

Excel 10

W7750A,B CONSTANT VOLUME AHU CONTROLLER

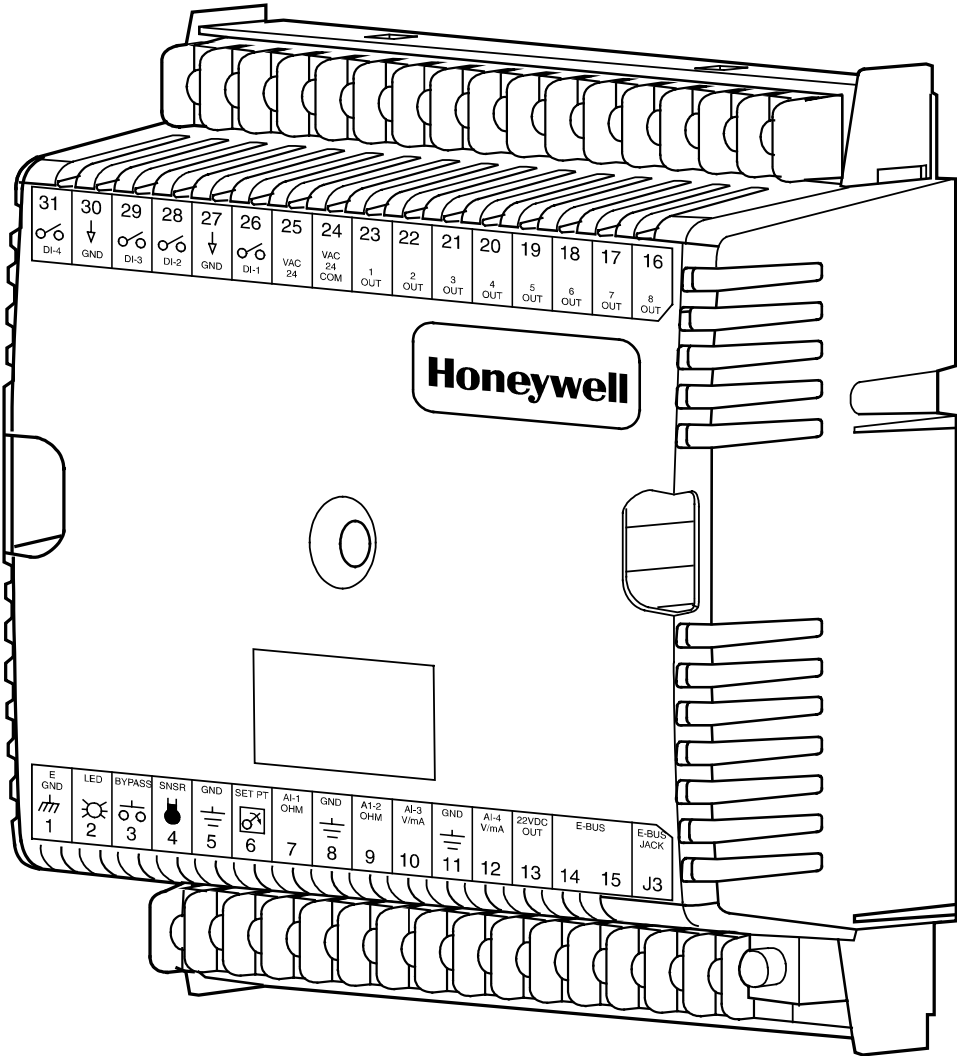


INSTALLATION INSTRUCTIONS

PRODUCT DESCRIPTION

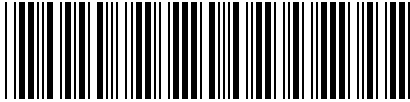
The W7750 is the Constant Volume Air Handling Unit (CVAHU) Controller in the Excel 10 product line family. See Fig. 1. The CVAHU is a Free Topology Transceiver (FTT) LonMark® compliant device designed to control single zone and heat pump air handlers. W7750 systems control the space temperature in a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



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Fig. 1. Excel 10 W7750A,B Constant Volume AHU Controller.

