Installation, Operation and Maintenance IM 1272-2

Group: **Fan Coils**
Part Number: **910243712**
Date: **June 2019**

OptiLine™ Vertical Stack Fan Coil

Model FSG

General

⚠ CAUTION

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

This manual contains the installation and operating instructions for your an coil system. There are some precautions that should be taken to derive maximum satisfaction from it. Improper installation can result in unsatisfactory operation or dangerous conditions.

Read this manual and any instructions packaged with separate equipment prior to installation. Give this manual to the owner and explain its provisions. The owner should retain this manual for future reference.

Safety Information

NOTICE

The manufacturer's warranty does not cover any damage or defect to the air conditioner caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the air conditioner. you should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

WARNING

Provide adequate combustion and ventilation air to the unit space as specified in the combustion and ventilation air section of these instructions.

WARNING

Install this unit only in a location and position as specified in the Mechanical Installation section of these instructions. Provide adequate combustion and ventilation air to the unit space as specified in the venting section of these instructions.

DANGER

Combustion products must be discharged outdoors. Connect this unit to an approved vent system only, as specified in Mechanical Installation section of these instructions. Use only with type of gas approved for this unit. Refer to the unit rating plate.

DANGER

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

WARNING

Always install unit to operate within the unit's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in the Mechanical Installation section of these instructions. See also unit rating plate.

WARNING

Units are not design certified to be installed inside the structure. Doing so can cause inadequate unit performance as well as property damage and carbon monoxide poisoning resulting in personal injury or death.

Design and Take-off Precautions

Attention should be paid to the height of drywall which encapsulates ductwork in a bulkhead. Note the height of the side supply air opening shown in the submittal and ensure that the drywall does not interfere with the side wall grille. Make allowance for the 1" flange around the grille. Call Daikin at the time of submittal review if side supply air openings need to be lowered or rotated to a vertical position to avoid interference with walls or doors.

The FSG vertical stacked fan coil unit is designed to have drywall applied directly to the face of the unit. Floor sleeves and extension sleeves through shear walls are not included.

It is important to accurately locate the floor sleeve relative to the fan coil and the drywall.

Receiving Inspection

The entire shipment should be inspected for damage, either readily visible or concealed. Any damage must be noted on the freight bill by the carrier's agent and Daikin notified within 24 hours.

Check riser projections at each end of the cabinet for damage that would prevent making an acceptable piping connection.

Check internal piping, coil and valve packages for possible transit damage. If contractor/installer deem it necessary to tighten mechanical fittings Daikin does not assume any responsibility for this procedure. It is stressed that the component manufacturer's recommended procedures be strictly followed.

Thermostats, and other accessories which have been shipped separately should be inspected for transit damage.

Electrical Connection

It is assumed that the fan coil unit will be in a dedicated electrical circuit. If the unit is to be in a circuit which includes electrical outlets or other electrical devices, Daikin must be informed prior to releasing the units for production.

Handling

Avoid dropping or jarring the fan coil unit during offloading and moving the unit into position. Do not lift the unit using the riser pipes.

Unless otherwise requested by the customer at the time of shop drawing approval, the cabinet insulation is left intact, covering the supply air openings and, if applicable, the secondary return air opening to prevent dust, snow or rain from entering the unit. The installer is responsible for cutting out the insulation and buttering the cut edge prior to installing the grilles.

Accessories

Do not install grilles or thermostats until after the walls have been painted. Caution the painter against spraying over the labels on the front cover of the unit.

Installation Identification

The fan coil unit has a label pasted on the panel that shields the motor/blower. The label shows either the floor and riser number or the room number.The unit must be placed in the correct location in the building in accordance with the label.

Handling

If the unit has risers attached, do not lift the unit using the riser pipes. Protect the fan coil from rain and snow.

Installation of Units with Risers Attached

⚠ WARNING

Use solder to connect the risers. Do not use Silfos (brazing) as this will cause the pipe to overheat and the insulation to be damaged.

NOTICE

Daikin does not advise on the location or method of anchoring as this is the responsibility of the engineering company retained to design the riser system.

⚠ CAUTION

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A rectangular opening is made in the floor slab, usually sleeved before pouring the floor. Refer to the catalog or submittals for sizes.

Rotate the unit from the horizontal position to vertical so that the bottom end of the risers insert into the expanded end of the risers on the unit below. 2" is allowed in the riser length for the depth of the insertion. Shim the unit plumb.

Before making the solder joint, ensure that the run outs from the supply and return risers are centered in the slots in the cabinet. If this is not done there is considerable risk of distorting the run out when the hot water riser expands causing the run out to contact the edge of the slot in the sheet metal potentially causing failures or leaks. Also ensure that the condensate riser stub out is at 90° to the cabinet so that the drain hose is not kinked.

Connect the risers by soldering (not brazing) using 95/5 solder. An additional cap of 50/50 solder can be added for extra strength.

Ensure that the horizontal run-out from each riser is centered in the slot in the cabinet and that the run-out from the riser is at 90º as it enters the cabinet, prior to soldering the risers. Anchoring the risers to the floor slabs is the responsibility of the contractor. Shim the unit plumb. It is not necessary to use a pad under the unit. Fire stopping the floor opening and making good the riser insulation at the floor opening is the responsibility of the contractor. Check that the drain hose is not kinked before soldering the condensate riser. If the risers incorporate expansion compensation loops, remove the support brackets after anchoring the risers.

Figure 1: Floor-by-floor Progressive Installation

A. Positioning the unit above the unit on the floor below.

B. Unit in place, ready to accept the connections from above.

C. Making connections from the unit above.

D. Unit "furred in" with grille attached and the thermostat wired.

E. Completed installation of unit.

The fan coil unit has unions at the shut off valves. These fittings must be checked prior to pressure testing the system by the contractor as part of the installation procedure. Mechanical fittings can loosen during transportation and handling. If contractor /installer deem it necessary to tighten mechanical fittings Daikin does not assume any responsibility for this procedure. It is stressed that the component manufacturer's recommended procedures be strictly followed.

The coil is pressure tested hydrostatically at the factory using a propylene glycol solution. Trace amounts of this solution are allowed to remain in the coil to ensure that the coil does not freeze during transportation. After testing on site with water the fan coil unit must not be exposed to freezing temperatures.

Riser anchoring is required for two purposes. The risers are anchored to the floor slab at one or more points in the height of the building so that they do not slip down under gravity. The second reason is to spread the expansion in opposite directions from the anchor point. Typically risers will be anchored at the midpoint of the height of the building. If there are riser expansion loops included in the risers inside the unit, the anchor point will be at the midpoint between two sets of loops. For example in a 16 story building there will be a loop on the hot water riser on floor 8 and anchors at floors 4 and 12. After anchoring, the risers are in effect attached to the building structure so it does not matter if the plastic straps holding the risers to the unit break off after installation.

- Complete the riser insulation at the solder joint is the responsibility of the contractor
- Fire stop the floor opening in accordance with code

Flushing and Testing

The fan coil is normally equipped with ball type shut off valves. The unit is shipped with the ball valves open to the coil.

After checking mechanical fittings inside the unit for tightness, it is recommended that the units on each riser stack are pressure tested using compressed air or nitrogen.

- Close the ball valves and flush the riser system
- Open the supply side ball valve and bleed air from the coils. The coil has a manual air vent for this purpose. The top of each riser should also have an air vent (not provided by the factory)
- Test the units and risers hydrostatically. Open the return side ball valve after testing
- Check that the strainer mesh is not choked, if there are strainers included with the unit

Drywall Installation

The fan coil model series "FSG" has a cabinet which is designed to be furred-in. Drywall can be directly attached to the cabinet or the unit can be framed.

Direct Application – The hinged air panel must be used. It is designed to fit the ½" drywall flange around the return air / access opening on the unit. Use drywall screws no longer than 1¼" and follow the instructions on the page in the submittals which shows where the screws can be located to avoid damaging internal components. When using the hinged panel, drywall must be attached to the front. The sides and back can be framed.

Framing – Frame the unit using metal studs. The flange around the return air/access opening is 2" deep. The type of return air panel which has a hinged filter door in its upper half is used with this type of installation. It is preferable that the stud does not touch the fan coil cabinet so that any slight vibration which may exist is not transferred to the stud.

Before installing the thermostat and grilles, the walls must be painted. Instruct the painter not to spray over the labels on the unit. After installation, dust must be vacuumed from the coil surfaces, the drain pan, the motor windings and the cabinet insulation.

Ducted Units

Remove the supply air opening knock-out in the top panel of the fan coil. Cut out the cabinet insulation from the opening and butter the cut edge if it is glass fiber insulation. Attach the supply air duct.

NOTE: Supply air duct flanges are not provided by the factory.

Electrical Connection

The unit has a single point connection at the junction box inside the unit. It might also have a disconnect switch and/or a fuse. All electrical wiring must be in accordance with the current version of the national and local codes. A qualified electrician must carry out the work. The junction box is located behind the fan/motor shield. Electrical power to the unit should be disconnected by opening the remote disconnect device prior to removing the fan/motor shield. All wiring must enter the unit through designated openings and not through the riser stub out openings.

Supply Air Grille Installation

The grille is a snap-in fit into the collar on the unit. If the unit has a ducted supply, side supply air grilles are provided with a balancing damper. If the unit has two unit mounted grilles and is not ducted, one of the grilles is provided with a damper. This grille is to be fitted to the opening which requires the lesser of the two air flows (for example the bedroom).

Return Air/Access Panel Installation

Remove the hinged door by raising to the horizontal position and gently pull out past the hinge pins. Place the return air panel in place and align the pre-drilled holes and secure using 4 sheet metal screws. Re-install the hinged filter access door using the same technique used to remove it.

Thermostat Installation

⚠ CAUTION

Adjusting fan RPM to a higher speed may result in excessive air flow noise.

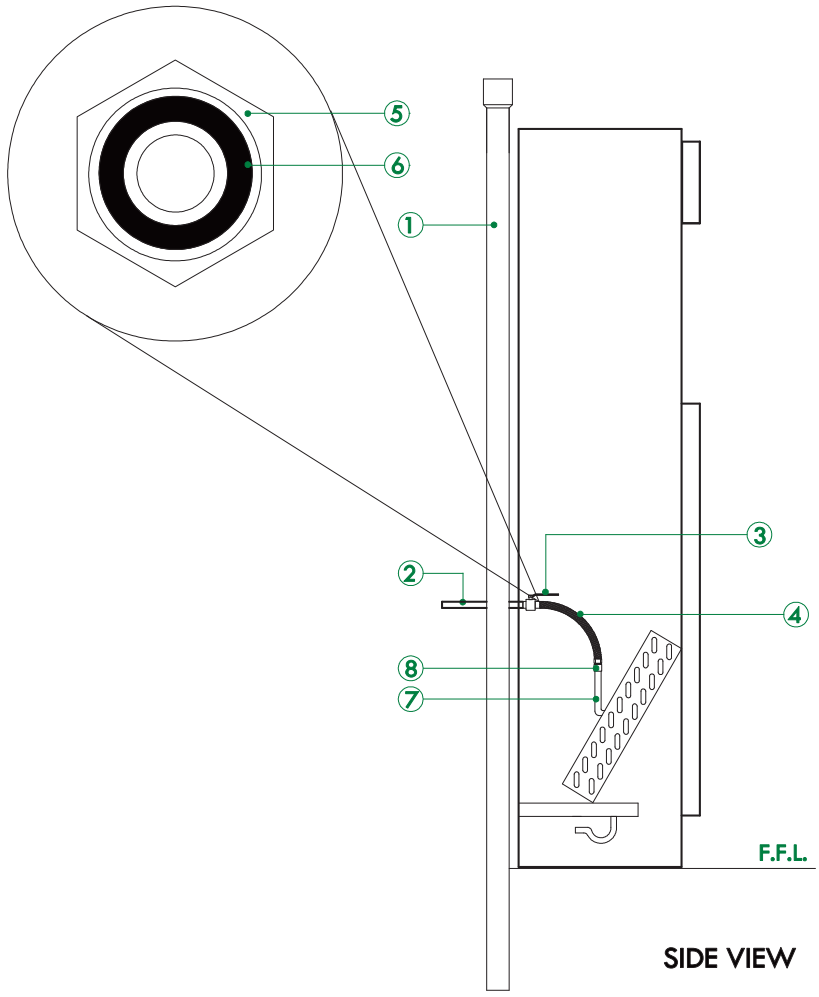
Unit mounted thermostat – Connect the wires from the thermostat to the wire harness usually inside the electrical box using the plug provided. Fit the thermostat onto the electrical box using the machine screws provided. The electrical box is located on the front of the unit, above the return air panel.

