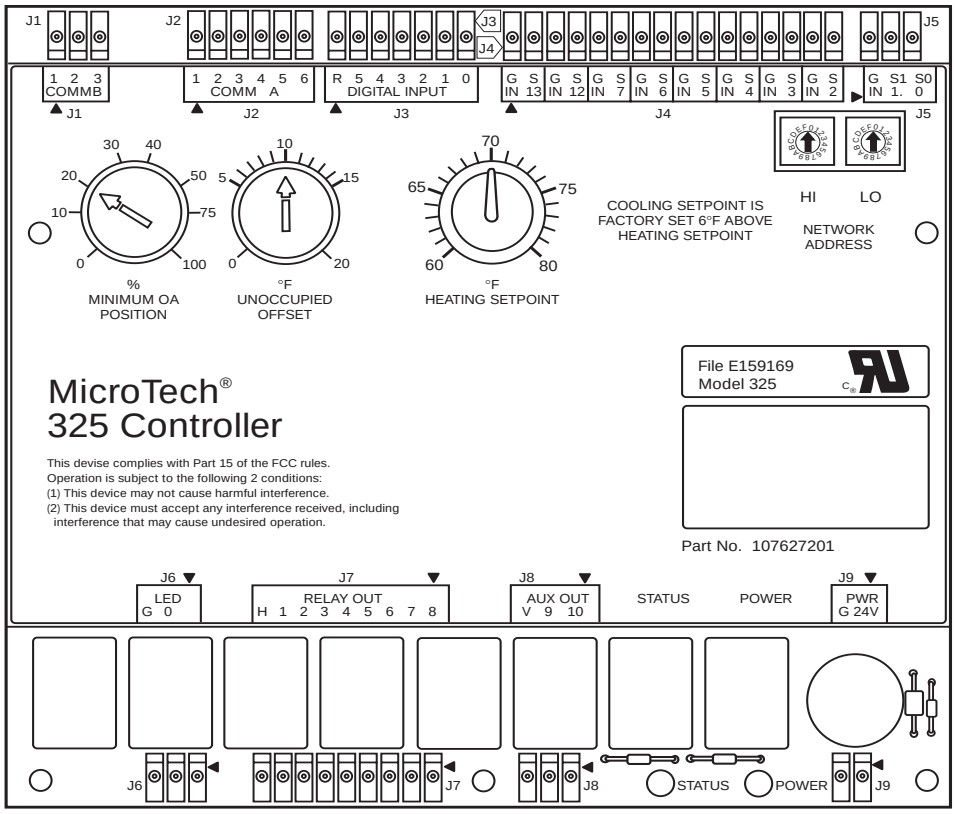
Installation & Maintenance Data	IM 613-2
	Group: **Unit Ventilator**
	Part No.: **106102102**
	Date: **May 2000**

MicroTech®
Unit Ventilator Controller



Used with AAF-HermanNelson Models AVS, AVV, AVR, AHF, AHV, AHR, AED, AEQ, AZS, AZQ, AZR, ARQ, ERQ

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Introduction

This manual provides information pertaining to the MicroTech Unit Ventilator Controller (UVC) as applied in the AAF-HermanNelson Unit Ventilator product line. It should be used in conjunction with the separate installation (Bulletin No. OM101 through OM107) and sequence of operation literature (see Tables 5 and 6).

⚠ CAUTION

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. **AAF-HermanNelson disclaims any liability resulting from any interference or for the correction thereof.**

⚠ CAUTION

This MicroTech controller contains static electricity sensitive components. A static discharge while handling electronic circuit boards may cause damage to the components. To prevent such damage during service involving board replacement, discharge any static charge by touching grounded bare metal inside the unit before performing any service work.

⚠ 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.

⚠ WARNING

This MicroTech control panel is designed to be stored and operated in temperatures from 32°F to 140°F and in relative humidity up to 95% (noncondensing).

General Description

The MicroTech Unit Ventilator Controller (UVC) is a microprocessor-based controller designed to provide sophisticated control of an economizer-equipped AAF-HermanNelson 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.

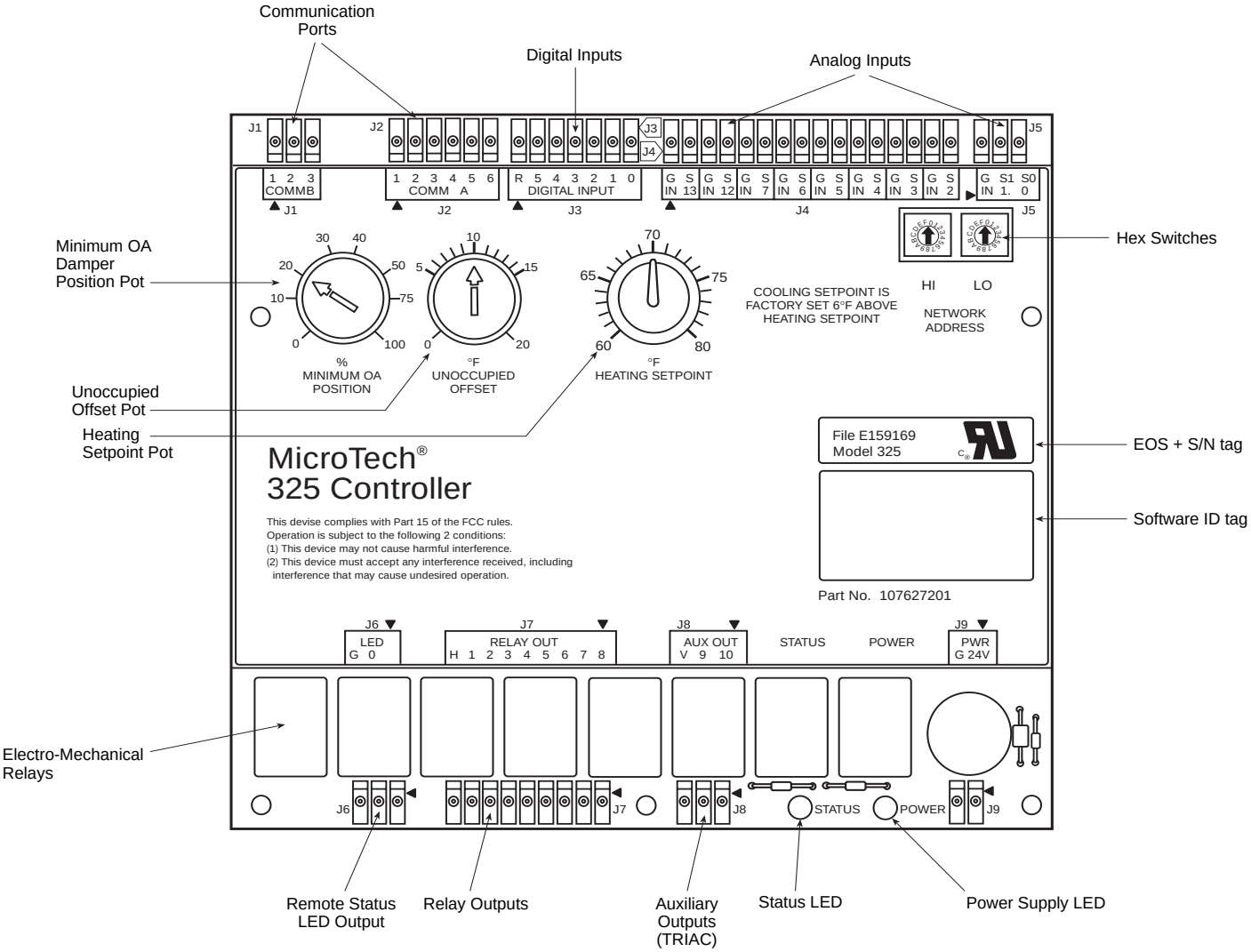
Each UVC is factory wired and factory programmed for the specific unit ventilator model and configuration options ordered by the customer. The UVC can be wired and programmed to operate as a stand-alone controller, as a master or slave controller, or as a MicroTech network controller.

Communication ports allow networking capability and access to any UVC from an IBM compatible personal computer (PC) equipped with Monitor software.

The MicroTech Unit Ventilator Controller (UVC) is shown in Figure 1.

Component Data

Figure 1. MicroTech Unit Ventilator Controller



Microprocessor

The UVC contains a microprocessor that is preprogrammed with the software required to monitor and control the unit. It receives input data from as many as 20 inputs (analog or digital) and sends commands to as many as 8 outputs (electromechanical relays). (There are 2 additional solid-state relay "aux" outputs which are not used for standard unit ventilator configurations.) The quantities and types of inputs and outputs are dependent on the unit ventilator model type and configuration options. All input and output connections to the UVC are made using insulation displacement type (IDC) terminal connectors.

The UVC uses field-adjustable setpoints and fixed, preprogrammed parameters to maintain unit control. (Many of the preprogrammed parameters can be adjusted with a PC equipped with Monitor software.)

Setpoint Adjustment Potentiometers

There are three setpoint adjustment potentiometers (pots) on the UVC:

- Minimum outdoor air damper position pot
- Heating setpoint pot
- Unoccupied offset adjustment pot

Note: On slave and network controllers, these three setpoint values are received via network communications, and the pot settings are ignored. On slave controllers only, the pot settings are used when communications are lost. Therefore, it is recommended that appropriate "default" pot settings be set for slave units.

Minimum Outdoor Air Damper Position Pot

The minimum position pot defines the minimum outdoor air (OA) damper position. The OA damper is typically held at its minimum position when cooling is not required or when the OA temperature is not suitable for free cooling. Refer to the sequence of operation document provided with your unit for more detailed information.

Heating Setpoint Pot

The heating setpoint pot adjusts both the occupied cooling and heating setpoints. The room occupied heating setpoint is shown on the UVC faceplate. The room occupied cooling setpoint is calculated by adding the deadband value to the heating setpoint (deadband default = 6°F).

Unoccupied Offset Adjustment Pot

The unoccupied offset pot sets the offset value used to determine the unoccupied heating (or night setback) and unoccupied cooling (or night setup) setpoints. The night setback setpoint is calculated by subtracting the offset value from the occupied heating setpoint. The night setup setpoint is calculated by adding the offset value to the occupied cooling setpoint.

Status LED

An amber, on-board status LED aids in diagnostics by indicating the unit ventilator operating mode and alarm conditions. If there are no current alarm conditions, the LED will indicate the unit operating mode as shown in Table 1. If there are one or more alarm conditions present, the LED will flash in a specific sequence to indicate a particular alarm condition. For more information on alarms, refer to the "Alarm Monitoring & Control" section of this manual.

A remote status LED is provided with all optional wall- mounted temperature sensor packages. It has the same function as the on-board status LED. If used, the remote LED is connected to the UVC at the terminal section labeled "LED."

Table 1. Status LED Indication

Status LED State	Indication
On Continually	Occupied Mode
On ½ sec./ Off 5½ sec.	Unoccupied Mode
On 5½ sec./ Off ½ sec.	Tenant Override Mode
Flashing*	Alarm Condition
On 3 sec. / off 3 sec.**	Calibration

* Refer to Table 9 in the "Alarm Monitoring & Control" section of this manual.

** Calibration of OA Damper, F&BP Damper, and/or valve actuators will be completed within approximately 5-min after power-on.

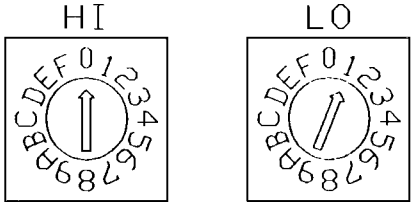
Power LED

The green, on-board power LED indicates microprocessor "on" status. After applying power to the unit, the power LED should illuminate continuously. For more information, refer to "Test Procedures" in the "Service Information" section of this manual.

Hex Switches

The UVC includes two hex (hexadecimal) switches that may need to be set. The HI and LO hex switches are shown in Figures 1 and 2. Table 2 provides a hex-to-decimal conversion guide.

Figure 2. Hex Switches



A "hex switch setting" is defined as the HI switch digit followed by the LO switch digit. For example, a hex switch setting of 2F would have the HI switch set to "2" and the LO switch set to "F."

Stand-alone Units

On compressor-equipped units (self-contained or split system), the hex switch setting defines the random start delay period. Each unit on a common circuit or time clock should have a different hex switch setting to ensure that multiple units do not start simultaneously. The settings may be between 01 and 3F.

If the unit ventilator has no compressor, leave the hex switch setting at 01.

Master, Slave and Network Units

The hex switch setting defines the controller's network address. (If the master, slave or network unit has a compressor, the random start delay is also defined by the hex switch setting.) For more information on master/slave addressing, refer to "Master/ Slave" in the "Start-up" section of this manual. For more information on MicroTech network addressing, refer to the MicroTech Network Master Panel installation bulletin.

Table 2. Hexadecimal to Decimal Conversion Guide

HI Hex Digit	LO Hex Digit															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63

* Hex switch setting 00 has a special purpose. It should not be used for normal operation.

Communication Ports

The UVC has two communication ports: Comm A and Comm B. Following are brief descriptions of each communication port's function. For further information, refer to the "Service Information" section of this manual.

Stand-alone and Network Units

Comm B is for MicroTech network communications to the Local Master Controller using an RS-485 format. (Comm B is configured this way in a stand-alone unit, but not used.) Comm A is for communications to an IBM compatible PC using an RS-232 format.

Master/Slave Units

Communications between master and slave UVC's is done using an RS-485 format. On the master unit, Comm B is used for communications to the slaves, and Comm A is not used. On a slave unit, Comm B is used for communications to the master, and Comm A is available for communications to an IBM compatible PC using an RS-232 format.

Temperature Sensors

The MicroTech UVC uses negative temperature coefficient (NTC) thermistors for temperature sensing. A thermistor chart, which provides voltage-to-temperature and resistance-to-temperature conversion data, is included in the "Service Information" section of this manual (Table 18).

Actuators

The UVC uses hydraulic, spring return, floating control actuators with position feedback for valve and damper modulation. These actuators are controlled using the "Change" and "Step-and-Wait" control algorithms. All cooling valves are normally closed, and all heating valves (including "2-pipe" hot/chilled water) are normally open. Outside air dampers are normally closed, and face and bypass (F&BP) dampers are normally open to the coil face.

On some units equipped with F&BP dampers, a spring return, two-position "end-of-cycle" (EOC) valve is used to prevent overheating or overcooling when the damper is in the full bypass position. Cooling EOC valves are normally closed, and heating EOC valves (including "2-pipe" hot/chilled water) are normally open.

