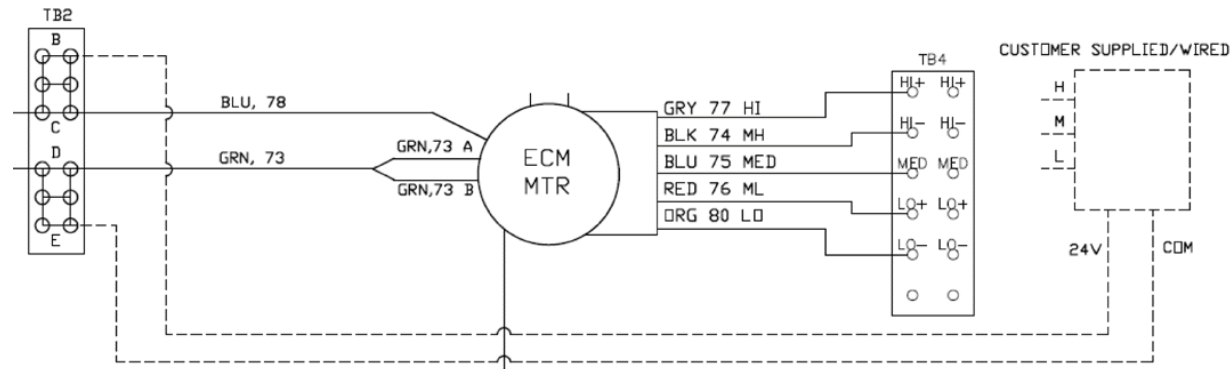


Figure 4: Two Motor EVO Board Bypass Wiring Detail for Large Cap Unit

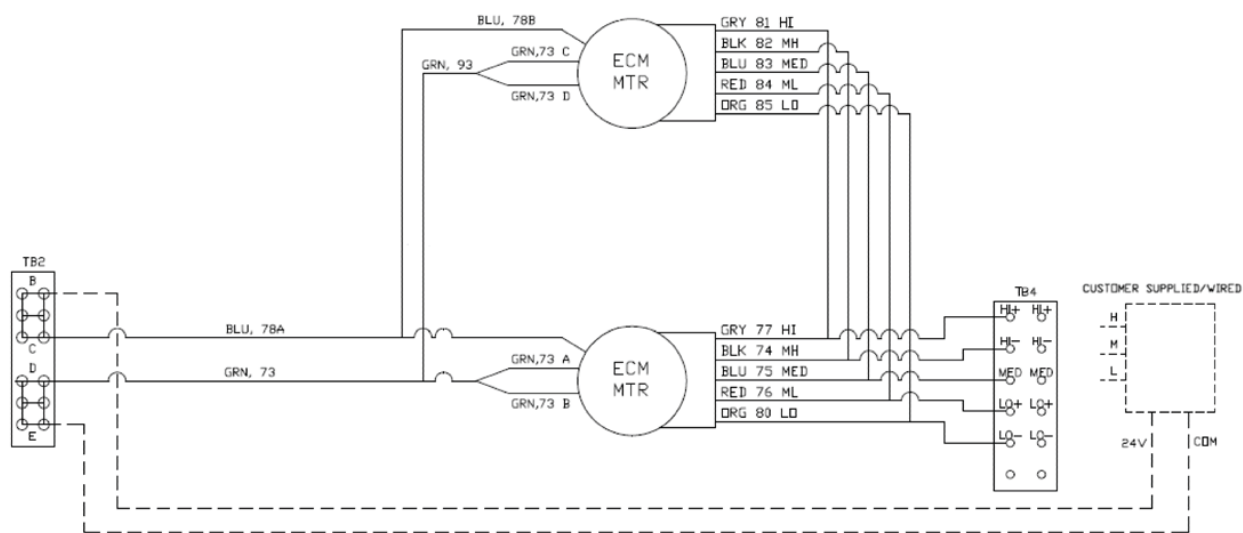


Table 1: Large Cap Wiring Schematics

| Drawing Number | Description |
|----------------|--|
| 910116769 | ECM with 3 speed control, 115V, 1 Motor |
| 910167425 | ECM with 3 speed control, 115V, 2 Motors |
| 910167454 | ECM with 3 speed control, 208-230V, 1 Motor |
| 910167432 | ECM with 3 speed control, 208-230V, 2 Motors |
| 910167455 | ECM with 3 speed control, 265-277V, 1 Motor |
| 910167433 | ECM with 3 speed control, 265-277V, 2 Motors |
| 910165943 | ECM with EVO Board, 115V, 1 Motor |
| 910166611 | ECM with EVO Board, 115V, 2 Motors |
| 910165944 | ECM with EVO Board, 208-230V, 1 Motor |
| 910166613 | ECM with EVO Board, 208-230V, 2 Motors |
| 910165945 | ECM with EVO Board, 265-277V, 2 Motors |

