Installation and Start-Up Instructions

CONTENTS

SAFETY CONSIDERATIONS

IMPORTANT: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with these instructions may cause radio interference. The equipment has been tested and complies with the limits of a Class A computing device as defined by FCC (Federal Communications Commission) regulations, Subpart J of Part 14, which are designed to provide reasonable protections against such interference when operated in a commercial environment.

Installation and start-up of air-handling equipment can be hazardous due to system pressure, rotating parts, and electrical components. Only trained and qualified service personnel should install, start-up or service air-conditioning equipment.

When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes, including ANSI (American National Standards Institute) Z223.1 or latest version. Wear a hard hat, safety glasses, and work gloves.

⚠ WARNING

Disconnect all power to the unit, then lock out and safety tag all disconnects before performing maintenance or service. Unit may automatically start if power is not disconnected. Electrical shock and personal injury could result.

⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system.
e. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

⚠ CAUTION

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed. Failure to follow these procedures may result in damage to equipment.

⚠ CAUTION

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

INTRODUCTION

General

Carrier's UC Open XP central station air handler controls provide heating, cooling, and ventilation control for constant volume (CV) and variable air volume (VAV) applications.

The control box provides centralized management of the air handler operation. A control module is supplied in the control box which can store hundreds of configuration settings and set points. It also performs self diagnostic tests at unit start-up, monitors the operation of the unit, and provides alarms.

The controls can operate either stand-alone or can be interfaced with BACnet®[1]. If a controller is installed as part of a network, the controller is connected to the BACnet communication bus with a field-installed cable.

When ordered along with a 39M unit, the UC Open XP is installed inside a control box in its own control plenum or externally mounted on the supply fan section. See Fig. 1 and Fig. 2. All factory-installed sensors will be wired to one of 2 locations based on the controls option selected in *AHU*Builder® program as outlined below:

NO PRODUCT INTEGRATED CONTROLS

No sensors are installed nor wired in the AHU (air-handling unit).

FACTORY WIRED - NO CONTROLLER

All factory- installed sensors are wired to a terminal strip normally located in either a control plenum or the supply fan section.

FACTORY WIRED - UNPROGRAMMED CONTROLLER IN CONTROL PLENUM

All factory-installed sensors are wired to a terminal strip inside the control plenum. The UC Open XP controller is then wired to the terminal strip and mounted inside the control plenum.

If shipping splits exist, wiring will be terminated at each split with a molex type quick connect at each end of the wiring.

The control box includes the control module, circuit breaker, transformers, and terminal blocks. An ON/OFF switch is provided to shut off the control box power.

The control box environmental limitations are as follows:

Shipping Temperature — –24 to 140°F

Shipping Humidity — 0 to 90%

Operating Temperature — 0 to 140°F

Operating Humidity — 0 to 90%

Service Area Requirements

Article 110-16 of the NEC (National Electrical Code) describes electrical installation. All UC Open XP control installations must comply with the minimum clearances required for electrical installation as listed in Table 110-16(a) of the code. Make sure to provide the necessary clearance from the UC Open XP controls and unit to any adjoining wall. Refer to the base unit installation instructions for detailed dimensions for each unit section.

Electrical Requirements

The control system will run off of the AHU system's power through 2 transformers to adjust the incoming voltage to 24 vac ± 10%. The incoming power supply may be 50 or 60 Hz and capable of providing a minimum of 3 amps (but not greater than 20 amps) to the control board. Do not run Class I power wiring in the same conduit as Class II sensor wiring, control wiring of field-installed devices, or the Class motor starter wiring.

IMPORTANT: To ease installation and servicing, all field-installed sensor wiring should be located on the service side of the unit. All factory wiring run between sections, which are equipped with separation joints, has factory-supplied connections. The wiring must be disconnected if the unit is separated for service.

Refer to Fig. 3 and 4 for control box components. Various wiring details are shown in Fig. 5 and 6. Factory-supplied and wired controller input and output points are listed in Tables 1 and 2 and corresponding terminal numbers in the control are shown in Fig. 7 and 8.

⚠ CAUTION

Power is present in the control box from the motor starter circuit even when the dedicated power to the control box is off.

The supply and return fan starter circuits are independent from each other. Either circuit can be 24 vac, 120 vac, or 240 vac powered.

All factory-supplied and installed accessories are powered by factory-installed transformers. Each transformer is UL (Underwriters Laboratories) listed as a Class II device. An accessory transformer is required on the CO_2 sensor.

All electrical components are UL listed. The electronic control module and control box assembly are approved under UL HVAC (Heating, Ventilation and Air Conditioning) Equipment Standard 873 for temperature indicating and regulatory equipment. When ordered factory-supplied with the air-handling equipment, the control is listed and labeled by UL Standard 60335-2-40 for heating and cooling units, and complies with NFPA (National Fire Protection Association) Standard 90A.

1. Third-party trademarks and logos are the property of their respective owners.

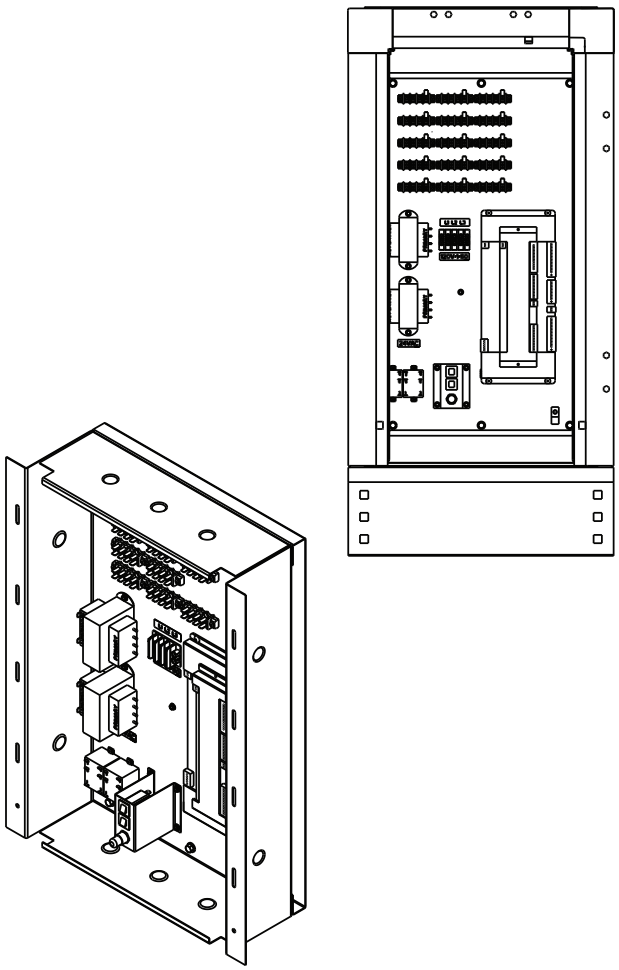


Fig. 1 — Typical Control Box Installation on 39M Supply Fan Section

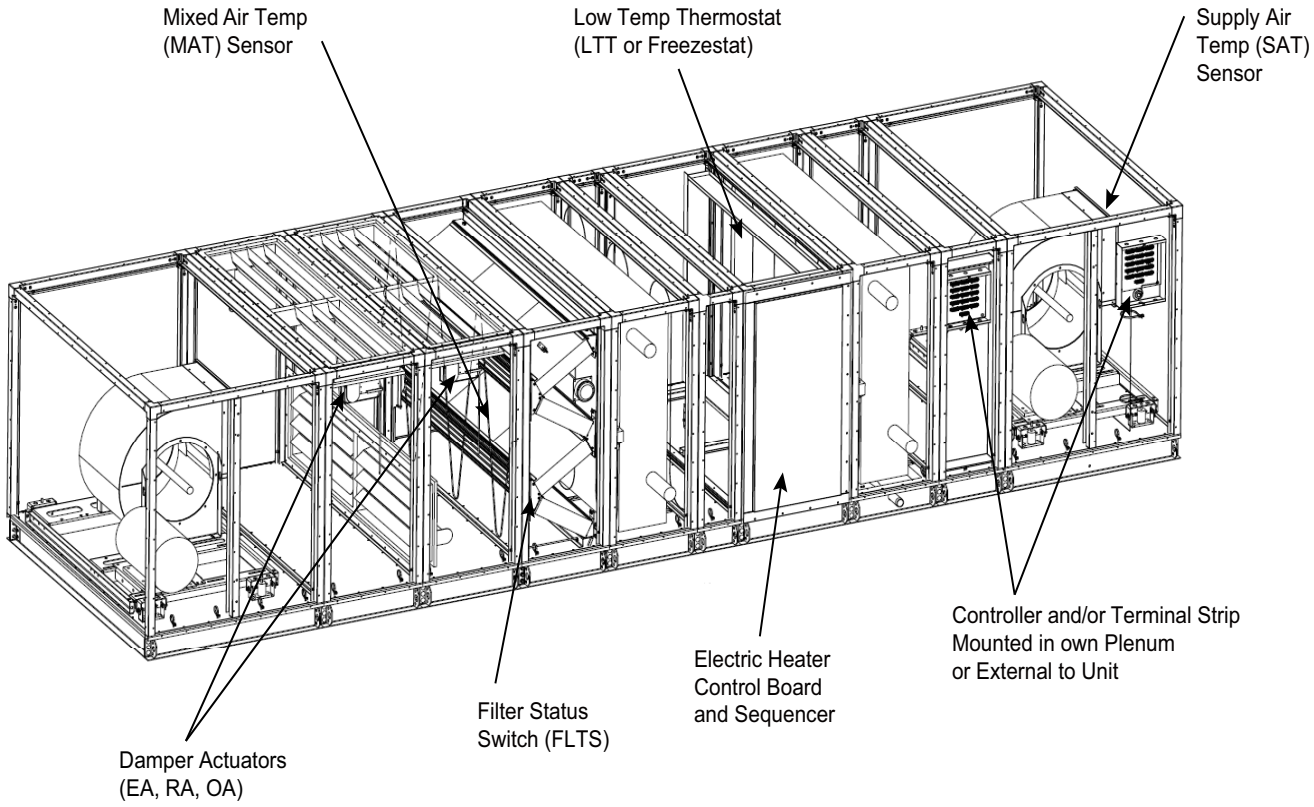


Fig. 2 — 39M Typical Sensor, Actuator, and Controller Installation Locations

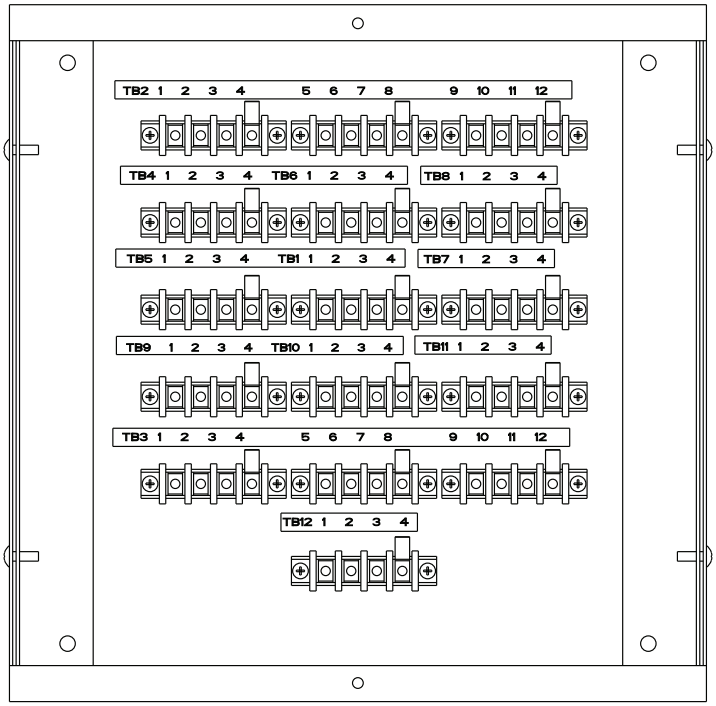


Fig. 3 — Sensor Only Terminal Box

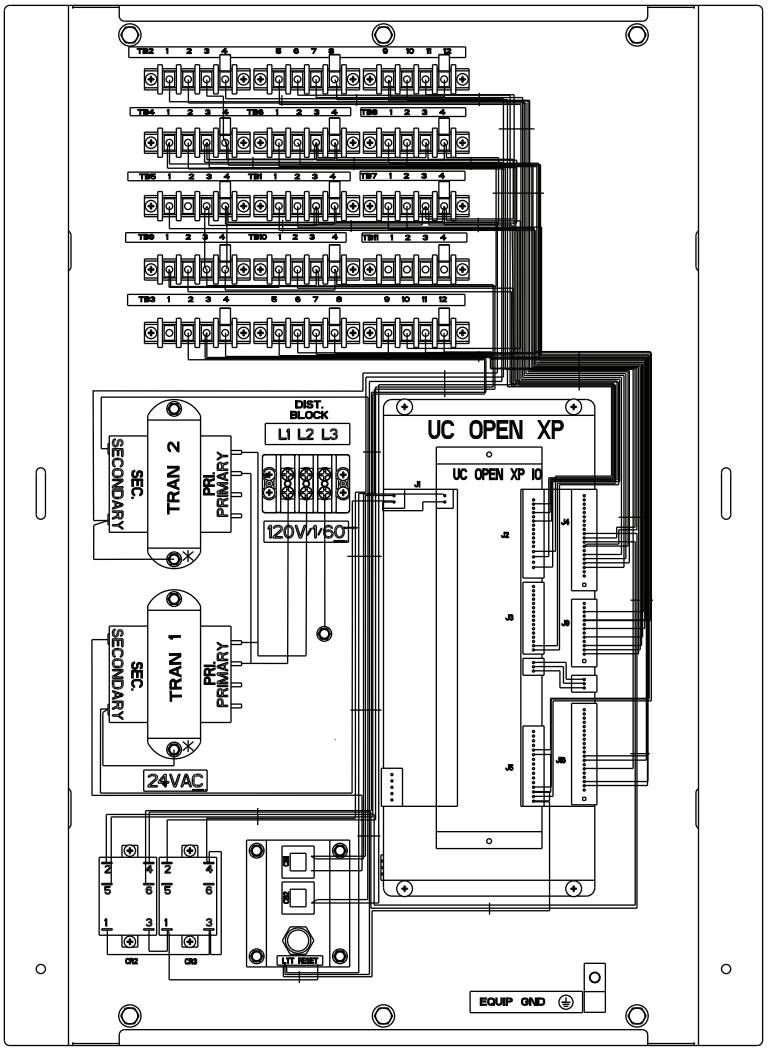
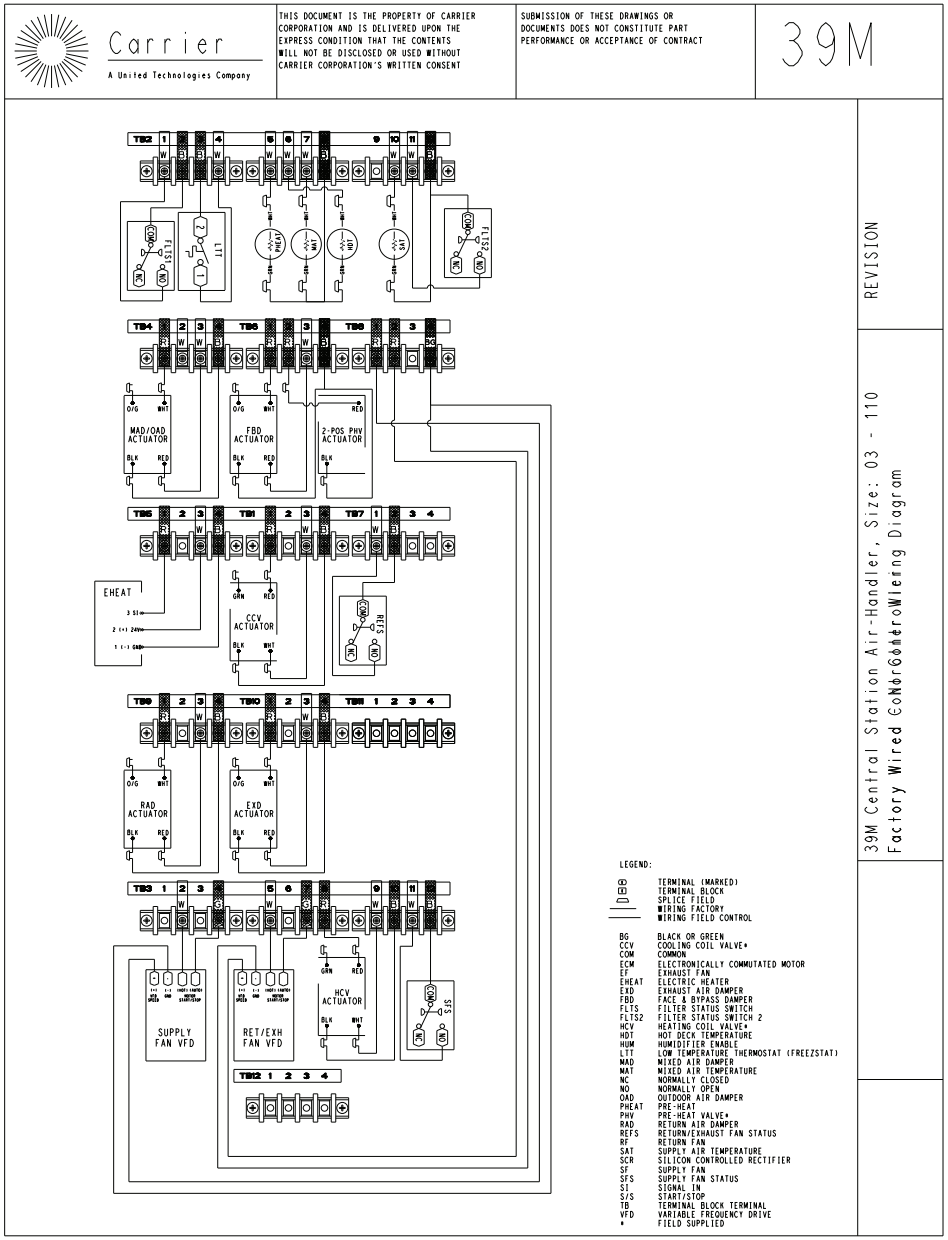