Standard Control Features

The following are standard MicroTech UVC control features as applicable to the various unit ventilator model types:

- Control Temperature
- Change and Step-&-Wait control algorithms
- Compressor short-cycle protection
- Low ambient lockout
- Random start
- Delayed reversing valve de-energization
- Emergency heat
- Defrost
- Alarm monitoring & controlled response

Control Temperature

All unit ventilators are designed to control the room (or zone) temperature. In order to maintain more stable room temperature control, the UVC uses the concept of a "Control Temperature." Depending on the unit ventilator model, configuration, and current mode of operation, the Control Temperature could be either (1) the actual room temperature or (2) a weighted value equal to 19/20 room temperature and 1/20 discharge air temperature.

Throughout the remainder of this manual, "room temperature" and "Control Temperature" will be assumed to be synonymous. For further information, refer to the sequence of operation document provided with your unit (see Table 6).

Change and Step-&-Wait Algorithms

The "Change" and "Step-and-Wait" algorithms work together in a two-stage process to modulate actuators (valves or dampers) in the unit ventilator. This control process enables the UVC to maintain tight space temperature control with no overshoot.

There are several Change and Step-and-Wait parameters that are factory set and adjustable only with a PC equipped with Monitor software. For most applications, the factory-set parameters will provide the best control. It is recommended that these values not be changed.

Following is a brief description of the Change and Step-and-Wait functions. For additional information, refer to the *MicroTech Unit Ventilator Controller Monitor Program User's Manual*.

Change

The Change function changes the valve or damper position *setpoint* in response to the deviation of the room temperature from its setpoint (offset). The amount of actuator-position setpoint change varies and is dependent on the amount of room temperature setpoint offset.

The Change algorithm is executed on a factory-set, periodic basis.

Step-and-Wait

The Step-and-Wait function causes the valve or damper to open or close as required to maintain the Change function's calculated position setpoint. The "step" period is the amount of time the electric actuator is driven either open or closed, and the "wait" period is the amount of time the actuator holds its position. The "step" and "wait" periods vary and are dependent on the amount of actuator-position setpoint offset.

The Step-and-Wait algorithm is executed on a periodic basis. This period is a factory-set constant that is equal to the sum of the "step" and "wait" periods described above.

Compressor Short-Cycle Protection

All compressor-equipped unit ventilator models (self-contained or split system) include compressor short-cycle protection.

When a compressor is energized, it will remain energized for at least 2 minutes before the temperature control sequence will be allowed to de-energize it. An alarm condition can override this "minimum-on" timer and stop the compressor if necessary.

When a compressor is de-energized, it will remain de-energized for at least 3 minutes before the temperature control sequence will be allowed to energize it again.

Low Ambient Lockout

Except for the water source heat pump (WSHP) models, all compressor-equipped unit ventilators (self-contained or split system) include compressor low ambient lockout protection.

This feature will prevent compressor operation when the unit is in the cooling mode and the outdoor air temperature is below 59°F.

Random Start

A random start feature is provided with all compressor-equipped unit ventilators (self-contained or split system). This feature will prevent simultaneous compressor start-up that could otherwise occur after the following events:

- Unit power-up
- Unoccupied to occupied changeover
- Brownout condition

The compressor start delay can be from 1 to 63 seconds and is determined by the UVC hex switch setting. For more information, refer to "Hex Switches" in the "Component Data" section of this manual.

Delayed Reversing Valve De-energization

All heat pump unit ventilator models have a 60-second (default) reversing valve de-energization delay feature.

This delay prevents the reversing valve from returning to its normal (cooling) position for a period of 60 seconds after the compressor is de-energized when the unit is in the heating mode. If necessary, an alarm condition can override the 60-second timer and de-energize the reversing valve with the compressor.

Emergency Heat

All heat pump unit ventilator models that are equipped with electric heat have an emergency heat feature.

The emergency heat mode is initiated by depressing the momentary, unit-mounted emergency heat switch. When the unit is in the emergency heat mode, the following actions occur:

- Compressor is immediately de-energized and locked out.
- Reversing valve is de-energized after a delay.
- Electric heat is staged to maintain the room heating setpoint regardless of outdoor air temperature (ASHP units) or entering water temperature (WSHP units).

The unit ventilator may be returned to normal operation by cycling power to the controller (use fan switch or main power switch).

ASHP Units Only: Note that the emergency heat switch (SW5) and defrost control contacts are wired in parallel and use the same UVC digital input (DI-3). The emergency heat switch provides a momentary contact closure and the defrost control provides a maintained contact closure. Therefore, do not hold the emergency heat switch down or the unit may enter the defrost mode instead of the desired emergency heat mode.

Defrost

The AE air source heat pump (ASHP) unit ventilator models have a defrost cycle which prevents frost from building up on the outdoor coil when the unit is operating in the heating mode.

An external defrost control provides a maintained contact closure to the UVC when defrost is required.

When the unit is in the defrost mode, the following actions occur:

- Reversing valve is de-energized (unit enters "cooling" cycle).
- Electric heat is staged to maintain the room setpoint regardless of outdoor air temperature.
- Compressor cannot be de-energized by room temperature control until defrost mode ends.

For further information on the defrost control cycle, refer to Bulletin No. OM 101, MicroTech Unit Ventilator Controller Sequences of Operation: Program UV1.

Alarm Monitoring & Controlled Response

The MicroTech UVC is capable of sophisticated alarm monitoring and controlled response functions. Each alarm (or "fault") is prioritized, indicated, and responded to with the appropriate action. If multiple alarms are present, the alarm with the highest priority is indicated.

A summary of the available alarm features is shown in Table 3. For more information, refer to the "Alarm Monitoring & Control" section of this manual. Following are brief descriptions of each feature.

Table 3. Alarm & Controlled Response Feature Availability

Alarm & Controlled Response Feature	Unit Ventilator Model				
	AE	AZ	AR	AV	AH
Sensor Diagnostics (Each Sensor)	•	•	•	•	•
Actuator Feedback Diagnostics (Each Actuator)	•	•	•	•	•
Brownout Protection	•	•	•	•	•
High Pressure	•	•	•		
Low Coil Temperature (DX and/or Water)	•	•	•	•	•
Low Refrigerant Temperature (Water Coil)			•		
Communication Error (Master/Slave Only)	•	•	•	•	•
Change Filter (Network Units Only)	•	•	•	•	•

Sensor Diagnostics
If a temperature sensor's value is out of range, the UVC will detect it and take the appropriate action. Each sensor fault has a specific priority, alarm indication, and set of response actions.

Actuator Feedback Diagnostics
The UVC will monitor the position feedback voltages of every modulating actuator provided with a particular unit ventilator. If a feedback value is out of range, the UVC will detect it and discontinue control of that actuator. Each feedback failure fault has a specific priority and alarm indication.

Brownout Protection
The brownout feature is meant to protect the compressor and electric heat contactors from low voltage or "brownout" conditions. If the supply voltage to the unit ventilator is below 85% of the nameplate value, the UVC will detect it, indicate it, and de-energize the compressor and electric heaters.

High Pressure
If excessive pressure in the refrigeration circuit is detected by the external pressure switch, the compressor will be de-energized immediately (hardware wired). The UVC will immediately de-energize the reversing valve, disable the compressor and indicate the alarm.

Low Coil Temperature
External thermostats will sense the DX and water coil temperatures (if present). The UVC will monitor each thermostat, and if a low coil temperature is detected, alarm indication and the appropriate action will occur.

Low Refrigerant Temperature (Water Coil)
If the WSHP unit is in the heating mode and the refrigerant temperature is too low, the UVC will indicate the alarm and immediately de-energize the compressor and reversing valve.

Communication Error (Master/Slave Units Only)
If a communication error occurs between a slave UVC and its master, the alarm will be indicated at the slave, and the affected units will continue operating. For further information, refer to the description of the master/slave communication type in the "Factory Configured Options" section of this manual.

Change Filter (Network Units Only)
When the unit ventilator fan run-time exceeds a network-adjustable setpoint, a change filter alarm is indicated locally and over the MicroTech network.

Factory And/Or Field Configured Options

In addition to the various heating and cooling options, the AAF-HermanNelson product line provides several factory-configured options that affect installation requirements and unit control. These options are either factory programmed, factory wired, or both. The model number code string specifies which options are present in a particular unit ventilator. The following options are described in this section:

- Communication type (stand-alone, master/slave or network)
- ASHRAE cycle II
- Room temperature sensor (unit or wall mounted)
- Tenant override (unit or wall mounted)
- Remote room setpoint adjustment
- Day-night changeover
- Ventilation lockout
- Exhaust fan interlock

Communication Type

All Unit Ventilator Controllers can be programmed to operate in one of the following communication modes:

- Stand-alone
- Master/slave
- MicroTech network

Stand-alone
A stand-alone UVC does not communicate over a network. It is independent and capable of performing complete room temperature and ventilation control.

Master/Slave
The master/slave application is designed to provide even temperature control of a zone containing up to six unit ventilators. One controller in the zone must be designated and programmed to be the master, and up to five controllers may be designated and programmed to be its slaves.

The master controller establishes the following parameters for itself and for each of its slaves:

- Operating mode (occupied, unoccupied, or tenant override)
- Minimum OA damper position setpoint
- Occupied heating and cooling setpoints
- Unoccupied heating and cooling setpoints

Because each UVC in the zone uses its own room temperature sensor and a common room temperature setpoint, even temperature control will be maintained regardless of any load variation within the zone.

Master: A master UVC is similar to stand-alone UVC. The only difference is that Comm B of a master controller is used for master/slave network communications. The minimum position setpoint, room setpoint, unoccupied offset, operating mode, and remote setpoint adjustment (if used) must be set at the master.

Slave: A slave UVC receives its operating mode and the above setpoint information from its master. When communications are established between a slave and its master, the slave will ignore its three on-board setpoint potentiometers.

Communication Failure: If the communication link between a slave and its master fails, the slave UVC will indicate the alarm and continue to operate using the temperature and minimum position setpoints defined by its on-board potentiometers. Its operating mode will be that last received from its master, or if power is cycled, it will default to occupied.

MicroTech Network
A variety of MicroTech unit and auxiliary controllers can be interconnected to form a MicroTech network. A MicroTech network provides a building operator with the capability to perform advanced equipment control and monitoring from a central or remote location. A network UVC is a controller that has been programmed with the software required to operate in a MicroTech network. The following features are provided for each network UVC over the MicroTech network:

- Day-night changeover scheduling
- Heating and cooling setpoint adjustment
- Minimum OA damper position setpoint adjustment
- Ventilation lockout
- Change filter alarm
- Demand limiting

Communication Failure: If the MicroTech network communication link failures for any reason, the affected UVC will remain operational. Its operating mode will be that last received over the network, or if power is cycled, it will default to occupied. Its minimum position, heating, and cooling setpoints will be those last received over the network, regardless of whether power is cycled.

ASHRAE Cycle

All unit ventilator controllers are factory programmed to follow ASHRAE II unit ventilator control cycle. The UVC uses the room temperature sensor to control the heating, ventilating, and cooling functions of the unit ventilator.

ASHRAE II Cycle

A discharge air temperature sensor is installed in all unit ventilators. If necessary, the ASHRAE II control algorithm can override room control and modify the heating, ventilating, and cooling functions (as available) to prevent the discharge air temperature from falling below the discharge air low limit setpoint. The discharge air low limit setpoints and sequences of operation vary and are dependent on the unit ventilator model and configuration. For further information, refer to the sequence of operation document (Bulletin No. OM101 through OM107) provided with your unit.

Room Temperature Sensor

A room temperature sensor is required for all unit ventilators. It may be unit mounted or wall mounted.

Unit Mounted Sensor

The unit mounted room sensor is factory installed and factory wired. It is located within an aspirating sampling chamber behind the unit ventilator fan access panel.

Wall Mounted Sensor

There are optional wall sensor packages available. All wall sensors include a remote status LED. Tenant override, setpoint adjustment, and bimetal thermometer are optional wall sensor features that are available in any combination.

The wall mounted sensor must be field installed and field wired to the unit ventilator. Refer to the model-specific unit ventilator installation manual and to Bulletin No. IM 629, MicroTech Room Temperature Sensors, for information on wall sensor package installation.

Remote Room Setpoint Adjustment

The remote setpoint adjustment potentiometer allows the room setpoint to be adjusted up or down by as much as 3°F. It is available with several of the optional wall sensor packages, and it may be used with all except slave-type Unit Ventilator Controllers.

Tenant Override

A unit mounted or wall mounted tenant override switch is available for use with all except slave-type Unit Ventilator Controllers. The tenant override switch provides a momentary contact closure that causes the unit to enter the “tenant override” operating mode for a set time period (default = 120 minutes). Except for the fact that it is temporary, the tenant override operating mode is identical to the occupied operating mode.

Unit Mounted Tenant Override Switch

The optional unit mounted tenant override switch is factory installed and factory wired.

Wall Mounted Tenant Override Switch

The wall mounted tenant override switch is available with several of the optional wall sensor packages. The wall sensor package must be field installed and field wired to the unit ventilator. Refer to the model-specific unit ventilator installation manual and to Bulletin No. IM 529, MicroTech Room Temperature Sensors, for information on wall sensor package installation.

Day-Night Changover

Day-night changeover control is required to change the unit ventilator operating mode from occupied (default) to unoccupied. When the unit is in the unoccupied operating mode, the OA damper is closed, and the night setback and setup room setpoints are maintained. The fan is energized only when heating or cooling is required. For further information, refer to sequence of operation document provided with your unit.

Stand-alone and Master Units

The day-night changeover function is provided by a factory-installed or field-installed device. The following changeover options are available:

- Relay (factory provided and installed pilot duty 24 VAC relay, coil for field connection)
- Time clock and holiday switch
- Manual day-night switch
- Pneumatic-electric (PE) switch or relay (field supplied & installed)

All of the above methods must provide a maintained contact closure (at DI-2) to place the UVC into the unoccupied operating mode. When the contacts are open (or if none are provided), the unit will be in the occupied operating mode. A 115 VAC relay can be separately purchased as a field installed accessory and used to replace the 24 VAC relay if necessary.

Network Units

The day-night changeover function is provided over the MicroTech network. It can be scheduled for every controller on the network using the UVC Monitor program.

Ventilation Lockout (Default) /Exhaust Fan Interlock Input

The ventilation lockout input feature provides a means for a field provided signal to override normal UVC control and close the outdoor air damper at any time. The exhaust fan interlock input feature provides a means for a field provided signal to override normal UVC control and fully opening the outdoor air damper at any time (all safeties remain in effect and may override this feature as needed for equipment protection). In MicroTech network applications only, the ventilation lockout feature is provided as part of the network.

