

Excel 10

W7751H3007 VAV ACTUATOR

HONEYWELL EXCEL 5000 OPEN SYSTEM

INSTALLATION INSTRUCTIONS

BEFORE INSTALLATION

The W7751H Smart VAV Actuator consists of a factory-combined variable air volume (VAV) box controller and a direct-coupled damper actuator with de-clutch mechanism. The actuator/controller assembly is field-mounted to the VAV box damper shaft similar to the mounting of a standard actuator, and the controller wiring is terminated to the screw terminals accessible inside the detachable wiring box. See Fig. 2.

The built-in actuator with de-clutch mechanism of the W7751H allows the installer to manually open or close its built-in VAV box damper without power or software tool.

The W7751H contains a Free Topology Transceiver (FTT) LonMark® compliant controller containing a Microbridge flow-through pressure sensor and communicates via the 78 kbaud LONWORKS® Network.

The W7751H mounts directly onto the VAV box damper shaft and has up to 6 Nm torque, 95 degree stroke, and 110 sec. timing at 50 Hz and 90 sec at 60 Hz.

NOTE: Any hardware driven by the triac outputs must have a min. current draw, when energized, of 25 mA at 24 Vac and a max. current draw of 770 mA.

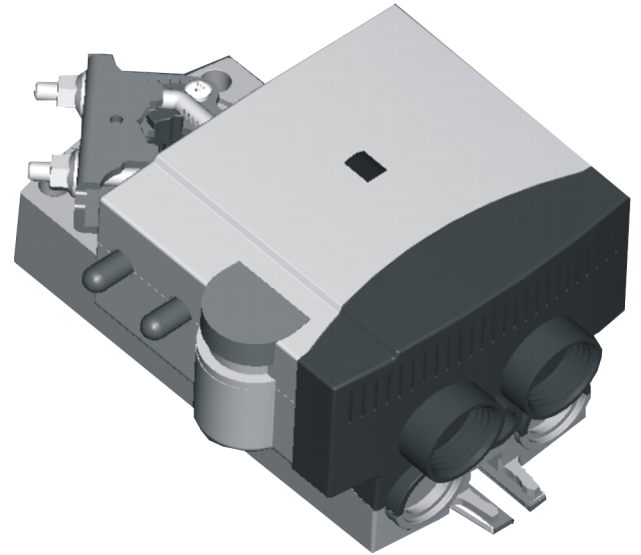


Fig. 1. Excel 10 Smart VAV Actuator

MAIN FEATURES

Legend for Fig. 2:

- 1) Universal shaft adapter
- 2) Mechanical end limits (manually adjustable in increments of 5.5°)
- 3) Air flow pick-up connector (-LO)
- 4) Air flow pick-up connector (-HI)
- 5) LONWORKS service LED
- 6) Declutch button
- 7) LONWORKS service pin
- 8) Detachable wiring box
- 9) Anti-rotation bracket

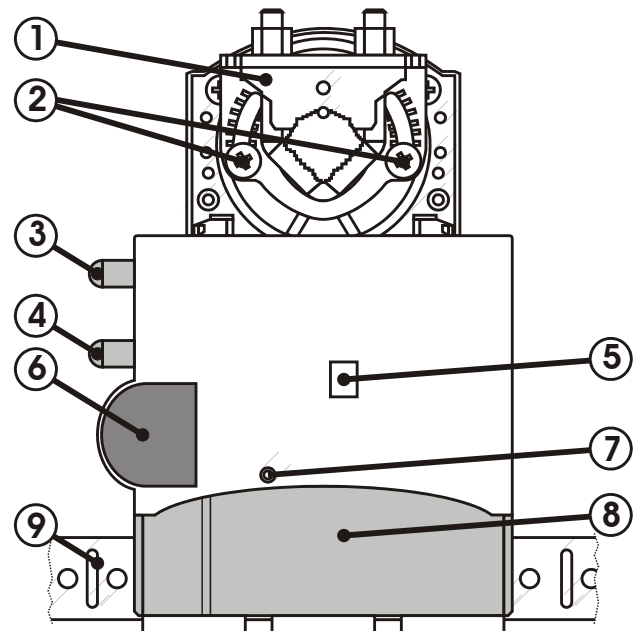


Fig. 2. W7751H main features

INSTALLATION

The W7751H provides IP40 in all mounting orientations.

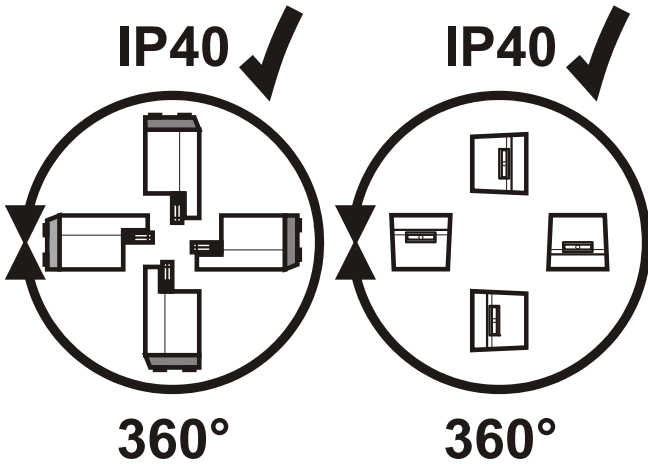


Fig. 3. Permissible orientations providing IP40

Mount the W7751H on the damper shaft and allow clearance for wiring, servicing, and module removal. Avoid mounting the W7751H in areas where acid fumes or other corrosive vapors can attack the actuator's metal parts, or in areas where escaping gas or other explosive vapors are present. See Fig. 23 for mounting dimensions.