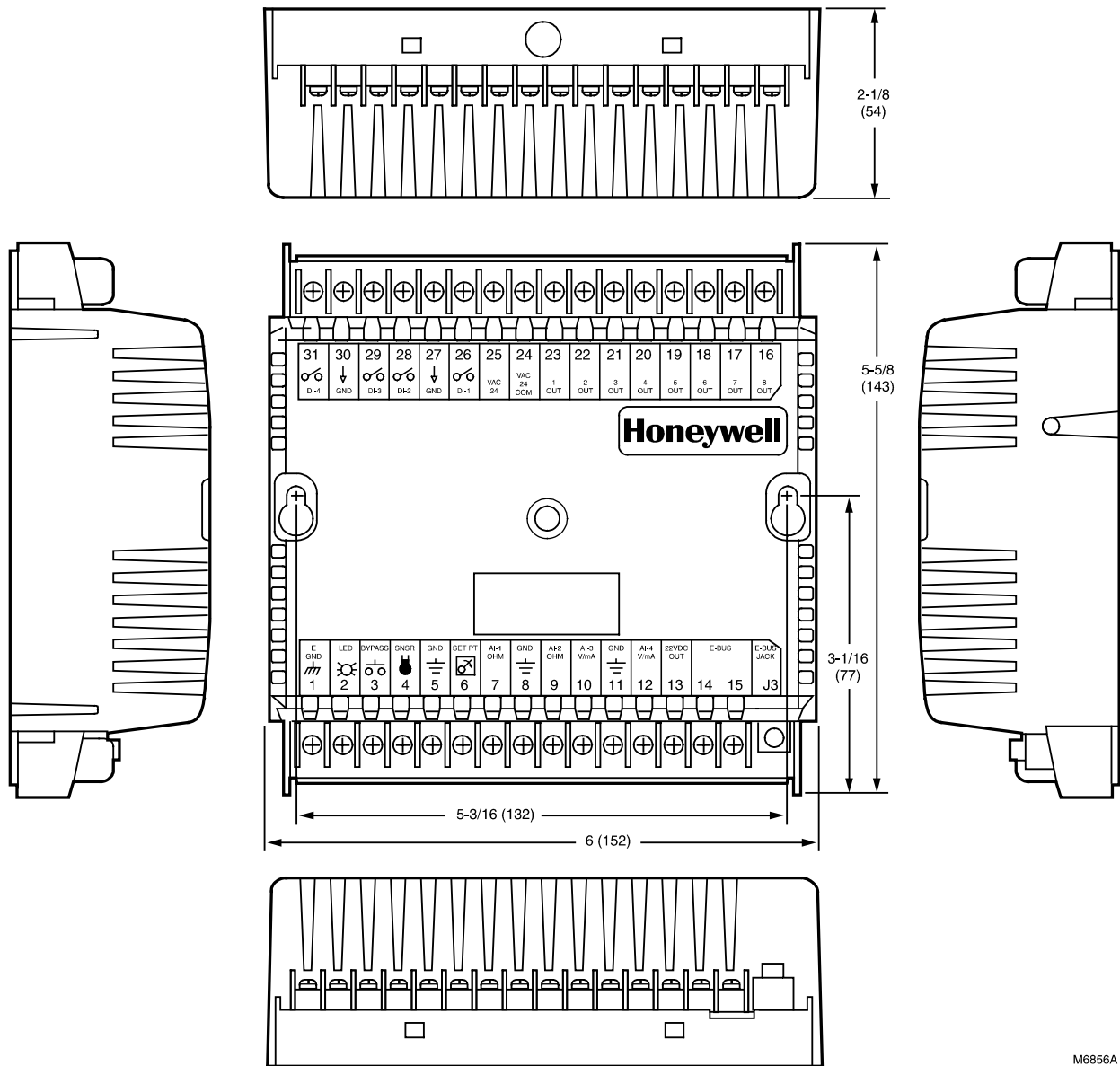


The W7750A,B Controller communicates via the 78 kilobaud Echelon® LonWorks® E-Bus Network.

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.

INSTALLATION

Mount the W7750A,B in a position that allows clearance for wiring, servicing and controller removal. Avoid mounting the W7750A,B 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.



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

The controller enclosure on the W7750A,B 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 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 (obtain locally). If using DIN rail also purchase from Augat Inc. part number 2TK2D DIN rail (adapter) two each, see Fig. 3.

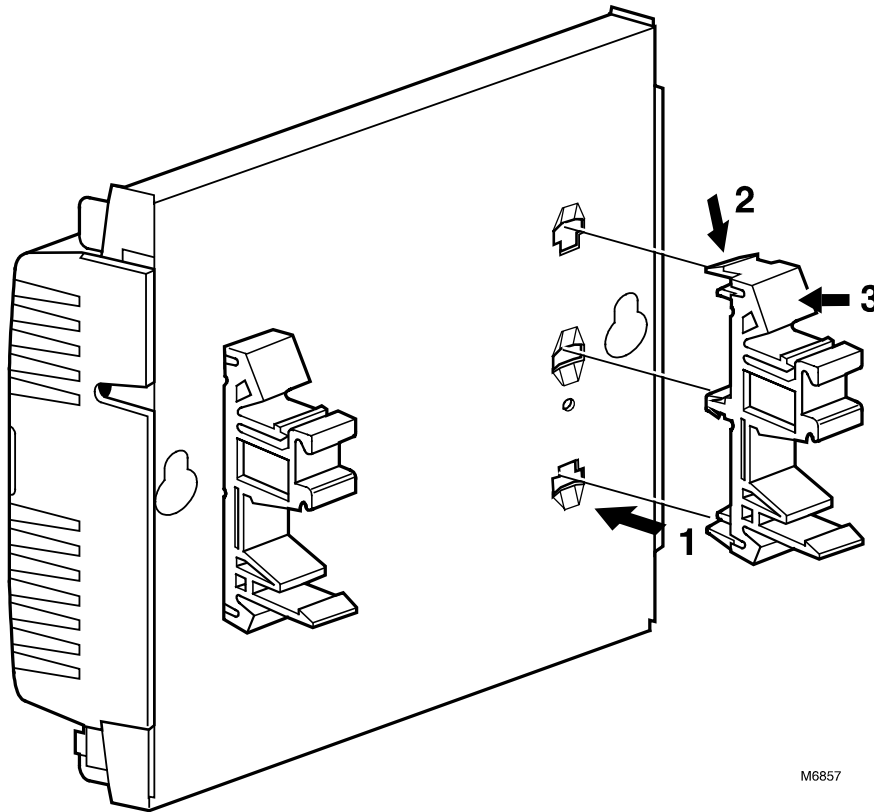


Fig. 3. W7750A,B DIN rail mounting.

Wiring

All wiring must comply with applicable electrical codes and ordinances or as specified on installation wiring diagrams. Controller wiring on the W7750A,B 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) must be connected to a verified earth ground for each controller in the group, see Fig. 5. (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 (US only). See System Engineering form 74-2958 for power wiring recommendations.)
- All loads on an Excel 10 W7750B 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. 9 through 15.

- 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 Controller) to earth ground. Refer to Fig. 9 through 15.

Power

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

IMPORTANT

Use the heaviest gauge wire available, up to 14 AWG (2.0 mm²) with a minimum of 18 AWG (1.0 mm²), for all power and earth ground wiring. Screw-type terminal blocks are designed to accept up to two 14 AWG (2.0 mm²) conductors, one on each side of the terminal screw. More than two wires that are 14 AWG (2.0 mm²) 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.

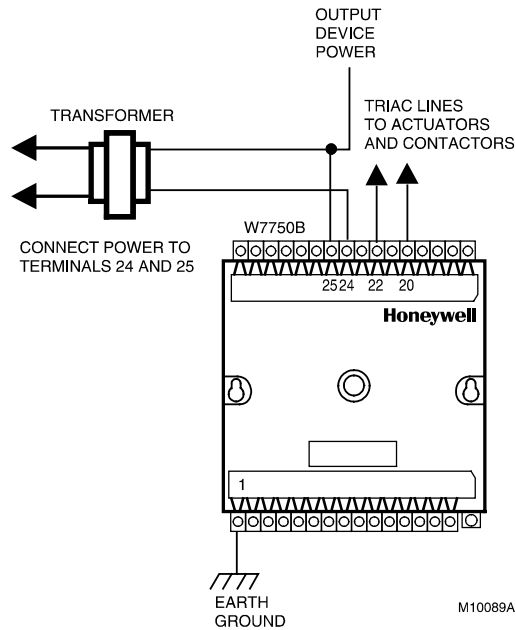


Fig. 4. Power wiring details for one Excel 10 per transformer.

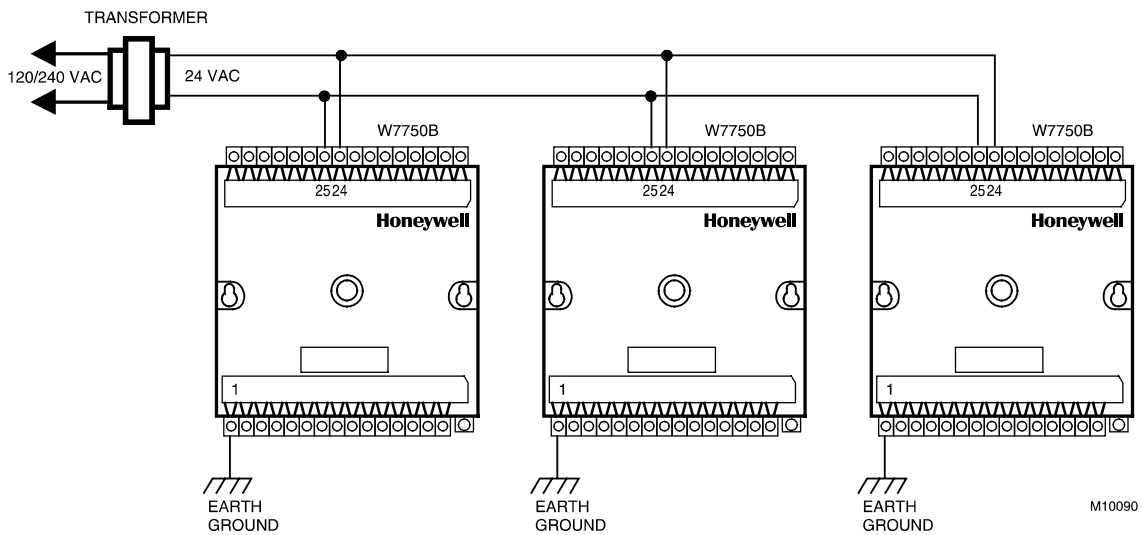


Fig. 5. Power wiring details for two or more Excel 10s per transformer.