Fig. 4 — UC Open XP Control Box Components



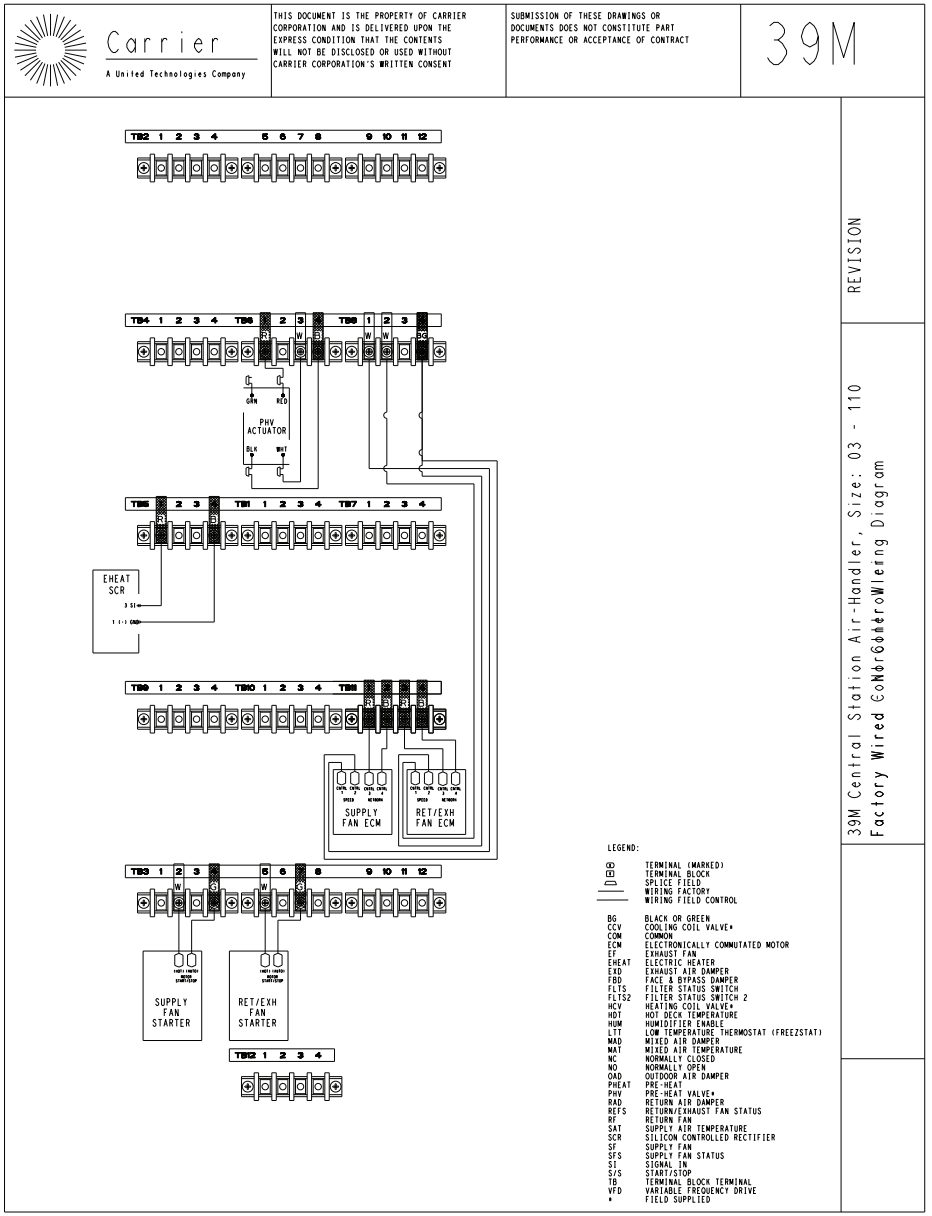


Fig. 5 — UC Open Wiring Schematic

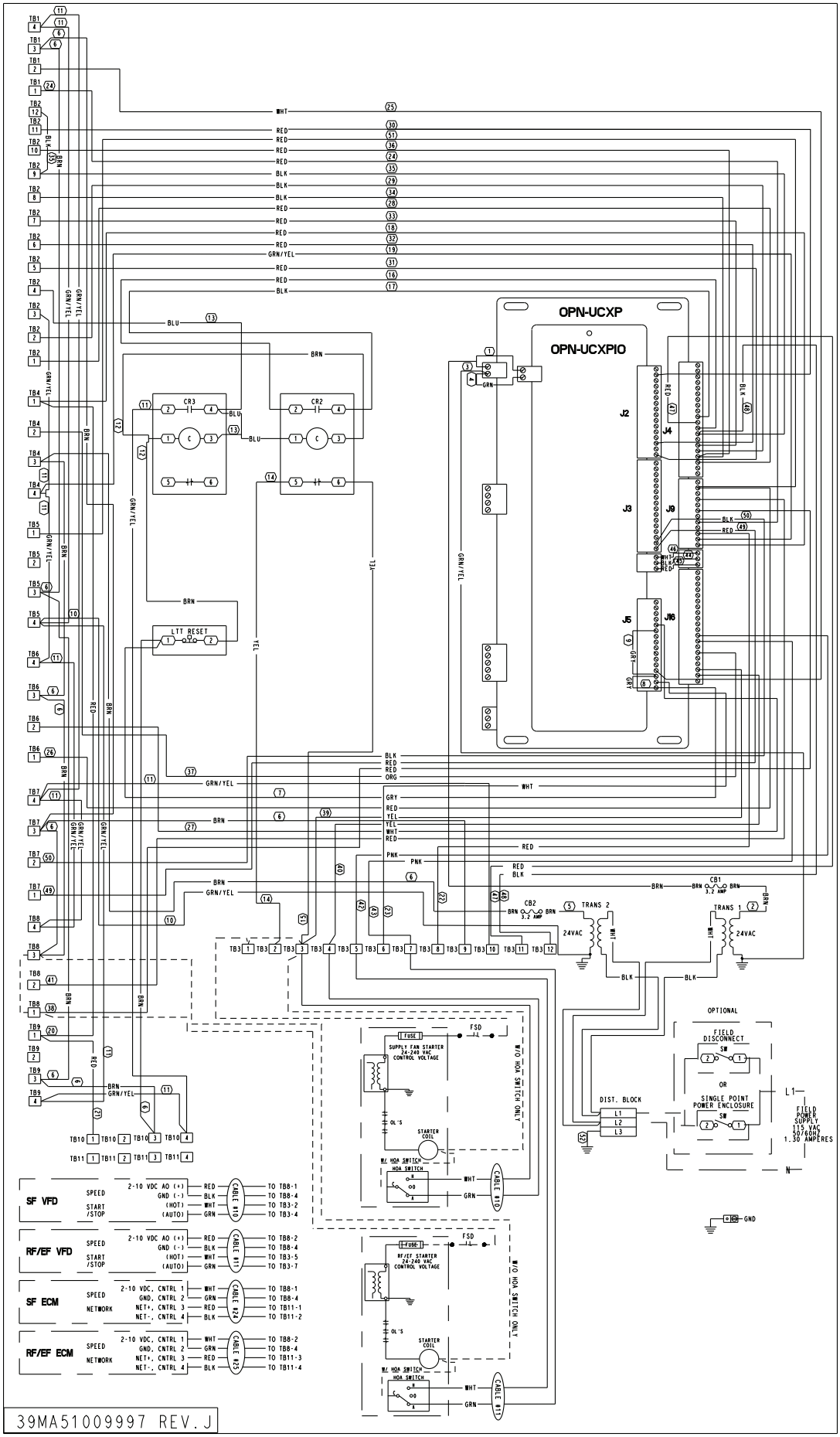


Fig. 6 — Controller Wiring Schematic

Table 1 — Sensor Only Wire Designations

CONNECTION DEVICE	WIRE NO.	WIRE PART NO.	"A" END WIRE LABEL	"A" END TERM	WIRE COLOR	WIRE LENGTH (in.)	"B" END WIRE LABEL	"B" END TERM
T1 24Vac Power	1	39MA51007701	CB1-2	J	BROWN	18	J1-1	E
					BROWN	18	J1-1	E
	2	39MA51007702	TRANS1-HOT	C	BROWN	15	CB1-1	C
T1 GND	3	39MA51007703	TRANS1-GND	H	GREEN/YELLOW	6	TRANS1-COM	J
			J1-2 (6126 Gnd)	E	GREEN/YELLOW	27		
	4	39MA51007704	J1-2 (8160 Gnd)	E	GREEN	5	J1-2 (Gnd)	E
T2 24Vac Power	5	39MA51007705	TRANS2-HOT	C	BROWN	6	CB2-1	C
	6	39MA51007706	CB2-2	C	BROWN	24	TB4-3	J
			TB6-3	J	BROWN	8		
					BROWN	8	TB8-3	J
			TB7-3	J	BROWN	8		
					BROWN	12	TB3-9	J
					BROWN	6	TB1-3	J
			TB5-3	J	BROWN	8		
					BROWN	4	TB9-3	J
			TB10-3	J	BROWN	6		
					BROWN	21	LTT-1	D
	7	39MA51007707	LTT-1	C	GREY	7	J5-1 (ExBO-1)	E
	8	39MA51007708	J5-1 (ExBO-1)	E	GREY	2	J5-3 (ExBO-2)	E
	9	39MA51007709	J5-3 (ExBO-2)	E	GREY	6	J5-11 (ExBO-6)	E
T2 GND	10	39MA51007710	TRANS2-GND	H	GREEN/YELLOW	6	TRANS2-COM	J
			TB5-4	D	GREEN/YELLOW	6		
	11	39MA51007711	TB2-3	D	GREEN/YELLOW	12	TB4-4	J
			TB6-4	J	GREEN/YELLOW	8		
					GREEN/YELLOW	6	TB8-4	J
			TB7-4	J	GREEN/YELLOW	6		
					GREEN/YELLOW	12	TB3-10	J
					GREEN/YELLOW	6	TB1-4	J
			TB5-4	J	GREEN/YELLOW	6		
					GREEN/YELLOW	3	TB9-4	J
			TB10-4	J	GREEN/YELLOW	6		
					GREEN/YELLOW	16	CR3-2	C
LTT	12	39MA51007712	LTT-2	C	BROWN	12	CR3-1	J
			CR2-3		BROWN	4		
	13	39MA51007713	CR2-1	C	BLUE	6	CR3-3	J
			CR3-4	J	BLUE	4		
					BLUE	24	TB2-4	C
	14	39MA51007714	TB3-2	C	YELLOW	18	CR2-5	C
	15	39MA51007715	CR2-6	C	YELLOW	17	TB3-3	D
	16	39MA51007716	CR2-2	C	RED	34	J4-9 (UI-05)	E
	17	39MA51007717	CR2-4	C	BLACK	34	J4-11 (Gnd)	E
MAD	18	39MA51007718	TB4-1	C	RED	26	J9-1 (AO-1)	E
	19	39MA51007719	TB4-4	D	GREEN/YELLOW	26	J9-2 (Gnd)	E
RAD	20	39MA51007720	TB9-1	J	RED	24	TB4-1	D
EXD	21	39MA51007721	TB10-1	C	RED	6	TB9-1	D
HCV	22	39MA51007722	TB3-8	C	RED	28	J9-3 (AO-2)	E
2 Pos HCV	23	39MA51007723	TB3-6	C	WHITE	32	J5-2 (ExBO-1)	E
CCV	24	39MA51007724	TB1-1	C	RED	25	J9-5 (AO-3)	E
2 Pos CCV	25	39MA51007725	TB1-2	C	WHITE	29	J5-4 (ExBO-2)	E
PHV/F&B	26	39MA51007726	TB6-1	C	RED	24	J9-11 (AO-6)	E
2 Pos PHV	27	39MA51007727	TB6-2	C	WHITE	24	J5-12 (ExBO-6)	E
FLTS	28	39MA51007728	TB2-1	C	RED	24	J4-3 (UI-01)	E
	29	39MA51007729	TB2-2	C	BLACK	24	J4-5 (Gnd)	E
FLTS2	30	39MA51007730	TB2-11	C	RED	24	J2-15 (ExIN-16)	E
PREHEAT	31	39MA51007731	TB2-5	C	RED	24	J2-1 (ExIN-09)	E
HOT DECK	32	39MA51007732	TB2-6	C	RED	24	J2-3 (ExIN-10)	E
MAT	33	39MA51007733	TB2-7	C	RED	21	J4-6 (UI-03)	E
Gnd	34	39MA51007734	TB2-8	C	BLACK	24	J2-4 (Gnd)	E
	35	39MA51007735	TB2-9	J	BLACK	26	J4-8 (Gnd)	E
					BLACK	3	TB2-12	C
SAT	36	39MA51007736	TB2-10	C	RED	21	J4-4 (UI-02)	E
HUMIDIFIER	37	39MA51007737	TB4-2	C	ORANGE	30	J16-6 (BO-2)	E
SF VFD	38	39MA51007738	TB8-1	C	RED	24	J9-7 (AO-4)	E
SF s/s	39	39MA51007739	TB3-3	C	YELLOW	28	J16-3 (BO-1no)	E
	40	39MA51007740	TB3-4	C	YELLOW	28	J16-2 (BO-1com)	E
RF VFD	41	39MA51007741	TB8-2	C	RED	24	J9-9 (AO-5)	E
RF s/s	42	39MA51007742	TB3-5	C	PINK	26	J16-9 (BO-3no)	E
	43	39MA51007743	TB3-7	C	PINK	24	J16-8 (BO-3com)	E
Comm Jumpers	44	39MA51007744	OPN-UCXPIO Xnet (-)	E	BLACK	5	OPN-UCXP Xnet (-)	E
	45	39MA51007745	OPN-UCXPIO Xnet (+)	E	RED	5	OPN-UCXP Xnet (+)	E
	46	39MA51007746	OPN-UCXPIO Xnet GND	E	WHITE	5	OPN-UCXP Xnet GND	E
SFS	47	39MA51007747	TB3-11	C	RED	28	J4-10 (UI-06)	E
SFS	48	39MA51007748	TB3-12	C	BLACK	28	J4-8 (Gnd)	E
REFS	49	39MA51007749	TB7-1	C	RED	24	J3-1 (ExIN-01)	E
REFS	50	39MA51007750	TB7-2	C	BLACK	24	J3-2 (Gnd)	E