One pilot duty 24 VAC relay is factory provided for either of these features. The normally open contacts of this relay are factory wired to the UVC (see “Input/Output Tables”). The coil of this relay needs to be field wired to the field provided signaling device to control this relay. A 115 VAC relay can be separately purchased as a field installed accessory and used to replace the 24 VAC relay if necessary.

By default, the designated UVC input for these features is configured for the ventilation lockout input feature (input energized = outside air damper closed). Using a PC with the Monitor software and a proper cable kit the designated input can be re-con-

figured for an exhaust fan interlock signal (input energized = outside air damper fully open). Ventilation lockout (default) and exhaust fan interlock features cannot be used simultaneously as they both use the same UVC input.

Exhaust Fan Control Signal (Default) /Auxiliary Heat Control Signal Output

The exhaust fan control signal output feature is provided so that the UVC can be used to control a remote-mounted field-suppled exhaust fan. The auxiliary heat output feature is provided so that the UVC can be used to control a remote-mounted, field-supplied auxiliary heating device (typically a normally open water valve). Exhaust fan control signal (default) and auxiliary heat control signal features cannot be used simultaneously as they both use the same UVC output.

One pilot duty 24 VDC relay and one diode need to be field provided when using the output for either of these features. The 24 VDC coil of this relay and the diode will be field mounted and connected to the appropriate UVC auxiliary output (see “Input/Output Tables” and “UVC Inputs and Outputs” sections). The normally open contacts of this relay can then be field wired to signal or control the appropriate device.

By default, the designated UVC output is configured to be used to signal exhaust fan operation (energized relay coil = exhaust fan on). Using a PC with the Monitor software and a proper cable kit the designated input can be re-configured for an auxiliary heat signal used to control a normally open hot water valve. When configured for auxiliary heat, the UVC will de-energize (valve open) the relay coil whenever the UVC control temperature is less than the current heating setpoint minus the Auxiliary Heat Differential Setpoint (default 2°F) and then energize (valve closed) the relay coil when the control temperature is 1°F or more above the current heating setpoint. The Auxiliary Heat Differential Setpoint is adjustable through the use of a PC with the Monitor software and a proper cable kit.

Software ID

Unit Ventilator Controller software is factory installed and tested in each unit prior to shipment. The software is identified by a program code and “software model” number printed on a small label attached to the controller (Refer to Figure 3).

Figure 3. Software ID Tag

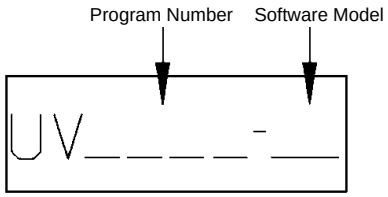


Table 4 shows the 7 programs and 18 software models used for the various unit ventilator models and configurations. As shown in the table, a program comprises one or more software models. Program number codification is as follows:

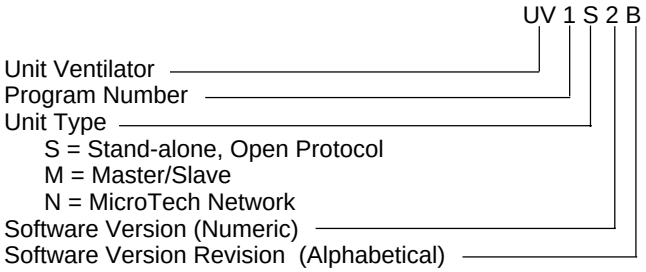


Table 4. Programs and Software Models

Program	Software Model	Unit Ventilator Model					Configuration Description
		AE	AZ	AR	AV	AH	
UV1***	MDL00	•					ASHP with Electric Heat
UV2***	MDL02			•			WSHP with Electric Heat
	MDL03			•			WSHP Only
UV3***	MDL04		•		•	•	DX Cooling with Electric Heat
	MDL05				•	•	DX Cooling Only
	MDL06				•	•	Electric Heat Only
UV4***	MDL07		•		•	•	DX with Wet Heat, Valve Control
	MDL08		•		•	•	DX with Wet Heat, Damper Control
UV5***	MDL09				•	•	Wet Heat Only, Valve Control
	MDL10				•	•	Wet Heat Only, Damper Control
	MDL11				•	•	2-Pipe, Valve Control
	MDL12				•	•	2-Pipe, Damper Control
UV6***	MDL13				•	•	4-Pipe, Valve Control
	MDL14				•	•	4-Pipe, Damper Control
UV7***	MDL15				•	•	CW Cooling Only, Valve Control
	MDL16				•	•	CW Cooling Only, Damper Control
	MDL17				•	•	CW with Electric Heat, Valve Control
	MDL18				•	•	CW with Electric Heat, Damper Control

Abbreviations:
ASHP Air source heat pump
WSHP Water source heat pump
DX Direct expansion (refrigerant)
CW Chilled water
Wet Heat Steam or hot water heat
2-Pipe Common hot water and chilled water coil
4-Pipe Separate wet heat and chilled water coils

Commissioning

⚠ WARNING

ELECTRICAL SHOCK HAZARD! Could cause severe injury or death. Failure to bond the frame of this equipment to the building electrical ground by use of the grounding terminal provided or other acceptable means may result in electrical shock. Service must be performed only by qualified personnel.

The following commissioning procedures pertain to unit ventilators equipped with the MicroTech Unit Ventilator Controller (UVC). These procedures must be performed in addition to the mechanical and electrical system commissioning procedures that are outlined in the model-specific installation literature. Table 5 provides a listing of this literature.

Caution: Before power is applied to any unit, the pre-start procedures in the model-specific installation literature must be closely followed.

Table 5. Model-Specific Unit Ventilator Installation Literature

Unit Ventilator Model	Installation & Maintenance Data Bulletin Number
AED, AEQ	IM 502
AZS, AZQ	IM 503
ARQ, ERQ	UV-3-202
AVS, AVV, AVR	IM 506

A large part of the commissioning procedure is ensuring that the unit ventilator operates according to its programmed sequence of operation. The unit ventilator sequences of operation are described in the program-specific literature listed in Table 6.

Table 6. Program-Specific Sequence of Operation Literature

UVC Program	Operation Manual Bulletin Number
UV1***	OM 101
UV2***	OM 102
UV3***	OM 103
UV4***	OM 104
UV5***	OM 105
UV6***	OM 106
UV7***	OM 107

Pre-Start

Required Tools and Literature

The following tools and additional literature may be required to properly commission a MicroTech UVC.

Tools:

1. Digital voltmeter
2. Digital ohmmeter
3. Digital thermometer
4. General technician's tools
5. PC equipped with Monitor software (required for master/slave and Network UVC, optional for stand-alone UVC's)

Literature:

1. Model-specific unit ventilator installation bulletin (see Table 5)
2. Program-specific sequence of operation bulletin (see Table 6)

Unit Ventilator Identification

The AAF-McQuay unit ventilators look similar; however, there are significant internal differences which are defined by the model number code string. In addition to the basic heating and cooling equipment, the model number code string specifies which factory-configured options have been provided. These options determine the internal wiring configuration and the field wiring requirements.

Obviously, it is extremely important that the correct unit ventilator be placed in the correct location in accordance with job requirements. Proper unit ventilator location should have been determined during the installation process. Nevertheless, proper location must be verified during the commissioning process.

Know Your Unit Ventilator

Before commissioning can proceed, the start-up technician must know which options are supposed to be present on a particular unit ventilator.

1. Check the model number code string against the job requirements. Refer to the unit-specific installation bulletin for a guide to model number nomenclature.
2. Check the program and software model numbers against the unit model number code string. The UVC software must be compatible with the unit ventilator configuration. Refer to the "Software ID" section of this manual.

   Note: If a PC is being used for commissioning, check the software ID using the Monitor program. The controller's program is identified on one of the display screens.

Field Wiring Check

The unit ventilator factory-configured options determine the low voltage field wiring requirements. If a specific option is present on a particular unit ventilator (as denoted by the model number), the associated field wiring (if any) must be checked.

Detailed electrical installation instructions and field wiring diagrams are included in the model-specific installation literature supplied with each unit ventilator. Referring to this literature and using the following check lists, the start-up technician should thoroughly check the electrical installation before the commissioning process proceeds.

Wall Sensor Packages

1. Check that the cable is twisted and shielded.
2. Check that the required number of conductors are available.
3. Check that the shield is grounded in accordance with the installation literature.

4. Check that the conductors have been terminated at the unit and the wall sensor package in accordance with the field wiring diagram.
5. Check that the cable length between the wall sensor package and its UVC does not exceed 250 feet.
6. **460V, Type AE & AZ Only:** Check that 600-volt rated cable has been used.

Network Communication (Master/Slave or MicroTech Network Units)

1. Check that the cable is a twisted, shielded pair of conductors.
2. Check that the shield is grounded in accordance with the installation literature.
3. Check that the conductors have been terminated at the units in accordance with the field wiring diagram.
4. At the UVC board, verify that the IDC connectors are disconnected from the Comm A and Comm B ports. (They will be connected during the start-up process.)
5. **460V, Type AE & AZ Only:** Check that 600-volt rated cable has been used.
6. **MicroTech Network Units Only:** Check that the conductors have been terminated at the Local Master Controller (LMC) in accordance with the field wiring diagram supplied with the LMC. Check that the cable length between the LMC and the farthest UVC does not exceed 5000 feet.

Day-Night Changeover (Stand-alone or Master Units)

1. Check that the conductors have been terminated at the unit in accordance with the field wiring diagram.

Note: Field terminations are not required for the factory-mounted time clock and manual switch options.

2. Check that the ultimate changeover device provides the proper action at the UVC. The dry contacts connected to DI-2 must be "open for occupied" and "closed for unoccupied." If used, the factory-installed relay is wired so that it must be "de-energized for occupied" and "energized for unoccupied."
3. **460V, Type AE & AZ Only:** Check that 600-volt rated conductors have been used.

Ventilation Lockout (Stand-alone, Master or Slave Units)

1. Check that the conductors have been terminated at the unit in accordance with the field wiring diagram.
2. Check that the field-supplied device energizes the factory-installed relay when ventilation lockout is desired.
3. **460V, Type AE & AZ Only:** Check that 600-volt rated conductors have been used.

Exhaust Fan Interlock

1. Check that the conductors have been terminated at the unit in accordance with the field wiring diagram.
2. Check that the field-supplied device energizes the factory-installed relay when exhaust fan interlock is desired.
3. 460V, Type AE & AZ Only: Check that 600-volt rated conductors have been used.

Remote Condensing or Heat Pump Unit (AV/AH Units Only)

Check that the conductors have been terminated at the unit in accordance with the field wiring diagram.

⚠ CAUTION

On AH units, it is recommended that the outdoor air temperature sensor be located so that it will accurately sense the outdoor air temperature. If this is not done, improper unit operation or damage to the remote condensing or heat pump unit could occur. The best location for the sensor is either outside the building (shielded from solar radiation) or in the outdoor air ductwork very near the intake.

Setpoint Initialization

Stand-alone and Master/Slave Units

The heating setpoint, unoccupied offset, and minimum OA damper position potentiometers (pots) should be set to the desired settings prior to start-up. For more information, refer to "Setpoint Adjustment Potentiometers" in the "Component Data" section of this manual.

Note: In a master/slave application, the master's pot settings define the setpoint values for its slave controllers. If communications fail, the affected slaves read their setpoint values from their own setpoint pots. For this reason, it is recommended that the three on-board setpoint pots on each slave be set so that they match the master's settings.

Network Units

The three setpoint adjustment potentiometers on a network unit are not operational. The UVC setpoint values are held in memory and can only be modified over the MicroTech network. Initially, before any changes are made over the network, the UVC will use the default, factory-set setpoints shown in Table 7.

Table 7. Network UVC Default Setpoints

Setpoint	Value
Occupied Cooling	78°F
Occupied Heating	72°F
Unoccupied Cooling	88°F
Unoccupied Heating	62°F
Minimum OA Damper Position	20%

Following are UVC start-up procedures for each communication type. The start-up procedure must be performed by a qualified technician for every UVC on a job.

Table 8. Network Communication Port Terminal Voltage Ranges

Communication Port Terminal	Acceptable Voltage Reading
4 (+)	3.0 ± 0.3 VDC
5 (-)	2.0 ± 0.3 VDC
6 (ground)	0.0 ± 0.2 VDC

Stand-alone

Because stand-alone controllers are independent of each other, they may be started in any order.

PC Access

A PC is not required for stand-alone UVC start-up; however, the start-up process will be easier and faster if a PC is used. If a PC is used, it must be equipped with Monitor software. For further information, refer to "PC Connection" in the "Service Information" section of this manual.

Procedure for Each Stand-alone UVC

1. Verify that the main power switch is at "Off."
2. Verify that the hex switch setting is not "00" or "FF."

   These settings are reserved for special applications. For further information, refer to "Hex Switches" in the "Component Data" section of this manual.
3. **Compressorized Units Only (Self-contained or Split System):** Set hex switches for random start delay.

   Valid settings are between 01 and 3F. For further information, refer to "Random Start" in the "Standard Control Features" section of this manual.
4. Apply power to the unit.

   Turn the main power switch to "On" and the motor speed switch to the desired speed, wait 5-minutes until calibration is complete.
5. Check the status LED and operating mode changeover devices. The status LED should illuminate after calibration. If a wall sensor package is used, the remote status LED should also illuminate. Referring to Table 1, verify that the day-night changeover and tenant override options (if present) are working properly. Do this by switching these devices and observing the status LED.
6. Verify that the unit ventilator is operating in accordance with its sequence of operation as outlined in the appropriate documentation (refer to Table 6).

   Since the sensed temperatures are fixed at any given moment, adjust the room setpoint and unoccupied offset pots to obtain the expected heating or cooling control actions. If a PC is available, adjust any other applicable parameters to obtain the expected UVC control actions.
7. Check the remote setpoint adjustment pot operation (if present).

   Verify that the expected UVC control action occurs when the remote pot is adjusted up or down.
8. Check that the ventilation lockout option works properly (if present).

   When the unit is in the occupied operating mode, verify that the OA damper closes when the ventilation lockout relay is energized.
9. Check that the exhaust fan interlock option works properly (if present).

   Verify that the OA damper opens when the exhaust fan interlock relay is energized.

Master/Slave

Because it provides operating mode and setpoint information to the slaves on its network, the master UVC must be started before any slave. After the master has been started, the slaves may be started in any order. However, if the start-up order follows the daisy chain from the master UVC to successive slaves, it will be easier to detect any wiring problems that may exist in the communications trunk.

To perform the setup procedures on the next page you must have the Windows Monitor program installed on a PC, the PC must be connected with proper cabling to Port-A on the MicroTech controller, and you must have established communication between the PC and the controller. The cable kit required to properly connect a 9-pin serial PC port to Port-A on a MicroTech controller is P/N 057186802 which will contain cables P/N 067784501 and P/N 067784503.

