Installation and Maintenance Manual IM 1286-2

Group: **ATS**
Document PN: **IM1286-2**
Date: **July 2024**

MicroTech® Unit Ventilator Controller

For Classroom Unit Ventilators

Used with Models: Vertical Floor - AVS, AVV, AVB, and AVR
Horizontal Ceiling - AHF, AHB, AHV and AHR
Self-Contained Vertical Floor - AZQ, AZU, AZR, AEQ, ARQ & GRQ

AHRI CERTIFIED™ www.ahridirectory.org Unit Ventilators AHRI Standard 840

Safety Information

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

Recognize safety information. When you see a safety symbol on the unit or in these instructions, be alert to the potential for personal injury or death. Understand the meanings of the words DANGER, WARNING, and CAUTION. DANGER identifies the most serious hazards that will result in death or severe personal injury; WARNING means the hazards can result in death or severe personal injury; CAUTION identifies unsafe practices that can result in personal injury, product damage, or property damage.

Improper installation, adjustment, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may result in personal injury or property damage. This product must be installed only by personnel with the training, experience, skills, and applicable licensing that makes him/her "a qualified professional HVACR installer."

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

Use copper conductors only. Unit terminals are designed to accept other types of conductors. Failure to do so may cause damage to the equipment.

⚠ WARNING

If the unit ventilator is to be used for temporary heating or cooling, the unit must first be properly commissioned. Failure to comply with this requirement will void the warranty.

⚠ CAUTION

Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components. Discharge any static electrical charge by touching the bare metal inside the main control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, relay modules, or power plugs while power is applied to the panel.

⚠ CAUTION

For proper space control, and a more trouble free unit operation, it is important that End-of-Cycle (EOC) valves be used in all face & bypass damper equipped unit ventilators. An EOC valve is required for the wet heat coil in any unit ventilator that combines both a refrigerant coil and a wet heat coil. Use an EOC valve on all wet heat coils to minimize the potential for overheating.

⚠ CAUTION

For proper space control, and a more trouble free unit operation, it is important that an occupancy control means be used such that the unit is placed into unoccupied mode during regular low load conditions such as nighttime, weekends and holidays.

⚠ CAUTION

Extreme temperature hazard. Can cause damage to system components. This MicroTech controller is designed to operate in ambient temperatures from -40°F to 158°F. It can be stored in ambient temperatures from -65°F to 176°F. The controller is designed to operate in a 10% to 90% RH (non-condensing) and be stored in a 5% to 95% RH (non-condensing) environment.

IMPORTANT

Before beginning installation, please read this publication in its entirety. Develop a thorough understanding before starting the installation procedure. This manual is to be used as a guide. Each installation is unique, so only general topics are covered. The order in which topics are covered may not be those required for the actual installation.

General Information

This manual contains information regarding the MicroTech© Direct Digital Control (DDC) system used in the Daikin Applied Unit Ventilator product line. It describes the MicroTech components, input/output configurations, field wiring options and requirements.

For installation and commissioning instructions and general information on a particular unit ventilator model, refer to the appropriate model-specific installation and maintenance bulletin, see Table 1.

For a description of unit operation and information on using the optional Local User Interface (LUI) to view data and set control parameters, refer to the MicroTech operation manual, see Table 1.

For installation and maintenance instructions on a particular plug-in communications module, refer to the appropriate protocol-specific installation and maintenance bulletin, see Table 1. For network wiring or client/server units, follow the network wiring instructions provided in IM 729.

General Description

The Daikin Applied unit ventilator comes equipped with a Direct Digital Control (DDC) system that controls the unit in response to various inputs e.g. temperatures, etc., in either a stand-alone or network controlled by a compatible Building Automation System (BAS) with communications capability in one of several industry standardized protocols.

The unit can operate in several modes; occupied, unoccupied, stand-by, and bypass (tenant override). The MicroTech controls are made up of the following standard components.

The MicroTech Unit Ventilator Controller (UVC) is a DDC microprocessor-based controller designed to provide sophisticated comfort control of an economizer-equipped Daikin Applied unit ventilator. In addition to providing normal operating control, the MicroTech UVC provides alarm monitoring and alarm-specific component shutdown if critical system conditions occur.

Each UVC is factory wired, factory programmed and factory run tested for the specific unit ventilator model and configuration ordered by the customer.

The operator can view actual temperatures, set the most common operating parameters, view alarms, etc., through use of an optional Local User Interface (LUI). The LUI provides a user adjustable security feature to protect against unauthorized or accidental control parameter changes. When networked with a BAS, additional parameters can be remotely read / set in addition to all those available on the LUI.

This MicroTech UVC is capable of complete, stand-alone unit control or it can be incorporated into a building-wide network using on board BACnet MS/TP communications or an optional plug-in LonMark communication module.

Optional MicroTech UV ServiceTool software can be used along with a PC to adjust operating parameters within the UVC. The UV ServiceTool software, while optional, is very useful for trouble-shooting and commissioning by allowing access to all user adjustable parameters within the UVC controller.

Basic Component Data

The main components of the unit ventilator MicroTech DDC system include the Unit Ventilator Controller (UVC), onboard BACnet and time clock capability, optional Local User Interface (LUI), and optional plug-in Lon communication module. Following are brief descriptions of these components.

MicroTech Unit Ventilator Controller (UVC)

(Located beneath the Local User Interface panel). Factory mounted and run tested, microprocessor-based DDC control device capable of complete standalone unit control, client/server control or incorporated into a building-wide network. The UVC contains a microprocessor that is preprogrammed with the application code required to operate the unit. The UVC supports up to 16 analog inputs, 8 binary inputs, 4 analog outputs, 2 PWM outputs, and 14 binary outputs. The controller can be field configured.

Figure 1: MicroTech Unit Ventilator Controller (UVC)

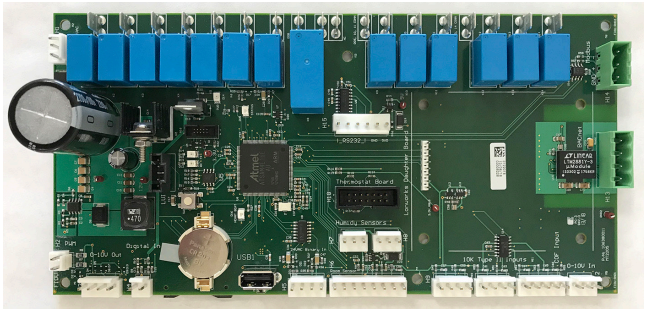


Table 1: Unit Ventilator Support Literature

Unit Ventilator Model Designations	Description	Bulletin Number
AEQ	Air Source Heat Pump	IM 1082
ARQ, GRQ	Water Source Heat Pump	IM 1083
AZQ, AZU, AZR	Self-Contained Air Conditioner	IM 1065
AVS, AVV, AVR, AVB	Vertical Floor Buildup and Split System	IM 817
AHF, AHV, AHR, AHB	Horizontal Ceiling Buildup and Split System	IM 830
All Models	LUI Installation Kit (Option)	IM 1282
Software Operation and Maintenance Literature		
All Models	MicroTech® Unit Ventilator Controls for Daikin Applied Classroom Unit Ventilators	OM 1280
All Models	Daikin Applied Intelligent System Manager Operation Manual	OM 1254
All Models	ServiceTools Operation Manual	OM 732
Protocol-Specific Communication Installation Literature		
All Models	MicroTech Unit Ventilator Protocol Information	ED 19110

Unit Ventilator Controller (UVC) I/O Specifications

Table 2: MicroTech Unit Ventilator Controller (UVC)

Power Supply	24 VAC +/-20% 50/60 Hz
Transformer Sizing	24VA with no loads connected to DO1-7. Otherwise, up to 75VA total depending on the load on DO1-7
Operating Temperature	-4°F(-20°C) to 158°F(70°C)
Storage Temperature	-40°F(-40°C) to 185°F(85°C)
Humidity	10%RH to 90%RH (non-condensing)
Agency Compliance	UL 60730-1 CSA E60730-1
Analog Inputs	AI 1-3 Resistive Input 0-1.5K ohms AI 5-6 Ratiometric 0-5 VDC AI 4, 7-12 Negative Temperature Coefficient (NTC) thermistor Reference resistance = 10,000 ohms @ 77°F (25°C) AI 13 Resistive input active when input is less than 201K ohms AI 14-16 0-10 VDC
Analog Outputs	AO 1-4 0-10 VDC 4-20 mA
PWM Outputs	PWM 1,2 12 VDC, 80Hz
Binary Inputs	BI 1-4 Supports contact closure using external 24 VAC BI 5-8 Supports dry contact closure to ground
Binary Outputs	Binary outputs are designed for 24 VAC low voltage applications. Maximum total output is limited by transformer VA BO 1-7 24 VAC maximum combined load = 10 amps BO 8 24 VAC maximum load = 10 amps BO 9-11 24 VAC maximum load = 10 amps per relay 24 VAC maximum combined load = 12 amps BO 12-14 24 VAC maximum load = 10 amps per relay 24 VAC maximum combined load = 12 amps