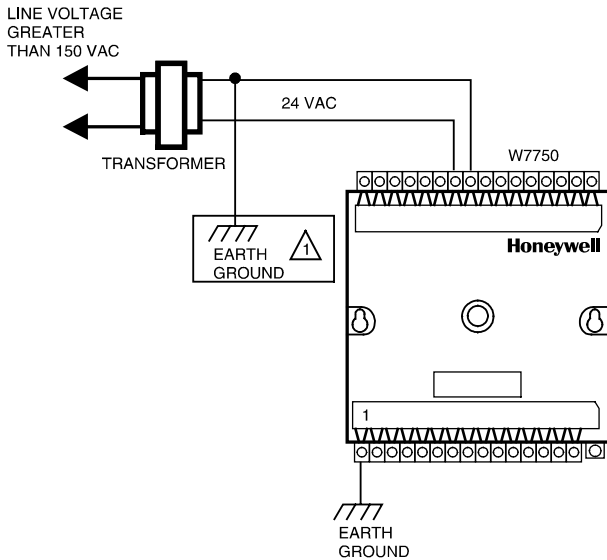
NOTES:

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

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

IMPORTANT

If the W7750 Controller is used on Heating and Cooling Equipment (UL 1995, US only) and the transformer primary power is more than 150 volts, connect the transformer secondary to earth ground, see Fig. 6. For these applications, only one Excel 10 controller can be powered by each transformer.



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

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

Communications

Refer to *E-Bus Wiring Guidelines, form 74-8565*, for a complete description of E-Bus network topology rules. Approved cable types for E-Bus communications wiring is Level IV 22 AWG (0.34 mm²) plenum or non-plenum rated unshielded, twisted pair, solid conductor wire. For nonplenum areas, US part AK3781 (one pair) or US part AK3782 (two pair) can be used. In plenum areas, US part AK3791 (one pair) or US part AK3792 (two pair) can be used. Communications wiring can be run in a conduit, if needed, with *non-switched* 24 Vac or sensor wiring. If a longer E-Bus network is required, a Q7740A 2-way or Q7740B 4-way repeater can be added to extend the length of the E-Bus. A Q7751A Router can be added to partition the system into two segments and effectively double the length of the E-Bus. Only one router is allowed with each Excel 10 Zone Manager, and each network segment can have a maximum of one repeater.

Pull the cable to each controller on the E-Bus and connect to communication terminals 14 and 15 (W7750A,B).

IMPORTANT

Notes on Communications Wiring:

- All field wiring must conform to local codes and ordinances (or as specified on the installation drawings).
- Approved cable types for E-Bus communications wiring is Level IV 22 AWG (0.34 mm²) plenum or non-plenum rated unshielded, twisted pair, solid conductor wire. For nonplenum areas, US part AK3781 (one pair) or US part AK3782 (two pair) can be used. In plenum areas, US part AK3791 (one pair) or US part AK3792 (two pair) can be used.
- Unswitched 24 Vac power wiring can be run in the same conduit as the E-Bus cable.
- Do not bundle device output wires with sensor, digital input or communications E-Bus wires.
- Do not use different wire types or gauges on the same E-Bus segment. The step change in line impedance characteristics causes unpredictable reflections on the E-Bus. When using different types is unavoidable, use a Q7751A Router at the junction.
- 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 E-Bus cable.
- Each E-Bus segment that is between routers which can contain up to 60 Excel 10s and has a segment length greater than 1640 ft. (500m), must have two E-Bus termination modules, one at each end of the daisy chain wiring run.
- Make sure that neither of the E-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 E-Bus terminals. Selecting the appropriate two wires depends on the E-Bus network topology. Refer to the *E-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 E-Bus wire run, mount the termination module on the appropriate terminals as shown in Fig. 7.

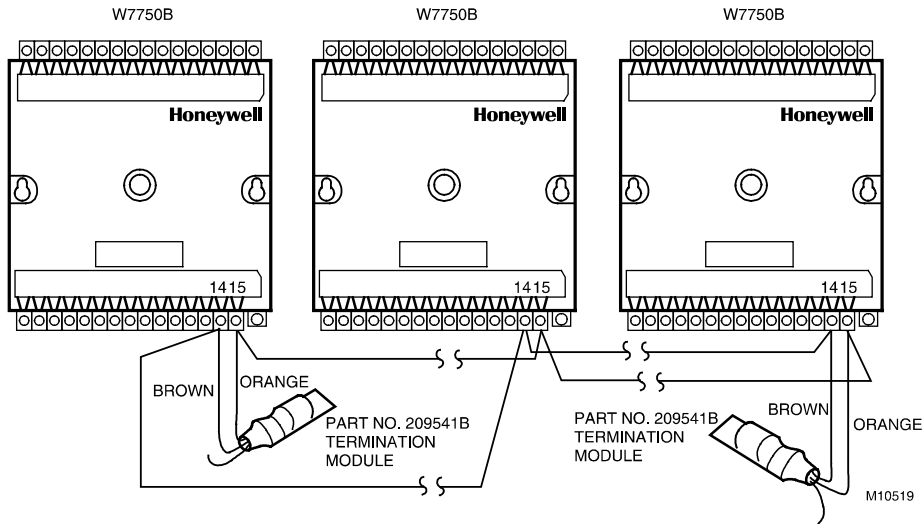


Fig. 7. Termination modules.

NOTE: When attaching two or more wires to the same terminal, other than 14 AWG (2.0 mm²), 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. (10 mm) insulation from the conductor.
2. Insert the wire in the required terminal location and tighten the screw to complete the termination.
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.
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. 9. Fig. 9 through 15 illustrate W7750A,B Controller wiring for various configurations. Connection for operator access to the E-Bus is provided by plugging the Serial LonTalk® Adapter (SLTA) connector into the E-Bus jack.

NOTE: If an Excel 10 W7750A,B Controller or Zone Manager 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.