Table 1 — Sensor Only Wire Designations (cont)

CONNECTION DEVICE	WIRE NO.	WIRE PART NO.	"A" END WIRE LABEL	"A" END TERM	WIRE COLOR	WIRE LENGTH (in.)	"B" END WIRE LABEL	"B" END TERM
EH	51	39MA51007751	TB5-1	C	RED	28	J9-11(AO-6)	E
Dist Block GND	52	39MA51007752	DIST. BLOCK L3	E	GREEN/YELLOW	4	CHASSIS GND	H
T1 120V POWER	53	39MA51007753	DIST. BLOCK L1	K	BLACK (#14GA.)	36	TRANS1-HOT PRIMARY	E
T2 120V POWER	54	39MA51007754	DIST. BLOCK L2	K	WHITE (#14GA.)	36	TRANS1-COM PRIMARY	E
T2 120V POWER	55	39MA51007755	DIST BLOCK L1	K	BLACK (#14GA.)	36	TRANS2-HOT PRIMARY	E
T2 120V COM	56	39MA51007756	DIST BLOCK L2	K	WHITE (#14GA.)	36	TRANS2-COM PRIMARY	E

Table 2 — UC Open XP Wire Designations

DEVICE / CHANNEL # / CABLE #	WIRE COLOR	TERMINAL	SIGNAL
Filter Status Switch (CHANNEL # UI-1) CABLE #3	WHITE	TB2-1	DRY CONTACT DI
	BLACK	TB2-2	SIGNAL GROUND
Supply Air Temperature (CHANNEL # UI-2) CABLE #1	WHITE	TB2-10	10K THERMISTOR AI
	BLACK	TB2-12	SIGNAL GROUND
Mixed Air Temperature (CHANNEL # UI-3) CABLE #4	WHITE	TB2-7	10K THERMISTOR AI
	BLACK	TB2-8	SIGNAL GROUND
OAT (CHANNEL #UI-4) (FIELD SUPPLIED / INSTALLED)	FIELD INST	UI-04 J4-7	10K THERMISTOR AI
	FIELD INST	GND J4-8	SIGNAL GROUND
Low Temperature Thermostat (FREEZSTAT) (CHANNEL #UI-5) CABLE #2	WHITE	TB2-4	DRY CONTACT DI
	BLACK	TB2-3	SIGNAL GROUND
Supply Fan Status (Channel #UI-6) Cable #21	WHITE	TB3-11	DRY CONTACT DI
	BLACK	TB3-12	SIGNAL GROUND
Return Air Temperature (CHANNEL #UI-7)	FIELD INST	UI-06 J4-10	10K THERMISTOR AI
	FIELD INST	GND J4-11	SIGNAL GROUND
Space RH (CHANNEL #UI-8)	FIELD INST	UI-08 J4-13	4-20 MA (+)
	FIELD INST	PWR OUT J4-1	+24 VDC POWER
	FIELD INST	GND J4-14	SIGNAL GROUND
Space Indoor Air Quality (CHANNEL #UI-11)	FIELD INST	UI-10 J4-16	4-20 MA (+)
	FIELD INST	PWR OUT J4-1	+24 VDC POWER
	FIELD INST	GND J4-17	SIGNAL GROUND
Outdoor Air Quality (CHANNEL #UI-11)	FIELD INST	UI-11 J4-18	4-20 MA (+)
	FIELD INST	PWR OUT J4-1	+24 VDC POWER
	FIELD INST	GND J4-20	SIGNAL GROUND
BP (CHANNEL #UI-12) (FIELD SUPPLIED / INSTALLED)	FIELD INST	UI-12 J4-19	4-20 MA (+)
	FIELD INST	PWR OUT J4-1	+24 VDC POWER
	FIELD INST	GND J4-20	SIGNAL GROUND
Return Exhaust Fan Status (CHANNEL # EXIN-1) CABLE #19	WHITE	TB7-1	DRY CONTACT DI
	BLACK	TB7-2	SIGNAL GROUND
High Supply Duct RH (CHANNEL # EXIN-2)	FIELD INST	EXIN-2 J3-3	DRY CONTACT DI
	FIELD INST	EXGND J3-4	SIGNAL GROUND
Fire/Smoke Shutdown Contact (CHANNEL # EXIN-3)	FIELD INST	EXIN-3 J3-5	DRY CONTACT DI
	FIELD INST	EXGND J3-6	SIGNAL GROUND
Smoke Mode Evacuation Input (CHANNEL # EXIN-4)	FIELD INST	EXIN-4 J3-7	DRY CONTACT DI
	FIELD INST	EXGND J3-8	SIGNAL GROUND
Smoke Mode Pressurization Input (CHANNEL # EXIN-5)	FIELD INST	EXIN-5 J3-9	DRY CONTACT DI
	FIELD INST	EXGND J3-10	SIGNAL GROUND
Smoke Mode Purge Input (CHANNEL # EXIN-6)	FIELD INST	EXIN-6 J3-11	DRY CONTACT DI
	FIELD INST	EXGND J3-12	SIGNAL GROUND
Enthalpy Switch (CHANNEL # EXIN-7)	FIELD INST	EXIN-7 J3-13	DRY CONTACT DI
	FIELD INST	EXGND J3-14	SIGNAL GROUND
Pre-Heat (CHANNEL # EXUI-9) CABLE #7	WHITE	TB2-5	10K THERMISTOR AI
	BLACK	TB2-8	SIGNAL GROUND
Hot Deck Temperature (CHANNEL # EXUI-10) CABLE #18	WHITE	TB2-6	10K THERMISTOR AI
	BLACK	TB2-8	SIGNAL GROUND
Filter Status Switch 2 (CHANNEL # EXUI-16 CABLE #17	WHITE	TB2-11	DRY CONTACT DI
	BLACK	TB2-12	SIGNAL GROUND
Supply Fan Motor Start/Stop (CHANNEL # DO-1) CABLE #10	RED	N/C	
	WHITE	TB3-2	MOTOR S/S
	BLACK	N/C	
	GREEN	TB3-4	MOTOR S/S
Humidifier Enable (CHANNEL # DO-2) CABLE #16	RED	N/C	
	WHITE	TB4-2	24VAC SIGNAL DO
	BLACK	TB6-4	GROUND
	GREEN	N/C	
Return Fan/Exhaust Fan Motor Start/Stop (CHANNEL # DO-3) CABLE #11	RED	N/C	
	WHITE	TB3-5	MOTOR S/S
	BLACK	N/C	
	GREEN	TB3-7	MOTOR S/S
Mixed Air Damper / Outdoor Air Damper (CHANNEL # AO-1) CABLE #5	RED	TB4-1	0-10 VDC AO
	WHITE	TB4-3	+24 VAC
	BLACK	TB4-4	POWER GROUND
	GREEN	N/C	
Return Air Damper (Smoke Control) (CHANNEL # AO-1) CABLE #22	RED	TB9-1	0-10 VDC AO
	WHITE	TB9-3	+24 VAC
	BLACK	TB9-4	GROUND
	GREEN	N/C	

Table 2 — UC Open XP Wire Designations (cont)

DEVICE / CHANNEL # / CABLE #	WIRE COLOR	TERMINAL	SIGNAL
Exhaust Air Damper	RED	TB10-1	0-10 VDC AO
	WHITE	TB10-3	+24 VAC
(CHANNEL # AO-1)	BLACK	TB10-4	GROUND
CABLE #6	GREEN	N/C	
Heating Coil Valve	RED	TB3-8	0-10 VDC AO
	WHITE	TB3-9	+24 VAC
(CHANNEL # AO-2)	BLACK	TB3-10	GROUND
CABLE #9	GREEN	N/C	
Cooling Coil Valve	RED	TB1-1	0-10 VDC AO
	WHITE	TB1-3	+24 VAC
(CHANNEL # AO-3)	BLACK	TB1-4	GROUND
CABLE #8	GREEN	N/C	
Supply Fan Variable Frequency Drive Start/Stop	WHITE	TB3-2	MOTOR S/S
(CHANNEL #BO-1) CABLE #10	GREEN	TB3-4	MOTOR S/S
Supply Fan Variable Frequency Drive Speed	RED	TB8-1	2-10 VDC AO
CHANNEL # AO-4) CABLE # 10	BLACK	TB8-4	GROUND
Return Fan/exhaust Fan Variable Frequency Start/Stop	WHITE	TB3-5	MOTOR S/S
(CHANNEL # AO-5) CABLE #11	GREEN	TB3-7	MOTOR S/S
Return Fan/Exhaust Fan Variable Frequency Speed	RED	TB8-2	2-10 VDC AO
(CHANNEL # AO-5) CABLE #11	BLACK	TB8-4	GROUND
Supply Fan ECM Speed	WHITE	TB8-1	2-10 VDC AO
	GREEN	TB8-4	GROUND
(CHANNEL #AO-4)	RED	TB11-1	MODBUS/BACNET +
CABLE #24	BLACK	TB11-2	MODBUS/BACKNET -
Return Fan/Exhaust Fan ECM Speed	WHITE	TB8-2	2-10 VDC AO
	GREEN	TB8-4	GROUND
(CHANNEL #AO-5)	RED	TB11-3	MODBUS/BACNET +
CABLE #25	BLACK	TB11-4	MODBUS/BACKNET -
Electric Heat	RED	TB5-1	0-10 VDC AO
	WHITE	TB5-3	+24 VAC
(CHANNEL # AO-6)	BLACK	TB5-4	GROUND
CABLE #12	GREEN	N/C	
Electric Heat with SCR	RED	TB5-1	0-10 VDC AO
	WHITE	N/C	
(CHANNEL # AO-6)	BLACK	TB5-4	GROUND
CABLE #12	GREEN	N/C	
PRE-HEAT VALVE	RED	TB6-1	0-10 VDC AO
	WHITE	TB6-3	+24 VAC
(CHANNEL # AO-6)	BLACK	TB6-4	GROUND
CABLE #20	GREEN	N/C	
Face and Bypass Damper	RED	TB6-1	0-10 VDC AO
	WHITE	TB6-3	+24 VAC
(CHANNEL # AO-6)	BLACK	TB6-4	GROUND
CABLE #23	GREEN	N/C	
2 Position Pre-Heat Valve	RED	TB6-2	+24 VAC DO
	WHITE	N/C	
(CHANNEL # EXBO-6)	BLACK	TB6-4	GROUND
CABLE #20	GREEN	N/C	
DIRECT EXPANSION STAGES 1,2,3	FIELD INST.	BO-4 J16-12	DX STAGE 1 (24 VAC)
	FIELD INST.	BO-5 J16-15	DX STAGE 2 (24 VAC)
(CHANNEL # DO-4, -5, -6	FIELD INST.	BO-6 J16-18	DX STAGE 3 (24 VAC)
(FIELD SUPPLIED / INSTALLED)	FIELD INST.	TB1-4	GROUND
DIRECT EXPANSION STAGES 4,5,6	FIELD INST.	EXBO-3 J5-6	DX STAGE 4 (24 VAC)
	FIELD INST.	EXBO-4 J5-8	DX STAGE 5 (24 VAC)
(CHANNEL # EXDO-3, -4, -5	FIELD INST.	EXBO-5 J5-10	DX STAGE 6 (24 VAC)
(FIELD SUPPLIED / INSTALLED)	FIELD INST.	TB1-4	GROUND