The DOS Monitor program may also be used to perform these setup procedures.

Points to keep in mind about Master/Slave Units

- Master/Slave controllers must be either all MicroTech 125 or all MicroTech 325; you cannot mix 125's with 325's and vice versa.
- Master/Slave networks that have both new and old EOS version MicroTech 325 controllers must use a new EOS controller for the Master (new EOS 325 controllers are labeled 21.169 or 21.A9, all other 325's are old EOS).
- Master/Slave controllers both use the same program (UV*M**.COD).
- All units are shipped as stand-alone units. Master/Slave code must be downloaded and then Master/Slave configuration performed.
- Slave UVC's are considered to be independent slaves, this means that Slave UVC's obtain their setpoints from the Master UVC but the Slave UVC's then operate based upon their own sensors.
- Port-A on a Master UVC unit will not communicate as you may expect a stand-alone UVC to communicate. If you must connect directly with a Master UVC, you must first set its HEX network address switches to FF then cycle power. The address to use in the Monitor program would then be 00.FF. While the HEX network address switches are set at FF, the Master UVC will not communicate with the Slave UVC's properly; therefore, you must remember to return the HEX switches to their proper settings, then cycle power when you are done.

- Slave units will communicate as expected when your PC is connected to Port-A, simply make sure you use the correct address for each Slave when using the Monitor program. For example, if the Slave HEX switches are set at 01, then the address you will use in the Monitor program will be 01.01; if the HEX switches are set to 02 on the Slave UVC, then you use 01.02 as the address, etc.
- If you need to communicate with a UVC that is already configured as a Master and is part of an operating Master/Slave network, then use the following method. For example, to calibrate actuators on a Master UVC, connect to Port-A on a Slave unit and set the Controller Address box on the Monitor Read/Write screen to 01.00. This will gain access to the Master controller so that actuator calibration may be performed.
- When a slave UVC loses communication to the Master UVC, the Slave UVC will operate based upon its potentiometer settings (i.e. % Minimum OA Position, etc.) located on the faceplate of the Slave UVC.

Initial Master Configuration

1. Connect the Master UVC's Port-A to your PC using the proper cables.
2. Adjust the Master UVC's Hex switches to FF and cycle unit power (auto calibration will occur).
3. Using the Windows Monitor software establish communications with the controller using address 00.FF.
4. In the Windows Monitor program, secure the correct Master/Slave software, then go to the Support menu and choose Read/Write.
5. On the Read/Write screen, in the Operation box select the Monitor radio button by clicking on it. In the Display box select the Decimal radio button by clicking on it.
6. Enter the following string of memory addresses into the Memory Address box exactly as shown then press the Enter key: 8011-8012,8001-8002,0911,0204.
7. Write a value of 73 to location 8011 by clicking on the current value.
8. Write a value equal to the number of slaves you will have into location 8012 by clicking on the current value of 8012. This value must be 1 through 5 as the minimum number of slaves is 1 and the maximum is 5. (Additional slaves may be added but it is recommended you not exceed ten (10) slaves).
9. Write a value of 0 to location 0911 by clicking on the current value.
10. Write a value of 4 to location 0204 to reset the controller.
11. Change location 8001 to equal location 8002 if there is a difference. If no difference, go to the next step.
12. Change the Master UVC Hex switches to 01.
13. Write a value of 4 to location 0204 to again reset the controller.
14. Master configuration is complete.
15. At this point you will lose communications with the Master UVC through Port-A on the Master. If you need to communicate with the Master UVC, the recommended method is to connect to one of the Slave UVC's Port-A and set the network address within the Monitor program to 01.00.

Initial Slave Configuration

1. Connect all Slave UVC Port-B's to the Master UVC's Port-B as shown on the drawings provided with the unit ventilator (these drawings are typically mounted on the inside of one of the unit ventilators removable panels).
2. Connect the Slave UVC's Port-A to the PC using the proper cables.
3. Using the Windows Monitor software, establish communications with the controller using network addresses 00.FF.
4. In the Windows Monitor program, secure the correct Master/Slave sotware, then go to the Support menu and choose Read/Write.
5. On the Read/Write screen, in the Operation box select the Monitor radio button by clicking on it. In the Display box, select the Decimal radio button by clicking on it.
6. Enter the following string of memory addresses into the Memory Address box exactly as shown, then press the Enter Key: 8011-8012,8001-8002,0911,0204.
7. Write a value of 33 to location 8011 by clicking on the current value.
8. Write a value of 0 to location 8012 by clicking on the current value.
9. Write a value of 1 to location 0911 by clicking on the current value.
10. Write a value of 4 to location 0204 to reset the controller.
11. Change location 8001 to equal 8002 if there is a difference. If no difference, go to the next step.
12. Change the Slave UVC Hex switches to 01 for Slave-1, 02- for Slave-2, 03 for Slave-3, etc.
13. Write a value of 4 to location 0204 to again reset the controller.
14. Slave configuration is complete, repeat this process for each Slave.

To Check an Existing Master UVC

1. Verify that the main power switch is at "Off."
2. Set the network address.

   For a master UVC, it is recommended that this hex switch setting be "01". (This is a "level 2" network address.) For further information, refer to "Hex Switches" in the "Component Data" section of this manual.
3. Apply power to the unit.

   Turn the main power switch to "On" and the motor speed switch to desired speed.
4. Check the status LED and operating mode changeover devices.

   The status LED should illuminate after calibration. If a wall sensor package is used, the remote status LED should also illuminate.

   Referring to Table 1, verify that the day-night changeover and tenant override options (if present) are working

properly. Do this by switching these devices and observing the status LED.

5. Check for proper voltage levels at the Comm B port.

   Use a DC voltmeter to test the voltage levels at the Comm B terminals with respect to ground. The terminals and acceptable voltage ranges are specified in Table 8.

   If the voltage levels are acceptable, connect the IDC connector to the **Comm B** port.

   If no voltage or improper voltage levels are found, the UVC is defective and must be replaced.

6. Verify that the unit ventilator is operating in accordance with its sequence of operation as outlined in the appropriate documentation (refer to Table 6).

   Since the sensed temperatures are fixed at any given moment, adjust the room setpoint and unoccupied offset pots to obtain the expected heating or cooling control actions. If a PC is available, adjust any other applicable parameters to obtain the expected UVC control actions.

7. Check for remote setpoint adjustment pot operation (if present). Verify that the expected UVC control action occurs when the remote pot is adjusted up or down.

8. Check that the ventilation lockout option works properly (if present).

   When the unit is in the occupied operating mode, verify that the OA damper closes when the ventilation lockout relay is energized.

   Verify that the OA damper opens when the exhaust fan interlock relay is energized.

9. Check that the fan interlock option works properly (if present).

   Verify that the OA damper opens when the exhaust fan interlock relay is energized.

To Check Existing Slave UVC

1. Verify that the main power switch is at “Off.”
2. Set the network address.

   Each slave must have a unique hex address. Begin by setting the first slave’s address to “01.” (This is a “level 3” network address.) Address each subsequent Slave in consecutive order (02, 03, 04, 05). For further information, refer to “Hex Switches” in the “Component Data” section of this manual.

3. Apply power to the unit.

   Turn the main power switch to “On” and the motor speed switch to desired speed, wait 5 minutes until calibration is complete.

4. Check the status LED.

   The status LED should illuminate after calibration. If a wall sensor package is used, the remote status LED should also illuminate.

   Verify that the slave’s status LED indication matches the master’s indication, regardless of the operating mode.

   If the status LED is flashing in a 16-blink sequence, the slave is not communicating with its master. Refer to “Test Procedures” in the “Service Information” section of this manual.

5. Check for proper voltage levels at the Comm B port.

   Use a DC voltmeter to test the voltage levels at the Comm B terminals with respect to ground. The terminals and acceptable voltage ranges are specified in Table 8.

   If the voltage levels are acceptable, go on to step 6.

   If no voltage or improper voltage levels are found, the UVC is defective and must be replaced.

6. Check for proper voltage levels at the communication port IDC connector.

   Use a DC voltmeter to test the voltage levels at the connector terminals with respect to ground. Test at the connector terminals corresponding to the communication port terminals listed in Table 8. Verify that the voltages are within the ranges specified in the table.

   If the voltage levels are acceptable, connect the IDC connector to the Comm B port.

   If no voltage or improper voltage levels are found, verify that the master UVC is energized and that the communications trunk wiring is intact.

7. Verify that the unit ventilator is operating in accordance with its sequence of operation as outlined in the appropriate documentation (refer to Table 6).

   Since the sensed temperatures are fixed at any given moment, adjust the UVC heating and cooling setpoints to obtain the expected heating or cooling control actions. This can be accomplished either by adjusting the pots at the master or by disconnecting the communications cable and adjusting the pots at the slave. (If the latter option is chosen, be aware that the status LED will indicate a 16-blink communication failure alarm.)

   If a PC is available, adjust any other applicable parameters (at the slave) to obtain the expected UVC control actions.

8. Check that the ventilation lockout option works properly (if present).

   When the unit is in the occupied operating mode, verify that the CA damper closes when the ventilation lockout relay is energized.

9. Check that the exhaust fan interlock option works properly (if present).

   Verify that the CA damper opens when the exhaust fan interlock relay is energized.

Network

Prior to the start-up of any Network Unit Ventilator Controllers, the following MicroTech network devices must be commissioned:

- IBM compatible PC with Monitor software
- Network Master Panel
- Local Master Panel (as applicable)
- Loop Water Controller (as applicable)

Refer to the literature supplied with these products for information on installing and commissioning them.

After these devices have been properly commissioned, the network UVC’s may be started in any order. However, if the start-up order follows the daisy chain from one UVC to the next, it will

be easier to detect any wiring problems that may exist in the communications trunk.

Communications Cable Check

Perform this check for every communications trunk connected to a Network Master Panel (NMP) or Local Master Panel (LMP).

1. Be sure that the communication port IDC connectors are disconnected at every UVC on the trunk.
2. Check that there are no shorts between any two conductors in the communications trunk.

   Use an ohmmeter to test for shorts at the communication port IDC connector of the NMP or LMP. (For the three combinations of conductor pairs, there should be infinite resistance between the conductors.) If the conductors are properly terminated, this check will test for shorts throughout the trunk.

Procedure for Each Network UVC

1. Verify that the main power switch is at "Off."
2. Set the network address.

   Each UVC on an NMP or LMP trunk must have a unique hex address. This address should be specified in the job submittal drawings. Refer to the submittal drawings and set the address in accordance with them. (This is a "level 3" network address.) For further information, refer to "Hex Switches" in the "Component Data" section of this manual.
3. Apply power to the unit.

   Turn the main power switch to "On" and the motor speed switch to either desired speed, wait 5 minutes until calibration is complete.
4. Check the status LED.

   The status LED should illuminate after calibration. If a wall sensor package is used, the remote status LED should also illuminate.
5. Check for proper voltage levels at the Comm B port.

   Use a DC voltmeter to test the voltage levels at the Comm B terminals with respect to ground. The terminals and acceptable voltage ranges are specified in Table 8.

   If the voltage levels are acceptable, go on to step 6.

   If no voltage or improper voltage levels are found, the UVC is defective and must be replaced.
6. Check for proper voltage levels at the communication port IDC connector.

   Use a DC voltmeter to test the voltage levels at the connector terminals with respect to ground. Test at the connector terminals corresponding to the communication port terminals listed in Table 8. Verify that the voltages are within the ranges specified in the table.

   If the voltage levels are acceptable, connect the IDC connector to the Comm B port.

   If no voltage or improper voltage levels are found, verify that the NMP or LMP is energized and that the communications trunk wiring is intact.
7. Verify that network communications between the UVC and the NMP have initiated.

   At the network PC, change the operating mode to unoccupied and check that the status LED responds accordingly.
8. Verify that the unit ventilator is operating in accordance with its sequence of operation as outlined in the appropriate documentation (refer to Table 6).

   Since the sensed temperatures are fixed at any given moment, adjust the UVC heating and cooling setpoints (at the network PC) to obtain the expected heating or cooling control actions.

   Adjust any other applicable parameters to obtain the expected UVC control actions.
9. Check that any desired network-executed control features are working properly (ventilation lockout, demand limiting, etc.).
10. Review the submittal drawings and make any necessary changes to the default UVC setpoints and parameters.
11. Check the remote setpoint adjustment pot operation (if present).

    Verify that the expected UVC control action occurs when the remote pot is adjusted up or down.
12. Check that the exhaust fan interlock option works properly (if present).

    Verify that the OA damper opens when the exhaust fan interlock relay is energized.

PC Access

A PC equipped with Monitor software is required for master or slave UVC start-up. For further information, refer to "PC Connection" in the "Service Information" section of this manual.

Communications Cable Check

1. Be sure that the communication port IDC connectors are disconnected at every UVC on the network.
2. Check that there are no shorts between any two conductors in the communications trunk.

   Use an ohmmeter to test for shorts at the communication port IDC connector of the Master UVC. (For the three combinations of conductor pairs, there should be infinite resistance between the conductors.) If the conductors are properly terminated, this check will test for shorts throughout the network.

Use an ohmmeter to test for shorts at the communication port IDC connector of the NMP or LMP. (For the three combinations of conductor pairs, there should be infinite resistance between the conductors.) If the conductors are properly terminated, this check will test for shorts throughout the trunk.

Procedure for Each Network UVC

1. Verify that the main power switch is at "Off."
2. Set the network address.

   Each UVC on an NMP or LMP trunk must have a unique hex address. This address should be specified in the job submittal drawings. Refer to the submittal drawings and set the address in accordance with them. (This is a "level 3" network address.) For further information, refer to "Hex Switches" in the "Component Data" section of this manual.
3. Apply power to the unit.

   Turn the main power switch to "On" and the motor speed

switch to either desired speed, wait 5 minutes until calibration is complete.

4. Check the status LED.

   The status LED should illuminate after calibration. If a wall sensor package is used, the remote status LED should also illuminate.

5. Check for proper voltage levels at the Comm B port.

   Use a DC voltmeter to test the voltage levels at the Comm B terminals with respect to ground. The terminals and acceptable voltage ranges are specified in Table 8.

   If the voltage levels are acceptable, go on to step 6.

   If no voltage or improper voltage levels are found, the UVC is defective and must be replaced.

6. Check for proper voltage levels at the communication port IDC connector.

   Use a DC voltmeter to test the voltage levels at the connector terminals with respect to ground. Test at the connector terminals corresponding to the communication port terminals listed in Table 8. Verify that the voltages are within the ranges specified in the table.

   If the voltage levels are acceptable, connect the IDC connector to the Comm B port.