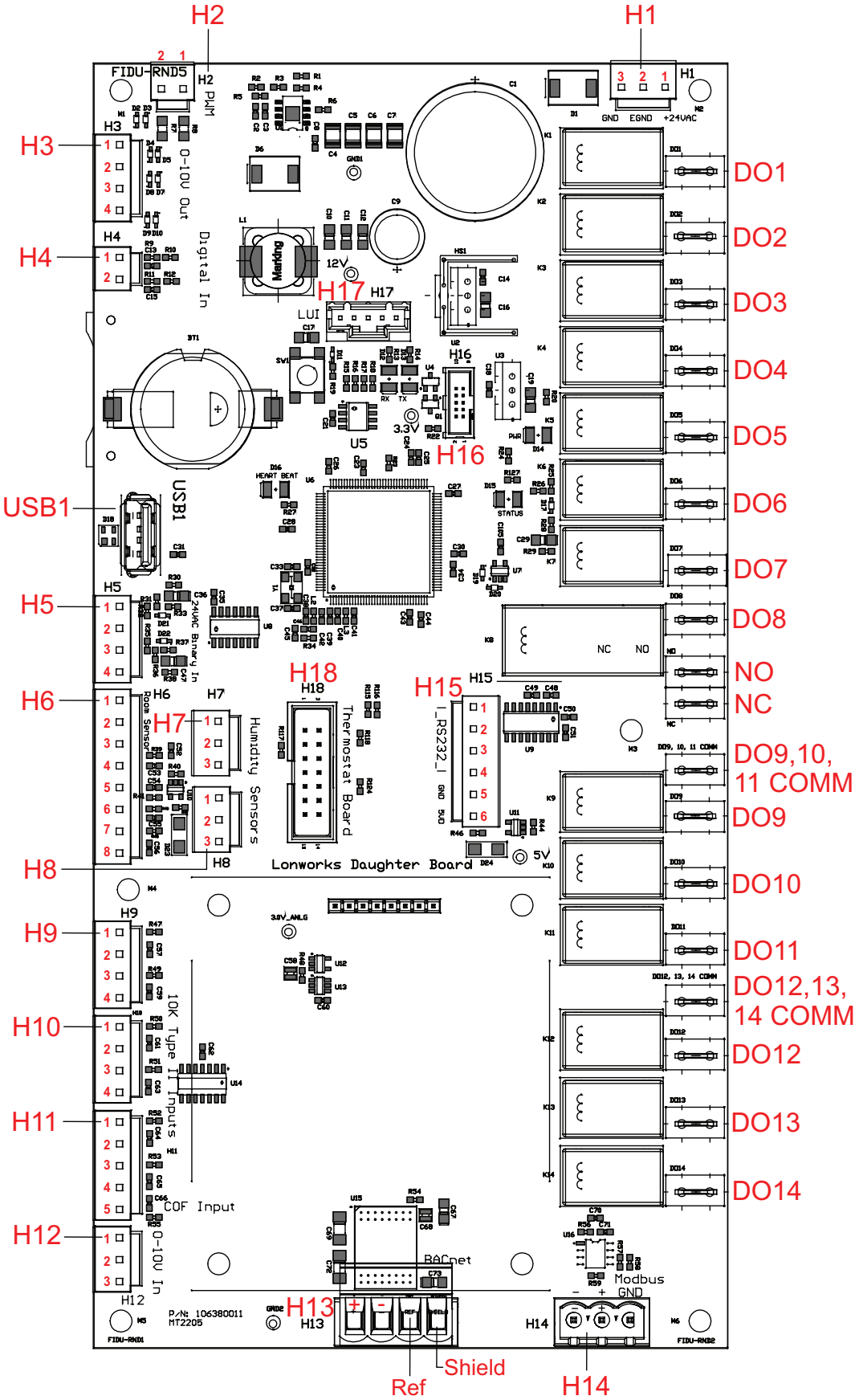
UVC Input and Output Designations

Note: *Refer to Figure 2 on page 8 for input and output terminals locations*

Table 3: UVC Input and Output Designations

Terminal	Software I/O	Signal Type	UV Function
24VAC Input Power			
H1-1		24VAC	UVC Power
H1-2		EGND	Earth Ground
H1-3		GND	Transformer Ground
PWM			
H2-1	PWM 1	80Hz Cycle	Supply Fan
H2-2	PWM 2	80Hz Cycle	
Analog Outputs			
H3-1	AO 1	0-10VDC Out	OA Damper
H3-2	AO 2	0-10VDC Out	F&B Damper
H3-3	AO 3	0-10VDC Out	Modulating Cooling Valve
H3-4	AO 4	0-10VDC Out	Modulating Heating Valve
Binary Inputs			
H4-1	BI 5	Discrete BI	Boilerless Indication
H4-2	BI 6	Discrete BI	Ventilation Lockout
H5-1	BI 1	24VAC BI	High Pressure
H5-2	BI 2	24VAC BI	Freeze Stat
H5-3	BI 3	24VAC BI	Configurable
H5-4	BI 4	24VAC BI	Configurable
Room Sensor Inputs			
H6-1	BI 7	Discrete BI	Occupancy
H6-2	BI 8	Discrete BI	Shutdown
H6-3	BO Status LED	Binary Output	Status LED
H6-4	AI 1	0-1.5K Pot	Setpoint
H6-5	AI 2	0-1.5K Pot	Unit Mode
H6-6	AI 3	0-1.5K Pot	Fan Speed
H6-7	AI 4	10K Type II Thermistor	Space Temperature
H6-8		GND	Sensor Ground
Analog Inputs			
H7-1		5VDC (Output)	Sensor Power
H7-2	AI 5	0-5 VDC Signal	Indoor Humidity Signal
H7-3		GND	Sensor Ground
H8-1		5VDC (Output)	Sensor Power
H8-2	AI 6	0-5 VDC Signal	Outdoor Humidity Signal
H8-3		GND	Sensor Ground
H9-1	AI 7	10K Type II Thermistor	Discharge Air Temperature
H9-2		GND	Sensor Ground
H9-3	AI 8	10K Type II Thermistor	Return Air Temperature
H9-4		GND	Sensor Ground
H10-1	AI 9	10K Type II Thermistor	Outdoor Air Temperature
H10-2		GND	Sensor Ground
H10-3	AI 10	10K Type II Thermistor	Outdoor Coil Refrigerant, Entering Water Temperature
H10-4		GND	Sensor Ground
H11-1	AI 11	10K Type II Thermistor	Leaving Water
H11-2		GND	Sensor Ground
H11-3	AI 12	10K Type II Thermistor	Indoor Coil Refrigerant/ Suction Refrigerant Temperature
H11-4		GND	Sensor Ground
H11-5	AI 13	Conductivity	Condensate
H12-1	AI 14	0-10VDC Input	CO_2
H12-2	AI 15	0-10VDC Input	
H12-3	AI 16	0-10VDC Input	
Binary Outputs			
DO1	BO1	24VAC Output	Fan Low or ECM Signal
DO2	BO2	24VAC Output	Fan Medium
DO3	BO3	24VAC Output	Fan High
DO4	BO4	24VAC Output	Reversing Valve or 2 Position Heating Valve
DO5	BO5	24VAC Output	Fault Indication
DO6	BO6	24VAC Output	Outdoor Fan Signal
DO7	BO7	24VAC Output	Exhaust Fan Signal or Auxiliary Heat
DO8		24VAC or Dry Contact Common	24VAC or Dry Contact Common
NO	BO8	Normally Open Output	Pump or Motorized Valve NO
NC	BO8	Normally Closed Output	Pump or Motorized Valve NC
DO9-11 COMM		24VAC or Dry Contact Common for 3 outputs	Electric heat 24VAC Common
DO9	BO9	24VAC or Dry Contact Output	Electric Heat Stage 1
DO10	BO10	24VAC or Dry Contact Output	Electric Heat Stage 2
DO11	BO11	24VAC or Dry Contact Output	Electric Heat Stage 3
DO12-14 COMM		24VAC or Dry Contact Common for 3 outputs	24VAC Common
DO12	BO12	24VAC or Dry Contact Output	Compressor 1 or 2 position Cooling Valve
DO13	BO13	24VAC or Dry Contact Output	Compressor 2
DO14	BO14	24VAC or Dry Contact Output	Drain Pan Heater

Figure 2: Unit Ventilator Controller Terminals



Optional Local User Interface (LUI)

The LUI provides a unit mounted interface which indicates the current unit operating state and can be used to adjust the unit ventilator operating parameters (operating mode, temperature set points, fan speed and occupancy mode). The LUI features a 4 x 20 OLED digit display, 6 keys, and 2 individual LED indicators. In addition to the operating mode states and fan functions, the touch pad will digitally display:

- The room set point temperature
- The current room temperature
- Any fault code for quick diagnostics at the unit

Figure 3: Optional Local User Interface (AV Model Shown)

Communication Types

On-board BACnet communication or the optional LonWorks communication module (future availability) provide control and monitoring information to your building automation system without the need for costly gateways. Information on BACnet and the optional LonWorks communication module are described below.

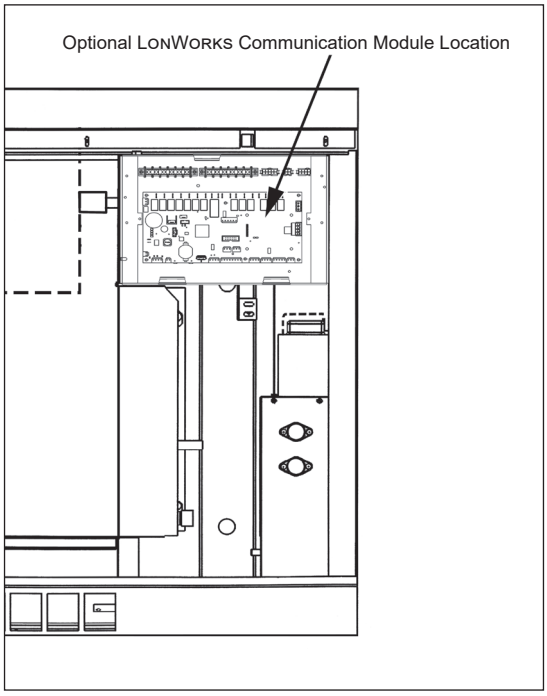
MicroTech® Controller with On-Board BACnet MS/TP

The MicroTech controller allows the UVC to inter-operate with systems that use the BACnet (MS/TP) protocol with a conformance level of 3. It meets the requirements of the ANSI/ASHRAE 135-2008 standard for BACnet systems.

Optional LonWorks SCC Communication Module

Optional Lon network communication is provided via a plug-in communication module that connects directly to the UVC. This module supports the LonWorks SCC (Space Comfort Control) profile number 8500-10. Unit controllers are LonMark certified with this optional LonWorks communication module.

Figure 4: Optional LonWorks Communication Module Location - Behind Right Front Access Panel on AH Unit Types, or Below the Top Right Access Door on AV, AZ, AE, AR, and GR Unit Types



Three Control Modes

MicroTech unit controllers provide the flexibility to operate Daikin Applied unit ventilators on any of three levels:

- As stand-alone units, with control either at the unit or from a wall sensor.
- In a client/server relationship, where client units follow the server unit for some or all functions.
- Controlled as part of a network using a centralized building automation system.

Stand-Alone Control

When operating in stand-alone mode, the MicroTech controller performs complete room temperature and ventilation control. Units can be operated in occupied, unoccupied, stand-by, or bypass (tenant override) modes. Occupied/unoccupied changeover can be accomplished:

- Automatically by an internal daily schedule (two occupied times and two unoccupied times for each of the seven days, and one holiday schedule)
- Using a field-wired occupancy sensor
- If a school has more than one zone, separate, internally-programmed schedules are used to regulate each zone.

Client/Server Control

Designation of the server and client units will be field-configurable and set up for a local peer-to-peer network between one Client connected to up to 9 Server units (network wiring between these units to be field-installed).
In a Client/Server setup, the server units follow the client's mode and setpoints, but the servers operate independently based upon their own locally installed sensors (such as entering water temperature or entering water temperature).
The Client/Server network has only one Client and each of the Server units will need to be configured with a unique address to ensure proper functionality. For information on how to wire for Client/Server control, refer to Client/Server Wiring later in this document. For information on how to set up the MicroTech Application for Client/Server control, refer to OM 1280, 'MicroTech® Unit Ventilator Controls for Daikin Applied Classroom Unit Ventilators'.

- Independent client units (default) use server setpoints and client sensors. The client follows the server unit modes, such as heat or cool, but has the flexibility to provide the conditioning required for its area within the space. Independent client units perform better in spaces where loads vary from one area of the space to the other (such as stairwells or cafeterias).

Network Control

MicroTech unit controllers provide easy integration into your building automation system of choice. All factory-installed options are handled by the unit controller. This simplifies the transmission of monitoring and setpoint data to the building automation system. Also refer to ED 19110.
MicroTech® controls have on-board BACnet communication, with the option for LonTalk to communicate control and monitoring information to your BAS, without the need for costly gateways. Unit controllers are LONMARK certified with the optional LONWORKS® communication module.
Flexible network communication options via our Protocol Selectability feature help you avoid control obsolescence over the life of your Daikin Applied equipment.

Controller Components

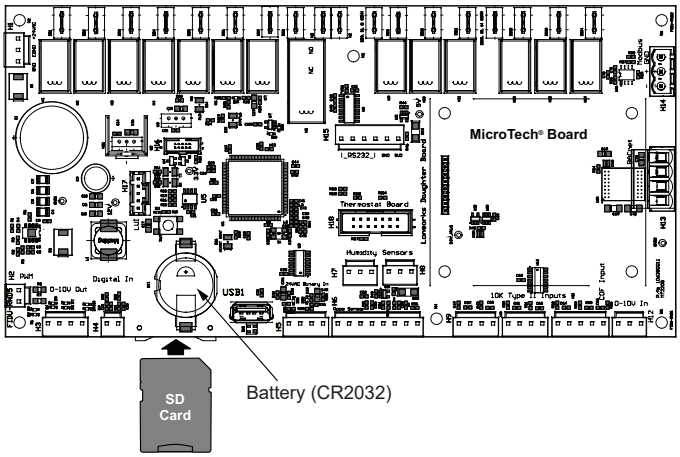
USB Interface

The on board USB-A port allows field access to the MicroTech controller. The USB interface can be used as connection point for the ServiceTool software allowing the user to download code, change unit configuration, and monitor unit operation. Technicians will have access to read all inputs, download code, setup trending, and backup, restore, or change unit configuration.

SD Card

An optional SD card can be factory installed. The SD card allows storage of data trending and configuration parameters. For further details refer to OM 732, "MicroTech® Unit Controller ServiceTools Software User Manual".

Figure 5: MicroTech UVC with SD Card



Battery Backup

The controller battery protects the time clock schedule in the event of a power loss. This battery should be replaced every 3 years with a new CR2032 or equivalent.

