GB1, HB1 AND SB1 BLEED DIFFERENTIAL PRESSURE SENSOR INSTALLATION

OVERVIEW

This document provides the instructions necessary to install Bleed Differential Sensors. Bleed sensor mounting kits are available in five styles for virtually any installation application.

- Wall mounting kit (Figure 1 - P.N. 800-1240) is designed for through-the--wall measurement between adjacent spaces (wall thickness 5 to 8 inches (12.7 to 20.3 cm).
- Underfloor/floor mounting kit (Figure 2 - P.N. 800-1255) is ideal for floor panel installations through underfloor plenums.
- Underfloor/wall mounting kit (Figure 3 - P.N. 800-1260) is designed for wall mount applications located above an underfloor plenum.
- Ducted damper mounting kit (Figure 4 - P.N. 800-1245) is designed for duct mounted dampers that have access on both sides of the damper.
- Plenum damper mounting kit (Figure 5 - P.N. 800-1250) is designed for plenum mounted dampers or louvers.

Figure 1. Bleed Differential Pressure Sensor (shown with Wall Mount Kit 800-1240)

NOTE:

The maximum length of bleed tubing supplied in standard damper installation kits is 36 inches {91.4 cm}.

Figure 2. Underfloor/Floor Mounting Kit

Figure 3. Underfloor/Wall Mounting Kit

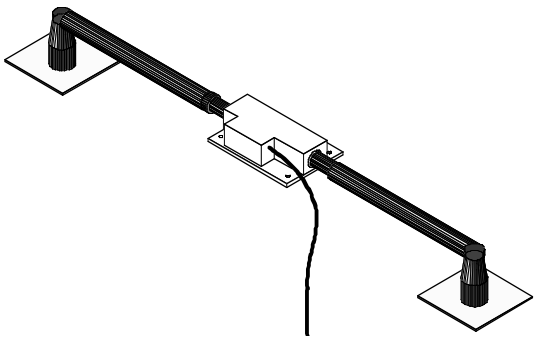


Figure 4. Ducted Damper Mounting Kit

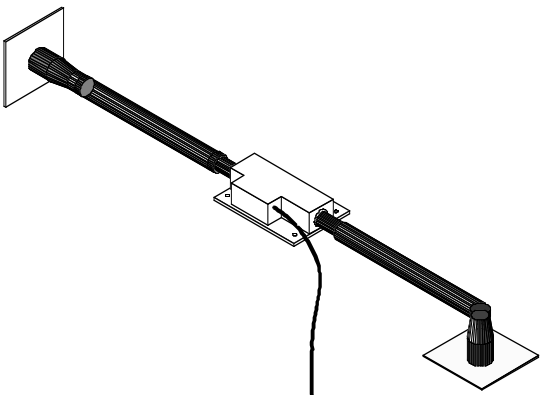


Figure 5. Plenum Damper Mounting Kit

The following are installation details for each of the five kits. For detailed application and sensor information, refer to the Bleed Sensor technical manual under separate cover. For detailed information on transmitter set up and operation of the complete airflow measurement station, refer to the associated transmitter technical manual under separate cover. Observe the following precautions during installation:

CAUTIONS/WARNINGS

Location of the probe(s) is critical for proper performance of the airflow station. Probes must be installed in accordance with the engineer's plans and ***EBTRON*** placement guidelines for the specified location. For probe placement detail, refer to the sensor/probe technical manual under separate cover.

Ensure that adequate installation/service clearance exists at the installation site to permit installation of the probes.Verify that the cable lengths supplied with the probes is sufficient to reach the planned transmitter installation.. Refer to the mechanical details of Figure 6 through 9 for each of the installation kits.

For specific installation questions, concerns or assistance, contact the ***EBTRON*** Applications Engineering Team at 800.2EBTRON (800.232-8766).