   If no voltage or improper voltage levels are found, verify that the NMP or LMP is energized and that the communications trunk wiring is intact.

7. Verify that network communications between the UVC and the NMP have initiated.

   At the network PC, change the operating mode to unoccupied and check that the status LED responds accordingly.

8. Verify that the unit ventilator is operating in accordance with its sequence of operation as outlined in the appropriate documentation (refer to Table 6).

   Since the sensed temperatures are fixed at any given moment, adjust the UVC heating and cooling setpoints (at the network PC) to obtain the expected heating or cooling control actions.

   Adjust any other applicable parameters to obtain the expected UVC control actions.

9. Check that any desired network-executed control features are working properly (ventilation lockout, demand limiting, etc.).

10. Review the submittal drawings and make any necessary changes to the default UVC setpoints and parameters.

11. Check the remote setpoint adjustment pot operation (if present).

    Verify that the expected UVC control action occurs when the remote pot is adjusted up or down.

12. Check that the exhaust fan interlock option works properly (if present).

    Verify that the OA damper opens when the exhaust fan energized.

Diagnostics & Service

Alarm Monitoring & Control

The Unit Ventilator Controller (UVC) is programmed to monitor the unit ventilator for specific alarm conditions that may occur on the various model types. If an alarm condition exists and is | detected by the UVC, a “fault” will occur. The UVC will indicate the fault and execute appropriate control actions for the alarm conditions. For most faults, these actions will fail-safe the unit ventilator.

Fault Code Interpretation

UVC faults are indicated at the status LED (on-board or remote). If a fault exists, operating mode indication will be replaced by an alarm-specific fault indication, the fault code.

A fault code is a series of blinks followed by a one-second pause. The number of blinks identifies the alarm condition as shown in Table 9. The fault code sequence will repeat continuously until the fault is cleared.

Priority and Multiple Alarms

Faults are ranked in order of their priority. Higher priority faults have lower fault code blink counts (see Table 9). If more than one fault is present at a time, the status LED will indicate the one with the highest priority. As the higher priority faults are cleared, the lower priority faults will be indicated.

The UVC will simultaneously respond to multiple faults with the appropriate control actions. If the programmed control actions of multiple faults are contradictory, the higher priority fault actions will occur. For example, assume that the 5-blink “low water coil temperature” and 7-blink “heating valve position feedback failure” faults exist concurrently. When the feedback failure fault occurs, UVC control of the heating valve outputs is programmed to cease (the valve would then hold its position). When the low coil temperature fault occurs, the heating valve is programmed to modulate to 25% open. In this situation, the 5-blink low coil temperature alarm has higher priority. Therefore, the heating valve will be opened. (Since there is no reliable feedback, the valve could possibly open past the 25% setpoint.)

Clearing Faults

Before any fault can be cleared, the alarm conditions that caused it must have returned to normal. When the alarm conditions are gone, a fault may be cleared either automatically or manually. Refer to Table 9 (page 18).

An auto reset fault will immediately clear whenever the alarm conditions that caused it disappear.

A manual reset fault can be cleared by cycling power to the controller.

Note: The cause of a manual reset fault should be investigated and eliminated before the unit is placed back into service.

Alarm Descriptions

Following are descriptions of the various faults listed in Table 9. Note that some alarms are present only on certain unit ventilator model types and configurations.

2-Pipe Units Only: All references to heating or cooling valves (modulating or EOC) in the “Effects” sections below also apply to 2-pipe units. Whether the 2-pipe valve is a “heating” or “cooling” valve is determined by the entering water temperature. The changeover setpoint is 80°F (default).

Table 9. Alarm and Fault Code Summary

Status LED Blinks (Priority	Alarm Description (Fault)	Trigger	Factory Setting	Fault Reset (Clear)	Unit Ventilator Model				
					AED AEQ	AZS AZQ	ARQ ERQ	AVS AVV	AHF AHV
2	Room Temperature Sensor Failure	Software	Outside Range: 0.39 to 4.88 VDC (±4%)	Auto	●	●	●	●	●
3	High Pressure	Hardware (HP)	Opens at 400 ± 10 psig Closes at 300 ± 20 psig	2-Auto resets within 7-days then Manual	●	●	●		
3	Low DX Coil Temperature (Units with Wet Heat)	Hardware (T4)	Opens at 30 ± 4°F Closes at 50 ± 6°F	2-Auto resets within 7-days then Manual		○		○	○
4	Low Refrigerant Temperature (Water Coil)	Hardware (T2)	Standard Range: Opens at 36 ± 3°F Closes at 46 ± 2°F Extended Range & Ground Opens at 25 ± 3°F Closes at 35 ± 2°F	2-Auto resets within 7-days then Manual			●		
5	Low DX Coil Temperature (Units without Wet Heat)	Hardware (T4)	Closes at 30 ± 4°F Opens at 50 ± 6°F	2-Auto resets within 7-days then Manual	●	○	●	○	○
5	Low Water Coil Leaving Air Temperature	Hardware (T6)	Closes at 38 ± 2°F Opens at 45 ± 2°F	Auto		○		○	○
6	Brownout	Software	Line Voltage < 85% of Nameplate Voltage	Auto (after 5 min)	●	●	●	○	○
7	Heating Valve Position Feedback Failure	Software	Outside Range: 0.2 ± 0.1 to 3.68 ± 0.29 VDC	Auto				○	○
8	Valve or F&BP Damper Position Feedback Failure	Software	Outside Range: 0.2 ± 0.1 to 3.68 ± 0.29 VDC	Auto		○		○	○
9 `	OA Damper Position Feedback Failure	Software	Outside Range: 0.2 ± 0.1 to 3.68 ± 0.29 VDC	Auto	●	●	●	●	●
10	Discharge Air Temperature Sensor Failure	Software	Outside Range: 0.39 to 4.88 VDC (±4%)	Auto	●	●	●	●	●
11	Outdoor Air Temperature Sensor Failure	Software	Outside Range: 0.39 to 4.88 VDC (±4%)	Auto	●	●	●	●	●
12	Mixed Air Temperature Sensor Failure	Software	Outside Range: 0.39 to 4.88 VDC (±4%)	Auto	○	○	○	○	○
13	Water-In Temperature Sensor Failure	Software	Outside Range: 0.39 to 4.88 VDC (±4%)	Auto		○	●	○	○
15	Change Filter (Network Units Only)	Software	Fan Runtime Setpoint, Adj.	Network	●	●	●	●	●
16	Communication Error (Master/Slave Only)	Software	N/A	Auto	●	●	●	●	●

● Alarm is available for this unit.

○ Alarm may be available, depending on unit configuration.

Room Temperature Sensor Failure

The "Room Temperature Sensor Failure" fault will occur when the voltage across the sensor is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting sensor faults.

Effects (as applicable):

- Fan is immediately de-energized.
- Compressor is immediately de-energized.
- Reversing valve is de-energized after a delay.
- Outside air damper is closed.
- All electric heat stages are de-energized.
- Face and bypass damper is positioned to 100% face.
- Heating valve is fully opened to the coil.
- Chilled water valve is closed to the coil.
- Heating EOC valve is opened.
- Cooling EOC valve is closed.

High Pressure

The "High Pressure" fault is an indication that the high pressure switch input (DI-4) sensed an open circuit while the controller was calling for the compressor to run.

The high pressure switch (HP) is wired in series with the compressor relay output (RO-2), the compressor relay coil (R1), and the UVC alarm input. Therefore, if a high pressure condition occurs, the compressor will be immediately shut down by the switch; then it will be disabled by the UVC. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting digital input faults.

AV/AH Units Only: Because compressorized AV or AH models are split systems, a factory-mounted high pressure switch is not possible, and the high pressure fault is not available. On some of these models, DI-4 is directly connected to 24 VAC to simulate a no-fault condition.

AZ Units with Wet Heat: Note that a 3-blink fault code could be either a high pressure or low DX coil temperature alarm.

Effects (as applicable):

- Compressor is immediately de-energized.

Low DX Coil Temperature (3-Blink Fault Code)

The 3-blink "Low DX Coil Temperature" fault is an indication that the low temperature switch input (DI-4) sensed an open circuit while the controller was calling for the compressor to run.

The low DX coil temperature switch (T4) is wired in series with the compressor relay output (RO-2) and the UVC alarm input. Switch T4 will open when the coil temperature falls below its setpoint. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting digital input faults.

AZ Units with Wet Heat: Note that a 3-blink fault code could be either a low DX coil temperature or high pressure alarm.

Effect:

- Compressor is immediately de-energized.

Low Refrigerant Temperature (Water Coil)

The "Low Refrigerant Temperature" fault will occur when the water source heat pump is in the heating mode and the refrigerant temperature is at or below the low limit setpoint.

Usually, a low refrigerant temperature condition is caused by insufficient water flow.

Effects:

- Compressor is immediately de-energized.
- Reversing valve is immediately de-energized.

Low DX Coil Temperature (5-Blink Fault Code)

The 5-blink "Low DX Coil Temperature" fault is an indication that the low temperature switch input (DI-5) sensed a contact closure while the controller was calling for compressorized cooling. (UVC's on air source heat pumps in the defrost cycle will ignore this alarm condition.)

The low DX coil temperature switch (T4) is connected between 24 VAC and the UVC alarm input. Switch T4 will close when the coil temperature falls below its setpoint. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting digital input faults.

Effect:

- Compressor is immediately de-energized.

Low Water Coil Leaving Air Temperature

The "Low Water Coil Temperature" fault is an indication that the low temperature switch input (DI-5) is sensing a contact closure. The low water coil temperature fault can occur at any time, regardless of the Control Temperature or operating mode.

The low water coil temperature switch (T6) is connected between 24 VAC and the UVC alarm input. Switch T6 will close when the coil temperature falls below its setpoint. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting digital input faults.

Note: On 2-pipe valve controlled units, the entering water temperature determines whether the valve will be enabled for heating. It must be greater than 80°F (default), otherwise the valve will be closed.

Effects (as applicable):

- Outdoor air damper is closed (exhaust fan interlock feature is overridden).
- Heating valve is positioned to 100% open to the coil (discharge air temperature < 55°F, default).
- Heating valve is positioned 25% open to the coil (discharge air temperature ≥ 55°F, default).
- Chilled water valve is closed to the coil.
- Compressor is immediately de-energized.
- First stage of electric heat is energized (only if fan is on).

Brownout

The "Brownout" fault indicates that the UVC is sensing low voltage levels. It is a safety that is intended to protect the compressor and electric heat contactors from low line voltage or "brownout" conditions.

The controller is programmed with a brownout setpoint that corresponds to 85% of the unit ventilator's nameplate line voltage value. If the UVC senses a voltage level less than its setpoint for more than 10 seconds (2 seconds with electric heat), it will trigger the brownout fault. The fault will reset when the sensed voltage remains at or above a level corresponding to 90% of the nameplate value for a period of 5 minutes. For information on troubleshooting this alarm, refer to "Test Procedures" in the "Service Information" section of this manual.

Effects (as applicable):

- Compressor is immediately de-energized.
- All electric heat stages are immediately de-energized.

Heating Valve Position Feedback Failure (4-Pipe Units Only)

The "Heating Valve Position Feedback Failure" fault is an indication that the UVC is sensing a valve position feedback voltage that is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting actuator feedback faults.

Effect:

- Heating valve will hold its position.

Valve or Face and Bypass Damper Position Feedback Failure

The "Valve or F&BP Damper Position Feedback Failure" fault is an indication that the UVC is sensing a valve or F&BP damper position feedback voltage that is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting actuator feedback faults.

On 4-pipe valve controlled units, this fault applies to the chilled water valve. On all other units with control valves or F&BP dampers, there is only one possibility: heating valve, chilled water valve, or F&BP damper actuator.

Effect:

- Valve or actuator will hold its position.

Outdoor Air Damper Position Feedback Failure

The "Outdoor Air Damper Position Feedback Failure" fault is an indication that the UVC is sensing a damper position feedback voltage that is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting actuator feedback faults.

Effect:

- Outdoor air damper will hold its position.

Discharge Air Temperature Sensor Failure

The "Discharge Air Temperature Sensor Failure" fault will occur when the voltage across the discharge air sensor is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting sensor faults.

Effects (as applicable):

- Control Temperature is set equal to the room temperature.
- Discharge air low limit functions are disabled.
- Discharge air high limit function is disabled.

- All other control processes execute normally (discharge air temperature is assumed to be acceptable).

Outdoor Air Temperature Sensor Failure

The "Outdoor Air Temperature Sensor Failure" fault will occur when the voltage across the outdoor air sensor is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting sensor faults.

Effects (as applicable):

- Economizer cooling is disabled (ventilation cooling lockout function assumes OA temperature is high).
- Compressorized cooling is disabled on all except AR unit (low ambient compressor lockout function assumes OA temperature is low).
- On ASHP units, electric heat can be enabled by the emergency heat, defrost, or discharge air low limit functions only (OA temperature is assumed to be high).
- Heating EOC valve is controlled by room temperature only (OA temperature is assumed to be high).

Water-In Temperature Sensor Failure

The "Water-In Temperature Sensor Failure" fault is applicable to WSHP units and to units equipped with water coils (except for 4-pipe valve controlled units). It will occur when the voltage across the entering water temperature sensor is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting sensor faults. **Note:** Except for 2-pipe units, this fault will not affect the normal operation of units equipped with water coils.

Effects (as applicable to WSHP units):

- Economizer changeover function depends on OA temperature only (entering water temperature is assumed to be high).
- Compressorized heating is available (entering water temperature is assumed to be high).
- Electric heat can be enabled by the emergency heat or discharge air low limit functions only (entering water temperature is assumed to be high).

Effects (as applicable to 2-pipe units):

- Valve or face and bypass damper cooling operation is disabled (entering water temperature is assumed to be high).
- EOC valve will act as a heating EOC valve (entering water temperature is assumed to be high).

Water-Out Temperature Sensor Failure

The "Water-Out Temperature Sensor Failure" fault will occur when the voltage across the leaving water temperature sensor is outside the acceptable range. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting sensor faults.

Change Filter

The "Change Filter" fault is a network feature indicating that the fan has operated longer than the set number of hours. Typically, this alarm is used to alert the building operator of the need to replace the filter. To clear the fault, the filter timer must be reset at the network PC.

Effect:

- An alarm message Iis sent over the network.

Communication Error

The "Communication Error" fault can only occur on slave units. It indicates that the unit is not communicating with its master. Refer to "Test Procedures" in the "Service Information" section of this manual for information on troubleshooting this fault.

