

## Excel 10

### W7750A,B,C CONSTANT VOLUME AHU CONTROLLER



#### INSTALLATION INSTRUCTIONS

#### PRODUCT DESCRIPTION

The W7750 is the Constant Volume Air Handling Unit (CVAHU) Controller in the Excel 10 product line family. See Fig. 1 (B model). The CVAHU is a Free Topology Transceiver (FTT) LONMARK® compliant device designed to control single zone and heat pump air handlers. W7750 systems control the space temperature in a given zone by regulating the heating

and cooling equipment in the air handler that delivers air to that space. The W7750 air handler is typically an all-in-one packaged unit, located on the roof of the building. In addition to standard heating and cooling control, the W7750 provides many options and advanced system features that allow state-of-the-art commercial building control. The controller is field mounted to the heating and cooling equipment that it controls, and the controller wiring is attached to the screw terminals located on the controller. See Fig. 1.

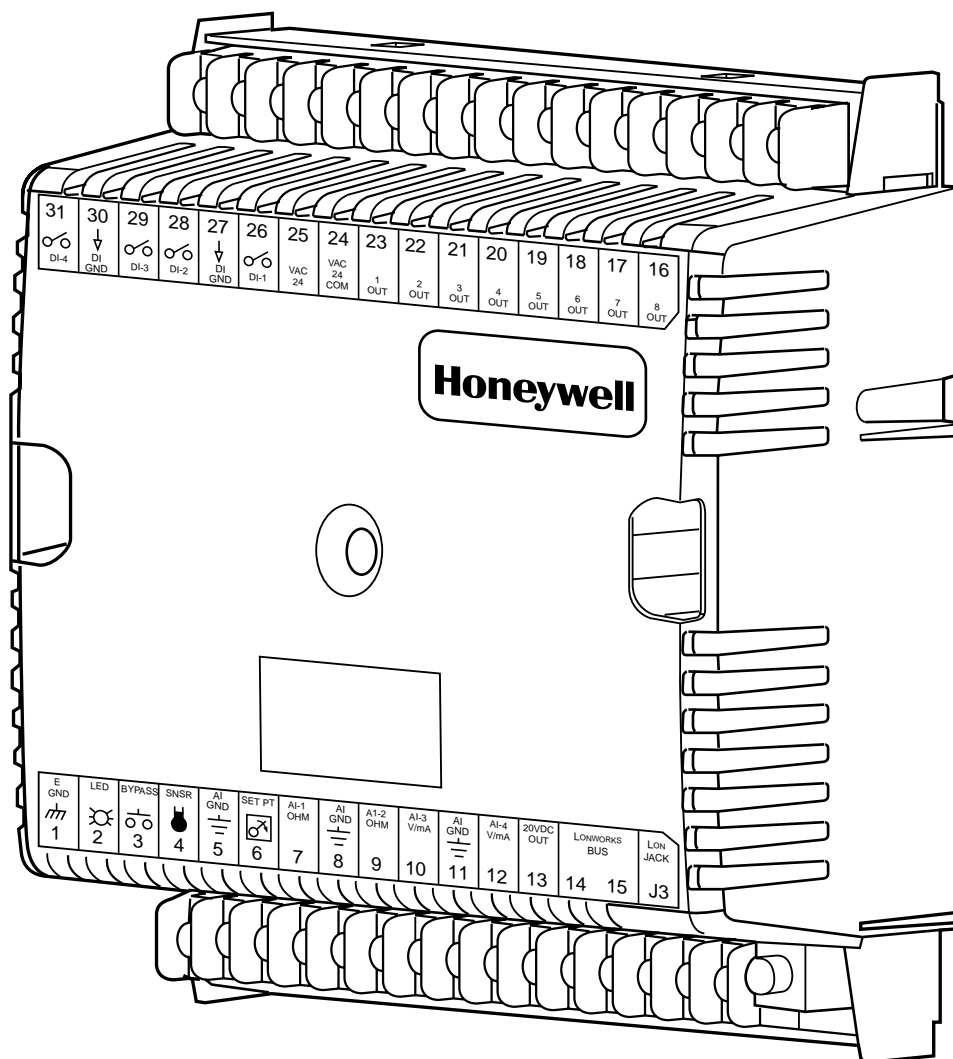


Fig. 1. Excel 10 W7750A,B,C Constant Volume AHU Controller (B shown).



The W7750A,B,C Controller communicates via the 78 kbps Echelon® LONWORKS® Network.

The relays in the W7750A have a specified dry contact minimum current of 100 mA at 5 Vdc. For the W7750B, any hardware driven by the Triac outputs must have a minimum current draw, when energized, of 25 mA and a maximum current draw of 500 mA. For the W7750C, any hardware driven by the analog outputs must have a maximum resistance of 500 ohms, resulting in a maximum voltage of 10 volts when driven at 20 mA.

## INSTALLATION

Mount the W7750A,B,C in a position that allows clearance for wiring, servicing and controller removal. Avoid mounting the W7750A,B,C in areas where acid fumes or other deteriorating vapors can attack the metal parts of the controller, or in areas where escaping gas or other explosive vapors are present. See Fig. 2 for mounting dimensions.