Temperature Sensor

The UVC is configured to use a 10K-ohm Type II passive Negative Temperature Coefficient (NTC) unit-mounted and wall-mounted sensor (see Figure 6, Figure 7 and Figure 8). These sensors vary their input resistance to the UVC as the sensed temperature changes (see Table 5 on page 11). Note the sensor locations in Figure 7 on page 12.

Figure 6: Unit Mounted Sensor, for Outdoor Air, Discharge Air and Room Air

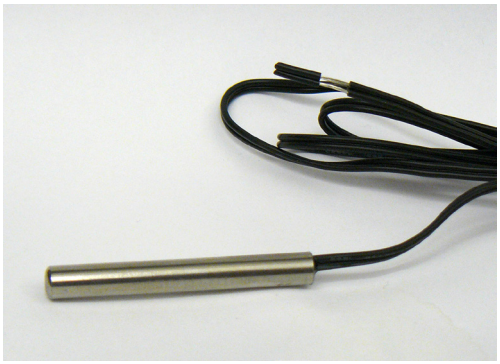


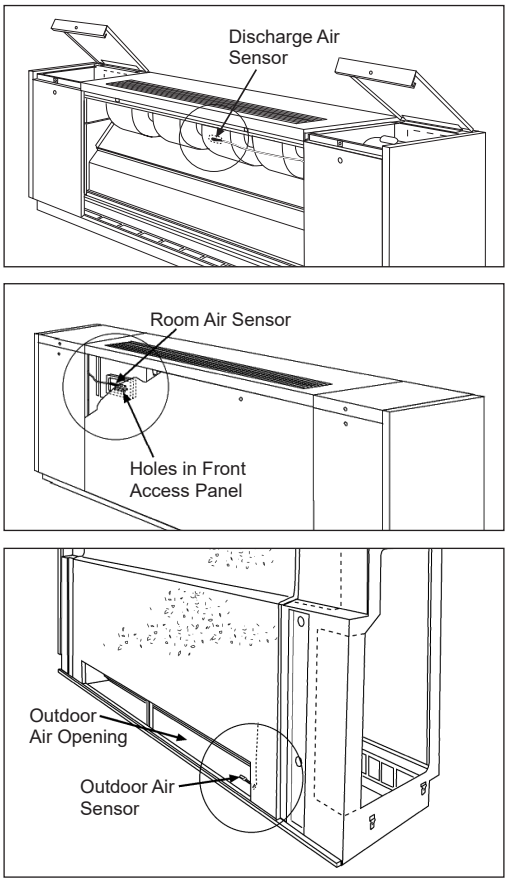
Table 4: 10K Type II Thermistor Output

°F	°C	Ohms	°F	°C	Ohms	°F	°C	Ohms
-39	-39.44	323839	37	2.78	28365	113	45.00	4367
-37	-38.33	300974	39	3.89	26834	115	46.11	4182
-35	-37.22	279880	41	5.00	25395	117	47.22	4006
-33	-36.11	260410	43	6.11	24042	119	48.33	3838
-31	-35.00	242427	45	7.22	22770	121	49.44	3679
-29	-33.89	225809	47	8.33	21573	123	50.56	3525
-27	-32.78	210443	49	9.44	20446	125	51.67	3380
-25	-31.67	196227	51	10.56	19376	127	52.78	3242
-23	-30.56	183068	53	11.67	18378	129	53.89	3111
-21	-29.44	170775	55	12.78	17437	131	55.00	2985
-19	-28.33	159488	57	13.89	16550	133	56.11	2865
-17	-27.22	149024	59	15.00	15714	135	57.22	2751
-15	-26.11	139316	61	16.11	14925	137	58.33	2642
-13	-25.00	130306	63	17.22	14180	139	59.44	2538
-11	-23.89	121939	65	18.33	13478	141	60.56	2438
-9	-22.78	114165	67	19.44	12814	143	61.67	2343
-7	-21.67	106939	69	20.56	12182	145	62.78	2252
-5	-20.56	100218	71	21.67	11590	147	63.89	2165
-3	-19.44	93909	73	22.78	11030	149	65.00	2082
-1	-18.33	88090	75	23.89	10501	151	66.11	2003
1	-17.22	82670	77	25.00	10000	153	67.22	1927
3	-16.11	77620	79	26.11	9526	155	68.33	1855
5	-15.00	72911	81	27.22	9078	157	69.44	1785
7	-13.89	68518	83	28.33	8653	159	70.56	1718
9	-12.78	64419	85	29.44	8251	161	71.67	1655
11	-11.67	60592	87	30.56	7866	163	72.78	1594
13	-10.56	57017	89	31.67	7505	165	73.89	1536
15	-9.44	53647	91	32.78	7163	167	75.00	1480
17	-8.33	50526	93	33.89	6838	169	76.11	1427
19	-7.22	47606	95	35.00	6530	171	77.22	1375
21	-6.11	44874	97	36.11	6238	173	78.33	1326
23	-5.00	42317	99	37.22	5960	175	79.44	1279
25	-3.89	39921	101	38.33	5697	177	80.56	1234
27	-2.78	37676	103	39.44	5447	179	81.67	1190
29	-1.67	35573	105	40.56	5207	181	82.78	1149
31	-0.56	33599	107	41.67	4981	183	83.89	1109
33	0.56	31732	109	42.78	4766	185	85.00	1070
35	1.67	29996	111	43.89	4561	187	86.11	1034

Table 5: Temperature Sensor Specifications

Type	Passive Negative Temperature Coefficient (NTC) - Silicon Sensing Element
Range	-40°F(-40°C) to 140°F(60°C)
Reference Resistance	10K ohms at 77°F(25°C)
Accuracy	+-1% at 77°F(25°C)
Leads	22 AWG, 2-wire

Figure 7: Sensor Locations



Humidity Sensor

On units equipped with humidity sensors, the UVC is configured to use a 0-100% RH, 0-5 VDC, capacitive humidity sensor(s) (see Figure 8 and Table 6). Humidity sensors are available as unit mounted only. The humidity sensors are used with units capable of passive or active dehumidification, or with units using outdoor enthalpy economizer or indoor/outdoor enthalpy economizer.

Figure 8: Humidity Sensor

Table 6: Humidity Sensor Specifications

Type	Capacitive Humidity Sensor
Voltage Supply	5 VDC Nominal (4.75 VDC to 5.25 VDC)
Voltage Output	1 to 4 VDC output for 0 to 100 %RH at 5 VDC supply (ratiometric to voltage supply) (70 ohm output impedance)
Operating Temp	-22°F(-30°C) to 140°F(60°C)
Storage Temp	-40°F(-30°C) to 158°F(70°C)
Humidity	0%RH to 100%RH
Sensing Range	1 to 99 %RH
Accuracy	+/- 3 %RH Typical, +/- 5 %RH Maximum
Calibration	Calibrated to within +/- 2 %RH at 55 %RH
Leads	24 AWG, 3-wire (blue-supply, yellow-output, white-ground)

⚠ CAUTION

The humidity sensor is not protected against reversed polarity. Check carefully when servicing the device or equipment damage will result.

CO_2 Sensor for Demand Controlled Ventilation

On units equipped for Demand Controlled Ventilation (DCV) the UVC is configured to use a 0-2000 PPM, 0-10 VDC, single beam absorption infrared gas sensor. CO_2 sensors are available as unit mounted only. An air collection probe (pitot tube and filter) is installed in the return air of the unit. See Figure 9, Figure 10 and Table 7.

Figure 9: Optional CO_2 Sensor

Figure 10: Air Collecting (Pitot Tube) Probe

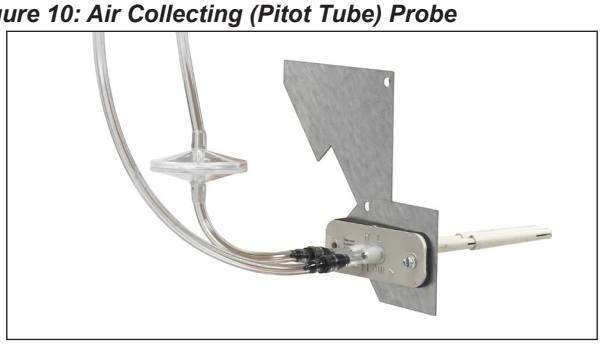


Table 7: Carbon Dioxide (CO2) Sensor Specifications

Type	Single Beam Absorption Infrared Gas Sensor
Operating Temp	60°F(15°C) to 90°F(32°C)
Storage Temp	-40°F(-40°C) to 158°F(70°C)
Humidity	0%RH to 95%RH (non-condensing)
Power Supply	18 to 30 VAC 50/60 Hz
Transformer Sizing	1.75 VA (Class 2)
Sensing Range	0 to 2000 PPM
Voltage Output	0 to 10 VDC (100 ohm output impedance)
Accuracy	+/- 100 PPM or 7% of range whichever is greater
Calibration	Self-calibration system eliminates the need for manual calibration

Actuators

Outdoor Air/Return Air Damper (OAD) Actuator

The outdoor air/return air damper actuator is a unit mounted, direct coupled, proportional control actuator that spring returns the outdoor air damper shut upon a loss of power. The actuator provides proportional damper control based on a 2 to 10 VDC input (scaled to 2-6 VDC for vertical configurations and 2-8 VDC for horizontal configurations) from the DDC Unit Ventilator Controller (UVC). Rotation is clockwise to open OA, close RA.

Figure 11: Outdoor Air Damper Actuator

Face & Bypass Damper Actuator

The Face & Bypass damper actuator is a unit mounted, direct coupled, non-spring returned actuator used for the modulation of the face and bypass damper. The actuator provides proportional damper control based on a 2 to 10 VDC input from the DDC Unit Ventilator Controller (UVC). Refer to the wiring diagram for proper installation of the resistor. The gears can be manually disengaged with a button on the actuator cover. Rotation is counterclockwise to bypass air around coil.

Figure 12: Face & Bypass Actuator

Table 8: Figure 11 and Figure 12 Actuators Technical Data

Actuator Type	Power Supply	Power Consumption	Transformer Sizing	Torque	Running Time	Direction of Rotation
Face & Bypass Damper Actuator	24 VAC ±20% 50/60 HZ	1.2 Watts 2.1 VA	3 VA (class 2 power source)	44 in-lb	90 sec	Reversible with built in switch.
Outdoor Air / Return Air Damper Actuator	24 VAC ±20% 50/60 HZ	Running: 4 Watt 6 VA Holding: 2 Watt 3.6 VA	8 VA (class 2 power source)	35 in-lb	90° with motor 30s 90° with spring return 15s	Spring: reversible with CW/CCW mounting. Motor: reversible with built in switch.

Face & Bypass End of Cycle Valves

2-Way End of Cycle Valve

When piping the 2-Way End of Cycle valve, refer to label to determine the direction of flow. The valve should be installed so that there is a 2" (51mm) minimum clearance to remove the actuator from the valve body. Provide unions for removal of unit coil and/or control valve as a future service consideration. Hot water connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping.

When using MicroTech controls, they must be opposite end. The End of Cycle valve accessory must be field installed on the unit for which it was selected.

Figure 13: 2-Way End of Cycle Valve

Table 9: 2-Position End of Cycle (EOC) Valve Actuator Specifications

Type	2-position, Spring Return, Electric Valve Actuator
Power Supply	24 VAC 50/60 Hz
Power Consumption	6.5 W Running
Transformer Sizing	7 VA (class 2)Dependent upon valve ordered:
Fluid Limits at	General: 32°F(0°C) to 200°F(93°C) at 104°F(40°C)
Ambient Temp Limit	Steam: 32°F(0°C) to 250°F(121°C) at 169°F(76°C), 15 psig (103 kPa)
Run Time	9 to 11-seconds
Spring Return	4 to 5-seconds

3-Way End of Cycle Valve

When piping the 3-Way End of Cycle valve, refer to label to determine the direction of flow. The valve should be installed so that there is a 2" (51mm) minimum clearance to remove the actuator from the valve body. Provide unions for removal of unit coil and/or control valve as a future service consideration. Hot water connections may be same end as cooling coil connections, but are recommended to be opposite end to facilitate piping.
When using MicroTech controls, they must be opposite end. The End of Cycle valve accessory must be field installed on the unit for which it was selected.