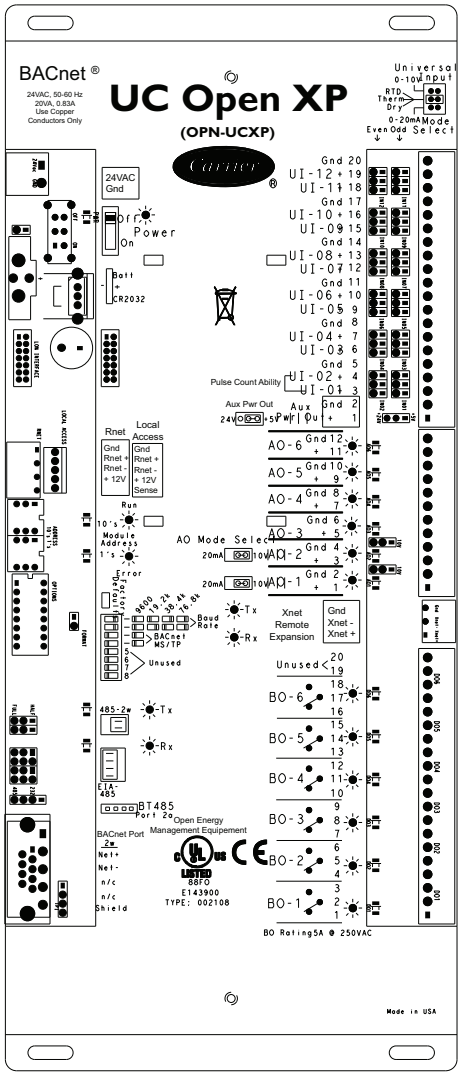


Fig. 7 — UC Open XP Input and Output Terminals

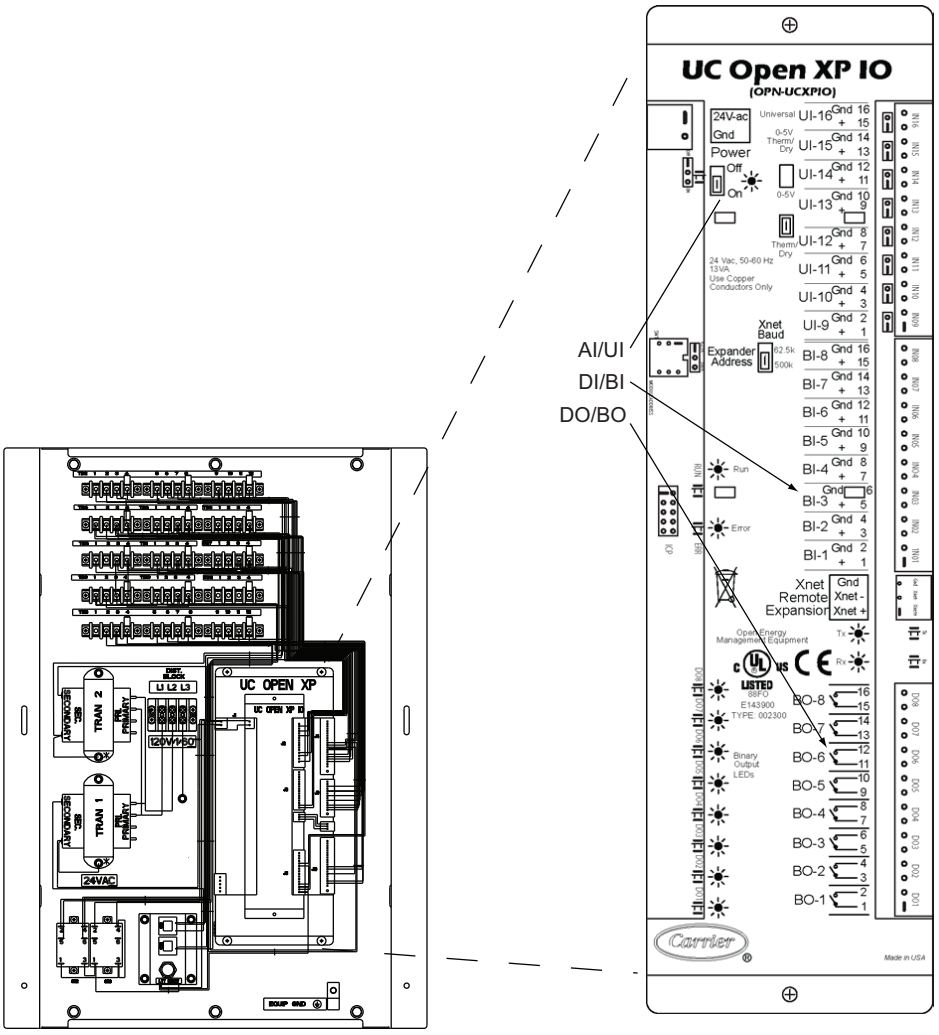


Fig. 8 — UC Open XP IO Input and Output Terminals

INSTALLATION

Leave protective coverings on the unit until it is installed indoors and protected from the elements, construction debris, and dirt.

The control box is shipped mounted in either the control plenum or external to the supply fan section. Visually inspect all components and wiring for any damage.

Control cable connectors are provided at each base rail split for easy disassembly and/or reassembly, allowing the unit to be shipped and/or installed in pieces.

UC Open XP Control System

The UC Open XP control system consists of a control board, sensors and controlled devices.

The UC Open XP is able to be loaded with nearly any type of controls software to control the unit. The user communicates with the UC Open XP controller with a service tool (laptop), using one of many types of software including i-Vu® Application Builder. Communications between the controller and other devices on the network are accomplished using a 3-wire bus that runs between controls.

The control board is powered from a 24 vac transformer connected to the power input connector. The control board monitors and controls components such as the supply fan, cooling and heating coil valves, mixed-air dampers, electric heat, etc.

Control System Wiring

The UC Open XP wiring is all internal to the 39M air handler. Since air-handling systems are normally made up of multiple component sections, Carrier has designed the control system wiring using quick connect snap plugs on wires that run between sections.

There may be multiple devices mounted within the various sections, which all must connect back to the UC Open XP controller. Figure 9 illustrates the connectivity between air-handling sections.

On the UC Open XP, there is a power plug, a plug to connect the module to optional I/O modules within the control panel, and a plug to daisy-chain the module to additional modules within the network or other building management system.

NOTE: Conductors and drain wire must be 22 or 24 AWG (American Wire Gage) minimum, low-capacitance, twisted, stranded shielded copper wire. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon®[1], or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –20°C to 60°C is required. See Table 3 for cables that meet the requirements.

Table 3 — Cable Requirements

MANUFACTURER	CABLE NO.
Alpha	2413 or 5463
American	A22503
Belden	8772
Columbia	02525

1. Third-party trademarks and logos are the property of their respective owners.

When connecting the UC Open XP communication bus to a system element, a color code system for the entire network recommended to simplify installation and checkout. The following color code is recommended in Table 4.

Table 4 — UC Open XP Communications Bus to System Element Color Code System

SIGNAL TYPE	CCN BUS CONDUCTOR INSULATION COLOR
+12V	RED
Rnet-	BLACK
Rnet+	WHITE
Gnd	GREEN

If a cable with a different color scheme is selected, a similar color code should be adopted for the entire network. At each system element, the shields of its communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to ground at only one point. If the communication bus cable exits from one building and enters another, the shields must be connected to ground at the lightning suppressor in each building where the cable enters or exits the building (one point only).

To Wire the Controller to the Network

NOTE: The UC Open XP communicates using BACnet on an MS/TP network segment communications at 9600 bps, 19.2 kbps, 38.4 kbps, or 76.8 kbps. Wire the controllers on an MS/TP network segment in a daisy-chain configuration.

NOTE: Install a BT485 on the first and last controller on a network segment to add bias and prevent signal distortions due to echoing. See Fig. 10.

1. Pull the screw terminal connector from the controller's power terminals labeled **Gnd** or **24 vac** or **Hot**.
2. Check the communications wiring for shorts and grounds.
3. Connect the communications wiring to the BACnet port's screw terminals labeled **Net+**, **Net-**, and **Shield**.

NOTE: Use the same polarity throughout the network segment.

4. Verify that the **MSTP** jumper is set to **MSTP**. See Fig. 11.
5. Set DIP switches 1 and 2 to the appropriate baud rate. See the MSTP baud diagram on the UC Open XP. The default baud rate is 76.8 kbps.

   NOTE: Use the same baud rate for all controllers on the network segment.
6. Set DIP switches 3 and 4 for MSTP. See Fig. 11.

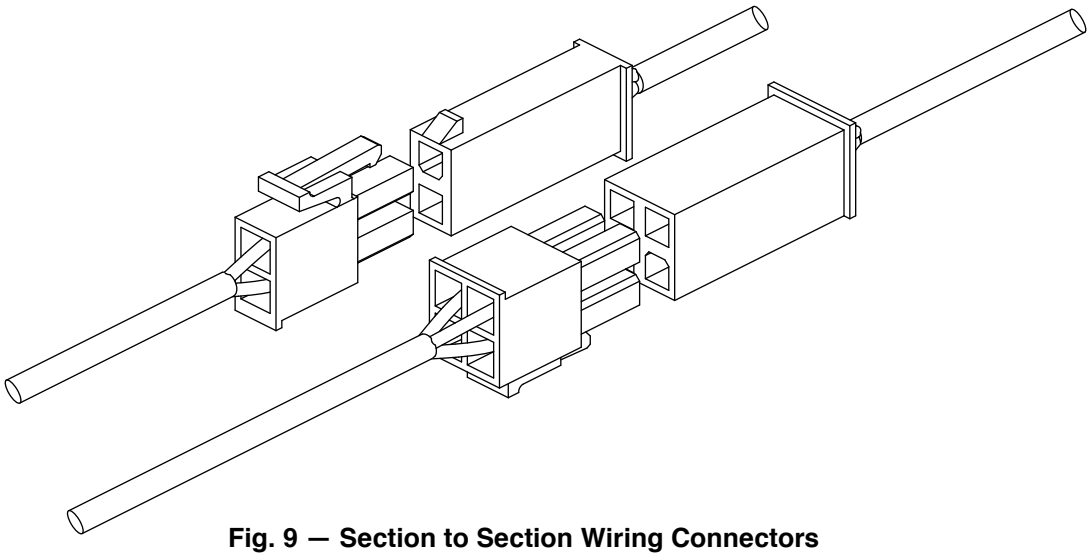
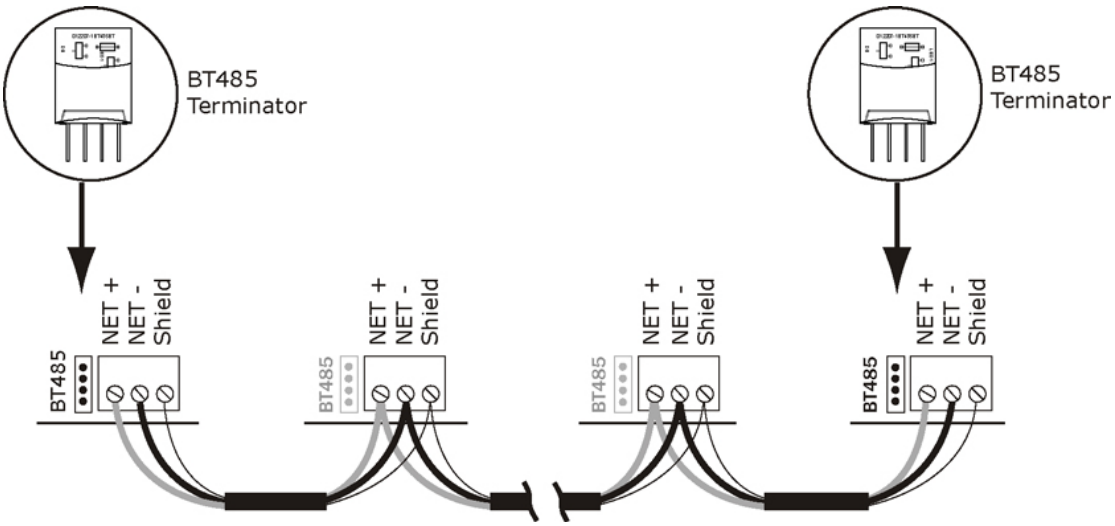


Fig. 9 — Section to Section Wiring Connectors



NOTE: See the MS/TP Networking and Wiring Installation Guide for more details.

Fig. 10 — UC Open XP Communication Wiring

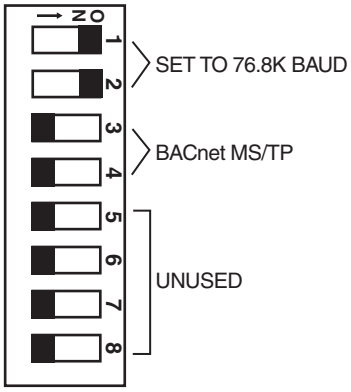


Fig. 11 — MSTP Jumper

1. Verify the jumper is set on the right 2 pins. See Fig. 12.

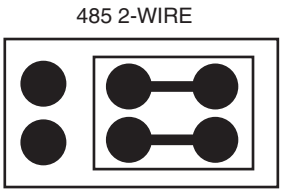


Fig. 12 — 485 2-Wire Jumper

2. Verify that the Communication Selection jumper is set to EIA-485. See Fig. 13.

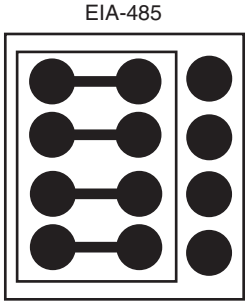


Fig. 13 — Communication Selection Jumper

3. Insert the power screw terminal connector into the UC Open XP's power terminals.
4. Verify communication with the network by viewing a module status report.

COMPONENT INSTALLATION AND FIELD WIRING

Wiring Requirements

All field wiring must comply with NEC and all local requirements. The recommended wiring is shown in Table 5.

Table 5 — Wiring Requirements

INPUT	MAXIMUM LENGTH	MINIMUM GAGE	SHIELDING
0-5 Vdc **0-10 Vdc**	500 feet (152 meters)	22 AWG	100 feet Unshielded 100-500 feet Shielded
0-20 mA	1000 feet (305 meters)	22 AWG	100 feet Unshielded 100-1000 feet Shielded
Thermistor **Dry Contact** **Pulse Counter** **TLO**	500 feet (152 meters)	22 AWG	100 feet Unshielded 100-500 feet Shielded
RTD	100 feet (30 meters)	22 AWG	Shielded
SPT Sensors	500 feet (152 meters)	18 AWG	Unshielded

LEGEND

AWG — American Wire Gage
RTD — Resistance Temperature Device
SPT — Setpoint
TLO — Timed Local Override

Refer to Table 6 for recommended brands and part numbers.

On units with factory-installed controls, each section (with factory-installed sensors or actuators) is wired back to the control plenum using UL listed, plenum type cable. All factory-supplied sensor wiring is terminated at the control box. Connectors are provided at each base rail split for easy disassembly.

NOTE: For application data regarding Space Temperature Sensors, Air Quality (CO_2) sensors and enthalpy and humidity sensors please see the 39M Controls Application Data. For installation and wiring instructions for these sensors please see the Carrier Sensor Installation Guide.

Supply-Air Temperature Sensor

The SAT sensor is factory installed and wired when either of the "Factory Wired" control options is selected in the *AHU*Builder® program. See Fig. 14. The sensor is normally located in the discharge of the supply fan unless heating or cooling coils are located downstream of the fan (blow-thru fans only). In a blow-thru situation, the sensor is located on the discharge end of the last blow-thru coil. The sensor consists of a thermistor encased within a stainless steel probe and is mounted to a junction box. The sensor's thermistor has a range of –245 to 185°F with a nominal resistance of 10,000 ohms at 77°F. See Table 7.