Remote mounted thermostat – Run low voltage wires from the 24V thermostat on the wall back to the terminal strip inside the unit.

The thermostat must have a 0-10VDC fan speed control signal to control the fan. A motor speed board model SPDM will allow the contractor to adjust the maximum fan speed if the factory set point is not suitable. If the thermostat has a 3 speed fan control, the digital to analog interface board, EVO board model EVO/10Y-4Spd must be used. This board has max RPM adjustment pots where the CFM can be adjusted for each spd if factory settings are not suitable.

Figure 2: Hose Kit Installation

FRONT VIEW OF HOSE KIT



SIDE VIEW

1. Insulated copper risers.
2. Optional 1/2" hard copper stub-out to slave fan coil unit.
3. Isolation valve.
4. 12" hose kit.
5. Nut on end of hose kit.
6. O-ring on hose kit on isolation valve end.
7. Copper piping from coil.
8. Adapter.

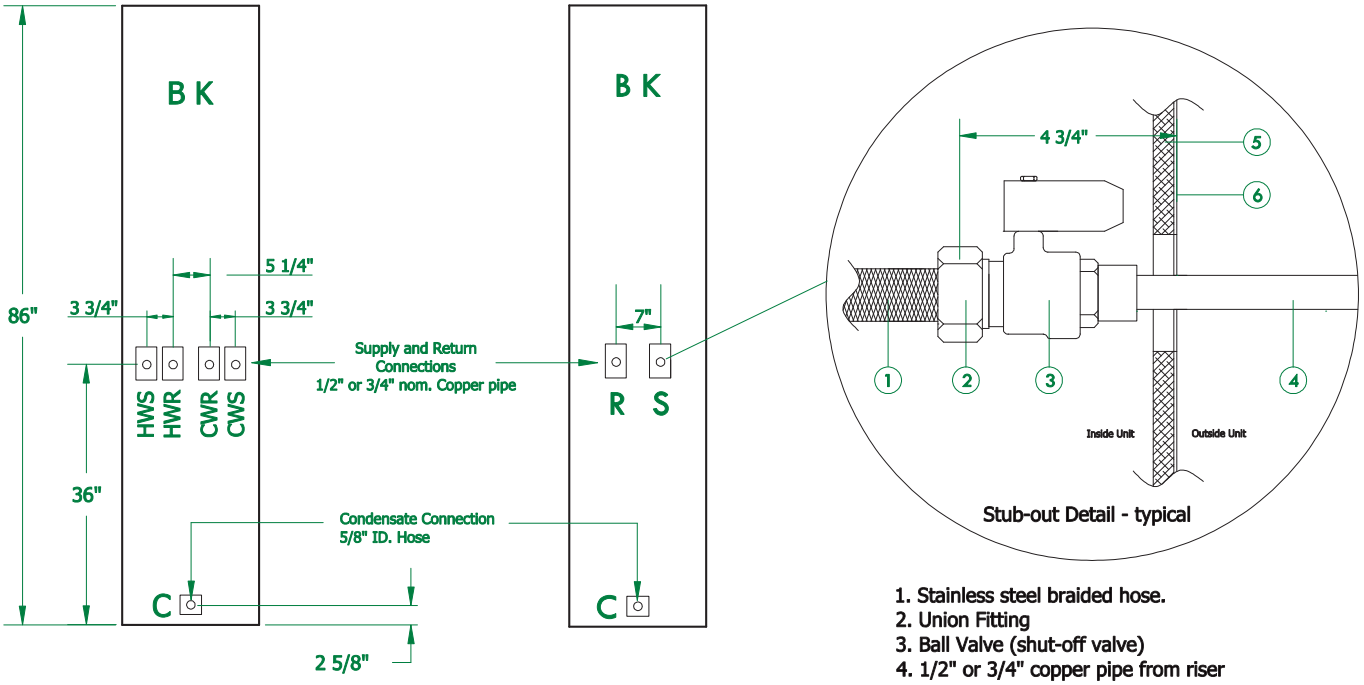
Notes:

1) For units shipped without risers attached, ensure isolation valves are installed with the proper spacing to allow the 12 inch hose kit to be installed with a 90 degree bend.

2) Using a hose longer than 12 inches in length may result in kinking and may affect unit performance or cause serious damage.

3) For units shipped without risers attached, o-rings will be shipped in a bag and must be inserted into the hose kit on site.

Figure 3: Master/Slave Installation



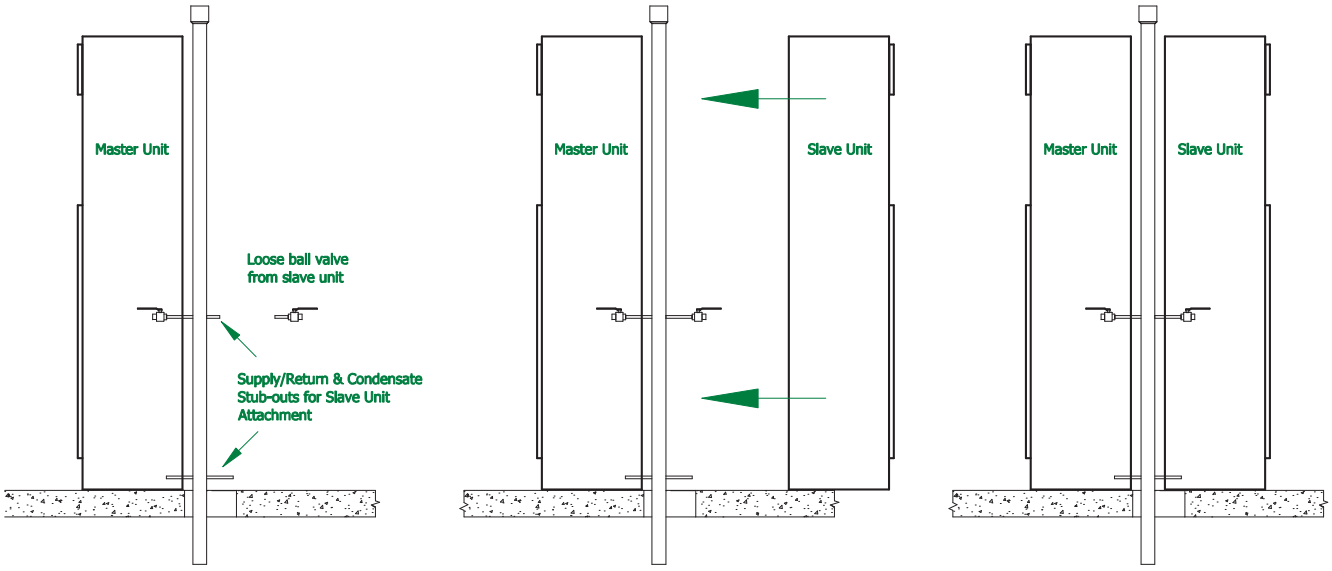
4 Pipe Slave Unit
With BK Connection

2 Pipe Slave Unit
With BK Connection

1. Stainless steel braided hose.
2. Union Fitting
3. Ball Valve (shut-off valve)
4. 1/2" or 3/4" copper pipe from riser stub-out. Some field provided copper may be required to reach inside the cabinet.
5. Insulation lining on interior surface of fan coil cabinet
6. Fan coil cabinet

The dimension from the outer surface of the cabinet to the union is a critical dimension to maintain proper bend radius of the stainless steel hoses and avoid kinking.

Master/Slave Unit Installation Procedure



1) Install Master Unit with risers

2) Solder ball valve from slave unit onto stub-out for master unit

3) Slide slave unit into place over top of ball valve

4) Make union connection from hose to ball valve inside slave unit

5) Make condensate connection

⚠ WARNING

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

⚠ CAUTION

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

Always isolate the unit electrically before removing the front access panel. Do this by opening the circuit breaker (or other switching device) in the distribution panel in the suite. Do not use the fan switch as the means of isolation. There is a high risk of electrocution if the unit is improperly isolated. If in doubt have a qualified electrician perform the service work.

Ensure that the fan has stopped rotating before proceeding to work within the unit. If the unit is equipped with a fuse or circuit breaker, do not change out either of these devices with ones of a higher Amp rating. The purpose of a fuse or circuit breaker is to protect the power wiring to the unit.

Take care when working inside the unit. Sheet metal components may have sharp edges.

If the black acrylic coating on the glass fiber cabinet liner is damaged, it must be patched to prevent glass fiber particles entering the air stream.

Every 3 Months

- Check/replace the filter

  The filter can be one of two types: a 1" thick cardboard framed type or a metal frame with filter media attached.

  Units with a hinged filter door in the upper half of the grille panel – Grasp the bottom edge of the door and sharply pull the door forwards. Lift the door to the horizontal position. The filter is now accessible and is removed by sliding it upwards out of the channels attached to the coil.

Table 1: Filter Size Chart

Unit Size	03 – 04	06 – 08	10 – 12
1" Filter Size	12" × 20"	14" × 25"	16" × 25"

Annually

(before the start of the cooling season)

- Remove the return air/access panel from the wall. Remove the two sheet metal screws which secure the panel that shields the fan assembly. Pull the shield panel sharply downward and remove.
- Vacuum the drain pan and check that the drain outlet is not blocked. Pour water into the pan and check that it drains quickly. If it appears to be partly blocked, remove and clean the drain hose beneath the pan.
- If the coil surface is dirty, vacuum the surface which faces the room. Take care not to damage the aluminum fins on the coil. If the fins are flattened, the performance of the unit will be reduced.
- Inspect the surface of the cabinet liner for evidence of dampness. The liner should be completely dry in all areas. Vacuum excessive dust from the liner, taking care not to damage the black acrylic coating on the liner. Do not run the unit if the liner is damp as this can promote mold growth. Determine the cause of the dampness. If there is evidence of mold growth it might be necessary to replace part or all of the liner. If in doubt consult a remediation specialist.
- Fan, fan motor, control valve(s), electric heater, drain pan over-flow switch, and thermostat do not require routine maintenance.