The W7751H is field-mounted to the VAV box damper shaft. The W7751H actuator opens or closes a damper by driving the damper shaft in either the counterclockwise (CCW) or clockwise (CW) direction. If the W7751H is to be mounted directly onto a damper shaft, use the mounting bracket and screw included in the delivery.

The wiring of the W7751H is terminated to a screw terminal block accessible inside the detachable wiring box. See section "Wiring".

The W7751H is shipped in the fully counterclockwise (CCW) position (95 degrees). Mount the W7751H so that the actuator is parallel with the VAV box damper housing.

CAUTION

Equipment damage hazard.
Mounting actuator unevenly with damper housing can damage actuator.

Mount the actuator flush with the damper housing or add a spacer between the anti-rotation bracket and the VAV damper box housing (see Fig. 6).

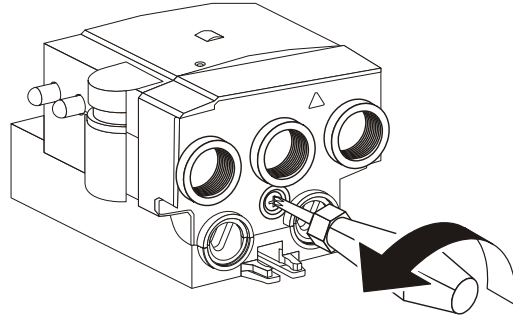


Fig. 4. Opening wiring box (1)

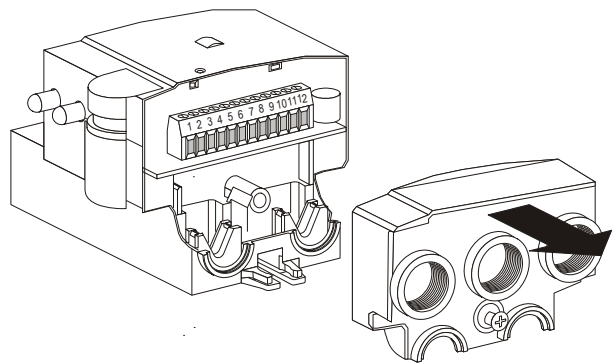


Fig. 5. Opening wiring box (2)

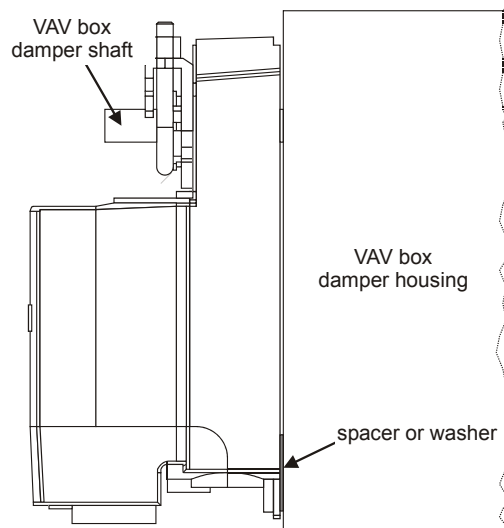


Fig. 6. Mounting W7751H with washer/spacer

Before mounting the W7751H onto the VAV box damper shaft, do the following:

1. Ensure that the diameter of the damper shaft is within the allowed limits (round: 8...16 mm, square: 6...13 mm).

2. Ensure that the damper shaft has a length of at least 40 mm.
3. Determine the direction (CW or CCW) in which the damper shaft rotates to open the damper (see Fig. 7).
4. Determine the angle of the damper opening (can be adjusted in increments of 5.5°).

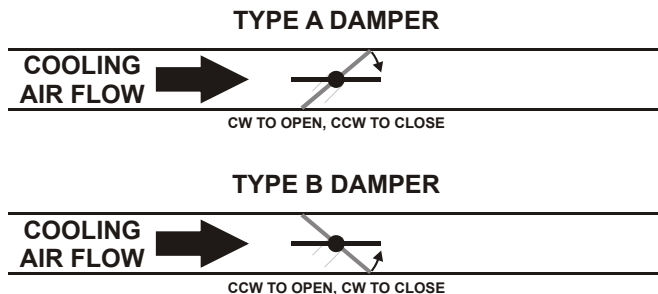


Fig. 7. Determining direction of rotation

The W7751H is shipped in the fully counterclockwise (CCW) position (95 degrees). The installation procedure varies depending on the damper direction.

NOTE: Be aware that, until the W7751H is powered and the damper is driven open, starting the fan system with all the VAV box dampers closed can cause duct over-pressurization and damage.

If Damper Rotates CW to Open

If the damper rotates clockwise (CW) to open, mount the W7751H as follows:

1. Manually open the damper.
2. Push down the declutch button of the W7751H, and while holding it down, manually rotate its shaft adapter fully to the clockwise position.
3. Mount the W7751H to the VAV damper box and shaft.
4. Set the mechanical end limits of the W7751H (see Fig. 8). When the W7751H closes, the damper will thus rotate CCW until the mechanical end limits are reached.

If Damper Rotates CCW to Open

If the damper rotates counterclockwise (CCW) to open, mount the W7751H as follows:

1. Manually open the damper.
2. Push the declutch button of the W7751H, and while holding it down, manually rotate its shaft adapter fully to the counterclockwise position.
3. Mount the W7751H to the VAV damper box and shaft.
4. Set the mechanical end limits of the W7751H (see Fig. 8). When the W7751H closes, the damper will thus rotate CW until the mechanical end limits are reached.