WALL MOUNT KIT INSTALLATION

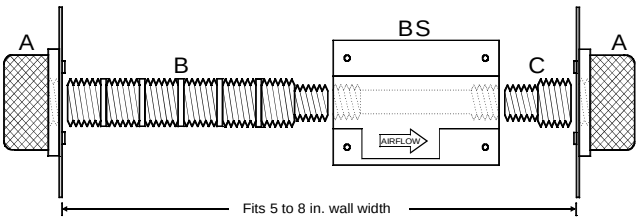
Figure 6 shows the Wall Mounting Kit components and installation detail between two adjacent spaces. Mount the bleed sensor so that the airflow directional arrow points from the high pressure side to the low pressure side of the installation.

The bleed sensor requires a 3 to 3.5 inch (76.2 to 88.9 mm) opening through the wall. Each opening is covered by the stainless steel face plates provided. The plates should be secured and sealed to the wall surface. If one pressure zone is exposed to rain or snow, a rain shield or louver (provided by others) must be used on the exterior wall surface to avoid water carry over into the sensor.

A standard 10 foot (3.048 m) plenum rated cable (up to 50 ft. [15.24 m] available) with terminal plug must be run to the ***EBTRON*** transmitter. For configuration and setup details, refer to the separate Transmitter Installation, Operation and Maintenance manual under separate cover.

Transmitter factory default output is uncorrected for friction and entry losses of the bleed sensor and mounting assembly. A 'K' factor can be applied to the uncorrected pressure or airflow to compensate for such losses. Select the K factor from Table 1 for the nominal operating pressure. To display the corrected pressure on Gold and Hybrid models with an LCD display, you must use the Kp factor method as outlined in the following paragraphs.

Wall Mount Kit Components



Label	Qty.	Description
A	2	4 in. x 4 in., 304 stainless steel face plate with protective mesh screen. Accepts 0.75 in. *(19.05 mm)* NPT male pipe or fitting.
B	1	0.75 in. *(19.05 mm)* NPT male x 0.5 in. *(12.7 mm)* NPT cut-off extension.
BS	1	Bleed sensor assembly.
C	1	0.75 in. *(19.05 mm)* NPT male x 0.5 in. *(12.7 mm)* NPT reducer fitting.

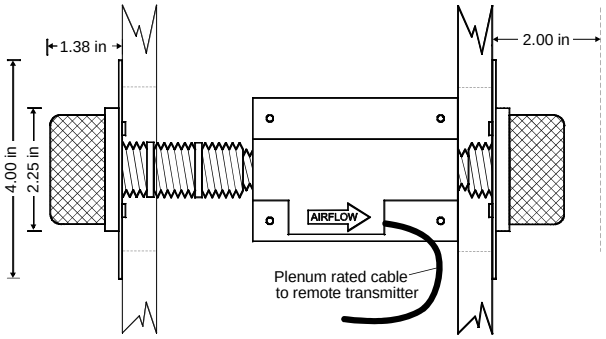


Figure 6. Wall Mount Installation Detail, Top View

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Converting to Actual Pressure

Converting Velocity: Kv Factor Method

Controlling airflow, rather than pressure, is the most accurate method for the determination of differential pressure on analog input control and data logging devices since pressure is proportional to the square of the velocity. Setup the transmitter to output bi-directional airflow. To correct for the losses in the host control system, take the square of the velocity divided by the Kv factor from Table 1 (i.e. **{airflow measured by the host control system / Kv }^{2}**). To indicate corrected pressure on devices with an LCD display, set the LCD units of measure to inWg (Pa for SI units) and enter Kp from Table 1. For transmitter configuration and setup details, refer to the Transmitter Installation, Operation and Maintenance technical manual under separate cover.

Converting Uncorrected Pressure: Kp Factor Method

Setup the transmitter to output bi-directional pressure. To correct for the losses in the host control system, scale the uncorrected pressure by the Kp factor from Table 1 (i.e. **Kp x uncorrected pressure measured by the host control system**). To indicate corrected pressure on devices with an LCD display, set the LCD units of measure to inWg (Pa for SI units) and enter Kp from Table 1. For transmitter configuration and setup details, refer to the Transmitter Installation, Operation and Maintenance technical manual under separate cover.