Effects:

- Room temperature, unoccupied offset, and minimum OA damper position setpoints will be obtained from the slave UVC's on-board pots.
- The operating mode will be that last received over the network from the master (cycling power will place the unit in the occupied mode).
- All other control processes execute normally.

Service Information

PC Connection

A personal computer (PC) equipped with the appropriate Monitor software may be directly connected to any UVC. Typically, for start-up or service purposes, the PC would be a portable laptop or notebook type (see PC specification below).

For stand-alone, master, or slave controllers, the computer must be loaded with "stand-alone" Monitor software. For network controllers, the PC must be loaded with the job-specific "network" Monitor software.

For all unit types, the PC is connected to the UVC at port Comm A. For master UVC's only, a special procedure is required to reconfigure the port for PC connection (see below).

MicroTech controllers use the RS-232C format for PC communications. The data transmission speed is 9600 baud.

PC Specification

A directly connected computer may be used for monitoring unit operation, changing setpoints, trend logging, downloading software, and diagnostics. The PC must be an IBM or 100% true compatible with the following features (minimum requirements):

- 386SX microprocessor
- 2 Megabytes of RAM (Random Access Memory)
- 60 Megabyte hard disk drive
- 3˚" floppy disk drive
- Asynchronous Serial Communications Adapter (9 or 25 pin male)
- 101 enhanced keyboard
- VGA graphics capability
- Internal time clock, battery backed
- Windows 3.1 or Windows 95
- MicroTech Monitor software

Cable Specification

A properly terminated, shielded, twisted pair cable is required to connect a PC to the UVC (Belden 8761 or equivalent). The cable must be terminated at an IDC connector as shown in Table 10. The maximum allowable cable length for direct connection between the PC and UVC is 50 feet. If the desired length is over 50 feet, an RS-232 cable extension kit is required (contact AAF-McQuay).

A universal communications cable kit that allows a PC to be connected to any MicroTech controller is available from AAF-McQuay. The part number is 57186801.

Table 10. RS-232 Communications Cable Terminations

Comm. Port Terminal	Connection
1	Jumped to terminal 2
2	Jumped to terminal 1
3	Transmit
4	Not used
5	Receive
6	Ground

Master UVC Connection Procedure

Normally, port Comm A of a master UVC is not available for any use. The port may be reconfigured for PC communications at 9600 baud using the RS-232 format by performing the following procedure:

1. Disconnect power to the UVC (use fan switch or mainpower switch).
2. Set the hex switches to "FF."
3. Connect the PC to the UVC at port Comm A.
4. Apply power to the UVC.

To return the master to normal operation, remove power, reset the hex switches, disconnect the PC, and restore power.

Note: The above procedure will also reconfigure port Comm B. As a result, network communications will be discontinued.

UVC Inputs and Outputs

IDC Terminal Connectors

All connections to the UVC board are made using 0.156" insulation displacement type (IDC) terminals. The IDC connectors can accept up to 18 AWG, 0.085" OD wire. They are available in two- through six-conductor styles (see parts list).

The IDC connector displaces wire insulation to make contact with the conductor. If a faulty UVC connection is suspected, try pressing down on the wire in the IDC terminal with a small screwdriver.

Analog Inputs

The UVC has 14 analog inputs. Ten of these are available for external (IDC) connection; the remaining four are used for internal connections to the three on-board pots and the brownout voltage sensor.

The ten analog inputs that are available for external connection are labeled "IN0" through "IN9" on the UVC and the Unit wiring diagram. Each input has two terminals: an "S" (signal) terminal and a "G" (ground reference) terminal. Inputs IN0 and IN1 have a common "G" terminal (see Figure 1). The "G" terminals of inputs IN2 through IN9 are internally connected.

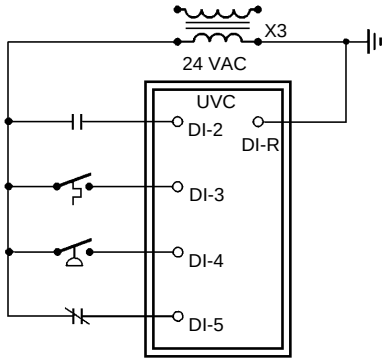
Each "S" terminal is internally connected to a 5 VDC power supply through a 3.3 KW resistor. The voltage at the "S" terminal varies as the temperature sensor resistance or actuator feedback signal changes. The UVC converts these voltages into temperature or actuator position data. (Refer to Table 18 and Figure 6.)

Digital Inputs

The UVC has six digital inputs, all of which are available for external (IDC) connection. These inputs are labeled "DIGITAL IN" on the UVC and "DI-0" through "DI-5" on the unit wiring diagram. Each input has two terminals: a numeric terminal and a common "DI-R" (ground) terminal (see Figure 1). All UVC digital input circuits are optically isolated.

The digital inputs sense the presence or absence of an external 24 VAC power source (transformer X3). The power source is connected to the input through a switch or set of contacts (see Figure 4). Refer to the wiring diagram supplied with your unit for specific wiring details.

Figure 4. Digital Input Wiring Example



Relay Outputs

The UVC has eight relay outputs. These outputs are internally connected to the normally open contacts of eight on-board, electromechanical relays. The outputs are labeled "RELAY OUTPUT" on the UVC and "RO-1" through "RO-8" on the unit wiring diagram. Each output has two terminals: a numeric terminal and a common "RO-H" (hot) terminal (see Figure 1).

The unit ventilator's 24 VAC loads are connected as shown in Figure 5, (page 22). The loads could be a contactor, another relay, a solenoid or an actuator's "open" or "close" circuits. Refer to the wiring diagram supplied with your unit for specific wiring details.

Auxiliary Outputs

The UVC has two Triac based auxiliary outputs. Output AO-9 is currently not used for field applications. Output AO-10 can be used to operate a field provided 24vdc pilot duty relay, (see figure 4a). By default, the normally open contacts of this field provided 24vdc pilot duty relay can then be used to signal exhaust fan operation (energized coil = exhaust fan on). Using a PC with the Monitor software and proper cable kit the AO-10 output can be re-configured in the field to operate the same 24vdc pilot duty relay to provide an auxiliary heat signal (energized coil = auxiliary heat off) instead of exhaust fan signal. Exhaust fan signal (default) and auxiliary heat signal features cannot be used simultaneously as they both use the same output.

Figure 4a. Auxiliary Output Wiring Example

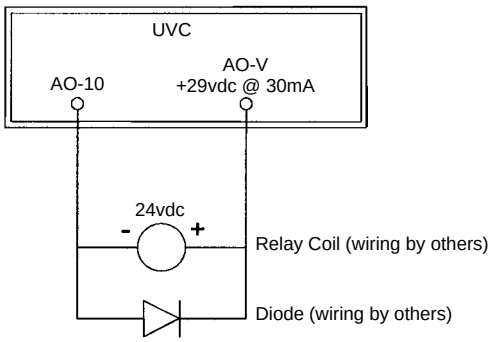
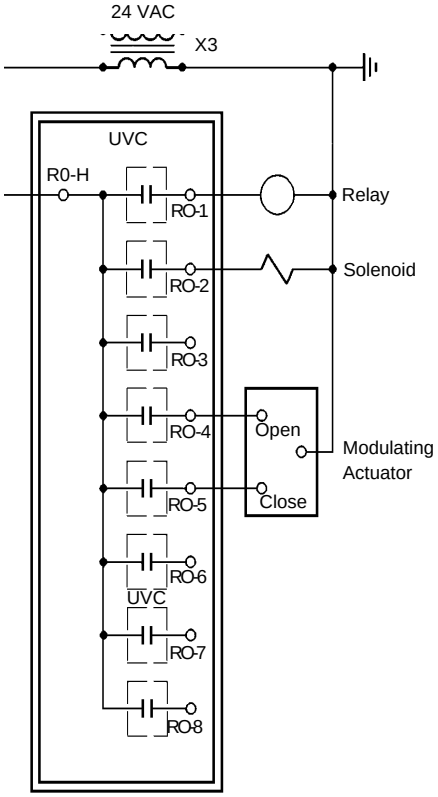


Figure 5. Relay Output Wiring Example



Input/Output Tables

All UVC input and output connections and their corresponding unit ventilator components are shown in the following tables. The tables are arranged according to UVC program and software model numbers. To determine the correct input/output information for a particular unit ventilator, you must know these numbers. Refer to the software ID tag attached to the UVC faceplate, or refer to Table 4.

*Table 11. Inputs and Outputs for Program UV1*** Units (Models AE or AV/AH)*

Connection	Software Model	Component Description
IN0	MDL00	Tenant override or remote spt. adjust or both (optional)
IN1	MDL00	Room temperature sensor
IN2	MDL00	Discharge air temperature sensor
IN3	MDL00	Outdoor air temperature sensor
IN5	MDL00	Not Used
IN6	MDL00	Not Used
IN7	MDL00	Outside air damper position
DI-1	MDL00	Ventilation lockout (default) or exhaust fan interlock (optional)
DI-2	MDL00	Day-night changeover device (optional)
DI-3	MDL00	① Emergency heat switch (SW5) & defrost control (T5)
DI-4	MDL00	② High pressure switch (HP)
DI-5	MDL00	Low DX coil temperature switch (T4)
RO-1	MDL00	Fan relay (R4)
RO-2	MDL00	Compressor relay (R1 on AE, R7 on AV/AH)
RO-3	MDL00	Reversing valve
RO-4	MDL00	Outside air damper open
RO-5	MDL00	Outside air damper close
RO-6	MDL00	Electric heat stage 1
RO-7	MDL00	Electric heat stage 2
RO-8	MDL00	Electric heat stage 3
AO-10	MDL00	Exhaust fan relay or auxilliary heat relay

Notes:

1. Emergency heat switch SW5 and defrost control T5 are wired in parallel. SW5 has momentary contacts and T5 has maintained contacts.
2. High pressure switch HP is not installed on AV/AH units. These units are wired to provide a constant, no-fault condition.

*Table 12. Inputs and Outputs for Program UV2*** Units (Models AR)*

Connection	Software Model	Component Description
IN0	All	Tenant override or remote spt. adjust or both (optional)
IN1	All	Room temperature sensor
IN2	All	Discharge air temperature sensor
IN3	All	Outdoor air temperature sensor
IN5	All	Water-in temperature sensor
IN6	All	Water-out temperature sensor & low refrigerant temperature switch
IN7	All	Outside air damper position
DI-1	All	Ventilation lockout (default) or exhaust fan interlock (optional)
DI-2	All	Day-night changeover device (optional)
DI-3	MDL02	Emergency heat switch (SW5)
	MDL03	Not Used
DI-4	All	High pressure switch (HP)
DI-5	All	Low DX coil temperature switch (T4)
RO-1	All	Fan relay (R4)
RO-2	All	Compressor relay (R1)
RO-3	All	Reversing valve
RO-4	All	Outside air damper open
RO-5	All	Outside air damper close
RO-6	MDL02	Electric heat stage 1
	MDL03	Not used
RO-7	MDL02	Electric heat stage 2
	MDL03	Not used
RO-8	MDL02	Electric heat stage 3
	MDL03	Not used
AO-10	All	Exhaust fan relay (default) or auxilliary heat relay

*Table 13. Inputs and Outputs for Program UV3*** Units (Models AZ or AV/AH)*

Connection	Software Model	Component Description
IN0	All	Tenant override or remote spt. adjust or both (optional)
IN1	All	Room temperature sensor
IN2	All	Discharge air temperature sensor
IN3	All	Outdoor air temperature sensor
IN5	All	Not Used
IN6	All	Not Used
IN7	All	Outside air damper position
DI-2	All	Day-night changeover device (optional)
DI-3	All	Ventilation lockout (default) or exhaust fan interlock (optional)
DI-4	MDL04	High pressure switch (HP)
	MDL05	① Not used
	MDL06	Not used
DI-5	MDL04	Low DX coil temperature switch (T4)
	MDL05	Low DX coil temperature switch (T4)
	MDL06	Not used
RO-1	All	Fan relay (R4)
RO-2	MDL04	Compressor relay (R1 on AZ, R7 on AV/AH)
	MDL05	Compressor relay (R7)
	MDL06	Not used
RO-3	All	Not used
RO-4	All	Outside air damper open
RO-5	All	Outside air damper close
RO-6	MDL04	Electric heat stage 1
	MDL05	Not used
	MDL06	Electric heat stage 1
RO-7	MDL04	Electric heat stage 2
	MDL05	Not used
	MDL06	Electric heat stage 2
RO-8	MDL04	Electric heat stage 3
	MDL05	Not used
	MDL06	Electric heat stage 3
AO-10	All	Exhaust fan relay (default) or auxilliary heat relay

Notes:

1. High pressure switch HP is not installed on AV/AH units. These units are wired to provide a constant, no-fault condition.

*Table 14. Inputs and Outputs for Program UV4*** Units (Models AZ or AV/AH)*

Connection	Software Model		Component Description
IN0	All		Tenant override or remote spt. adjust or both (optional)
IN1	All		Room temperature sensor
IN2	All		Discharge air temperature sensor
IN3	All		Outdoor air temperature sensor
IN5	All		Water-in temperature sensor
IN6	MDL07		Heating valve position
	MDL08		F&BP damper position
IN7	All		Outside air damper position
DI-2	All		Day-night changeover device (optional)
DI-3	All		Ventilation lockout (default) or exhaust fan interlock (optional)
DI-4	All	② ③	High pressure (HP) & low DX coil temp (T4) switches
DI-5	All	①	Low water coil temperature switch (T6)
RO-1	All		Fan relay (R4)
RO-2	All		Compressor relay (R1 on AZ, R7 on AV/AH)
RO-3	All		Not used
RO-4	All		Outside air damper open
RO-5	All		Outside air damper close
RO-6	MDL07		Heating valve close (extend)
	MDL08		F&BP damper close to face (extend)
RO-7	MDL07		Heating valve open (retract)
	MDL08		F&BP damper open to face (retract)
RO-8	MDL07		Not used
	MDL08		Heating EOC valve close (2-position, N.O.)
AO-10	All		Exhaust fan relay (default) or auxilliary heat relay

Notes:

1. Switch T6 is not installed on units with steam coils. These units are wired to provide a constant, no-fault condition.
2. High pressure switch HP is not installed on AV/AH units. Only low temperature switch T4 is connected to DI-14 on these units.
3. High pressure switch HP and low temperature switch T4 are wired in series on AZ units only.