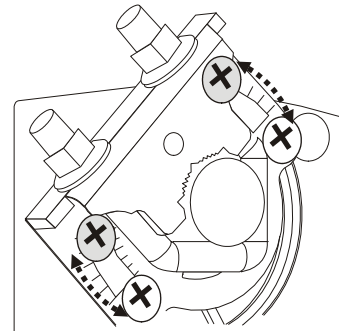


Fig. 8. Setting the mechanical end limits

Reconfiguring to Match Rotation Direction

Using the LNS plug-in, the W7751H can be reconfigured to match the direction the damper shaft rotates to open the damper. Reconfigure the damper's direction of rotation to "open" or "closed," according to your needs.

To change the damper direction from CW to CCW using the LNS plug-in, proceed as follows.

1. Open the configuration part of the plug-in and select the "Wiring" tab (see Fig. 9).

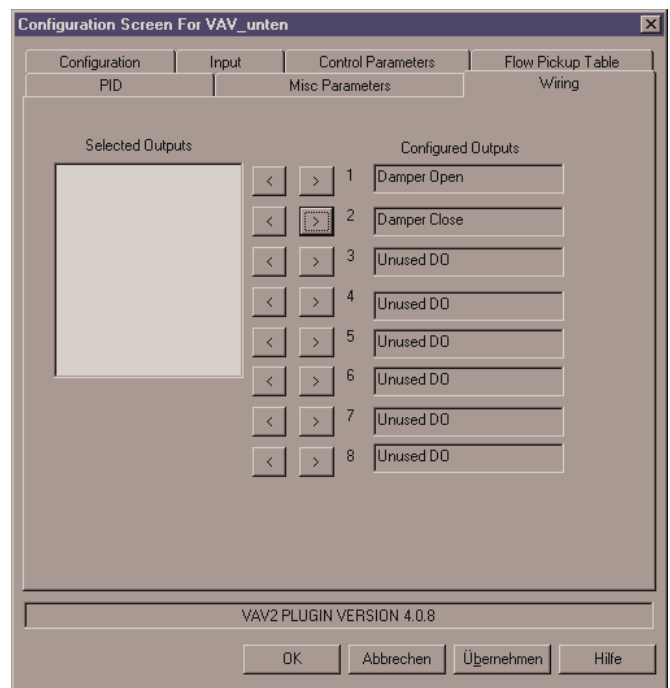


Fig. 9. Wiring tab (default configuration)

2. Then deselect the output configuration (see Fig. 10).

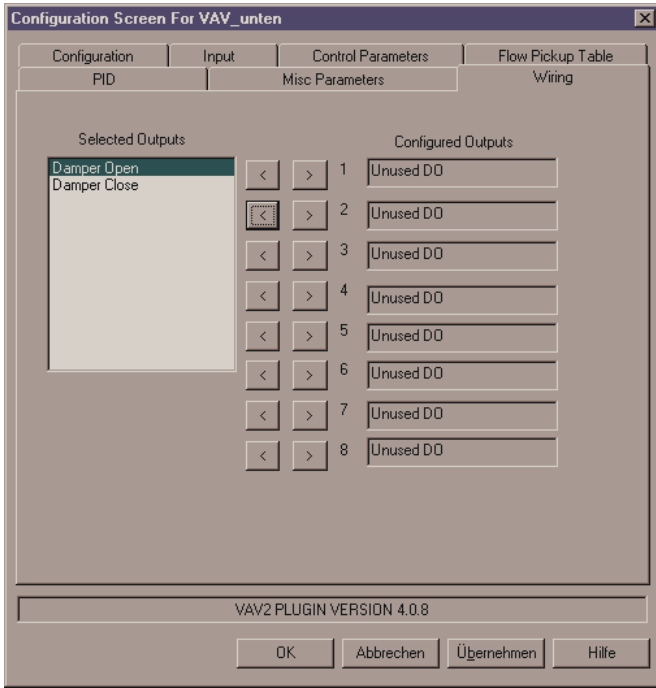


Fig. 10. Deselecting the output configuration

3. Now, configure the outputs so that the W7751H operates counterclockwise (CCW) (see Fig. 11).

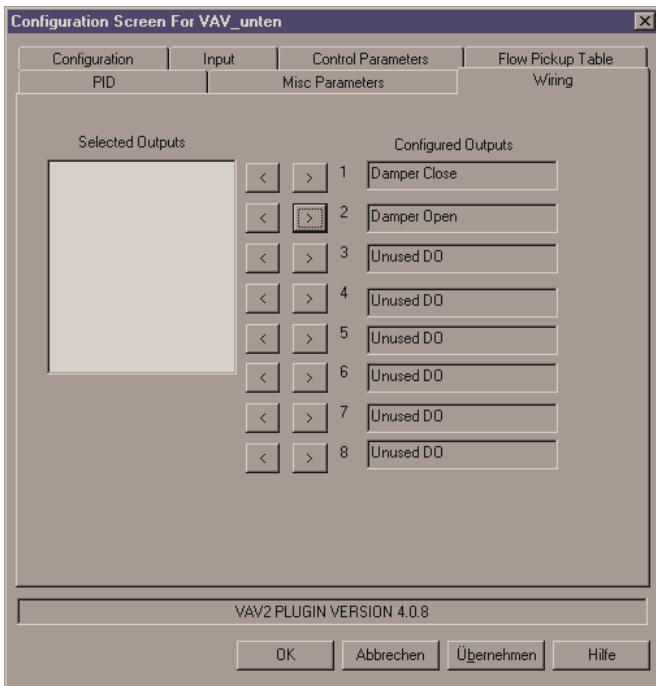


Fig. 11. Configuring the W7751H to open CCW

The damper direction has now been reconfigured.

