

## DPT-2015 Differential Pressure Transmitter for VAV Box Applications

### Installation

#### Parts Included

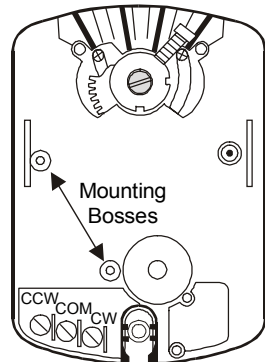
- DPT-2015 transmitter
- two No. 6 x 1/4 in. thread-forming Plastite® screws

### Mounting

#### On an M9104 or M9106 Actuator

Proceed as follows to mount the DPT-2015:

1. Align the two mounting holes located on the DPT-2015 with the mounting bosses located on the M9104 or M9106. (See Figure 1.)



**Figure 1: Two Mounting Bosses**

2. Attach the DPT-2015 to the actuator with the screws provided, using a No. 2 Phillips screwdriver.

**IMPORTANT:** Secure the nonslotted mounting hole on the DPT-2015 first, followed by the slotted hole to avoid stressing the transmitter's housing. Avoid overtightening the screws to avoid stripping the threads.

Note: Refer to the installation instructions packed with the M9104-AGx-2N or M9106-AGx-2N0x actuator to complete the actuator installation.

#### On an EDA-2040 Actuator

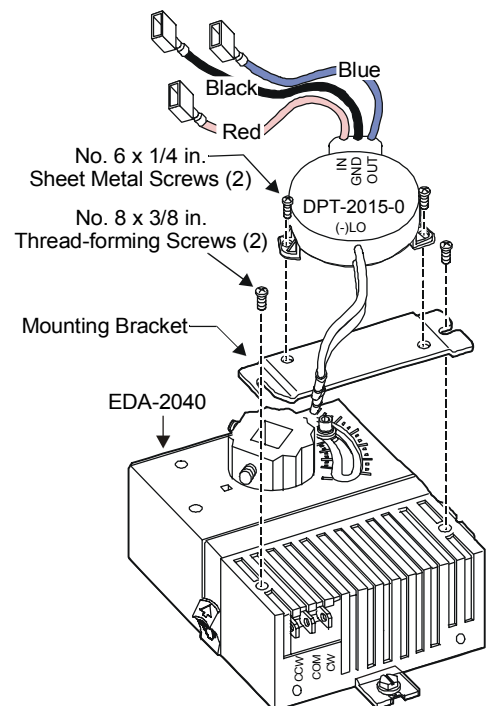
Use the DPT-2015-MNT Mounting Kit to replace a DPT-2000 or retrofit to the EDA-2040 without mounting bosses (date code prior to 9540).

To install the DPT-2015-MNT Mounting Kit:

Note: Skip Steps 1 and 2 if the DPT-2015-1 is already available.

1. Align the mounting holes on the DPT-2015 with the two inside mounting holes on the mounting bracket provided in the kit.
2. Attach the DPT-2015 to the mounting bracket with the two No. 6 x 1/4 in. sheet metal screws as shown in Figure 2, using a No. 2 Phillips screwdriver.

**IMPORTANT:** Secure the nonslotted mounting hole on the DPT-2015 first, followed by the slotted hole to avoid stressing the transmitter's housing.



**Figure 2: Using the Mounting Kit with the DPT-2015 on an EDA-2040**

- Mount the bracket to the mounting holes located on the EDA-2040 with the two No. 8 x 3/8 in. thread-forming Plastite screws, using a No. 2 Phillips screwdriver.

## Wiring

The DPT-2015 requires a 15 VDC power signal (14.5 to 17 VDC, unregulated) and provides a nominal 0.5 to 4.5 VDC control signal. It is compatible with a variety of controllers, including the Johnson Controls Variable Air Volume (VAV) Series controller.

**IMPORTANT:** All wiring must be in accordance with the National Electrical Code and applicable local code requirements.



### **WARNING: Risk of Electrical Shock.**

Disconnect all power supplies to the system before wiring the DPT-2015 to avoid possible electrical shock or damage to the equipment.

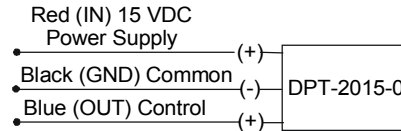
Refer to Table 1 and Figure 3 and proceed as follows to wire the DPT-2015:

- Wire the power common and signal common from the controller to the black, GND (Common) wire on the DPT-2015.
- Locate the power output terminal on the controller (or separate power supply), and wire it to the red, IN wire on the DPT-2015. The supply power must be between 14.5 and 17 VDC, unregulated.
- Locate the analog input terminal on the controller, and wire it to the blue, OUT wire on the DPT-2015.