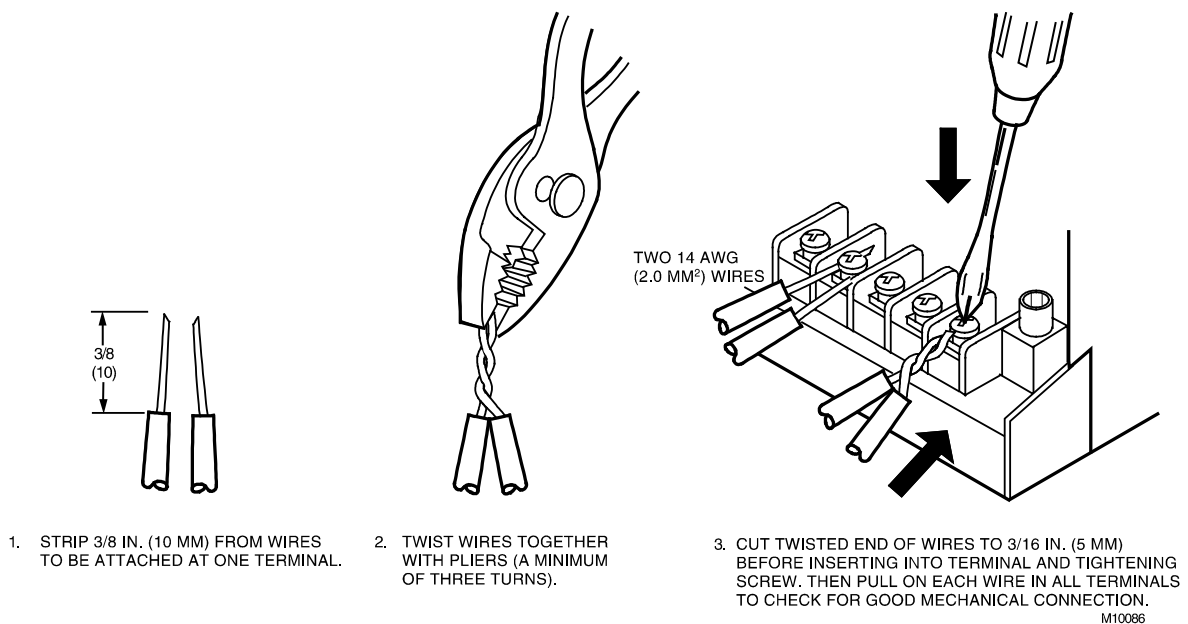
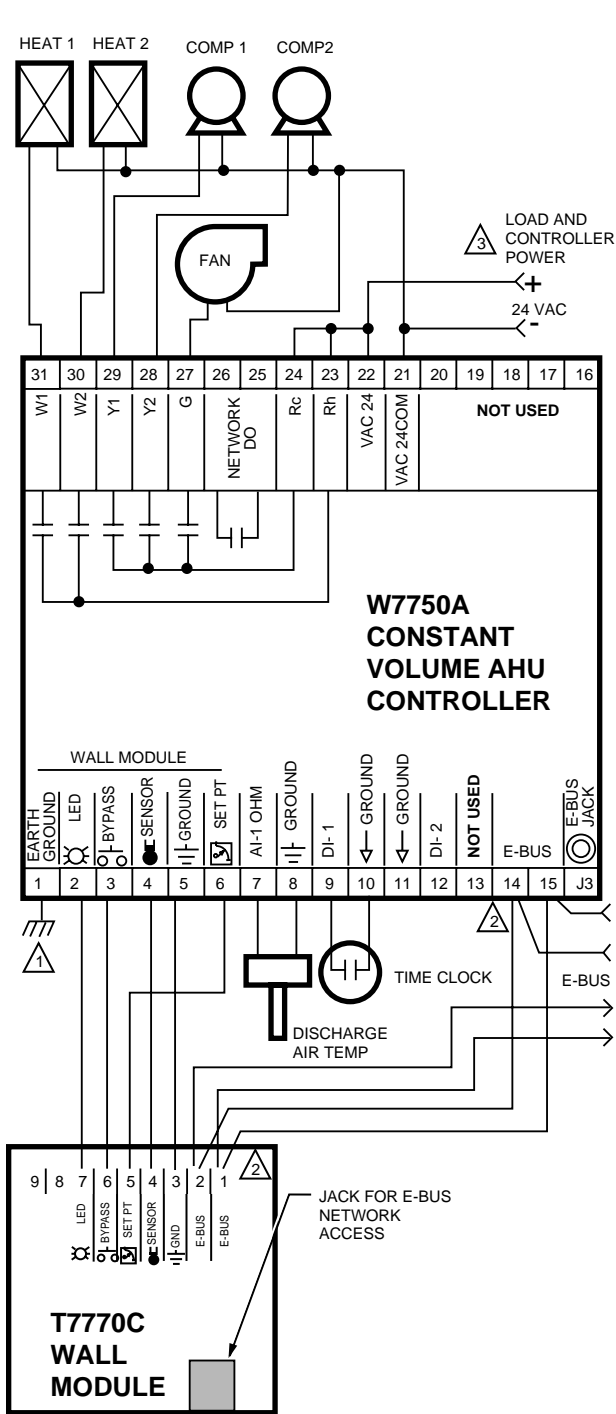


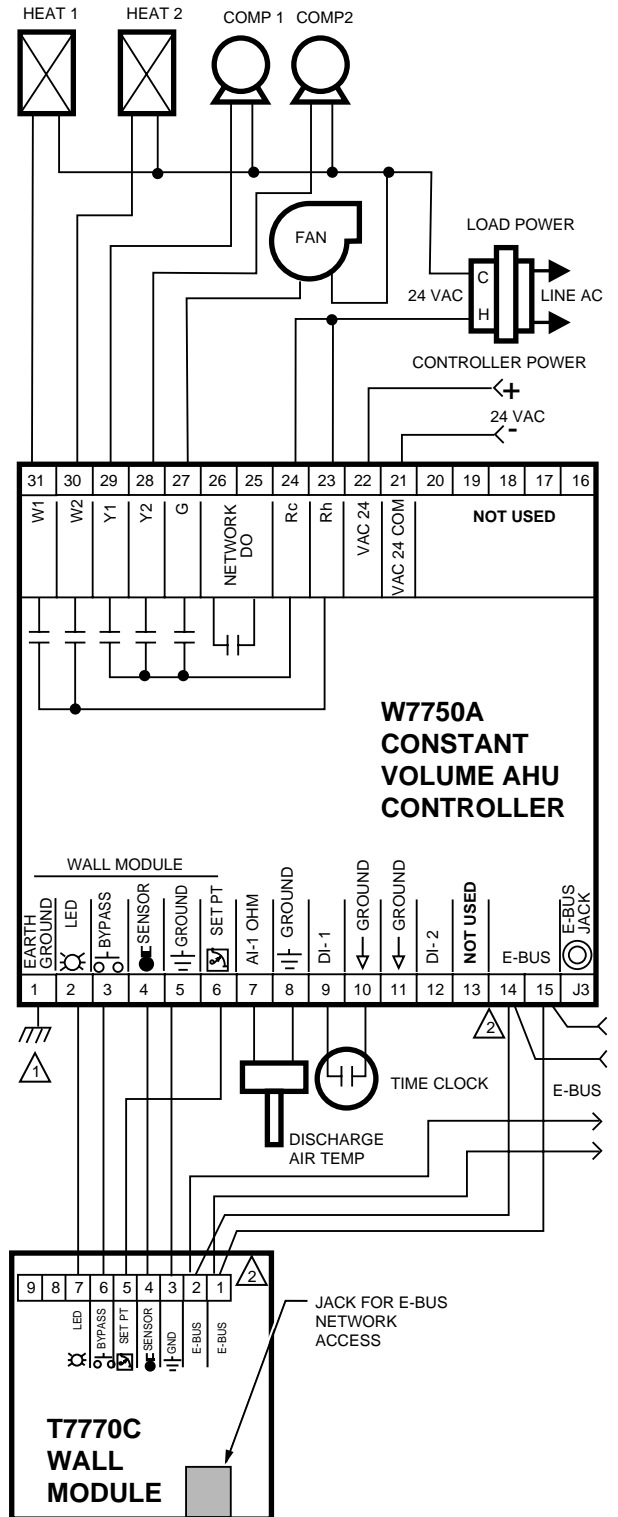
Fig. 8. Attaching two or more wires at terminal blocks.