Converting Airflow or Uncorrected Pressure to Actual Pressure Using the Polynomial Method

The polynomial method is the most accurate method for converting to actual pressure when a wide range of pressure measurement is required. This method must be implemented in the host control system. Setup the transmitter to output bi-directional airflow and apply the polynomial values to the scaled output of the transmitter. To indicate the approximate corrected pressure on devices with an LCD display, set the LCD units of measure to inWg (Pa for SI units) and enter Kp for the nominal pressure from Table 1. For transmitter configuration and setup details, refer to the Transmitter Installation, Operation and Maintenance technical manual under separate cover.

Table 1. K Factors

Nominal Pressure (inWg)	K_v	K_p	Nominal Pressure (Pa)	K_v	K_p
0.0100	2241	3.192	2.4882	0.7217	3.192
0.0200	2460	2.651	4.9764	0.7920	2.651
0.0300	2523	2.521	7.4646	0.8122	2.521
0.0400	2583	2.405	9.9528	0.8316	2.405
0.0500	2661	2.265	12.4410	0.8569	2.265
0.1000	2854	1.969	24.8820	0.9190	1.969
0.2500	2977	1.810	62.2050	0.9585	1.810
0.5000	2992	1.792	124.4100	0.9633	1.792
0.7500	2962	1.828	186.6150	0.9538	1.828
1.0000	2963	1.828	248.8200	0.9539	1.828

Table 2. Polynomial Coefficients

		Corrected Pressure= $av^4+bv^3+cv^2+dv+e$, where v=abs{velocity}				
Absolute Pressure Range		a	b	c	d	e
inWg	0 to 0.04		-5.4994E-11	1.5905E-07	9.4889E-06	0.0000E+00
	0.04 to 0.125	-4.5700E-13	1.4573E-09	-1.6064E-06	8.8239E-04	-1.5593E-01
	0.125 to1.0	-2.6702E-15	2.1312E-11	6.7606E-08	1.4775E-05	1.9472E-02
Pa	0 to 10		-1.0444E-01	1.5341E+00	4.6486E-01	0.0000E+00
	10 to 30	-1.7088E-01	2.7676E+00	-1.5495E+01	4.3228E+01	-3.8800E+01
	30 to 300	-9.9843E-04	4.0473E-02	6.5210E-01	7.2384E-01	4.8450E+00

Note: Calculate polynomial coefficients using the absolute value of the velocity (i.e. unsigned) then apply the sign, positive or negative to the result.

UNDERFLOOR/WALL MOUNTING KIT INSTALLATION

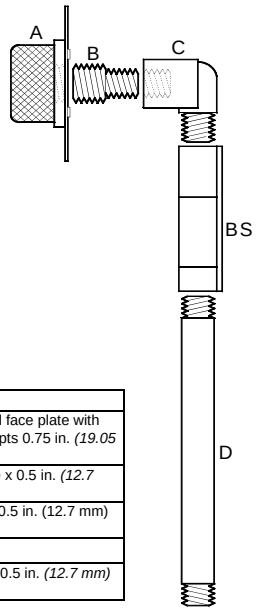
Figure 7 shows the Underfloor/Wall Mounting Kit components and installation details for underfloor systems through a floor plate.

As shown in Figure 7, mount the bleed sensor so that the airflow directional arrow points away from the floor (up). Drill a 1.0 inch *(25.4 mm)* hole through the base wall beam and floor where the bleed sensor will be mounted. The end of the tube should protrude slightly into the floor plenum. Secure the bleed sensor housing (BS) to a support beam or other suitable bracket so that the base of the sensor is approximately 2.25 inches *(57.2 mm)* from the interior wall surface (room side). The bleed sensor requires a 3 to 3.5 inch *(76.2 to 88.9 mm)* opening through the wall surface. The opening is covered by the stainless steel face plate (A) after the wall surface is installed. A standard 10 foot (3.048 m) plenum rated cable (up to 50 ft (15.24 m) available) with terminal plug must be run to the remotely mounted transmitter.