**IMPORTANT:** Upon completion of wiring connections, make sure that the wires from the DPT-2015 are routed away from the coupler on the M9104 or M9106 actuator.

**Table 1: Wiring Connections**

DPT Wire Designation	Signal
IN (Red) +	Power (14.5 to 17 VDC)
GND (Black) -	Common
OUT (Blue) +	Control (0.5 to 4.5 VDC)



**Figure 3: DPT-2015 Wiring Diagram**

## Setup and Adjustments

### Air Pressure

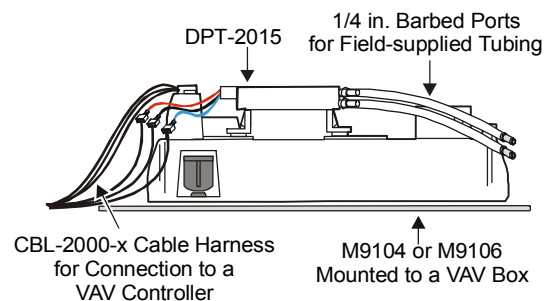
The flow pickup device, provided with the VAV box, must be connected to the DPT-2015 using field-supplied 1/4 in. O.D. tubing as follows:

- Cut two lengths of tubing and connect them to the flow pickup device.

**IMPORTANT:** Make sure the tubing is properly sized and made of an elastic material, such as silicone rubber, to ensure airtight connections and minimize flow measurement errors.

- Connect the tubing from the flow pickup device to the corresponding barbed high and low pressure ports on the DPT-2015.

Note: The low pressure port is indicated as (-)LO on the transmitter. (See Figure 4.)



**Figure 4: DPT-2015 Side View**



**CAUTION: Equipment Damage Hazard.**

Overpressure limit is 15 in. W.C. Do not blow into ports to test the operation as this may damage the sensing element.

**IMPORTANT:** Route the tubing so a portion of it is lower than the DPT-2015. This creates a trap that prevents any condensation from entering the transmitter. Do not make any sharp bends in the tubing. This could collapse the tube and block the pressure path.

To make sure the DPT-2015 is operating properly:

1. Perform the checkout procedure provided in the controller instructions.
2. Set up and zero the DPT-2015 using HVAC PRO™ software when the DPT-2015 is used with a Johnson Controls VAV controller. Refer to the *Variable Air Volume (VAV) Controller Technical Bulletin (LIT-6363040)* for details.

**IMPORTANT:** Perform final commissioning when the transmitter is at normal operating temperatures and mounted in its normal operating position.

### Troubleshooting

The DPT-2015 must be auto zeroed by the Johnson Controls VAV controller. If not operating properly:

1. Verify that the air lines on the DPT-2015 are connected to their respective high and low ports without kinks or leaks in the tubing.
2. Check voltage to ensure it is within the 14.5 to 17 VDC range and the polarity is correct.
3. Disconnect the air lines from the high and low ports, and place a voltmeter across Terminals OUT and GND. If the output is not between 0.4 and 0.6 volts with power applied to the DPT-2015 in the vertical position, the transmitter is defective and should be replaced.

Note: Voltage readings may vary by 0.1 volt if the transmitter is in the horizontal position.

### Airflow Measurement

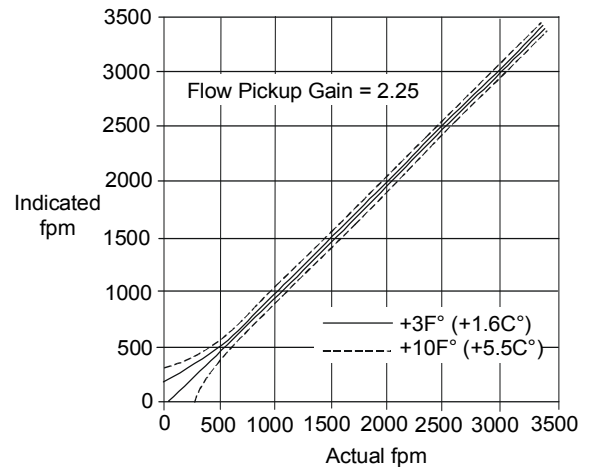
The DPT-2015 provides maintenance-free performance within the control range of 400 to 3,000 feet per minute (fpm) when used as recommended with the Johnson Controls VAV controller.

The minimum 400 fpm velocity and the gain of the airflow pickup produces an accurately measured pressure difference.

**IMPORTANT:** Where accuracy is important, VAV terminal inlets must be sized to maintain air velocity above 400 fpm to determine airflow volume by measuring differential pressure.