NOTE: Fan motor has sealed bearings and does not require additional lubrication.

⚠ CAUTION

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

Turn ON the disconnect switch located behind the fan enclosure cover to the “On” position.

Standard Thermostat Digital Programmable Thermostat

Select the mode, heating or cooling by pressing the “Mode” button. Adjust the setpoint to desired temperature setting using the up/down arrow buttons. Toggle the “Fan” button between auto and run. In auto mode, the fan speed will vary based on the difference between room temperature and room setpoint. This is the most economical operating mode. In “Run” mode, the fan will operate a predetermined speed set in the “Engineering parameters”.

The “On/Off” button turns the unit ON or OFF. The thermostat is pre-programmed which can be altered and programmed for 5/2 day, 5, 1, 1 and 7 day. The battery back-up lasts for 5 years. See thermostat operating instructions for further information. Refer to thermostat operating instructions for other thermostats used.

NOTE: The thermostat must have 0-10VDC fan signal to control fan speed. A motor speed board model SPDM will allow the contractor to adjust the maximum fan speed if the factory set point is not suitable. If a thermostat with a 3-speed fan switch is used, a digital to analogue interface board model EVO/10Y-4Spd must be used to convert the fan signal to a 0-10VDC.

Adjusting the Maximum CFM

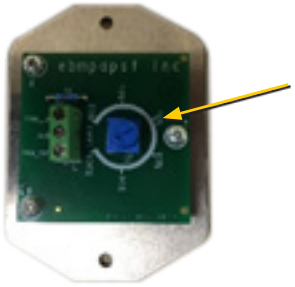
⚠ WARNING

If the maximum CFM is adjusted to a value above the design airflow, excessive air noise could occur

The maximum CFM is factory set to the closest nominal design CFM, (300, 400, 600, 800, 1000 or 1200), but can be field adjusted if needed. With the 0-10VDC thermostat fan signal, the max CFM can be adjusted by adjusting the blue knob on the EBM fan board in the electrical box. See Fig. 1 and reference Table 1. To increase the maximum CFM, turn the adjustment clockwise toward 100% and to reduce the maximum CFM, adjust counter clock-wise toward 0%. The chart below indicates the percent flow, CFM, relative to cabinet size and external static pressure.

If a 3 speed fan control thermostat is used, the CFM for each speed is factory set to be 50% on low speed, 75% on medium speed, and 100% on high speed. Each motor speed CFM may be adjusted by turning the adjustment pots on the EVO board. Call 1=low speed, call 2=medium speed and call 3=high speed. See Fig. 2

Figure 4: EVO 3 Spd Fan CFM Adjustment Board

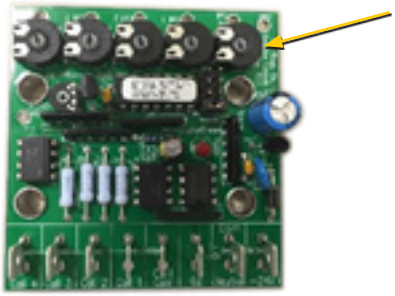


Rotate dial clockwise to increase max CFM or counter clockwise to decrease. (Used with 0-10VDC fan speed signal)

Table 2: EBM Fan Speed Controller Setting Reference

Cabinet Size	CFM	Dial Position @ free blow	Dial Position@ 0.2" ESP	Dial Position@ 0.4" ESP
03 – 04	200	50%	—	—
03 – 04	300	60%	70%	—
03 – 04	400	80%	90%	—
06 – 08	500	50%	60%	70%
06 – 08	600	60%	70%	80%
06 – 08	700	70%	80%	90%
06 – 08	800	80%	90%	100%
10 – 12	900	50%	55%	60%
10 – 12	1000	55%	60%	65%
10 – 12	1100	60%	65%	70%
10 – 12	1200	65%	70%	75%

Figure 5: EVO 3 Spd Max CFM Adjustment Board



Rotate dial(s) clockwise to increase max CFM or counter clockwise to decrease. Call 1, 2 & 3 are used with 3 spd fan thermostat. (Call 4 not used)

Sequence of Operation

2-Pipe Heating/Cooling Units

The control valve is activated by the cool and heat outputs from the thermostat which are connected to an aquastat. On a call for cooling from the thermostat and the water temperature is less than 65ºF, the aquastat energizes the control valve. If the water temperature rises above 85ºF, the aquastat de-energizes the control valve. On a call for heating from the thermostat and the water temperature is greater than 85ºF, the aquastat energizes the control valve. If the water temperature drops below 65ºF, the aquastat de-energizes the control valve.

The aquastat has black, yellow and orange wire leads. The switch closes for heating at 85ºF +/- 5F through BLK and ORG and cooling at 65ºF +/- 5ºF through BLK and YEL.

2-Pipe Heating/Cooling Auxiliary Electric Heat Unit

The control valve and electric heat relay are activated by the cool and heat outputs of the thermostat which are connected to two aquastats labled A1 and A-2 on the wiring diagram. On a call for cooling from the thermostat and the water temperature is less than 65ºF, the A1 aquastat energizes the control valve. If the water temperature rises above 85ºF, the aquastat deenergizes the control valve. On a call for heating from the thermostat and the water temperature is more than 100ºF, the A2 aquastat energizes the control valve. If the water drops below 75ºF, the aquastat de-energizes the control valve and energizes the electric heat relay.

The A2 aquatat has black, yellow and orange wire leads. The switch closes for heating at 100ºF +/- 5ºF through BL and ORA and cooling at 75ºF +/- 5ºF through BL and YEL. The A1 aquastat has 2 brown wire leads. The switch closes for heating at 85ºF +/- 5ºF and cooling at 65ºF +/- 5ºF.

2-Pipe Heating/Cooling Total Electric Heat Unit

The control valve and electric heat relay are activated by the cool and heat outputs of the thermostat. No aquastats are used. On a call for cooling from the thermostat, the thermostat energizes the chilled water control valve. On a call for heating from the thermostat, the thermostat heat output energizes the electric heat relay. The control valve remains closed.

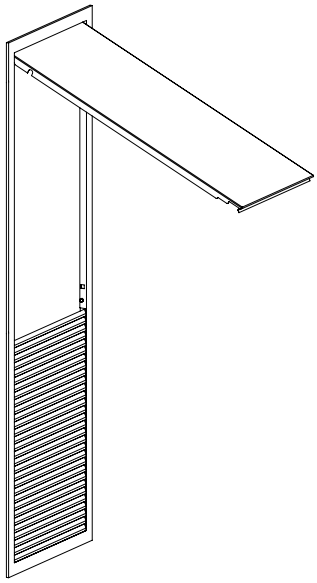
4-Pipe Heating/Cooling Unit

The hot water control valve and chilled water control valve are activated by the cool and heat outputs of the thermostat. No aquastats are used. On a call for cooling from the thermostat, the thermostat cool output energizes the chilled water control valve. On a call for heating from the thermostat, the thermostat heat output energizes the heating water control valve

NOTE: Always refer to wiring diagram on the motor cover panel to the determine the model and type of fan coil. This can be viewed by lifting the hinged filter access panel door.

See submittal for more information specific to the unit and refer to the wiring diagram on the motor cover.

Figure 6: Hinged Filter Access Panel Door



- 2-Pipe valve control heating/cooling units
- 2-Pipe valve control heating/cooling auxiliary heat units
- 2-Pipe valve control heating/cooling with total electric heat units
- 4-Pipe valve control heating/cooling units

Most problems can be promptly diagnosed at the thermostat. The fan assembly is accessible and removable through the return air opening, after removal of the return air grill and fan access cover. The fan assembly has a five wire plug harness for power and 0-10VDC speed control signal.

The 2-pipe units are equipped with a change-over aqua-stat mounted on the riser accessed through the return air panel. The 2-pipe with auxiliary heat units have 2 aqua-stats and the 2-pipe with primary electric heat have no aqua-stat. Thermostats and control valves are 24VAC.

If Fan Motor Fails To Start

- Check main power supply, (circuit breaker) and unit switch are “ON” and unit has power
- Set thermostat ON/OFF switch to “ON” and press fan button to “ON”
- If fan will not operate, check that there is 24VAC coming from the transformer
- If 24VAC is not present, replace the transformer
- If 24 VAC is present from the transformer, check the thermostat wiring connections and motor wiring harness plug and thermostat connections
- If all is good and system is 4-pipe (no aquastat), check the DC voltage on terminals 11 & 12 on the thermostat. If no voltage is present, replace the thermostat
- If the voltage is between 1 & 10VDC on terminals 11 & 12, and there is supply voltage to the fan motor, replace the fan assembly
- If the system is change-over or has auxiliary electric there, check the voltage at the aquastats*
- If no voltage is present at BLK or YEL, replace the aquastat

  * Aquastat with black, yellow and orange wire leads closes for heating at 85F +/- 5F through BLK and ORG and cooling at 65F +/ 5F through BLK and YEL.

Control Valve Fails to Operate

Check the voltage from the thermostat, if no voltage, replace the thermostat. If 24 volts or a DC voltage for modulating valves is present, replace the actuator. If the system has an aquastat(s), check that 24 volts is present from the aquastat. If 24 volts is present, replace the actuator. If no voltage is present, replace the aquastat

Electric Heat Coil Fails to Operate

The electric heat coil module is located behind the motor cover above the fan and consists of a relay operated by the thermostat, a high temperature automatic limit control and thermal cut-off directly attached to the heating element. Both the thermal cut off and high temperature limit control are in the heating coil power circuit.

The temperature limit control sensing element protrudes through the control box directly above the heating element to sense over heating of the coil including fan failure. This is an auto-reset type and will reset when the temperature drops below the preset limit.

The thermal cut off is located below one of the coil terminals directly attached to the coil element. Both safety devices can be replaced easily in the field if continuity test reveal an open circuit. If these circuits are both closed, replace the heating element by removing the 4 screws securing the mounting plate and removing the entire heating assembly.