Figure 14: 3-Way End of Cycle Valve

Table 10: EOC Actuator Specifications

Control	2 Position
Electrical	24 VAC, 50/60 Hz
Stroke	Power Stroke 9 to 11 seconds Spring return 4 to 5 seconds
Ambient	32°F to 125°F (0°C to 52°C)

Table 11: F&BP EOC Valve Body Specifications

	2-Way Valve	3-Way Valve
Connections	3/4" FNPT, 1" FNPT	3/4" FNPT
Static Pressure	300 psi (2100 kPa)	300 psi (2100 kPa)
Close-Off Pressure	13 & 15 psi (90 & 103 kPa)	13 psi (90 kPa)
Temperature	32°F to 200°F (0°C to 93°C)	32°F to 200°F (0°C to 93°C)

Modulating Valve Actuators

2-Way Modulating Valve (Chilled Water, Hot Water or Combination)

Two-way modulating control valves for MicroTech are designed to regulate the flow of chilled water, hot water or the combination. They consist of a nickel plated brass body and stainless steel ball valve and stem, with a spring return proportional actuator. The optional valve accessory is shipped separately from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 15: 2-Way Modulating Valve (Chilled Water, Hot Water or Combination)

Table 12: 2-Way Actuator Specifications (CW, HW, CW/HW)

Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, ±10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC, 0.5 mA max
Angle of Rotation	Max. 95°, 90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	95 sec
Running Time (Fail-Safe)	<25 sec
Ambient Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 13: 2-Way Valve Body Specifications (CW, HW, CW/HW)

Service	chilled, hot water, up to 60% glycol
Flow Characteristic	equal percentage
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Media Temperature Range (Water)	0°F to 250°F [-18°C to 120°C]
Max Differential Pressure (Water)	50 psi (345 kPa)
Close-Off Pressure	200 psi

2-Way Modulating Valve (Steam) - 1/2"

Two-way modulating control valves for MicroTech are designed to regulate the flow of steam. They consist of a nickel plated brass body and stainless steel ball valve and stem, with a spring return, proportional actuator. The optional valve accessory is shipped separate from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 16: 2-Way Modulating Valve (Steam) - 1/2"

Table 14: 2-Way Actuator Specifications (Steam) - 1/2"

Power Supply	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2" conduit connector"
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC, 0.5 mA max
Angle of Rotation	Max. 95°, 90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	95 sec
Running Time (Fail-Safe)	<25 sec
Ambient Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 15: 2-Way Valve Body Specifications (Steam) - 1/2"

Service	high temperature hot water/low pressure steam, up to 60% glycol
Flow Characteristic	A-port equal percentage
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Max Inlet Pressure (Steam)	15 psi
Media Temperature Range (Water)	60°F to 266°F [16°C to 130°C]
Media Temperature Range (Steam)	250°F [120°C]
Maximum Differential Pressure (Steam)	15 psi
Max Differential Pressure (Water)	60 psi partially open ball, 116 psi full open
Close-Off Pressure	200 psi

2-Way Modulating Valve (Steam) - 3/4"

The modulating control valves for MicroTech are designed to regulate the flow of steam. They consist of a nickel plated brass body and stainless steel ball valve and stem, with a spring return, proportional actuator. The optional valve accessory is shipped separate from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 17: 2-Way Modulating Valve (Steam) - 3/4"

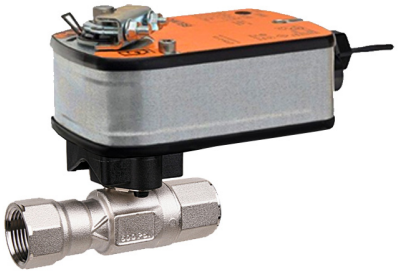


Table 16: 2-Way Actuator Specifications (Steam) - 3/4"

Power Supply	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC (max 0.7 mA) for 95°
Angle of Rotation	90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	150 sec constant, independent of load
Running Time (Fail-Safe)	<25 sec @ -4°F to 122°F [-20°C to 50°C], < 60 sec @ -22°F [-30°C]"
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 17: 2-Way Valve Body Specifications (Steam) - 3/4"

Service	high temperature hot water/low pressure steam, up to 60% glycol
Flow Characteristic	A-port equal percentage
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Max Inlet Pressure (Steam)	15 psi
Media Temperature Range (Water)	60°F to 266°F [16°C to 130°C]
Media Temperature Range (Steam)	250°F [120°C]
Maximum Differential Pressure (Steam)	15 psi
Max Differential Pressure (Water)	60 psi partially open ball, 116 psi full open
Close-Off Pressure	200 psi

3-Way Modulating Valve (Chilled Water, Hot Water or Combination)

Three-way modulating control valves for MicroTech are designed to regulate the flow of hot or chilled water or the combination. They consist of a nickel plated brass body and stem with chrome plated brass ball valve, with a spring return, proportional actuator. The optional valve accessory is shipped separate from the unit ventilator for field installation to prevent shipping damage and to provide flexibility in making the field piping connection.

Figure 18: 3-Way Modulating Valve (Chilled Water, Hot Water or Combination)

Table 18: 3-Way Actuator Specifications (CW, HW, CW/HW)

Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, ±10%
Electrical Connection	3ft [1m], 18 GA plenum cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	2 to 10 VDC, 0.5 mA max
Angle of Rotation	Max. 95°, 90°
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	95 sec
Running Time (Fail-Safe)	<25 sec
Ambient Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]

Table 19: 3-Way Valve Body Specifications (CW, HW, CW/HW)

Service	chilled, hot water, up to 60% glycol
Flow Characteristic	A-port Equal percentage; B-port modified linear for constant flow
Controllable Flow Range	75°
Body Pressure Rating [psi]	600
Media Temperature Range (Water)	0°F to 250°F [-18°C to 120°C]
Max Differential Pressure (Water)	50 psi (345 kPa)
Close-Off Pressure	200 psi

Make Electrical Wiring Connections

⚠ WARNING

To avoid electrical shock, personal injury or death, be sure that field wiring complies with local and national fire, safety, and electrical codes, and voltage to the system is within the limits shown in the job-specific drawings and unit electrical data plate(s).

⚠ DANGER

Power supply to unit must be disconnected when making field-connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

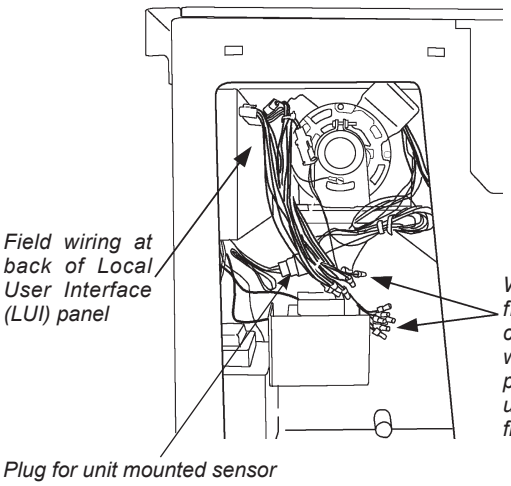
⚠ CAUTION

Use copper conductors only. Use of aluminum conductors may result in equipment failure and overheating hazards. All wiring in right hand compartment must be class 1.

Field Wiring Harness Locations

The low voltage field wiring connections have all been centrally located within the unit ventilator and are easily accessible.
To simplify field connections, multi-pin plugs are factory provided and pre-wired with short wire whips. Each of the wires in these wire whips is capped and should remain capped if not used. To make a field connection simply locate the correct wire, cut the wire cap from the wire and then connect the wire with your field wiring as shown in the field wiring diagrams.
All low voltage field wiring connections must be run in shielded cable with the shield drain wires connected as shown in the field wiring diagrams. See the wiring diagram provided on the unit ventilator right front access panel.
In addition, those unit ventilators equipped with optional electric heating coil have electric heating coil power connections at right end only.

Figure 19: Model AV - Field Wiring Whips with Caps Viewed From Right End Compartment