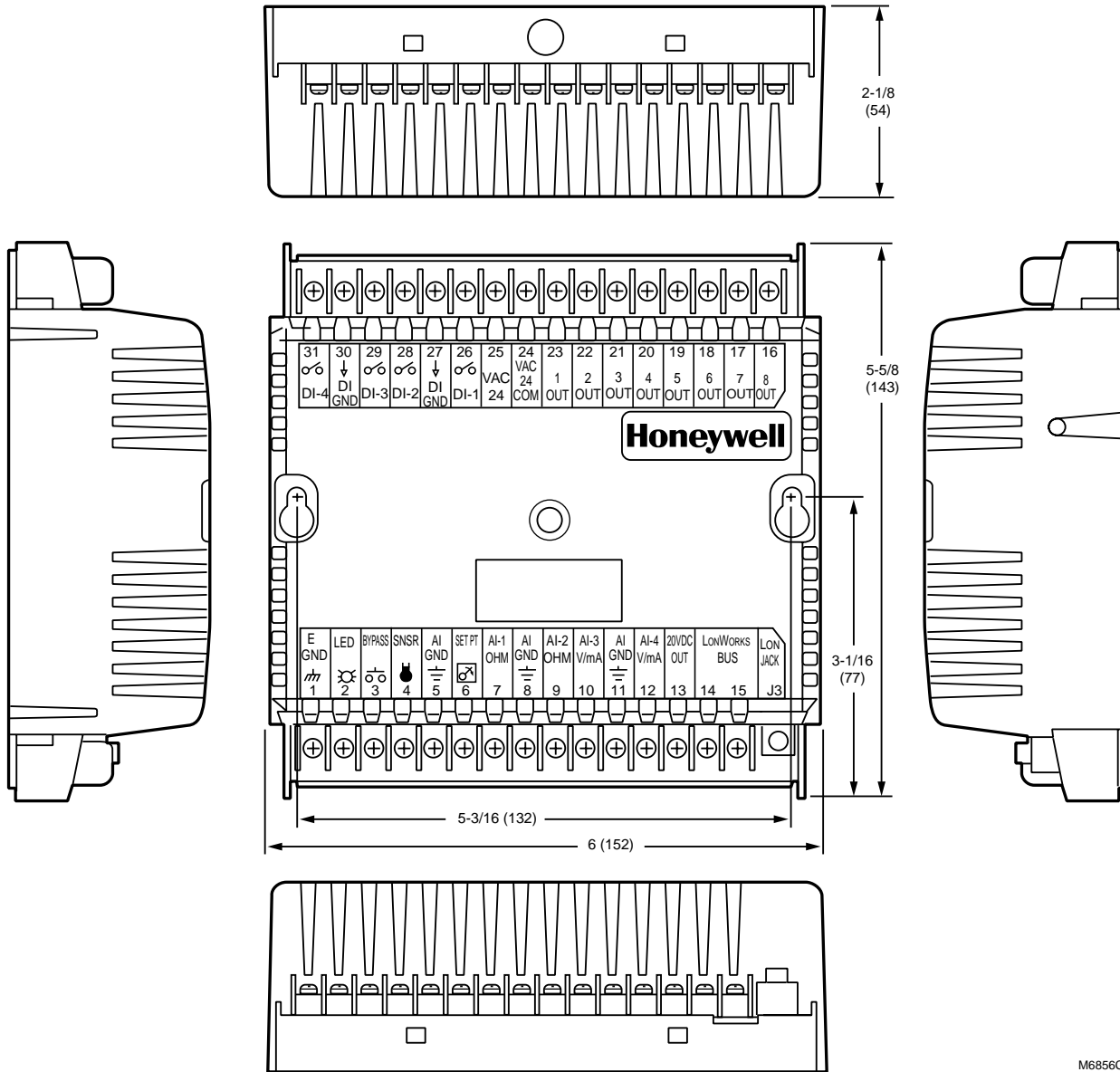


Fig. 2. W7750A,B,C (B shown) mounting dimensions in in. (mm).

The controller enclosure on the W7750A,B,C is constructed of a sheet metal housing and a plastic factory-snap-on cover. The controller mounts using two screws inserted through the plastic cover. Use the screws appropriate for the mounting surface. The W7750A,B,C can be mounted in any orientation. Ventilation openings were designed into the cover to allow

proper heat dissipation regardless of the mounting orientation.

The W7750 can also be mounted using DIN rail. To mount the W7750 on DIN rail, purchase two DIN rail adapters (obtain locally) part number TKAD, from Thomas and Betts, see Fig. 3.

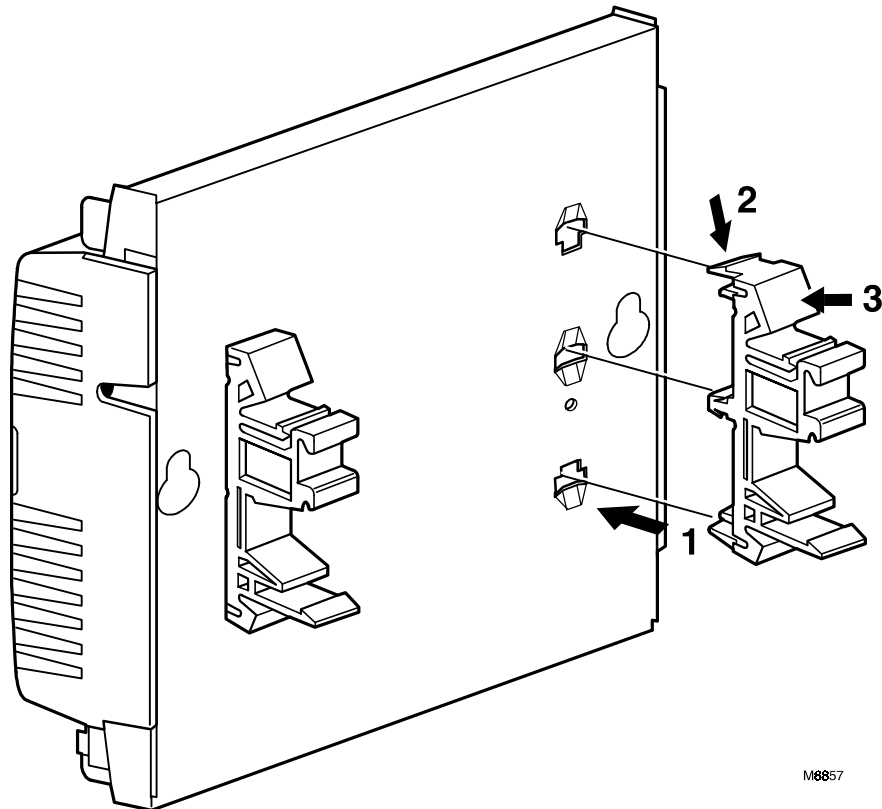


Fig. 3. W7750A,B,C DIN rail mounting.

## Wiring

All wiring must comply with applicable electrical codes and ordinances or as specified on installation wiring diagrams. Controller wiring on the W7750A,B,C is terminated to the screw terminal blocks located on the top and the bottom of the device.

### NOTES:

- For multiple controllers operating from a single transformer, the same side of the transformer secondary must be connected to the same power input terminal in each controller. The ground terminal (1 on the W7750A,B,C) must be connected to a verified earth ground for each controller in the group, see Fig. 4.
- All loads on an Excel 10 W7750B,C Controller must be powered by the same transformer that powers the Excel 10 Controller. A W7750A Controller can use separate transformers for controller power and output power.
- Keep the earth ground connection (terminal 1) wire run as short as possible. Refer to Fig. 10 through 16.
- Do not connect the analog or digital ground terminals (5, 8, 10 and 11 on the W7750A Controller and 5, 8, 11, 27 and 30 on the W7750B and C Controllers) to earth ground. Refer to Fig. 10 through 16.

## Power

The 24 Vac power from an energy limited Class II Power Source must be provided to each W7750A,B,C Controller. To conform to Class II restrictions (U.S. only), transformers must not be larger than 100 VA. More than one W7750A,B,C Controller can be powered by a single transformer. Fig. 4 shows power wiring details for multiple controllers and Fig. 5 depicts a single controller using one transformer.

### IMPORTANT

*Use the heaviest gauge wire available, up to 14 AWG (2.0 mm<sup>2</sup>) with a minimum of 18 AWG (1.0 mm<sup>2</sup>), for all power and earth ground wiring. Screw-type terminal blocks are designed to accept up to two 14 AWG (2.0 mm<sup>2</sup>) conductors, one on each side of the terminal screw. More than two wires that are 14 AWG (2.0 mm<sup>2</sup>) can be connected with a wire nut. Include a pigtail with this wire group and attach the pigtail to one side of the terminal block.*

### NOTES:

- Unswitched 24 Vac power wiring can be run in the same conduit as the LONWORKS cable.
- Maintain at least a three-inch (76 millimeter) separation between Triac outputs and LONWORKS wiring throughout the installation.

See the following **IMPORTANT** on **Heating and Cooling Equipment (UL 1995, U.S. only)**.

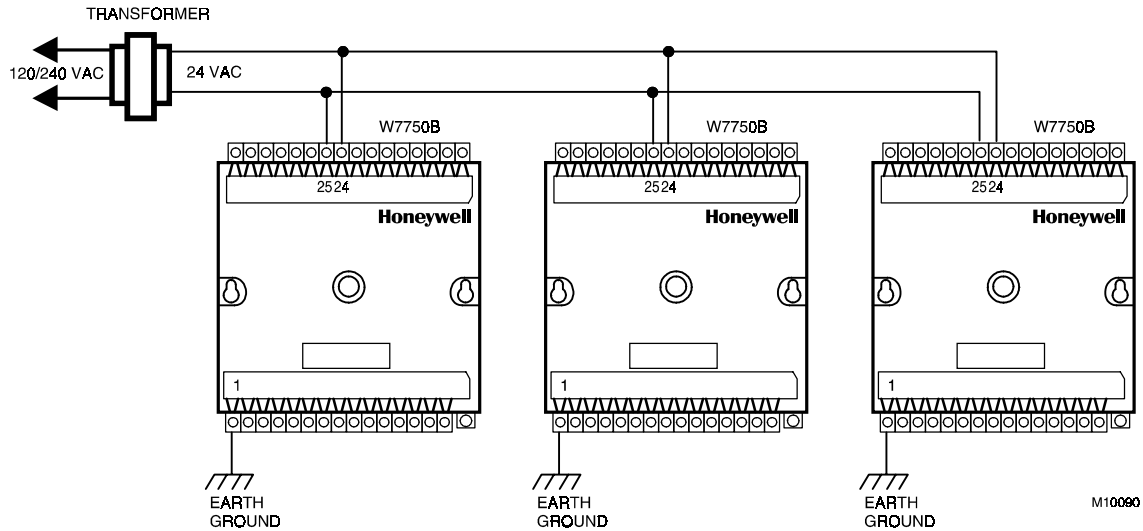


Fig. 4. Power wiring details for two or more Excel 10s per transformer. (Controller configurations are not necessarily limited to three devices, but the total power draw including accessories cannot exceed 100 VA when powered by the same transformer, U.S. only). See System Engineering, form 74-2958 for power wiring recommendations.

