

Installation and Maintenance Manual

IM 1016-2

Group: **Applied Air Systems**

Part Number: **910231057**

Date: **July 2018**

MTB 158 Microprocessor Thermostat

ON/OFF and 3-Wire Controller

DANGER

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

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

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

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

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

CAUTION

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

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

Installation

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

Figure 1: Wiring Diagram for 3-Wire Valve Configuration

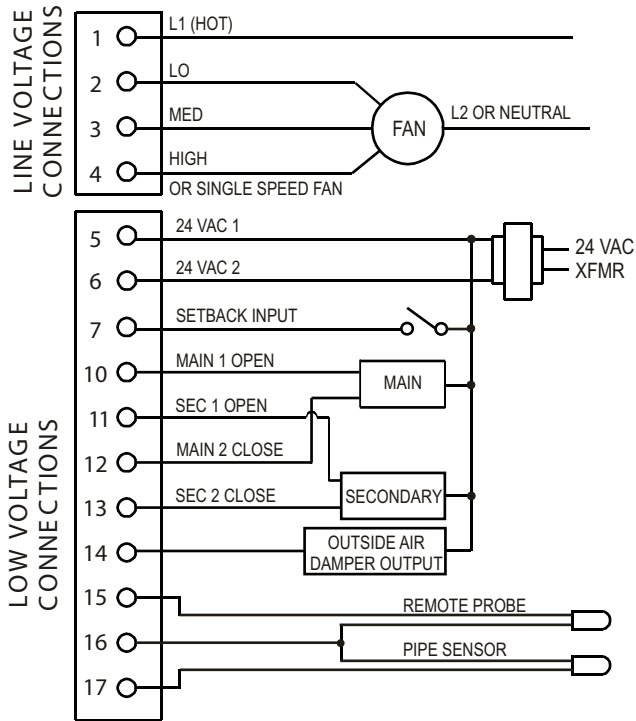


Figure 2: Wiring Diagram for ON/OFF Output Configuration

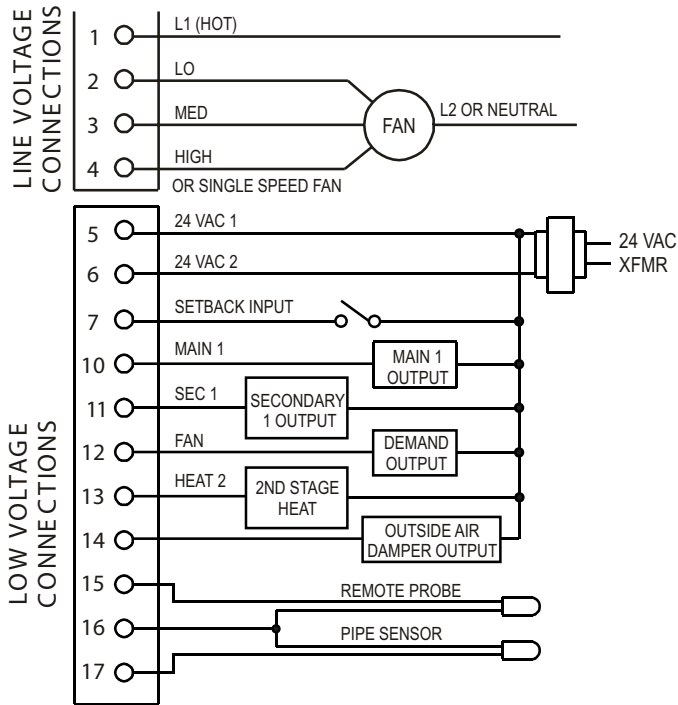


Table 1: Ratings

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

Thermostat Operation

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

Table 2: Main and Secondary Output Operation*

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

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

Mode Button Operation

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

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

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

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

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

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

Fan Speed Switch Operation

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

Up/ Down Arrow Operation

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

Setback Operation

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

Pipe Sensor Operation

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

Three Wire Floating Valve Operation

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

Outside Air Damper Operation

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

Application Notes

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

Service Menu

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

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

Adjust Value: Use UP ▲ or DOWN ▼ arrow.

Table 3: Service Menu Functions

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

Figure 3: Circuit Board Jumpers

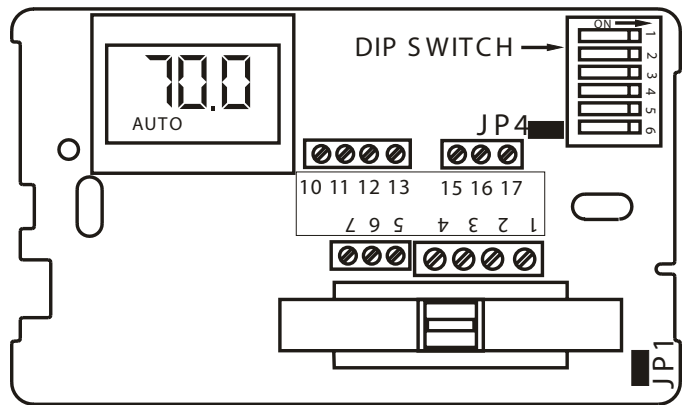
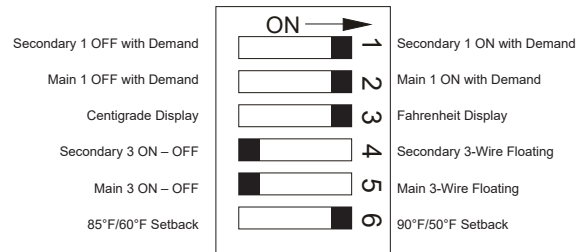


Figure 4: Dip Switch Configuration



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

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

Table 4: Circuit Board Jumper Configuration

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

Power-Up Operating Sequence

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