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), 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.

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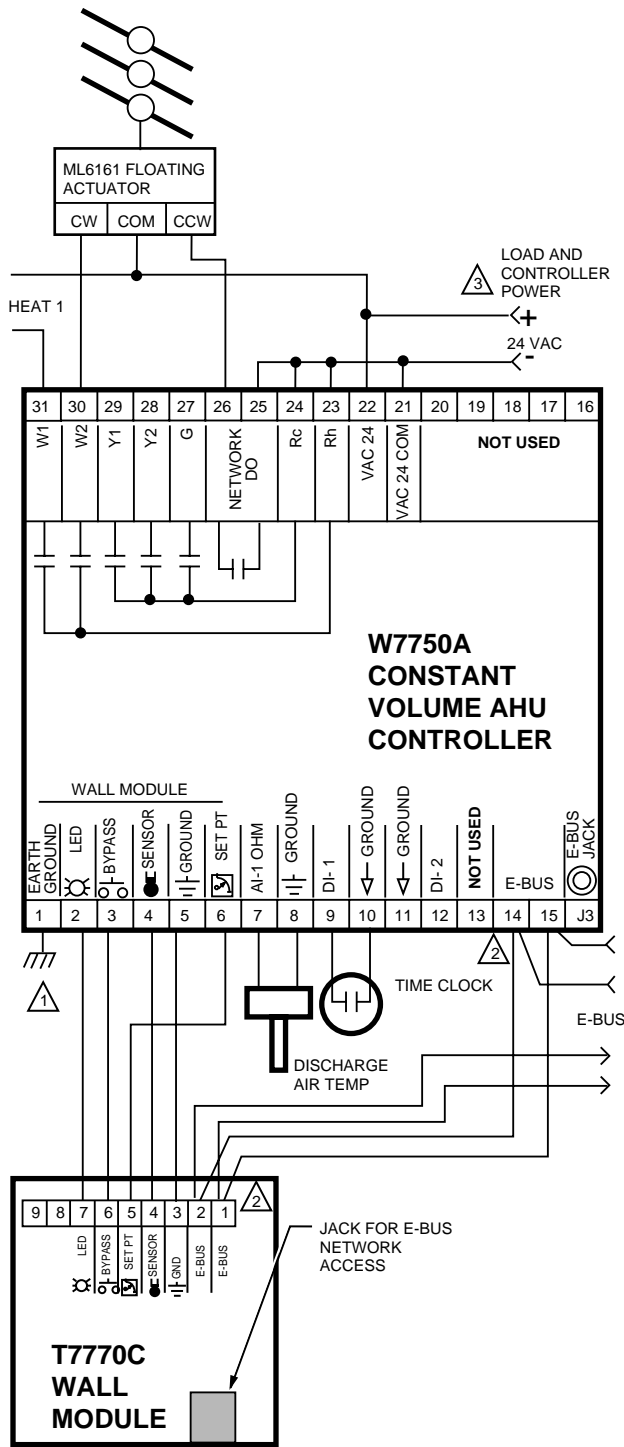
Fig. 9. Typical W7750A Controller AHU application wiring diagram. (For note 2, refer to Fig. 8.)



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.

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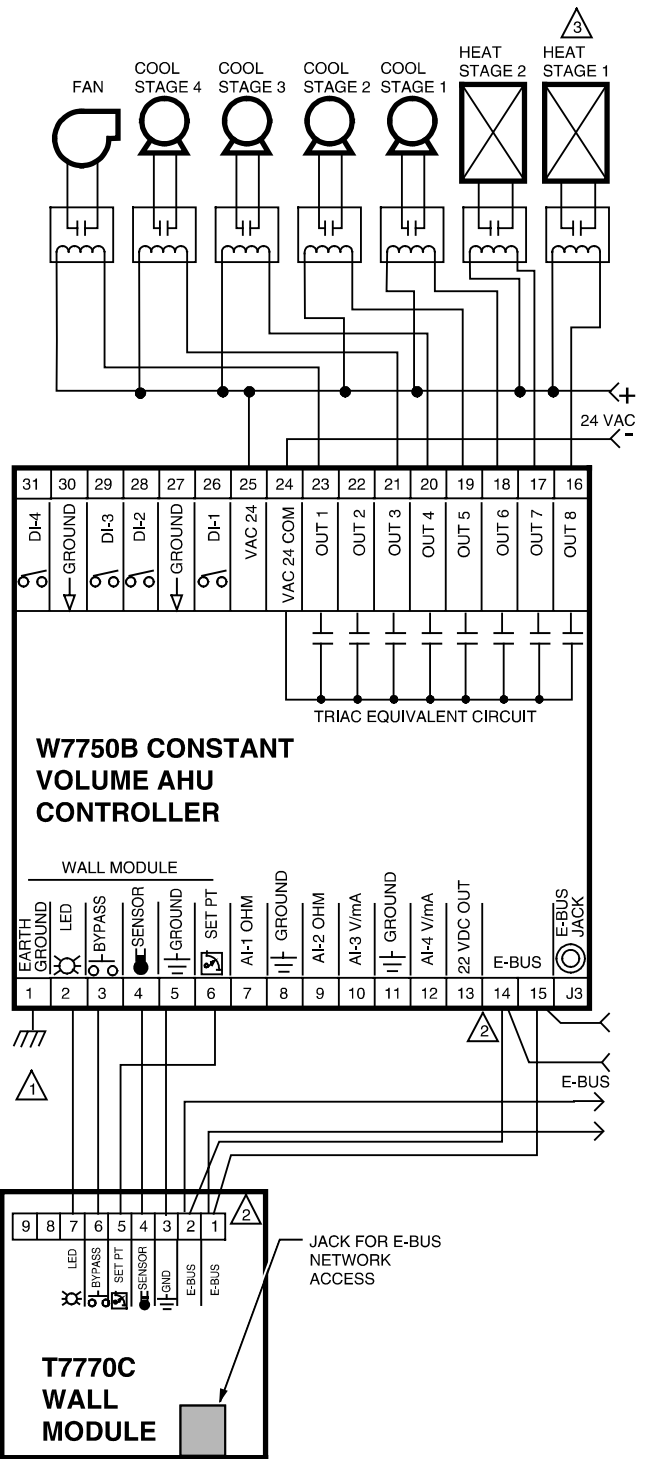
Fig. 10. Typical W7750A Controller with separate transformer application wiring diagram. (For note 2, refer to Fig. 8.)