**IMPORTANT**

If the W7750 Controller is used on **Heating and Cooling Equipment (UL 1995, U.S. only)** and the transformer primary power is more than 150 volts, connect the 24 Vac common (24 VAC COM) terminal to earth ground, see Fig. 6. For these applications, only one Excel 10 Controller can be powered by each transformer.

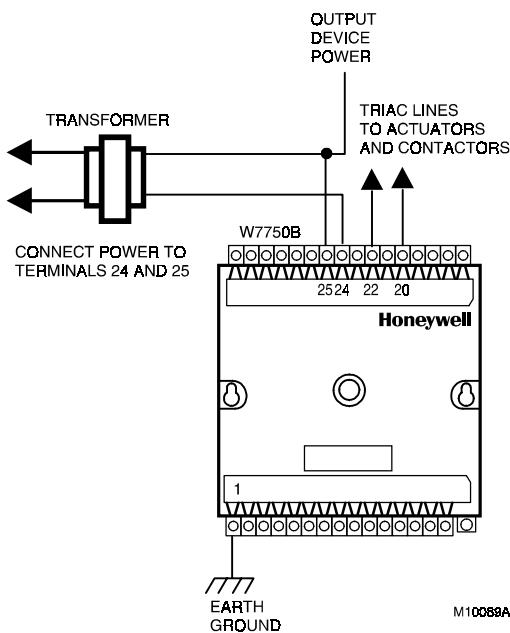
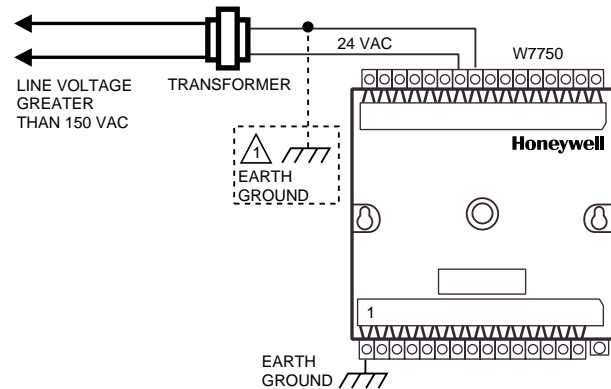


Fig. 5. Power wiring details for one Excel 10 per transformer.



IF THE W7750 CONTROLLER IS USED IN UL 1995 EQUIPMENT AND THE PRIMARY POWER IS MORE THAN 150 VOLTS, GROUND 24 VAC COM SIDE OF TRANSFORMER SECONDARY. M10088A

Fig. 6. Transformer power wiring details for one Excel 10 used in UL 1995 equipment (U.S. only).

**Communications**

Refer to *LONWORKS Wiring Guidelines, form 74-2865*, for a complete description of LONWORKS Bus network topology rules and approved cable types. One cable type for LONWORKS Bus communications wiring is Level IV 22 AWG (0.34 mm<sup>2</sup>) plenum or non-plenum rated unshielded, twisted pair, solid conductor wire. For non-plenum areas, U.S. part AK3781 (one pair) or U.S. part AK3782 (two pair) can be used. In plenum areas, U.S. part AK3791 (one pair) or U.S. part AK3792 (two pair) can be used. Some stranded conductor cables are allowed, contact Echelon Corp. Technical Support for the recommended vendors of Echelon approved cables.

Communications wiring can be run in a conduit, if needed, with *non-switched* 24 Vac or sensor wiring. If a longer LONWORKS Bus network is required, a Q7740A 2-way or Q7740B 4-way repeater can be added to extend the length of the LONWORKS Bus. Each network segment can have a maximum of one repeater. Pull the cable to each controller on the LONWORKS Bus and connect to communication terminals 14 and 15 (W7750A,B,C).

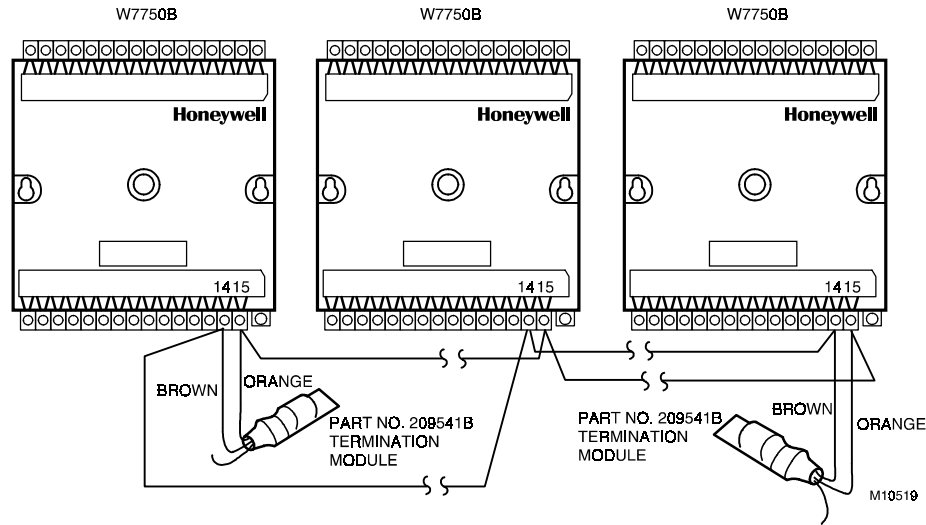


Fig. 7. Termination modules.

**IMPORTANT**

*Notes on Communications Wiring:*

- All field wiring must conform to local codes and ordinances (or as specified on the installation drawings).
- Honeywell provided cable types for LONWORKS Bus communications wiring is Level IV 22 AWG (0.34 mm<sup>2</sup>) plenum or non-plenum rated unshielded, twisted pair, solid conductor wire. For non-plenum areas, U.S. part AK3781 (one pair) or U.S. part AK3782 (two pair) can be used. In plenum areas, U.S. part AK3791 (one pair) or U.S. part AK3792 (two pair) can be used.
- Some stranded cables are allowed, contact Echelon Corp. Technical Support for the recommended vendors of Echelon approved cables.
- Unswitched 24 Vac power wiring can be run in the same conduit as the LONWORKS Bus cable.
- Don't bundle device output wires with sensor, digital input or communications LONWORKS Bus wires.
- Do not use different wire types or gauges on the same LONWORKS Bus segment. The step change in line impedance characteristics causes unpredictable reflections on the LONWORKS Bus.
- In noisy (high EMI) environments, avoid wire runs parallel to noisy power cables, motor control centers, or lines containing lighting dimmer switches, and keep at least 3 in. (76 mm) of separation between noisy lines and the LONWORKS Bus cable.
- Each LONWORKS Bus segment that is between routers which can contain up to 60 Excel 10s and is doubly terminated, must have two 209541B Excel 10 FTT Termination Modules, one at each end of the daisy chain wiring run.
- Make sure that neither of the LONWORKS Bus wires is grounded.