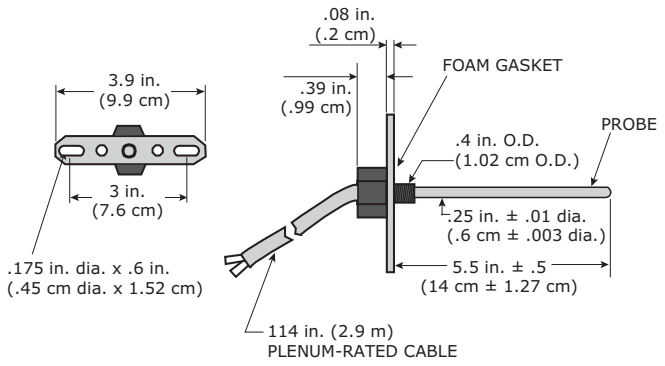


Fig. 14 — Supply-Air/Return-Air Temperature Sensor (33ZCSENSAT)

Table 6 — Recommended Sensor and Device Wiring

WIRE TYPE	BELDEN PART NO.	CAROL PART NO.	ALPHA PART NO.
300-v, Non-Plenum, 60 C Minimum (CM)			
2-Conductor, 18 AWG Cable	9740	C6101 (or C5460*)	1897C
4-Conductor, 18 AWG Cable	8489	C2404 (or C5084*)	1898/4C
3-Conductor, 20 AWG Shielded Cable	8772	C2528	2413C/5463
150-v, Plenum Rated (CMP/CL2P)			
2-Conductor, 18 AWG Cable	82740	C8276	—
4-Conductor, 18 AWG Cable	82489	C8524	—
3-Conductor, 20 AWG Shielded Cable	83553	C8173	58133
600-v, High-Voltage Rated, 90 C†			
2-Conductor, 18 AWG Cable	9486	—	5606B1801
4-Conductor, 16 AWG Cable	—	—	7616/4
3-Conductor, 18 AWG Shielded Cable	—	—	5646B1801

LEGEND

AWG — American Wire Gage

*Wire rated at 200-v.

†For control wiring internal to a variable frequency drive, motor starter, electric heater, or condensing unit control box, which has a nameplate operating voltage greater than 300 VAC.

Table 7 — Temperature to Resistance Conversion — 10K MAT, SAT and Preheat Thermistors

TEMPERATURE		RESISTANCE (ohms)
°F	**°C**	**10K Thermistor**
–40	–40.0	336,000.0
–31	–35.0	242,700.0
–22	–30.0	177,000.0
–13	–25.0	130,402.0
–4	–20.0	97,060.0
5	–15.0	72,940.0
14	–10.0	55,319.0
23	–5.0	42,324.0
32	0.0	32,654.0
41	5.0	25,396.0
50	10.0	19,903.0
59	15.0	15,714.0
68	20.0	12,493.0
77	25.0	10,000.0
86	30.0	8,056.0
95	35.0	6,530.0
104	40.0	5,327.0
113	45.0	4,370.0
122	50.0	3,606.0
131	55.0	2,986.0
140	60.0	2,488.0
149	65.0	2,083.0
158	70.0	1,752.0
167	75.0	1,480.0
176	80.0	1,255.0
185	167.2	1,070.0
194	90.0	915.0
203	95.0	787.0
212	100.0	680.0
221	105.0	592.0
230	110.0	517.0
246	119.0	401.0
239	115.0	450.0

Fan Status Switch

The fan status switch monitors any change in AC current that is indicative of a motor failure, belt loss or slippage or mechanical failure of the fan. The fan status switch is factory-supplied with each supply, return or exhaust fan when either of the "Factory Wired" control options are selected. The switch is factory-installed and wired when a VFD (variable frequency drive), starter, disconnect or ECM fan power box is factory installed and sufficient room exists. Otherwise, the switch is factory-supplied for field installation. See Fig. 15-19 for installation locations.

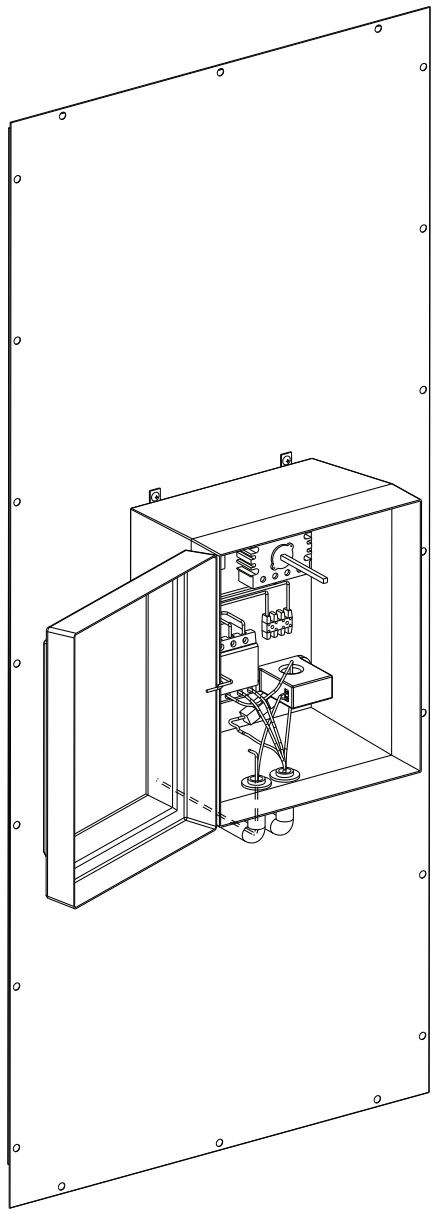


Fig. 15 — Fan Status Switch Installed in Motor Starter

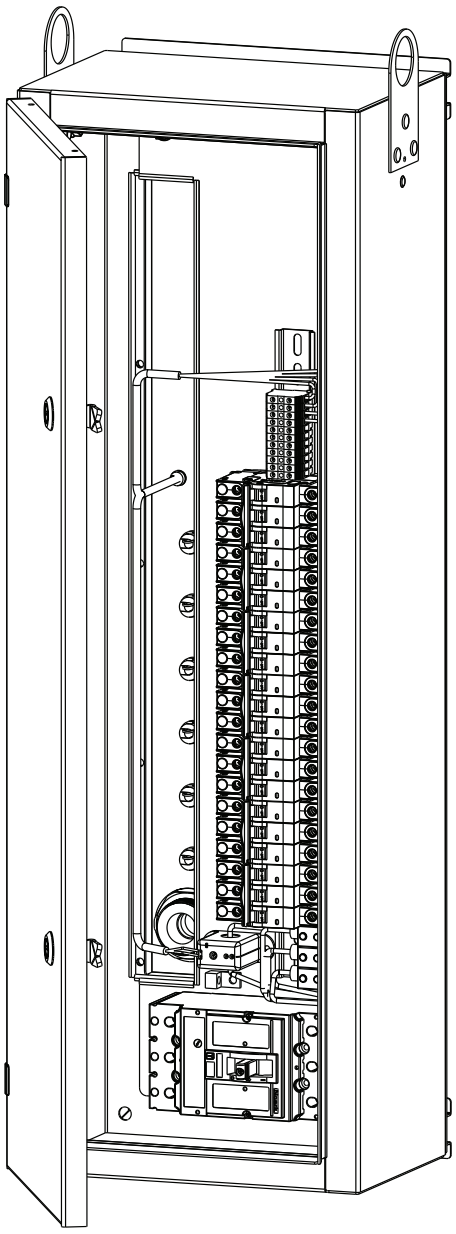


Fig. 16 — ECM Fan Power Box

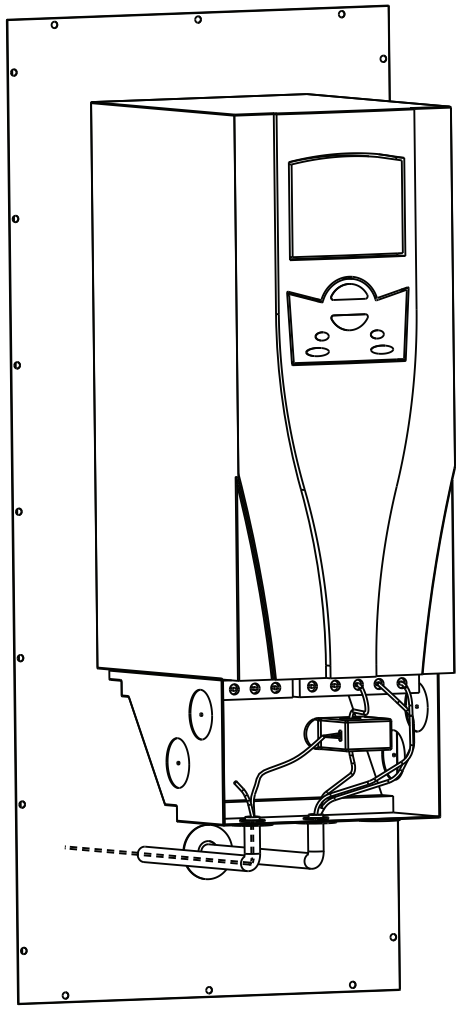


Fig. 17 — Fan Status Switch Installed in VFD

The fan status switch includes two status LED (light-emitting diode) indicators that will indicate one of three states; tripped on, current present but below trip point, and current off or below the low end of the adjustable trip point range.

Fan Status Switch Adjustment

The fan status is adjustable with an operating range of 0 to 150 Amps and is factory set to the 100 Amp trip point position. To adjust the trip point:

1. With current flowing through the aperature of the current switch, verify the Blue LED is on.
2. If the Blue LED is on, slowly adjust the potentiometer (labeled as “TRP ADJ” in Fig. 18) clockwise until the RED LED just turns on and stop immediately. The trip point is now set at the normal operating load current.

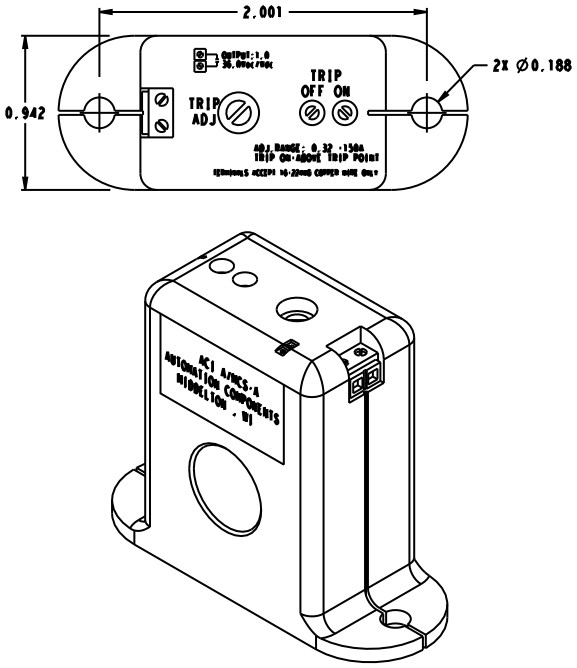


Fig. 18 — Fan Status Switch

Fan Status Switch Field Installation

If the AHU is ordered with no VFD, starter, disconnect or ECM fan power box and the fan status switch is supplied, then the fan status switch will ship in the fan section for field installation:

⚠ CAUTION

The fan status switches should be used on insulated conductors only.

1. The fan status switch may be mounted in any position using the provided Tek Screws and holes in the base. Leave a minimum distance of 1 inch between the current switch and any other magnetic devices such as contactors and transformers.
2. Loop (1 turn) "Black" wire from conduit assembly running into the starter/disconnect/VFD/bypass/ECM Fan Power Box from the motor through the sensor as shown in Fig. 19.
3. Connect the "Black" wire to the appropriate connector within the starter/disconnect/VFD/bypass/ECM fan power box.
4. Connect the control wiring to the control connection terminals near the top of the fan status switch as shown in Fig. 19.

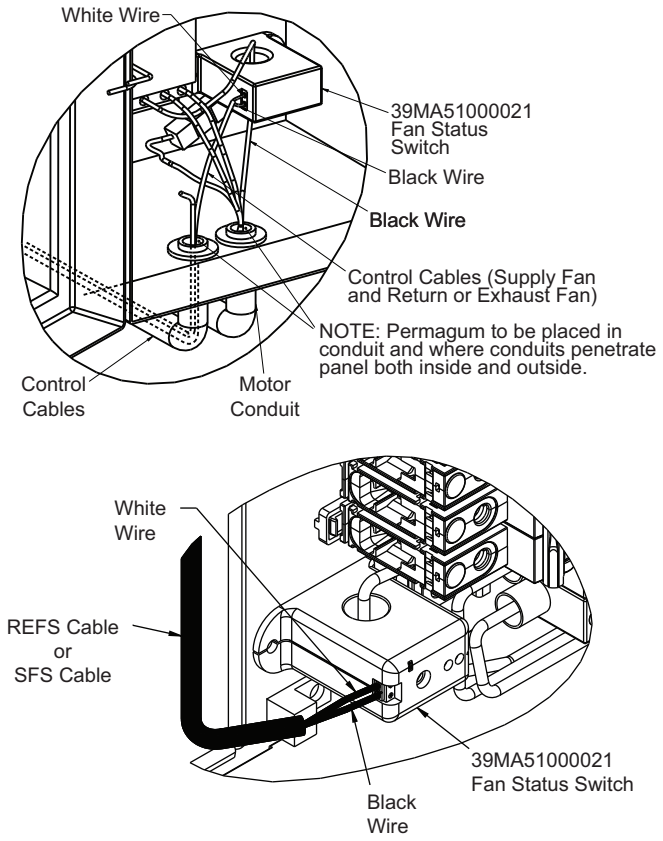


Fig. 19 — Fan Status Switch Installation

Return-Air Temperature Sensor

The return-air temperature sensor (RAT) is ordered separately and installed in the return-air duct (Fig. 14). Mount the sensor in the middle of the return-air duct upstream from the return-air damper. The sensor's probe tip should be centered within the duct.

Outdoor-Air Temperature Sensor (OAT) (P/N 33ZCSENOAT)

The OAT sensor is ordered separately for field installation and consists of a thermistor encased within a probe. See Fig. 20.

The OAT Sensor has an operating range of –40°F to 245°F with a nominal resistance of 10,000 ohms at 77°F and an accuracy of ± 36°F.

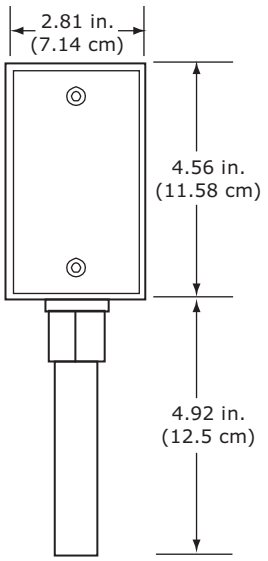


Fig. 20 — Outdoor-Air Temperature (OAT) Sensor

Mixed-Air Temperature Sensor

The mixed-air temperature sensor measures the temperature of the air leaving the mixing box. The MAT sensor is factory-supplied and installed when either of the "Factory Wired" control options is selected in the *AHU*Builder® program and a mixing box or filter mixing box is present. The sensor is located inside the last mixing box in the airflow, and the terminal box is mounted on the hand side of the unit.

This sensor uses multiple thermistor elements and provides both mechanical and electrical averaging to achieve an average temperature measurement over the entire element length. Polarity is not a consideration. See Fig. 21 for an installation.

Low-Temperature Thermostat (LTT)

The low-temperature thermostat (often referred to as a freezestat) is factory-supplied and installed when there is a factory-supplied and installed steam or water heating and/or cooling coil and either of the "Factory Wired" control options is selected in the *AHU*Builder® program. See Fig. 22. The thermostat is used to protect the equipment coils from freezing temperatures in the event of a malfunction, by detecting the presence of a potentially damaging condition. The UC Open XP control will stop the fan if damaging conditions are detected. If field installed, the LTT should be done so on the entering air side of the first cooling coil in the equipment. (For heating only units, it is installed on the leaving air side of the first heating coil.) A single LTT is used for coil face areas up to 45 sq ft. For larger coils, one LTT is used for each 45 sq ft of coil face area. If multiple coils are used, such as a split coil, one LTT is used on each coil even if the total coil face area is 45 square feet or less. The UC Open XP control accommodates multiple LTTs.