Figure 5: Single Motor EVO Board Bypass Wiring Detail for ThinLine Unit

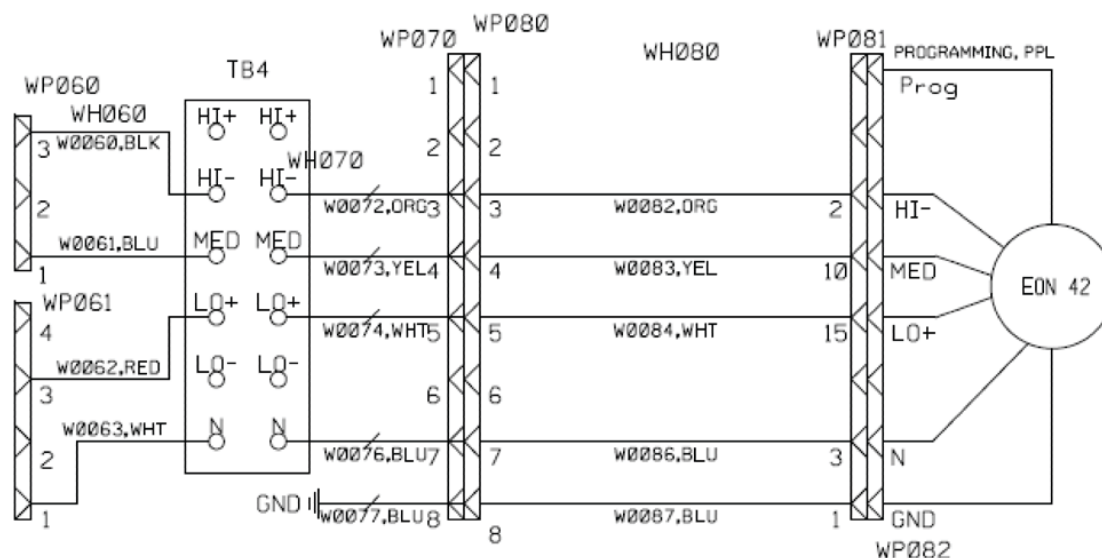


Figure 6: Two Motor EVO Board Bypass Wiring Detail for ThinLine Unit

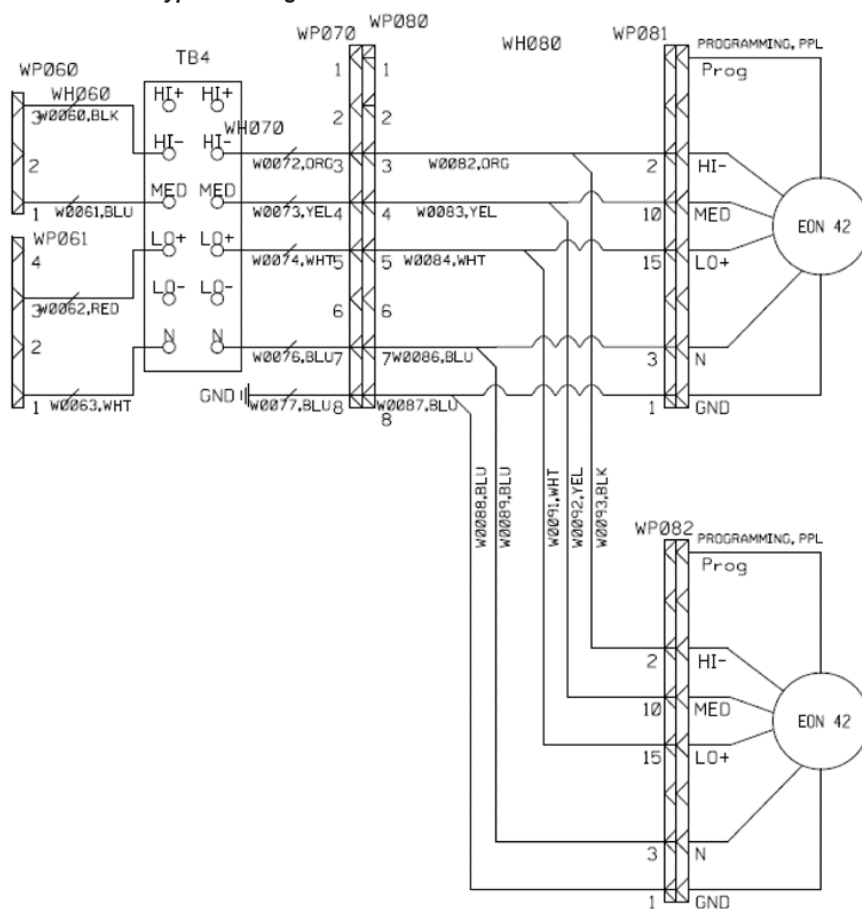




Figure 7: Standard 16 pin Wire Harness Detail

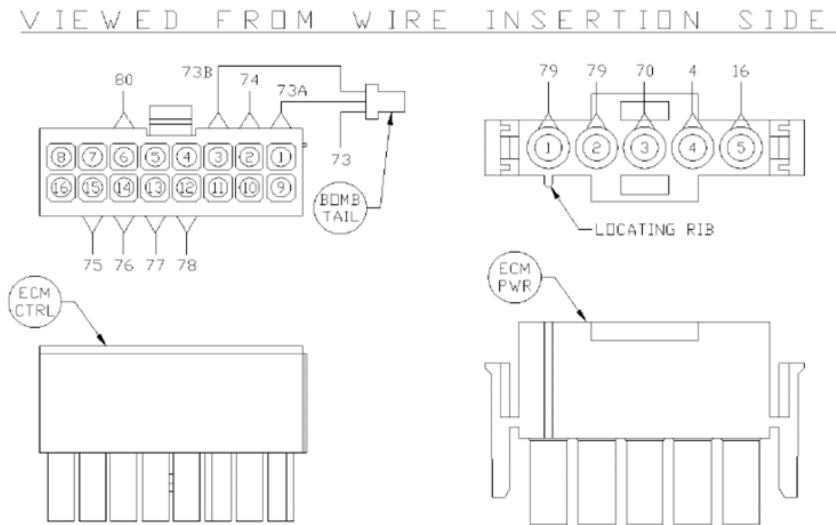
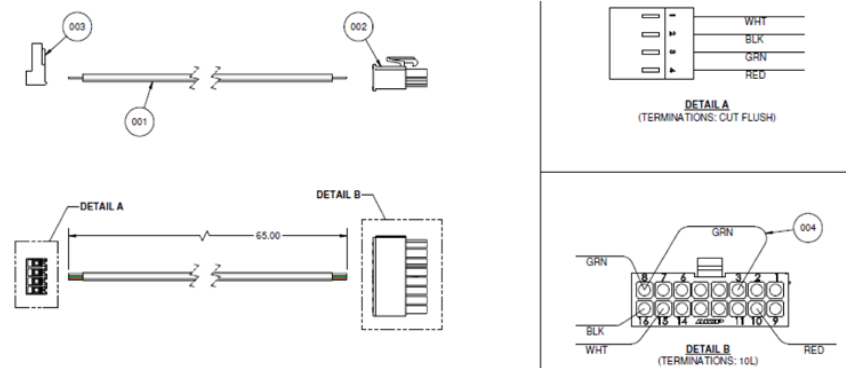


Figure 8: EVO Board 16 Pin Wire Harness Detail





REFERENCE VOLTAGE TABLES

Table 7: Size 2 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|-------------|
| LOW | 1.31 VDC | 158 @ 0" WC |
| MED | 1.95 VDC | 228 @ 0" WC |
| HIGH | 2.16 VDC | 308 @ 0" WC |

Table 8: Size 3 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|-------------|
| LOW | 1.53 VDC | 177 @ 0" WC |
| MED | 2.11 VDC | 265 @ 0" WC |
| HIGH | 2.77 VDC | 352 @ 0" WC |

Table 9: Size 4 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|----------------|
| LOW | 1.74 VDC | 228 @ 0.05" WC |
| MED | 2.46 VDC | 337 @ 0.05" WC |
| HIGH | 3.20 VDC | 452 @ 0.05" WC |

Table 10: Size 6 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|---------------|
| LOW | 1.40 VDC | 340 @ 0.1" WC |
| MED | 2.1 VDC | 522 @ 0.1" WC |
| HIGH | 2.75 VDC | 711 @ 0.1" WC |

Table 11: Size 8 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|-------------|
| LOW | 0.89 VDC | 410 @ 0" WC |
| MED | 2.77 VDC | 627 @ 0" WC |
| HIGH | 4.95 VDC | 825 @ 0" WC |

Table 12: Size 10 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|----------------|
| LOW | 0.50 VDC | 551 @ 0.05" WC |
| MED | 2.55 VDC | 825 @ 0" WC |
| HIGH | 4.40 VDC | 1105 @ 0" WC |

Table 13: Size 12 Voltage Table—ThinLine

| Speed | Voltage* | CFM* |
|-------|----------|--------------|
| LOW | 0.47 VDC | 719 @ 0" WC |
| MED | 2.50 VDC | 1010 @ 0" WC |
| HIGH | 4.60 VDC | 1344 @ 0" WC |

* These values are all approximates and based on testing with the 3 row coil.

** MAX VDC is referring to the dial being turned to its MAXIMUM voltage output.

Page 7 intentionally omitted



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