NOTE: If a 209541B Termination Module is required at the CVAHU, connect two of the three termination module wires to the LONWORKS Bus terminals. Selecting the appropriate two wires depends on the LONWORKS Bus network topology. Refer to the LONWORKS Bus Wiring Guidelines, form 74-2865, and the Excel 10 FTT Termination Module Installation Instructions,

form 95-7554. For example, using a doubly terminated daisy-chained bus topology, if controllers are on either end of an LONWORKS Bus wire run, mount the termination module on the appropriate terminals as shown in Fig. 7.

NOTE: When attaching two or more wires to the same terminal, other than 14 AWG (2.0 mm<sup>2</sup>), be sure to twist them together. Deviation from this rule can result in improper electrical contact. See Fig. 8.

Wire to the terminal blocks as follows:

1. Strip 1/2 in. (13 mm) insulation from the conductor.
2. Cut a single wire to 3/16 in. (5 mm) then insert the wire in the required terminal location and tighten the screw.
3. If two or more wires are being inserted into one terminal location, twist the wires together a minimum of three turns before inserting them, See Fig. 8.
4. Cut the twisted end of the wires to 3/16 in. (5 mm) before inserting them into the terminal and tightening the screw.
5. Pull on each wire in all terminals to check for good mechanical connection.

**Wiring Details**

The W7750A Controller has the terminal arrangement shown in Fig. 10. Fig. 10 through 16 illustrate W7750A,B,C Controller wiring for various configurations. Connection for operator access to the LONWORKS Bus is provided by plugging the Serial LONTALK<sup>®</sup> Adapter (SLTA) connector into the LONWORKS Bus jack.

The W7750B is shipped with the digital outputs switching the 24 Vac to the load (High Side). The W7750B provides a jumper to select High-Side or Low-Side switching of the digital outputs. Fig. 9 shows the W7750B High-Side/Low-Side selectable switching.

NOTE: If a Excel 10 W7750A,B,C Controller is not connected to a good earth ground, the controllers internal transient protection circuitry is compromised and the function of protecting the controller from noise and power line spikes cannot be fulfilled. This could result in a damaged circuit board and require replacement of the controller. Refer to installation diagrams for specific wiring.

The W7750C provides three 4-to-20 mA analog outputs and five High-Side only digital outputs. The three analog outputs are used to control modulating heating, cooling and economizer equipment. Up to two of the three analog outputs can also be configured as *Free* outputs that can drive a variety of position command settings received from the LONWORKS Bus. The three AOs can be used as digital outputs where *ON* is 20 mA, and *OFF* is 4 mA.

**NOTE:** When used as a digital output the maximum current must be less than 20 mA.

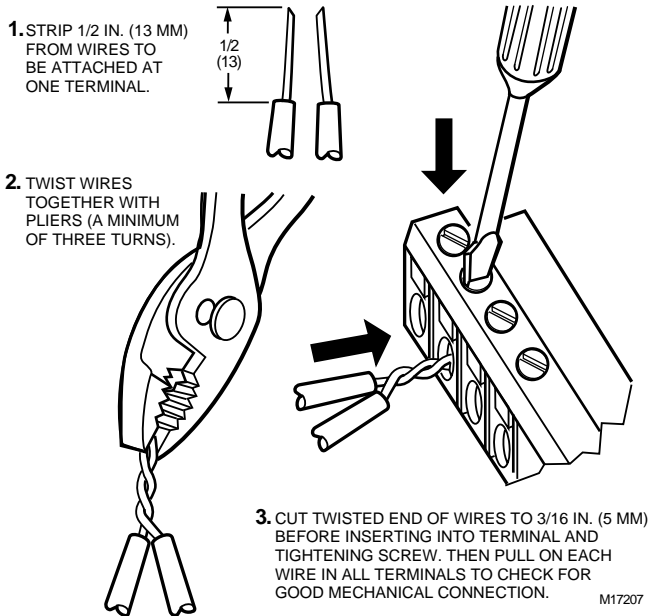
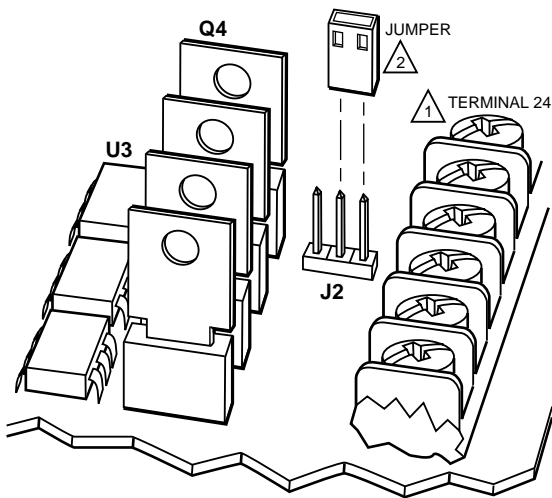


Fig. 8. Attaching two or more wires at terminal blocks.

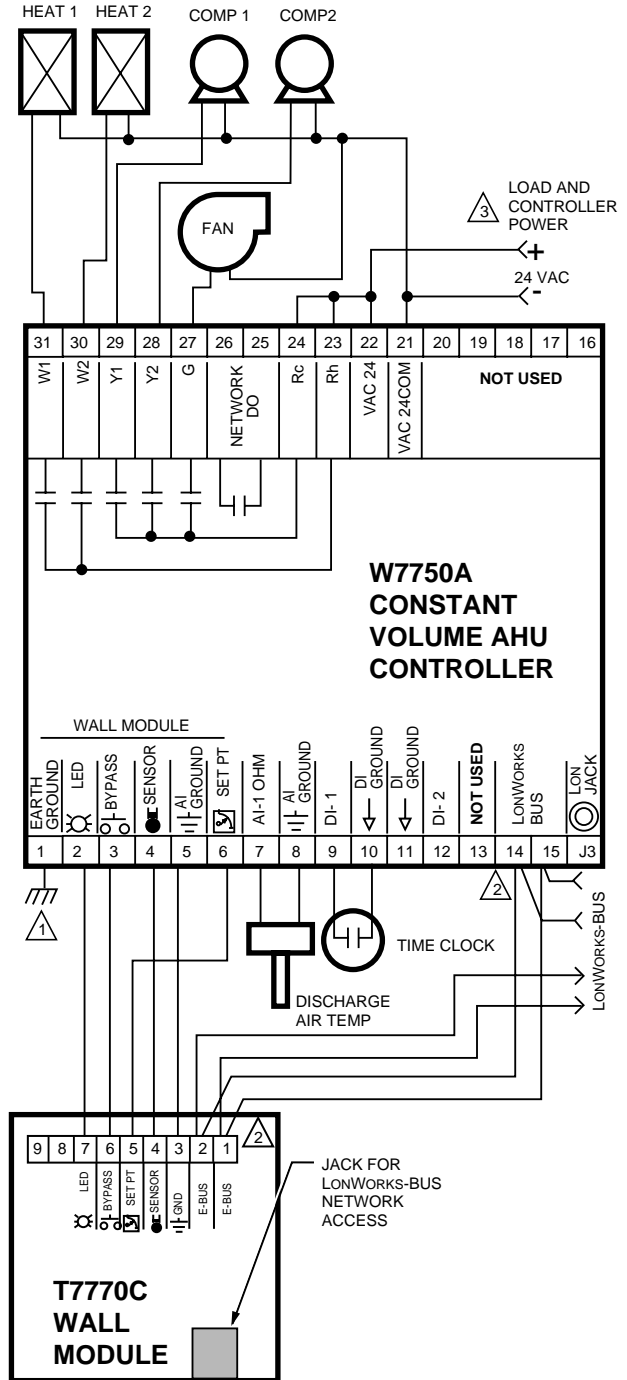


- 1 J2 IS LOCATED NEAR TERMINAL 24 (COVER REMOVED).
  - 2 W7750B IS FACTORY-DELIVERED WITH JUMPER ON HIGH-SIDE (PINS CLOSEST TO TERMINAL BLOCK). LOW-SIDE PINS ARE TWO PINS CLOSEST TO Q4.
- M16418A

Fig. 9. W7750B High-Side/Low-Side selectable switching and jumper location.