IMPORTANT

It is recommended that the dampers be left in an "open" position after W7751H installation to avoid the possibility of over-pressurizing the ductwork on fan startup.

Use the de-clutch button to open the W7751H's box damper only after the W7751H has been powered down (this is to prevent over-pressurization in the ductwork on fan startup). To use the de-clutch button, press and hold down the button (this disengages the motor). Turn the damper shaft until the damper is open and then release the button. When power is restored to the W7751H, it synchronizes the damper actuator so that the damper is in the correct position on startup.

Air Flow Pick-up

Connect the air flow pick-up to the two connectors on the W7751H. See Fig. 12.

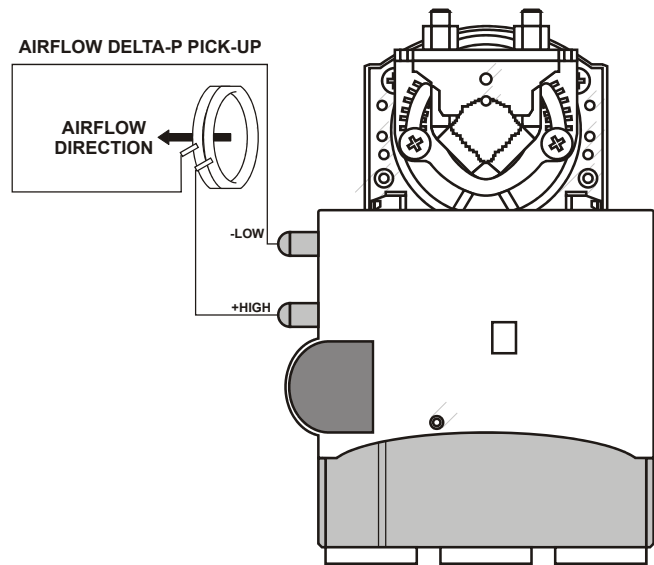


Fig. 12. Air flow pick-up connections

NOTES:

- Use 6-mm outside diameter with 1-mm wall thickness plenum-rated 1219 FR (94V-2) pneumatic tubing.
- Always use a fresh cut on the end of the tubing that connects to the air flow pick-ups and the connectors on the W7751H.

Connect the high pressure or upstream tube to the plastic restrictor labeled (+ HI) or P1 and the low-pressure or downstream tube to the restrictor labeled (- LO) or P2. See labeling in Fig. 12.

NOTE: If controllers are mounted in unusually dusty or dirty environments, a 5-micron disposable air filter is recommended for the high-pressure line (marked as +) connected to the air flow pick-up.

When twin tubing is used from the pick-up, split the pick-up tubing a short length to accommodate the connections.

NOTES:

- The tubing from the air flow pick-up to the W7751H should not exceed 0.914 m in length. Lengths much longer than this can degrade the flow sensing accuracy.

- To avoid damaging the air flow connectors, use caution when removing tubing from them. Always pull straight away from the connector; never remove by pulling at an angle.

Wiring

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

NOTES:

- 24 Vac power connections. Verify that multiple controllers powered by the same transformer are wired with the transformer secondary connected to the same input terminal numbers on each W7751. See Fig. 13. 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. For power wiring recommendations, refer to Excel 10 W7751B,D,F,H,J Variable Air Volume Controller – Application Guide (Product Literature No.: 74-2949).
- In the case of multiple W7751H units operating from a single transformer, the same side of the transformer secondary must be connected to the same input terminal in each W7751H and the ground terminals (terminal 3 of the W7751H) must be connected to a verified earth ground for each controller in the group. See Fig. 14. 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. For power wiring recommendations, refer to Excel 10 W7751B,D,F,H,J Variable Air Volume Controller – Application Guide (Product Literature No.: 74-2949).
- All loads on a W7751H must be powered by the same transformer that powers the W7751H.
- Keep the earth ground connection (terminal 3) wire run as short as possible. See Fig. 14.
- Do *not* connect the analog ground (terminal 5) to the earth ground. See Fig. 15.

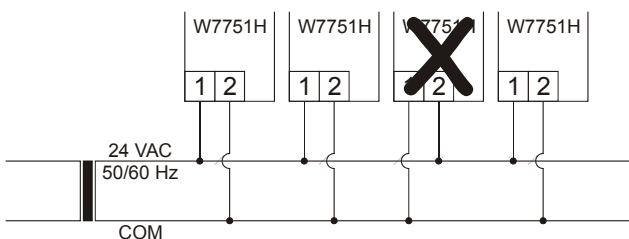


Fig. 13. Wiring multiple W7751 units (with transformer secondary connected to same input terminal numbers)

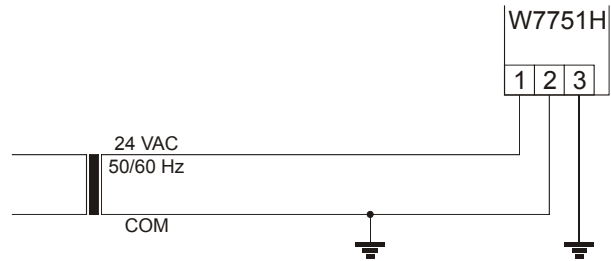


Fig. 14. Earth grounding

Power

The 24 Vac power from an energy-limited Class II Power Source must be provided to each W7751H. To conform to Class II restrictions, transformers must not be larger than 100 VA.

IMPORTANT

Power must be OFF prior to connecting to or disconnecting from output terminals 9 and 10.