Wiring Location Using Wall Sleeve with Models AZQ, AZR, AZU and AEQ

Figure 20: Wall Sleeve with Electric Stub-Up from Bottom

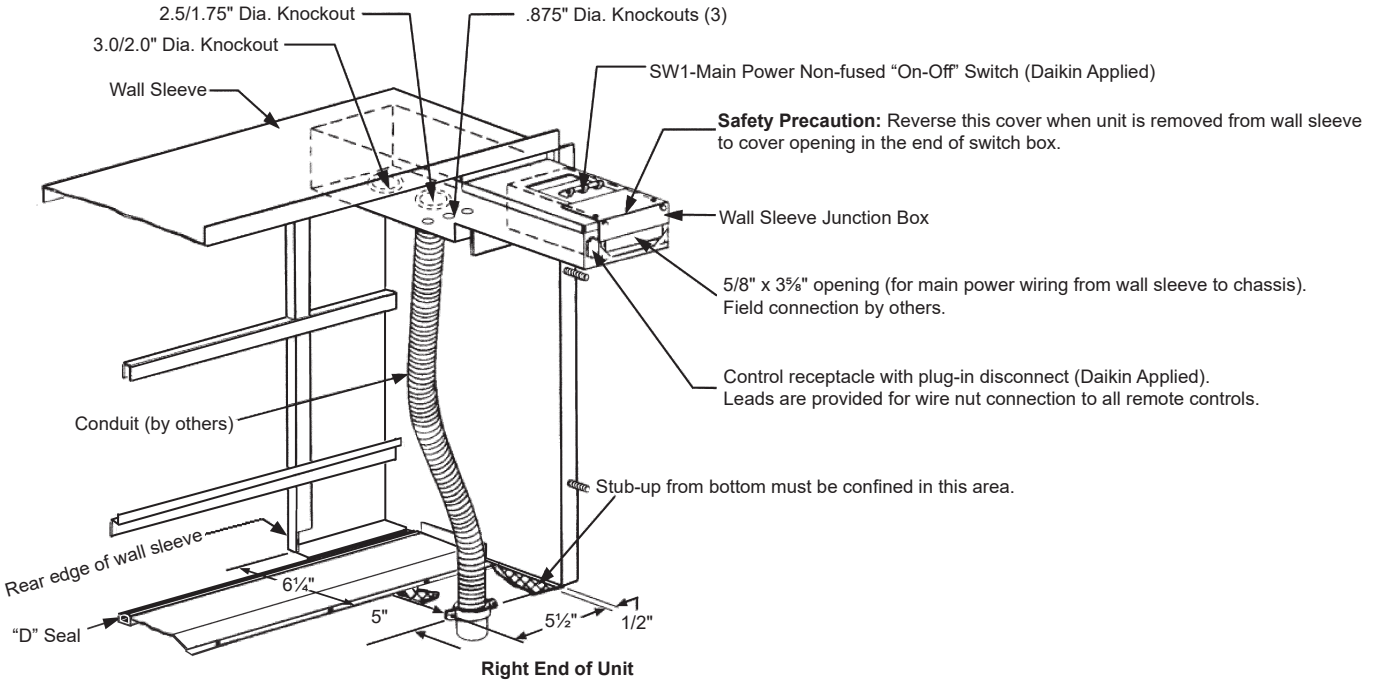


Figure 21: Wall Sleeve with Electric Stub-Up from Side

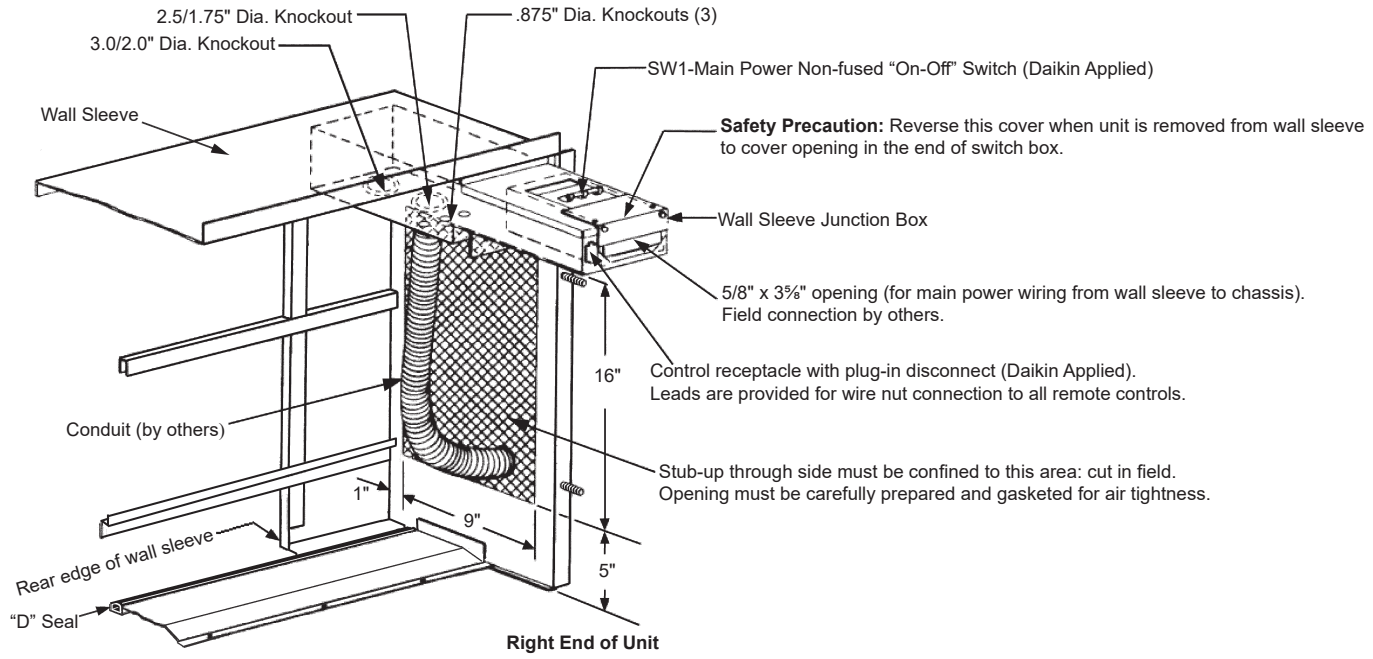
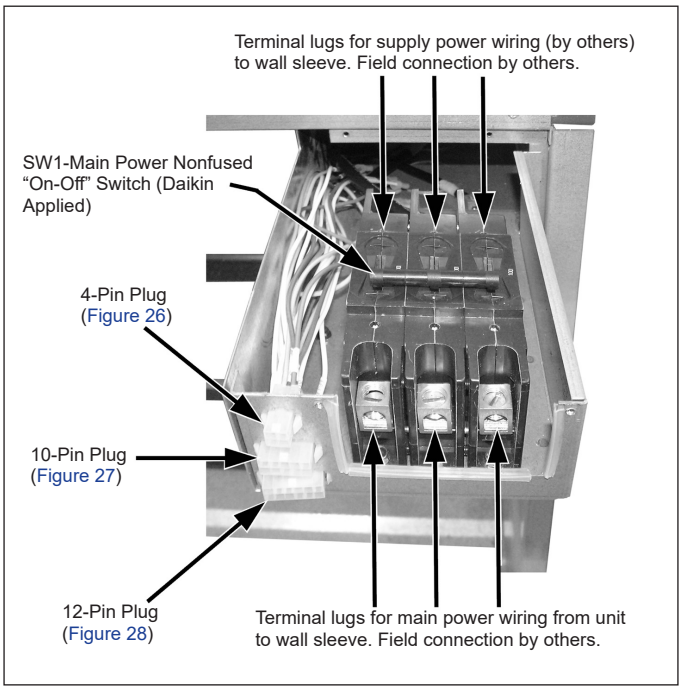


Figure 22: Wall Sleeve Junction Box Details for MicroTech - Models AZ & AE



Note: *For Electromechanical control use 12-pin plug only. 10-pin plug and 4-pin plug not used for electromechanical. Control connections for electromechanical are made to the terminal block in the left end compartment. For further details on Electromechanical controls see IM 1065 (Models AZ) and IM 1082 (Model AE).*

Figure 23: Models AR & GR Self-Contained WSHP Units - Electrical Power On/Off Switch Located Behind Front-Middle Access Panel in Wire Trough, with Power Entry Accessed Behind Right-Front Access Panel.

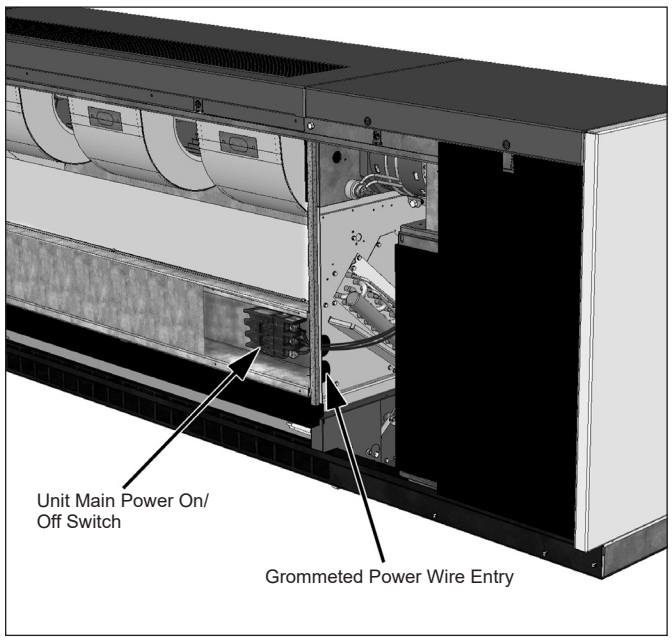


Figure 24: Models AR & GR - Electrical Power On/Off Switch for Power Wiring Connections

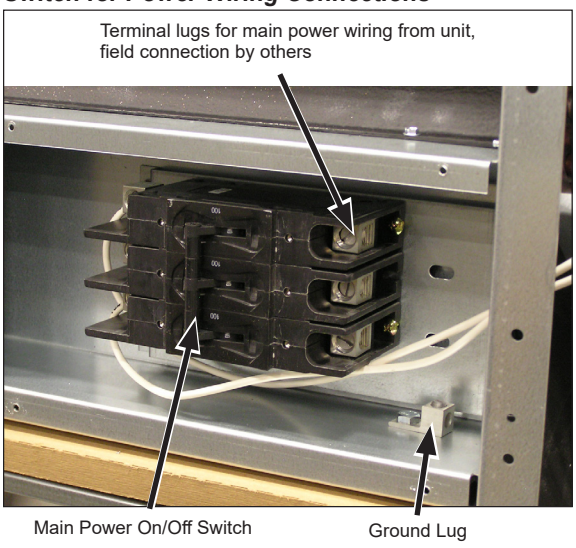


Figure 25: Models AR & GR - Control Wiring Plug Connections in Right End Compartment

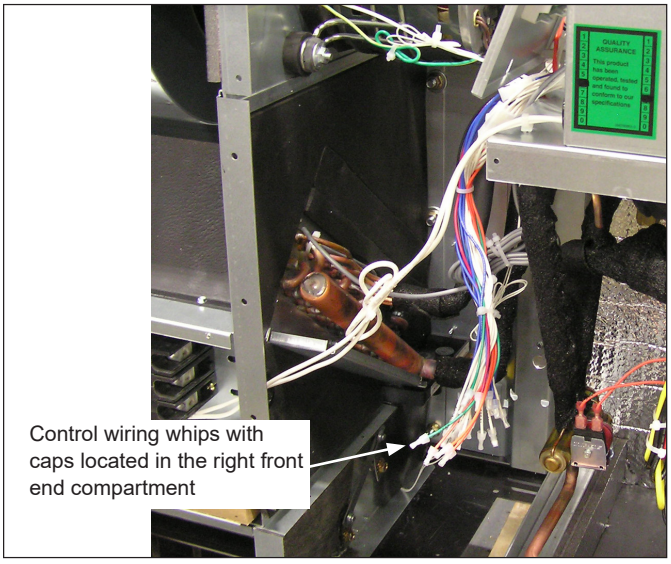
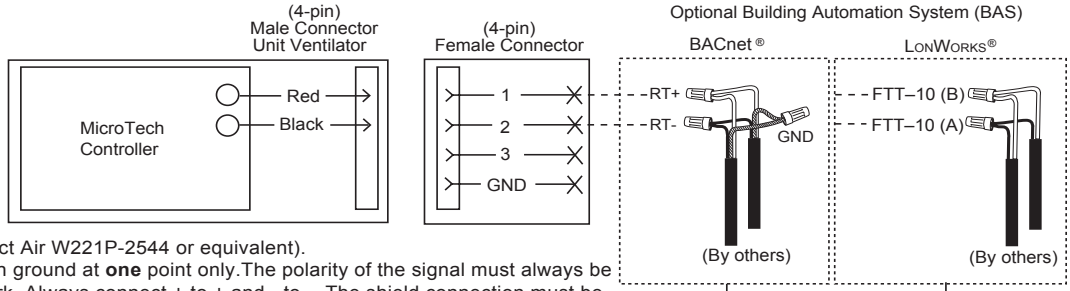


Figure 26: 4-Pin Plug MicroTech Control Wiring Diagram

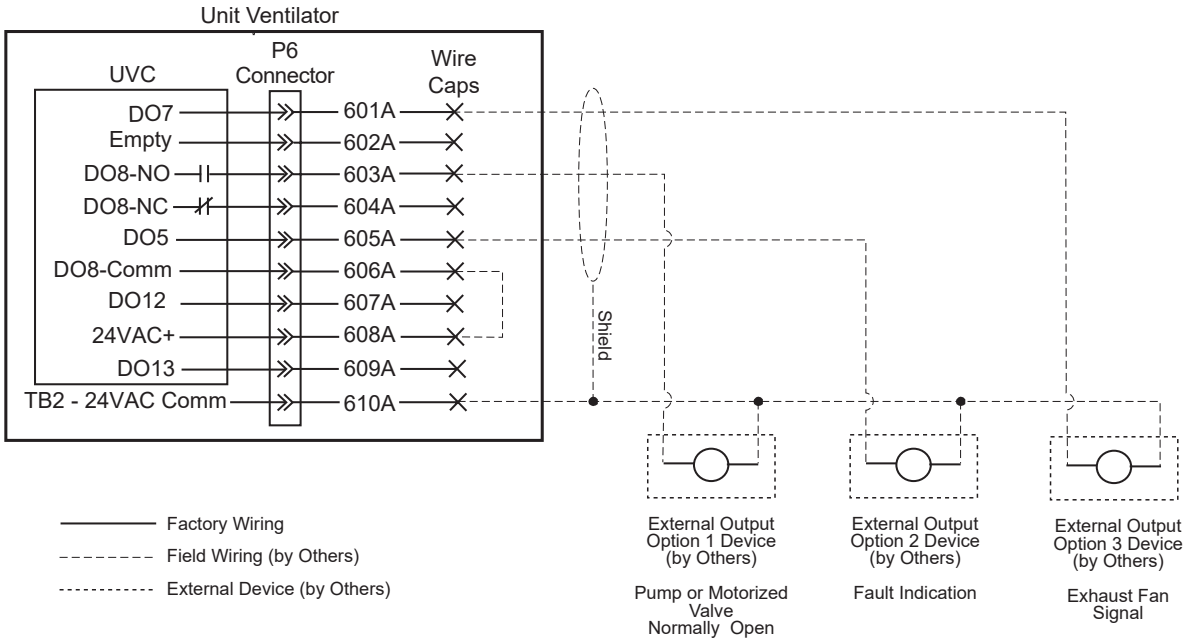


Wiring:
Use twisted shielded pair (Connect Air W221P-2544 or equivalent).
Daisy-chain and tie shield to earth ground at **one** point only.The polarity of the signal must always be maintained throughout the network. Always connect + to + and - to -. The shield connection must be continuous throughout the entire network and must be connected to earth ground at **one** (and only one) point.