- ⚠️ EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), FOR EARTH GROUND WIRE.
- ⚠️ TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- ⚠️ LOAD POWER WIRE CAN BE CONNECTED TO TERMINAL 22.

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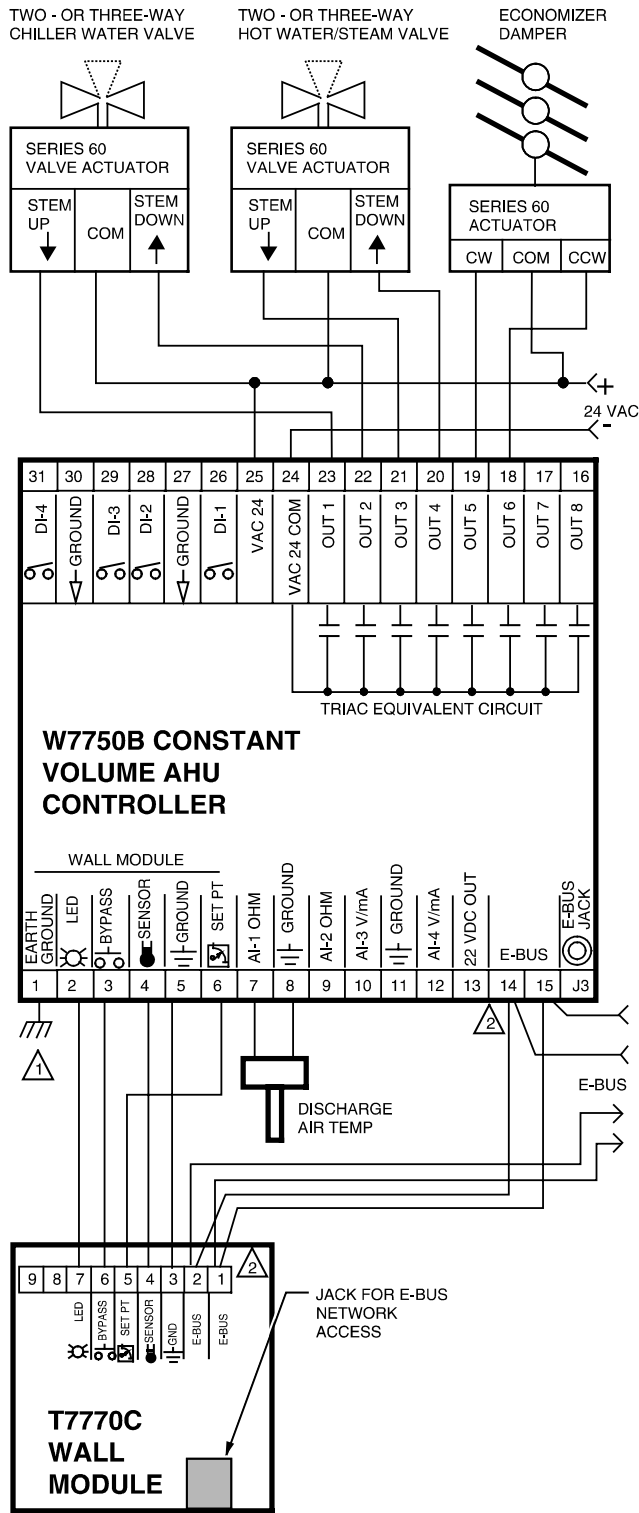
Fig. 11. W7750A Controller floating economizer damper wiring diagram. (For note 2, refer to Fig. 8.)
NOTE: Digital outputs are configurable. The terminal locations for each function are user selectable.



- ⚠️ EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), FOR EARTH GROUND WIRE.
- ⚠️ TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- ⚠️ IF THE HEAT EQUIPMENT IS GAS-FIRED, CONFIGURE THE IGNITER AS HEAT STAGE 1, AND PHYSICALLY CONNECT IT TO OUT 8. THIS OUTPUT HAS BUILT-IN ELECTRICAL NOISE SUPPRESSION TO HANDLE IGNITOR CIRCUITS, WHICH ARE TYPICALLY VERY NOISY.

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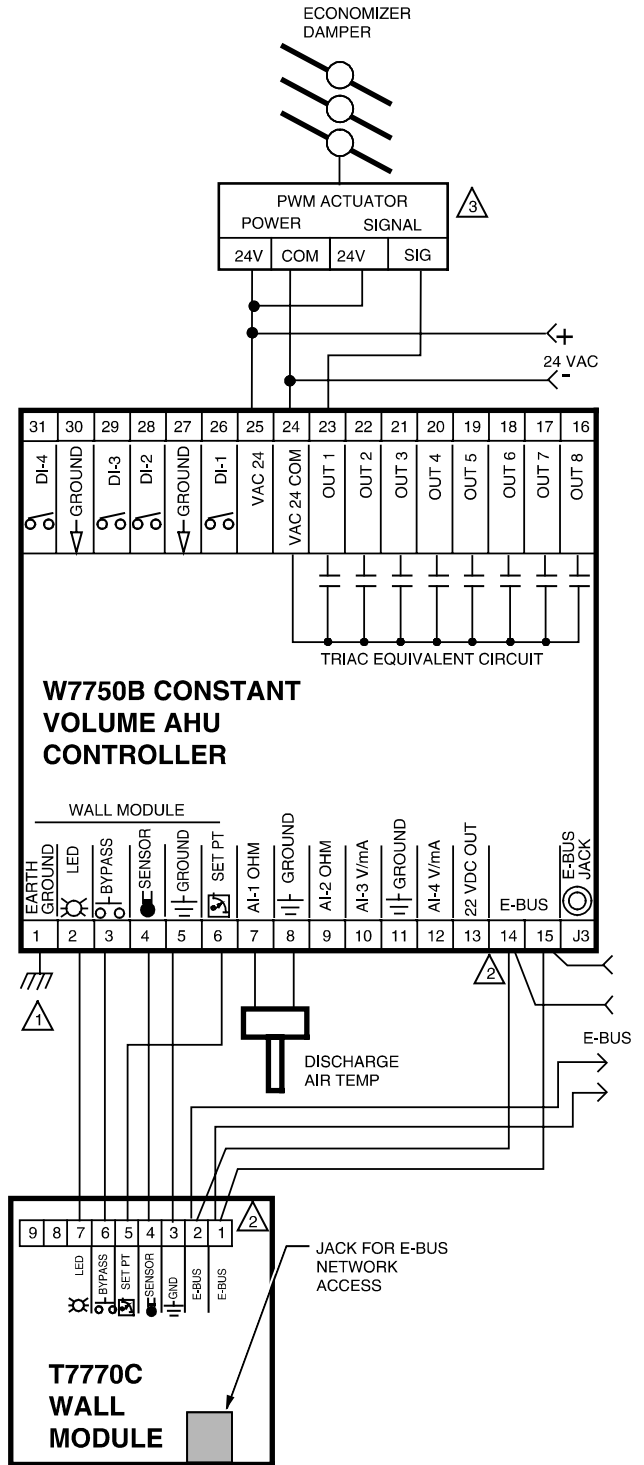
Fig. 12. W7750B Controller with staged heating and cooling wiring diagram. (For note 2, refer to Fig. 8.)