Use the heaviest gauge wire available, up to 2.0 mm² with a minimum of 1.0 mm², for all power and earth ground wiring. For non-plenum, open areas, run cables exposed (or in conduit, if required).

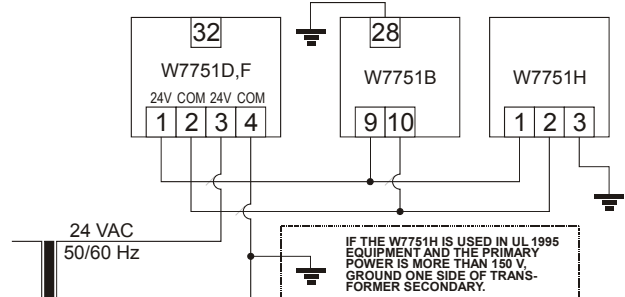


Fig. 15. Power wiring for multiple controllers

NOTES:

- Unswitched 24 Vac power wiring can be run in the same conduit as the LONWORKS® network cable.
- Maintain a 76-mm separation between triac outputs and LONWORKS® network wiring throughout the installation.

Communications

See Chapter "LonWorks System Engineering" of Excel 50/500 LonWorks Mechanisms – Interface Description (Product Literature No.: EN0B-0270GE51) for a complete description of LONWORKS® network topology rules.

Pull the cable to each device on the LONWORKS® network and connect to communication terminals 11 and 12 of the W7751H.

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 LONWORKS® network communications wiring is Level IV 0.34 mm² plenum or non-plenum rated unshielded, twisted pair, solid conductor wire. For non-plenum 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.
- Only one router is allowed with each Excel 10 Zone Manager, and each network segment can have a maximum of one repeater.
- Unswitched 24 Vac power wiring or sensor wiring can be run in the same conduit as the LONWORKS® network cable.
- Do not bundle output wires with sensor, digital input or LONWORKS® network wires.
- Ensure that neither LONWORKS® bus wire is grounded.
- 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 76 mm of separation between noisy lines and the LONWORKS® network cable.
- Do not use different wire types or gauges on the same LONWORKS® bus segment: Step changes in line impedance characteristics cause unpredictable reflections on the LONWORKS® bus.
- For LONWORKS termination, use an XAL-Term.

Verify Termination Module Placement

The installation wiring diagrams should indicate the locations for placement of termination module(s). See Chapter "LonWorks System Engineering" of Excel 50/500 LonWorks Mechanisms – Interface Description (Product Literature No.: EN0B-0270GE51). Correct placement of the termination module(s) is required for proper LONWORKS® network communications.

Wiring Details

Wire to the terminal blocks as follows:

1. Strip 5 mm insulation from the conductor
2. Insert the wire into the required terminal location and tighten the screw to complete the termination.

NOTE: 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).

NOTE: With the exception of 2.0 mm², if inserting two or more wires into one terminal location, use end sleeves. Deviation from this rule can result in improper electrical connection.

Fig. 16 through Fig. 21 provide detailed wiring diagrams for the W7751H. See the installation diagrams for specific wiring.

NOTE: Ensure that the wall module's Configuration DIP Switch is set as shown in Fig. 19. Switches 1 through

3 set the timing of the valve actuator to match the W7751H outputs (minimum of 0.1 s, with a max. time of 25.6 s). Switch 4 determines the action of the actuator (OFF = Direct Acting, ON = Reverse Acting).