The factory-supplied LTT has a range of 35 to 60°F and is factory set at 35°F. The temperature setting is field adjustable. To adjust the temperature set point, turn the adjustment screw (located on the top of the case) until the position indicator is at the desired temperature. (A clockwise rotation increases the set point.)

The LTT operates two low voltage relays. The normally closed contacts of one relay is wired in series with the motor starter circuit. If a 1-ft section of the capillary tube senses cold air at or below the thermostat setting, the fan shuts down. A manual reset is provided in the control box to restart the fan after the abnormal condition is corrected. The temperature must exceed the set point by 5°F or more for the reset button to restore the circuit to normal operation.

⚠ CAUTION

DO NOT set the low-temperature thermostat below 35°F. Coil damage may result.

For all heating coils, the LTT sensor senses the temperature of the air leaving the coil (downstream). For all cooling coils, the LTT sensor sensing the temperature of the air entering the coil (upstream).

The sensor is mounted to the coil baffle panel, near the bottom. The capillary sensing tube is routed through the upper bushing in the coil baffle panel. It is run vertically up and down across the coil face and extends evenly across the coil face from side to side. It will form a "W" pattern as shown in Fig. 23 and 24. The LTT control assembly and reset switch is installed on the hand side of the section.

Preheat Temperature Sensor (PHEAT)

The preheat temperature sensor measures the temperature of the air leaving the preheat coil. The sensor is factory-supplied and installed when there is an extended length electric heating coil in its own section before a cooling coil and either of the "Factory Wired" control options is selected in the *AHU*Builder® program. The PHEAT sensor is normally on the downstream side of the heating coil in the heating coil section.

The sensor consists of multiple thermistors evenly spaced and encased within a flexible copper tube, which provides average temperature sensing. The sensor tubing is installed on the downstream side of the preheat coil and is serpentined so it can sense average temperature. The preheat sensor has a range of –40 to 185°F with a nominal resistance of 10,000 ohms at 77°F.

Filter Status Switch (P/N 33AMSENFLT000)

The filter status differential pressure switch (FLTS) is a snap action SPDT type switch. When a dirty filter element causes the pressure drop across the filter media to exceed the switch setting, the switch closes and sends an alarm signal to the control box. The switch has a set point range from 0.05 to 2.0 in. wg. Refer to the filter manufacturer's information for the maximum dirty filter pressure drop, or use Table 8 determine the appropriate set point for the specific filter type used.

Table 8 — Filter Pressure Settings

FILTER TYPE (Efficiency)	RECOMMENDED MAXIMUM PRESSURE SETTING (in. wg)
2-in. Flat (<35%)	0.5
2 to 4-in. Flat (35-65%)	1.0
Bag/Cartridge (65-85%)	1.2
Final (85-98%)	1.5

The filter status switch is factory installed in a filter or filter mixing box section if ordered in the *AHU*Builder® program when either of the "Factory Wired" control options is selected. The switch can be factory installed across the first filter section in the airstream on all types of air-handling units.

The filter switch will typically be factory-installed on the upstream side of the filter track. The 1/4-in. pneumatic tubing will be connected to the "low" pressure port and run into the downstream side of the filter. See Fig. 25.

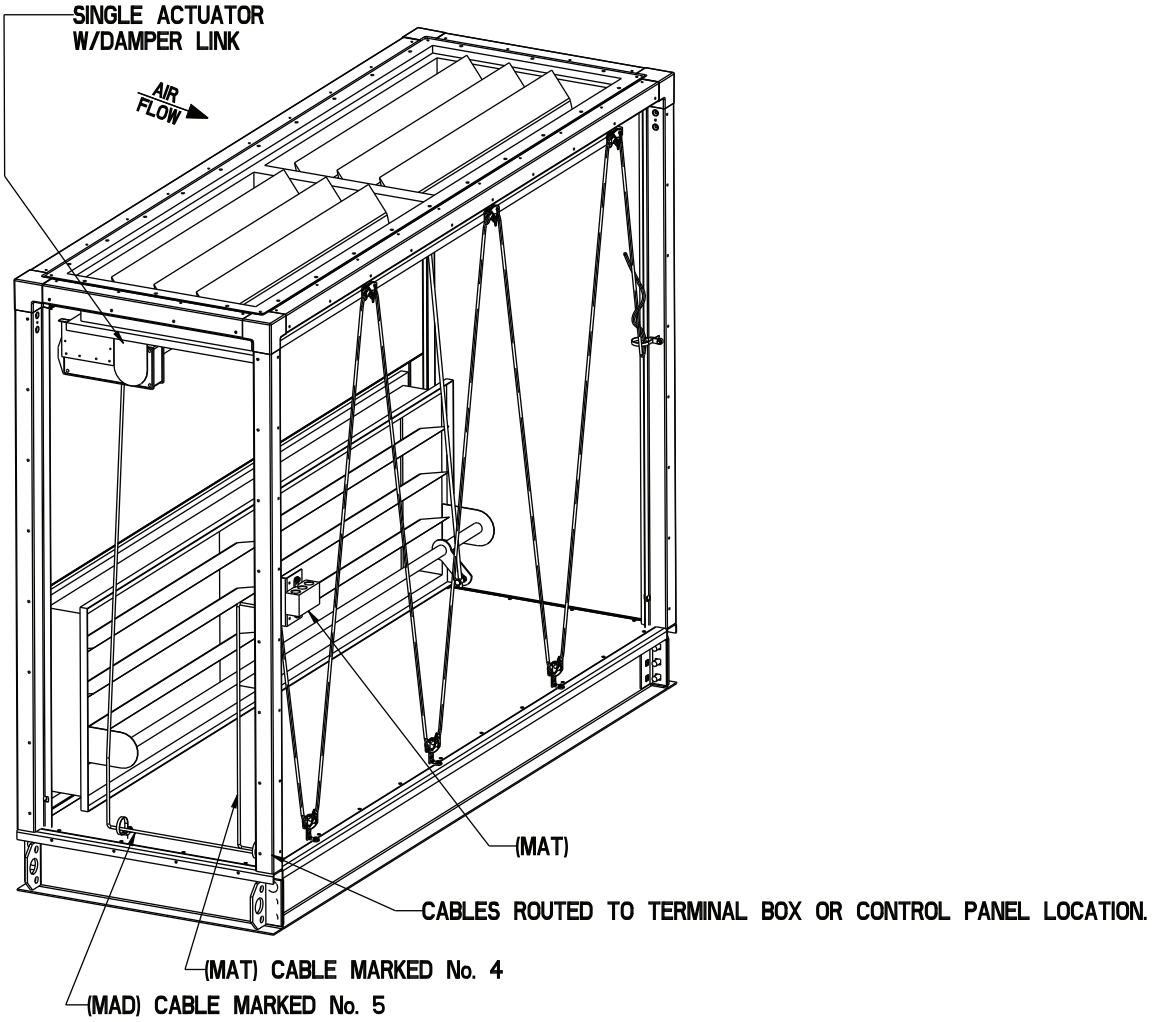


Fig. 21 — Typical MAT (Mixed-Air Temperature Sensor) Installation

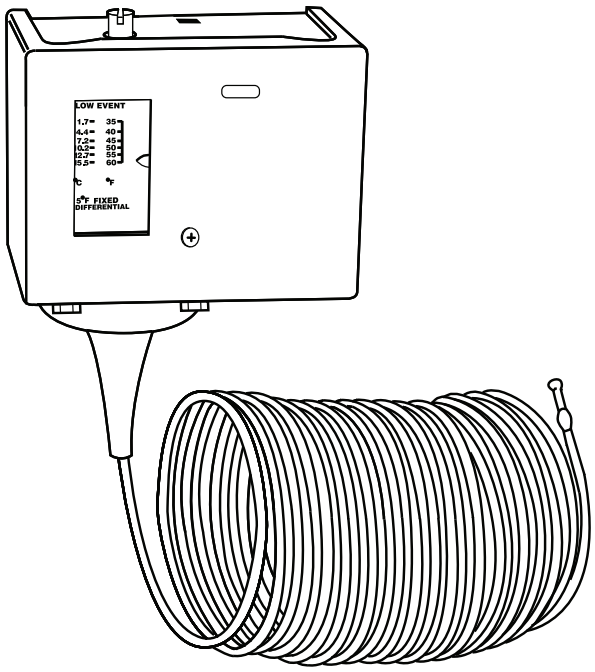


Fig. 22 — Low-Temperature Thermostat

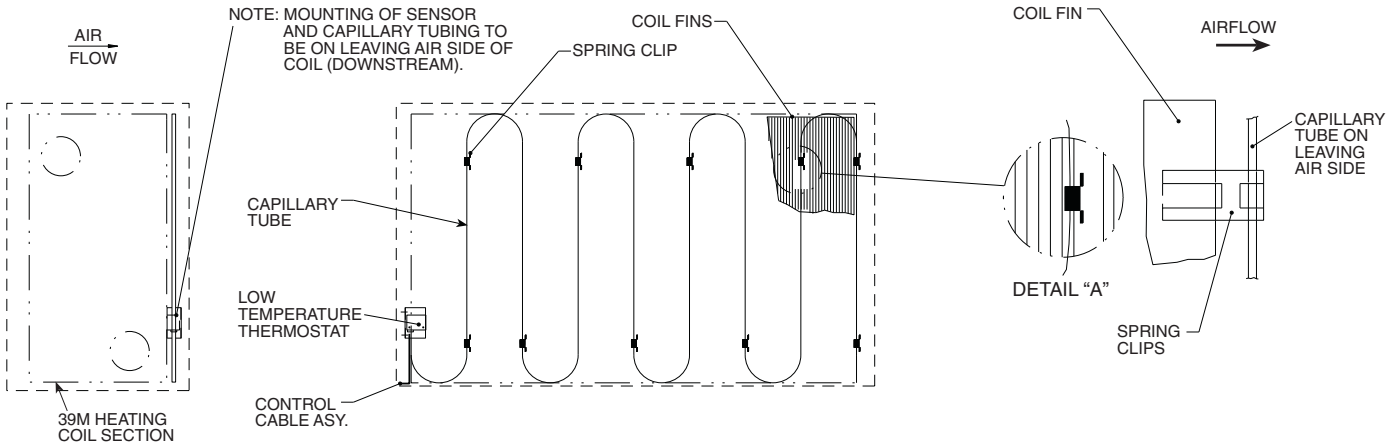


Fig. 23 — Heating Coil Section, Typical Capillary Tube Routing for LTT on Heating Only Applications

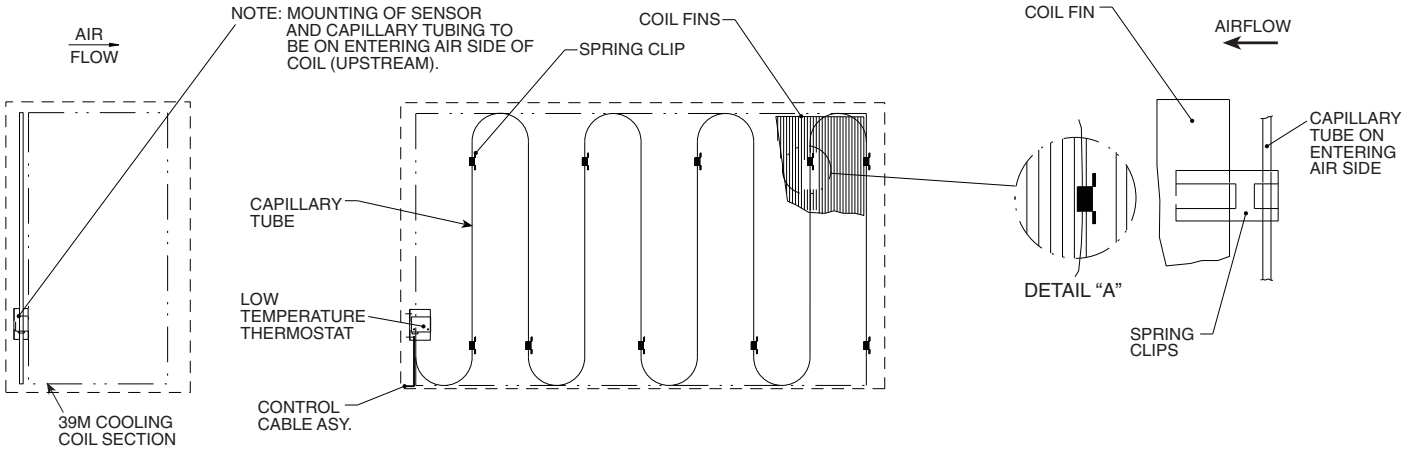


Fig. 24 — Cooling Coil Section, Capillary Tube Routing

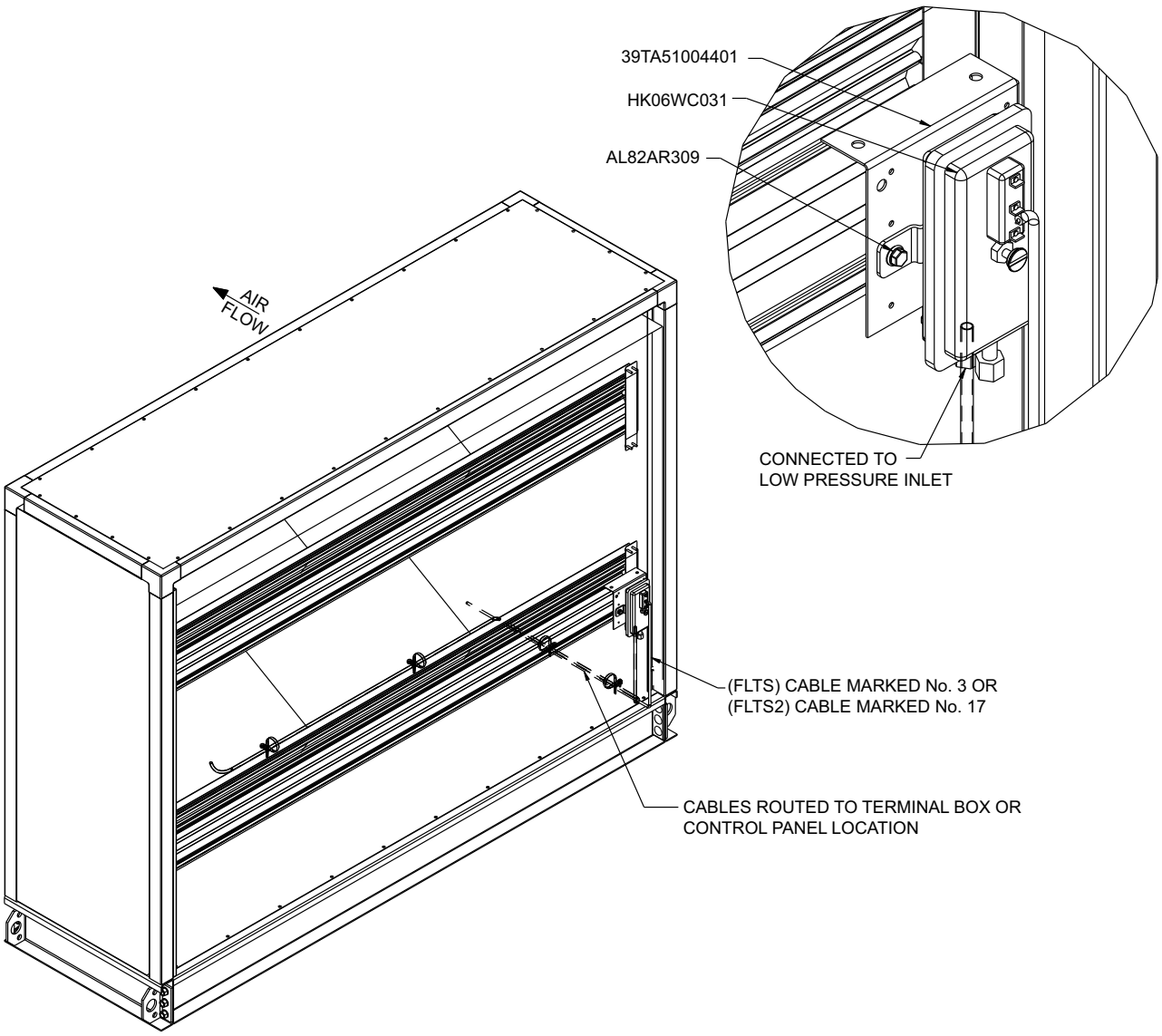


Fig. 25 — Filter Status Switch Installation

Steam/Water Valves

Steam and water valve assemblies are field-supplied and installed. All valves must be fully modulating and capable of being positioned at any point within the valve's travel range.