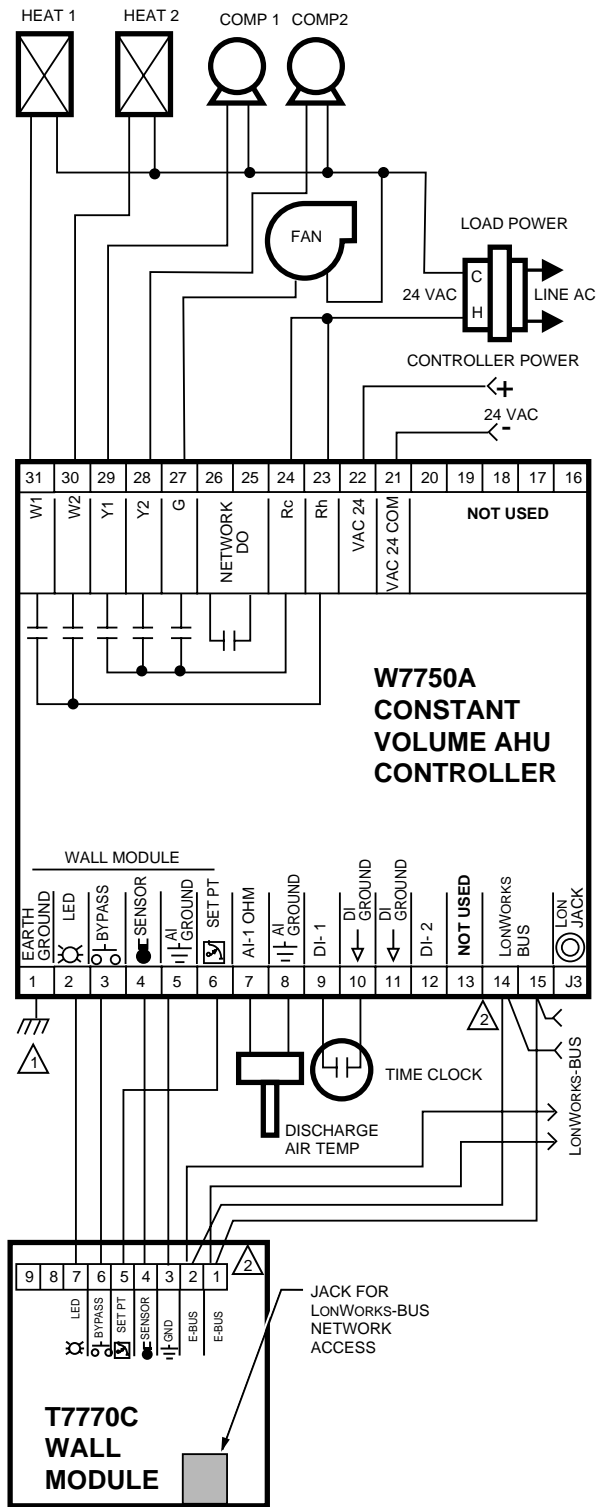
**IMPORTANT:**

To replace an old W7750B2003 Controller, make sure the High-Side/Low-Side jumper for the new W7750B is in the Low-Side position. Pop off the cover on the new W7750B to gain access to the jumper (see Fig. 9).



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE. UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
  - 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
  - 3 LOAD POWER WIRE CAN BE CONNECTED TO TERMINAL 22.
- M10085C

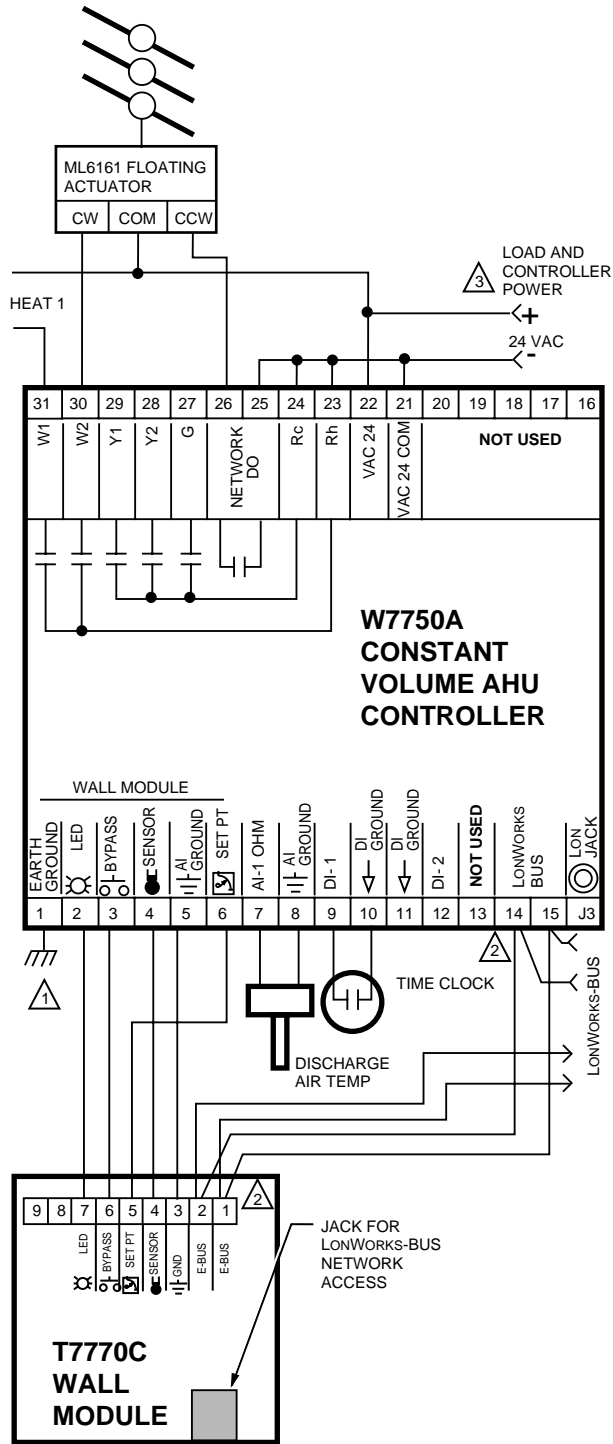
Fig. 10. Typical W7750A Controller AHU application wiring diagram. (For note 2, refer to Fig. 8.)



- ⚠️ 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
- ⚠️ 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.

**Fig. 11. Typical W7750A Controller with separate transformer application wiring diagram.**  
(For note 2, refer to Fig. 8.)