The BACnet MS/TP bus can use either solid or stranded wires of the following types:
3-wire twisted cable, 2 twisted-pair telephone cable, or two twisted pair with shield.
The wiring is polarity sensitive. The polarity of the signal must always be maintained throughout the network. Always connect + to + and - to -. The shield connection must be continuous throughout the entire network and must be connected to earth ground at **one** (and only one) point.

Use Belden 8471, NEMA Level 4, or Echelon-approved equivalent wire.
Since the LonWorks communication wiring is polarity insensitive, no polarity must be observed when making connections via the unshielded twisted-pair wiring.

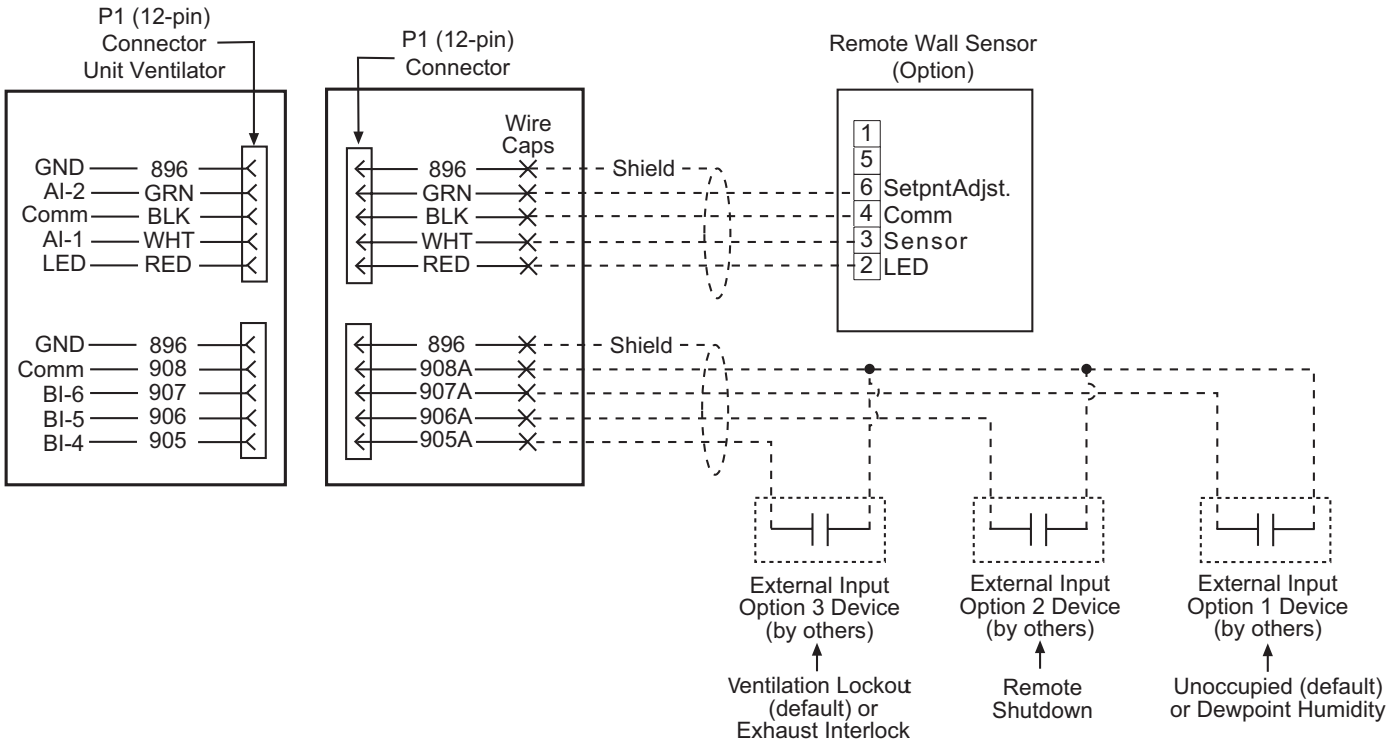
Figure 27: 10-Pin Plug MicroTech Wiring Diagram



Note: *Not all external input options are available for all models.*

Figure 28: 12-Pin Plug MicroTech® Control Wiring Diagram

Note: *Not all external input options are available for all models.*



Using A Remote Temperature Sensor

The low voltage field wiring connections have all been centrally located within the unit ventilator and are easily accessible.
To simplify field connections, multi-pin plugs are factory provided and pre-wired with short wire whips, see Figure 25 on page 18. Each of the wires in these wire whips is capped and should remain capped if not used. See Table 21 for wiring the remote mounted temperature sensor to the unit control wiring.

All low voltage field wiring connections must be run in shielded cable with the shield drain wires connected as shown in the field wiring diagrams.
For sensor terminal wiring details see the installation manual specific to the sensor being used.
The UVC is capable of using one of four remote wall mounted temperature sensors. It is recommended that additional wires be pulled to compensate for potential wire breakage or future options

Table 20: Room Temperature Sensors

Room Temperature Sensors used with Unit Ventilator		**Digitally Adjustable Display Sensor** 	**Digitally Adjustable Display Sensor** 	**Basic Room Sensor With Cool to Warm Adjust** 	**Basic Room Sensor** 
		Part No. 910247458	**Part No.** 910247448	**Part No.** 910247453	**Part No.** 910247450
Feature					
Setpoint Adjustment		Digitally Adjustable	Digitally Adjustable	Cool to Warm	None
Display	Room Temperature & Setpoint	●	●		
Operating Modes	System	Heat-Cool-Auto-Off			
	Fan	Auto-High-Medium-Low			
	Occupancy	LCD Display of Occupied-Unoccupied Icon	LCD Display of Occupied-Unoccupied Icon		
Annunciation	Status LED	LCD Display of Unit Status	LCD Display of Unit Status	●	●
	LCD Alarm Display	●	●		
Reset	Alarm	●	●	●	●
	Setback Override	●	●	●	●

Table 21: Unit Ventilator MicroTech Board to Digital Room Temperature Sensor Wiring

MicroTech Base Board									
Terminal Block Label	**TB1**	**H6-1**	**H6-2**	**H6-3**	**H6-4**	**H6-5**	**H6-6**	**H6-7**	**H6-8**
Sensor 910247458	●	●	○	●	●	●	●	●	●
Sensor 910247448	●	●	○	●	●	○	○	●	●
Sensor 910247453	○	○	○	●	●	○	○	●	●
Sensor 910247450	○	○	○	●	○	○	○	●	●
Description	24VAC	Occupancy	Shutdown (Not Used)	Status LED	Setpoint	Unit Mode	Fan Speed	10K RTD	Ground
Wire	**908**	**907**	**906**	**909**	**912**	**901**	**902**	**911**	**910**
Typical Wiring									
Terminal Label	**R**	**U**	**1 (ST)**	**3 (SP)**	**2 (FM)**	**6 (FC)**	**4 (UTS)**	**5 (GND)**	
Description	24VAC	Unoccupied	Unit Status Output	Setpoint Adjust	Unit Mode	Fan Speed	Room Temp Sensor & Tenant Override	Ground	
Room Temperature Sensor									

Terminal Designations

● = Active Terminal ○ = Not Used

When Using A Remote Temperature Sensor

⚠ WARNING

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

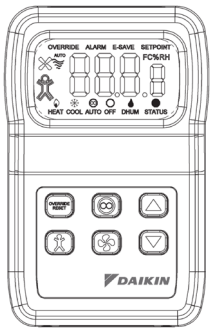
⚠ WARNING

To avoid electrical shock, personal injury or death:

1. Installer must be qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and damage to equipment.
3. Make all connections in accordance with electrical wiring diagrams, and in compliance with national and local codes. Use copper conductors only.
4. Do not exceed ratings of the device. This is a low voltage device: Never apply more than 12VAC/VDC to any lead or damage will result.
5. Avoid locations where excessive moisture, corrosive fumes, or vibrations are present.

Note: *Avoid placing wall sensor near drafty areas such as doors or windows. Avoid external walls, or dead spots near exposed columns. Avoid direct sunlight on wall sensor.*

Figure 29: Wall Mounted Temperature Sensor



If a decision is made to use a remote wall mounted temperature sensor instead of the unit mounted room air sensor, then placement of the remote wall mounted temperature sensor is critical for proper room temperature sensing (see Figure 30 and Figure 31). The UVC is capable of using one of four remote wall mounted temperature sensors. It is recommended that additional wires be pulled to compensate for potential wire breakage or future options.

- 6-Button Digital Adjustable Sensor (PN 910247458) 8 total wires (power and ground wires should be bundled separately)
- 4-Button Digital Adjustable Sensor (PN 910247448) 6-wires (power and ground wires should be bundled separately)
- The Basic Sensor with setpoint adjustment (PN 910247453) 4-wires
- The Basic Sensor (PN 910247450) 3-wires

NOTICE

For sensor terminal wiring details see the installation manual specific to the sensor being used.

Figure 30: Correct Wall Sensor Locations

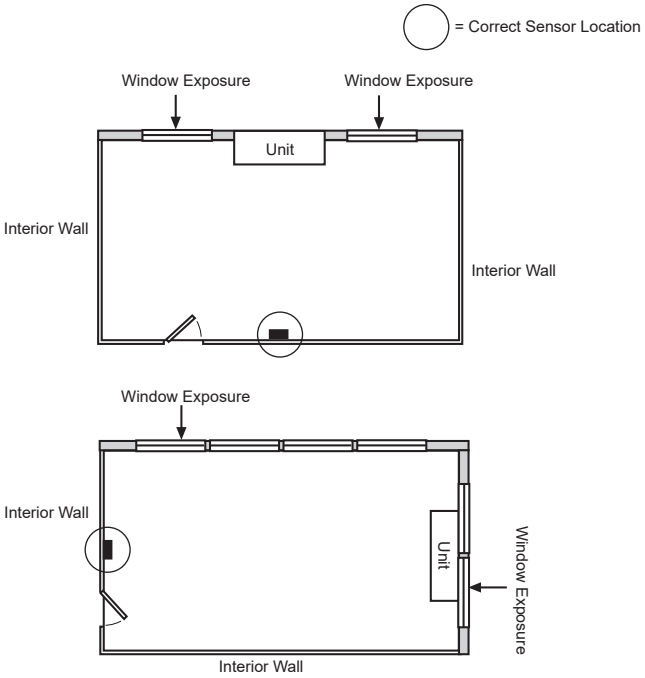


Figure 31: Incorrect Unit and Wall Sensor Locations

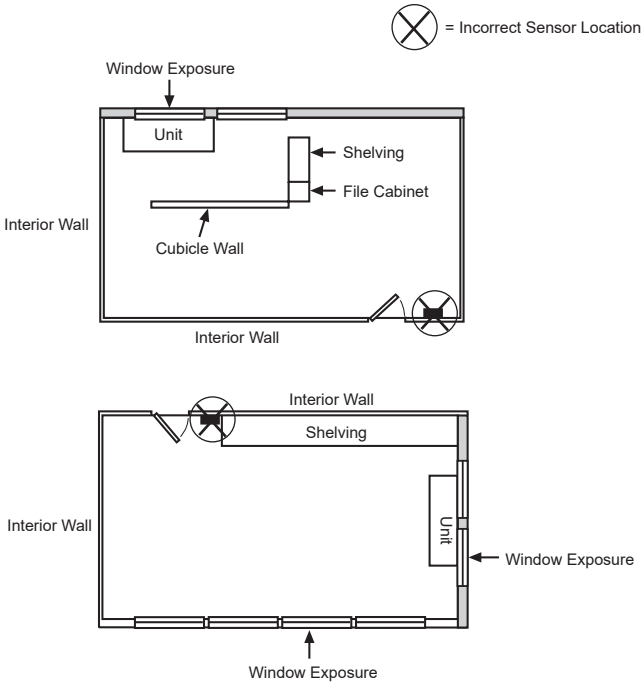


Table 22: Max Sensor Wire Length and Gauge

Maximum sensor wire length for less than 1°F error	
Gauge	**Length**
16 AWG	500 ft. (152 m)
18 AWG	310 ft. (94 m)
20 AWG	200 ft. (61 m)
22 AWG	125 ft. (38 m)

Mounting

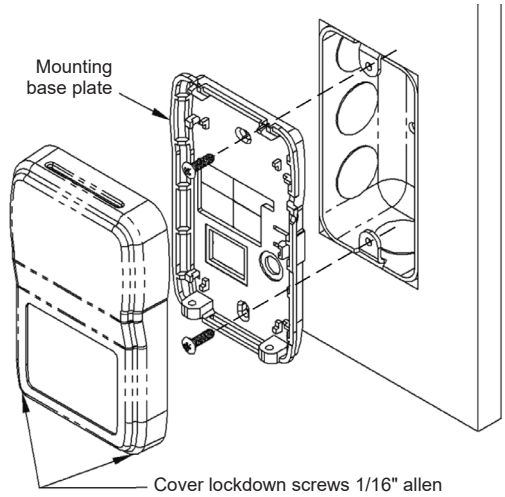
Location

Avoid mounting on outside walls or in direct sunlight.