*Table 15. Inputs and Outputs for Program UV5*** Units (Models AV/AH) (2 pipe)*

Connection	Software Model	Component Description
IN0	All	Tenant override or remote spt. adjust or both (optional)
IN1	All	Room temperature sensor
IN2	All	Discharge air temperature sensor
IN3	All	Outdoor air temperature sensor
IN5	All	Water-in temperature sensor
IN6	MDL09	Heating valve position
	MDL10	F&BP damper position
	MDL11	Heat/cool valve position
	MDL12	F&BP damper position
IN7	All	Outside air damper position
DI-2	All	Day-night changeover device (optional)
DI-3	All	Ventilation lockout (default) or exhaust fan interlock (optional)
DI-4	All	Not used
DI-5	MDL9	Not used
	MDL10	Not used
	MDL11	Low water coil temp switch (T6)
	MDL12	Not used
RO-1	All	Fan relay (R4)
RO-2	MDL09	Not used
	MDL10	Not used
	MDL11	Heat/cool valve close (extend)
	MDL12	Not used
RO-3	MDL09	Not used
	MDL10	Not used
	MDL11	Heat/cool valve open (retract)
	MDL12	Not used
RO-4	All	Outside air damper open
RO-5	All	Outside air damper close
RO-6	MDL09	Heating valve close (extend)
	MDL10	F&BP damper close to face (extend)
	MDL11	Not used
	MDL12	F&BP damper close to face (extend)
RO-7	MDL09	Heating valve open (retract)
	MDL10	F&BP damper open to face (retract)
	MDL11	Not used
	MDL12	F&BP damper open to face (retract)
RO-8	MDL09	Not used
	MDL10	Heating EOC valve close (2-postition, N.O.)
	MDL11	Not used
	MDL12	Heat/cool EOC valve close (2-postition, N.O.)
AO-10	All	Exhaust fan relay (default) or auxilliary heat relay

Notes:

1. Switch T6 is not installed on heating only units with steam coils. Unit is wired to provide a constant, no-fault condition.

*Table 16. Inputs and Outputs for Program UV6*** Units (Models AV/AH) (4 pipe)*

Connection	Software Model	Component Description
IN0	All	Tenant override or remote spt. adjust or both (optional)
IN1	All	Room temperature sensor
IN2	All	Discharge air temperature sensor
IN3	All	Outdoor air temperature sensor
IN5	MDL13	Heating valve position
	MDL14	Hot Water-in temperature sensor
IN6	MDL13	Chilled water valve position
	MDL14	F&BP damper position
IN7	All	Outside air damper position
DI-2	All	Day-night changeover device (optional)
DI-3	All	Ventilation lockout (default) or exhaust fan interlock (optional)
DI-4	All	Not used
DI-5	MDL13	Low water coil temp switch (T6)
	MDL14	Not used
RO-1	All	Fan relay (R4)
RO-2	MDL13	Chilled water valve open (extend)
	MDL14	Chilled water EOC valve open (2-position, N.C.)
RO-3	MDL13	Chilled water valve close (retract)
	MDL14	Not used
RO-4	All	Outside air damper open
RO-5	All	Outside air damper close
RO-6	MDL13	Heating valve close (extend)
	MDL14	F&BP damper close to face (extend)
RO-7	MDL13	Heating valve open (retract)
	MDL14	F&BP damper open to face (retract)
RO-8	MDL13	Not used
	MDL14	Heating EOC valve close (2-position, N.O.)
AO-10	All	Exhaust fan relay (default) or auxilliary heat relay

*Table 17. Inputs and Outputs for Program UV7*** Units (Models AV/AH)*

Connection	Software Model	Component Description
IN0	All	Tenant override or remote spt. adjust or both (optional)
IN1	All	Room temperature sensor
IN2	All	Discharge air temperature sensor
IN3	All	Outdoor air temperature sensor
IN5	All	Water-in temperature sensor
IN6	MDL15	Chilled water valve position
	MDL16	F&BP damper position
	MDL17	Chilled water valve position
	MDL18	F&BP damper position
IN7	All	Outside air damper position
DI-2	All	Day-night changeover device (optional)
DI-3	All	Ventilation lockout (default) or exhaust fan interlock (optional)
DI-4	All	Not used
	MDL15	Low water coil temperature switch (T6)
DI-5	MDL16	Not used
	MDL17	Low water coil temperature switch (T6)
	MDL18	Not used
RO-1	All	Fan relay (R4)
RO-2	MDL15	Chilled water valve open (extend)
	MDL16	EOC valve (2-position, N.C.)
	MDL17	Chilled water valve open (extend)
	MDL18	F&BP damper close to face (extend)
RO-3	MDL15	Chilled water valve close (retract)
	MDL16	Not used
	MDL17	Chilled water valve close (retract)
	MDL18	F&BP damper open to face (retract)
RO-4	All	Outside air damper open
RO-5	All	Outside air damper close
RO-6	MDL15	Not used
	MDL16	F&BP damper close to face (extend)
	MDL17	Electric heat stage 1
	MDL18	Electric heat stage 1
RO-7	MDL15	Not used
	MDL16	F&BP damper open to face (retract)
	MDL17	Electric heat stage 2
	MDL18	Electric heat stage 2
RO-8	MDL15	Not used
	MDL16	Not used
	MDL17	Electric heat stage 3
	MDL18	Electric heat stage 3
AO-10	All	Exhaust fan relay (default) or auxilliary heat relay

Test Procedures

This section contains troubleshooting procedures for the following:

- Microprocessor problems
- Power supply problems
- Erroneous temperature readings
- Temperature sensor faults (codes 2, 10, 11, 12, 13, and 14)
- Digital input faults (codes 3, and 5)
- Brownout fault (code 6)
- Actuator feedback faults (codes 7, 8, and 9)
- Master/slave communication error fault (code 16)

Microprocessor Problems

The power and status LED indications can aid in UVC diagnostics.

Power LED: Immediately after power is applied to the UVC, the watchdog LED should illuminate continuously.

If the LED does not illuminate, check that the UVC power supply is intact (see "Power Supply Problems" below).

Status LED: Approximately 40 seconds after power is applied to the UVC, the status LED should illuminate as shown in Table 1. If the LED fails to respond properly, either there is a software problem or the UVC is defective. If a PC and the proper software is available, try downloading new software. If this does not help, the UVC is defective and must be replaced.

Power Supply Problems

The UVC requires a 24 VAC power supply. It is connected to the board at the section labeled "POWER" (terminal 6,24V). A transformer steps down the line voltage to the required 24 VAC: transformer X2 or X3 (line to 24 VAC). (Transformer X2 is used only on units with compressors.) Refer to the unit wiring diagram.

If a problem with the UVC power supply is suspected, check the following:

1. Verify that the main power switch is at "On."
2. Check the voltage at the secondary of transformer X2 or X3. It should be approximately 24 VAC (load dependent).

Transformer X3 provides auxiliary power for the UVC. It is used for the digital input and relay output circuits. If the controller LED's are responding properly but the fan will not run, transformer X3 may be defective. Check the voltage at the secondary of transformer X3; it should be approximately 24 VAC.

Erroneous Temperature Readings

If it is suspected that the UVC is operating using erroneous temperature data, the following procedure may be used to check the sensors:

1. Measure the temperature at the suspect sensor using an accurate thermometer.
2. Determine the sensor's analog input number. Refer to the unit wiring diagram or to the input/output tables (Tables 11 through 17).
3. Remove the IDC connector from its UVC terminals and measure the resistance of the sensor (through the IDC connection). Using the thermistor chart (Table 18), compare this value with the measured temperature.

   If the measured resistance and temperature match, go on to step 4.

Table 18. Thermistor Chart

°F	Ohms	Volts	°F	Ohms	Volts	°F	Ohms	Volts
15	16,104	4.145	77	3,000	2.373	139	761	0.932
16	15,627	4.124	78	2,927	2.343	140	746	0.917
17	15,166	4.102	79	2,857	2.313	141	731	0.902
18	14,720	4.080	80	2,789	2.283	142	717	0.888
19	14,288	4.057	81	2,723	2.253	143	703	0.874
20	13,871	4.034	82	2,658	2.223	144	689	0.859
21	13,467	4.011	83	2,595	2.194	145	676	0.846
22	13,076	3.988	84	2,534	2.164	146	662	0.831
23	12,698	3.964	85	2,474	2.135	147	649	0.818
24	12,333	3.940	86	2,416	2.106	148	637	0.805
25	11,979	3.915	87	2,360	2.077	149	625	0.792
26	11,636	3.890	88	2,305	2.049	150	613	0.779
27	11,304	3.865	89	2,251	2.020	151	601	0.766
28	10,983	3.839	90	2,199	1.992	152	589	0.753
29	10,672	3.814	91	2,149	1.965	153	578	0.741
30	10,371	3.788	92	2,099	1.937	154	567	0.729
31	10,079	3.761	93	2,051	1.909	155	556	0.717
32	9,797	3.734	94	2,004	1.882	156	546	0.706
33	9,523	3.707	95	1,959	1.855	157	535	0.694
34	9,258	3.608	96	1,914	1.828	158	525	0.683
35	9,002	3.653	97	1,871	1.802	159	516	0.673
36	8,753	3.625	98	1,829	1.775	160	506	0.661
37	8,512	3.597	99	1,788	1.750	161	496	0.650
38	8,278	3.569	100	1,747	1.724	162	487	0.640
39	8,052	3.540	101	1,708	1.698	163	478	0.629
40	7,832	3.511	102	1,670	1.673	164	469	0.619
41	7,619	3.482	103	1,633	1.648	165	461	0.610
42	7,413	3.453	104	1,597	1.624	166	452	0.599
43	7,213	3.424	105	1,562	1.600	167	444	0.590
44	7,019	3.394	106	1,528	1.576	168	436	0.580
45	6,831	3.365	107	1,494	1.552	169	428	0.571
46	6,648	3.335	108	1,461	1.528	170	420	0.561
47	6,471	3.305	109	1,430	1.505	171	413	0.553
48	6,299	3.274	110	1,398	1.482	172	405	0.544
49	6,133	3.244	111	1,368	1.459	173	398	0.535
50	5,971	3.213	112	1,339	1.437	174	391	0.527
51	5,814	3.183	113	1,310	1.415	175	384	0.518
52	5,662	3.152	114	1,282	1.393	176	377	0.510
53	5,514	3.121	115	1,254	1.371	177	370	0.501
54	5,371	3.078	116	1,228	1.350	178	364	0.494
55	5,231	3.059	117	1,201	1.328	179	357	0.485
56	5,096	3.028	118	1,176	1.308	180	351	0.478
57	4,965	2.996	119	1,151	1.287	181	345	0.471
58	4,838	2.965	120	1,127	1.267	182	339	0.463
59	4,714	2.934	121	1,103	1.247	183	333	0.456
60	4,594	2.902	122	1,080	1.227	184	327	0.448
61	4,477	2.871	123	1,058	1.208	185	321	0.441
62	4,363	2.839	124	1,036	1.189	186	316	0.435
63	4,253	2.808	125	1,014	1.170	187	310	0.427
64	4,146	2.777	126	993	1.151	188	305	0.421
65	4,042	2.745	127	973	1.133	189	299	0.413
66	3,941	2.714	128	953	1.115	190	294	0.496
67	3,842	2.682	129	933	1.097	191	289	0.409
68	3,748	2.651	130	914	1.079	192	284	0.384
69	3,655	2.620	131	895	1.062	193	280	0.389
70	3,565	2.589	132	877	1.045	194	275	0.382
71	3,477	2.558	133	859	1.028	195	270	0.376
72	3,392	2.527	134	842	1.012	196	266	0.371
73	3,309	2.496	135	825	0.995	197	261	0.364
74	3,228	2.465	136	809	0.980	198	257	0.359
75	3,150	2.434	137	792	0.963	199	252	0.353
76	3,074	2.404	138	777	0.948	200	248	0.348

If the measured resistance and temperature do not match, either there is a wiring problem or the sensor is defective. Check the IDC connection and the sensor circuit wiring for defects.

4. Replace the connector and measure the DC voltage across the sensor terminals. Using the thermistor chart, compare this value with the measured temperature. If the measured voltage and temperature match, the UVC may require factory service, or it may be defective.

   If the measured voltage and temperature do not match, the UVC is defective (this assumes sensor and circuit are intact).

Temperature Sensor Faults

The following procedure can be used to troubleshoot any of the six faults that indicate a temperature sensor failure. This type of fault has a 2, 10, 11, 12, or 13 blink fault code (see Table 9). It is usually caused by an open or shorted sensor circuit.

1. Determine the sensor's analog input number. Refer to the unit wiring diagram or to the input/output tables (Tables 11 through 17).
2. Remove the IDC connector from its UVC terminals and measure the resistance of the sensor (through the IDC connection). Compare this value to the acceptable range of values listed in the thermistor chart (Table 18).

   If the measured resistance is within the acceptable range of values, go on to step 3.

   If the measured resistance is higher or lower than any chart value, either there is a wiring problem or the sensor is defective. Check the IDC connection and the sensor circuit wiring for defects.
3. Replace the connector and measure the DC voltage across the sensor terminals.

   If the reading is between 0.39 VDC ± 4% and 4.88 VDC ± 4%, the measured voltage is acceptable. Attempt to clear the fault by cycling power to the UVC. If the fault does not clear, the UVC may require factory service, or it may be defective.

   If the reading is less than 0.39 VDC ± 4% or greater than 4.88 VDC ± 4%, the UVC is defective (this assumes sensor and circuit are intact).

Digital Input Faults

The four possible digital input faults are triggered by either a high pressure or low temperature switch. They are indicated by a 3- or 5-blink fault code (see Table 9).

Note that an open switch causes a 3-blink fault code and a closed switch causes a 5-blink fault code. Usually, a digital input fault is caused by high pressure or low temperature alarm conditions that are due to mechanical problems in the unit ventilator. However, this type of fault could also be caused by a problem in the digital input circuit.

Following is a procedure that may be used to check for problems in the digital input circuit. If the probable cause of the fault is found using the procedure, attempt to clear the fault by cycling power to the UVC. If the probable cause of the fault is not found using the procedure, assume that mechanical problems exist and have a qualified technician service the unit before attempting to reset the UVC.

1. Check the voltage at the secondary of transformer X3; it should be approximately 24 VAC.
2. Determine the switch's digital input number. Refer to the unit wiring diagram or to the input/output tables (Tables 11 through 17).
3. Check the wiring and connections throughout the digital input circuit.
4. Measure the resistance through the switch contacts (with at least one wire disconnected). The "3-blink" switches are normally closed, and the "5-blink" switches are normally open (see Table 9).

   The alarm conditions that cause these faults should return to normal fairly quickly. If the switch is not in its normal position after a reasonable amount of time, it is likely that the switch is defective.

Brownout Fault

A low line voltage condition is indicated by the 6-blink brownout fault code.

The UVC senses AC voltage for brownout conditions. If the line voltage to the unit of the phase used to provide power to the units 24 VAC transformer drops by 20% below the units nameplate value a brownout fault will occur. Once line voltage returns to 10% below nameplate or higher normal operation resumes.