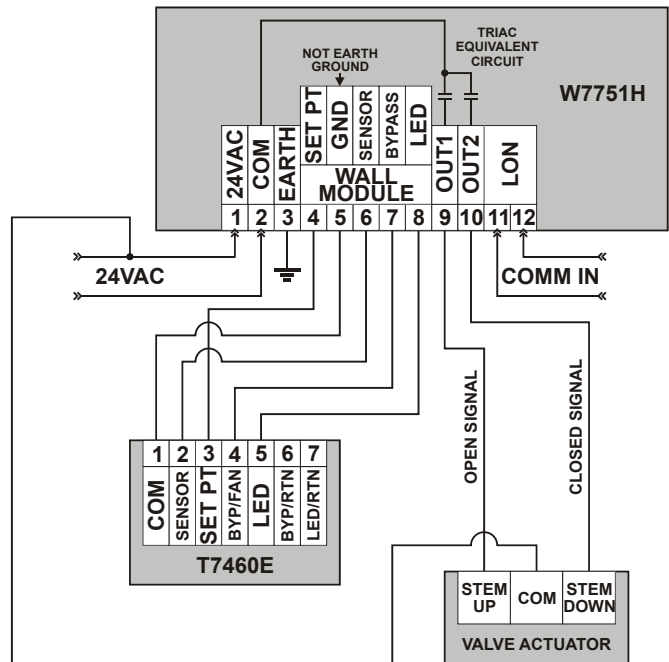


Fig. 16. W7751H modulating reheat valve wiring diagram

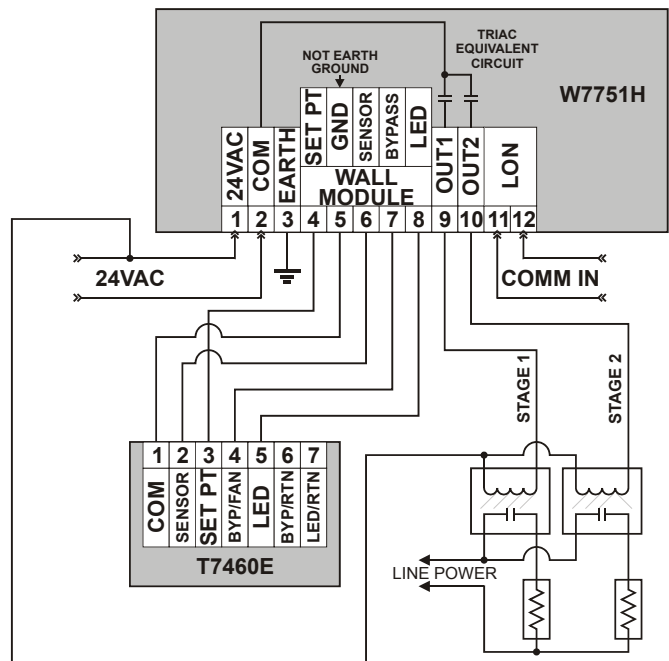


Fig. 17. W7751H two-stage reheat wiring diagram

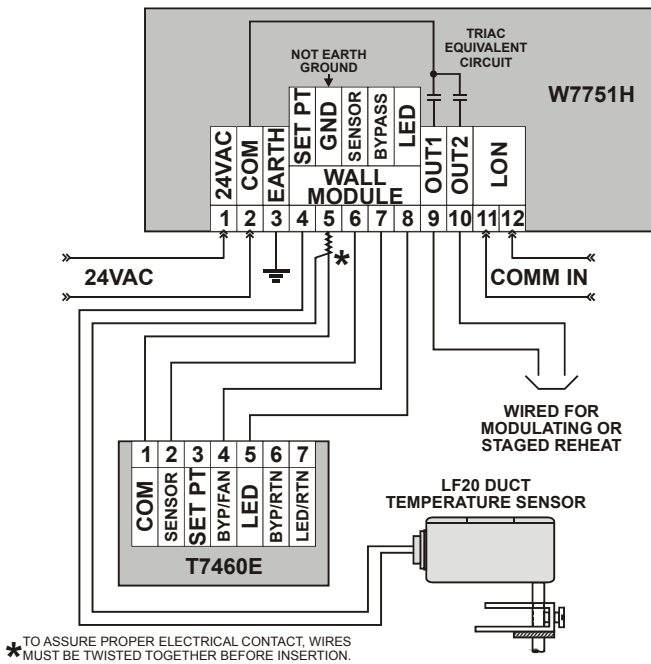


Fig. 18. W7751H discharge air sensing

CHECKOUT

Step 1. Wiring Connections

Inspect all wiring connections at the W7751H and the T7460 terminals, and verify compliance with installation diagrams. If any wiring changes are required, *first* be sure to remove power from the controller *before* starting work. Pay particular attention to:

- Controller wiring: Be sure that each W7751H is wired (terminal 3 on the W7751H) to a verified earth ground using a wire run as short as possible with the heaviest gauge wire available, up to 2.0 mm² with a minimum of 1.0 mm² for each controller in the group. See Fig. 15.
- Verify that triac wiring to external devices uses the proper load power/24 Vac terminal (terminal 1 on the W7751H).

NOTE: All wiring must comply with applicable electrical codes and ordinances. See the installation diagrams for specific wiring.

Step 2. Startup

Broadcasting the Service Message

The Service Message contains the device's ID number and can therefore be used to confirm the physical location of a particular W7751H in a building's LONWORKS® network. There are two methods for broadcasting the Service Message from the W7751H:

1. Operating the service pin on the W7751H: Insert a thin rod (e.g., paper clip) into the service pin hole (see Fig. 2) and push briefly; the Service Message will then be broadcast on the network.
2. Using the wall module bypass button: Pressing the wall module's bypass/override button for more than four seconds causes the W7751H to broadcast the Service

Message (supported in firmware version 1.2.15 and higher). When using this method, the occupancy override state of the W7751H changes depending upon how long the bypass/override button is pressed. For example, if the button is pressed for six seconds, the W7751H will broadcast the Service Message and also enter into the "continuous unoccupied" mode. To clear the "continuous unoccupied" mode, the button must be pressed briefly.

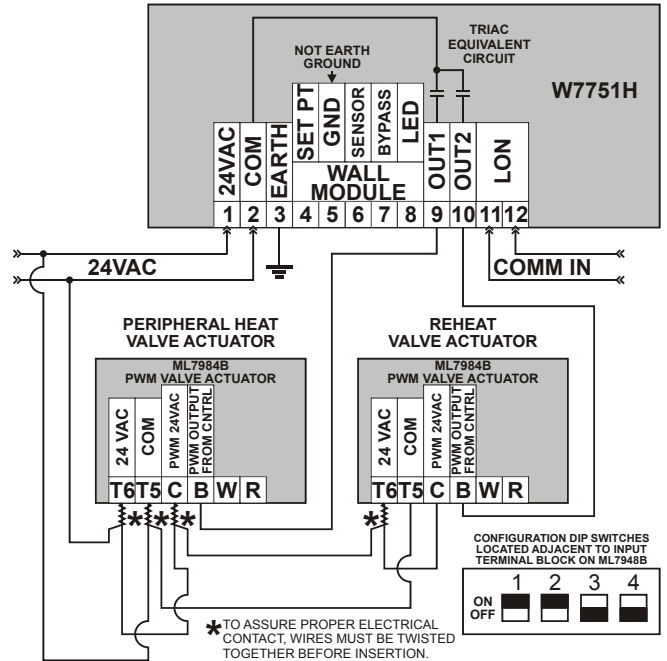


Fig. 19. W7751H to PWM Valve Actuator

NOTE: Ensure that all transformer wiring is as shown. Reversing terminations will result in equipment malfunction.