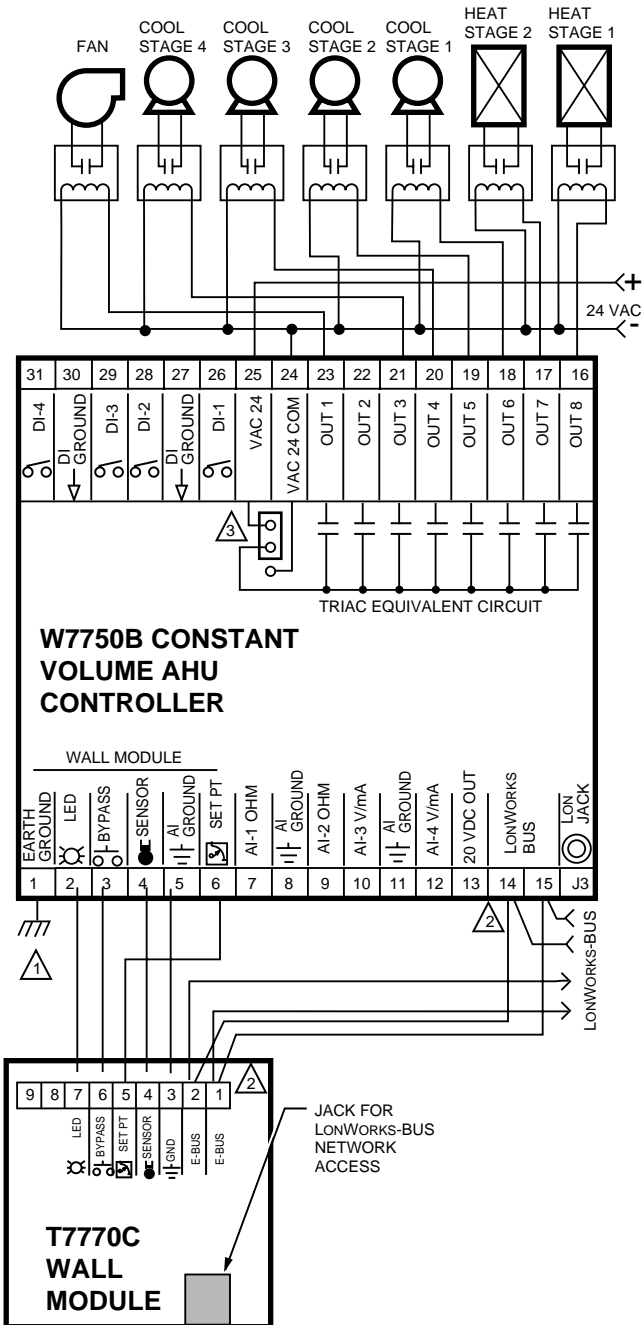
M10084C



- ⚠️ 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
- ⚠️ 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- ⚠️ 3 LOAD POWER WIRE CAN BE CONNECTED TO TERMINAL 22.

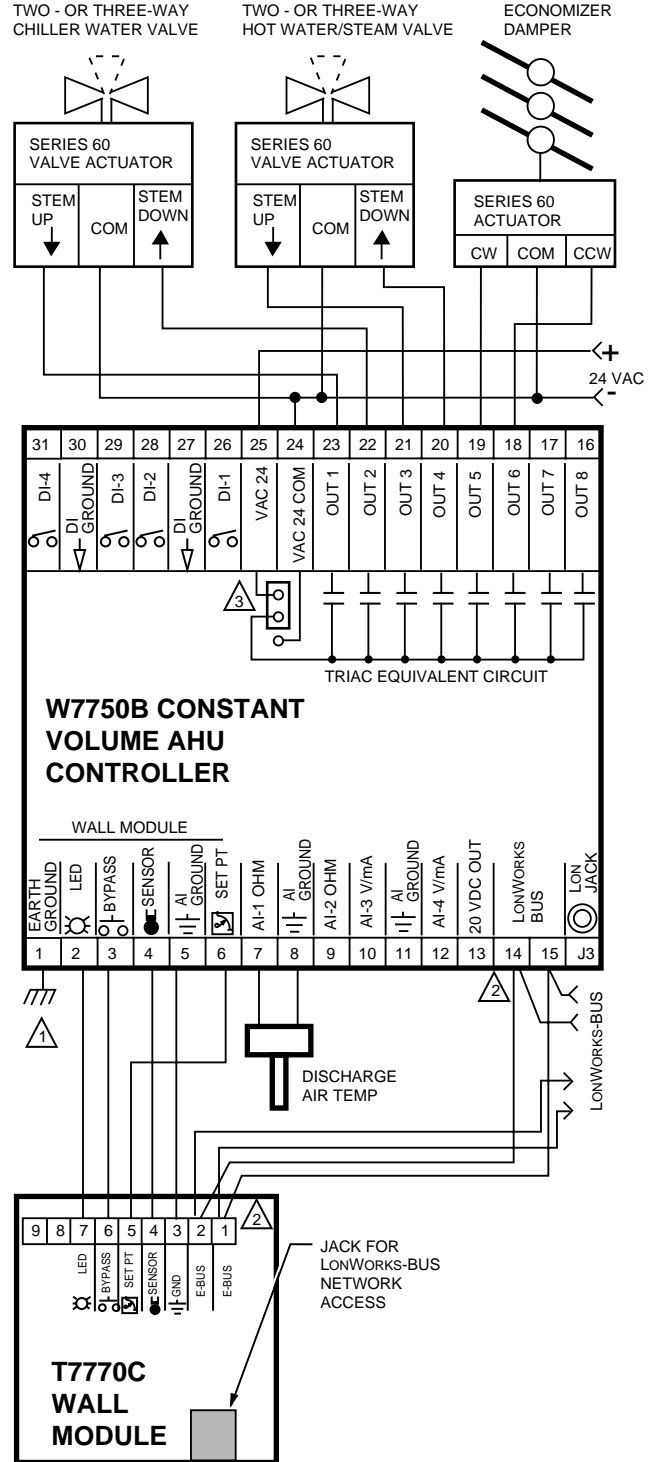
M10083C

**Fig. 12. W7750A Controller floating economizer damper wiring diagram.** (For note 2, refer to Fig. 8.)  
**NOTE:** Digital outputs are configurable. The terminal locations for each function are user selectable.



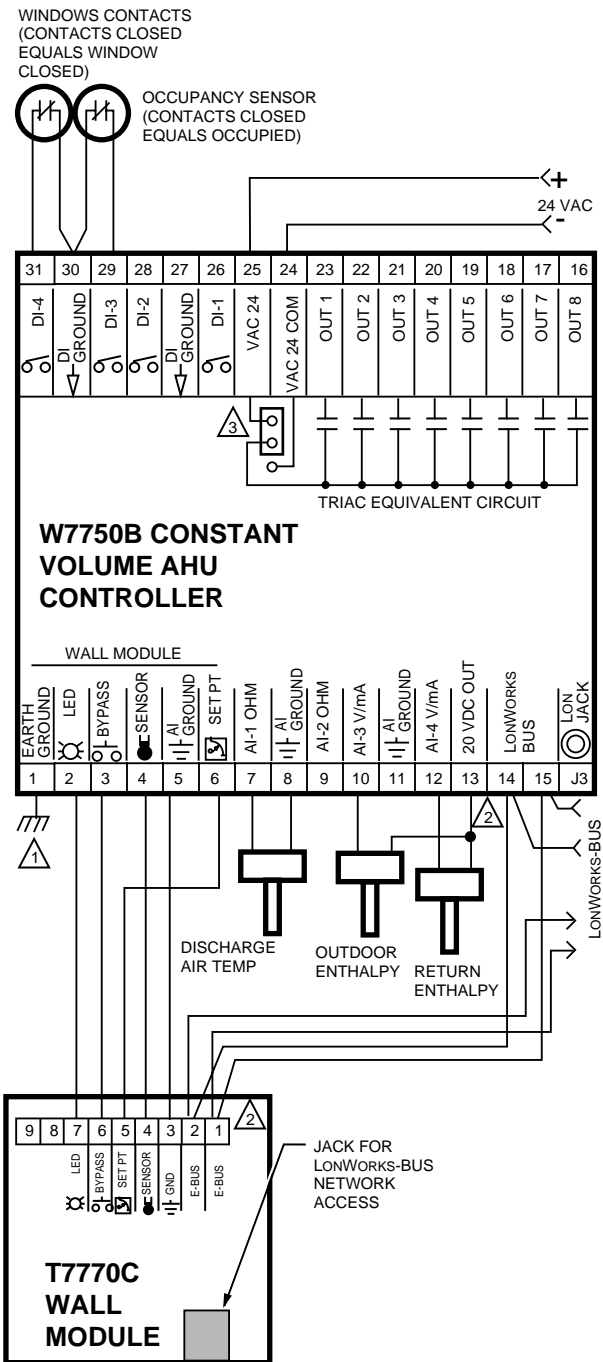
- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- 3 WIRING DIAGRAM SHOWS JUMPER (FOR J2) IN FACTORY DEFAULT HIGH-SIDE POSITION.