The transmitter can be set up to indicate uni-directional airflow. Maintain the airflow rate that corresponds to the desired actual pressure for proper operation of the underfloor diffusers (consult diffuser manufacturer for recommended pressure ranges). Controlling the airflow directly, rather than the pressure, will result in more stable control.

If desired, the transmitter can be set up to indicate pressure on the LCD display. Maintain the uncorrected pressure that corresponds to the desired actual pressure. Set Kp (in the transmitter setup) to display the corrected pressure on the LCD display. Refer to Table 4 for corrected setpoints. For specific configuration and setup details, refer to the Transmitter Installation, Operation and Maintenance manual under separate cover.

Underfloor Wall Mount Kit Components



Label	Qty.	Description
A	1	4 in. x 4 in., 304 stainless steel face plate with protective mesh screen. Accepts 0.75 in. *(19.05 mm)* NPT male pipe or fitting.
B	1	0.75 in. *(19.05 mm)* NPT male x 0.5 in. *(12.7 mm)* NPT reducer fitting.
C	1	0.5 in. (12.7 mm) NPT male x 0.5 in. (12.7 mm) NPT female right angle fitting.
BS	1	Bleed sensor assembly.
D	1	0.5 in. *(12.7 mm)* NPT male x 0.5 in. *(12.7 mm)* NPT x 8 in. *(203.2 mm)* pipe.

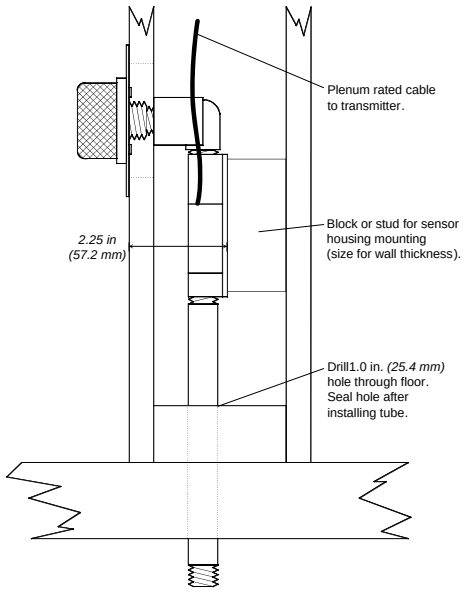


Figure 7. Underfloor Wall Mount Installation Detail

Table 4. Underfloor Wall Mount Control Setpoint Determination

Desired Floor Pressure (inWg)	Control Setpoint (transmitter output) Airflow (FPM)	Control Setpoint (transmitter output) Pressure (inWg)	K_p	Desired Floor Pressure (Pa)	Control Setpoint (transmitter output) Airflow (m/s)	Control Setpoint (transmitter output) Pressure (Pa)	K_p
0.0200	221.2	0.00305	6.556	4.98	1.12	0.76	6.556
0.0300	333.7	0.00694	4.321	7.46	1.69	1.73	4.321
0.0400	393.1	0.00964	4.151	9.95	2.00	2.40	4.151
0.0500	429.6	0.01150	4.346	12.44	2.18	2.86	4.346
0.0600	467.1	0.01360	4.410	14.93	2.37	3.39	4.410
0.0700	502.8	0.01576	4.442	17.42	2.55	3.92	4.442
0.0800	538.4	0.01807	4.427	19.91	2.73	4.50	4.427
0.0900	574.0	0.02054	4.381	22.39	2.92	5.11	4.381
0.1000	609.7	0.02317	4.315	24.88	3.10	5.77	4.315

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DUCTED DAMPER AND PLENUM DAMPER MOUNTING KITS

The following paragraphs detail installation of ducted and plenum relief and return damper control applications, and for minimum outside air applications.