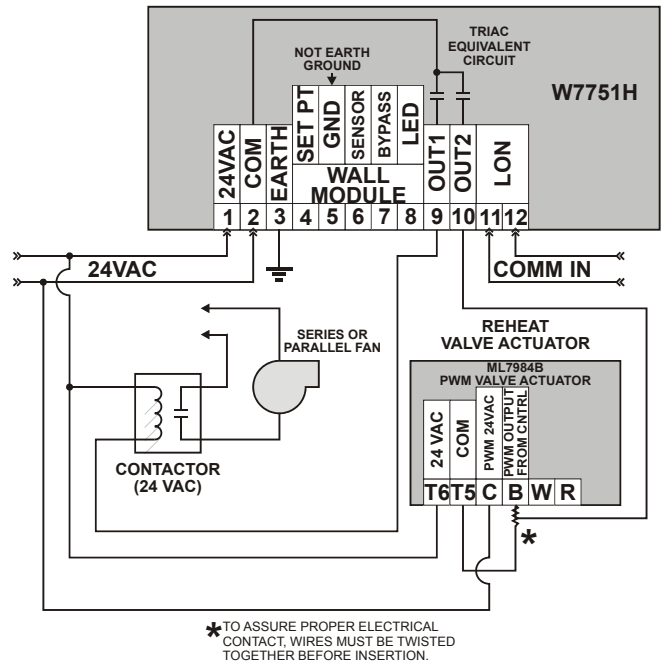


Fig. 20. W7751H to PWM Valve Actuator and series or parallel fan

Alarms

CARE is used to perform the ID Assignment task. Once ID Assignment has been performed and commissioning has been completed, check the LONWORKS service LED to determine if there are any alarms. Possible alarm causes can be determined by viewing the nvoAlarm, e.g., in CARE.

LONWORKS Service LED

The LONWORKS Service LED on the front of the W7751H (see Fig. 2) provides a visual indication of the status of the device. When the W7751H receives power, the LED appears 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 = the W7751H has an alarm condition.

When the W7751H has an alarm condition, it reports it to the central node on the LONWORKS® network (typically, the Excel 10 Zone Manager). Also, the W7751H 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 using XBS or the corresponding LNS plug-in. For a description of Excel 10 Alarms, refer to Table 12 of Excel 10 W7751B,D,F,H,J Variable Air Volume Controller – Application Guide (Product Literature No.: 74-2949)

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

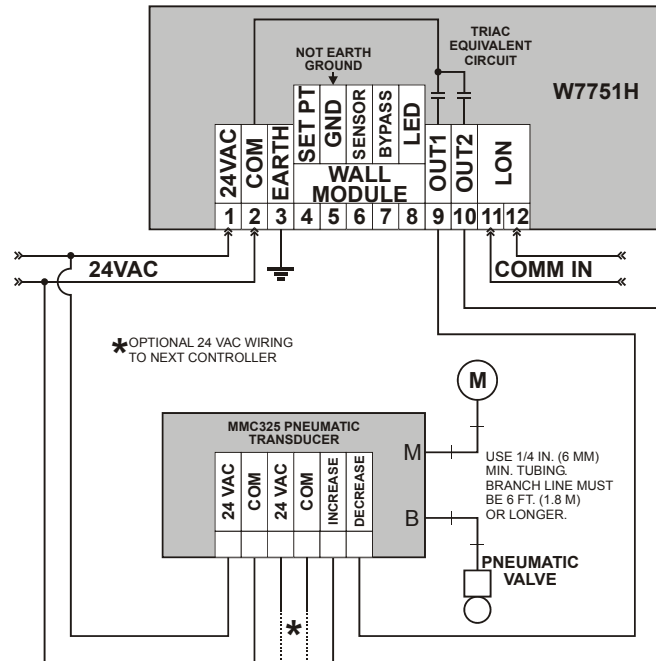


Fig. 21. W7751H to pneumatic transducer

NOTE: Reverse wires (INCREASE/DECREASE) to reverse action (DIRECT/REVERSE).

T7460 Wall Module Override LED

The remote override LED located on the T7460 Wall Module, will display the "manual override" mode of the W7751H. Possible modes are:

1. LED = OFF. No override active.
2. LED = Continuously ON. Bypass mode (timed occupied override).
3. LED = One flash per second. Continuous unoccupied override.
4. LED = Two flashes per second. Remote only, continuous occupied override.

T7560 Wall Module

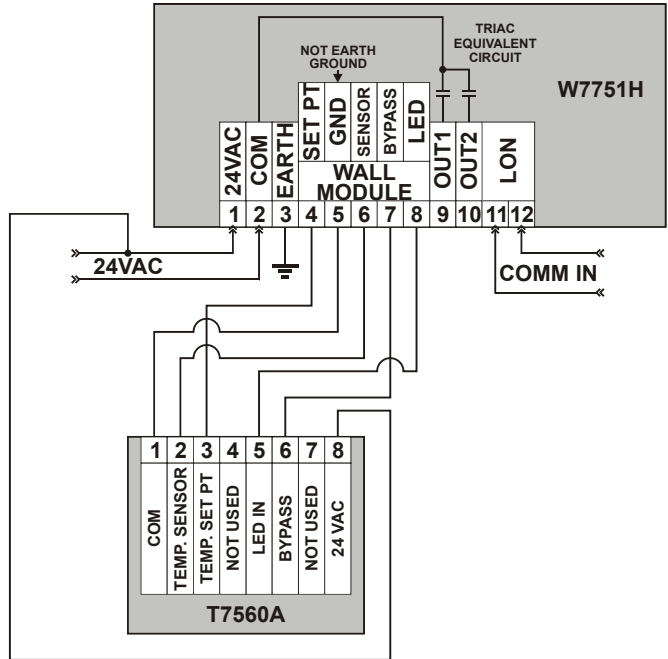


Fig. 22. W7751H to T7560A

NOTE: The parameter P4 of the T7560A must be set to "2".
 P4:2 LED override mode from controller, US signaling (100 ms pulses); with contr. W7750, W7751, W7753, W7761, and XL12

The W7751H supports a reduced command set, only:

- The "BYPASS" and the "UNOCCUPIED" commands are supported.
- The "OCCUPIED" command is not supported; rather, the "OCCUPIED" state is triggered, e.g., by TodEvent schedule.