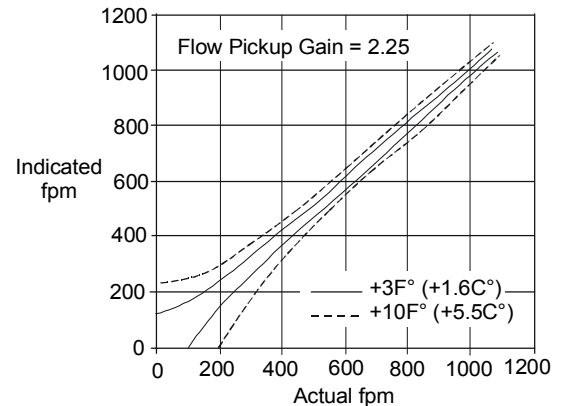
A velocity pressure of about 0.01 in. W.C. (2.49 Pa) is accepted as the lower limit measurement in VAV terminals. Pressure independent VAV terminals utilize an airflow pickup, which amplifies the airstream velocity pressure about 2.25 times, varying by manufacturer.

Figure 5 illustrates the typical accuracy of the measurement system consisting of the DPT-2015 and VAV controller for the conditions specified.



**Figure 5: Typical Accuracy of the DPT-2015**

At low flow, transmitter span and non-linearity errors have negligible impact on flow measurement accuracy, but the error envelope widens due to the temperature effect on transmitter offset. (See Figure 6.)



**Figure 6: Temperature Effect on DPT-2015**

The controller auto zero function helps reduce the temperature effect error by zeroing offset errors. When auto zero occurs daily, the remaining temperature effect error is the result of the 24-hour transmitter ambient temperature swing relative to the temperature at which the auto zero occurred.

The error envelope becomes smaller with increased airflow pickup gain and with smaller ambient temperature deviations at the transmitter location. Both charts show the error envelope for deviations of  $\pm 3F^{\circ}$  ( $\pm 1.6C^{\circ}$ ) and  $\pm 10F^{\circ}$  ( $\pm 5.5C^{\circ}$ ) from the temperature when auto zero occurred.

## Repairs and Replacement

Field repairs must not be made. For a replacement or an accessory, refer to the Ordering Information section in *DPT-2015 Differential Pressure Transmitter for VAV Box Applications Product Bulletin (LIT-216200X)*.

## Technical Data

<b>Product</b>	DPT-2015 Differential Pressure Transmitter for VAV Box Applications	
<b>Power Requirements</b>	15 VDC (14.5 to 17 VDC) unregulated, 15 mA maximum	
<b>Pressure Range</b>	0 to 1.5 in. W.C. (0 to 374 Pa) maximum	
<b>Overpressure Limit</b>	15 in. W.C. (3.74 kPa)	
<b>Output Voltage</b>	0.5 to 4.5 VDC into load impedance of 25,000 ohms minimum	
<b>Accuracy Linearity</b>	Linearity:	$\pm 1.0\%$ full span maximum
	Repeatability/Hysteresis:	$\pm 0.05\%$ full span maximum
<b>Position Effects</b>	Zero Shift:	$\pm 0.1$ VDC maximum
	Span Shift:	$\pm 0.05$ VDC maximum
<b>Stability (One Year)</b>	Zero Shift:	$\pm 0.5\%$ full span
	Span Shift:	$\pm 2\%$ full span
<b>Temperature Effects</b>	Zero:	$\pm 0.06\%$ of full span per $F^{\circ}$ maximum over 60 to 120 $^{\circ}F$ (15.6 to 49.0 $^{\circ}C$ ) range
	Span:	$\pm 1.5\%$ of full span maximum over 60 to 120 $^{\circ}F$ (15.6 to 49.0 $^{\circ}C$ ) range
<b>Power Supply Effects</b>	For power supply changes of 14.5 to 17.1 VDC, referenced to 15.0 VDC	
	Zero Shift:	$\pm 0.01$ VDC maximum
	Span Shift:	+0.02, -0.04 VDC maximum
<b>Terminals</b>	1/4 in. male spade terminals with 8 in. (203 mm) wire length	
<b>Pressure Connections</b>	6 in. (152 mm) length of silicone tubing with barbed fittings for 1/4 in. (6.35 mm) O.D. tubing	
<b>Ambient Operating Conditions</b>	32 to 140 $^{\circ}F$ (0 to 60 $^{\circ}C$ ) 90% RH maximum, non-condensing	
<b>Ambient Storage Conditions</b>	-22 to 185 $^{\circ}F$ (-30 to 85 $^{\circ}C$ ) 90% RH maximum, non-condensing	
<b>Dimensions (H x W x D)</b>	1.00 x 2.71 x 2.5 in. (25.4 x 68.8 x 63.5 mm)	
<b>Shipping Weight</b>	2.5 oz. (0.07 kg)	
<b>Agency Compliance</b>	UL 916 Listed, File E107041, CCN PAZX CSA C22.2, No. 205 Certified, File LR68965, Class 4812 05	

*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*



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