**Fig. 13. W7750B Controller with staged heating and cooling wiring diagram. (For note 2, refer to Fig. 8.)**



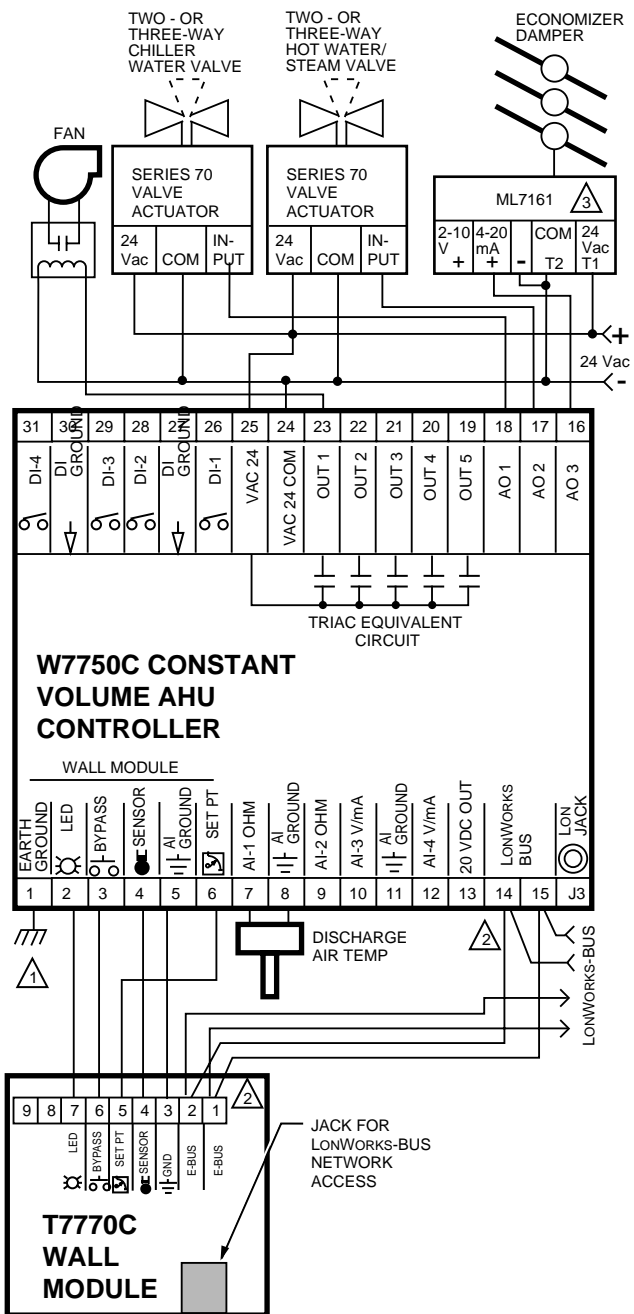
- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- 3 WIRING DIAGRAM SHOWS JUMPER (FOR J2) IN FACTORY DEFAULT HIGH-SIDE POSITION.

**Fig. 14. W7750B Controller with floating heating, cooling and economizer wiring diagram. (For note 2, refer to Fig. 8.)**



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- 3 WIRING DIAGRAM SHOWS JUMPER (FOR J2) IN FACTORY DEFAULT HIGH-SIDE POSITION.

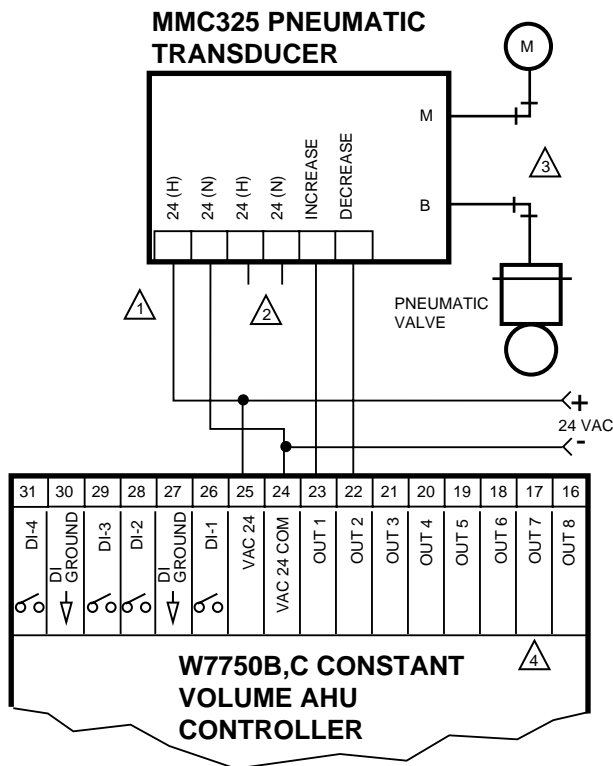
Fig. 15. W7750B,C wiring diagram with 4 to 20 mA enthalpy sensors and digital inputs. (For note 2, refer to Fig. 8.)



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM<sup>2</sup>) WITH A MINIMUM OF 18 AWG (1.0 MM<sup>2</sup>), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- 3 IF AN ANALOG OUTPUT DEVICE HAS A SIGNAL COM (-) TERMINAL, CONNECT IT TO THE 24 VAC COM TERMINAL NUMBER 24.

Fig. 16. W7750C Controller with 4-to-20 mA heating, cooling and economizer wiring diagram. (For note 2, refer to Fig. 8.)

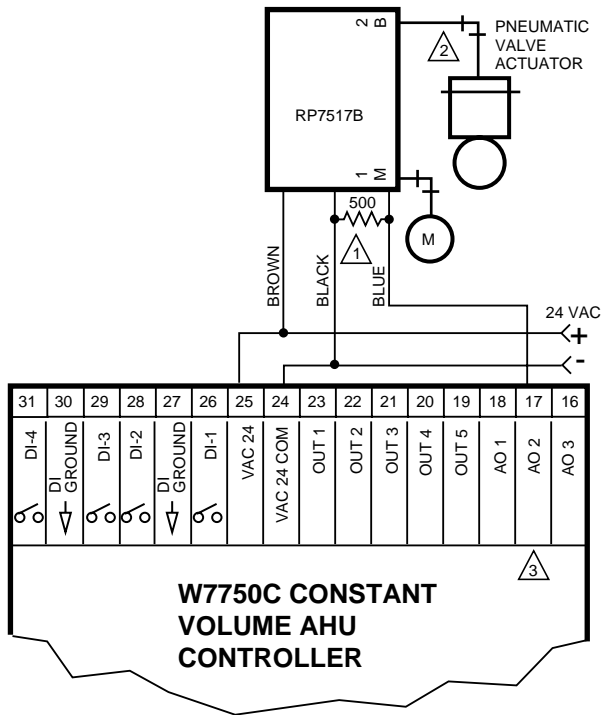
See Fig. 17 or 18 to wire a pneumatic transducer to a W7750B or W7750C.