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.

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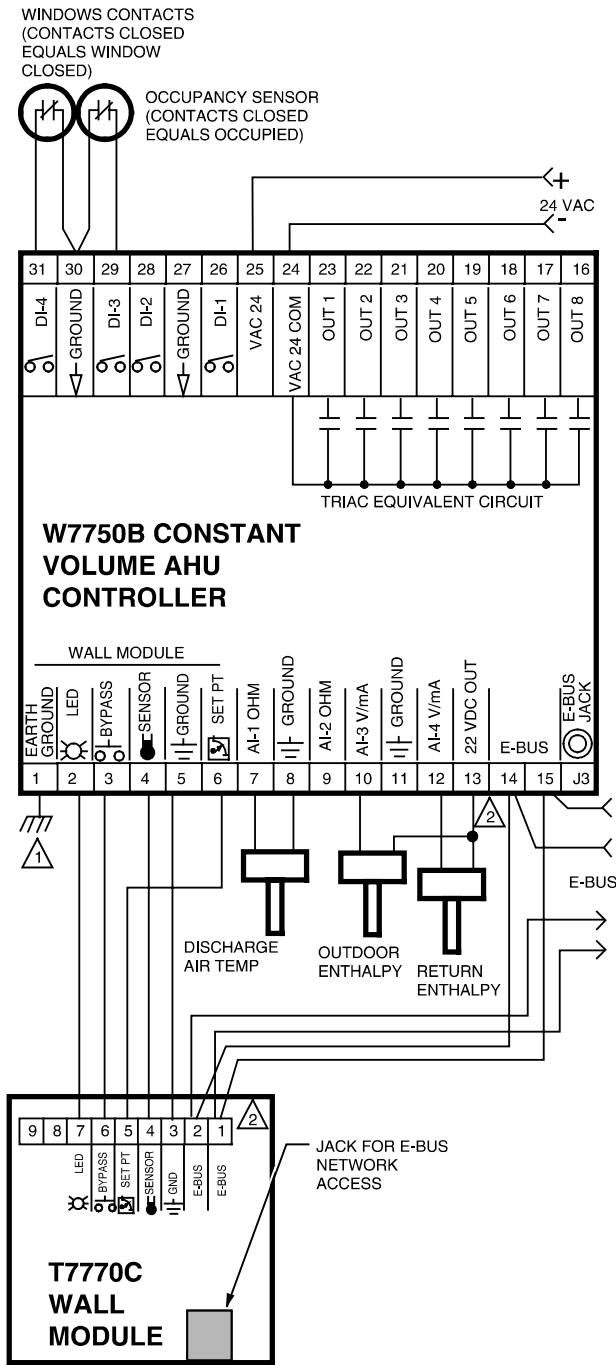
Fig. 13. W7750B Controller with floating heating, cooling and economizer wiring diagram. (For note 2, refer to Fig. 8.)



- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.
- 3 FOR WIRING DETAILS FOR PWM DEVICES, REFER TO DOCUMENTATION INCLUDED WITH PWM DEVICES.

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Fig. 14. W7750B Controller PWM damper actuator wiring diagram. (For note 2, refer to Fig. 8.)

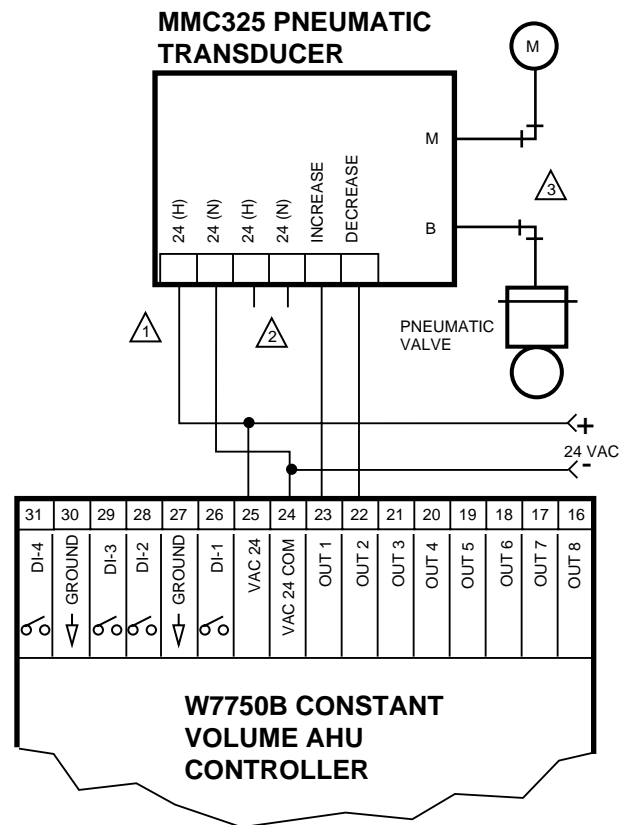


- 1 EARTH GROUND WIRE LENGTH SHOULD BE HELD TO A MINIMUM. USE THE HEAVIEST GAUGE WIRE AVAILABLE, UP TO 14 AWG (2.0 MM²) WITH A MINIMUM OF 18 AWG (1.0 MM²), FOR EARTH GROUND WIRE.
- 2 TO ASSURE PROPER ELECTRICAL CONTACT, WIRES MUST BE TWISTED TOGETHER BEFORE INSERTION INTO THE TERMINAL BLOCK.

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

See Fig. 16 to wire a pneumatic transducer to a W7750B.



- 1 MAKE SURE ALL TRANSFORMER/POWER WIRING IS AS SHOWN; REVERSING TERMINATIONS RESULTS IN EQUIPMENT MALFUNCTION.
- 2 OPTIONAL 24 VAC WIRING TO NEXT CONTROLLER.
- 3 USE 1/4 IN (6 MM) PNEUMATIC TUBING. MINIMUM BRANCH LINE MUST BE 6 FT. (1.8M) OR LONGER.