Figure 8 shows the Ducted Damper Mounting Kit and installation details. For Ducted Damper kits, installation consists of drilling a 2 inch hole in the duct attached to each side of the damper, leaving enough space to mount the 4 inch stainless steel plate.

Similarly, as shown in Figure 9, Plenum Damper Mounting kit installation consists of drilling a 2 inch hole on one side of the damper (in the duct), and another 2 inch hole in the plenum on the other side.

Cut tubing to length and secure with the pipe clamps provided. Keep tubing straight to avoid kinks.

Setup the transmitter to output uni-directional airflow. (Refer to the Transmitter Installation, Operation and Maintenance manual under separate cover.)

Relief Damper Control (Relief Fan Systems)

Install the bleed sensor across the relief damper and open the damper to maintain an arbitrary positive flow or bleed pressure when relief is required at the AHU. Uncoupling the relief air damper from the outside air and recirculation dampers is an excellent way to get positive control of the relief air damper and avoid negative airflow through the relief flow circuit. Several of ***EBTRON***'s control strategies recommend the use of a bleed sensor to avoid negative airflow during switch over from minimum outside air to economizer modes, especially on multi-story buildings where stack pressure can be problematic.

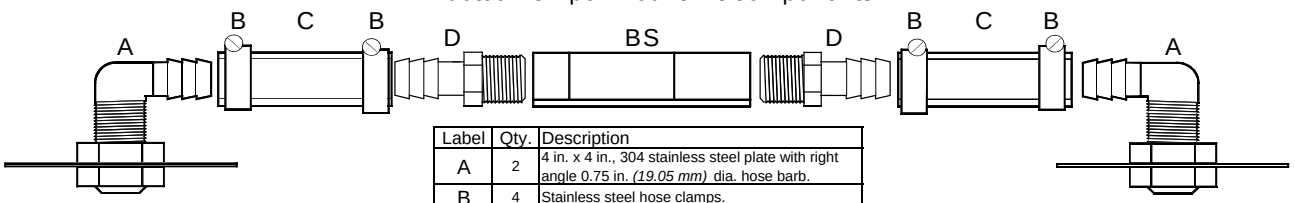
Return Damper Control (Relief Fan Systems)

Install the bleed sensor across the return damper and reset the maximum open position of the return damper to maintain a positive flow or bleed pressure when there is relief at the AHU. This method can avoid the short-circuit path between the outside air intake and relief fan that can occur when the return air damper is oversized.

Minimum Outside Air Control

For critical control of minimum outside air, contact the ***EBTRON*** Applications Engineering team at 800.2***EBTRON*** (800.232-8766).

Ducted Damper Mount Kit Components



Label	Qty.	Description
A	2	4 in. x 4 in., 304 stainless steel plate with right angle 0.75 in. *(19.05 mm)* dia. hose barb.
B	4	Stainless steel hose clamps.
C	3 ft.	0.75 in. *(19.05 mm)* dia. nylon reinforced tubing.
D	2	0.5 in. *(12.7 mm)* NPT male x 0.75 *in. (19.05 mm)* dia. hose barb fitting.
BS	1	Bleed sensor assembly.