Receiving & Inspection

- ☐ Unit received undamaged
- ☐ Unit received as ordered

Handling & Installation

- ☐ Unit installed level & square
- ☐ Proper access is provided
- ☐ Proper over-current protection is provided
- ☐ Unit protected from dirt & foreign matter

Cooling/heating Connections

- ☐ Protect valve package components from excessive heat
- ☐ Pressure test all piping for leaks
- ☐ Install drain lines and traps as required
- ☐ Insulate all piping as required
- ☐ Connect risers from master to secondary units if required
- ☐ Connect risers to piping package if shipped separately or supplied by others

Electrical Connections

- ☐ Refer to unit wiring diagram
- ☐ Connect incoming power service
- ☐ Install and connect “shipped lose” components like thermostat

Unit Start-up

- ☐ Check for free and proper fan rotation
- ☐ Record electrical supply voltage and amperage
- ☐ Check all wiring for secure connections
- ☐ Close all unit isolation valves
- ☐ Flush water systems
- ☐ Open all isolation valves after system flush
- ☐ Check that Erie control valve is not in the “locked” open position.
- ☐ Vent water systems as required
- ☐ All duct work and grills are in place
- ☐ Filters are in place
- ☐ Start blowers, pumps, chillers etc
- ☐ Check all units for electrical over-load
- ☐ Check all duct work and units for air leaks
- ☐ Balance water systems as required
- ☐ The Erie control valve can be “locked” open by manually positioning the lever on the back of the valve actuator. Ensure this released so after flushing to allow the valve to be controlled by the thermostat
- ☐ Balance air system as required
- ☐ Record all final settings for future reference
- ☐ Check piping and walls for severe vibration
- ☐ Check all dampers for proper operation (if any)
- ☐ Verify heating and cooling operation
- ☐ Ensure all access panels and grilles are securely 1 in place
- ☐ Verify condensate is flowing

Figure 7: 2-pipe Changeover plus Electric Heat, 120 Volt, 250 mm

SYM	Description
DISC	SWITCH - 1 POLE - 120-277V - 30A
XMR1	TRANSFORMER-120/208/240/277 TO 24V-40VA-CLASS 2
F1	FUSE-250VAC-10A-TIME DELAY-MISC
M1	MOTOR - 120V - 0.15 HP
CS1	SENSOR-CURRENT-SOLID-FIXED SETPOINT
QC3	9 PIN QUICK CONNECT
HTR1	E-COIL - FANCOIL - 2.0KW - 120V - 1ST
R4	HEAT RELAY - SPST - 24V - 30A - RES
T6	HIGH LIMIT AUTO RESET, SPST
CVA	VALVE-ACTUATOR-NC-2&3WAY-24V
T1	THERMOSTAT-24VAC/10VDC-MOD OUT
A1	AQUASTAT - 3 WIRE - 1/2IN - L85-20F
A2	AQUASTAT - 2 WIRE - 1/2IN - L85-20F
TB1	TERMINAL STRIP
FSC	FAN SPEED CONTROLLER

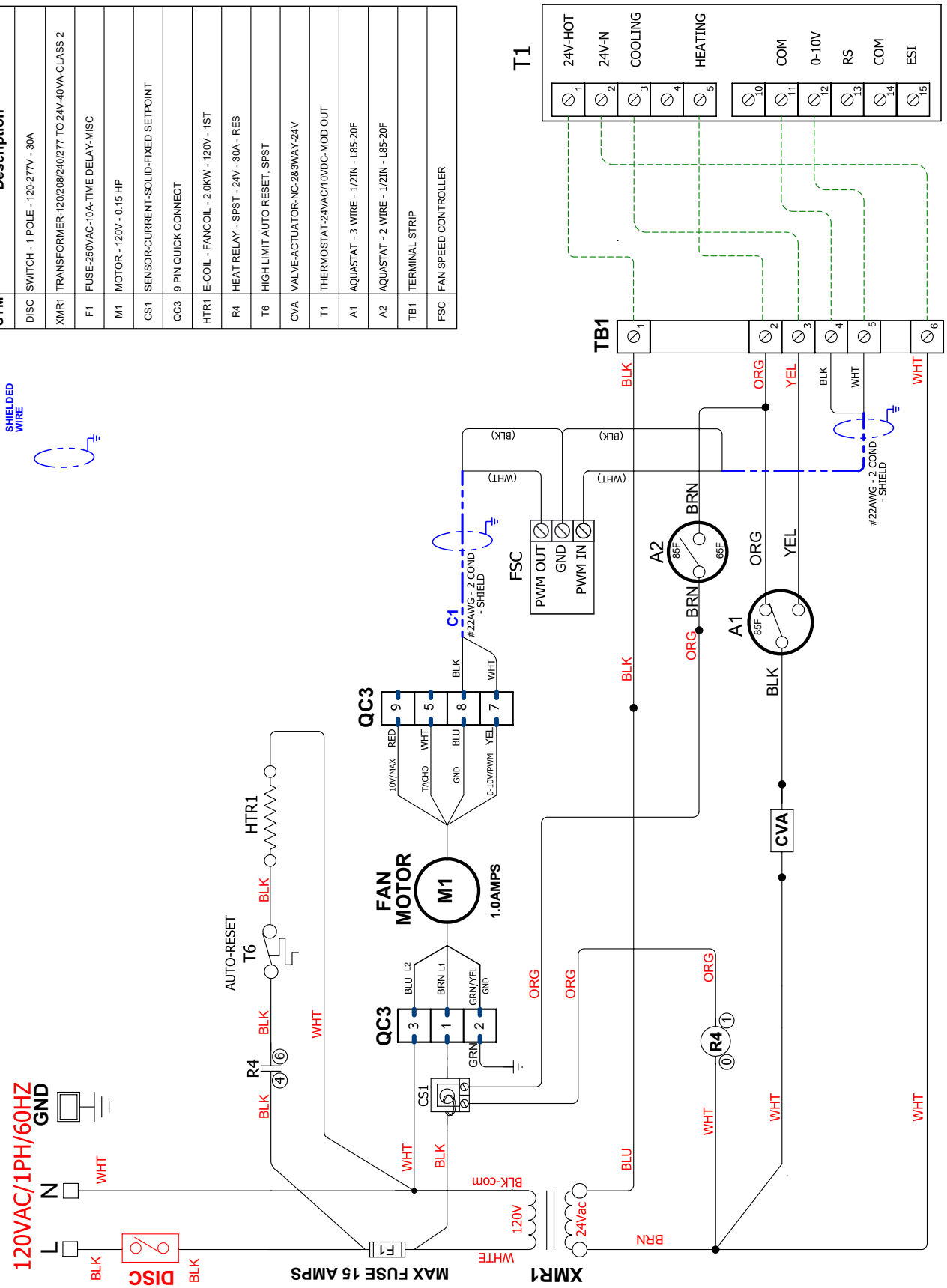


Figure 8: 2-pipe, Changeover plus Electric Heat, 208 Volt, 250 mm

SYM	Description
DISC	SWITCH - 2 POLE - 120/277V - 30A
XMR1	TRANSFORMER-120/208/240/277 TO 24V-40VA-CLASS 2
M1	MOTOR - 208V - 1/10 HP
QC3	9 PIN QUICK CONNECT
F1, F2	FUSE-600VAC-10A-TIME DELAY-CLASS CC
CS1	SENSOR-CURRENT-SOLID-FIXED SETPOINT
HTR1	E-COIL - FANCOIL - 3.5KW - 208V - 1ST
R4	HEAT RELAY - DPST - 24V - 25A - RES
T6	HIGH LIMIT AUTO RESET, DPST
CVA	VALVE-ACTUATOR-NC-2&3WAY-24V
T1	THERMOSTAT-24VAC/10VDC-MOD OUT
A1	AQUASTAT - 3 WIRE - 1/2IN - L85-20F
A2	AQUASTAT - 2 WIRE - 1/2IN - L85-20F
TB1	TERMINAL STRIP
FSC	FAN SPEED CONTROLLER