Valves must be able to accept a 4 to 20 mA or 0 to 10 vdc control signal.

⚠ CAUTION

To prevent electric shock and equipment damage, disconnect the power to the control box before installing any valve assemblies.

Field-Supplied Two-Position Water Valves

The UC Open XP control supports two-position water valves for heating or CV cooling applications, although it is not recommended for air handler applications, except if face and bypass damper control is used.

All water valve assemblies must be field-supplied. For compatibility, 24 vac type actuators are required. Actuator power consumption must be rated under 25 va. The actuator must utilize a spring return method to reposition the valve back to the normal position if power is removed. Normally open or normally closed type valves are both acceptable and their selection depends on the application and specific customer requirements.

Mixing Box Damper Actuators

The spring return mixed-air damper actuators are factory-supplied and installed when ordered in the *AHU*Builder® program. When installed, the actuators are done so directly on the damper jackshaft. If more than one damper is located inside of the mixing box, either separate actuators on each damper or one actuator with damper linkage can be ordered. Spring return damper actuators are proportional modulating, direct shaft mount type, capable of being driven in both directions and holding position at any point in its travel range. The actuator is mechanically reversible. As installed from the factory it provides spring return closing of the outdoor-air damper on loss of power.

⚠ CAUTION

It is extremely important to properly link parallel blade outdoor-air and parallel blade return-air dampers. Failure to do so may cause mixing problems, stratification, or coil freezing under some conditions, especially in combination type filter mixing boxes. Opposed blade type outdoor-air dampers are recommended, in conjunction with parallel blade type return-air dampers. Using these together will minimize potential problems. See Fig. 25.

All factory-mounted actuators ordered with the equipment are mounted to the outdoor-air damper and have the linkages preset for spring return closed outdoor air. If the opposite damper will be used for outdoor air, the actuator must be removed from the damper and re-installed on the opposite damper. The linkages must also be readjusted for proper operation. The actuators are 24 V with a 2 to 10 VDC output signal and a 4 to 20 mA control signal.

NOTE: For shipping purposes, the secondary connecting rod which connects the outdoor-air damper to the return-air damper will be set so that both the outdoor air and return air dampers remain closed. Before operating the equipment, loosen the bolt that retains the rod and fully open the return air damper, then tighten the bolt to lock the rod in position. For field-mounted actuators, see Fig. 26.

Exhaust Damper Actuator

A separate exhaust/relief damper actuator may be factory-supplied. This damper actuator is the same make and type of spring return actuator used for the mixing box dampers and will be factory mounted to the exhaust damper inside a factory-supplied exhaust box if ordered via the *AHU*Builder® program. See Fig. 27. A separate cable is provided to control the exhaust air damper.

Face and Bypass Damper Actuators

Face and bypass damper actuators are factory-supplied and installed when ordered via the *AHU*Builder® program. These actuators are of the same make and type of spring return actuator as the mixed-air damper actuators.

All face and bypass damper actuators are wired to the UC Open XP controller using plenum cable. Actuator connections depend on the application. Refer to Tables 1 and 2 for cable terminations of face and bypass heating and cooling actuators.

Variable-Frequency Drives

Variable-frequency drives (VFDs) are used for fan volume control on VAV units. Variable frequency drives can be factory-supplied. The input for external frequency input for the variable frequency drive must accept a 4 to 20 mA signal. The UC Open XP controller provides an isolated 4 to 20 mA control signal to the drive. The external start/stop input to the drive must accept a contact closure. Use 2-conductor, 18 or 20 AWG cable (single-shielded twisted pair or a 3-conductor shielded cable may be used) to connect the external frequency input and the external start/stop input to the output of the control.

IMPORTANT: Wire the VFD start/stop input so that if it is placed in the manual or bypass mode, the low temperature thermostat is still in the motor control circuit to protect the unit.

For VAV units, set the minimum VFD frequency output (speed at 4 mA external input signal) such that the desired supply duct static pressure is achieved when all the air terminals are set to maintain minimum airflow. Verify that the supply fan status shows the fan status is ON while the supply fan is operating at the lowest speed. Increase the VFD Minimum Frequency Output Value until the desired static pressure set point is achieved when the system airflow is at the lowest possible value.

DX Cooling Control

Direct expansion (DX) cooling applications are not directly controlled via the UC Open XP. DX cooling applications are controlled only by the applicable condenser controller by controlling the staging of the compressors. The supply air temperature (SAT) sensor and the return air temperature (RAT) sensor in or near the AHU are necessary inputs for the condenser controller to control the compressor staging for both digital and standard type scroll compressors. These sensors are generally wired directly to the condenser's control module, however they may pass the necessary signal to the condenser's controller via the UC Open XP and the BACnet network. For further information regarding DX control, see the 39M Control Product Data and the applicable condenser's control guide.

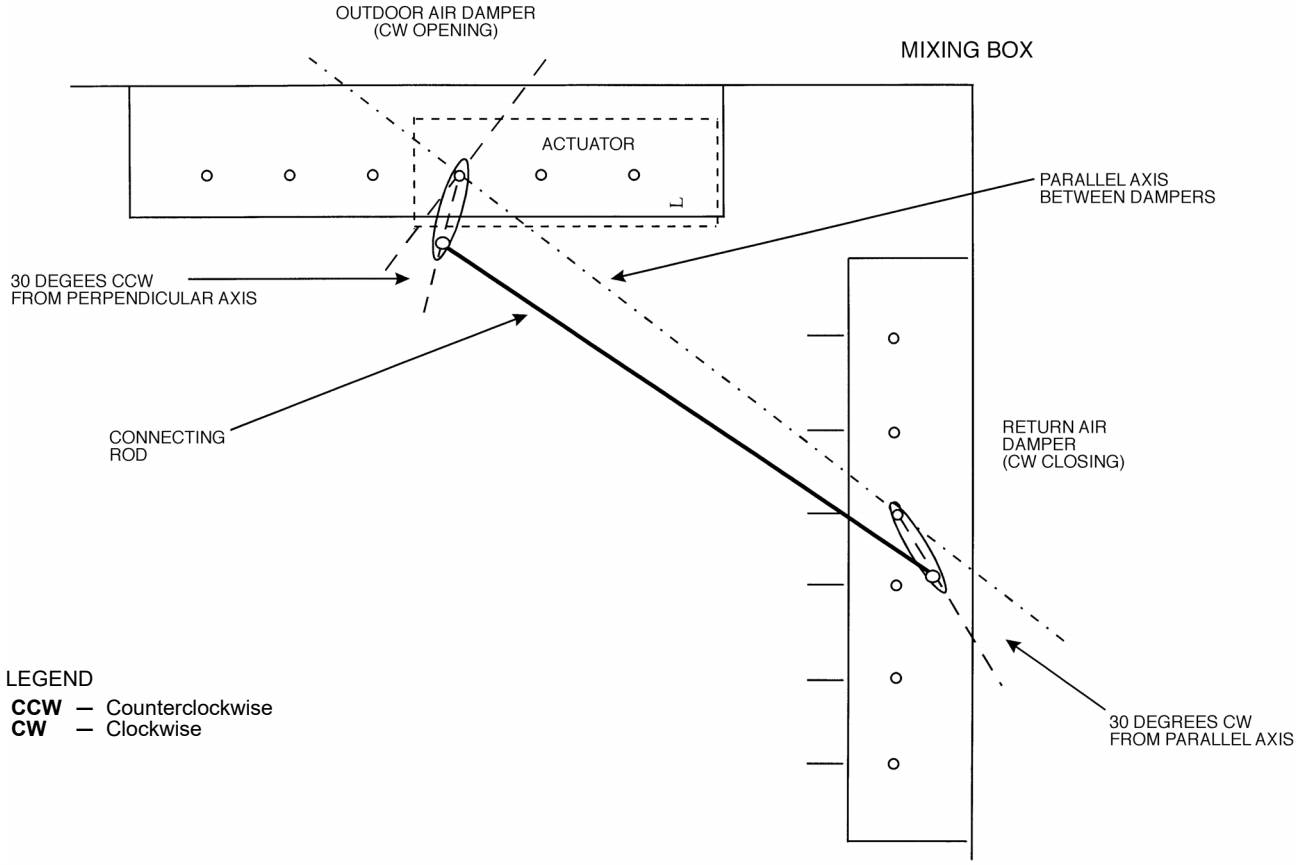


Fig. 26 — Typical Damper Secondary Linkage (Two Parallel Blade Dampers)

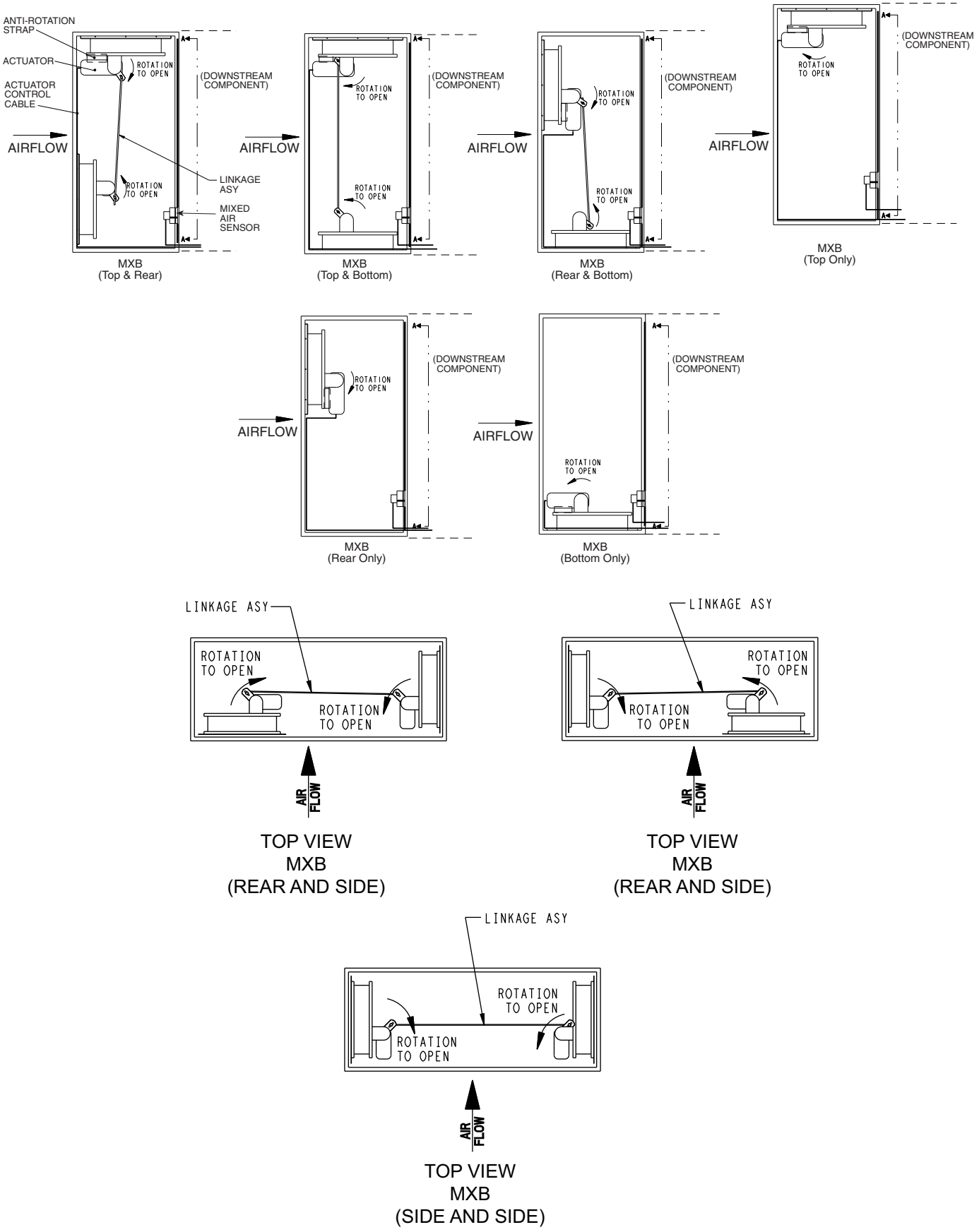


Fig. 27 — Actuator Field Mounting

Electric Heat Control

Electric heaters can be controlled via an electric heat sequencer, SCR controller or Vernier controller as described below.

Electric Heat Sequencer

The UCS-621E is a solid-state device used for multistage electric heater control. This transducer can be factory-supplied and wired if ordered via the *AHU*Builder® program and will be installed inside the electric heat control compartment. The UCS-621E provides six stages of relay control with adjustable relay set points and differentials, requires 24 VAC/VDC power and provides a LED indication of relay status. The electric heat transducer accepts a 0 to 20 mA or 0 to 15 vdc input signal and has an operating temperature range of 32 to 158°F with a humidity limit of 5% to 95% relative, non-condensing. See Fig. 28 and Table 9.

SCR Controller

The silicon controlled rectifier is available via a drop down in *AHU*Builder® program for low kW electric heaters on unsheathed wire elements only. The SCR controller is a solid-state device that provides 0 to 100% power control. With no moving parts, the SCR controller is both step less and noiseless and provides a much longer operational life for an electric heater.

The SCR controller is installed in the electric heater control box as shown in Fig. 29.

The SCR controller is designed to receive a 0 to 10 vdc, 4 to 20 mA or 0 to 135 ohm control signal. The controller operates between 32 and 176°F from 0% to 95% relative humidity, non-condensing. The SCR provides an auto shut-off feature when the SCR ambient temperature is above 180°F. Controller is powered from a 24 vac transformer factory wired in to the electric heater power supply.