Junction Box, (J-Box)

1. Pull the wire through the wall and out of the junction box, leaving about six inches free.
2. Pull the wire through the hole in the base plate.
3. Secure the back plate to the box using the #6-32 × 1/2 inch mounting screws provided.
4. Screw the plate firmly to the wall so the foam plate backing is compressed about 50%.
5. Terminate the unit according to the guidelines in the Termination section.
6. Attach cover by latching it to the top of the base, rotating it down and snapping into place.
7. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until it is flush with the bottom of the cover.

Figure 32: Junction Box Mounting (Hardware is Provided for Both Junction Box and Drywall Installation.)



Drywall Mounting

1. Place the base plate against the wall where you want to mount the sensor.
2. Mark out the two mounting holes where the unit will be attached to the wall. Drill a 3/16” hole in the center of each mounting hole and insert a drywall anchor into the holes.
3. Drill one 1/2” hole in the middle of the marked wiring through hole area.
4. Pull the wire through the wall and out the 1/2” hole, leaving about six inches free.
5. Pull the wire through the hole in the base plate.
6. Secure the base to the drywall anchors using the #6 × 1” mounting screws provided.
7. Screw the plate firmly to the wall so the foam plate backing is compressed about 50%.
8. Terminate the unit according to the guidelines in the Termination section.
9. Attach cover by latching it to the top of the base, rotating it down and snapping it into place.
10. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until it is flush with the sides of the cover

Note: *In any wall-mount application, the wall temperature and the temperature of the air within the wall cavity can cause erroneous readings.*

The mixing of room air and air from within the wall cavity can lead to condensation, erroneous readings and sensor failure. To prevent these conditions, Daikin Applied recommends sealing the conduit leading to the junction box with fiberglass.

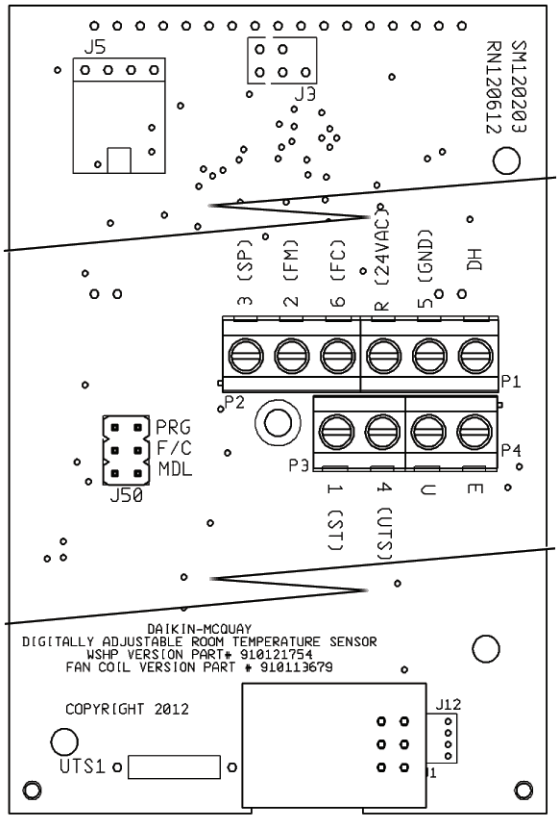
Maintenance

Wipe the display as needed with a damp water only cotton cloth. Do not use any type of cleaner as it may damage the buttons or scratch the display. Do not paint.

Terminations

Daikin Applied recommends using shielded 22AWG for all connections and a separate twisted pair for the power wire connections. The shield should be earth grounded only at the power source. Larger gauge wire may be required for runs greater than 250'.

Figure 33: Sensor Circuit Board



⚠ CAUTION

The AC power wiring at terminals [R] & [5] should be run in a separate twisted shielded pair to avoid fluctuating and inaccurate signal levels induced into the other sensor signal wires. This sensor AC power can be run in the same conduit with the sensor signal wire as long as it's run in twisted, shielded pair and terminated properly.

All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run any of this device's wiring in the same conduit as other AC power wiring. Tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. If you are experiencing any of these difficulties, please contact your Daikin Applied representative.

Power & Control Field Wiring

Figure 34: External Input Wiring Examples with or without Daisy Chaining of Units

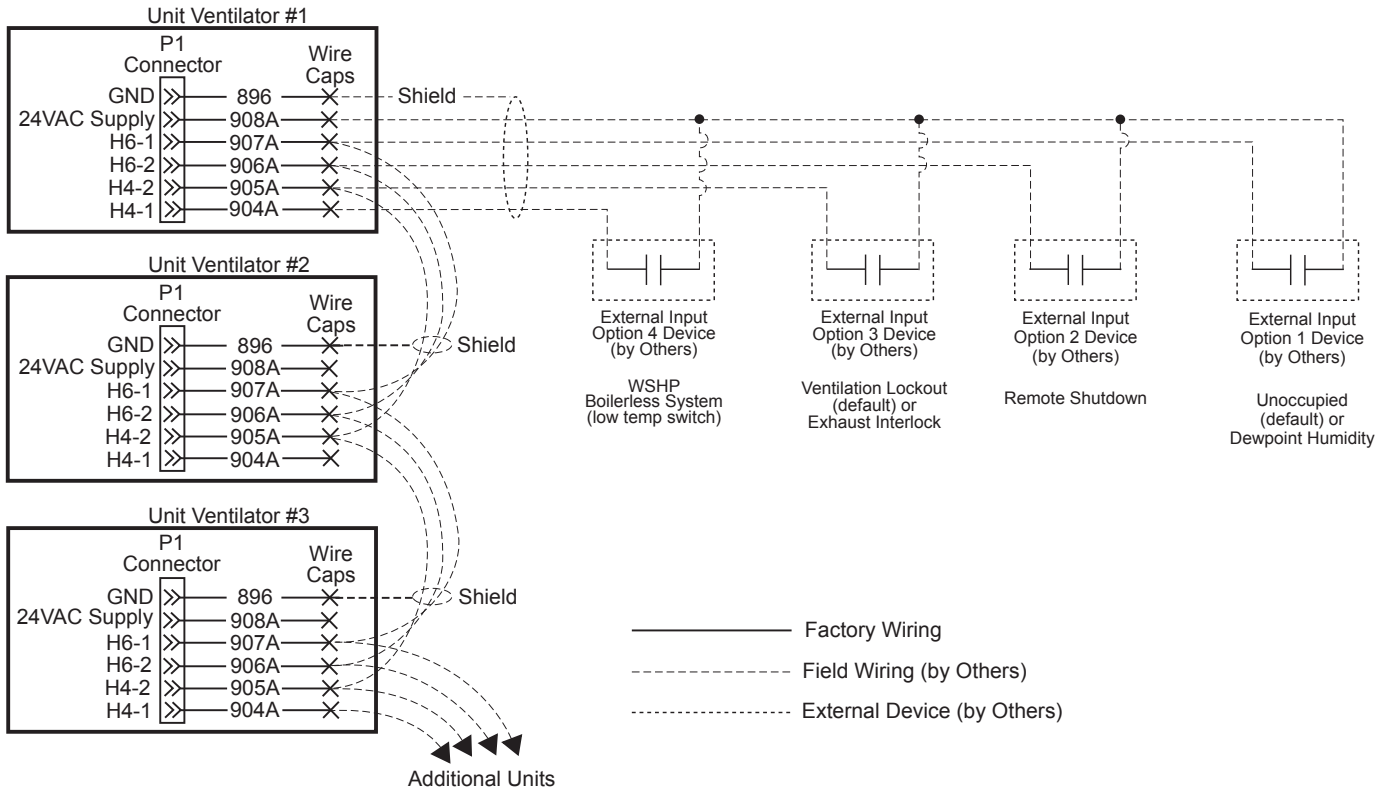


Figure 35: External Output Wiring - Multiple Units Shown

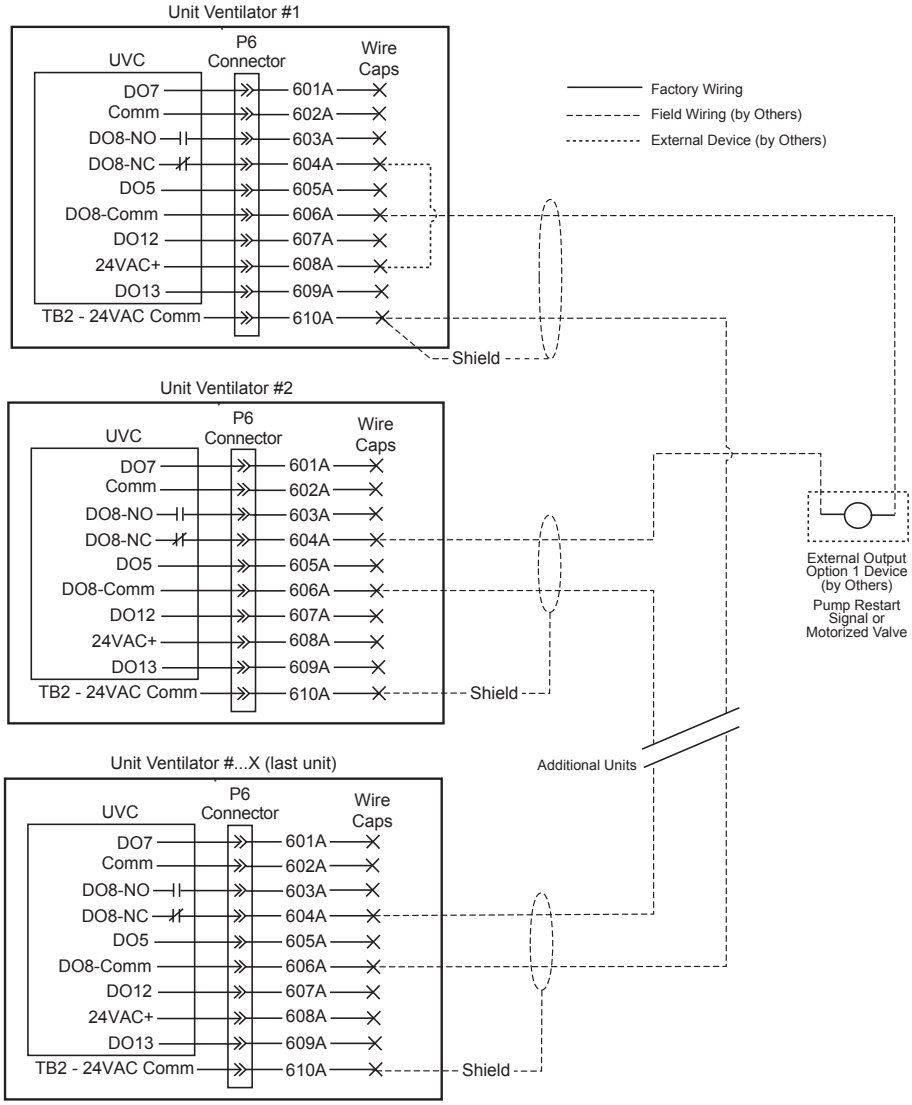
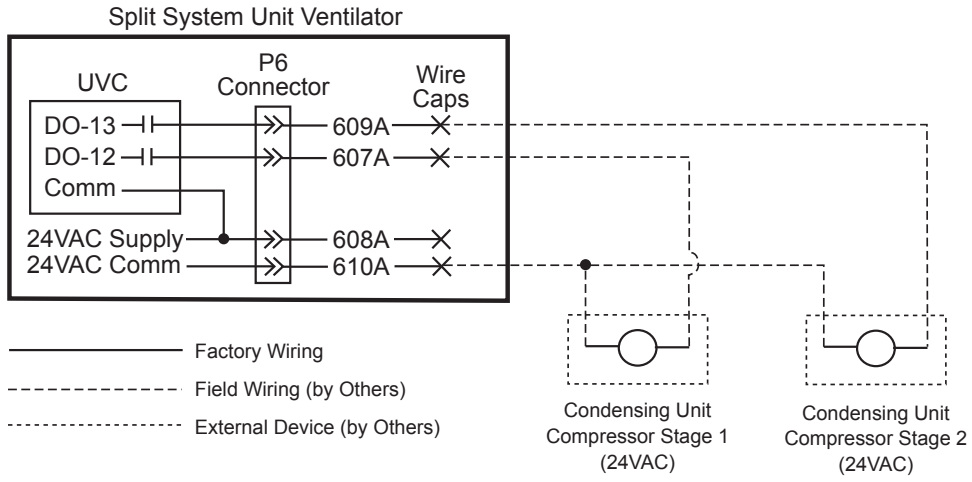