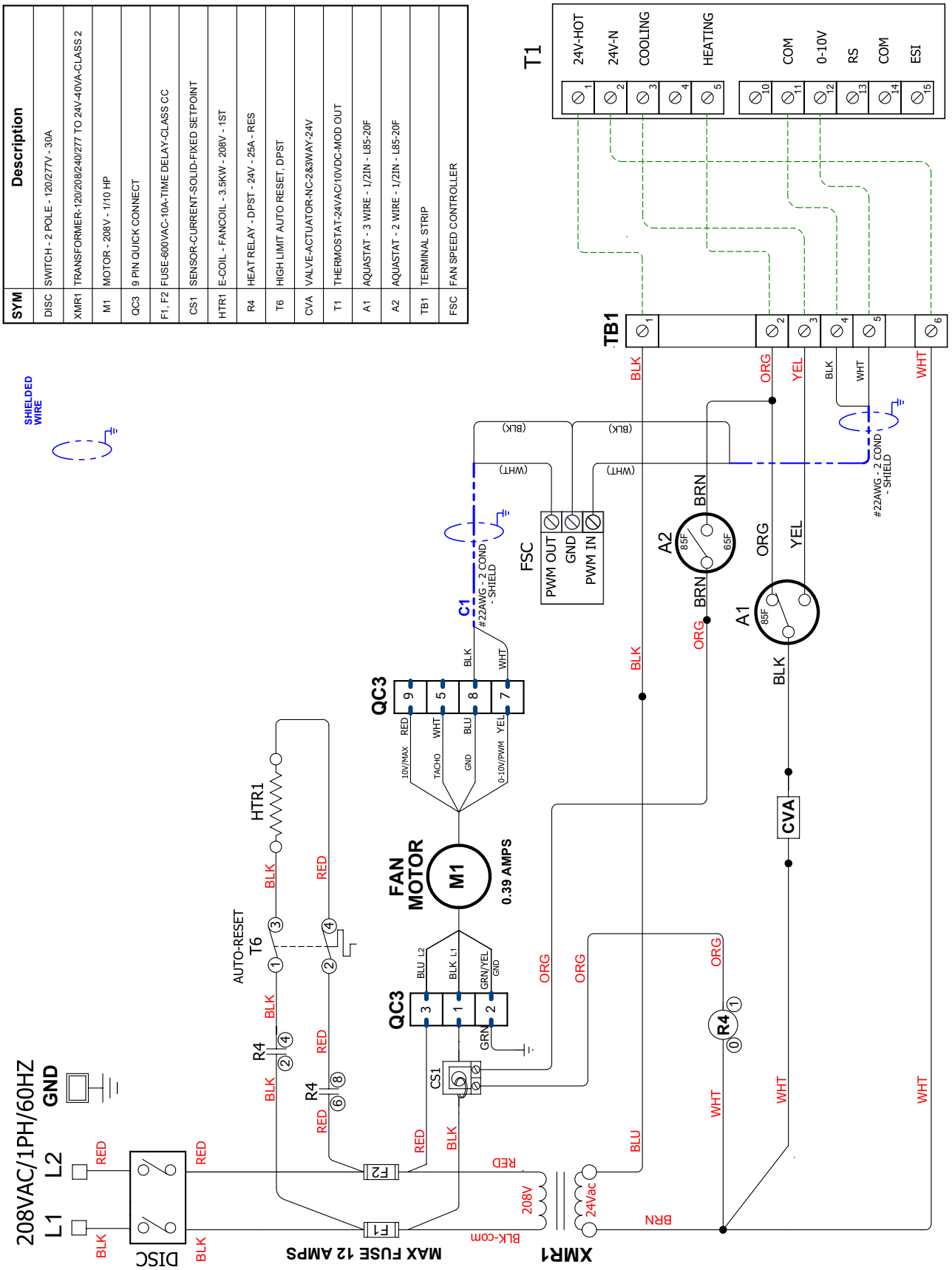


Figure 9: 2-Pipe, Cooling Only, 120 Volt, 280 mm

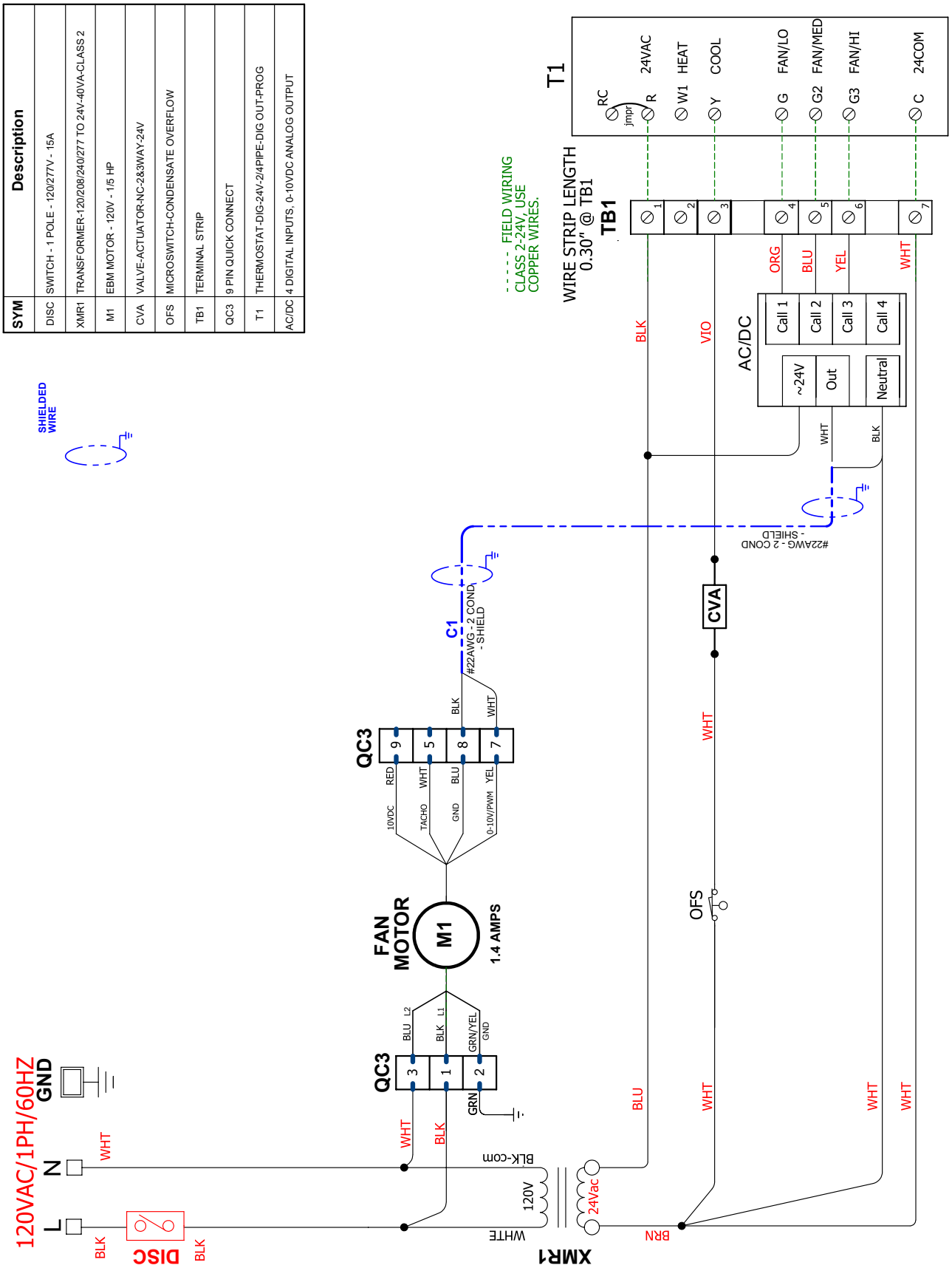
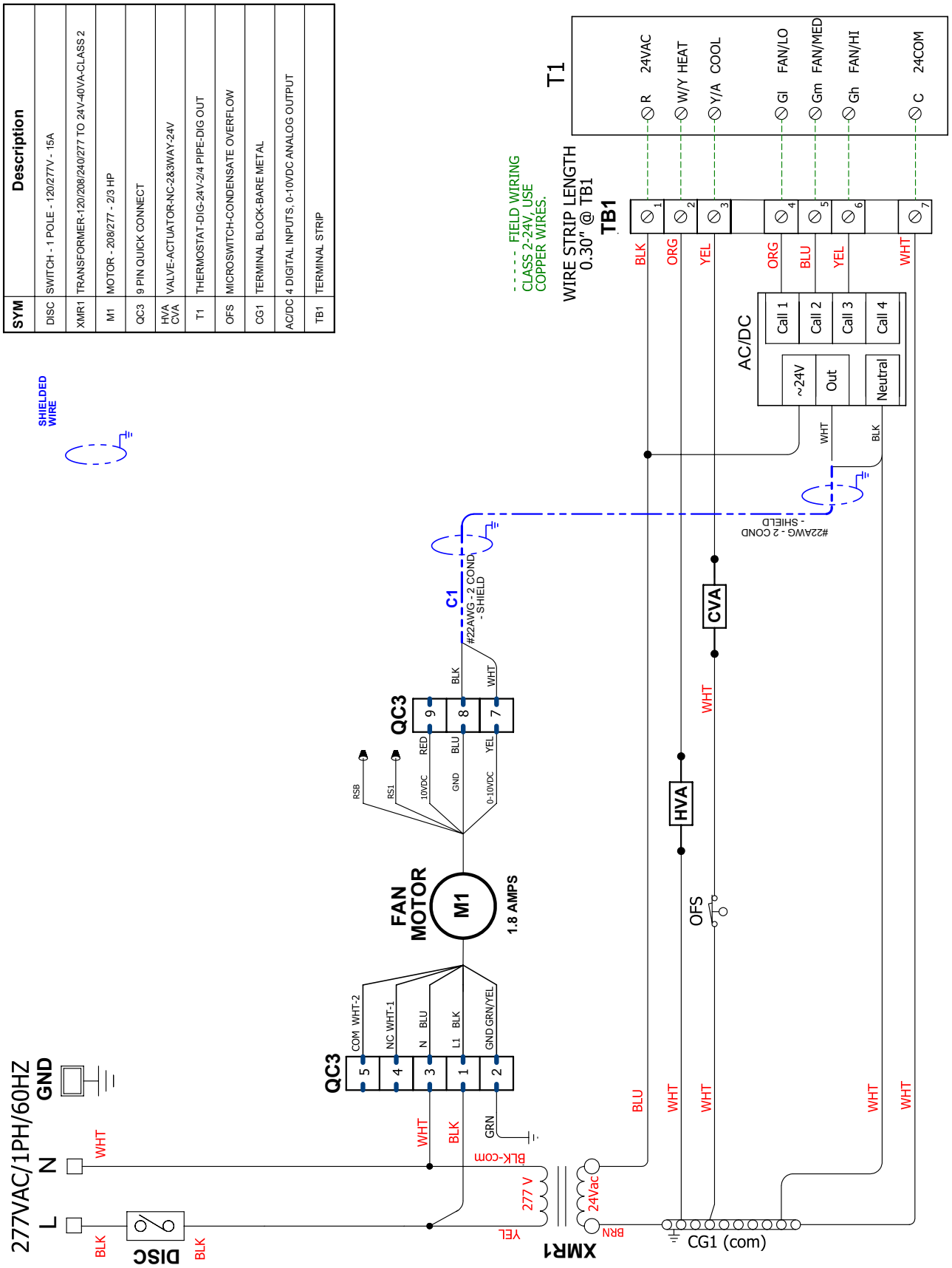


Figure 10: 4-Pipe, 277 Volt, 310 mm



Programmable Digital On–Off Valve and Modulating Fan Control Thermostats

Figure 11: Front and Back View of TE226 – 24 Vac Thermostat

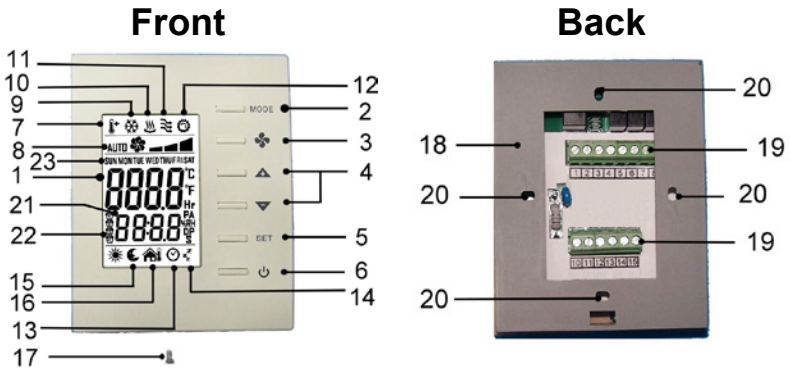


Table 3: TE226 Components

#	Item	Description
1	LCD	Display temperature and working status
2	MODE button	Access to user and engineer menu and for setting confirmation or change ºC/ºF unit if pressed for over 3 seconds
3	FAN button	Toggle to change Fan mode: Auto or Continuous
4	UP & DOWN buttons	Increase and decrease setting or previous/next item
5	SET button	Setting for Clock and Programmable Schedules
6	On/Off button	Turn ON/OFF thermostat
7	Set-point icons	Display set-point temperature while it is flashing
8	Fan icons	Indicate Fan status
9	Flake icon	Indicate working in Cooling mode
10	Hot spring icon	Indicate working in Heating mode
11	Flow icon	Indicate working in ventilating mode
12	Working icon	Indicate cooling/heating valve open
13	Clock	Not used
14	Sleep	Sleep mode is enable while it is shown
15	Moon Sign	Indicate room unoccupied
16	Outdoor icon	Indicate door/window open
17	Cover screw	Screw to tighten back cover with front cover
18	Back plate	Plate for mounting on electric box
19	Wiring terminal blocks	Terminals for wiring
20	Mounting holes	Holes for mounting on electric box
21	small 8888	Display time
22	Schedule number	Programmable Schedule running or setting
23	Day	Current day of Sunday ~ Saturday or setting

Installation

Mounting on electric box

1. Separate backplate from the controller by loosing the cover screw.
2. Align the mounting holes on the screw holes of the electric box (applicable to 65 × 65 or US standard box).
3. Fix the backplate on the electric box by tightening the backplate screws. Suggest to use Philips wider “truss head” or “washer head” #6-32 × 3/4" (20mm).
4. DO NOT let the bolt head rise above the wall of mounting holes of backplate. It might cause the short circuit of the controller.

Mounting front cover

Lock front cover on the backplate by tightening the cover screw underneath with Philip screwdriver.

Wiring Example

1. All wires must be inserted above the retainers of respective terminal block before tightening the captive screws.
2. Select Normally Open or Normally Closed Cooling and Heating valve Option in the Engineering Mode parameter E20 and E21.