- ⚠️ MAKE SURE ALL TRANSFORMER/POWER WIRING IS AS SHOWN; REVERSING TERMINATIONS RESULTS IN EQUIPMENT MALFUNCTION.
- ⚠️ OPTIONAL 24 VAC WIRING TO NEXT CONTROLLER.
- ⚠️ USE 1/4 IN (6 MM) PNEUMATIC TUBING. MINIMUM BRANCH LINE MUST BE 6 FT. (1.8M) OR LONGER.
- ⚠️ TERMINALS 16,17, 18 ARE ANALOG OUTPUTS (W7750C ONLY). M10078C

**Fig. 17. Pneumatic transducer to W7750B,C (B shown, see triangle note 4).**

**RP7517B PNEUMATIC TRANSDUCER**



- ⚠️ ANALOG OUTPUTS FROM W7750C ARE 4 TO 20 mA SIGNALS. A 500 OHM 1% TOLERANCE (OR BETTER) PRECISION RESISTOR IS REQUIRED TO DRIVE THIS (RP7517B) AND OTHER 2 TO 10V DEVICES. PLACE THIS RESISTOR AS CLOSE AS POSSIBLE TO THE DRIVEN DEVICE.
- ⚠️ USE 1/4 IN (6 MM) PNEUMATIC TUBING. MINIMUM BRANCH LINE MUST BE 6 FT. (1.8M) OR LONGER.
- ⚠️ TERMINALS 16 TO 18 ARE ANALOG OUTPUTS (W7750C ONLY). M17368

**Fig. 18. RP7517,B pneumatic transducers to W7750C.**

**CHECKOUT**

**W7750A,B,C Checkout**

**Step 1. Check Installation and Wiring**

Inspect all wiring connections at the W7750A,B,C and the T7770 terminals, and verify compliance with installation wiring diagrams. If any wiring changes are required, *first* be sure to remove power from the controller *before* starting work. Pay particular attention to:

- 24 Vac power connections. Verify that multiple controllers being powered by the same transformer are wired with the transformer secondary connected to the same input terminal numbers on each W7750. Use a meter to measure 24 Vac at the appropriate terminals. See Fig. 4. (Controller configurations are not necessarily limited to three devices, but the total power draw, including accessories, cannot exceed 100 VA when powered by the same transformer (U.S. only). See System Engineering, form 74-2958 for power wiring recommendations.)

- Controller wiring. Be sure that each controller is wired (terminal 1) to a verified earth ground using a wire run as short as possible with the heaviest gauge wire available, up to 14 AWG (2.0 mm<sup>2</sup>) with a minimum of 18 AWG (1.0 mm<sup>2</sup>) for each controller in the group. See Fig. 4 or 5.
- Verify that Triac wiring to external devices uses the proper load power/24 Vac common terminal (terminal 24 on the W7750B) for High-Side switching.

NOTE: All wiring must comply with applicable electrical codes and ordinances or as specified on installation wiring diagrams.

**VERIFY TERMINATION MODULE PLACEMENT**

The installation wiring diagrams should indicate the locations for placement of the 209541B Termination Module(s). Refer to the *LONWORKS Bus Wiring Guidelines*, form 74-2865, and the *Excel 10 FTT Termination Module Installation Instructions*, form 95-7554. Correct placement of the termination module(s) is required for proper LONWORKS Bus communications.

## Step 2. Startup

### W7750 CONTROLLER OCCUPANCY STATUS LED

The LED on the front and center of a W7750 Controller provides a visual indication of the occupancy status of the device, see Fig. 19. When the W7750 receives power, the LED should appear in one of the following states:

1. Off—no power to the processor.
2. Continuously On—processor is in initialized state.
3. Slow blink—controlling, normal state.
4. Fast blink—the Excel 10 has an alarm condition.

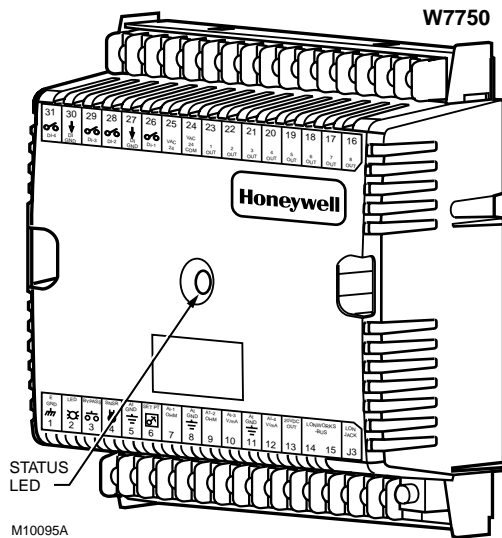


Fig. 19. LED location on W7750s.

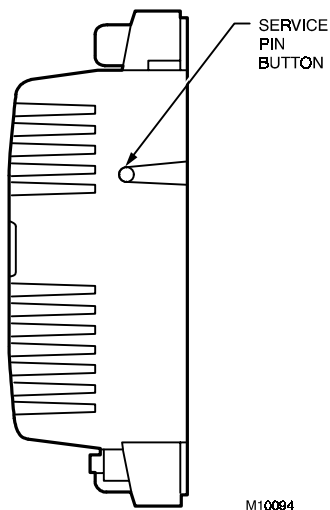


Fig. 20. Location of Service Pin Button.

## Sending the Service Message

The Service Message allows a device on the LONWORKS Bus to be positively identified. The Service Message contains the controller Neuron<sup>®</sup> ID number and, therefore, can be used to confirm the physical location of a particular Excel 10 in a building.

There are three methods of sending the Service Message from an Excel 10 W7750 Controller.

One uses the Service Pin Button on the side of the controller (see Fig. 20). The Service Pin Button sends out the Service Message when it is pressed, regardless of the controller's current mode of operation.

The second involves using the PC Configuration tool. When an *Assign ID* command is issued from the commissioning tool, the node goes into the SERVICE\_MESSAGE mode (WINK) for five minutes. In the SERVICE\_MESSAGE mode, pressing the occupancy override button on the wall module causes the Service Message to be sent on the network. All other functions are normal in the SERVICE\_MESSAGE mode. If an Excel 10 W7750 Controller does not have an override button connected, it can still send the Service Message on the network by temporarily shorting the controller Bypass Input terminal to the Sensor Ground terminal on the W7750A,B,C short terminals 3 and 5.

The third method requires holding down the Wall Module bypass pushbutton for more than four seconds to send out the Service Message.

## Step 3. I/O Tests

The controller must be configured using a PC configuration tool. Once this is done, the W7750 can be commanded to MANUAL mode, and each output can be exercised to verify proper wiring connections and equipment operation.

## Step 4. Temperature Sensor Calibration

The temperature sensor in the T7770 Wall Module can be calibrated to allow for sensor inaccuracies, wire resistance, etc. This allows the Excel 10 W7750 Controller to very accurately report the space temperature.

See the Excel 10 E-Vision Users Guide, form 74-2588 or the Excel LONSPEC<sup>™</sup> User Guide, form 74-2937 for the procedure to field-calibrate the T7770 space temperature sensor.

## Step 5. Verify Sequences of Operation

For the detailed descriptions of the sequences of operation, see Appendix B in the Excel 10 System Engineering, form 74-2958.

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LONSPEC<sup>™</sup> is a trademark of Echelon<sup>®</sup> Corporation

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