When the W7751H is in the state "STANDBY" or "OCCUPIED," this not displayed by the T7560A.

Step 3. I/O Tests

The W7751H must be configured using the LNS plug-in. Once this is done, the W7751H can be commanded to the "manual" mode, and each output and input can be

exercised/viewed to verify proper wiring connections and equipment operation.

W7751H Checkout

To check out the W7751H, determine the direction the damper shaft moves to open the damper (CW or CCW). See Fig. 7.

Connect the W7751H with the laptop PC. To do this, the W7751H must be wired, powered, and connected to the portable PC via the LonTalk adapter. The LonTalk® Adapter connects to the W7751H either directly via the LONWORKS network or via the T7460-LONJACK (accessory available with the T7460 and T7560 Wall Modules). Using the LONWORKS® tool, you should then drive the W7751H actuator fully open and then closed. Observe the actuator's operation; if the damper is closed, it should begin to open. If the damper is open, it should begin to close.

If no movement is observed, check to see if 24 Vac is present at the W7751H. With proper wiring, with 24 Vac present, and with proper commands from the LNS plug-in, the actuator should operate properly.

Step 4. Verify Sequences of Operation

For the detailed descriptions of the sequences of operation, see Excel 10 W7751B,D,F,H,J Variable Air Volume Controller – Application Guide (Product Literature No.: 74-2949).

Optional Accessories

Spare Parts Kit

Order no.: A7211.2071. Contains:

- 1 anti-rotation bracket + screws
- 2 universal terminal blocks
- 2 strain-relief clamps
- 2 grommets*
- 2 adjustable end stops

*In order to guarantee IP54, only original Honeywell grommets may be used.



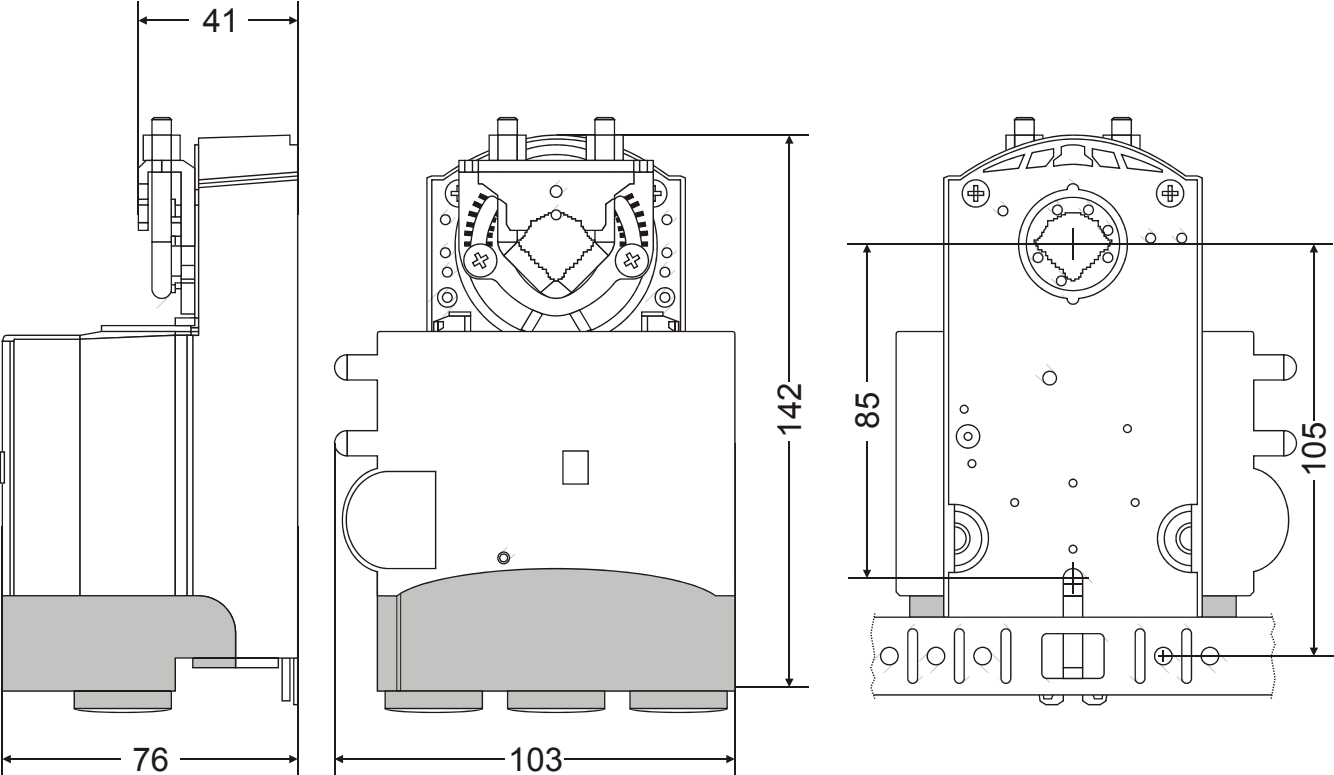


Fig. 23. Dimensions (in mm)

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