Figure 12: Wiring Diagram for TE226 – 24Vac Thermostat

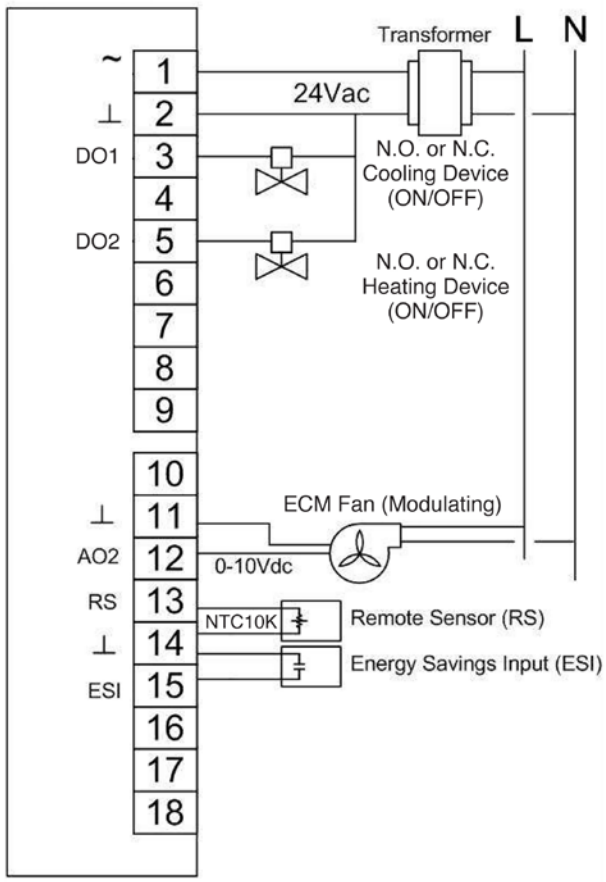


Table 4: On Demand Output DO1 and DO2

Set in Engineering Mode	
DO1 Cooling Output on demand for cooling	Parameter E20 Set To :
0 Vac	0
24 Vac	1
DO2 Heating Output on demand for heating	Parameter E21 SetTo:
0	Vac 0
24	Vac 1

AO2	RS	ESI
ECM Fan – 0~10 VDC	Remote Temperature Sensor (NTC10K)	Occupancy

Operation

User Mode Operation

The first tier of operation includes the following settings to operate (Figure 2):

1. Power switch ⏻ “ON” or “OFF” to start/stop the System.
2. After the switching “ON”, press any button to start the User Mode operation.
    a. Press “MODE” button to switch over different working modes. When MODE is pressed for more than 3 seconds, the unit of temperature will toggle to change to ºF or ºC.
    b. Press “UP/DOWN” button to increase/decrease or rotate the values of setting.
    c. Press “FAN” button to toggle over different fan modes.
    d. Press “SET” button to set current date/time. When SET is pressed for more than 3 seconds, users can set the temperature for programmable schedules.
3. It will return to normal display with the latest setting if there’s no button pressed for 10 seconds.

Table 5: Display Descriptions

#	Item	Description	Remarks
1	Normal Display	Display current room or set-point temperature and current time-day.	Setting “-SP-“parameter in engineer table to choose current room or set-point temperature.
2	Temperature Setting ▼ ▲	Set the required temperature	
3	Mode Select **MODE**	1. Select the Working Mode: (1) Run/Halt/Stop for schedule 2. When MODE is pressed for more than 3 seconds, the unit temperature will toggle to change between ºF or ºC	**RUN:** Run schedules. **HALT:** Pause “Current” Schedule and Use Manual SP. **STOP:** Stop Using All Schedules and Use Manual SP.
4	Fan Auto/Continuous 	1. Change Fan Mode for Auto or Continuous Mode. 2. Auto Mode will stop fan output during dead band 3. Continuous mode will output low speed during dead band	Low Speed Can Be Set Via FanL (E17) parameter in Engineer Table
5	Time/ Date/ Schedule Setting **SET**	1. Set current time in 12-or 24-hour format 2. Set Calendar and Day of Week 3. When set is pressed for more than 3 seconds, users can set temperature set points for programmable schedules	Press SET to continue settings. Press MODE, FAN, Or POWER Button to escape any time during setting.

Figure 13: User Mode Operation Sequence

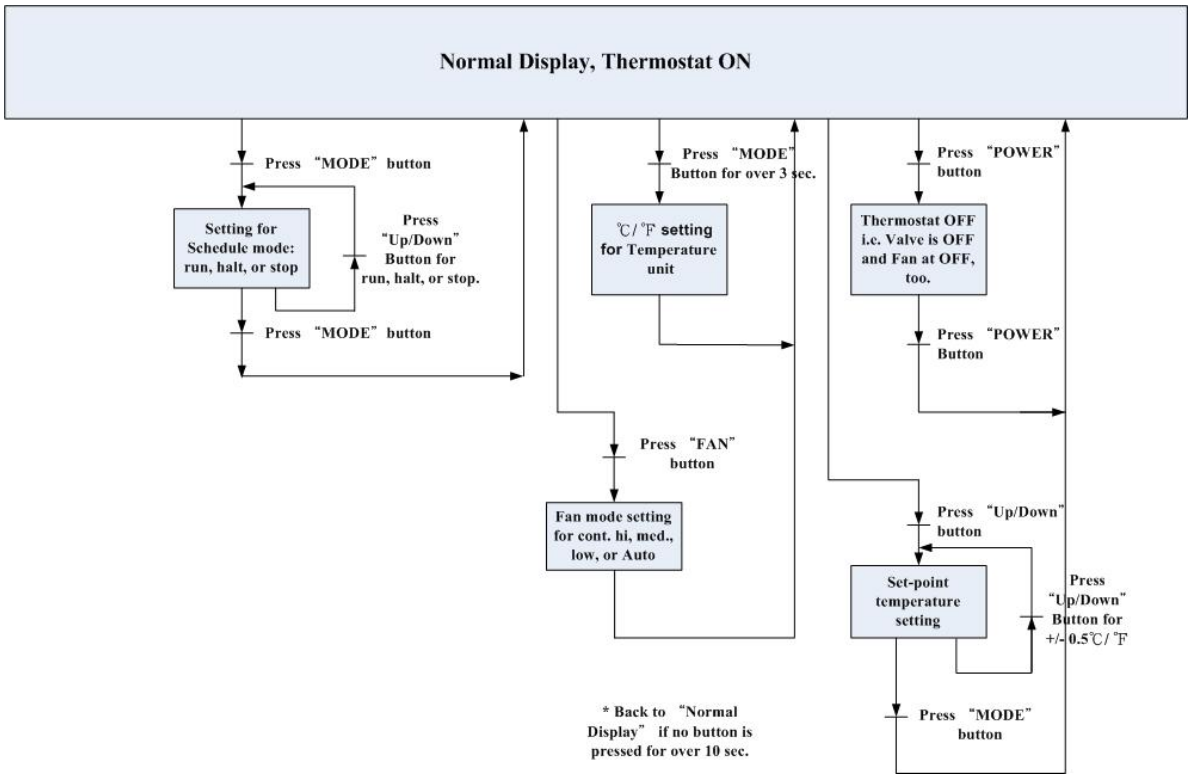
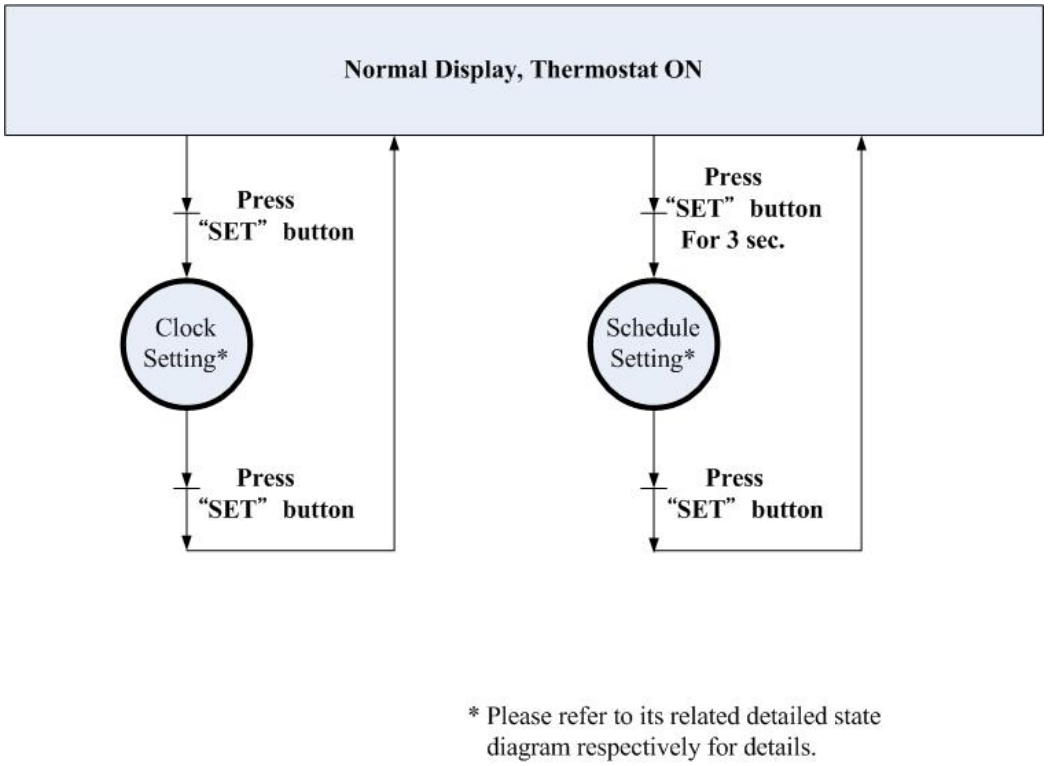


Figure 14: Overview for the Settings of Clock and Programmable Schedules



Press MODE, FAN, or POWER button to escape anytime during setting.