Figure 36: Split-System Condensing Unit Signal Wiring



Client/Server Communication Wiring

Client/Server communication wiring to all client/server devices on the network, shall be installed per standard Modbus wiring guidelines. Up to 10 controllers (1 Client and up to 9 Servers) can be connected in a Client/Server network. All devices in the network shall be Daisy-Chained in any order using 22 AWG twisted pair stranded shielded wire. For lengths over 4000 feet a repeater shall be used, however minimize wire length when possible. Do not “Star” or “T” the network wire. See Figure 38 for a detailed diagram.

Required Hardware:

- Screwdriver
- Controls screwdrivers
- 22 AWG twisted pair stranded shielded communication wire (field supplied)
- (2) 120 ohm end of line resistors (field supplied)

Modbus communication wiring is landed on connector H14 on the MicroTech controller. The mating connector for terminal H14 is part number 910108485. See Figure 37 for a detailed diagram.

Terminal	Signal Type	UV Function
Modbus		
H14-1	RS485 -	Modbus -
H14-2	RS485 +	Modbus +
H14-3	EGND	Earth Ground

Figure 37: Connector H14 on MicroTech Controller

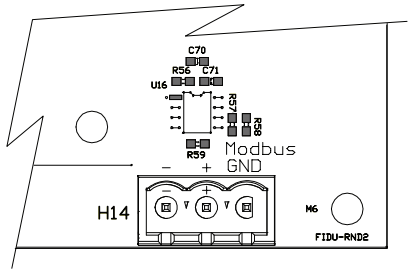
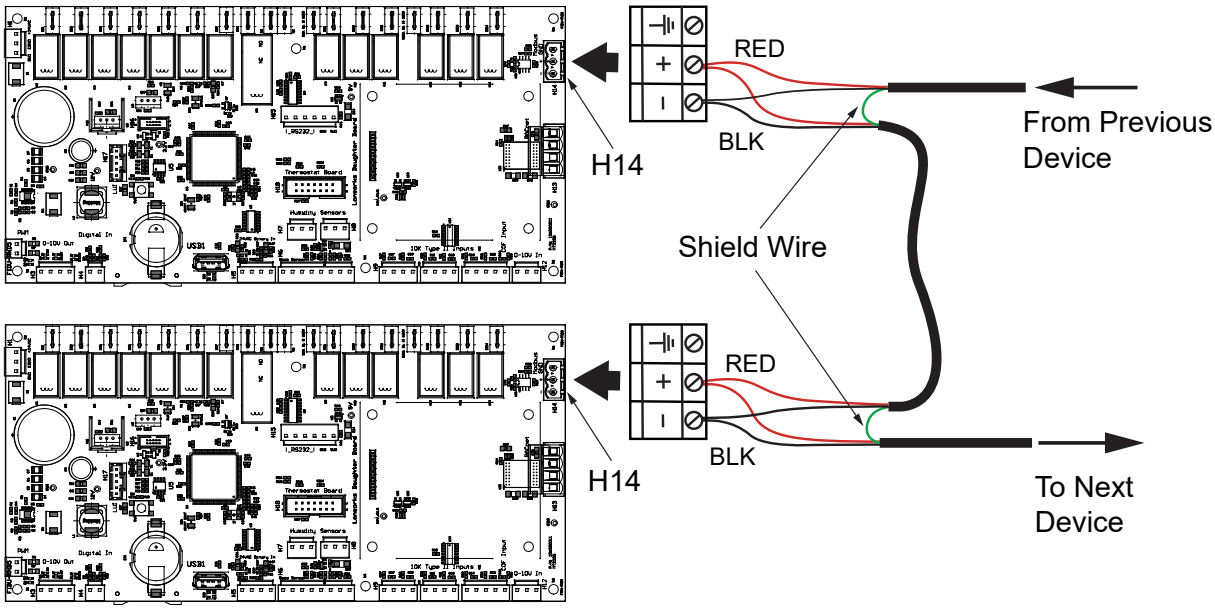


Figure 38: Daisy Chain Wiring Summary



To properly connect the communication wires to the appropriate terminal block follow these steps:

1. Cut off 1 inch of the outer jacket of the cable, being cautious to not nick the inner insulation.
2. For each inner wire strip off 0.25 inches of the insulation.
3. Ensure the polarity (+/-) for each conductor is maintained throughout all devices.
4. When wiring two cables to the controller, twist together the shield wires from both cables and secure with a wire nut, shown in Figure 39. Twist the wire nut in the same direction the wires were twisted together. Land shield to earth ground at ONE END ONLY to prevent ground currents from being created as seen in Figure 41. **Ensure that the shield wire does not ground against the case.**
5. Insert the wires into the appropriate terminal block. The bare communication wire shall not extend beyond 0.125 inches, shown in Figure 40.

Figure 39: Twisted Pair Wiring with The Shields Twisted Together. Use a Wire-Nut on the Shield Connection

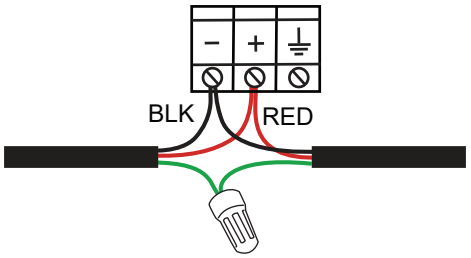
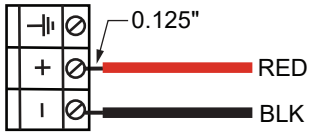


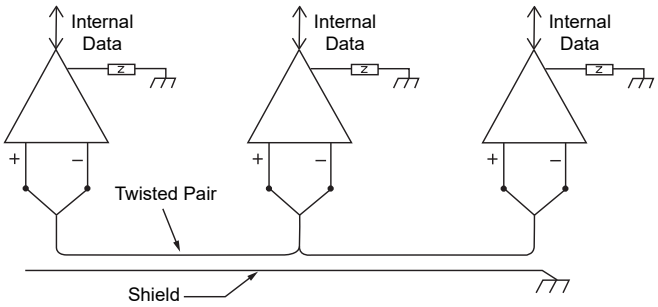
Figure 40: Communication Wires Inserted into Terminal Block



NOTE: If bare communication wire contacts the cable's foil shield, shield wire, or a metal surface other than the terminal block, communications may fail.

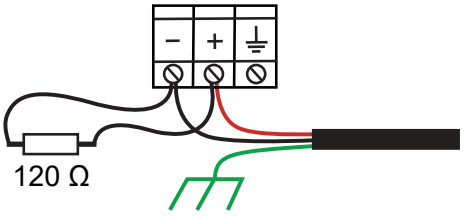
In Figure 41 all of the non-isolated devices use two-wire connections with the reference level between devices established by an internal earth ground connection made through some impedance (Z) at each device. This is generally the lowest cost solution and is sufficient for installations where electrical noise, ground noise, and stray fields are low. RS-485 is designed to operate with voltages on the signaling wires between -7 and +12 volts.

Figure 41: Twisted Pair Wiring with Devices and Shield Grounded at One Location



A 120 ohm end of line (EOL) resister, also known as a termination resistor, is required on both ends, as seen in Figure 42. This will reduce bounce back interference when the Modbus signal gets to the end of the trunk.

Figure 42: Wiring at EOL Device. Only Ground Shield at One Location



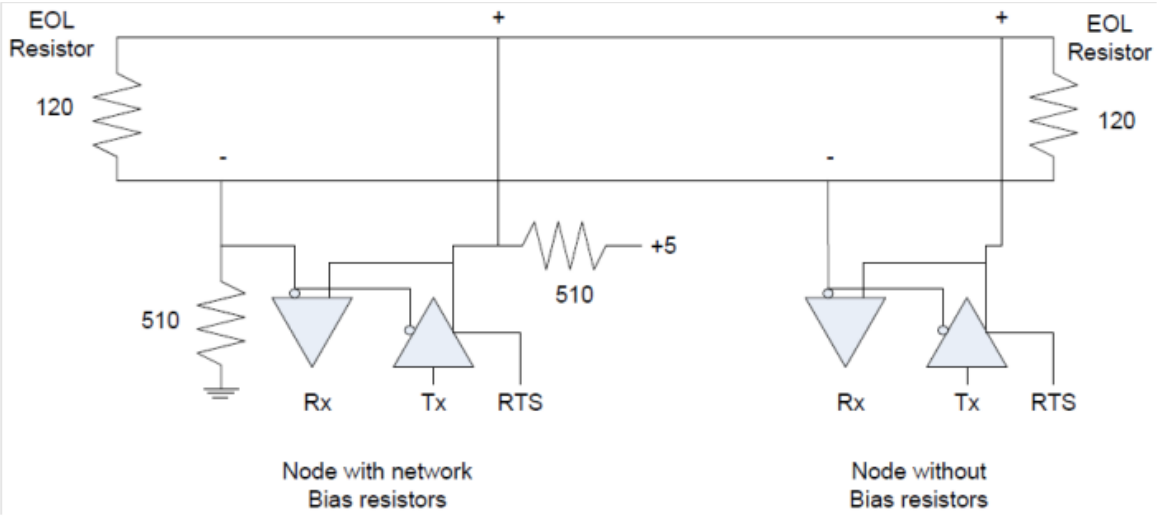
Up to one set of bias resistors (510Ω ± 5%) may be added if desired. Refer to Figure 43 for wiring details.

Avoid Signal Noise

For best communication avoid running communication wires or sensor input wires next to AC power wires, VFDs, or the controller's relay output wires. These can be sources of noise that can affect signal quality. Devices that could cause noise are:

- Spark igniters
- Radio transmitter
- VFD
- Electric motor > 1 hp
- Generator
- Relays
- Transformers
- Induction heaters
- Large conductors
- Video display devices

Figure 43: Bias Resistors and EOL Resistors on Network



Daikin Applied Training and Development

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

Warranty

All Daikin Applied equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. Refer to Form 933-430285Y. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

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

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

Products manufactured in an ISO Certified Facility.