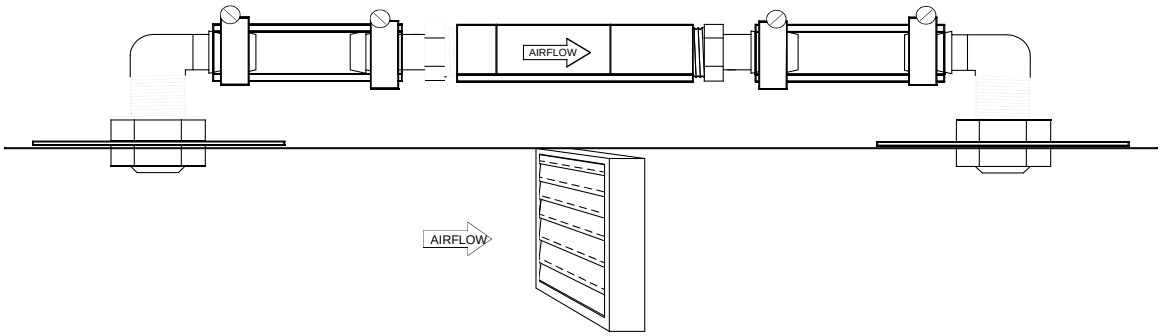
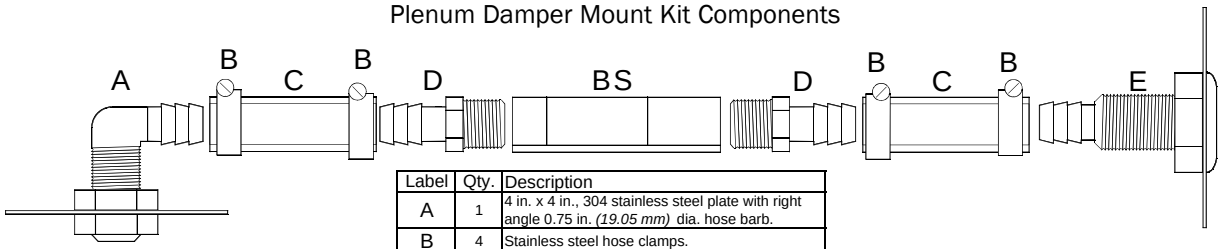


Figure 8. Ducted Damper Mount Installation Detail

Plenum Damper Mount Kit Components



Label	Qty.	Description
A	1	4 in. x 4 in., 304 stainless steel plate with right angle 0.75 in. *(19.05 mm)* dia. hose barb.
B	4	Stainless steel hose clamps.
C	3 ft.	0.75 in. *(19.05 mm)* dia. nylon reinforced tubing.
D	2	0.5 in. *(12.7 mm)* NPT male x 0.75 *in. (19.05 mm)* dia. hose barb fitting.
BS	1	Bleed sensor assembly.
E	1	4 in. x 4 in., 304 stainless steel plate straight 0.75 in. *(19.05 mm)* dia. hose barb.

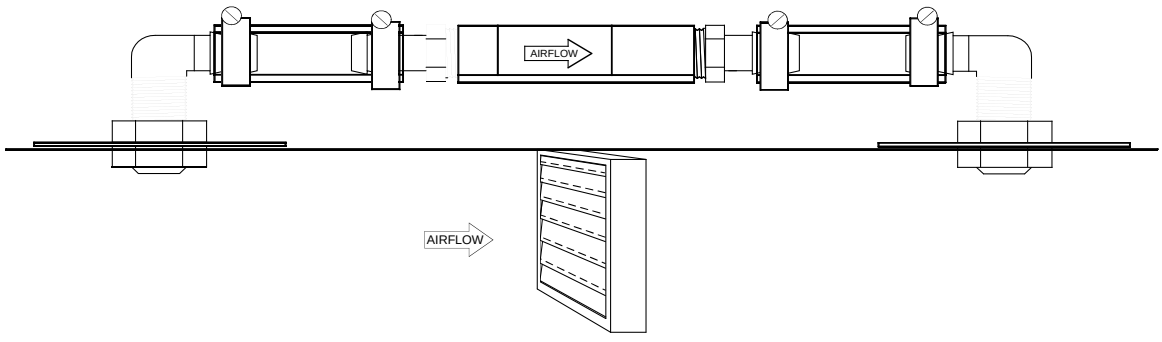


Figure 9. Plenum Damper Mount Installation Detail

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