Figure 15: Detailed State Diagram for Clock Setting

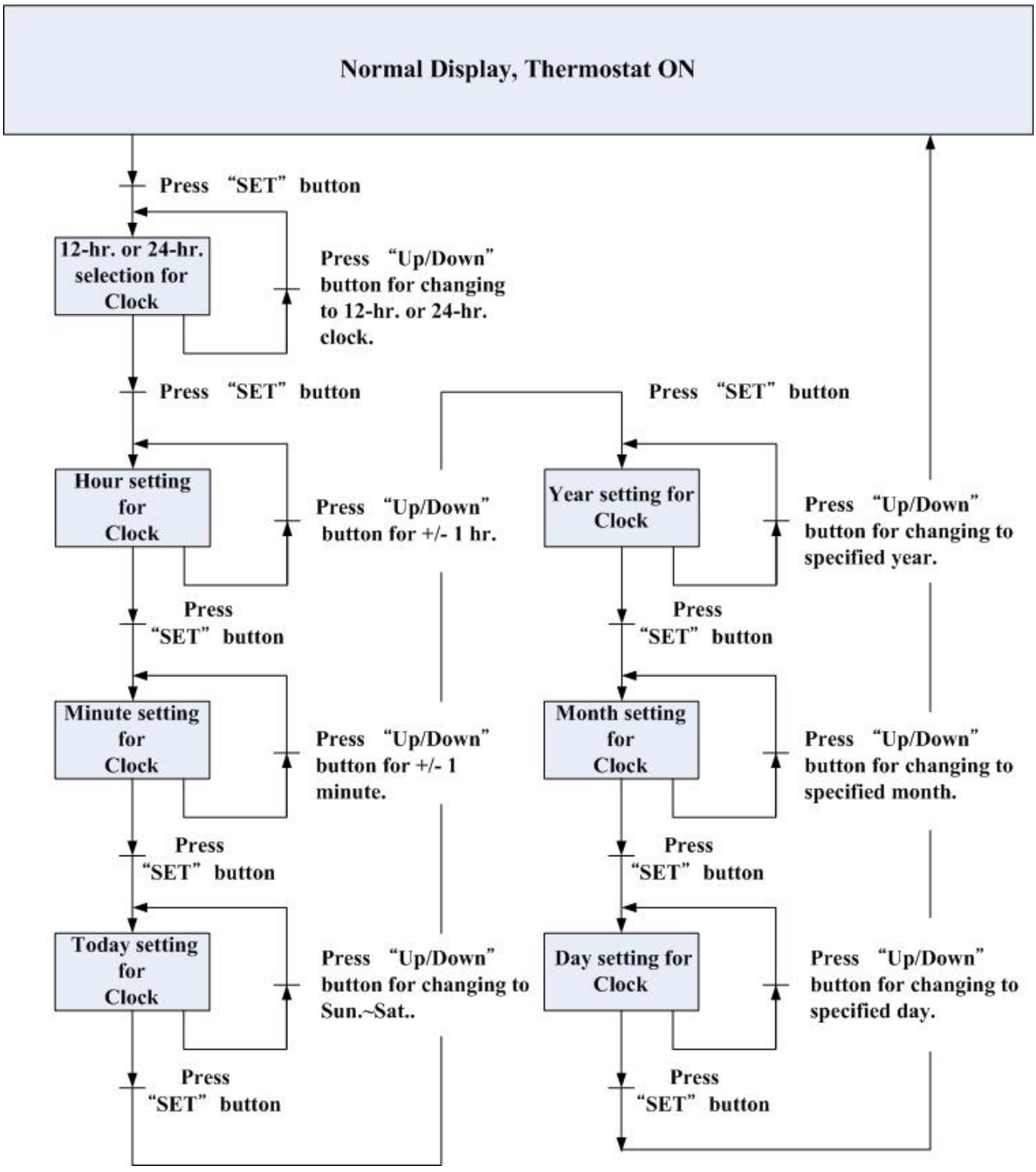


Figure 16: Detailed State Diagram for Schedule Setting

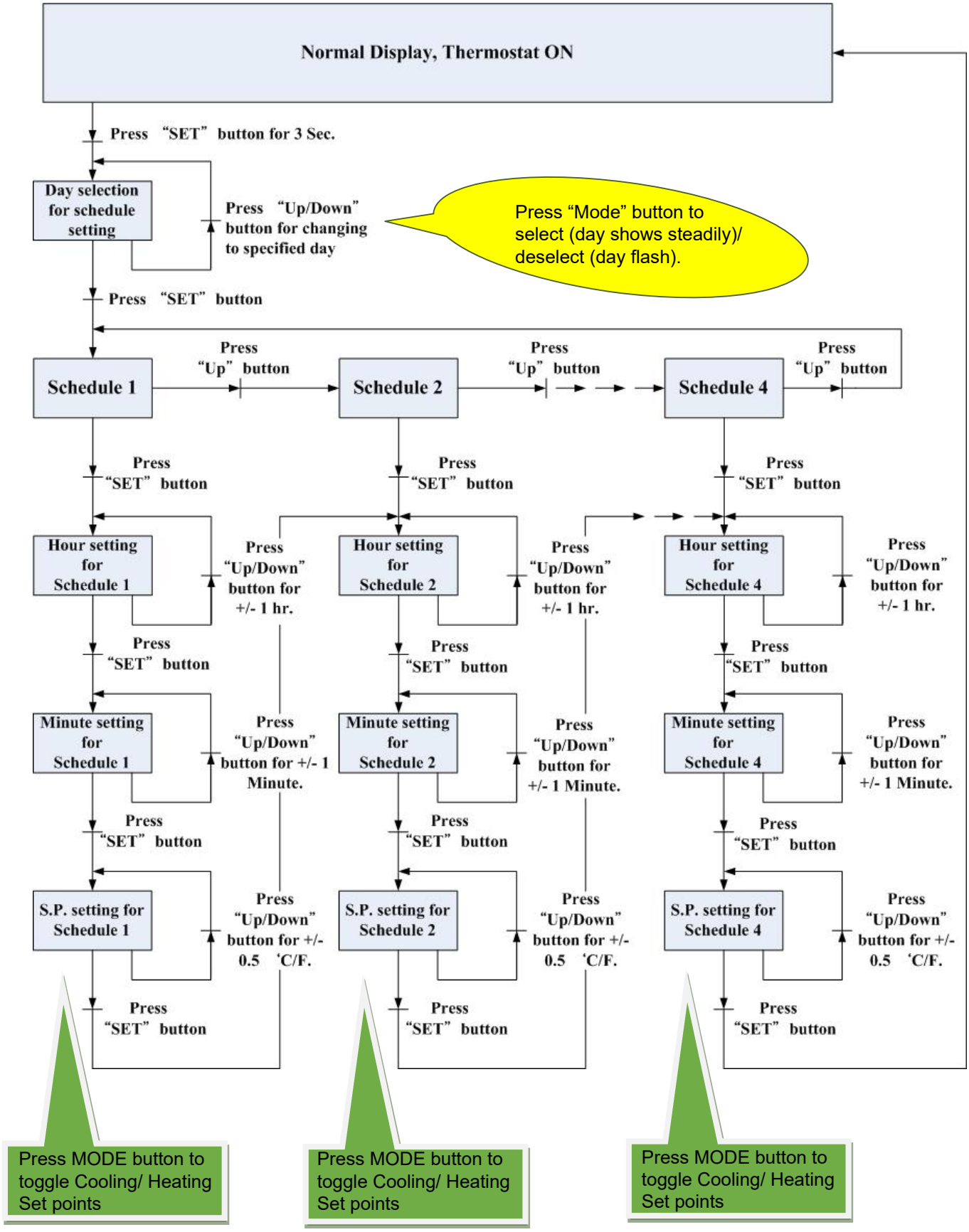


Table 6: DefaultSetPointforProgrammableSchedules

COOL							
	SUN	**MON**	**TUE**	**WED**	**THU**	**FRI**	**SAT**
Sch.1 ①	6:00	6:00	6:00	6:00	6:00	6:00	6:00
	78°F	78°F	78°F	78°F	78°F	78°F	78°F
Sch. 2 ②	8:00	8:00	8:00	8:00	8:00	8:00	8:00
	85°F	85°F	85°F	85°F	85°F	85°F	85°F
Sch. 3 ③	18:00	18:00	18:00	18:00	18:00	18:00	18:00
	78°F	78°F	78°F	78°F	78°F	78°F	78°F
Sch. 4 ④	22:00	22:00	22:00	22:00	22:00	22:00	22:00
	78°F	78°F	78°F	78°F	78°F	78°F	78°F
HEAT							
	SUN	**MON**	**TUE**	**WED**	**THU**	**FRI**	**SAT**
Sch.1 ①	6:00	6:00	6:00	6:00	6:00	6:00	6:00
	70°F	70°F	70°F	70°F	70°F	70°F	70°F
Sch. 2 ②	8:00	8:00	8:00	8:00	8:00	8:00	8:00
	60°F	60°F	60°F	60°F	60°F	60°F	60°F
Sch. 3 ③	18:00	18:00	18:00	18:00	18:00	18:00	18:00
	70°F	70°F	70°F	70°F	70°F	70°F	70°F
Sch. 4 ④	22:00	22:00	22:00	22:00	22:00	22:00	22:00
	60°F	60°F	60°F	60°F	60°F	60°F	60°F

- **Unoccupied Set Points:** activated by occupancy contact; Cooling: 82ºF/ Heating: 60ºF for factory defaults. And These two can be re-set by ESIC(E2) and ESIH(E3) parameters in Engineer Mode table.
- When **schedules are activated,** refer to cooling/ heating set points according to current schedule.
- When **pause or stop schedules,** refer to manual set point or latest set point as cooling set point and dead band for heating set point deviation.
- Programmable Cooling Set Point range: **50ºF ~ 98ºF; Programmable** Heating Set Point range: **40ºF ~ 90ºF**; make sure to set heating lower than cooling set point to have proper controls.

Control Actions

ON-OFF Valve Controls

When Cooling or Heating is on, a “Running (Gear) ⚙” icon will be shown on the LCD.

Figure 17: Cooling and Heating Control, Auto Changeover, Dead band Option = 0

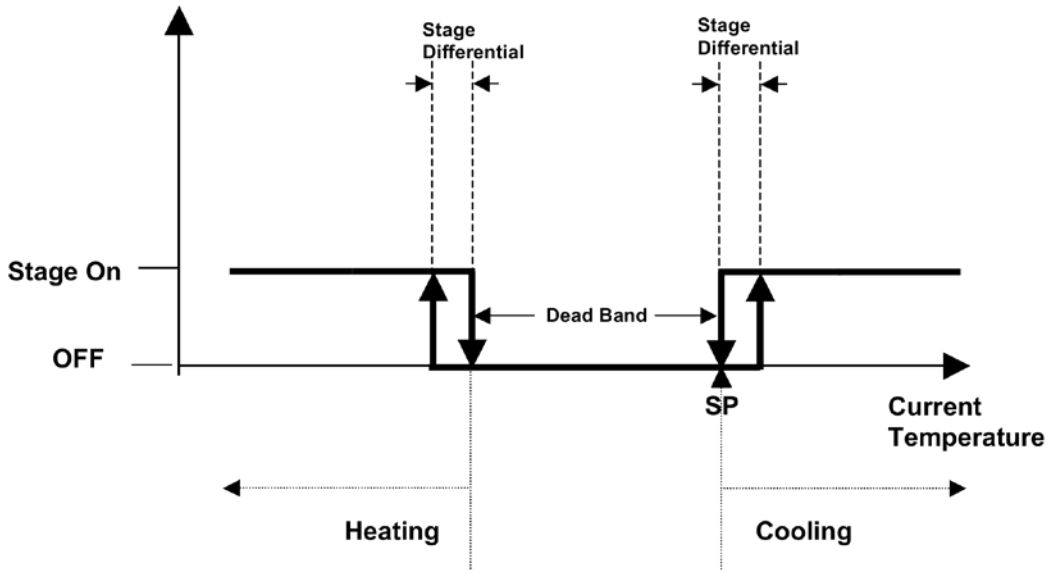
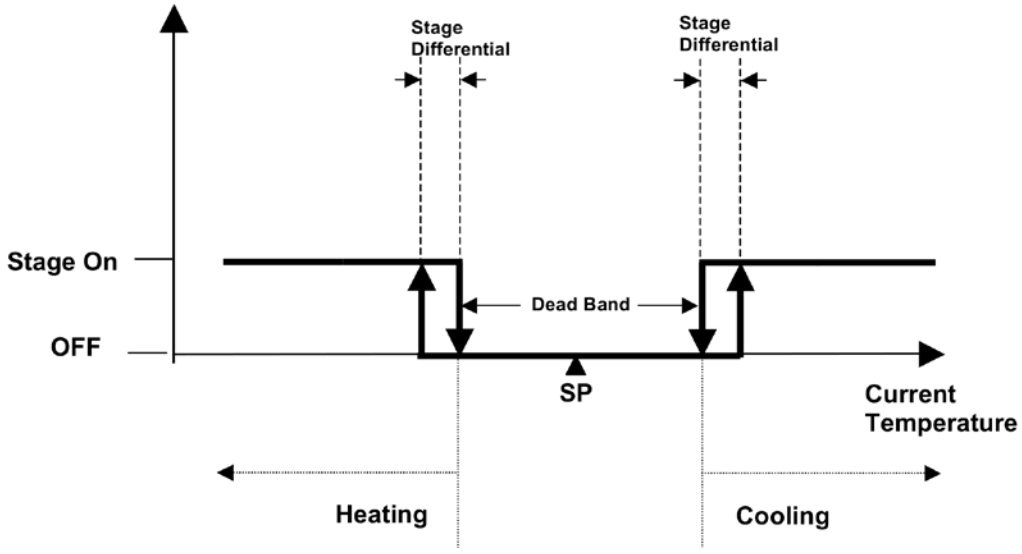


Figure 18: Cooling and Heating Control, Auto Changeover, Dead band Option = 1



Fan Controls

1. **Fan Output Adjustment:** Fan output can be set to minimum adjustment (AO2 Low (E7)) from 0-5 Vdc and to maximum adjustment (AO2 High (E8)) from 5 to 10 Vdc.