If a brownout fault occurs, check the line voltage to the unit ventilator. If it is less than 85% of the nameplate value, contact the power company. If the line voltage remains greater than 85% of the nameplate value for more than 5 minutes but the fault does not reset, perform the following:

1. Check the primary and secondary voltages of power supply transformers X2 or X3.
2. Check for faulty wiring or connections throughout the power supply circuit.

Actuator Feedback Faults

The following procedure can be used to troubleshoot any of the three faults that indicate an actuator feedback failure. This type of fault has a 7, 8, or 9 blink fault code (see Table 9). It is usually caused by a defective actuator or a mis-wired feedback circuit.

1. Estimate the amount of actuator extension by observing the position of the valve or damper. Verify that the actuator linkage is intact.
2. Determine the feedback circuit's analog input number. Refer to the unit wiring diagram or to the input/output tables (Tables 11 through 17).
3. Leaving the connector in place, measure the DC voltage across the input terminals. Compare this reading and the observed actuator position with the information below.
4. If the reading is between 0.2 ± 0.1 VDC and 3.68 ± 0.29 VDC, the measured voltage is acceptable. Attempt to clear the fault by cycling power to the UVC. If the fault does not clear, the UVC may require factory service, or it may be defective.

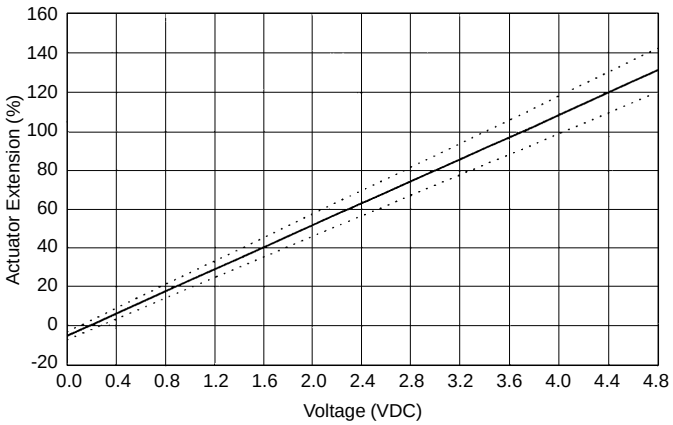
   If the reading is less than 0.1 VDC or greater than 3.97 VDC, check the wiring and connections between the actuator and the UVC. Look for shorts or disconnections. Referring to the unit wiring diagram, verify that the feedback wires are terminated properly. If the wiring is intact and the fault does not clear, go on to step 4.

Note: If the linkage is disconnected or damaged, it is possible that the actuator could extend beyond the nominal full stroke of one-half inch. If it does, the feedback voltage could exceed the acceptable upper limit.

5. Remove the IDC connector from the analog input and measure the DC voltage across the UVC terminals. It should be approximately 5 VDC. If it is, the actuator is defective. If it is not, the UVC is defective.

Note: Stroke endpoint parameters for each actuator are loaded into the UVC at the factory and auto calibrated at each power-up. If an actuator must be replaced, the stroke endpoint parameters in the controller may need to be reset. If nuisance alarms are occurring or if a valve or damper will not fully close, obtain factory service.

Figure 6. Barber-Colman Actuator Position Feedback Voltages



Notes:

1. Extension percentage is based on $^1/_2$-inch nominal full stroke.
2. Voltages are measured at UVC analog input terminals.
3. Range of expected accuracy is defined by the dotted lines.
4. Voltage at maximum possible actuator extension is 4.63 VDC (linkage disconnected).

Master/Slave Communication Error Fault

A master/slave communication error is indicated by a 16-blink fault code. Troubleshooting this fault is limited to the following checks:

- Verification of master and slave UVC communication port voltages
- Verification of communications wiring integrity
- Verification of network addressing

The best way to accomplish these checks is to perform the master/slave start-up procedure. Refer to “Master/Slave” in the “Start-up” section of this manual.

If all of the above checks have been performed and the UVC will still not communicate, either the controller is defective or factory service is required.

UVC Replacement

Data relating to the unit ventilator configuration and actuator characteristics are stored at the factory when each unit is built and tested. This information defines the program number, software model, and several parameter settings that are unique for each unit ventilator. If a UVC is defective and must be replaced, its unit-specific software (defined by the above data) must be loaded into the replacement controller.

If a PC is available, it may be possible to recover the software from the defective UVC.

If a PC is not available or the software cannot be recovered, the replacement UVC must be downloaded at the factory. To do this, the factory needs the following information:

- Full model number
- Serial number
- Job control number

This information is listed on the unit mounted dataplate. It must be included with the replacement UVC part order.

Valve And Damper Actuator Calibration Procedures

Points to keep in mind about actuator calibration.
Actuator calibration must be performed...

- after every actuator replacement
- after any linkage adjustment
- as a service test to verify proper operation when problems are reported
- if a program has been downloaded to the controller and the previous calibration values were not saved prior to program download.
- If it appears that the controlled device is not working properly use these procedures as a troubleshooting tool to fully activate the controlled device then visually and or mechanically verify proper operation
- If the software in your MicroTech 325 controller is version 6 or higher (UV**6*.COD), then calibration will be automatically performed after every unit power cycle. If your software has the auto calibration feature, the amber LED will blink 3 seconds on, then 3 seconds off until calibration is complete. This feature is not implemented in MicroTech 125 controllers
- All actuators (version 5 software or lower) are factory calibrated during unit testing and need not be calibrated at initial unit start-up unless changes are made to linkage and or actuators are replaced
- The same memory addresses described in the procedures above may also be accessed using the DOS Monitor program
- **ALWAYS**, if damper or valve problems are reported, check for damper blockages or linkage problems that prevent full damper movement and or look for stuck or sticky valves; correct any problems found then perform the appropriate calibration procedure

To perform the calibration procedures below you must have the Windows Monitor program installed on a PC, the PC must be connected with proper cabling to Port-A on the MicroTech controller, and you must have established communication between the PC and the controller. The cable kit required to properly connect a 9-pin serial PC port to Port-A on a MicroTech controller is P/N 057186802 which will contain cables P/N 067784501 and P/N 067784503.

You need to know which model of unit ventilator you will be working with before performing any of the calibration procedures.

MicroTech 325 F&BP Damper and Water Valve Calibration
The following procedure is for Model 7-hot water valve, Model 8-F&BP damper, Models 9-hot water valve, Model 10-F&BP damper, Model 12-F&BP damper, Model 14-F&BP damper, and Model 16-F&BP damper.

1. Establish communications to the controller using a PC with the Windows Monitor software and proper cables.
2. In the Windows Monitor program, go to Support menu and choose Read/Write.
3. Make sure the address located in the Controller Address box is the same as the UV you wish to work on. If you are directly connected to the controller you wish to work on, and the controller is not a Master in a Master I Slave network, then the Controller Address 00.FF may be used.
4. On the Read/Write screen, in the Operation box select the Monitor radio button by clicking on it. In the Display box select the Decimal radio button by clicking on it.
5. Enter the following string of memory addresses into the Memory Address box exactly as shown then press the Enter key: 0212-0217,0A01-0A02,0204,0505-0507,0901-0902,091A-091B,0935-0936.
6. Notice in the Read/Write area that the values located in 0A01 and 0A02 are identical. Write to 0A01 by clicking on the value and change it to any value other than the value at 0A02.
7. Write a value of 4 to location 0204. This will reset the controller. The program will stop; all outputs will go off.
8. Write 255 to location 0216, this will return a value of 1. This will begin forcing the F&BP damper to the full bypass position (or begin closing the valve).
9. Watch memory location 0506 change, when this value stops changing, the damper is in the full bypass position (valve fully closed). On a sheet of paper, write this value down for later use.
10. Write a 0 to location 0216. Then write a 255 to location 0217, this will return a value of 1. This will begin forcing the F&BP damper to the full face position (or begin opening the valve).
11. Watch memory location 0506 change, when this value stops changing, the damper is in the full face position (valve fully opened). On a sheet of paper, write this value down for later use.
12. Write a 0 to location 0217.
13. Using the Read/Write screen write the lowest value of the two numbers you wrote down on the sheet of paper to location 091A, then write the higher value to location 091B.
14. Change location 0A01 to match 0A02.
15. Reset the controller by writing 4 to location 0204.
16. The controller should start its program and begin operating normally.

Note: The same procedure is used for MicroTech 125 controllers except you must replace all instances of 0A01 with 8001, and replace all instances of 0A02 with 8002.

MicroTech 325 F&BP Damper and Water Valve Calibration
The following procedure is for Model 11-heat/cool water valve, Model 13-cold water valve (not hot water valve), Model 15-cold water valve, Model 17-cold water valve, and Model 18-F&BP damper.

1. Establish communications to the controller using a PC with the Windows Monitor software and proper cables.
2. In the Windows Monitor program, go to Support menu and choose Read/Write.
3. Make sure the address located in the Controller Address box is the same as the UV you wish to work on. If you are directly connected to the controller you wish to work on, and the controller is not a Master in a Master I Slave network, then the Controller Address 00.FF may be used.

4. On the Read/Write screen, in the Operation box select the Monitor radio button by clicking on it. In the Display box select the Decimal radio button by clicking on it.
5. Enter the following string of memory addresses into the Memory Address box exactly as shown then press the Enter key: 0212-0217,0A01-0A02,0204,0505-0507, 0901-0902,091A-091B,0935-0936.
6. Notice in the Read/Write area that the values located in 0A01 and 0A02 are identical. Write to 0A01 by clicking on the value and change it to any value other than the value at 0A02.
7. Write a value of 4 to location 0204. This will reset the controller. The program will stop; all outputs will go off.
8. Write 255 to location 0212, this will return a value of 1. This will begin forcing the F&BP damper to the full bypass position (or begin closing the valve)
9. Watch memory location 0506 change, when this value stops changing, the damper is in the full bypass position (or valve fully closed). On a sheet of paper, write this value down for later use.
10. Write a 0 to location 0212. Then write a 255 to location 0213, this will return a value of 1. This will begin forcing the F&BP damper to the full face position (or begin opening the valve).
11. Watch memory location 0506 change, when this value stops changing, the damper is in the full face position (or valve fully opened). On a sheet of paper, write this value down for later use.
12. Write a 0 to location 0213.
13. Using the Read/Write screen write the lowest value of the two numbers you wrote down on the sheet of paper to location 091A, then write the higher value to location 091B.
14. Change location 0A0l to match 0A02.
15. Reset the controller by writing 4 to location 0204.
16. The controller should start its program and begin operating normally.

Note: The same procedure is used for MicroTech 125 controllers except you must replace all instances of 0A01 with 8001, and replace all instances of 0A02 with 8002.

MicroTech 325 Water Valve Calibration

The following procedure is for Model 13-hot water valve only (not cold water valve)

1. Establish communications to the controller using a PC with the Windows Monitor software and proper cables.
2. In the Windows Monitor program, go to Support menu and choose Read/Write.
3. Make sure the address located in the Controller Address box is the same as the UV you wish to work on. If you are directly connected to the controller you wish to work on, and the controller is not a Master in a Master/Slave network, then the Controller Address 00.FF may be used.
4. On the Read/Write screen, in the Operation box select the Monitor radio button by clicking on it. In the Display box select the Decimal radio button by clicking on it.
5. Enter the following string of memory addresses into the Memory Address box exactly as shown then press the Enter key: 0212-0217,0A01-0A02,0204,0505-0507, 0901-0902,091A-091B,0935-0936
6. Notice in the Read/Write area that the values located in 0A01 and 0A02 are identical. Write to 0A01 by clicking on the value and change it to any value other than the value at 0A02.
7. Write a value of 4 to location 0204. This will reset the controller. The program will stop; all outputs will go off.
8. Write 255 to location 0216, this will return a value of 1. This will begin forcing the valve closed.
9. Watch memory location 0505 change, when this value stops changing, the valve is fully closed. On a sheet of paper, write this value down for later use.
10. Write a 0 to location 0216. Then write a 255 to location 0217, this will return a value of 1. This will begin forcing the valve opened.
11. Watch memory location 0505 change, when this value stops changing, the valve is fully opened. On a sheet of paper, write this value down for later use.
12. Write a 0 to location 0217.
13. Using the Read/Write screen write the lowest value of the two numbers you wrote down on the sheet of paper to location 0935, then write the higher value to location 0936.
14. Change location 0A01 to match 0A02.
15. Reset the controller by writing 4 to location 0204.
16. The controller should start its program and begin operating normally.

Note: The same procedure is used for MicroTech 125 controllers except you must replace all instances of 0A01 with 8001, and replace all instances of 0A02 with 8002.

MicroTech 325 OA Damper Calibration

The following procedure is for all Models

1. Establish communications to the controller using a PC with the Windows Monitor software and proper cables.
2. In the Windows Monitor program, go to Support menu and choose Read/Write.
3. Make sure the address located in the Controller Address box is the same as the UV you wish to work on. If you are directly connected to the controller you wish to work on, and the controller is not a Master in a Master/Slave network, then the Controller Address 00.FF may be used.
4. On the Read/Write screen, in the Operation box select the Monitor radio button by clicking on it. In the Display box select the Decimal radio button by clicking on it.
5. Enter the following string of memory addresses into the Memory Address box exactly as shown then press the Enter key: 0212-0217,0A01-0A02,0204,0505-0507, 0901-0902,091A-0918.
6. Notice in the Read/Write area that the values located in 0A01 and 0A02 are identical. Write to 0A01 by clicking on the value and change it to any value other than the value at 0A02.
7. Write a value of 4 to location 0204. This will reset the controller. The program will stop; all outputs will go off.
8. Write 255 to location 0214, this will return a value of 1. This will begin opening the OA damper.

9. Watch memory location 0507 change, when this value stops changing, the OA damper should be fully opened. On a sheet of paper, write this value down for later use.
10. Write a 0 to location 0214. Then write a 255 to location 0215, this will return a value of 1. This will begin closing the OA damper.
11. Watch memory location 0507 change, when this value stops changing, the OA damper is fully closed. On a sheet of paper, write this value down for later use.
12. Write a 0 to location 0215.
13. Using the Read/Write screen write the lowest value of the two numbers you wrote down on the sheet of paper to location 0901, then write the higher value to location 0902.
14. Change location 0A01 to match 0A02.
15. Reset the controller by writing 4 to location 0204.
16. The controller should start its program and begin operating normally.

Note: The same procedure is used for MicroTech 125 controllers except you replace all instances of 0A01 with 8001, and replace all instances of 0A02 with 8002.

Notes:

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