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Fig. 16. Pneumatic transducer to W7750B.

CHECKOUT

W7750A,B Checkout

Step 1. Check Installation and Wiring

Inspect all wiring connections at the W7750A,B 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. See Fig. 5. (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 (US 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 mm²) with a minimum of 18 AWG (1.0 mm²) for each controller in the group. See Fig. 4.

— Verify that Triac wiring to external devices uses the proper load power/24 Vac hot terminal (terminal 25 on the W7750B).

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 *E-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 E-Bus communications.

Step 2. Startup

W7750 Controller Status LED

The LED on the front and center of a W7750 Controller provides a visual indication of the status of the device, see Fig. 17. When the W7750 receives power, the LED should appear in one of the following allowable states:

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

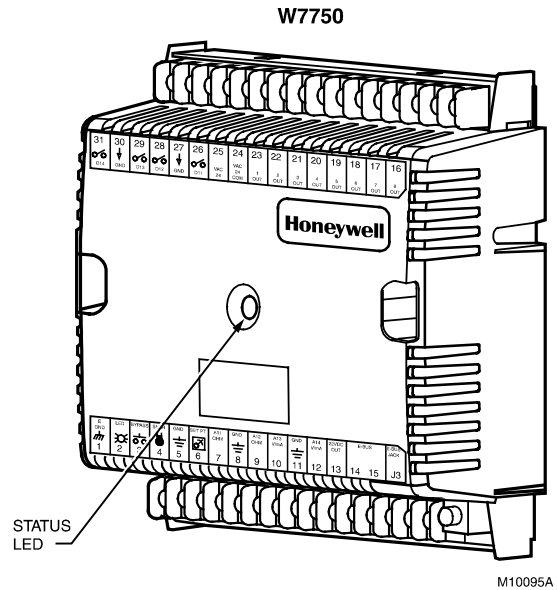


Fig. 17. LED location on W7750s.

Alarms

When an Excel 10 has an alarm condition, it reports it to the central node on the E-Bus (typically, the Excel 10 Zone Manager). See Table 1. The information contained in the alarm message follows.

Subnet Number: This is the E-Bus subnet that contains the Excel 10 node that has the alarm condition. Subnet 1 is on the Zone Manager side of the router; Subnet 2 is on the other side.

Node Number: This is the Excel 10 node that has the alarm condition (see Network Statics).

Alarm Type: The specific alarm being issued. An Excel 10 can provide the alarm types listed in Table 1.

Table 1. Excel 10 Alarms.

Name of Alarm or Error Bit	Alarm Type Number	Meaning of Alarm Code or Error Bit
RETURN_TO_NORMAL	128	Return to no alarm after being in an alarm condition. This code is added numerically to another alarm code to indicate that the alarm condition has returned to normal.
ALARM_NOTIFY_DISABLED	255	The alarm reporting was turned off by the nviManualMode. No more alarms are reported via nvoAlarm until nviManualMode turns on alarm reporting or upon application restart.
NO_ALARM	0	No alarms presently detected.
INPUT_NV_FAILURE	1	One or more NV inputs have failed while receiving an update within their specified FAILURE_DETECT_TIME.
NODE_DISABLED	2	The control algorithm stopped because the controller is in DISABLED_MODE, MANUAL, or FACTORY_TEST mode. No more alarms are reported via nvoAlarm and nvoAlarmLog when the controller is in the DISABLED_MODE. Alarms continue to be reported if the controller is in the MANUAL or FACTORY_TEST mode.
SENSOR_FAILURE	3	One or more sensors have failed.
FROST_PROTECTION_ALARM	4	The space temperature is below the frost alarm limit 42.8°F (6°C) when the mode is FREEZE_PROTECT. The alarm condition remains until the temperature exceeds the alarm limit plus hysteresis.
INVALID_SET_POINT	5	One of the Setpoints is not in the valid range or in the correct order.
LOSS_OF_AIR_FLOW	6	The air flow switch indicates that there is no air flow when the node is commanding the fan to run. The control is shut down and disabled until power is cycled or the node is reset. See NOTE 1 below. See nciConfig. ubFanFailTimeSO for more details.
DIRTY_FILTER	7	The pressure drop across the filter exceeds the limit and the filter requires maintenance. The control runs normally.

(continued)

Table 1. Excel 10 Alarms (Continued).

Name of Alarm or Error Bit	Alarm Type Number	Meaning of Alarm Code or Error Bit
SMOKE_ALARM	8	The smoke detector detected smoke and the node entered an emergency state.
IAQ_OVERRIDE	9	The indoor air quality sensor detected that the indoor air quality is poorer than the desired standard and additional outdoor air is being brought into the conditioned space.
LOW_LIM_ECON_CLOSE	10	The economizer has to close beyond the minimum position to prevent the discharge air temperature from going below the discharge temperature low limit.

NOTE 1: The node can be reset by switching the node to MANUAL and then switching to the normal operating mode.

Also, the Excel 10 variables, *AlarmLogX*, where X is 1 through 5, that store the last five alarms to occur in the controller, are available. These points can be viewed through XBS, XI584 or E-Vision.

Certain alarm conditions are suppressed conditionally as follows:

Broadcasting the Service Message

The Service Message allows a device on the E-Bus to be positively identified. The Service Message contains the controller ID number and, therefore, can be used to confirm the physical location of a particular Excel 10 in a building.

There are two methods of broadcasting the Service Message from an Excel 10 W7750 Controller. One uses a hardware button on the side of the controller (see Fig. 18). The other involves using the PC Configuration tool, as follows.

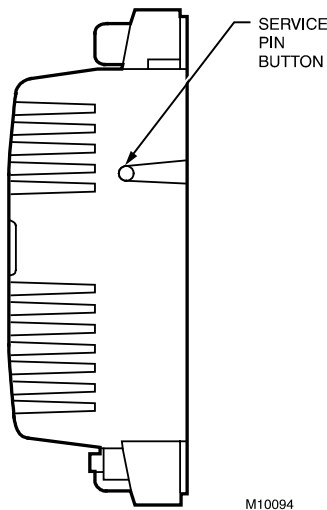


Fig. 18. Location of Service Pin Button.

When an *Assign ID* command is issued from the commissioning tool, the node goes into the SERVICE_MESSAGE mode for five minutes. In the SERVICE_MESSAGE mode, pressing the occupancy override button on the remote wall module causes the Service Message to be broadcast 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 broadcast the Service Message on the network by temporarily shorting the controller Bypass Input terminal to the Sensor Ground terminal on the W7750A,B short terminals 3 and 5.

Step 3. I/O Tests

The controller must be configured using the Excel 10 E-Vision 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. See the Excel 10 E-Vision User's Guide, form 74-2588, for details on configuring W7750 controllers.

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 User's Guide, form 74-2588, 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 Manual, form 74-2958.

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