   These two values are adjusted by a balancing contractor that will measure minimum and maximum CFM the fan will supply and set the two values.

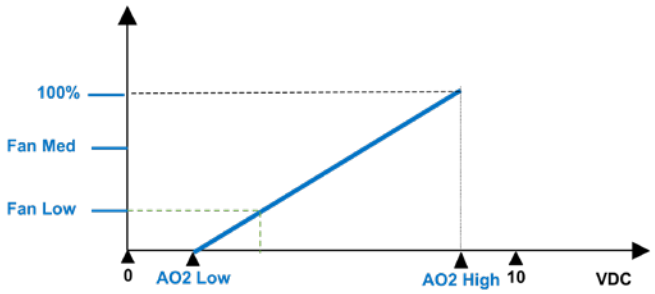
2. **Fan Control:** Fan should have option to run continuously at low speed (Fan Low (E17)) (say 25–30% of max design airflow) during occupied and dead band for delivery outside air from suite HRV or OA vent duct

   If there is a call for heating or cooling the fan would ramp up to maximum design airflow for the FCU on the project.

3. **Fan Mode:** By pressing FAN button to toggle AUTO icon ON and OFF to represent Auto Mode (“AUTO” show on screen) and Continuous Mode. Continuous Mode will keep fan running at pre-set minimum speed all time while Auto Mode will run from 0%. During dead band, Auto Mode will stop the fan while Continuous Mode will run the fan at low speed as set in (Fan Low (E17)).

   By pressing POWER button it will switch ON/OFF fan and heating/cooling outputs to their default positions.

Figure 19: Fan Control Diagram



Special Notes

1. Fan bar will be shown according to the fan output when reaches low speed, medium speed or 100% of max output.
2. ESI (Energy Saving Input) Contact status — When the contact is activated (Vacation or Room unoccupied), a “Moon ( )” icon will be shown on the LCD and the thermostat will change the set point temperatures to Cooling & Heating to be ESIC & ESIH (refer to Engineer table for details).When the contact is deactivated (Open) (Room will be back to be occupied), it will set the set point values back to normal.
3. The icon , , , or will be shown on LCD while the programmable Schedule 1, 2, 3, or 4 is running.
4. If “MODE” button is pressed, there are three Schedule modes “RUN, HALT, and STOP” for selection:
   a. **RUN** mode means Running on Schedules. And at the same time an icon ( ) will be steadily shown on the LCD.
   b. **HALT** mode means temporarily using manual S.P instead of “current” Schedule. And the icon ( ) will be flashing on the LCD.
   c. **STOP** mode means using manual S.P instead of “all” Schedules. i.e. Temporarily disable all programmable Schedules. And the icon ( ) will NOT be shown on the LCD.

Examples of Engineering Mode:

5. E19 There is an adjustable time delay between heating and cooling from 0 to 5 minutes.This delay time can be adjusted by the “dLAy” parameter in the Engineer table. The default is set to 0 minutes. This feature can be used in addition to dead band for thermoelectric (Wax) control valve actuators that have long 3 minute travel time to prevent overlapping.
6. Proportional band “Pb” or (Stage Width) set in E12, Integral Time “I-t” set in E4, Dead band offset “db” set in E1.
7. E22 Dead Band option “dbOP”parameter set to 0 will offset Heating from set point by db setting example 2 ºC and starts Cooling at the set point Parameter set to 1 will offset heating and cooling from the set point equally in total db set example 2 ºC (1 ºC heating and 1ºC cooling)
8. E20 “dirC” Cooling set to 0 for Normally Open Valve set to 1 for Normally Closed valve.
9. E21 “dirH” Heating set to 0 for Normally Open Valve set to 1 for Normally Closed valve. T and other parameters.

Engineer Mode Operation

This mode is highly suggested to be operated bytrained engineers because it is related to system parameters that will affect the control results.

To operate:

1. Press UP and DOWN buttons for over 5 seconds to enter into engineer mode.
2. Press UP or DOWN button to rotate the menu item and press MODE button to enter into the item.
3. Press UP or DOWN button to change the setting and press MODE button to confirm the setting and return to menu item selection. For no button pressed for 10 seconds, it will go back to menu item selection.The setting won't be changed then.
4. To leave Engineer Mode, rotate till "END" and press MODE button or leave the button intact for 10 seconds.

Figure 20: Engineer Mode Operation Sequence

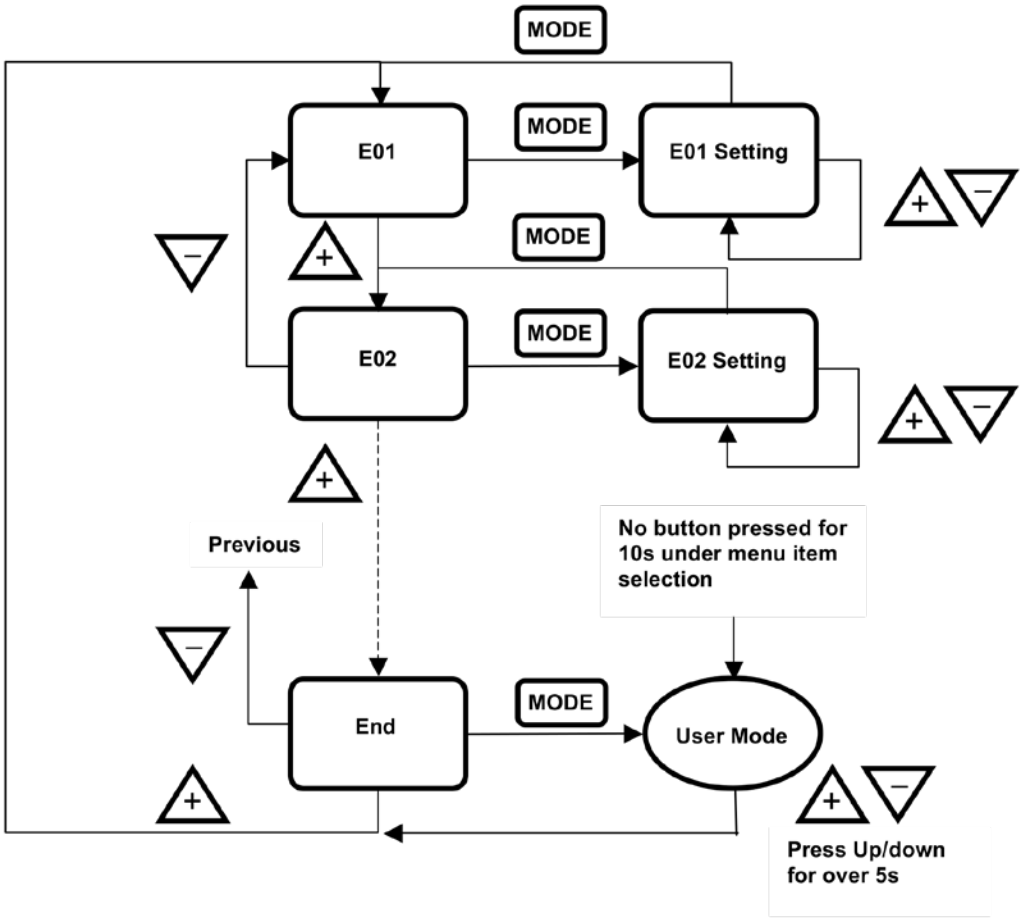


Table 7: Engineer Mode Menu Item Descriptions

Item	Mnemonic	Description	°C Type		°F Type		Step
			Default	Range	Default	Range	
E1	db	Dead band offset	2.0	0~10.0	7.0	0~18.0	0.5 (°C/°F)
E2	ESIC	Unoccupied (ESI) Cooling Set Point	28.0	25.0~35.0	82.0	77.0~95.0	1.0(°C/°F)
E3	ESIH	Unoccupied (ESI) Heating Set Point	15.0	10.0~22.0	59.0	50.0~72.0	1.0(°C/°F)
E4	I-t	Integral Time and Output Cycle Time	90	10~500	90	10-500	10 (Sec.)
E5	AO1L	Not used					
E6	AO1H	Not used					
E7	AO2L	Analog Output 2 Low Adjustment (for FAN control)	0	0~125	0	0~125	1(~0.044V)
E8	AO2H	Analog Output 2 High Adjustment (for FAN control)	-25	-150~0	-25	-150~0	1(~0.044V)
E9	SP-L	Low Limit for Temperature Set Point	10.0	0~50.0	50.0	32.0~122.0	1.0 (°C/°F)
E10	SP-H	High Limit for Temperature Set Point	35.0	0~50.0	95.0	32.0~122.0	1.0 (°C/°F)
E11	OFSt	Current Temperature Offset	0.0	-10.0~10.0	0.0	-18.0~18.0	0.1(°C/°F)
E12	Pb	Proportional Band or Stage Width	2.0	0~10.0	3.6	0~18.0	0.1 (°C/°F)
E13	LOC	Bit Definition — Bit 0: Mode Button 1: Down Buttons 2: Up Button 3: Fan Button 4: Power Button 5: Set Button 6: ESI Contact Detection 7: Reserved *Bit Value 0: Unlock/enable 1: Lock/disable Examples: 0 – Unlock/enable all 1 – Lock MODE Button 2 – Lock Down Button … 8 – Lock Fan Button … 15 – Lock MODE & Down & Up & Fan SPEED Buttons 16 – LockPower Button … 64 – Disable ESI contact detection … … 255 – Lock/disable all	0	0–255	0	0–255	1
E14	ESI	ESI Contact Definition	0	0~1	0	0~1	0: N.O. 1: N.C.
E15	rS	Present Temperature is Getting from Built-In Temperature Sensor, or Remote Temperature Sensor	0	0~1	0	0~1	0: built-in 1: remote
E16	-SP-	Display Present Value of Temperature or Set Point for Normal Displaying	0	0–1	0	0–1	0: display PV 1: display SP
E17	FAnL	Lowest Fan Speed in Continuous Fan Mode	25	0~100	25	0~100	1(%)
E18	Fan2	Medium Fan Speed	60	20~100	60	20~100	1(%)
E19	dLAy	Minimum delay time between cooling and heating	0	0~5	0	0~5	1 (minute)
E20	dirC	Cooling Valve N.C./N.O. Setting	1	0~1	1	0~1	0: N.O. 1: N.C.

Item	Mnemonic	Description	°C Type		°F Type		Step
			Default	Range	Default	Range	
E21	dirH	Heating Valve N.C./N.O. Setting	1	0~1	0	0~1	0: N.O. 1: N.C.
E22	dbOP	Dead band Options	1	0~1	1	0~1	0: DB is aligned to Cooling SP 1: SP is in the middle of DB
E23	tESt	Self-Diagnostic					
E24	rSt	Reset All Parameters to Factory Defaults					
E25	End	Exit Engineer Mode					

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