Vernier Controller

A Vernier controller is available via a drop down in *AHU*Builder® for high kW electric heaters on unsheathed wire elements only. The Vernier controller is a combination of a standard multi-stage controller and an SCR controller and provides 0 to 100% power control for an electric heater.

The Vernier controller is designed to receive a 0 to 10 vdc, 4 to 20 mA or 0 to 135 ohm control signal. The controller operates between 32 and 176°F from 0% to 95% relative humidity, non-condensing. The SCR provides an auto shut-off feature when the SCR ambient temperature is above 180°F. Controller is powered from a 24 vac transformer factory wired in to the electric heater power supply.

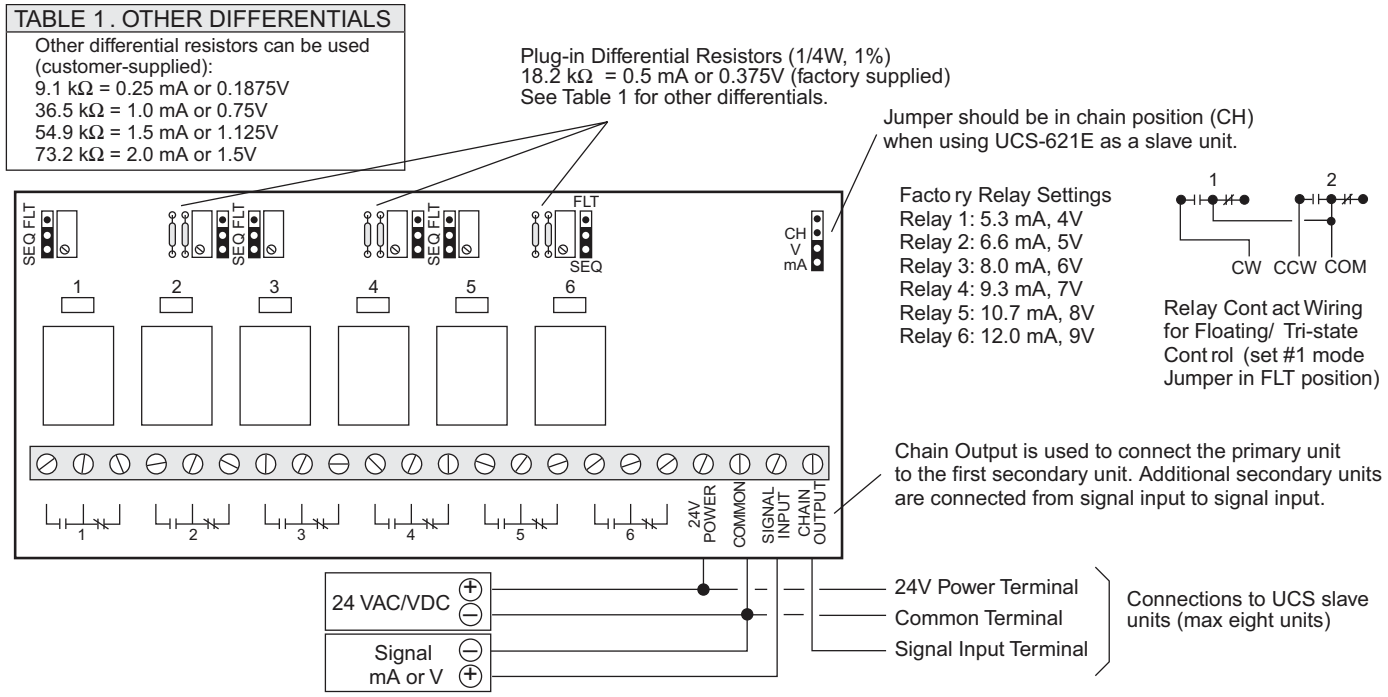


Fig. 28 — 6-Stage Electric Heat Sequencer

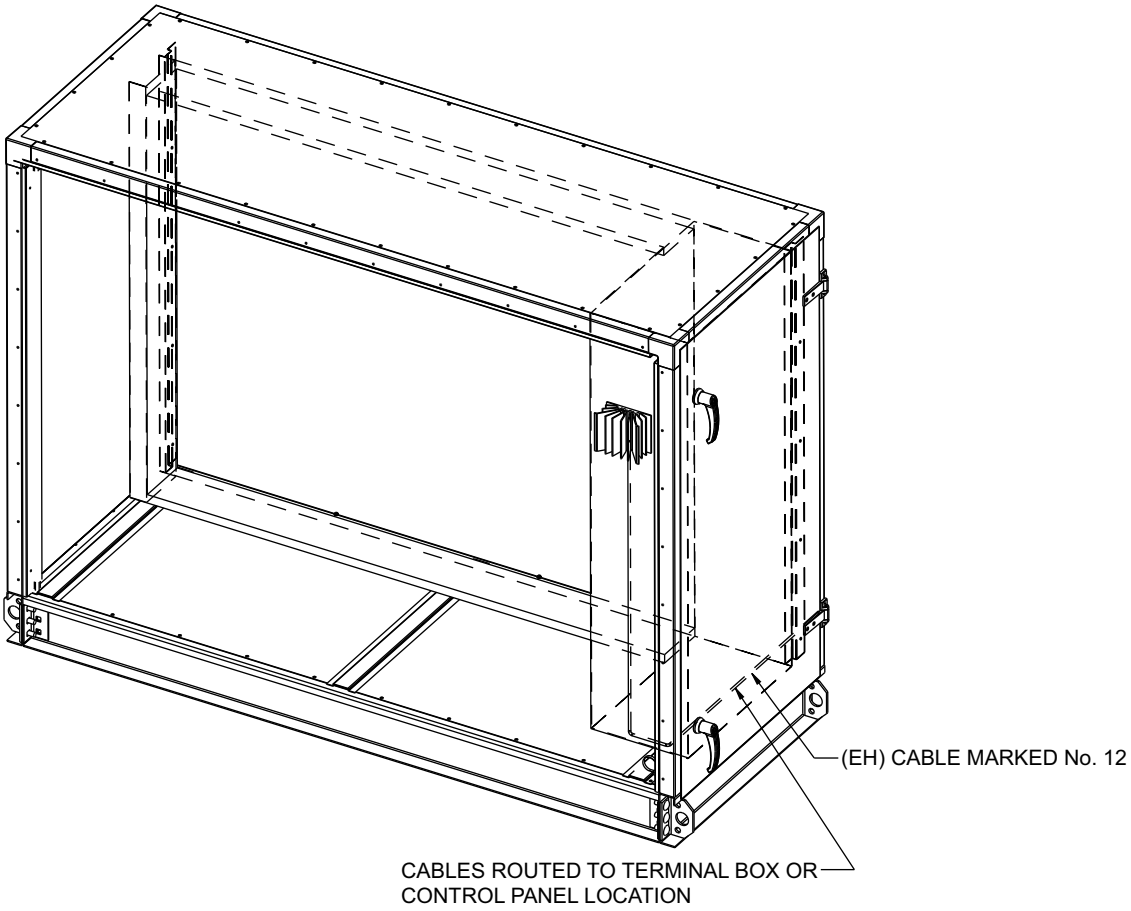


Fig. 29 — SCR Installation

Table 9 — Heater Wiring

TOTAL NO. OF HEATER CIRCUITS	NO. OF CIRCUITS CONTROLLED BY STAGE 1	STAGE 1 CAPACITY (%)	NO. OF CIRCUITS CONTROLLED BY STAGE 2	STAGE 2 CAPACITY (%)
1	1	100	0	0
2	1	50	1	50
3	1	33	2	67
4	2	50	2	50
5	2	40	3	60
6	2	33	4	67
7	3	43	4	57
8	3	38	5	62
9	4	44	5	56
10	4	40	6	60
11	4	36	7	64
12	5	42	7	58
13	5	38	8	62
14	5	36	9	64
15	6	40	9	60
16	6	38	10	62

NOTE: All stages must be wired sequentially in order to provide proper heater safety operation. For example, if 3 circuits are to be connected to the stage 1 control relay, they must be the first 3 circuits (C1, C2, and C3).

TROUBLESHOOTING

If you have problems mounting, wiring, or addressing the UC Open XP or UC Open XP IO, contact Carrier Technical Support.

Communication LEDs

The LEDs indicate if the controller is speaking to the devices on the network. The LEDs should reflect communication traffic based on the baud rate set. The higher the baud rate the more solid the LEDs become. See Table 10.

Table 10 — Communication LEDs

LED	STATUS
Power	Lights when power is being supplied to the expander. NOTE: The UC Open XP is protected by internal solid-state polyswitches on the incoming power and network connections. These polyswitches are not replaceable, but they will reset themselves if the condition that caused the fault returns to normal.
Rx	Lights when the controller receives data from the network segment; there is an Rx LED for ports 1 and 2.
Tx	Lights when the controller transits data from the network segment; there is an Rx LED for ports 1 and 2.
Run	Lights based on controller status.
Error	Lights based on controller status.

The RUN and ERROR LEDs indicate controller and network status. See Table 11.

Table 11 — Run and Error LEDs

IF RUN LED SHOWS	AND ERROR LED SHOWS	STATUS IS
Alternating Flashes with the ERROR LED	Alternating Flashes with the RUN LED	The controller files have been archived.
2 Flashes Per Second	Off	Normal
	2 Flashes, Alternating with RUN LED	Five minute auto-restart delay after system error.
	3 Flashes, Then Off	The controller has just been formatted.
	4 Flashes, Then On	Two or more devices on this network have the same MS/TP network address.
	1 Flash per Second	The controller is alone on the network.
	On	Exec halted after frequency system errors or control programs halted
5 Flashes Per Second	On	Exec start-up aborted, boot is running
	Off	Firmware transfer in progress, boot is running
7 Flashes Per Second	7 Flashes per Second, Alternating with RUN LED	Ten second recovery period after brownout
14 Flashes Per Second	14 Flashes per Second, Alternating with RUN LED	Brownout
On	On	Failure. Try the following solutions: Turn the UC Open XP off, then on. Download memory to the UC Open XP. Replace the UC Open XP.

LEGEND

A/D — Analog to Digital
CE — Consumer Electronics
FCC — Federal Communication Commission
FOC — Full Operational Capacity
LED — Light Emitting Diode
RTD — Resistance Temperature Detector
UL — Underwriters Laboratories

NOTE: To help you troubleshoot, obtain a Module Status (Modstat) from the controller and review the system Error and Warning details.

UC Open XP Specifications

SPECIFICATION	DESCRIPTION
Maximum Number of Control Programs*	20
Maximum Number of BACnet Objects*	1050
Maximum Number of BACnet Third-Party Integration Points Using Snap*	10
Power	24 vac ± 10%, 50-60 Hz 20 VA Power Consumption (26 VA with BACview attached) 26 vdc (25 V min, 30 V max) Single Class 2 source only, 100 VA or less
BACnet Port	Port 2a: BACnet MS/TP (9600 bps, 19.2 kbps, 38.4 kbps or 76.8 kbps)
Rnet Port	For SPT sensors and a BACview in any of the following combinations, wired in a daisy-chain configuration: • 1 SPT Plus, SPT Pro, or SPT Pro Plus • 1-4 SPT Standards • 1-4 SPT Standards, and 1 SPT Plus, SPT Pro, or SPT Pro Plus Any of the above combinations, plus a BACview, but no more than 6 devices total
Local Access Port	For system start-up and troubleshooting using Field Assistant or BACview (115.2 kbps)
Xnet Remote Expansion Port	For communication with the UC Open XP IO expander
Inputs	12 input configurable for 0-10V, RTD Therm Dry, or 0-20mA. Inputs 1 and 2 may be used for pulse counting
Input Pulse Frequency	10 pulses per second, minimum pulse width (on or off time) required for each pulse is 50 msec
Input Resolution	12 bit A/D
Binary Output	6 binary outputs, configured as dry contact, normally open or normally closed, must be powered from a class 2 power source
Analog Output	6 analog outputs: • 1 and 2 are configurable for 0-10V or 0-20mA • 3-6 are 0-10V only
Output Resolution	8 bit D/A
Real Tme Clock	Battery-backed real time clock keeps track of time in the event of a power failure.
Battery	10-year Lithium CR2032 battery provides a minimum of 10,000 hours of data retention during power outage
Protection	Incoming power and network connections are protected by non-replaceable internal solid-state polyswitches that reset themselves when the condition that causes a fault returns to normal. The power, network, input, and output connections are also protected against voltage transient and surge events.
Status Indicators	LEDs indicate status of communications, running, errors, and power. LED indicators for transmit/receive for Port 1 and Port 2a and for each of the 12 outputs.
Environmental Operating Range	0 to 140 F (–18 to 60 C), 0 to 90% relative humidity, non-condensing
Storage Temperature Range	–24 to 140 F (–30 to 60 C), 0 to 90% relative humidity, non-condensing
Physical	Rugged aluminum housing with removable screw terminals
Overall Dimensions	Height: 11 13/16 in. (30 cm) Width: 5 in. (12.7 cm)
Weight	1.1 lb (0.5 kg)
BACnet Support	Conforms to the Advanced Application Controller (B-AAC) Standard Device Profile as defined in ANSI/ASHRAE Standard 135-2004 (BACnet) Annex L
Listed By	UL-916, (Canadian Std C22.2 No. 205-M1983), CE, FCC Part 15-Subpart B-Class A

*Depends on available memory.

UC Open XP IO Specifications

SPECIFICATION	DESCRIPTION
Power	24 vac ± 10%, 50-60 Hz 13 VA Power Consumption 26 vdc (25 V min, 30 V max) Single Class 2 source only, 100 VA or less
Binary Inputs	IN 1-8 are binary only and support pulse counting up to 10 Hertz, dry contact only
Universal Inputs	IN 9-16 are universal inputs, jumper selectable between thermistor/dry contact only
Input Resolution	10 bit A/D
Input Pulse Frequency	10 pulses per second max. Minimum pulse width (on or off time) required for each pulse is 50 msec.
Binary Outputs	8 binary outputs, configured as dry contact, normally open, and must be powered from a Class 2 power source.
Protection	Incoming power and network connections are protected by non-replaceable internal solid-state polyswitches that reset themselves when the condition that causes a fault returns to normal. The power, network, input, and output connections are also protected against voltage transient and surge events.
Status Indicators	LEDs indicate status of communications, running, errors, and outputs
Environmental Operating Range	0° to 140°F (–18° to 60°C), 0 to 90% relative humidity, non-condensing
Storage Temperature Range	–24°F to 140°F (–30°C to 60°C), 0 to 90% relative humidity, non-condensing
Physical	Rugged aluminum housing with removable screw terminals
Overall Dimensions	Height: 10 5/8 in. (27 cm) Width: 3 in. (7.6 cm)
Weight	0.73 lb (0.33 kg)
Listed By	UL-916, (Canadian Std C22.2 No. 205-M1983), CE, FCC Part 15-Subpart B-Class A

LEGEND

A/D – Analog to Digital
CE – Consumer Electronics
FCC – Federal Communications Commission
LED – Light Emitting Diode
UL – Underwriters Laboratories

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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